Kawasaki

Ninja750R
GPX750R



Motorcycle
Service Manual

Quick Reference Guide

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

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

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

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EMISSION CONTROL INFORMATION

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

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

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

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

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

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

(Continued on next page.)

NOTE

○The phrase "remove or render inoperative any device or element of design" has been generally interpreted as follows:

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

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

TAMPERING WITH NOISE CONTROL SYSTEM PROHIBITED

Federal law prohibits the following acts or the causing thereof: (1) The removal or rendering inoperative by any person other than for purposes of maintenance, repair, or replacement, of any device or element of design incorporated into any new vehicle for the purpose of noise control prior to its sale or delivery to the 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.

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)



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.

Read OWNER'S MANUAL before operating.

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.

General Information

1

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Before Servicing

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

Especially note the following:

(1) Dirt

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

(2) Battery Ground

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

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

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

(c) damage to electrical parts.

(3) Tightening Sequence

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

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

(4) Torque

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

(5) Force

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

(6) Edges

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

(7) High Flash-point Solvent

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

(8) Gasket, O-ring

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

(9) Liquid Gasket, Non-permanent Locking Agent

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

(10) Press

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

(11) Ball Bearing

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

(12) Oil Seal and Grease Seal

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

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

(13) Seal Guide

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

(14) Circlip, Retaining Ring

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

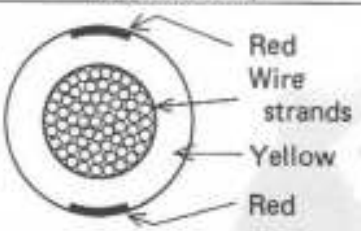
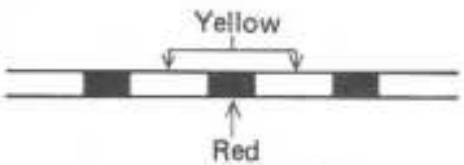
(15) Lubrication

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

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

(16) Electrical Wires

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

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

(17) Replacement Parts

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

(18) Inspection

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

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

(19) Service Data

Numbers of service data in this text have following meanings:

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

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

Model Identification

ZX750-F1 Left Side View:



ZX750-F1 Right Side View:



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	
Carburetor synchronization -- check †		•	•	•	•	•	•	•	
Idle speed -- check †		•	•	•	•	•	•	•	
Throttle grip play -- check †		•		•		•		•	
Spark plug -- clean and gap †			•	•	•	•	•	•	
Valve clearance -- check †		•		•		•		•	
Air suction valve (US) -- check †			•	•	•	•	•	•	
Air cleaner element -- clean		•		•		•		•	
Air cleaner element -- replace	5 cleanings					•			
Fuel system -- clean †				•		•		•	
Evaporative emission control system (Cal) -- check †		•	•	•	•	•	•	•	
Battery electrolyte level -- check †	month	•	•	•	•	•	•	•	
Brake light switch -- check †		•	•	•	•	•	•	•	
Brake pad wear -- check †			•	•	•	•	•	•	
Brake/clutch fluid level -- check †	month	•	•	•	•	•	•	•	
Brake/clutch fluid -- change	2 years					•			
Steering -- check †		•	•	•	•	•	•	•	
Drive chain wear -- check †			•	•	•	•	•	•	
Nut, bolt, fastener tightness -- check †		•		•		•		•	
Tire wear -- check †			•	•	•	•	•	•	
Engine oil -- change	year	•		•		•		•	
Oil filter -- replace		•		•		•		•	
General lubrication -- perform			•	•	•	•	•	•	
Front fork oil -- change								•	
Swing arm pivot, uni-trak linkage -- lubricate				•		•		•	
Coolant -- change	2 years							•	
Radiator hoses, connections -- check †	year	•		•		•		•	
Steering stem bearing -- lubricate	2 years					•			
Alternator belt -- adjust		•		•		•		•	
Master cylinder cup and dust seal -- replace	2 years								
Caliper piston seal and dust seal -- replace	2 years								
Clutch slave cylinder piston seal -- replace	2 years								
Brake/clutch hose and pipe -- replace	4 years								
Fuel hose -- replace	4 years								
Drive chain -- lubricate	Every 300 km								
Drive chain slack -- check †	Every 800 km								

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

Torque and Locking Agent

Tighten all bolts and nuts to the proper torque using an accurate torque wrench. In insufficiently tightened, a bolt or nut may become damaged or fall off, possibly resulting in damage to the motorcycle and injury to the rider. A bolt or nut which is overtightening may become damaged, strip an internal thread, or break and then fall out. The following table lists the tightening torque for the major bolts and nuts, and the parts requiring use of a non-permanent locking agent or liquid gasket.

When checking the tightening torque of the bolts and nuts, first loosen the bolt or nut by half a turn and then tighten to specified torque.

Fastener	Torque			Remarks
	N-m	kg-m	ft-lb	
Cooling System:				
Cooling Fan Switch	7.8	0.80	69 in-lb	
Water Temperature Sensor	15	1.5	11.0	L
Water Drain Plugs: Cylinder	7.8	0.80	69 in-lb	
Water pipe	7.8	0.80	69 in-lb	
Air Bleed Valve	7.8	0.80	69 in-lb	
Engine Top End:				
Cylinder Head Cover Bolts	9.8	1.0	87 in-lb	
Camshaft Sprocket Bolts	15	1.5	11.0	L
Camshaft Cap Bolts	12	1.2	8.5	
Valve Adjuster Locknuts	23	2.3	16.5	
Camshaft Chain Tensioner Bolts	12	1.2	8.5	
Chain Tensioner Cap Bolts	4.9	0.50	43 in-lb	
Cylinder Head Bolts	39	4.0	29	
Clutch:				
Clutch Spring Bolts	9.8	1.0	7.0	
Clutch Hub Nut	13.5	14	100	
Clutch Cover Damper Bolts	9.8	1.0	7.0	
Clutch Hose Banjo Bolts	29	3.0	22	
Clutch Lever Pivot Nut	5.9	0.60	52 in-lb	
Master Cylinder Clamp Bolts	8.8	0.90	78 in-lb	
Clutch Hose Joint Bolt	1.8	1.8	13.0	
Air Bleed Valve	7.8	0.80	69 in-lb	
Engine Lubrication System:				
Engine Oil Drain Plug	20	2.0	14.5	
Oil Filter Bolt	20	2.0	14.5	
Oil Hose Banjo Bolts	25	2.5	18.0	
Oil Pressure Switch	15	1.5	11.0	LG

Letters used in the "Remarks" column mean:
L : Apply a non-permanent locking agent to the threads.
LG : Apply liquid gasket to the threads.
S : Tighten the fasteners following the specified sequence.

Fastener	Torque			Remarks
	N-m	kg-m	ft-lb	
Oil Pressure Relief Valve	15	1.5	11.0	L
Oil Pump Bolts	12	1.2	8.5	L
Oil Pump Holder Bolts	12	1.2	8.5	L
Oil Pump Sprocket Bolt	9.8	1.0	7.0	L
Oil Pan Bolts	12	1.2	8.5	
Oil Bleether Cover Bolts	12	1.2	8.5	
Engine Removal/Installation:				
Engine Mounting Bolts	44	4.5	33	
Engine Bracket Bolts	19	1.9	13.5	
Crankshaft/Transmission:				
Connecting Rod Big End Cap Nuts	36	3.7	27	
Starter Motor Clutch Allen Bolts	12	1.2	8.5	L
Idler Shaft Chain Guide Allen Bolts (Upper and Lower)	12	1.2	8.5	L
Idler Shaft Pulley Bolt	39	4.0	29	
Crankcase Bolts: (6 mm)	12	1.2	8.5	L
(8 mm)		2.8		
Shift Return Spring Bolt		2.5		L
Shift Drum Bearing Holder Allen Bolts				
Shift Rod Holder Allen Bolts				L
External Shift Mechanism Cover Screws: 2 screws only at rear ward				L
Shift Pedal Pivot Bolt	49	5.0	36	
Neutral Switch	15	1.5	11.0	
Wheels/Tires:				
Front Axle Nut	88	9.0	65	
Front Axle Holder	21	2.1	15.0	
Rear Axle Nut	110	11.0	80	
Air Valve Nut	1.5	0.15	13	
Final Drive:				
Engine Sprocket Bolts	98	10	72	
Rear Sprocket	86	8.8	64	
Brakes:				
Caliper Holder Bolts: (Front)	33	3.3	25	
(Rear)	34	3.5	25	
Brake Hose Banjo Bolts	29	3.0	22	
Disc Mounting Allen Bolts	23	2.3	16.5	
Brake Lever Pivot Nut	5.9	0.60	52 in-lb	
Front Master Cylinder Mounting Bolts	8.8	0.90	78 in-lb	

Fastener	Torque			Remarks
	N-m	kg-m	ft-lb	
Torque Link Nut	19	1.9	13.5	
Rear Master Cylinder Mounting Bolts	23	2.3	16.5	
Air Bleed Valve	7.8	0.80	69 in-lb	
Suspension:				
Front Fork:				
Fork Clamp Bolts (upper and Lower)	21	2.1	15.0	
Outer Tube Bottom Allen Bolts	21	2.1	15.0	
Front Axle Holder	21	2.1	15.0	
Rear Shock Absorber:				
Shock Absorber Mounting Bolts and Nut (Upper and Lower)	59	6.0	43	
Uni-trak:				
Tie-rod Mounting Bolts, Nuts	59	6.0	43	
Rocker Arm Mounting Bolt, Nuts	59	6.0	43	
Swing Arm Pivot Nuts	88	9.0	65	
Steering:				
Steering Stem Head Nut	39	4.0	29	
Steering Stem Nut	4.9	0.50	43 in-lb	
Handlebar Holder Allen Bolts	19	1.9	13.5	
Frame:				
Rear Frame Mounting Bolts: (Upper)	19	1.9	13.5	
(Lower)	44	4.5	33	
Electrical System:				
Spark Plugs	14	1.4	10.0	
Pickup Rotor Allen Bolts 25	2.5	18.0		
Alternator Pulley Bolt	110	11	80	
Alternator Belt Cover Bolts: (Front)				
(Rear)	4.9	0.50	43 in-lb	
Alternator Belt Side Cover Bolts	4.9	0.50	43 in-lb	
Water Temperature Sensor	15	1.5	11.0	
Cooling Fan Switch	7.8	0.80	69 in-lb	
Neutral Switch	15	1.5	11.0	
Oil Pressure Switch	15	1.5	11.0	

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 – 39	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

General Specifications

Items		ZX750-F1
Dimensions:		
Overall length		2 170 mm, (C)(SA)(U) 2 115 mm
Overall width		715 mm
Overall height		1 185 mm
Wheelbase		1 460 mm
Road clearance		150 mm
Seat height		775 mm
Dry weight		1 912 N (195 kg), (Cal) 1 917 N (195.5 kg)
Curb weight:	Front	1 079 N (110 kg), (Cal) 1 084 N (110.5 kg)
	Rear	1 108 N (113 kg)
Fuel tank capacity		21.0 L
Performance:		
Climbing ability		30°
Braking distance		12.5 m from 50 km/h
Minimum turning radius		3.0 m
Engine:		
Type		4-stroke, DOHC, 4-cylinder
Cooling system		Liquid-cooled
Bore and stroke		68.0 x 51.5 mm
Displacement		748 mL
Compression ratio		11.2
Maximum horsepower		78.0 kW (106 PS) @10 500 r/min (rpm), (A) 77.2 kW (105 PS) @10 000 r/min (rpm) (B)(G)(SP) 73.6 kW (100 PS) @10 500 r/min (rpm) (W) 38.2 kW (52 PS) @6 000 r/min (rpm) (F) 75.1 kW @10 500 r/min (rpm)
Maximum torque		76.5 N-m (7.8 kg-m, 56.4 ft-lb) @8 500 r/min (rpm) (B)(G)(SP) 70.6 N-m (7.2 kg-m, 52.1 ft-lb) @8 500 r/min (rpm) (W) 61.8 N-m (6.3 kg-m, 45.6 ft-lb) @5 500 r/min (rpm)
Carburetion system		Carburetors, Keihin CVK34 x 4
Starting system		Electric starter
Ignition system		Battery and coil (transistorized)
Timing advance		Electronically advanced
Ignition timing		From 10° BTDC @1 000 r/min (rpm) to 35° BTDC @3 500 r/min (rpm)

(Continued on next page.)

Items			ZX750-F1
Spark plug			NGK DR8ES or ND X27ESR-U
			Ⓒ NGK DR8ES-L or ND X24ESR-U
			ⒶⓈⒶⒾ NGK D9EA or ND X27ES-U
			Ⓤ NGK D8EA or ND X24ES-U
Cylinder numbering method			Left to right, 1-2-3-4
Firing order			1-2-4-3
Valve timing:	Inlet	Open	35° BTDC
		Close	65° ABDC
		Duration	280°
	Exhaust	Open	65° BBDC
		Close	35° ATDC
		Duration	280°
Lubrication system			Forced lubrication (wet sump with cooler)
Engine oil:	Grade		SE class
	Viscosity		SAE10W40, 10W50, 20W40, or 20W50
	Capacity		3.8 L
Drive Train:			
Primary reduction system:			
	Type		Gear
	Reduction ratio		1.732 (97/56)
Clutch type			Wet multi disc
Transmission:	Type		6-speed, constant mesh, return shift
	Gear ratios:	1st	2.923 (38/13)
		2nd	2.125 (34/16)
		3rd	1.666 (35/21)
		4th	1.380 (29/21)
		5th	1.217 (28/23)
		6th	1.083 (26/24)
Final drive system:			
	Type		Chain drive
	Reduction ratio		2.937 (47/16)
Overall drive ratio			5.512 @Top gear
Frame:			
Type			Tubular, double cradle
Caster (rake angle)			27°
Trail			97 mm
Front tire:	Type		Tubeless
	Size		110/90 V16
Rear tire:	Type		Tubeless
	Size		140/70 V18

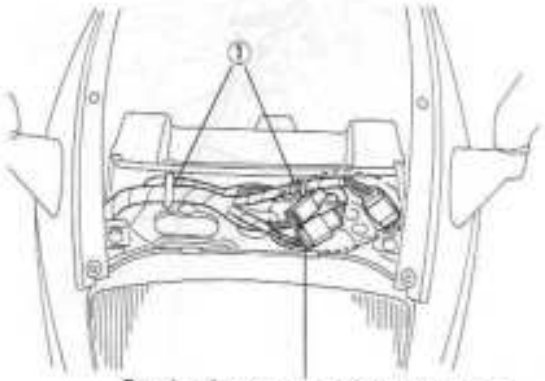
(Continued on next page.)

Items		ZX750-F1
Front suspension:		
	Type	Telescopic fork
	Wheel travel	140 mm
Rear suspension:		
	Type	Swing arm (uni-trak)
	Wheel travel	120 mm
Brake type:	Front	Dual disc
	Rear	Single disc
Electrical Equipment:		
Battery		12 V 14 Ah
Headlight:	Type	Semi-sealed beam
	Bulb	12 V 60/55 W (quartz-halogen)
Tail/brake light		12 V 5/21 W x2 , Ⓒ Ⓢⓐ Ⓤ 12 V 8/27 W x2
Alternator:	Type	Three-phase AC
	Rated output	27 A @6 000 r/min (rpm), 14 V
Voltage regulator:		
	Type	Short-circuit

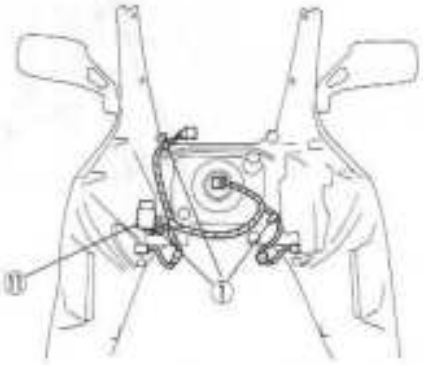
Specifications subject to change without notice, and may not apply to every country.

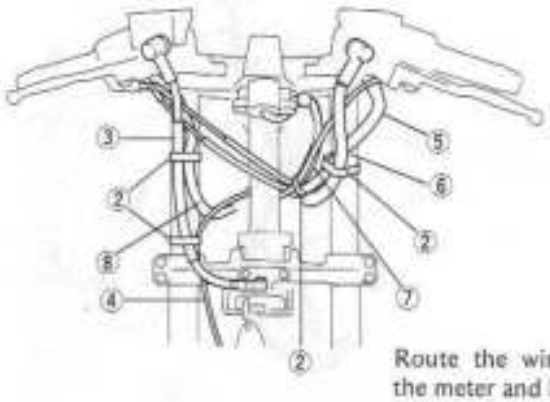
Ⓐ : Australian Model
Ⓑ : UK Model
Ⓒ : Canadian Model
Ⓒal : California Model
Ⓕ : French Model
Ⓖ : West Germany Model
Ⓘ : Italian Model
Ⓢⓐ : South African Model
Ⓢⓟ : Spanish Model
Ⓤ : US Model
Ⓦ : Swiss Model

Suggested Wiring, Cable or Hose Routing

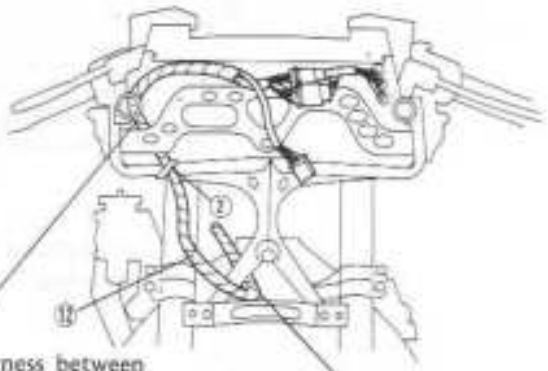


Put in the connectors between the meter and bracket.

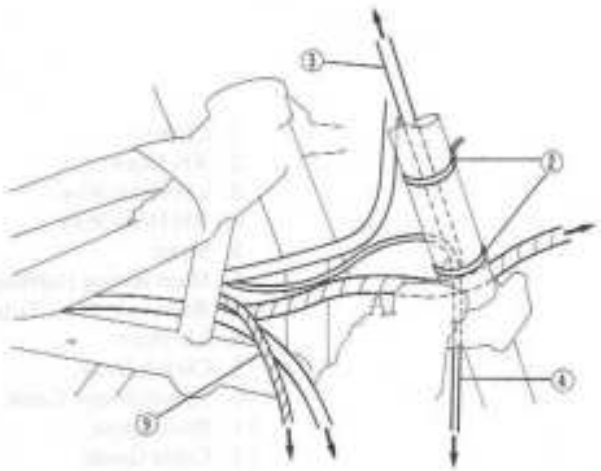




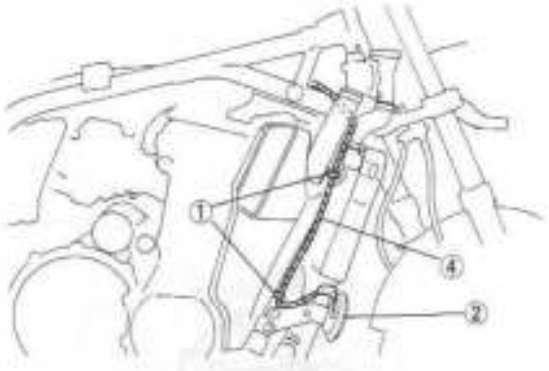
Route the wiring harness between the meter and bracket.

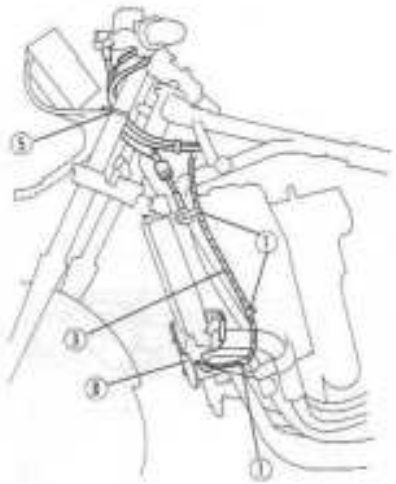


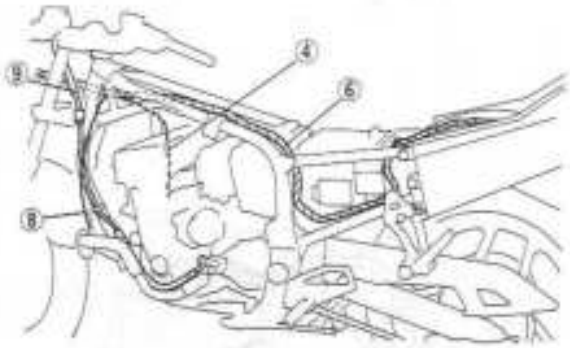
Route the wiring harness between the fairing stays.

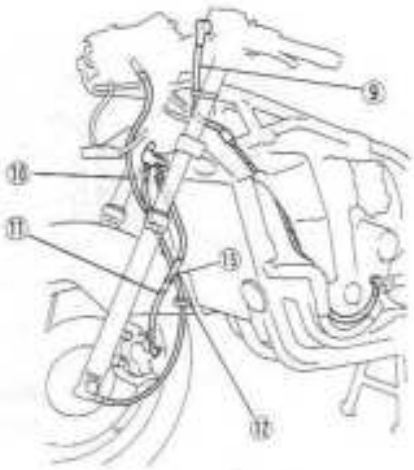


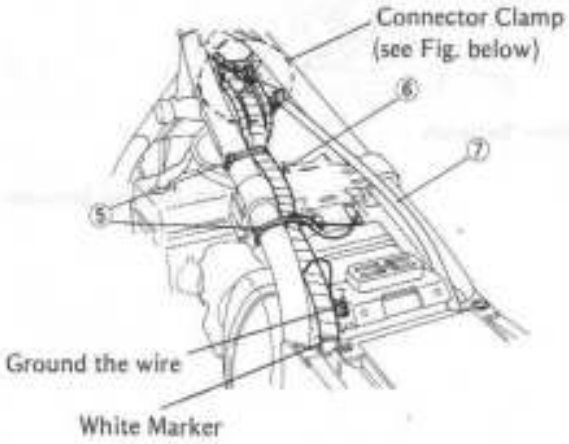
1. Clamp
2. Strap
3. Brake Hose
4. ESCS Wire
5. LH Switch Housing Wiring Harness
6. Clutch Hose
7. Choke Cable
8. RH Switch Housing Wiring Harness
9. RH Horn Wire
10. Reserve Tank Tube
11. ESCS Relay
12. Meter Wiring

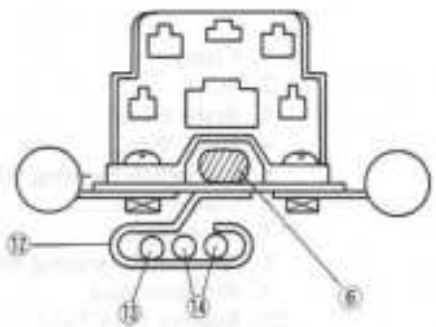




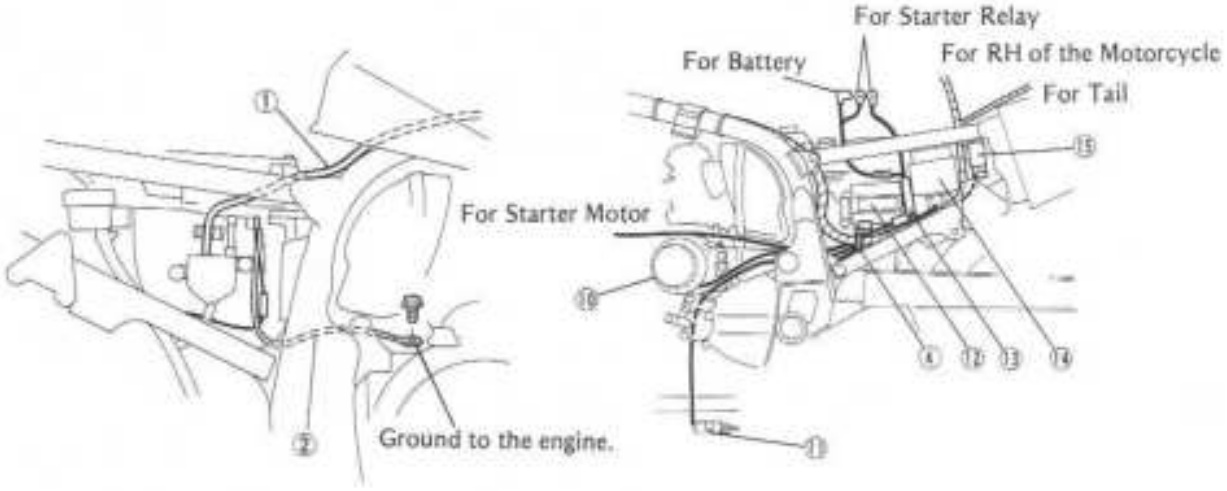


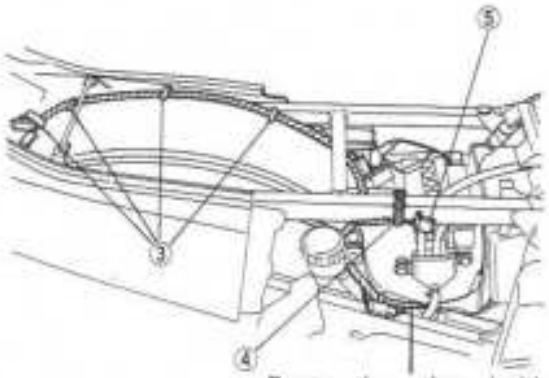




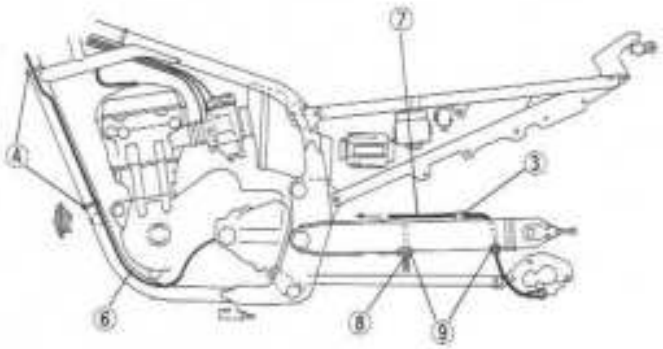


1. Clamp
2. RH Horn
3. LH Horn Wire
4. RH Horn Wire
5. Strap
6. Main Wiring Harness
7. Reservoir Tank Tube
8. LH Horn
9. Clutch Hose
10. Speedometer Cable
11. Brake Hose
12. Cable Guide
13. Choke Cable
14. Throttle Cable
15. Brake Hose Guide





Route the wires inside of the breather hose.



1. Reservoir Tank Tube
2. Battery Ground Wire
3. Clamp
4. Strap
5. Fuel Gauge Wire Connector
6. Clutch Hose
7. Rear Brake Hose
8. Breather Hose
9. Hose Guide
10. Alternator
11. Side Stand Switch
12. Junction Box
13. Main Fuse
14. IC Igniter
15. Turn Signal Relay

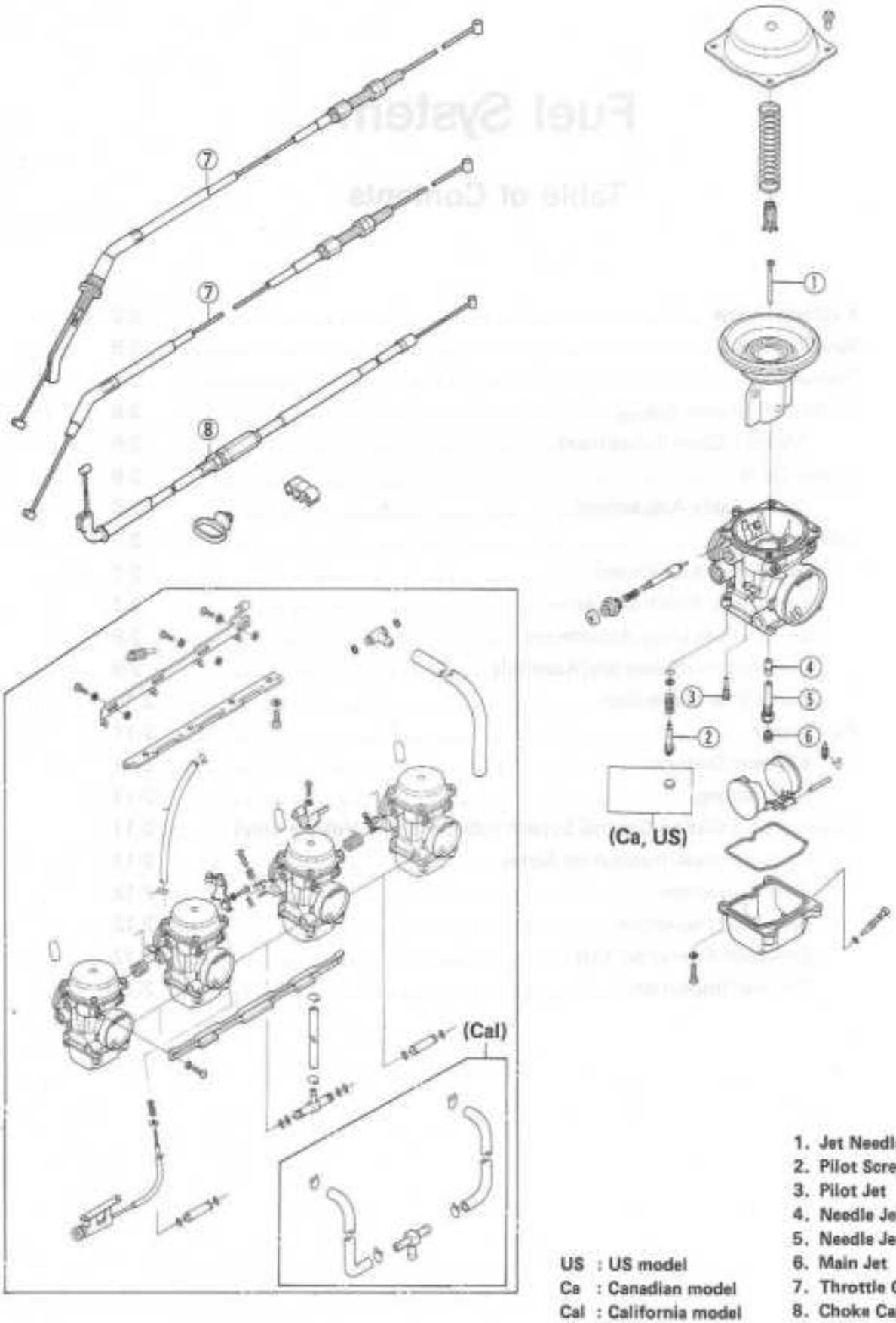
Fuel System

2

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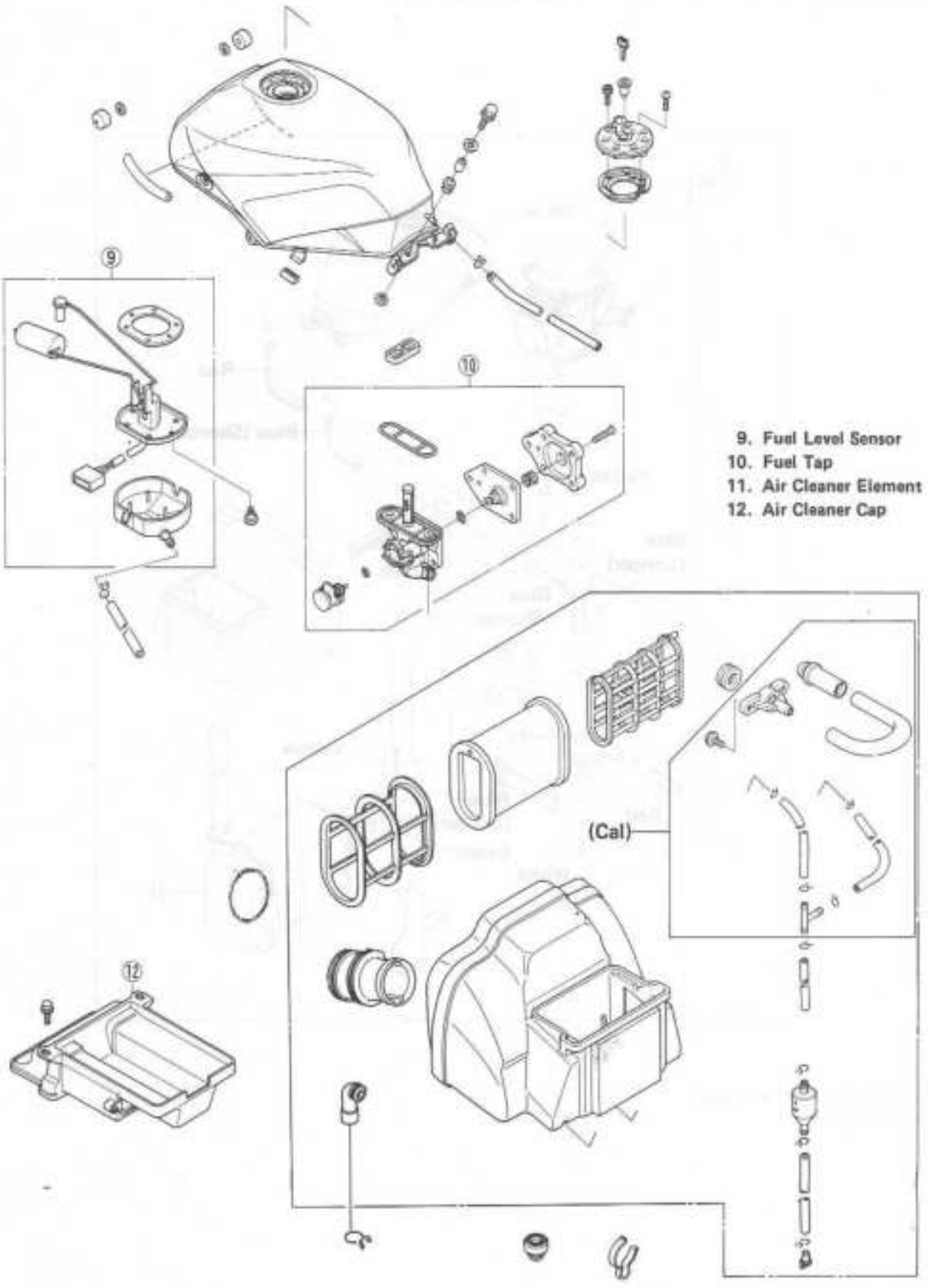
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Exploded View



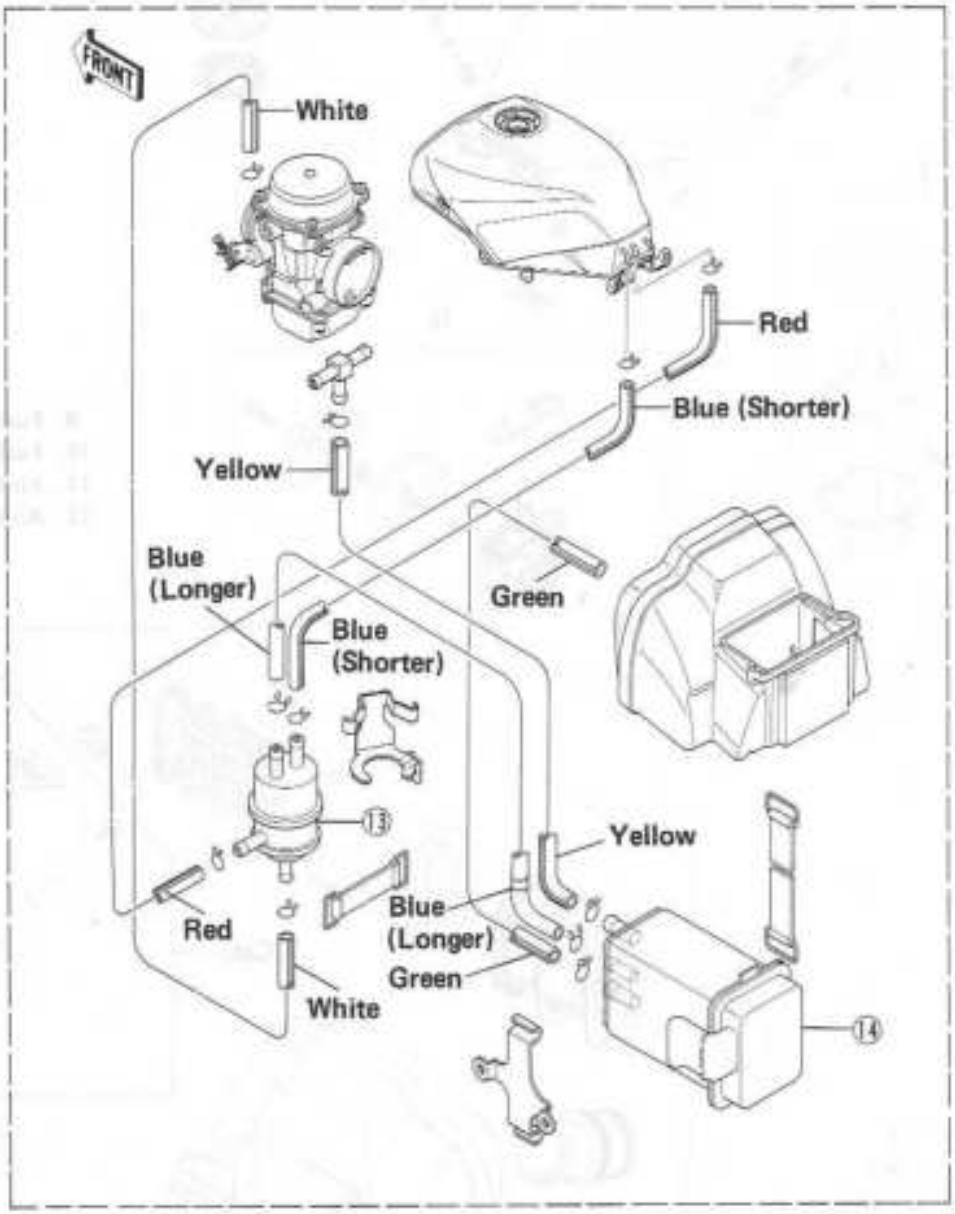
US : US model
Ca : Canadian model
Cal : California model

1. Jet Needle
2. Pilot Screw
3. Pilot Jet
4. Needle Jet
5. Needle Jet Holder
6. Main Jet
7. Throttle Cables
8. Choke Cable



9. Fuel Level Sensor
10. Fuel Tap
11. Air Cleaner Element
12. Air Cleaner Cap

Evaporative Emission Control System (California Model)



13. Liquid/Vapor Separator
14. Canister

Specifications

Item	Standard
Throttle Grip:	
Throttle grip free play	2 – 3 mm
Choke Cable:	
Choke lever free play	2 – 3 mm
Carburetors:	
Make, type	Keihin, CVK34
Main jet	#112, (Cal) : #118
Jet needle	N53I
Pilot screw	2 turns out, (US) : —, (W) (AU) : 1¾ turns out
Service fuel level	−0.5 ± 1 mm
Float height	17.0 mm
Idle speed	950 – 1 050 r/min (rpm)
	(Cal): 1 200 – 1 300 r/min (rpm)
Synchronization vacuum	Less than 2.7 kPa (2 cm Hg)

(AU) : Austrian Model
(Cal) : California Model
(US) : US Model
(W) : Swiss Model

Special Tools

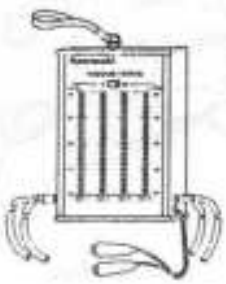
Fuel Level Gauge: 57001-1017



Pressure Cable Luber: K56019-021



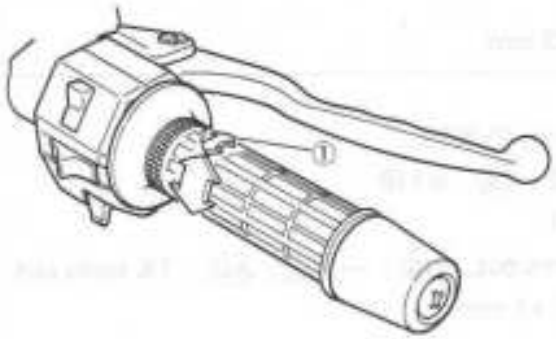
Vacuum Gauge: 57001-1198



Throttle Grip and Cables

Throttle Cable Adjustment

•Check throttle grip free play.

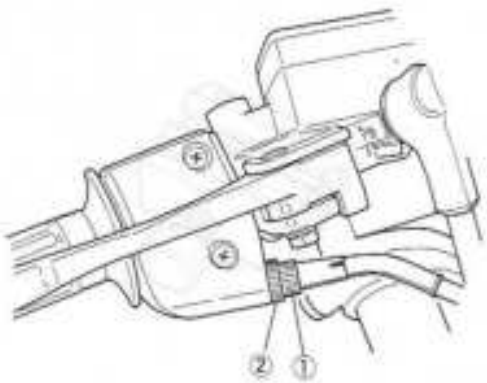


1. Throttle Grip Free Play

Throttle Grip Free Play

Standard: 2 – 3 mm

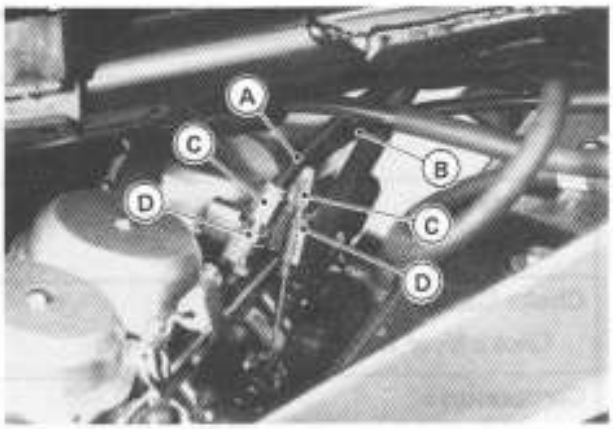
•If the free play is incorrect, loosen the locknut and turn the adjuster of the accelerator cable until the proper amount of throttle grip play is obtained.



1. Adjuster 2. Locknut

•Tighten the locknut securely.

★If the play can not be adjusted by using the adjuster at the throttle grip, use the adjusters at the carburetors.



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

•Loosen the locknuts of both adjusting nuts.

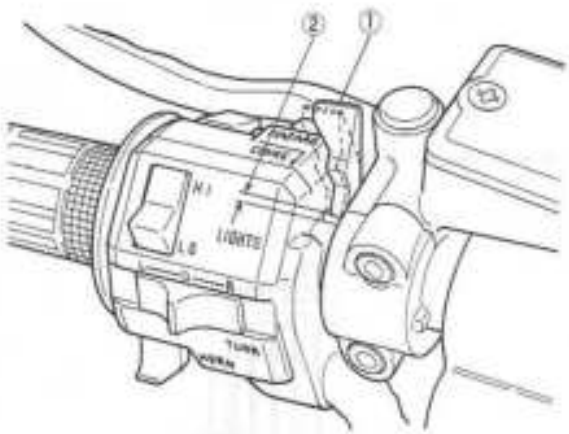
•With the throttle grip completely closed, turn out the adjusting nut of the decelerator cable until the inner cable just becomes tight.

•Turn the adjusting nut of the accelerator cable until the proper amount of throttle grip play is obtained.

•Tighten the locknuts securely.

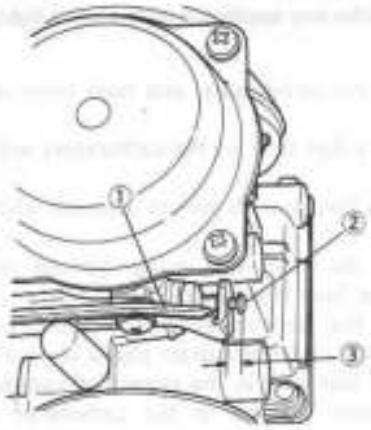
Choke Cable

Choke Cable Adjustment



1. Choke Lever 2. Play

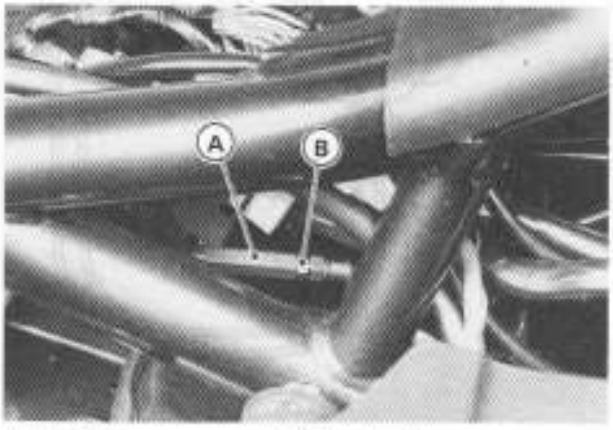
•Check choke cable free play.
○Determine the amount of choke cable play at the choke lever. Pull the choke lever until the starter plunger lever at the carburetor contacts with the starter plunger; the amount of choke lever lower end travel is the amount of choke cable play.



1. Starter Plunger Lever
2. Starter Plunger
3. Play

Choke Cable (Lever) Play
Standard: 2 – 3 mm

•If the play is incorrect, loosen the locknut and turn the adjuster at the middle of the cable until the proper amount of choke lever play is obtained.
○Remove the fuel tank.



A. Adjuster B. Locknut

•Tighten the locknuts securely.

Carburetors

Idle Speed Adjustment

•Set the motorcycle on its center stand.
•Start the engine and warm it up thoroughly.
•Turn the handlebar from side to side while idling the engine.
★If idle speed varies, the throttle cables may be poorly routed or they may be damaged.
•Correct any problem before operating the motorcycle.

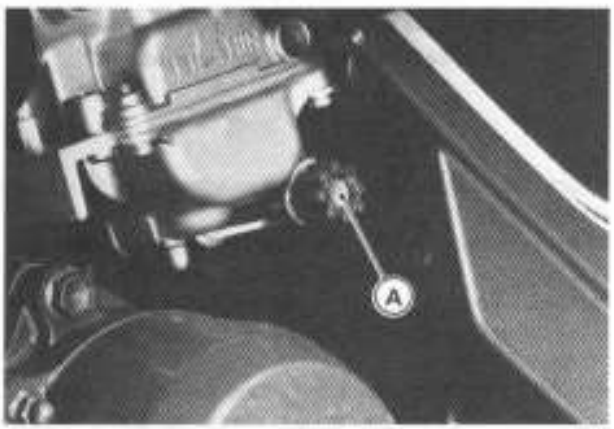
WARNING

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

•Check idle speed.

Idle Speed
Standard: 950 – 1 050 r/min (rpm)
(CA) 1 200 – 1 300 r/min (rpm)

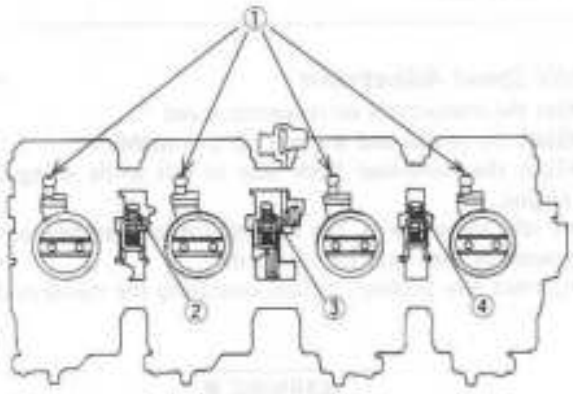
•Turn the idle adjusting screw until idle speed is correct.



A. Idle Adjusting Screw

Carburetor Synchronization

•Set the motorcycle on its center stand.
•Start the engine and warm it up thoroughly.
•Check idle speed.
•Attach the vacuum gauge set (special tool: P/N 57001-1198) to the fittings on the carburetors.



1. Fittings
2. Right Adjuster for Right Two Carburetors
3. Center Adjuster for Right and Left Pairs
4. Left Adjuster for Left Two Carburetors

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

Carburetor Synchronization Vacuum

Standard: Less than 2.7 kPa (2 cmHg) difference between any two carburetors

•Turn the adjusting screws to synchronize the carburetors.

○First synchronize the left two and then the right two carburetors by means of the left and right adjusting screws. Then synchronize the left two carburetors and the right two carburetors using the center adjusting screw.

•If the carburetor synchronization cannot be obtained by using the adjusting screws, check for dirt or blockage, and then check the pilot screw settings.

•Check the carburetor synchronization again.

NOTE

○*Do not turn the pilot screws carelessly during carburetors synchronization. You may cause a poor running at low engine speed.*

•Check idle speed.

Service Fuel Level Adjustment

WARNING

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

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

•Connect a fuel tank to the carburetors with a suitable hose.

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

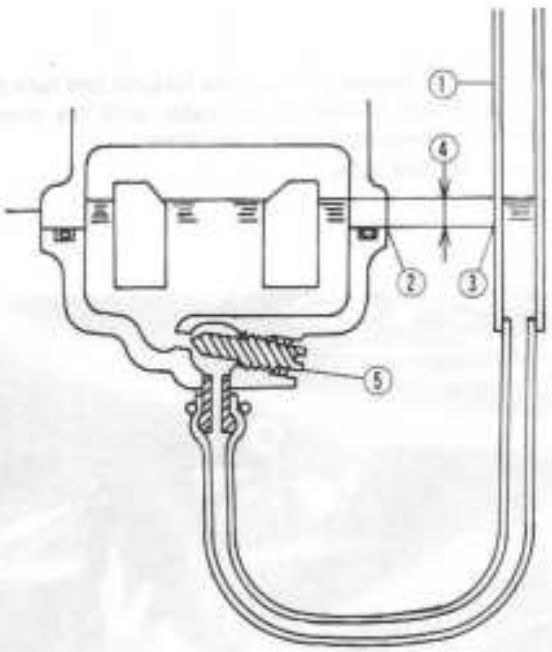
•Connect the fuel level gauge (special tool) to the carburetor float bowl with the fuel hose.

•Hold the fuel tank to feed fuel to the carburetor, then turn out the carburetor drain plug a few turns.

•Read the fuel level in the gauge and compare it to the specification. Screw in the carburetor drain plug.

NOTE

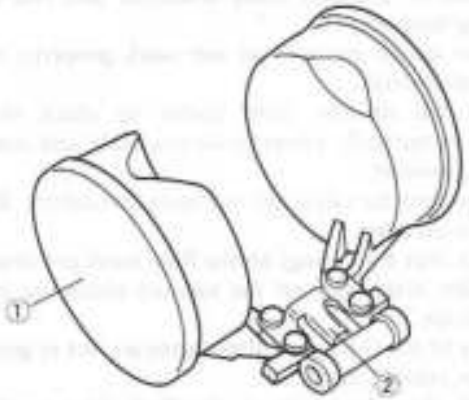
○*Keeping the gauge vertical, align its "zero" line with the bottom edge of the carburetor body. Then turn out the drain plug to feed fuel to the gauge.*



1. Fuel Level Gauge: 57001-1017
2. Bottom Edge of Carburetor Body
3. "Zero" Line
4. Fuel Level
5. Drain Plug

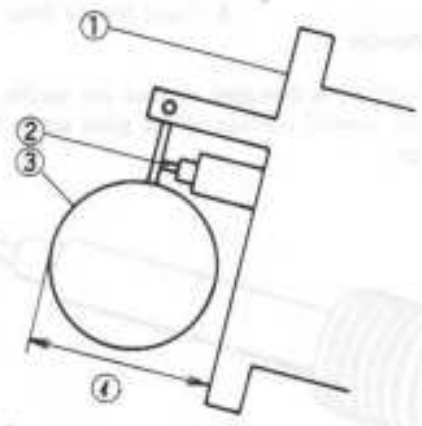
Service Fuel Level
(from Bottom Edge of Carburetor Body)
Standard: 0.5 mm (below) – 1.5 mm (above)

•To adjust the fuel level, bend the tang on the float arm to change the float height.



1. Float 2. Tang

•Measure the float height tilting the carburetor to touch the tang on the needle rod.
○Increasing the float height lowers the fuel level and decreasing the float headlight raises the fuel level.



1. Bottom Edge of Carburetor Body
2. Float Height
3. Tang
4. Needle Rod

Float Height
Standard: 17 mm

NOTE

○*Do not push the needle rod in during the float height measurement.*

Carburetor Disassembly/Assembly

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

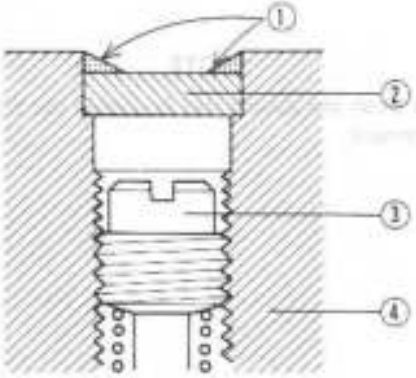
○**During carburetor disassembly, be careful not to damage the diaphragm. Never use a sharp edge to remove the diaphragm.**

•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.
•Turn in the pilot screw fully but not tightly, and then back it out the same number of turns counted during disassembly.
•For the US model, install the pilot screw plug as follows:
○Install a new plug in the pilot screw hole, and apply a small amount of a bonding agent to the circumference of the plug to fix the plug.

CAUTION

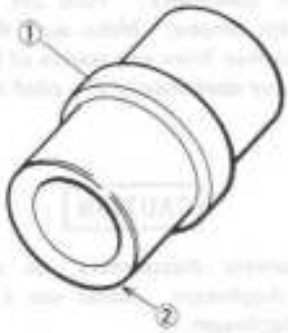
○**Do not apply too much bonding agent to the plug or the pilot screw itself may be fixed.**

Plug installation (US model only)



1. Apply bonding agent.
2. Plug
3. Pilot Screw
4. Carburetor Body

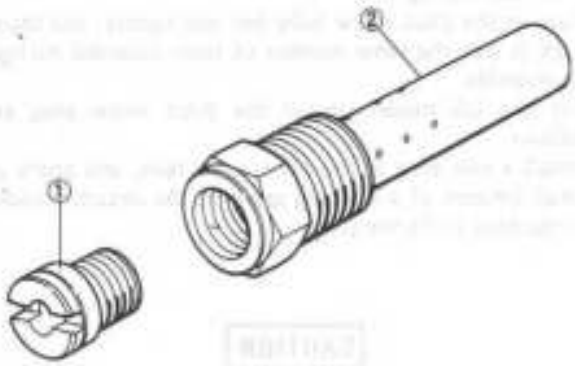
•Turn the carburetor body upside-down, and drop the needle jet into place so that the smaller diameter end of the jet goes in first.



1. Needle Jet
2. Small End

CAUTION

○Do not force the needle jet holder (air bleed pipe) and main jet of overtighten them. They could be damaged requiring replacement.



1. Main Jet
2. Needle Jet Holder

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.

•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.

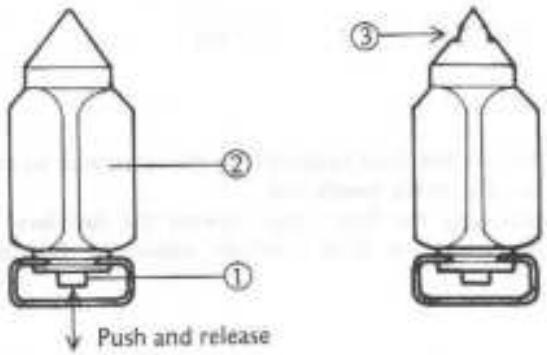
•Turn the throttle cable pulley to check that the throttle butterfly valves move smoothly and return by spring tension.

★If the throttle valves do not more smoothly. Replace the carburetors.

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

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

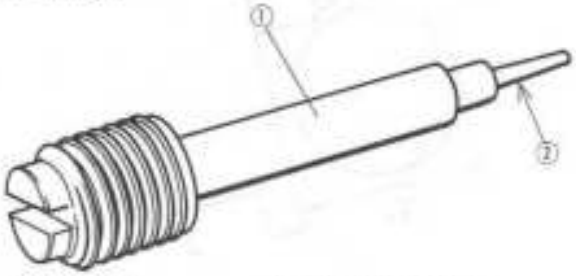
•Check the plastic tip of the float valve needle. It should be smooth, without any grooves, scratches, or tears.



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

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

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



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.

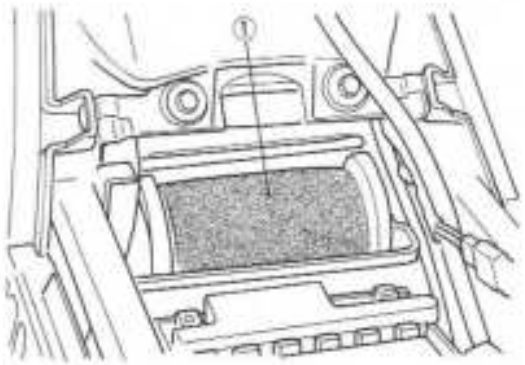
Air Cleaner

Element Cleaning

WARNING

○Clean the element 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 element. A fire or explosion could result.

- Remove the following.
  Seat
  Air Cleaner Housing/Battery Cover
- Take out the air cleaner element.



1. Air Cleaner Element

WARNING

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

- Wash the element in a bath of high flash-point solvent and then squeeze it dry.

CAUTION

○Do not wring or twist the element as it may tear.

- Saturate the element with SAE30 motor oil and squeeze out the excess.
- Wrap the element in a clean, dry cloth and squeeze it as dry as possible.

Oil Draining

A drain hose is connected to the bottom of the air cleaner housing, to drain oil accumulated at the bottom of the housing.

- Visually check the transpart reservoir at the middle of the drain hose if the oil accumulates in the reservoir.

★If any oil accumulates in the reservoir, drain it by taking off the plug at the lower end of the drain hose.



A. Plug
B. Air Cleaner Housing
C. Drain Hose
D. Reservoir

WARNING

○Be sure to install the plug in the drain hose after draining. Oil on tires will make them slippery and can cause an accident and injury.

Evaporative Emission Control System (US California Vehicle only)

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

Parts Removal/Installation Notes

WARNING

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

CAUTION

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

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

Hose Inspection

★If any hose is kinked, deteriorated or badly damaged, replace it with a new own.

Separator Inspection

★If the separator is cracked or badly damaged, 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.

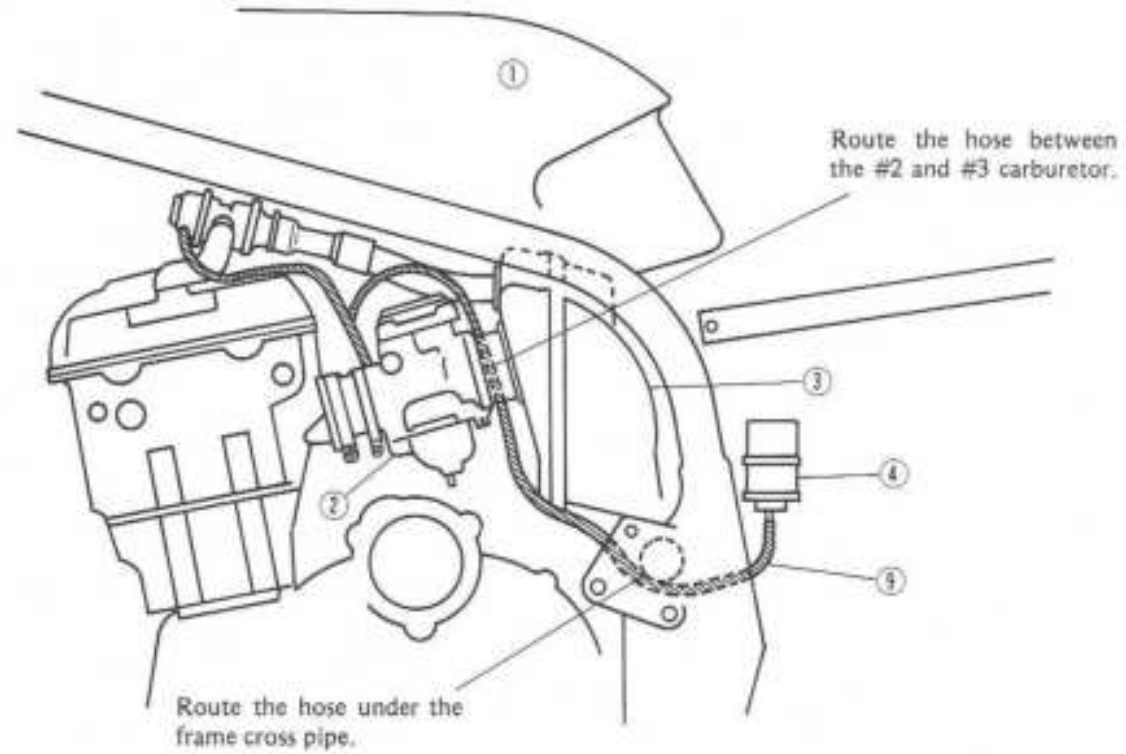
Canister Inspection

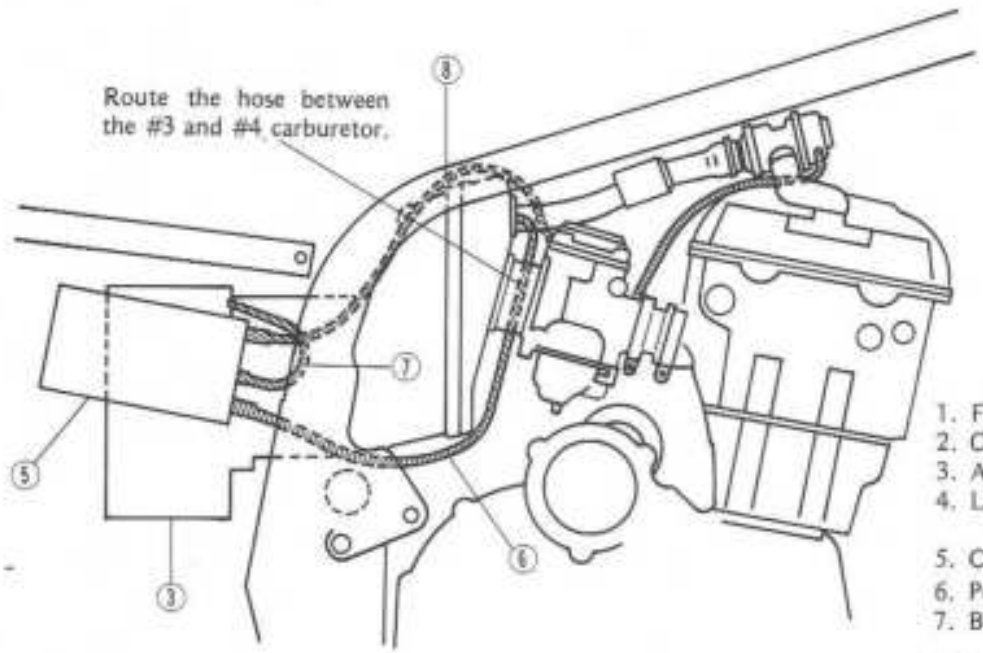
★If the canister has any crack or bad damage, replace it with a new one.

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
Hose Routing





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

Cooling System

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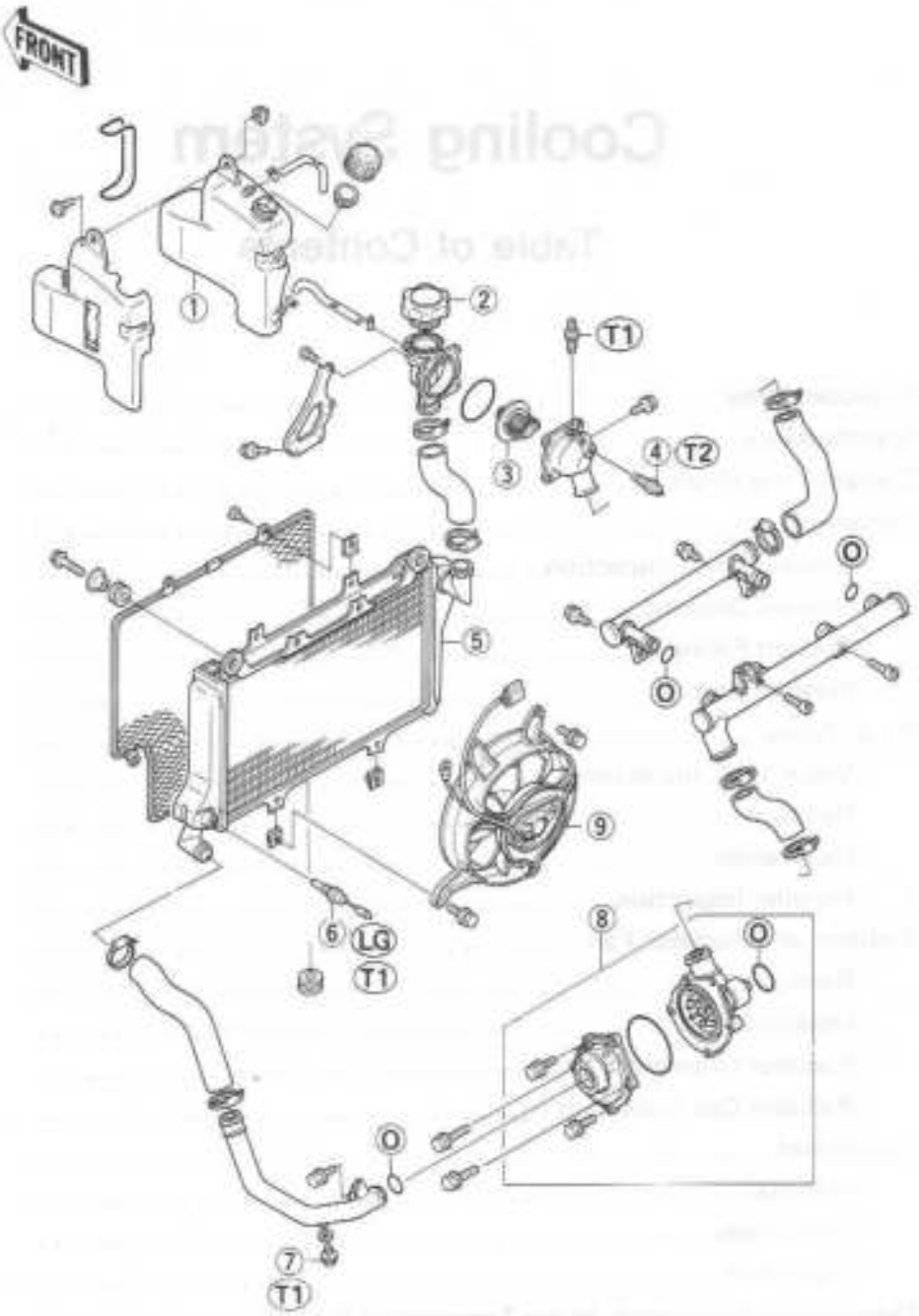
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Exploded View



1. Reservoir Tank
2. Radiator Cap
3. Thermostat
4. Water Temperature Sensor
5. Radiator
6. Radiator Fan Switch
7. Drain Plug
8. Water Pump
9. Radiator Fan

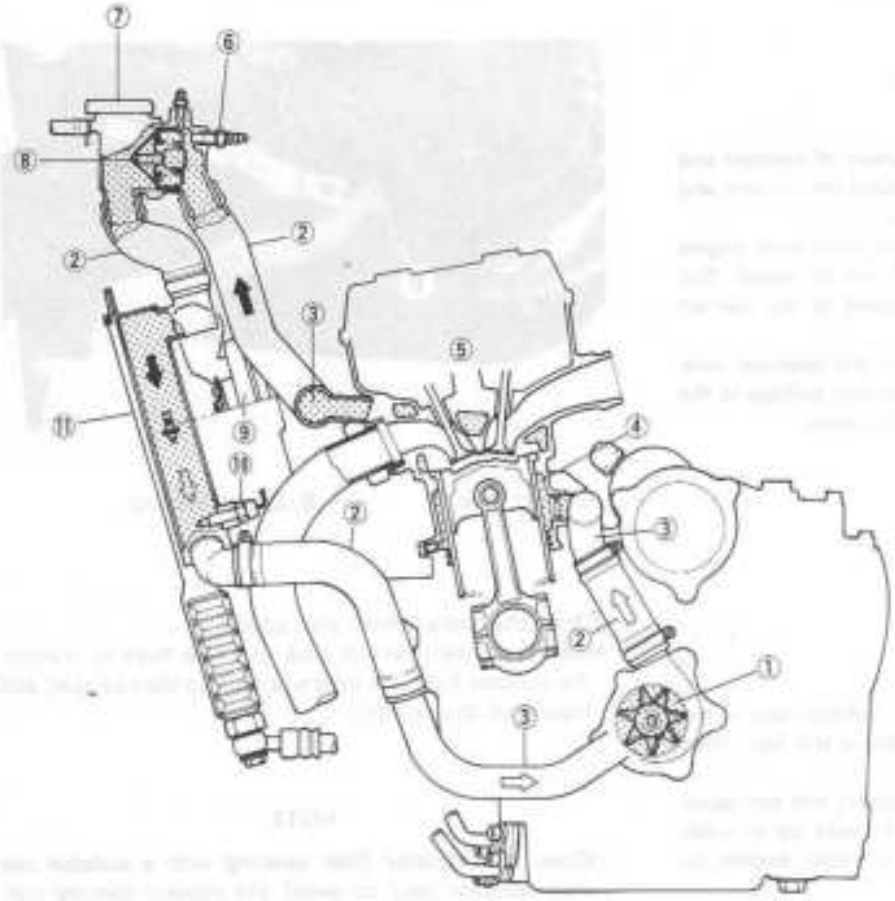
LG : Apply liquid gasket to the threads.
O : Apply oil when installing.
T1: 7.8 N-m (0.80 kg-m, 69 in-lb)
T2: 15 N-m (1.5 kg-m, 11.0 ft-lb)

Specifications

Item	Standard
Coolant:	
Type	Permanent type of antifreeze (soft water and ethylene glycol plus corrosion and rust inhibitor chemicals for aluminum engines and radiators)
Mixed ratio	Soft water 50%, coolant 50%
Freezing point	−35°C (−31°F)
Total amount	2.0 L
Radiator:	
Radiator cap relief pressure	93 – 123 kPa (0.95 – 1.25 kg/cm², 14 – 18 psi)
Thermostat:	
Valve opening temperature	80 – 84°C (176 – 183°F)
Valve full opening lift	More than 8 mm @95°C (203°F)

Coolant Flow Chart

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



1. Water Pump
2. Water Hose
3. Water Pipe
4. Water Jacket
5. Cylinder Head
6. Water Temperature Sensor
7. Radiator Cap
8. Thermostat
9. Radiator Fan
10. Radiator Fan Switch
11. Radiator

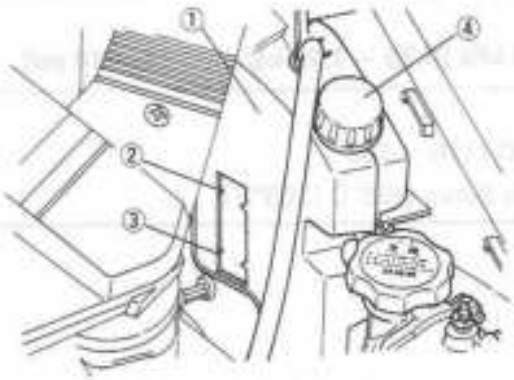
Coolant

Coolant Level Inspection

NOTE

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

●Check the coolant level in the reservoir tank with the motorcycle held perpendicularly.
★If the coolant level is lower than the LOW mark, add coolant to the FULL mark.



1. Reservoir Tank
2. FULL Mark
3. LOW Mark
4. Tank Cap

CAUTION

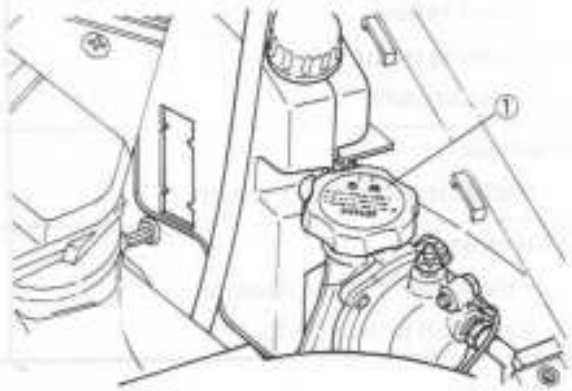
○For refilling, add the specified mixture of coolant and soft water. Adding water alone dilutes the coolant and degrades its anticorrosion properties.
○The diluted coolant can attack the aluminum engine parts. In an emergency, soft water can be added. But the diluted coolant must be returned to the correct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

Coolant Draining

WARNING

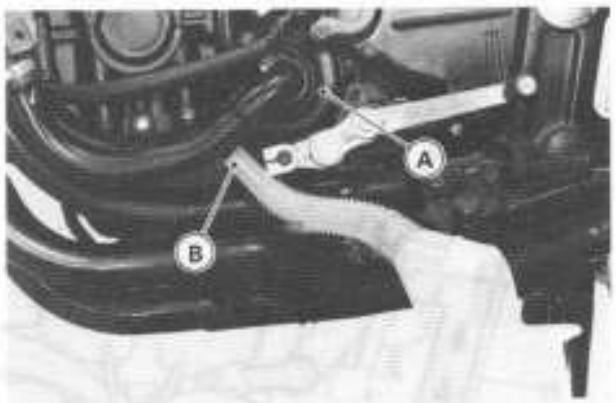
○To avoid burns, do not remove the radiator cap or try to change the coolant when the engine is still hot. Wait until it cools down.
○Coolant on tires will make them slippery and can cause an accident and injury. Immediately wipe up or wash away any coolant that spills on the frame, engine, or other painted parts.
○Since coolant is harmful to the human body, do not use for drinking.

●Remove the following.
Lower Fairing
Right Side Inner Fairing
Radiator Cap



1. Radiator Cap

Drain Plug (bottom of water pipe)



A. Water Pipe
B. Drain Opening

●Drain the coolant from the radiator.
●Blow into the reservoir tank overflow tube to transfer the coolant from the reservoir tank to the radiator, and then drain the coolant.

NOTE

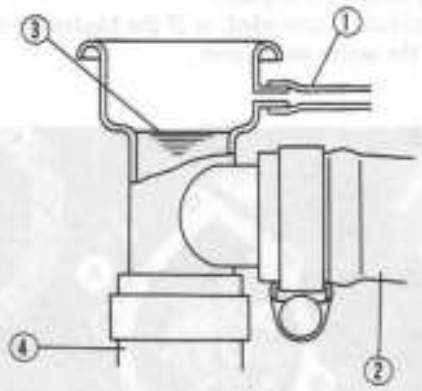
○Cover the radiator filler opening with a suitable cap (not radiator cap) to avoid the coolant coming out.



A. Reservoir Tank Overflow Tube
B. Blow into the tube.

Coolant Filling

- Tighten the drain plug at the bottom of the water pipe to the specified torque (see Exploded View).
- Fill the radiator up to the radiator filler neck with coolant, and install the radiator cap.



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

NOTE

○*Pour in the coolant slowly so that it can expel the air from the engine and radiator.*

- 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.**

Water and Coolant Mixture Ratio (Recommended)

Soft Water	:	**50%**
Coolant	:	**50%**
Freezing Point	:	**–35°C (–31°F)**

NOTE

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

- Start the engine, warm it up thoroughly until the radiator fan turns on and then stop the engine.
- Check the coolant level in the reservoir tank after the engine cools down.

★If the coolant level is lower than the LOW mark, add coolant up to the FULL mark.

CAUTION

○**Do not add more coolant above the FULL mark.**

Pressure Testing

- Remove the radiator cap, and install a cooling system pressure tester on the radiator filler neck.

NOTE

○*Wet the cap sealing surfaces with water or coolant to prevent pressure leaks.*

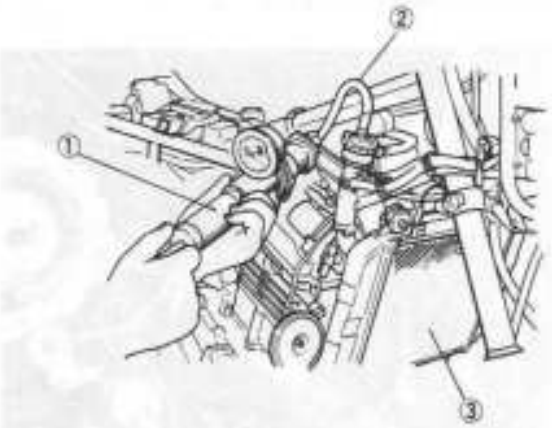
- Build up pressure in the system carefully until the pressure reaches 123 kPa (1.25 kg/cm², 18 psi).

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).**

- Watch the gauge for at least 6 seconds.

★If the pressure holds steady, the system is all right.



1. Pressure Tester
2. Adapter
3. Radiator

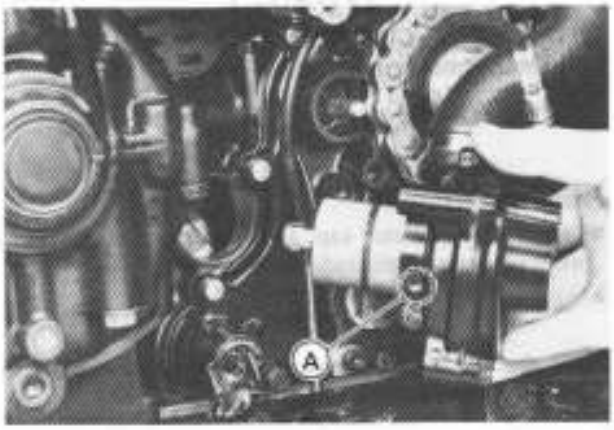
*If the pressure drops soon, check for leaks around the radiator.

Water Pump

Visual Leak Inspection

•Check the drainage outlet passage at the bottom of the water pump body for coolant leaks. The pump removal is not required.

*If the mechanical seal is damaged, the coolant leaks through the seal and drains through the passage. Replace the water pump unit.

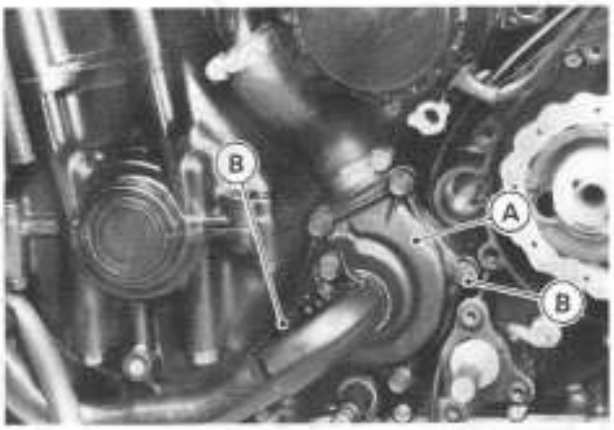


A. Drainage Outlet Passage
(at the bottom of the pump body)

Removal

•Drain the coolant.

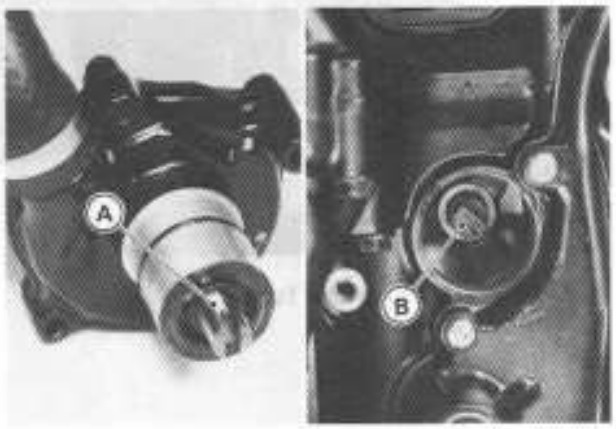
•Remove the following.
Clutch Slave Cylinder (see Clutch chapter)
Engine Sprocket Cover (see Final Drive chapter)
Water Pipe
Water Hose
WAter Pump Mounting Bolts



A. Water Pump B. Mounting Bolts

Installation

•Note the position of the oil pump shaft projection and turn the water pump shaft so that the projection fits into the slot.

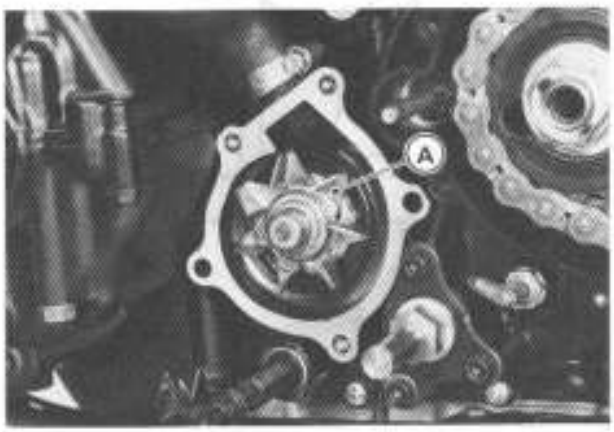


A. Water Pump Shaft B. Oil Pump Shaft

Impeller Inspection

•Visually check the impeller.

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



A. Impeller

Radiator and Radiator Fan

Removal

•Remove the following.
Lower Fairing
Upper Fairing
Coolant (Draining)
Radiator Fan Connector (Disconnecting)

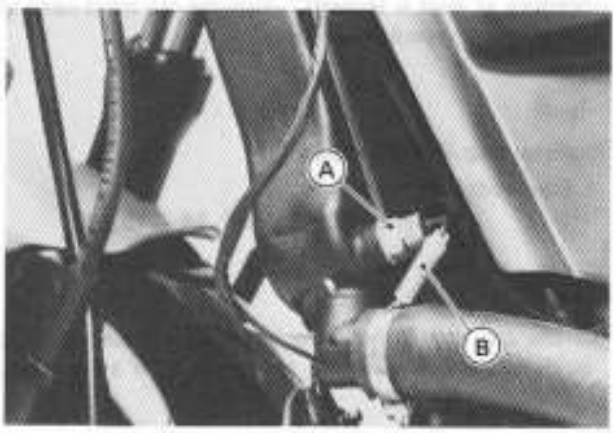


A. Radiator Fan Connector

WARNING

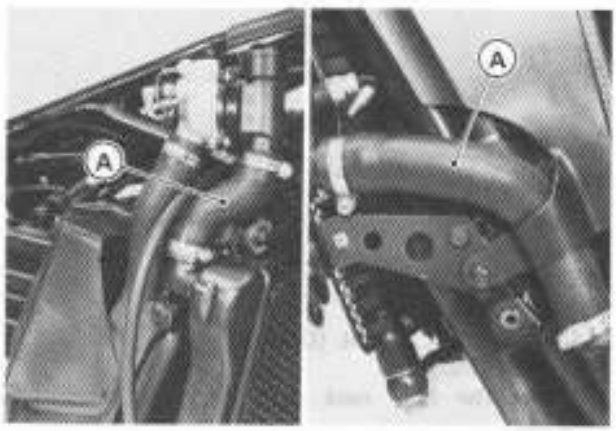
○The radiator fan is connected directly to the battery. The radiator fan may start even if the ignition switch is off. NEVER TOUCH THE RADIATOR FAN UNTIL THE RADIATOR FAN CONNECTOR IS DISCONNECTED. TOUCHING THE FAN BEFORE THE CONNECTOR IS DISCONNECTED COULD CAUSE INJURY FROM THE FAN BLADES.

Fan Switch Connector (Disconnecting)



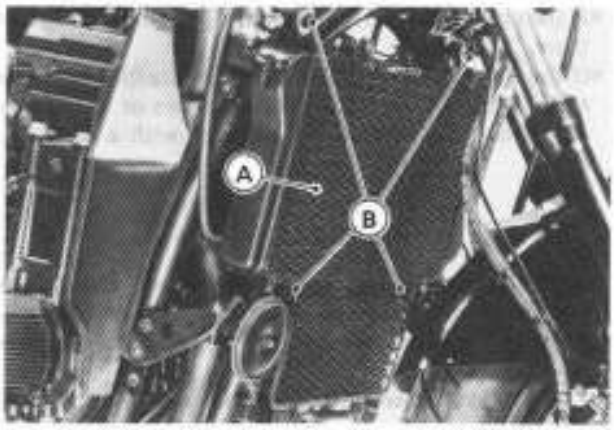
A. Fan Switch B. Connector

Left and Right Radiator Hoses



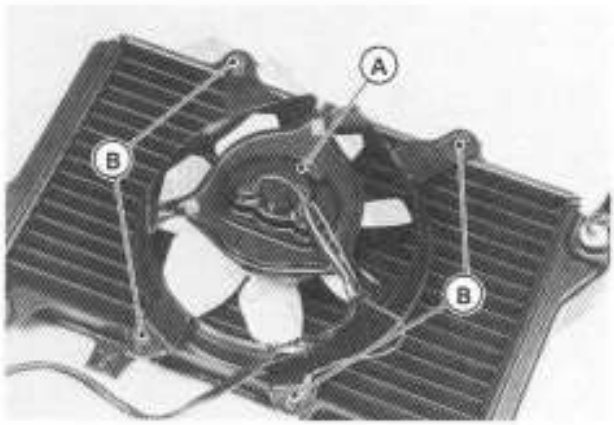
A. Radiator Hose

Radiator Screen
Radiator Mounting Bolts



A. Radiator Screen B. Radiator Mounting Bolts

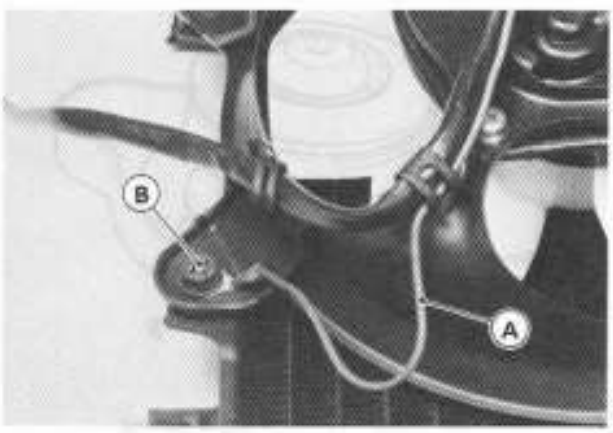
Radiator Fan Mounting Bolts



A. Radiator Fan B. Fan Mounting Bolts

Installation

●Be sure to ground the fan switch ground lead by tightening it with the fan mounting bolt.



A. Ground Lead B. Mounting Bolt

Radiator Inspection

•Check the radiator core.

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

★If the corrugated fins are deformed, carefully straighten them.

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

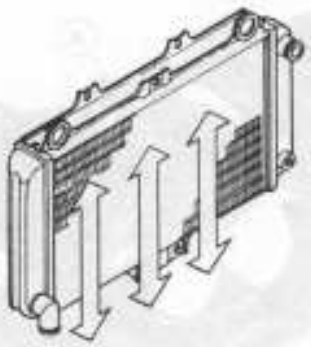
CAUTION

□When cleaning the radiator with steam cleaner, be careful of the following to prevent radiator damage.

1) Keep the steam gun away more than 0.5 m from the radiator core.

2) Hold the steam gun perpendicular to the core surface.

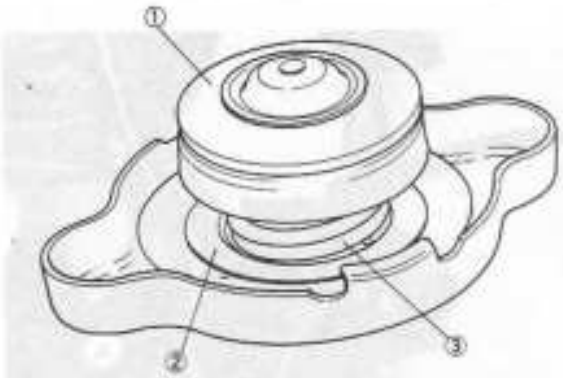
3) Run the steam gun horizontally following the core fin direction. Running it vertically may damage the fin.



Radiator Cap Inspection

•Check the condition of the top and bottom valve seals of the radiator cap.

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

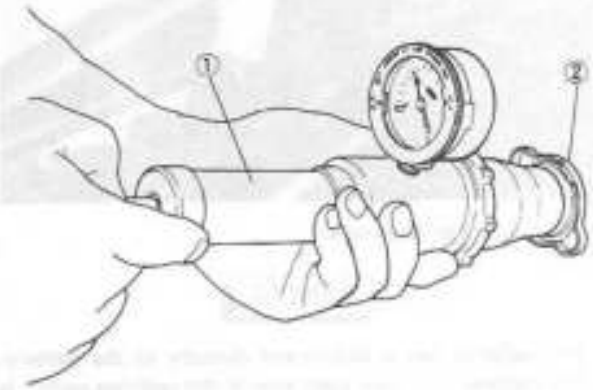


1. Bottom Valve Seal
2. Top Valve Seal
3. Valve Spring

•Install the cap on a cooling system pressure tester.

NOTE

□*Wet the cap sealing surfaces with water or coolant to prevent pressure leaks.*



1. Pressure Tester
2. Radiator Cap

•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

Standard: 93 – 123 kPa
(0.95 – 1.25 kg/cm², 14 – 18 psi)

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

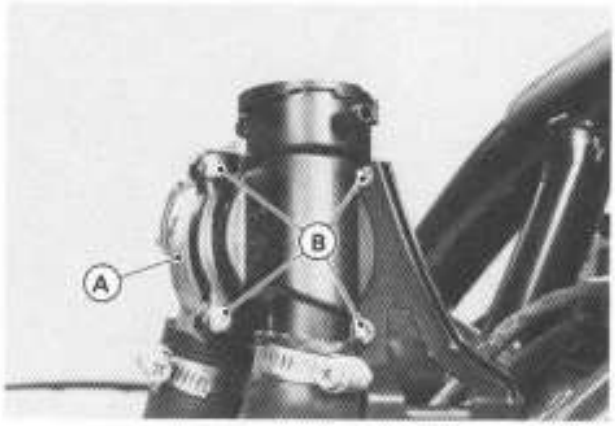
Thermostat

Removal

•Remove the following.
Coolant about 200 mL (Draining)
Upper Fairing

•Remove the filler neck part from the thermostat housing.

•Remove the thermostat from its housing.

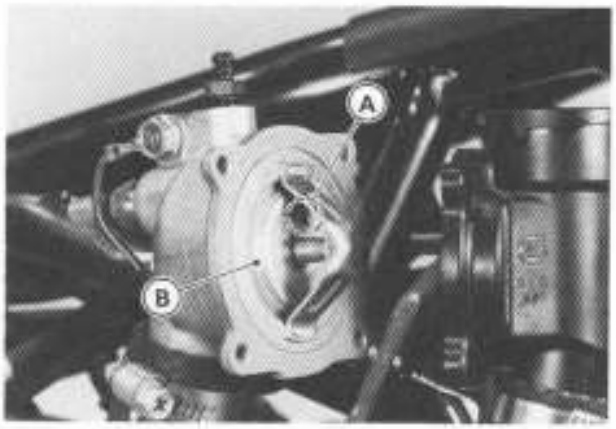


A. Thermostat Housing B. Mounting Screws

Installation

- Install the thermostat noting the following.

○Install the thermostat in the housing so that the air hole is on top.

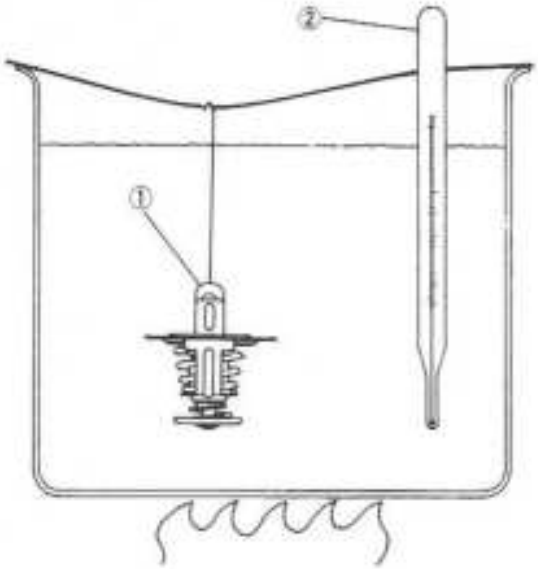


A. Air Hole B. Thermostat

○Be sure to install the O-ring to the housing.
○Add the coolant.

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 in a container of water and raise the temperature of the water.



1. Thermostat 2. Thermometer

*If the measurement is out of the service limit range, replace the thermostat.

Thermostat Valve Opening Temperature
69.5 – 72.5°C (157 – 163°F)

Thermostat Fan Switch Water Temperature Sensor

Water Temperature Sensor Removal

CAUTION

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

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

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 specification (see Exploded View).

Inspection

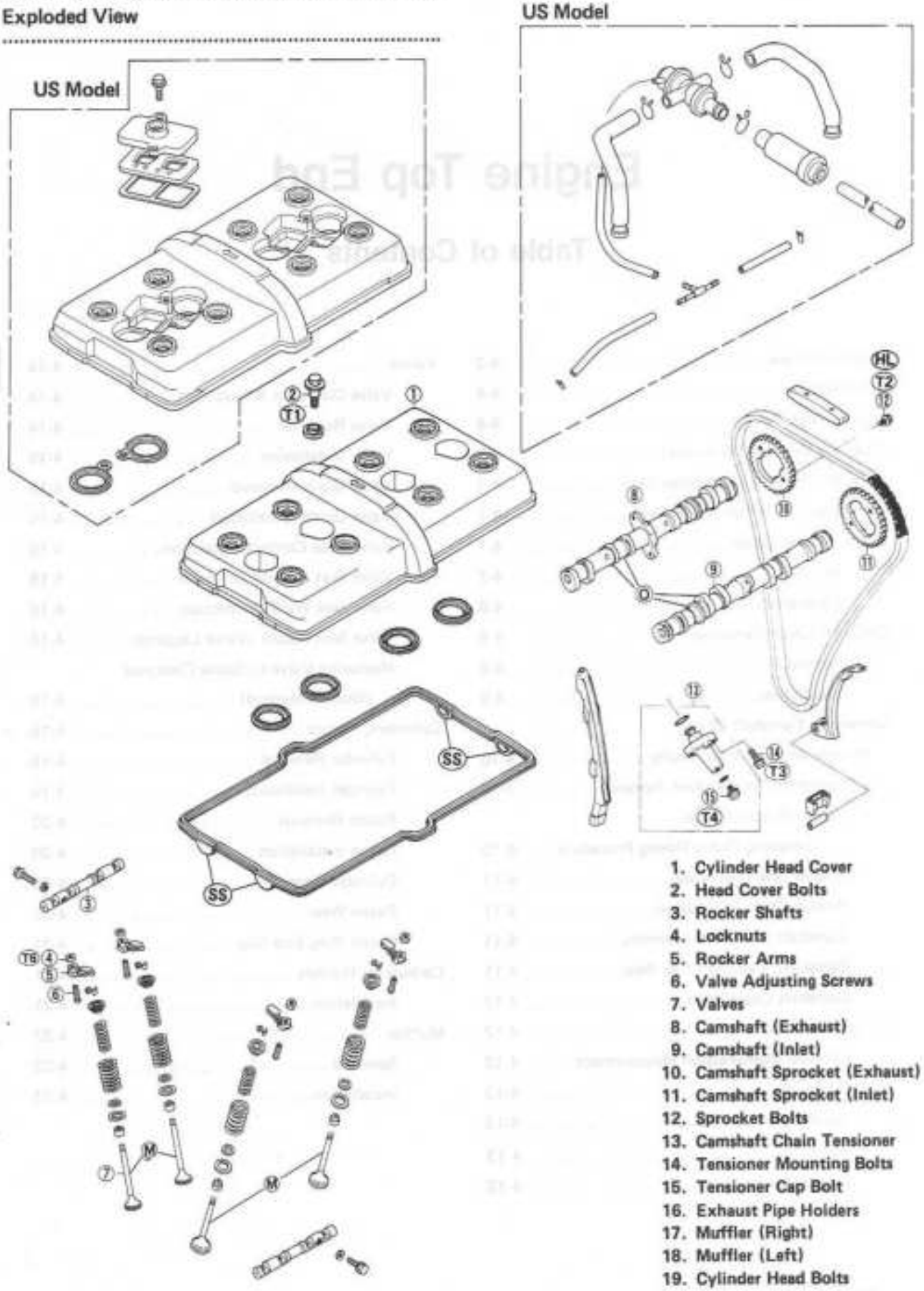
Refer to the Electrical System chapter.

Engine Top End

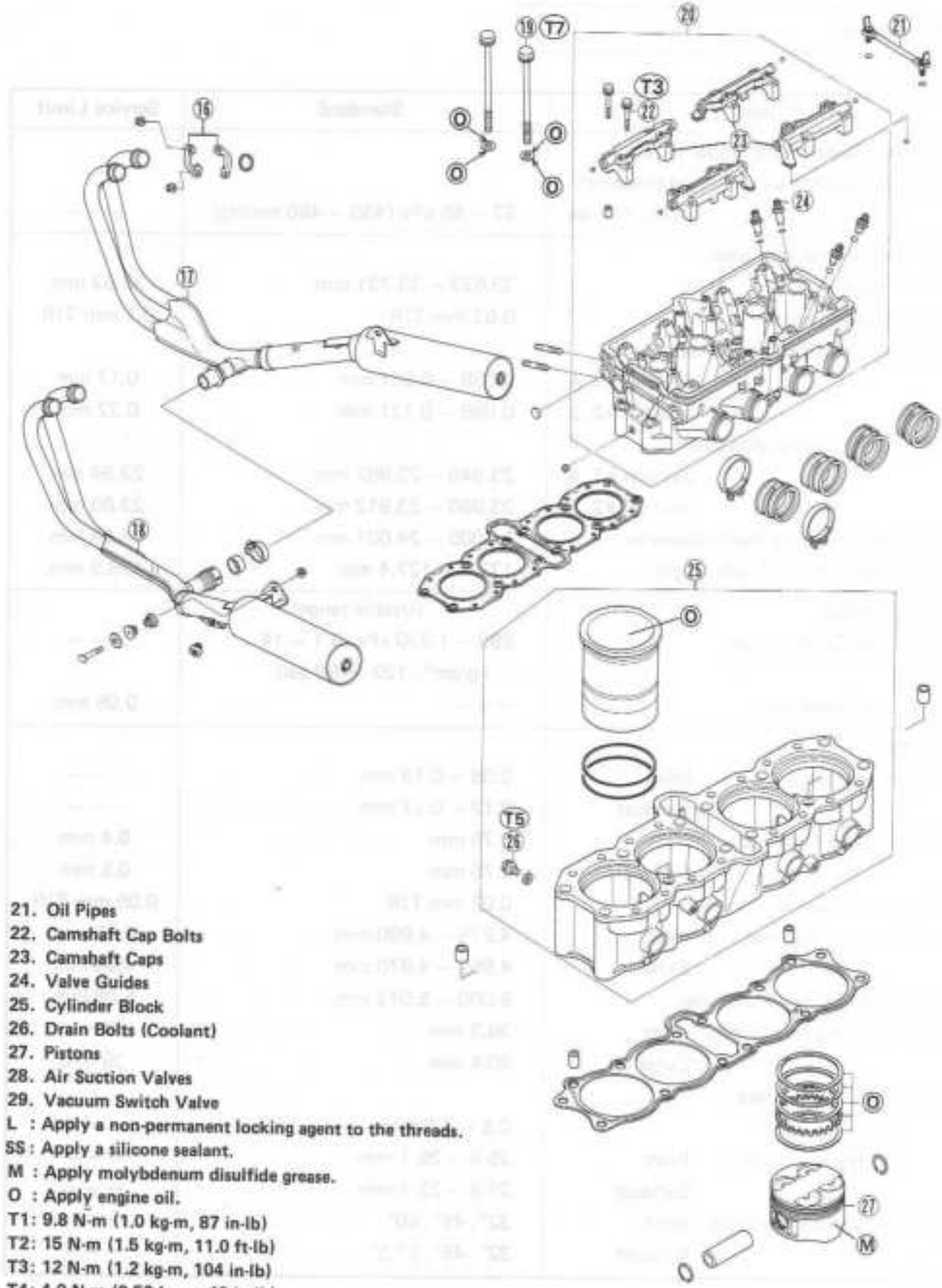
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Exploded View



1. Cylinder Head Cover
2. Head Cover Bolts
3. Rocker Shafts
4. Locknuts
5. Rocker Arms
6. Valve Adjusting Screws
7. Valves
8. Camshaft (Exhaust)
9. Camshaft (Inlet)
10. Camshaft Sprocket (Exhaust)
11. Camshaft Sprocket (Inlet)
12. Sprocket Bolts
13. Camshaft Chain Tensioner
14. Tensioner Mounting Bolts
15. Tensioner Cap Bolt
16. Exhaust Pipe Holders
17. Muffler (Right)
18. Muffler (Left)
19. Cylinder Head Bolts
20. Cylinder Head Assembly



21. Oil Pipes
22. Camshaft Cap Bolts
23. Camshaft Caps
24. Valve Guides
25. Cylinder Block
26. Drain Bolts (Coolant)
27. Pistons
28. Air Suction Valves
29. Vacuum Switch Valve

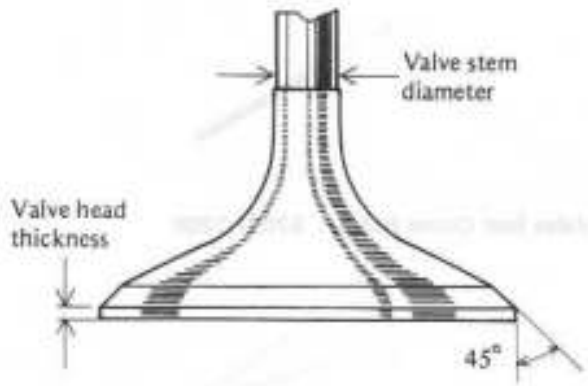
L : Apply a non-permanent locking agent to the threads.
SS : Apply a silicone sealant.
M : Apply molybdenum disulfide grease.
O : Apply engine oil.
T1: 9.8 N-m (1.0 kg-m, 87 in-lb)
T2: 15 N-m (1.5 kg-m, 11.0 ft-lb)
T3: 12 N-m (1.2 kg-m, 104 in-lb)
T4: 4.9 N-m (0.50 kg-m, 43 in-lb)
T5: 7.8 N-m (0.80 kg-m, 69 in-lb)
T6: 23 N-m (2.3 kg-m, 16.5 ft-lb)
T7: 39 N-m (4.0 kg-m, 29 ft-lb)

Specifications

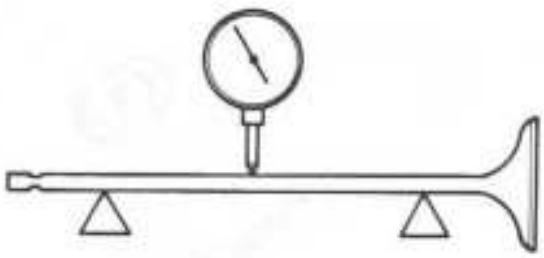
Item		Standard	Service Limit
Clean Air System (US model only):			
Vacuum switch valve closing pressure:			
	Open → Close	57 – 65 kPa (430 – 490 mmHg)	– – –
Camshaft, Camshaft Chain:			
Cam height		33.623 – 33.731 mm	33.52 mm
Camshaft runout		0.02 mm TIR	0.1 mm TIR
Camshaft, camshaft cap clearance:			
	Journal #1, 4	0.038 – 0.081 mm	0.17 mm
	Journal #2, 3	0.088 – 0.131 mm	0.22 mm
Camshaft journal diameter:			
	Journal #1, 4	23.940 – 23.962 mm	23.94 mm
	Journal #2, 3	23.890 – 23.912 mm	23.89 mm
Camshaft bearing inside diameter		24.000 – 24.021 mm	24.08 mm
Camshaft chain 20-link length		127.0 – 127.4 mm	128.9 mm
Cylinder Head:		(Usable range)	
Cylinder Compression		890 – 1 370 kPa (9.1 – 14 kg/cm², 129 –199 psi)	– – –
Cylinder head warp		– – –	0.05 mm
Valves:			
Valve clearance:	Inlet	0.08 – 0.13 mm	– – –
	Exhaust	0.12 – 0.17 mm	– – –
Valve head thickness:	Inlet	0.75 mm	0.4 mm
	Exhaust	0.75 mm	0.5 mm
Valve stem bend		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		5.000 – 5.012 mm	5.08 mm
Valve spring free length:	Inner	36.3 mm	35 mm
	Outer	40.4 mm	39 mm
Valve seating surface:			
Width		0.5 – 1.0 mm	– – –
Outside diameter:	Inlet	25.9 – 26.1 mm	– – –
	Exhaust	21.9 – 22.1 mm	– – –
Valve seat cutting angle:	Inlet	32°, 45°, 60°	– – –
	Exhaust	32°, 45°, 67.5°	– – –

Item		Standard	Service Limit
Cylinder, Pistons:			
Cylinder inside diameter		68.000 – 68.012 mm	68.10 mm
Piston diameter		67.942 – 67.958 mm	67.79 mm
Piston/cylinder clearance		0.042 – 0.070 mm	– – –
Piston ring/groove clearance:			
	Top	0.03 – 0.07 mm	0.17 mm
	Second	0.02 – 0.06 mm	0.16 mm
Piston ring thickness:	Top & Second	0.97 – 0.99 mm	0.90 mm
Piston ring groove width:	Top	1.02 – 1.04 mm	1.12 mm
	Second	1.01 – 1.03 mm	1.11 mm
	Oil	2.51 – 2.53 mm	2.60 mm
Piston ring end gap:	Top & Second	0.20 – 0.35 mm	0.7 mm

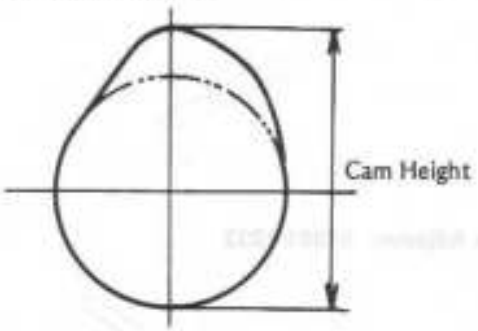
Valve Head



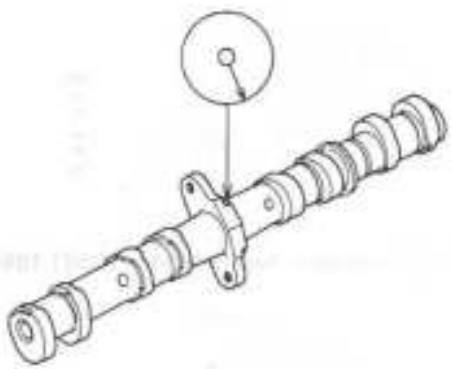
Valve Stem Bend



Cam Height Measurement



Camshaft Runout

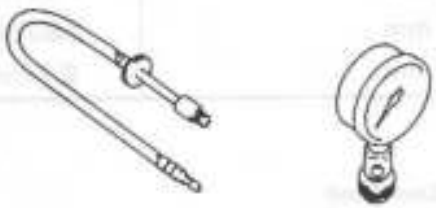


Special Tools

Piston Base: 57001-147



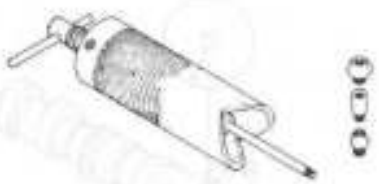
Compression Gauge: 57001-221
Adapter: 57001-1018



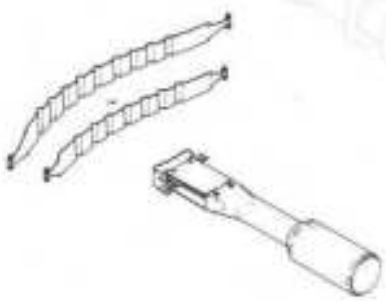
Valve Spring Compressor Assembly: 57001-241
Adapter: 57001-1202



Piston Pin Puller Assembly: 57001-910



Piston Ring Compressor Assembly (4): 57001-1094



Valve Seat Cutter 45°-φ24.5: 57001-1113
Valve Seat Cutter 45°-φ27.5: 57001-1114
Valve Seat Cutter 32°-φ25: 57001-1118
Valve Seat Cutter 32°-φ28: 57001-1119
Valve Seat Cutter 60°-φ30: 57001-1123
Valve Seat Cutter 67.5°-φ22: 57001-1207



Valve Guide Arbor: 57001-1203



Valve Guide Reamer: 57001-1204



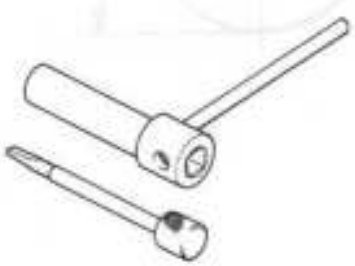
Valve Seat Cutter Holder: 57001-1208



Bar: 57001-1128



Valve Adjuster: 57001-1232

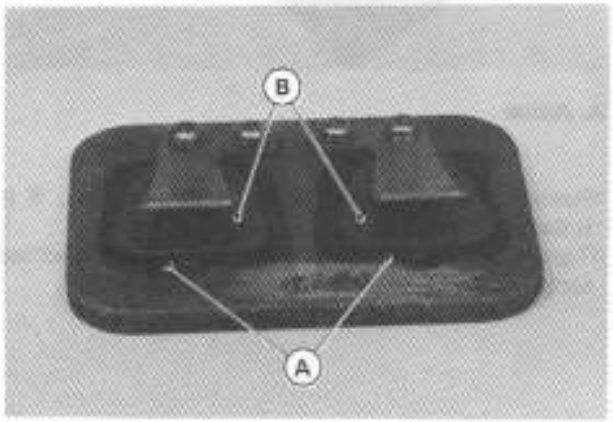


Clean Air System (US model)

Air Suction Valve Inspection

•Visually inspect the reeds for cracks, folds, warps, heat damage, or other damage.

★If there is any doubt as to the condition of the reed, replace the air suction valve as an assembly.



A. Valve Holder B. Reeds

•Check the reed contact areas of the valve holder for grooves, scratches, any signs of separation from the holder, or heat damage.

★If there is any doubt as to the condition of the reed contact areas, replace the air suction valve as an assembly.

•If any carbon or other foreign particles have accumulated between the reed and the reed contact area, wash the valve assembly clean with high flash-point solvent.

CAUTION

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

Vacuum Switch Valve Test

•Check the vacuum switch valve by blowing air into the air hose fitting.

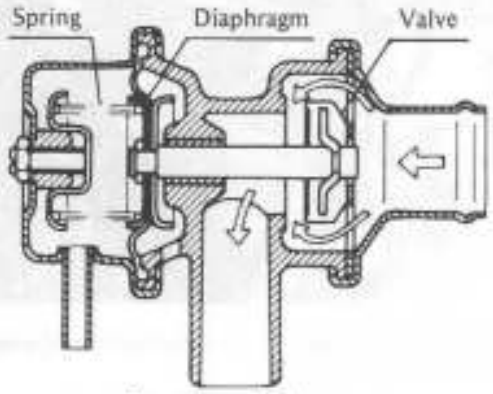
○When the vacuum applied to the vacuum hose fitting of the valve is low, the vacuum switch valve is opened and air flows through the air hose fittings.

○When the vacuum rises gradually and reaches a certain level, the valve is closed and air does not flow.

★If the vacuum switch valve does not operate as described, replace the valve.

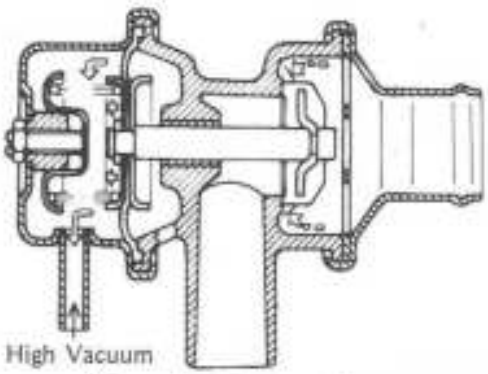
Vacuum Switch Valve Operation

1. During Cruising (open throttle)



Secondary air flows.

2. During Engine Braking



Secondary air cannot flow.

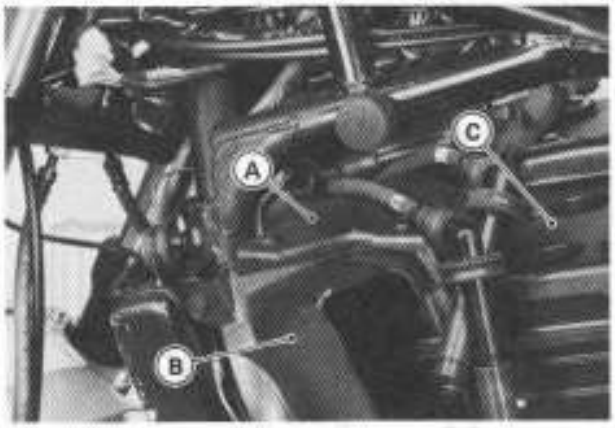
Vacuum Switch Valve Closing Pressure

Open → Close: 57 – 65 kPa (430 – 490 mmHg)

Cylinder Head Cover

Removal

•Remove the following.
Fairings
Fuel Tank
Spark Plug Caps
Baffle Plates (Left and Right Sides)
Baffle Plate (Upper)



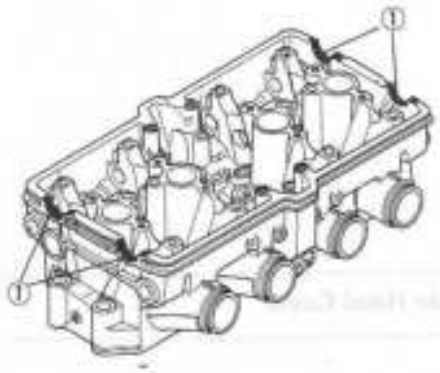
A. Baffle Plate (Upper)
B. Baffle Plate (Side)
C. Cylinder Head Cover

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

Installation

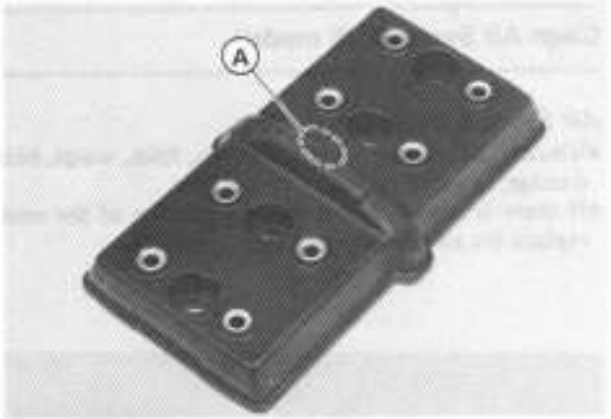
•Installation is the reverse of removal. Note the following.

○Apply a silicone sealant to the cylinder head as shown.



1. Silicone Sealant Applied Areas

○Point the arrow on the cylinder head cover forwards.



A. Arrow

○Replace the head-cover gasket with new one, if it is damaged.

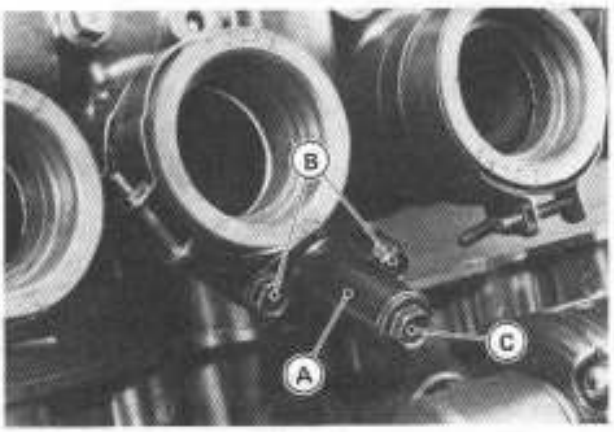
○Tighten the cylinder head cover bolts to the specified torque (see Exploded View).

Camshaft Chain Tensioner

Removal

•Remove the carburetors.

•Remove the mounting bolts and take off the camshaft chain tensioner.



A. Camshaft Chain Tensioner
B. Mounting Bolts
C. Cap Bolt

CAUTION

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

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

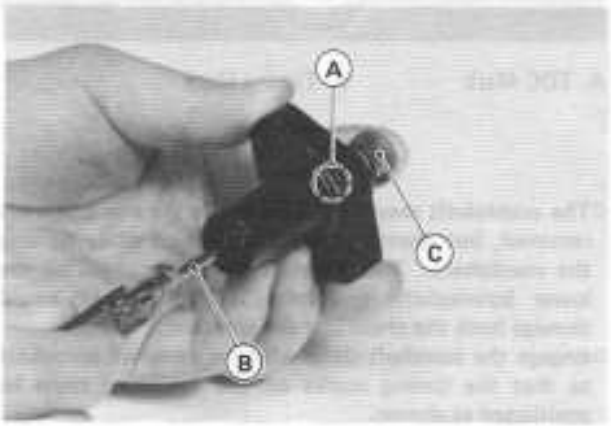
○Do not turn over the crankshaft while the tensioner is removed. This could upset the cam chain timing, and damage the valves.

Installation

●Perform the following.

○Remove the cap bolt.

○While compressing the push rod, turn it **clockwise** with a suitable screwdriver until the rod stops.



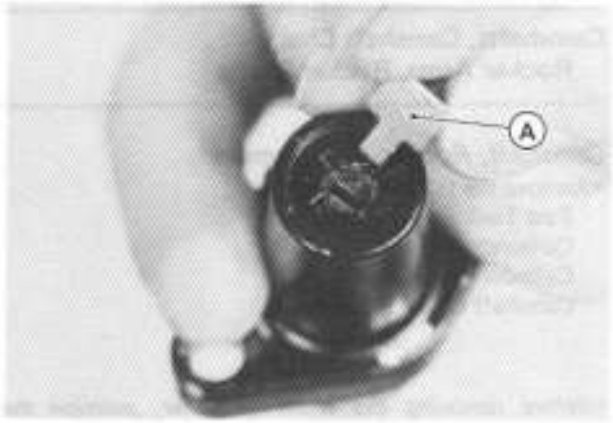
A. Turn clockwise.
B. Screwdriver
C. Push Rod

CAUTION

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

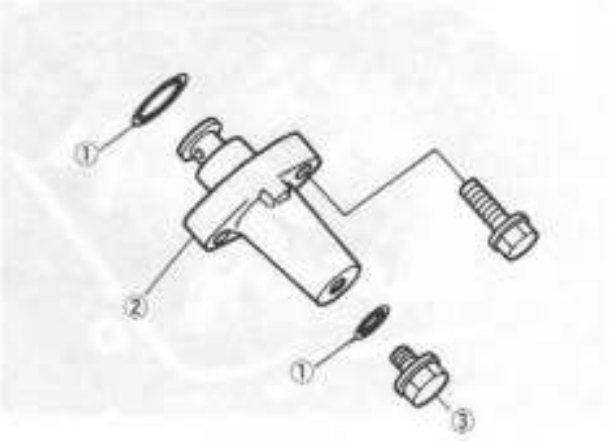
NOTE

○To make the procedure easy, use a holder plate to keep the rod from pushing out. A replacement chain tensioner (spare parts) has a push rod holder plate.



A. Holder Plate

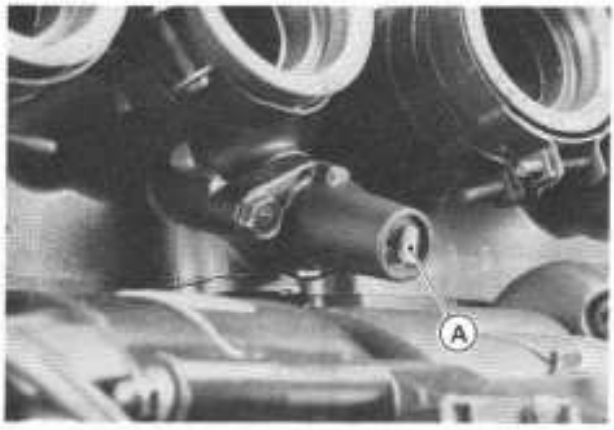
○Install the O-rings to the tensioner body and cap bolt.



1. O-ring
2. Chain Tensioner
3. Cap Bolt

○Tighten the tensioner mounting bolts to the specified torque (see Exploded View).

○Remove the holder plate and tighten the cap bolt to the specified torque (see Exploded View).



A. Holder Plate

Camshafts, Camshaft Chain, Rocker Arms, Rocker Shafts

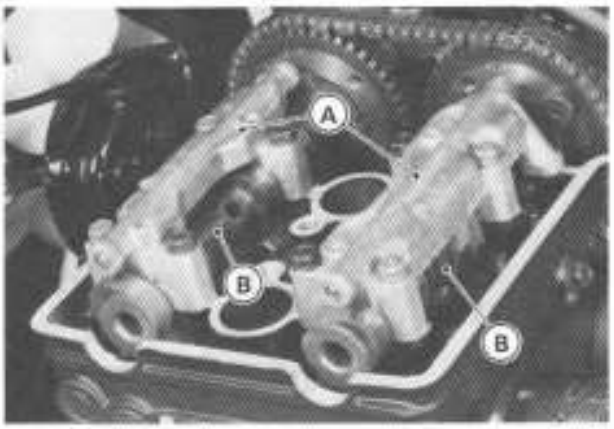
Camshaft, Rocker Arm Removal

●Remove the following.
Fuel Tank
Carburetors
Cylinder Head Cover
Camshaft Chain Tensioner

NOTE

○*Before removing the chain tensioner, position the crankshaft at #1, 4 piston TDC.*

●Remove the camshaft cap bolts and take off the camshaft caps and camshafts.



A. Camshaft Caps B. Camshafts

●Stuff a clean cloth into the chain tunnel to keep any parts from falling into the crankcase.
●Remove the rocker arms.

NOTE

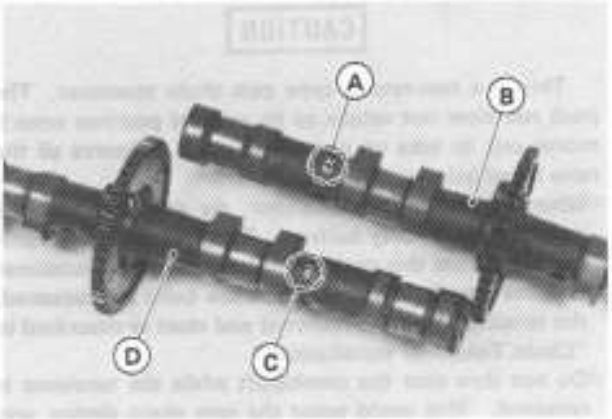
○*Mark and record the rocker arm locations so they can be reinstalled in their original positions.*

Camshaft Installation (Including Chain Timing Procedure)

●Be careful of the following.
○Apply clean engine oil to all cam parts and journals.

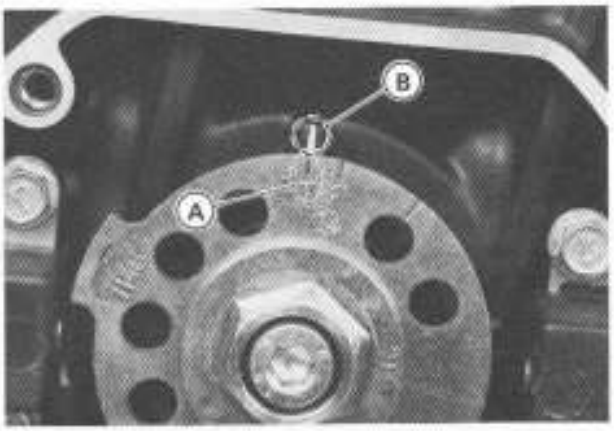
NOTE

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



A. EX Mark C. IN Mark
B. Exhaust Camshaft D. Inlet Camshaft

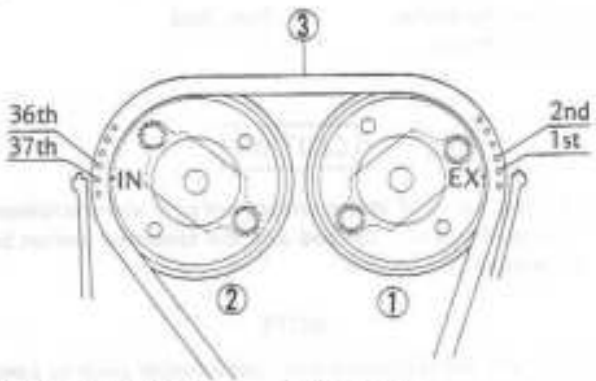
○Position the crankshaft at #1, 4 piston TDC.



A. TDC Mark B. Timing Mark

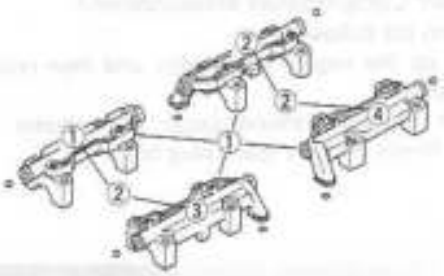
CAUTION

○The crankshaft may be turned, while the camshafts are removed, but always pull the chain taut while turning the crankshaft. This avoids kinking the chain on the lower (crankshaft) sprocket. A kinked chain could damage both the chain and the sprocket.
○Engage the camshaft chain with the camshaft sprockets so that the timing marks on the sprockets must be positioned as shown.



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

○In according to the camshaft cap location numbers, install the caps in the correct position as shown.



1. Camshaft Caps 2. Location Numbers

NOTE

○***Before installing the camshaft caps, be sure the O-rings are in place.***

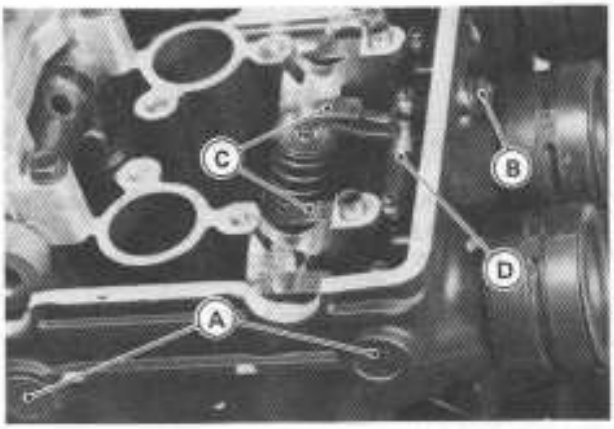
CAUTION

○**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 all camshaft cap bolts evenly to seat the camshafts in place, then torque all bolts to the specified torque (see Exploded View).

Rocker Shaft Removal

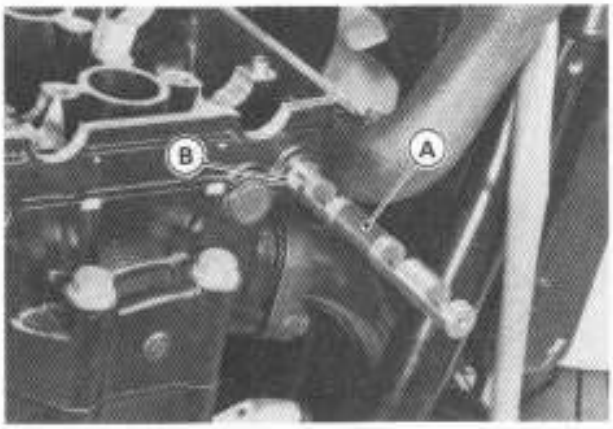
●Remove the camshafts.
●Remove the rocker arms.
●Remove the rocker shaft mounting bolts and tap out the shafts with the plugs using a soft metal rod.



A. Plugs C. Rocker Arms
B. Mounting Bolts D. Rocker Shafts

Rocker Shaft Installation

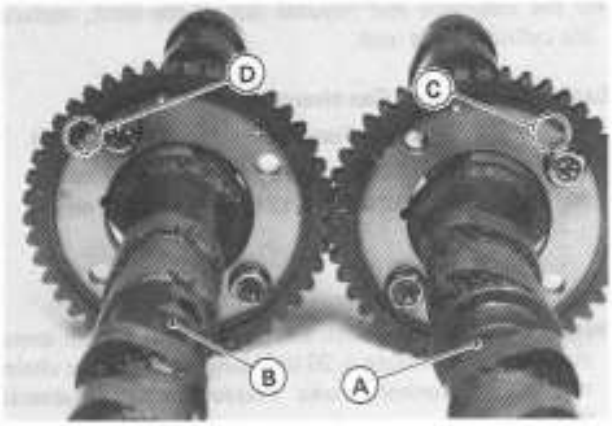
●Be careful of the following.
○Install the rocker shafts so that the bolt holes on the shafts come to the inside of the engine.



A. Rocker Shafts B. Bolt Holes

Camshaft, Sprocket Assembly

●Be careful of the following.
○The inlet and exhaust sprockets are identical. Use the bolt holes marked EX for the exhaust camshaft and IN for the inlet camshaft.



A. Exhaust Camshaft C. EX Mark
B. Inlet Camshaft D. IN Mark

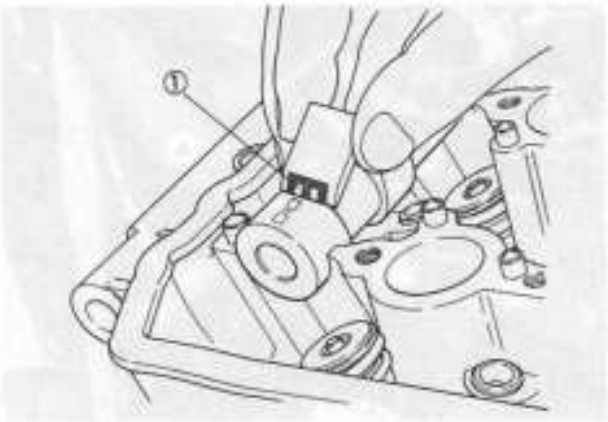
○Apply a non-permanent locking agent to the camshaft sprocket bolts and tighten them to the specified torque (see Exploded View).
○If the camshafts are replaced with new ones, apply a thin coat of a molybdenum disulfide grease to all cam parts and journals.

Camshaft, Camshaft Cap Wear

●Be careful of the following.
○Measure each clearance between the camshaft and the camshaft cap using plastigage (press gauge).

NOTE

○*Tighten the camshaft cap bolts to the specified torque (see Exploded View).*



1. Plastigage Width

NOTE

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

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

Camshaft, Camshaft Cap clearance

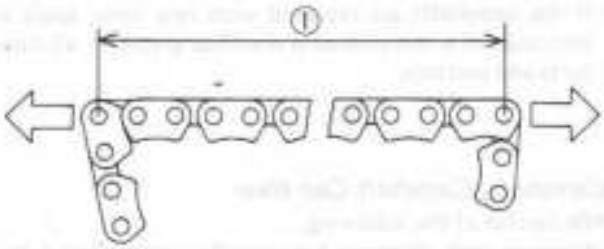
	Standard	Service Limit
#1, #4 journal	0.038 – 0.081 mm	0.17 mm
#2, #3 journal	0.088 – 0.131 mm	0.22 mm

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:	158.8 – 159.0 mm
Service Limit:	161.2 mm

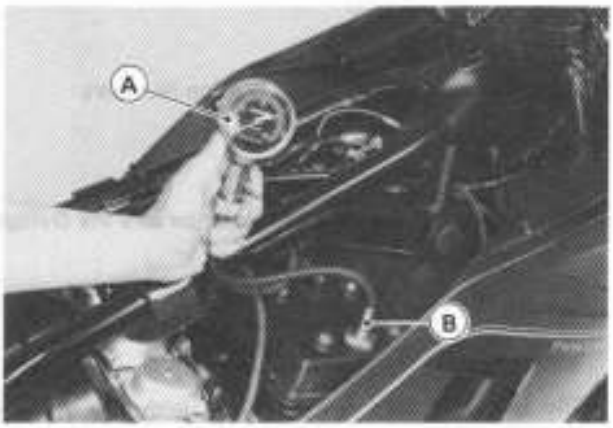


1. 20-link Length

Cylinder Head

Cylinder Compression Measurement

●Perform the following.
○Warm up the engine thoroughly and then remove the spark plugs.
○Attach the compression gauge and adapter (special tools) firmly into the spark plug hole.



A. Compression Gauge: 57001-221
B. Adapter: 57001-1018

○Hold the throttle wide open and crank the engine with the starter.
○When the gauge stops rising, stop cranking and read the gauge.

Cylinder Compression

Usable Range: 890 – 1370 kPa (9.1 – 14.0 kg/cm², 129 – 199 psi)

NOTE

○*Use the battery which is fully charged.*

★If cylinder compression is higher than the specified range, check the following.
○Carbon build-up on the cylinder head combustion chamber
○Carbon build-up on the piston head
★If cylinder compression is lower than the specified range, check the following.
○Valve not seating properly
○Piston/cylinder clearance excessive
○Gas leakage around the cylinder head gasket
○Valve clearance too small

Removal

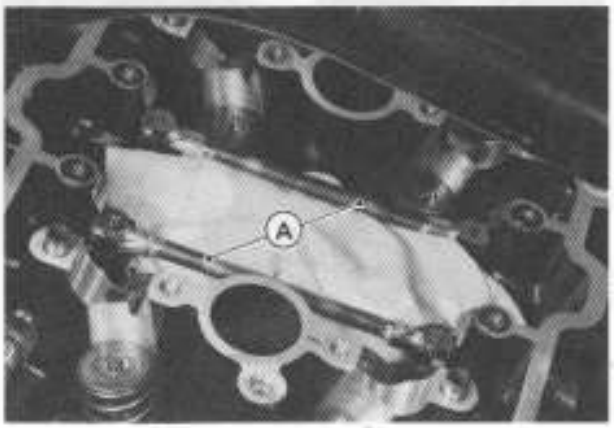
●Remove the following.
Fairing
Coolant
Engine Oil
Fuel Tank
Radiator
Horns
Mufflers
Oil Hose (front of cylinder head)
Carburetors
Cylinder Head cover
Camshaft Chain Tensioner

NOTE

○*Before removing the camshaft chain tensioner position the crankshaft at #1, 4 piston TDC.*

Camshafts

●Remove the oil pipes from the cylinder head.



A. Oil Pipes

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

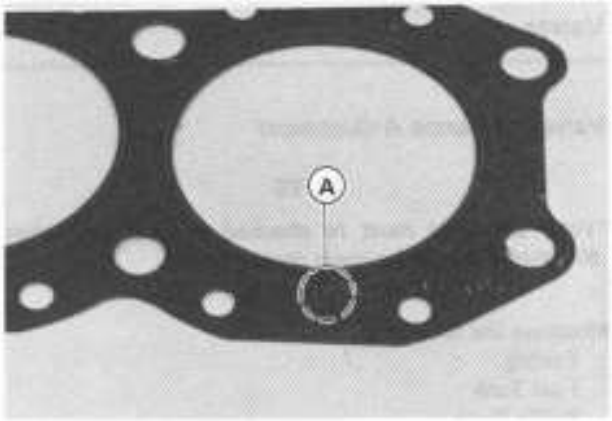
Installation

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

○Replace the cylinder head gasket with a new one.

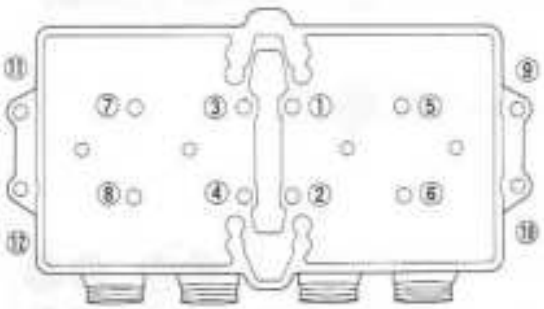
NOTE

○*Install the new cylinder head gasket with the side marked UP facing up.*



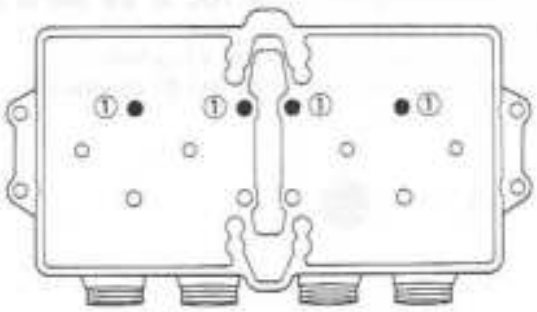
A. UP Mark

○Tighten the cylinder head bolts following the tightening sequence to the specified torque (see Exploded View).



NOTE

○*There are two types of the cylinder head bolt, longer and shorter. The longer bolts must be installed to the exhaust side.*



1. Longer Bolts (Length 148 mm)

○Apply engine oil to both upper and lower sides of the cylinder head bolt washers.

○Tighten the oil hose banjo bolts to the specified torque (see Exploded View).

Valves

Valve Clearance Adjustment

NOTE

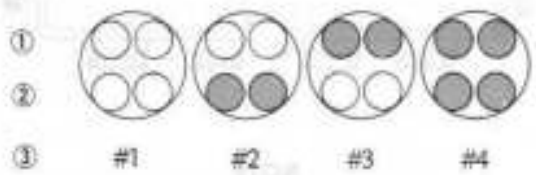
○*Valve clearance must be checked and adjusted when the engine is cold (at room temperature).*

●Remove the following.
Fairing
Fuel Tank
Baffle Plate
Pickup Coil Cover
Cylinder Head Cover

●Using a thickness gauge, measure the valve clearance between the rocker arm and the cam.

○**When positioning #4 piston TDC at the end of the compression stroke:**
inlet valve clearance of #2 and #4 cylinders
exhaust valve clearance of #3 and #4 cylinders

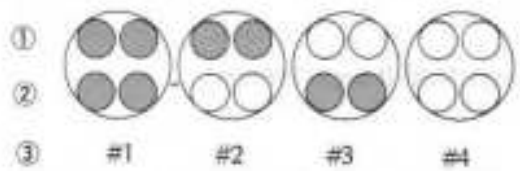
Measuring Valves



1. Exhaust Valves
2. Inlet Valves
3. Cylinder Numbers

○**When positioning #1 piston TDC at the end of the compression stroke:**
inlet valve clearance of #1 and #3 cylinders
exhaust valve clearance of #1 and #2 cylinders

Measuring Valves



1. Exhaust Valves
2. Inlet Valves
3. Cylinder Numbers

Valve Clearance (between Cam and Rocker Arm)

Standard:	**Inlet:**	**0.08 – 0.13 mm**
	Exhaust:	**0.12 – 0.17 mm**

●Valve clearance can be measured between the valve stem and the rocker arm. In this case, the valve clearance specification is the following.

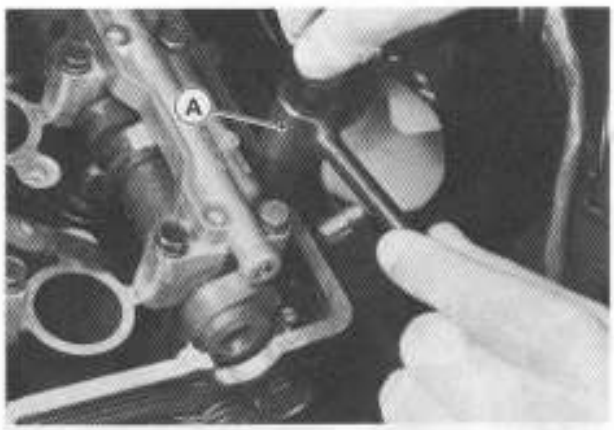
Valve Clearance (between Valve Stem and Rocker Arm)

Standard:	Inlet:	0.13 – 0.18 mm
	Exhaust:	0.18 – 0.23 mm

★If the valve clearance is not within the specified range, adjust the valve clearance.

●Perform the following to adjust the valve clearance.

○Using the valve adjuster (special tool), loosen the valve adjusting screw locknut.



A. Valve Adjuster: 57001-1232

○Turn the valve adjusting screw until the correct clearance is obtained.

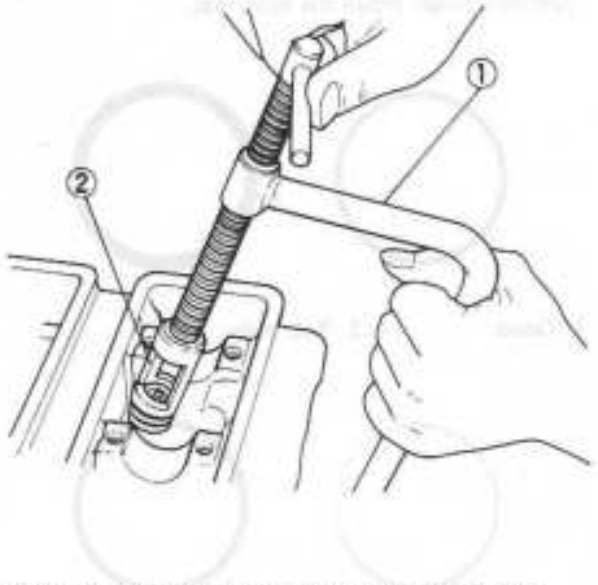
○Holding the valve adjusting screw with the holder of the valve adjuster (special tool), tighten the locknut to the specified torque (see Exploded View).

○Install the removed parts.

Valve Removal

●Perform the following.

○Using the valve spring compressor assembly and adapter (special tools), remove the valve.



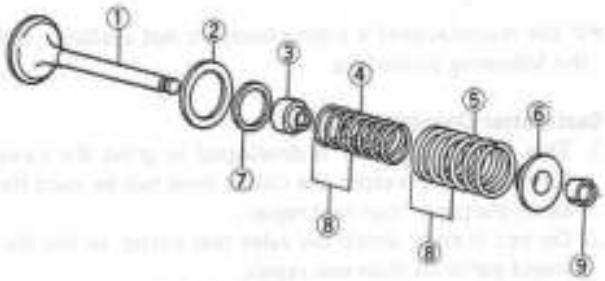
1. Valve Spring Compressor Assembly: 57001-241
2. Adapter: 57001-1202

Valve Installation

●Be careful of the following.

○Apply a thin coat of molybdenum disulfide grease to the valve stem before valve installation.

○Install the springs so that the closed coil end faces downwards.



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

Valve Guide Removal

●Perform the following.

○Using the valve guide arbor (special tool), tap out the valve guide.



1. Valve Guide Arbor: 57001-1203

NOTE

○*Heat the area around the valve guide to 120 – 150°C (248 – 302°F).*

Valve Guide Installation

●Perform the following.

○Using the valve guide arbor (special tool), drive the valve guide until its flange touches to the cylinder head.

NOTE

○*Heat the area around the valve guide hole to 120 – 150°C (248 – 302°F).*

○*Apply oil to the valve guide outer surface before valve guide installation.*

○*Using the valve guide reamer (special tool), ream the valve guide.*



1. Valve Guide Reamer: 57001-1204

Valve Face Contact Inspection

●Check the valve face seating surface width.

○Measure the seat width of the portion where there is no build-up carbon (white portion) of the valve face with a vernier caliper.

★If the valve face seating surface width is not within the specified range, replace the valve with a new one.

Valve Seat Outside Diameter

●If the outside diameter of the seating pattern on the valve seat is too large or too small, repair the valve seat.

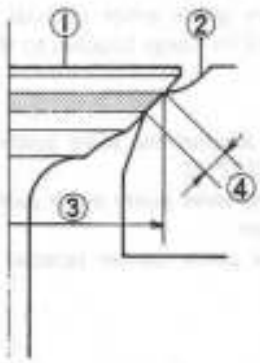
Valve Seating Surface Outside Diameter

Standard:	**Inlet:**	**25.9 – 26.1 mm**
	Exhaust:	**21.9 – 22.1 mm**

Valve Seat Width Inspection

●Check the valve seating surface width.

○Measure the seat width of the portion where there is no build-up carbon (white portion) of the valve seat with a vernier caliper.

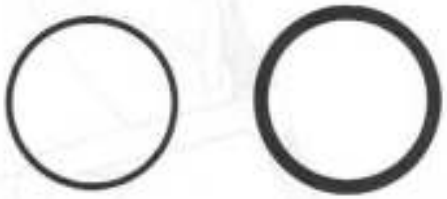


1. Valve
2. Valve Seat
3. Seating Surface Outside Diameter
4. Seating Surface Width

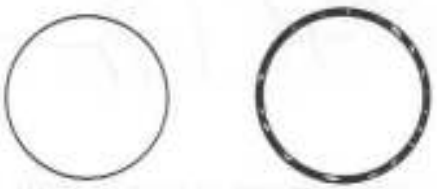
Valve Seating Surface Width (IN and EX)

Standard:	**0.5 – 1.0 mm**

★If the valve seating surface width is not within the specified range, repair the valve seat.



1. Good 2. Too wide



3. Too narrow 4. Uneven

Valve Seat Repair (Valve Lapping)

●Using the valve seat cutters (special tools), repair the valve seat.

Valve Seat Cutters

Inlet Valves:	**45° – φ27.5**	**57001-1114**
	32° – φ28	**57001-1119**
	60° – φ30	**57001-1123**
Exhaust Valves:	**45° – φ24.5**	**57001-1113**
	32° – φ25	**57001-1118**
	67.5° – φ22	**57001-1207**

Holder and Bar

Holder:	**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 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 than seat repair.
3. Do not fail to apply engine oil to the valve seat cutter before grinding the seat surface. Also wash off ground particles sticking to the cutter with washing oil.

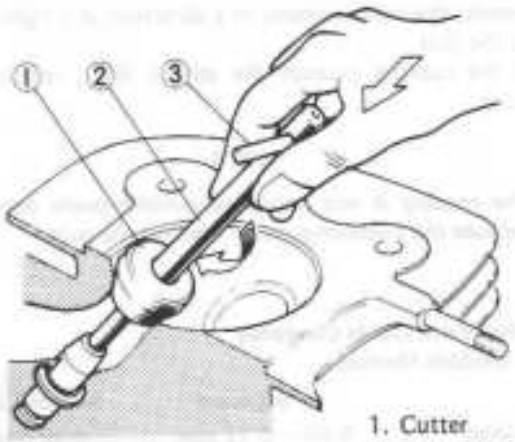
NOTE

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

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

NOTE

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



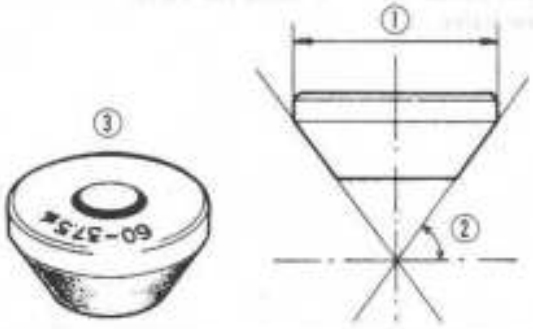
1. Cutter
2. Cutter Holder
3. Bar

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.

45° . . . . . .Cutter angle
24.5φ . . . . . .Outer diameter of cutter



1. Outer Diameter of Cutter
2. Angle of Cutter
3. Cutter

Operating Procedures:

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

CAUTION

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

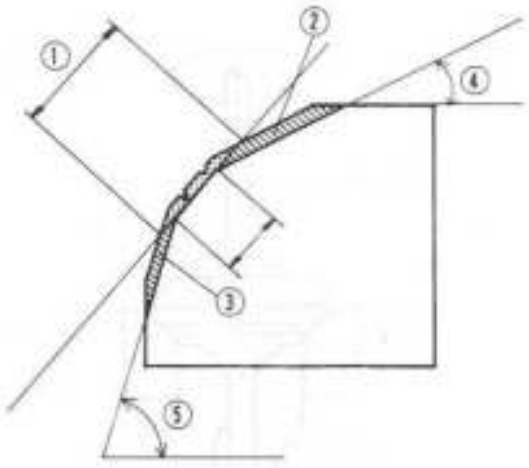
- Measure the outside diameter of the seating surface with a vernier caliper.
- ★If the outside diameter of the seating surface is too small, repeat the 45° grind until the diameter is within the specified range.
- ★If the outside diameter of the seating surface is too large, make the 32° grind described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

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

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

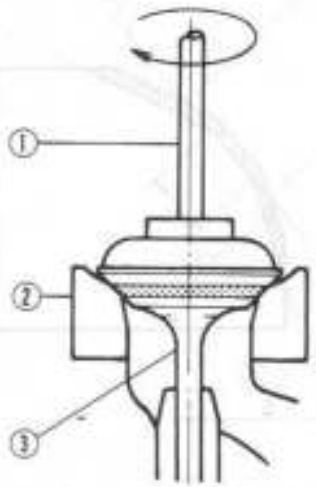
CAUTION

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



1. Widened width of engagement by machining with 45° cutter
2. Ground volume by 32° cutter
3. Ground volume by 67.5° cutter
4. 32°
5. 67.5°

○After making the 32° grind, return to the seat O.D. measurement step above.
●To measure the seat width, use a vernier caliper to measure the width of the 45° angle portion of the seat at several places around the seat.
★If the seat width is too narrow, repeat the 45° grind until the seat is slightly too wide, and then return to the seat O.D. measurement step above.
★If the seat width is too wide, make the 67.5° grind described below.
●Grind the seat at a 67.5° angle until the seat width is within the specified range.
○To make the 67.5° grind, fit 67.5° cutter to the holder holder, and slide it into the valve guide.
○Turn the holder, while pressing down lightly.
○After marking the 67.5° grind, return to the seat width measurement step above.
●Lap the valve to the seat, once the seat width and O.D. are within the ranges specified above.
○Put a little coarse grinding compound on the face of the valve in a number of places around the valve head.
○Spin the valve against the seat until the grinding compound produces a smooth, matched surface on both the seat and the valve.
○Repeat the process with a fine grinding compound.
●The seating area should be marked about in the middle of the valve face.
★If the seat area is not in the right place on the valve, check to be sure the valve is the correct part. If it is, it may have been refaced too much; replace it.
●Be sure to remove all grinding compound before assembly.
●When the engine is assembled, be sure to adjust the valve clearance (see Valve Clearance Adjustment).



1. Lapper
2. Valve Seat
3. Valve

Measuring Valve-to-Guide Clearance (Wobble Method)

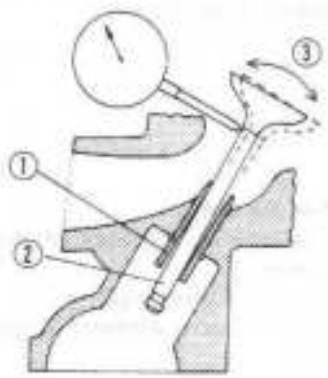
If a small bore gauge is not available, inspect the valve guide wear by measuring the valve to valve guide clearance with the wobble method, as indicated below.
●Insert a new valve into the guide against the stem perpendicular to it as close as possible to the cylinder head mating surface.
●Move the 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)

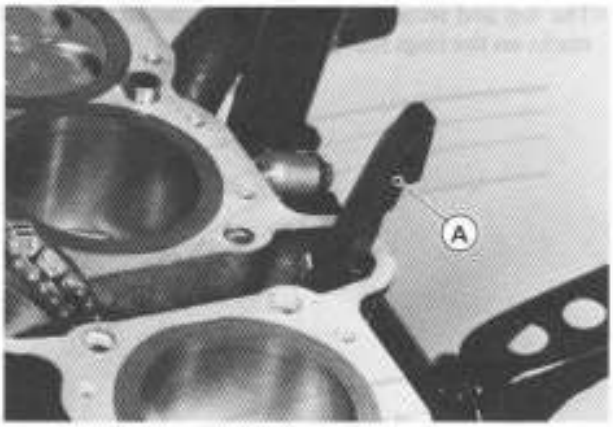
	Standard	Service Limit
Inlet	0.03 ~ 0.12 mm	0.30 mm
Exhaust	0.10 ~ 0.19 mm	0.37 mm



1. Valve Guide
2. New Valve
3. Move the Valve.

Cylinders, Pistons

Cylinder Removal
●Remove the cylinder head.
●Pull out the camshaft chain guide (exhaust side).



A. Chain Guide

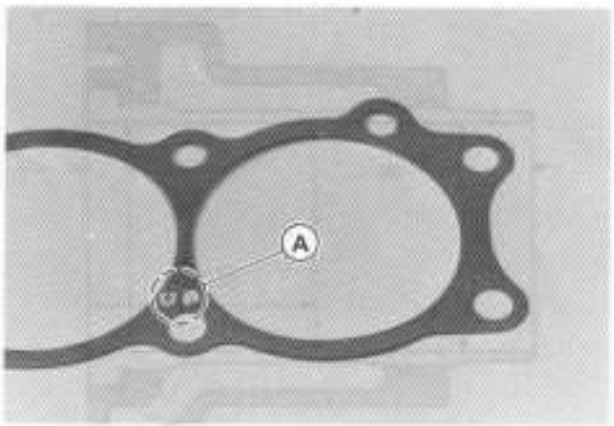
○Remove the water hose and then the cylinder block.

Cylinder Installation

●Be careful of the following.
○Replace the cylinder base gasket with a new one.

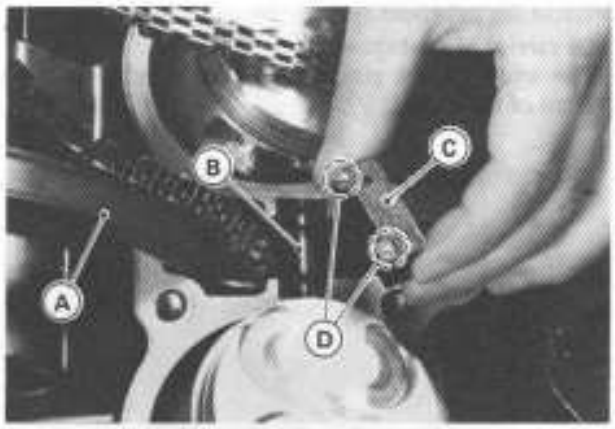
NOTE

○*Install the cylinder base gasket with its side marked UP facing upwards.*



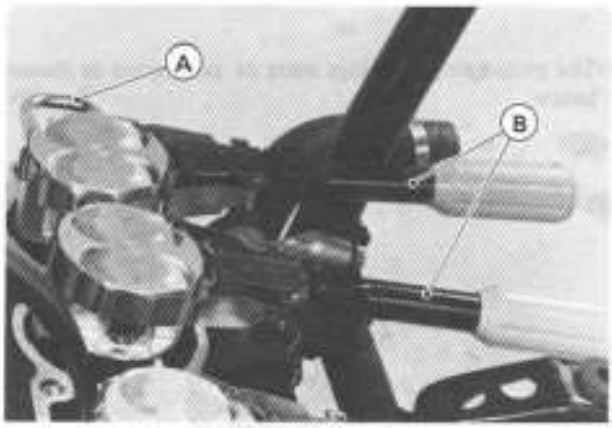
A. UP Mark

○Put the camshaft chain guide (inlet side) on the upper crankcase and install it with the holder. The arrow on the holder must point toward the front.



A. Chain Guide
B. Pin
C. Holder
D. Arrow

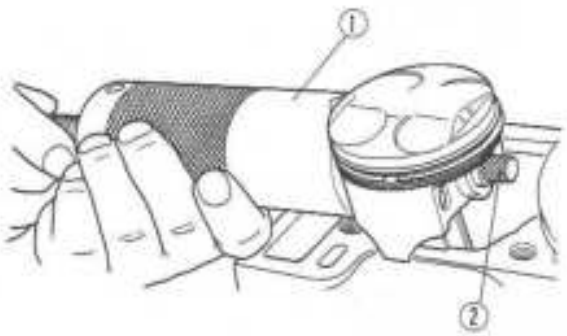
○Using the piston base and piston ring compressor assemblies (special tools), install the cylinder block.



A. Piston Base: 57001-147
B. Piston Ring Compressor Assembly: 57001-1094

Piston Removal

●Remove the cylinder block.
●Place a clean cloth under the pistons and remove the piston pin snap rings from the outside of each piston.
○Using the piston pin puller assembly (special tool), remove the piston pins.



1. Piston Pin Puller Assembly: 57001-910
2. Adapter

Piston Installation

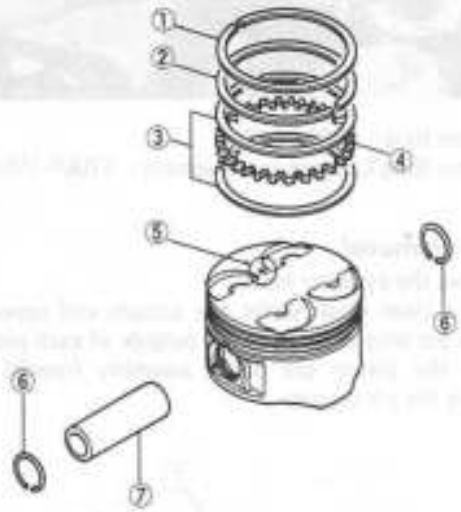
●Be careful of the following.

○The arrow on the piston head must point toward the front of the engine.



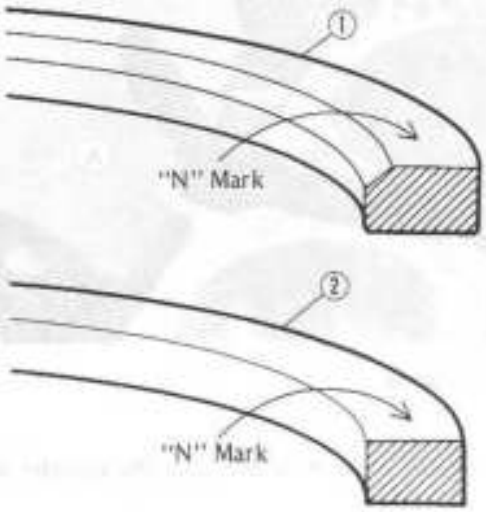
A. Arrow

○The piston ring openings must be positioned as shown below.



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

○The top and second rings must be installed with the N marks on the rings facing up.



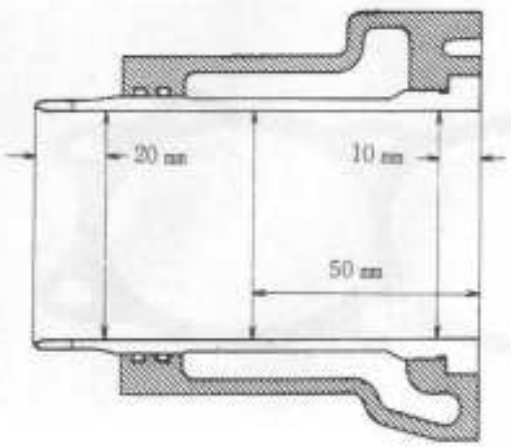
1. Top Ring 2. 2nd Ring

CAUTION

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

Cylinder Wear

●Measure the cylinder inside diameter taking a side-to-side and a front-to back measurement at each of the 3 positions (total of 6 measurements) shown below.



Cylinder Inside Diameter

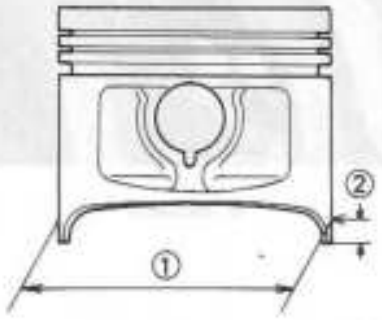
Standard:	**68.000 – 68.012 mm**
Service Limit:	**68.10 mm**

Piston Wear

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

Piston Outside Diameter

Standard:	**67.942 – 67.985 mm**
Service Limit:	**67.79 mm**



1. Piston Outside Diameter
2. 5 mm up from bottom

Piston Ring, Piston Ring Groove Wear

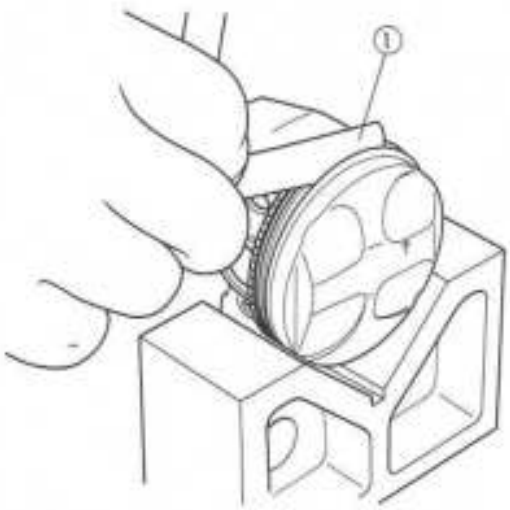
•Check for uneven groove wear by inspecting the ring seating.

*The rings should fit perfectly parallel to the groove surfaces. If not, the piston must be replaced.

•With the piston rings in their grooves, make several measurements with a thickness gauge to determine piston ring/groove clearance.

Piston Ring Groove Clearance

	Standard	Service Limit
Top	**0.03 ~ 0.07 mm**	**0.17 mm**
Second	**0.02 ~ 0.06 mm**	**0.16 mm**



1. Thickness Gauge

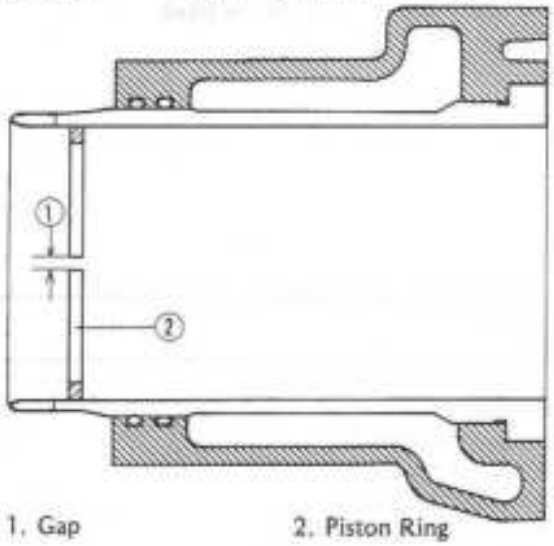
Piston Ring End Gap

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

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

Piston Ring End Gap

	Standard	Service Limit
Top	**0.20 ~ 0.35 mm**	**0.7 mm**
Second	**0.20 ~ 0.35 mm**	**0.7 mm**



1. Gap
2. Piston Ring

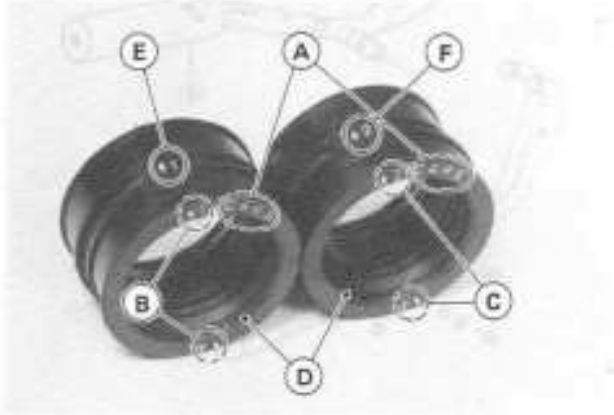
Carburetor Holders

Installation

•Be careful of the following.

○Install the carburetor holders with the CARB marks on them facing rearwards.

○There are two types of the carburetor holder, for #1, 4 carburetors and #2, 3 carburetors. Do not mix up them.



A. CARB Mark
B. Mark for #1, 4
C. Mark for #2, 3
D. Carburetor Holders
E. Holder for #1 Carburetor
F. Holder for #2 carburetor

○Install the holder clamps being careful of the screw position and the screw head direction.

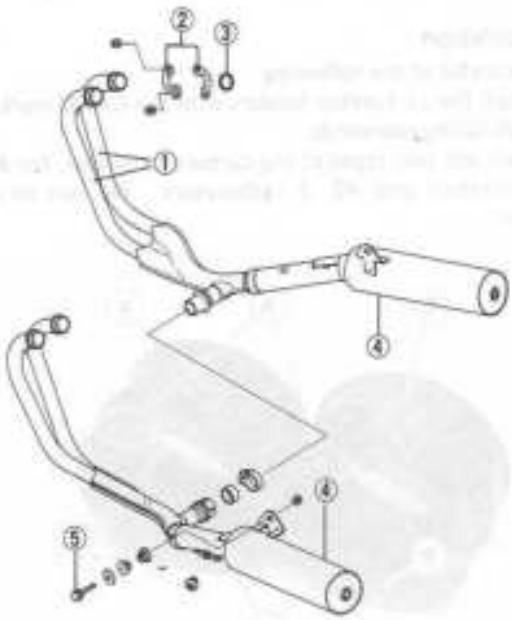


1. Holder Clamp
2. Screw
3. Screw Head

Muffler

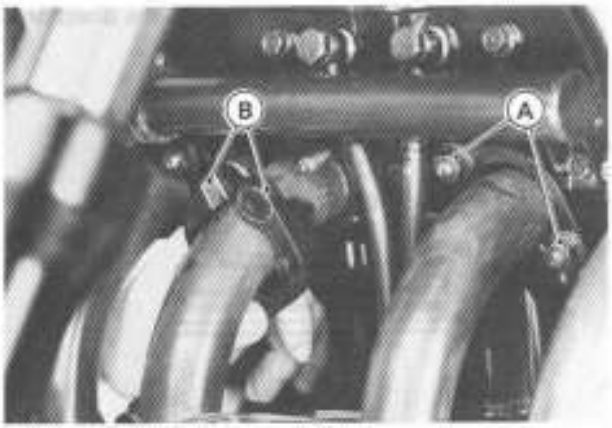
Removal

●Remove the following.
Coolant (draining)
Radiator
Oil Cooler (from Oil Pan)
Horns (both left and right)
Muffler Mounting Bolts
(Rear Footpeg Bracket Mounting)



1. Exhaust Pipes
2. Holders
3. Exhaust Gasket
4. Muffler
5. Mounting Bolt

●Remove the nuts and take off the exhaust pipe holders.



A. Nuts
B. Holders

Installation

●Installation is the reverse of removal. Note the following.
○Replace the exhaust gaskets with new ones.
○Check the cooling system for leaks.

Clutch

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- Bleeding the Clutch Line 5-5

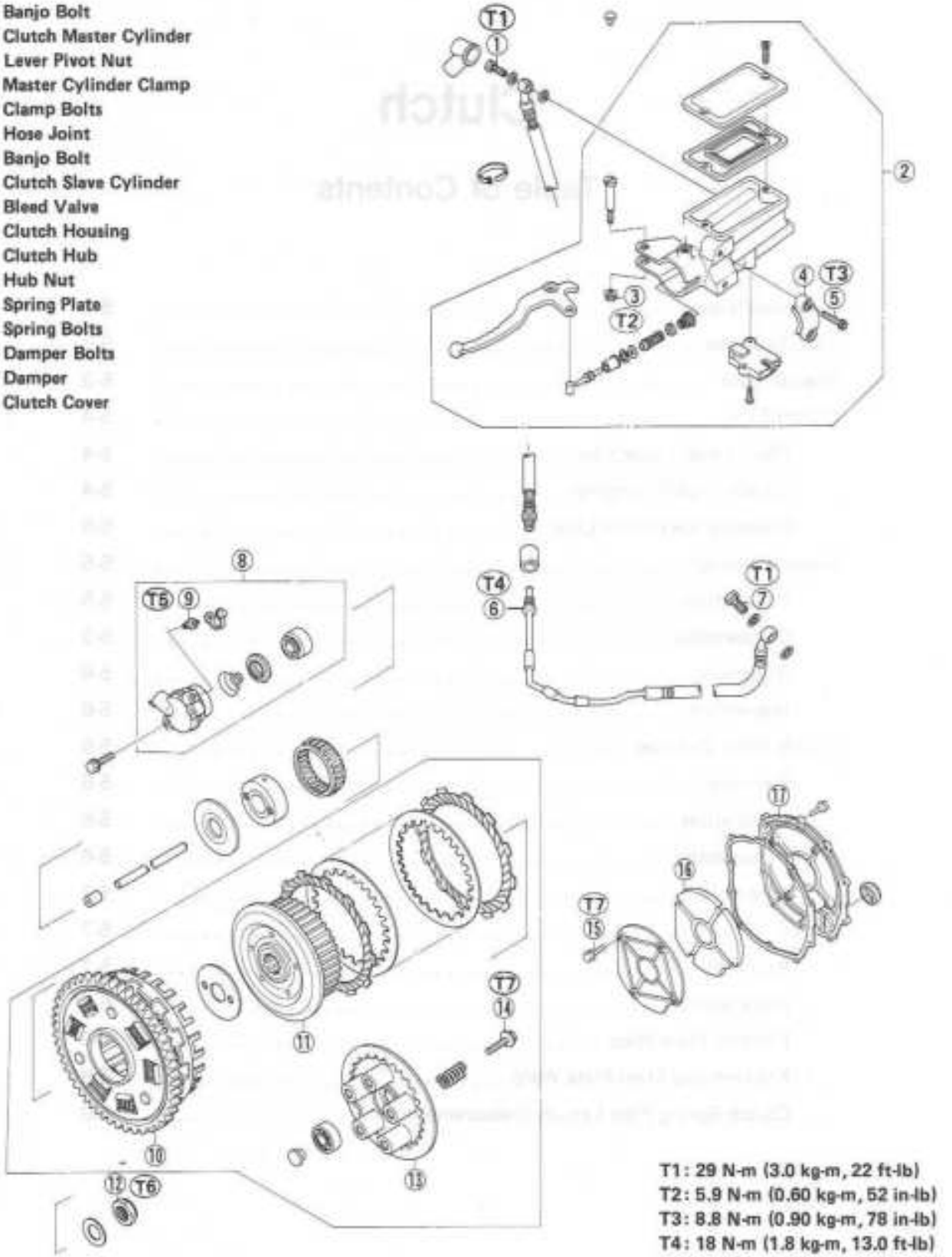
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Exploded View

1. Banjo Bolt
2. Clutch Master Cylinder
3. Lever Pivot Nut
4. Master Cylinder Clamp
5. Clamp Bolts
6. Hose Joint
7. Banjo Bolt
8. Clutch Slave Cylinder
9. Bleed Valve
10. Clutch Housing
11. Clutch Hub
12. Hub Nut
13. Spring Plate
14. Spring Bolts
15. Damper Bolts
16. Damper
17. Clutch Cover



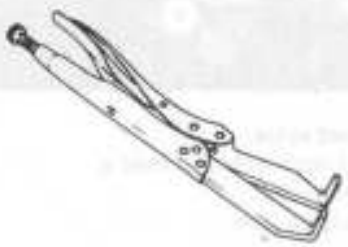
T1: 29 N-m (3.0 kg-m, 22 ft-lb)
T2: 5.9 N-m (0.60 kg-m, 52 in-lb)
T3: 8.8 N-m (0.90 kg-m, 78 in-lb)
T4: 18 N-m (1.8 kg-m, 13.0 ft-lb)
T5: 7.8 N-m (0.80 kg-m, 69 in-lb)
T6: 135 N-m (14.0 kg-m, 100 ft-lb)
T7: 9.8 N-m (1.0 kg-m, 87 in-lb)

Specifications

Item		Standard	Service Limit
Clutch Fluid:	Grade	D.O.T.4 Heavy Duty Brake Fluid	
	Brand (recommended)	Castrol Girling-Universal Castrol GT (LMA) Castrol Disc Brake Fluid Castrol Shock Premium Heavy Duty	
Clutch:	Friction plate thickness	2.9 – 3.1 mm	2.8 mm
	Friction and steel plate warp	Less than 0.2 mm	0.3 mm
	Clutch spring free length	36.4 mm	35.1 mm

Special Tool

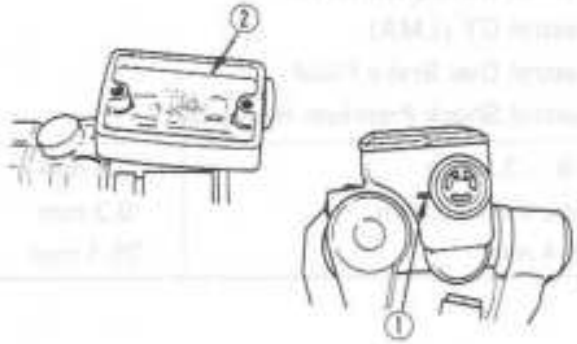
Clutch Holder: 57001-305



Clutch Fluid

Fluid Level Inspection

●Check the clutch fluid level in the reservoir.



1. Lower Level Line 2. Upper Level Line

NOTE

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

★If the fluid level is lower than the lower level line, fill the reservoir to the upper level line in the reservoir.

WARNING

○**Change the fluid in the clutch line completely if the fluid must be refilled but the type and brand of the 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 fluid lowers the fluid boiling point and could cause the clutch to be ineffective. It may also cause the rubber clutch parts to deteriorate.**

Recommended Clutch Fluid

Grade:	**D.O.T.4 Heavy Duty Brake Fluid**
Brand:	**Castrol Girling-Universal**
	Castrol GT (LMA)
	Castrol Disc Brake Fluid
	Check Shock Premium Heavy Duty

NOTE

○*Since the clutch fluid is the same as the brake fluid, refer to Brake Fluid Section in Brakes for further details.*

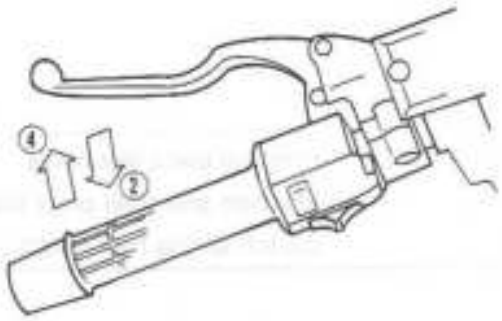
Clutch Fluid Changing

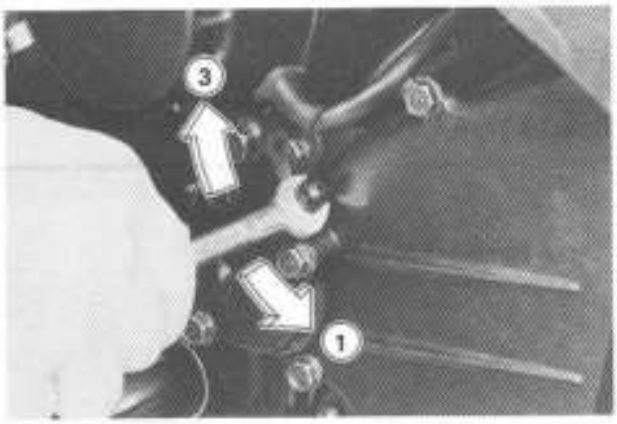
●Remove the reservoir cap, and remove the rubber cap on the bleed valve.

●Attach a clear plastic hose to the bleed valve on the clutch slave cylinder, and run the other end of the hose into a container.

●Fill the reservoir with fresh fluid.

●Change the clutch fluid as follows.





1. Open the bleed value.
2. Squeeze the clutch lever and hold it.
3. Close the bleed value.
4. Release the clutch lever.

○Repeat this operation until fresh fluid comes out into the plastic hose (fluid color changes).

○Check the fluid level in the reservoir as often as necessary and replenish the fluid to keep it from running completely out.

NOTE

○*If the fluid in the reservoir runs completely out any time during fluid changing, the bleeding operation must be done since air will have entered the line.*

WARNING

○**Do not mix two brands of fluid.**

Bleeding the Clutch Line

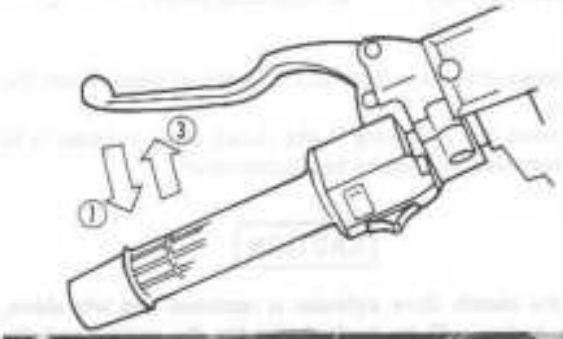
•With the reservoir cap off, slowly pump the clutch lever several times until no air bubbles can be seen rising up through the fluid from the holes at the bottom of the reservoir. This bleeds the air from the master cylinder end of the line.

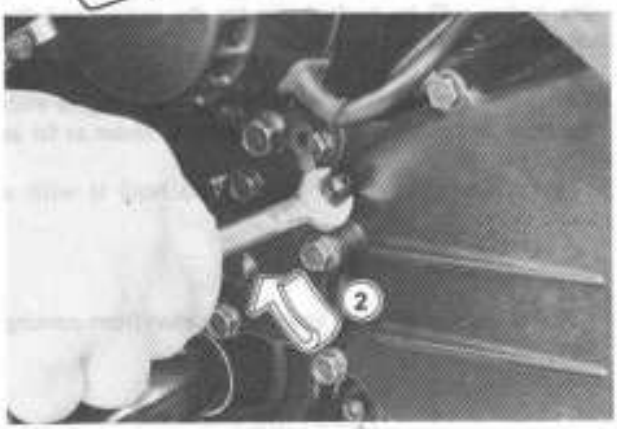
NOTE

○*Tap the clutch hose lighting going from the lower side to the upper side and let the air off from the reservoir.*

•Attach a clear plastic hose to the bleed valve on the clutch slave cylinder, and run the other end of the hose into a container.

•Bleed the clutch line as follows.





1. Pump the clutch lever a few times until it becomes hard and then hold it squeezed.
2. Quickly open and close the bleed valve.
3. Release the clutch lever.

○Repeat this operation until no more air can be seen coming out into the plastic hose.

○Check the fluid level in the reservoir as often as necessary and replenish the fluid to keep it from running completely out.

NOTE

○*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.*

WARNING

○**Do not mix two brands of fluid.**

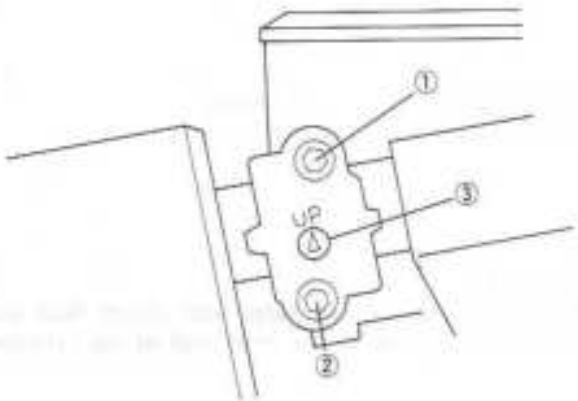
Master Cylinder

Installation

•When installing the clutch master cylinder, be careful of following.

○Install the master cylinder clamp with the arrow on it pointing upwards.

○Tighten the upper clamp bolt first, and then the lower clamp bolt to the specified torque (see Exploded View).



1. Tighten upper clamp bolt first.
2. Lower Clamp Bolt
3. Arrow

○Replace the aluminum washer on each side of the clutch hose fitting with a new one.

○Tighten the banjo bolt to the specified torque (see Exploded View).

•Perform the following after installing the master cylinder.

Bleeding of Clutch Line
Checking of Clutch Operation
Checking of Fluid Leakage

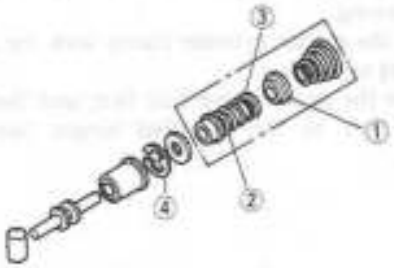
Disassembly

•Remove the following.

Clutch Lever
Dust Cover
Circlip
Piston and Secondary Cup, Primary Cup
Spring

NOTE

○*Do not remove the secondary cup from the piston.*



1. Primary Cup
2. Secondary Cup
3. Piston
4. Circlip

Assembly

•Clean the disassembled parts with clutch fluid and apply clutch fluid to the inner wall of the cylinder.

CAUTION

○**Take care not to scratch the piston or the inner wall of the cylinder.**

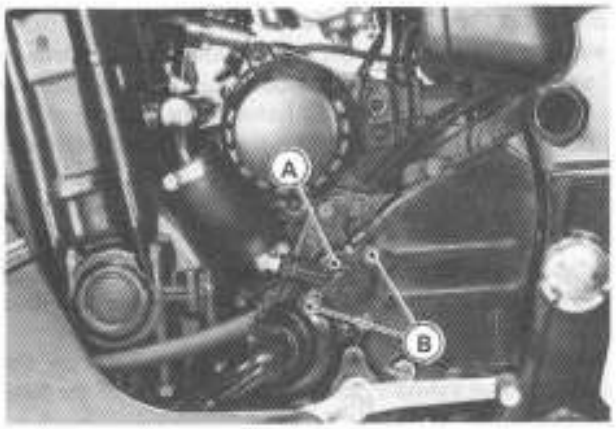
Inspection

•Check the following for wear, damage, cracks, or deterioration:
Cylinder Inner Wall and Piston
Primary and Secondary Cups
Dust Cover
Spring
•Check that the relief and supply ports on the cylinder are not plugged.

Clutch Slave Cylinder

Removal

•Perform the following if the clutch slave cylinder is to be disassembled.
○Loosen the clutch hose banjo bolt on the clutch slave cylinder.
○Remove the mounting bolts and take off the clutch slave cylinder.



A. Slave Cylinder B. Mounting Bolts

○Remove the banjo bolt and free the cylinder from the hose.
•Perform the following if the clutch slave cylinder is to be removed but not to be disassembled.

CAUTION

○**If the clutch slave cylinder is removed and left alone, the piston will be pushed out by the spring and the clutch fluid will be drained.**

○Remove the clutch slave cylinder from the engine with the hose and push the piston into the cylinder as far as it will go.
○Squeeze the clutch lever slowly and hold it with a band.

NOTE

○*Holding the clutch lever keeps the piston from coming out.*

CAUTION

○**Immediately wipe up any brake fluid that spills it may painted or plated surfaces.**

Installation

•Replace the aluminum washers on each side of the clutch hose fitting with new ones.
•Tighten the banjo bolt to the specified torque (see Exploded View).
•Check the fluid level in the master cylinder reservoir, and bleed the air in the clutch line.
•Check the clutch operation.

Disassembly

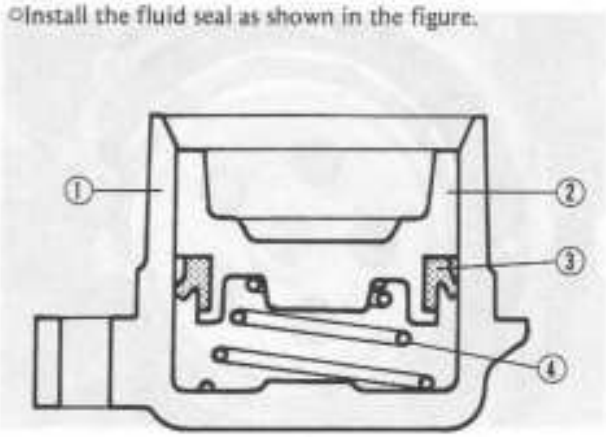
•Leaving the clutch slave cylinder removed, remove the piston slowly out of its place by the spring.

Assembly

●Perform the following.

○Apply clutch fluid to the outside of the piston and the fluid seal.

○Install the fluid seal as shown in the figure.



1. Cylinder
2. Piston
3. Fluid Seal
4. Spring

CAUTION

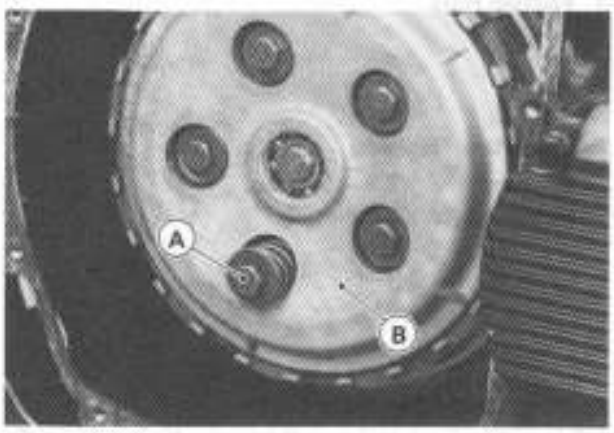
○Replace the fluid seal with a new one if it was removed from the piston.

Clutch

Removal

●Remove the following.

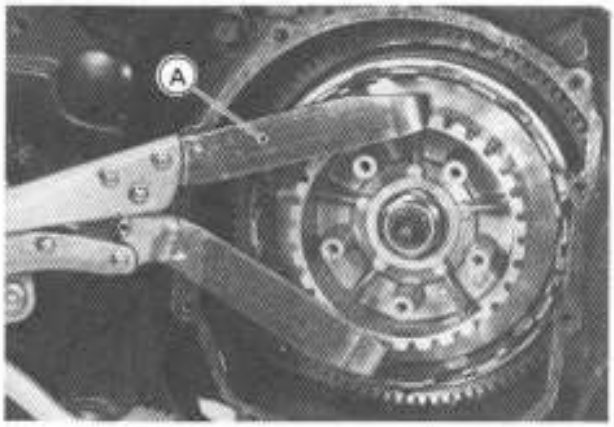
Clutch Cover
Clutch Spring Bolts
Clutch Springs
Clutch Spring Plate (with Bearing and Pusher)



A. Spring Bolt
B. Spring Plate

Friction Plates, Steel Plates

●Using the clutch Hub Holder (special tool), remove the hub nut.



A. Clutch Hub Holder: 57001-305

●Remove the washer and clutch hub.

●Using the 6 mm bolts, pull out the sleeve and take out the clutch housing with the needle bearing.

●Remove the spacer.

●Pull out the clutch push rod if necessary.

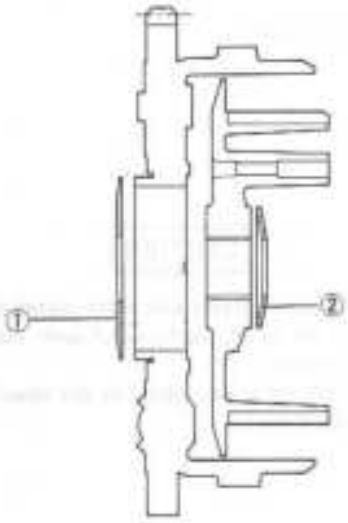
Installation

●Installation is the reverse of removal, noting the following.

NOTE

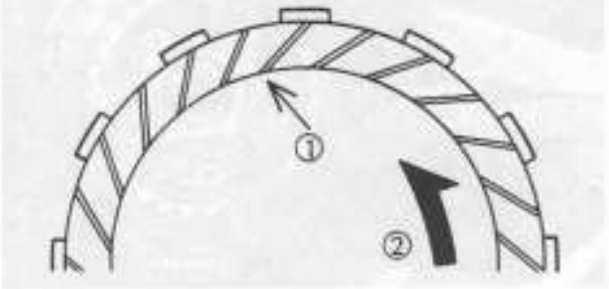
○Install the spacer with the chamfer side facing in.

○Install the hub nut washer as shown in the figure.



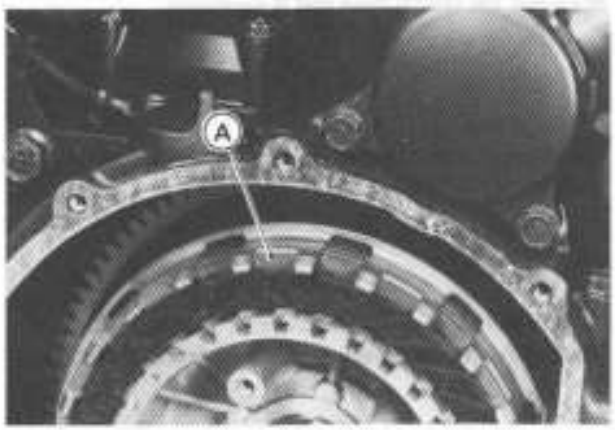
1. Spacer
2. Washer

○Replace the hub nut with a new one.
○Using the clutch hub holder (special tool), tighten the clutch hub nut to the specified torque (see Exploded View).
○Install the friction plates and steel plates, starting with a friction plate and alternating them.
○Install the friction plates as shown in the figure.



1. Oil Groove 2. Direction of Rotation

○Install the left friction plate fitting the tangs in the groove on the housing as shown.



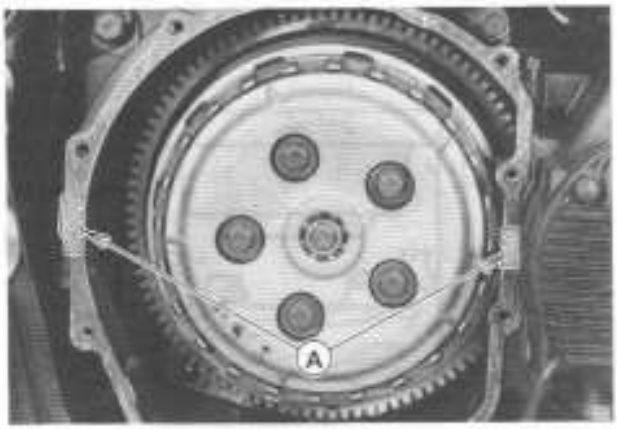
A. Last Friction Plate

CAUTION

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

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

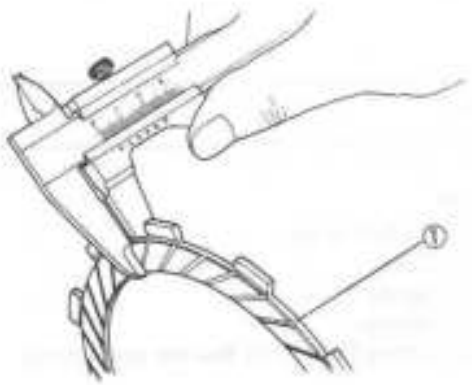
●Apply a silicone sealant to the crankcase halves mating surface on the front and rear sides of the cover mount.



A. Silicone Sealant Applied Areas

Friction Plate Wear

★If any friction plate thickness is less than the service limit, replace the friction plates as a set.



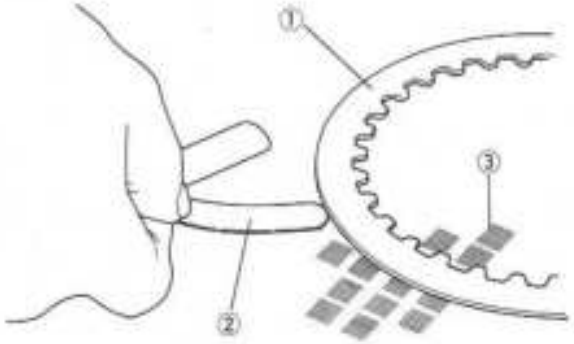
1. Friction Plate

Friction Plate Thickness

Standard:	**2.9 – 3.1 mm**
Service Limit:	**2.8 mm**

Friction and Steel Plate Warp

★If any plate is warped over the service limit, replace the plates as a set.



1. Friction or Steel Plate 3. Surface Plate
2. Thickness Gauge

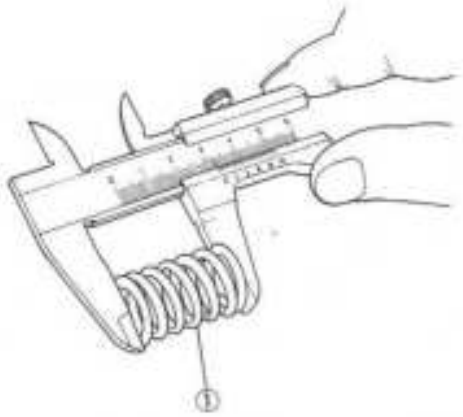
Friction and Steel Plate Warp

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

Clutch Spring Free Length Measurement

*If any of the springs is shorter than the service limit, it must be replaced.

Clutch Spring Free Length Measurement



1. Clutch Spring

Clutch Spring Free Length

Standard:	**36.4 mm**
Service Limit:	**35.1 mm**

Engine Lubrication System

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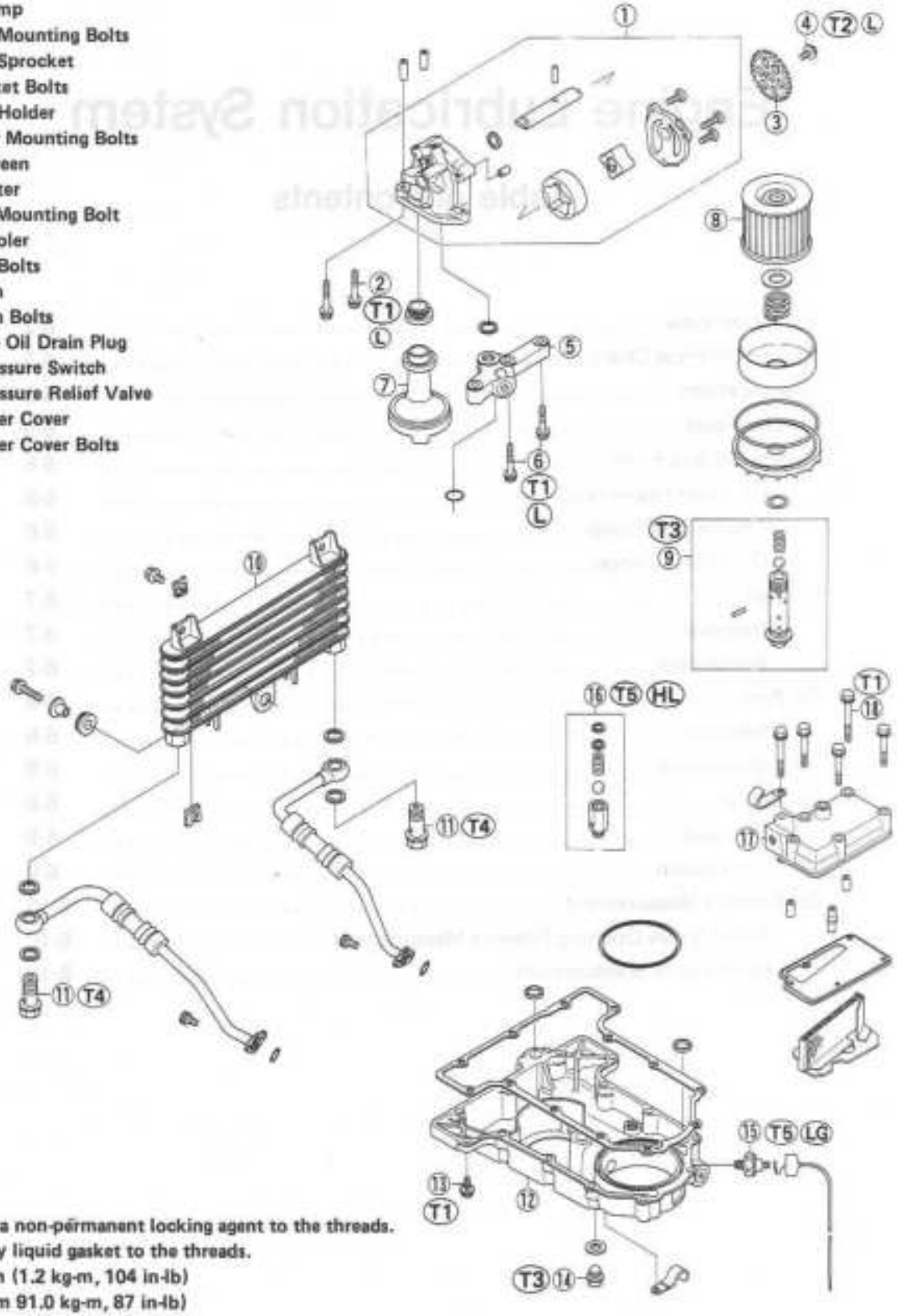
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Oil Cooler 6-9
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- Relief Valve Opening Pressure Measurement 6-10
- Oil Pressure Measurement 6-10

Exploded View

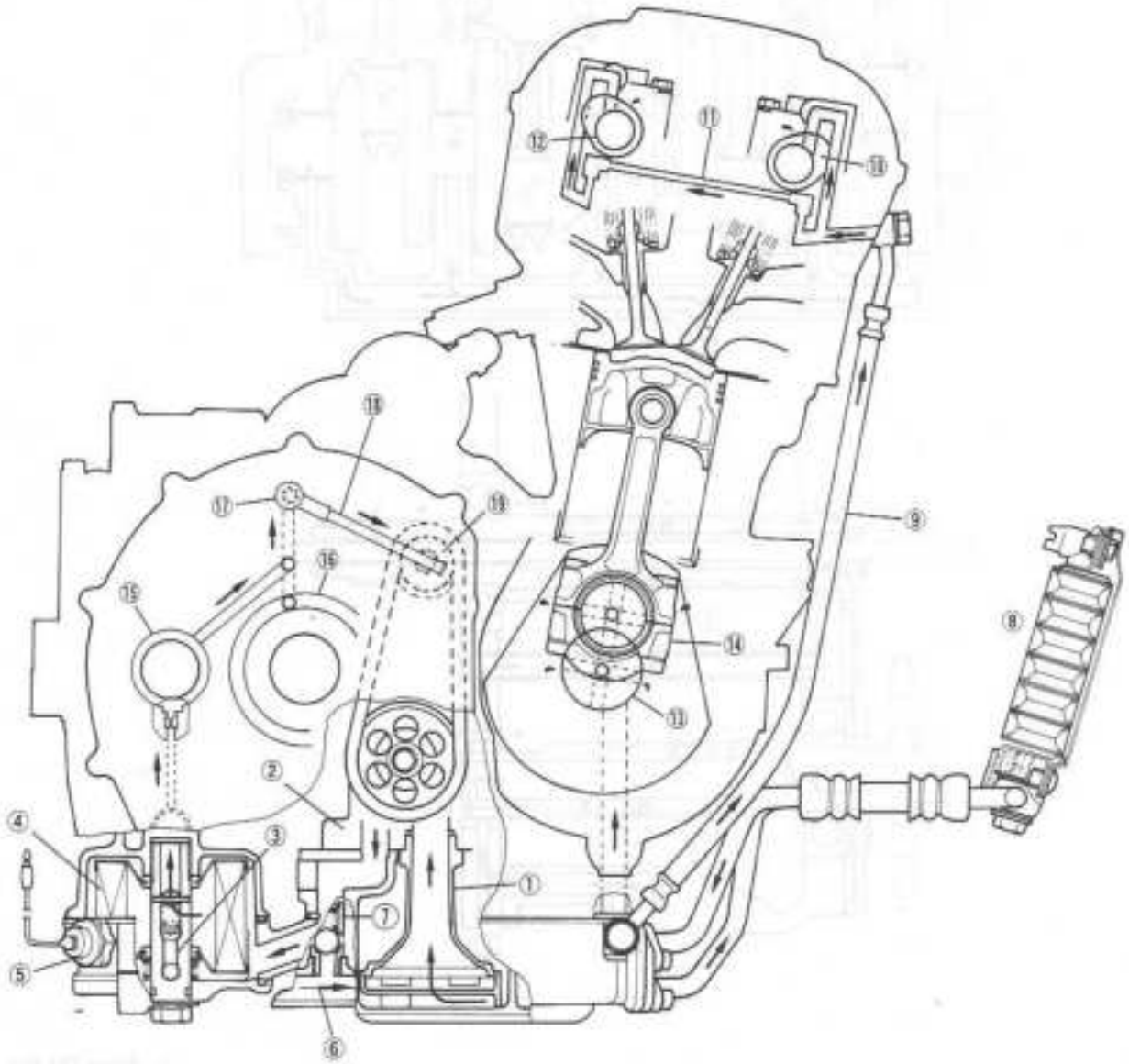
1. Oil Pump
2. Pump Mounting Bolts
3. Pump Sprocket
4. Sprocket Bolts
5. Pump Holder
6. Holder Mounting Bolts
7. Oil Screen
8. Oil Filter
9. Filter Mounting Bolt
10. Oil Cooler
11. Banjo Bolts
12. Oil Pan
13. Oil Pan Bolts
14. Engine Oil Drain Plug
15. Oil Pressure Switch
16. Oil Pressure Relief Valve
17. Breather Cover
18. Breather Cover Bolts

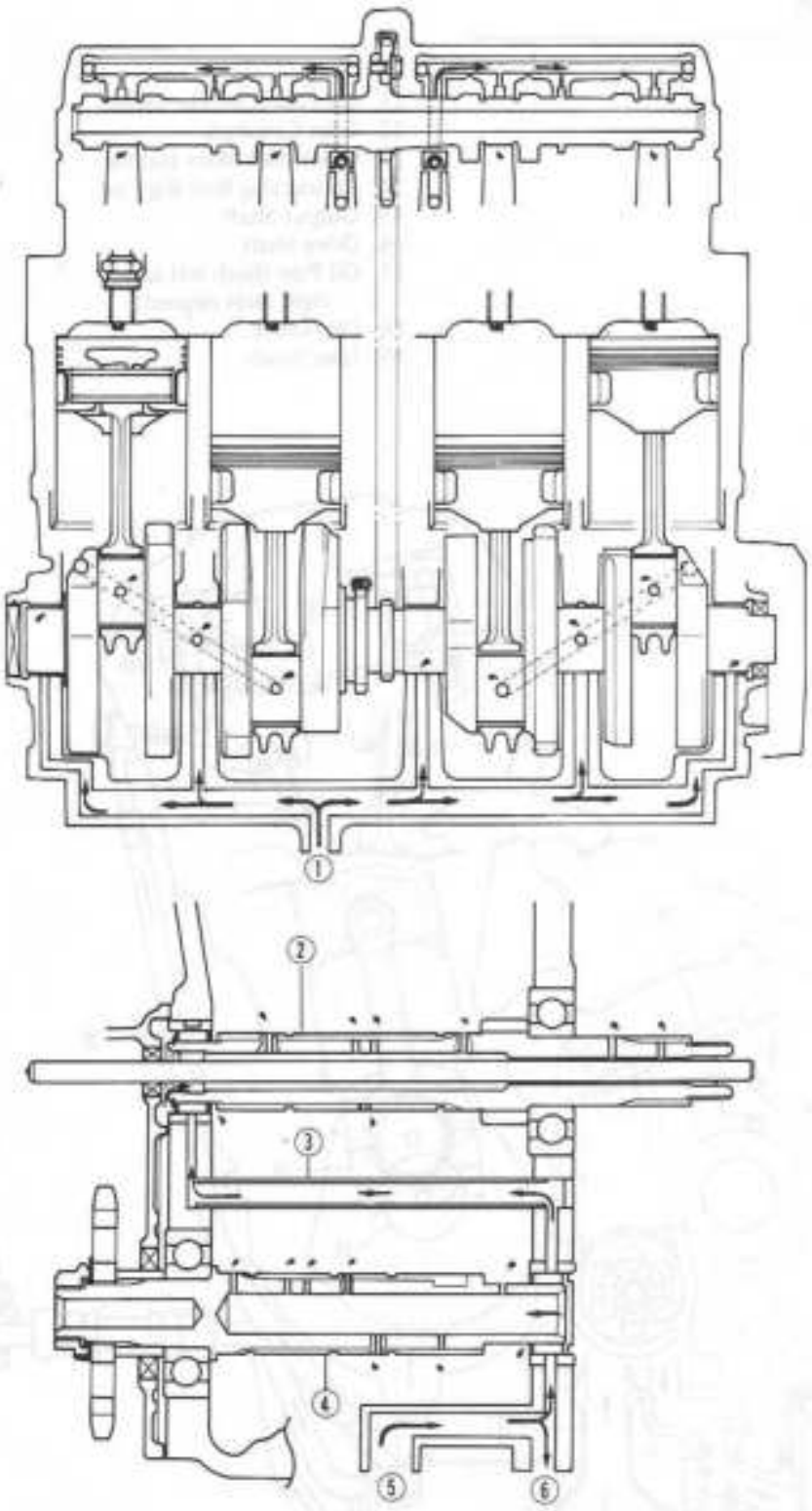


L : Apply a non-permanent locking agent to the threads.
LG : Apply liquid gasket to the threads.
T1: 12 N-m (1.2 kg-m, 104 in-lb)
T2: 9.8 N-m 91.0 kg-m, 87 in-lb)
T3: 20 N-m (2.0 kg-m, 14.5 ft-lb)
T4: 25 N-m (2.5 kg-m, 18.0 ft-lb)
T5: 15 N-m (1.5 kg-m, 11.0 ft-lb)

Engine Oil Flow Chart

1. Oil Screen
2. Oil Pump
3. Bypass Valve
4. Oil Filter
5. Oil Pressure Switch
6. Oil Passage
7. Relief Valve
8. Oil Cooler
9. Oil Hose
10. Exhaust Camshaft
11. Oil Pipe (Cylinder Head)
12. Inlet Camshaft
13. Crankshaft Main Journal
14. Connecting Rod Big End
15. Output Shaft
16. Drive Shaft
17. Oil Pipe (both left and right ends opened)
18. Oil Nozzle
19. Idler Shaft





1. From Oil Pan
2. Drive Shaft
3. Oil Pipe
4. Output Shaft
5. From Oil Filter
6. To Oil Pan

Specifications

Item	Standard
Engine Oil:	
Grade	SE or SF class class
Viscosity	SAE 10W40, 10W50, 20W40, or 20W50
Capacity	3.0 L (when filter is not removed) 3.2 L (when filter is removed) 3.8 L (when engine is completely dry)
Oil Pressure Measurement:	
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)	294 – 390 kPa (3.0 – 4.0 kg/cm², 43 – 57 psi)

Special Tools

Oil Pressure Gauge: 57001-164



Oil Pressure Gauge Adapter: 57001-1233



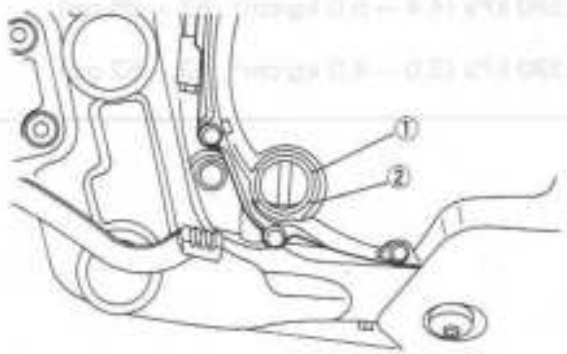
Engine Oil and Oil Filter

WARNING

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

Oil Level Inspection

●Check the engine oil level between the upper and lower level in the gauge.



1. Upper Level 2. Lower Level

NOTE

○Situate the motorcycle so that it is perpendicular to the ground.

○If the motorcycle has just been used, wait several minutes for all the oil to drain down.

○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

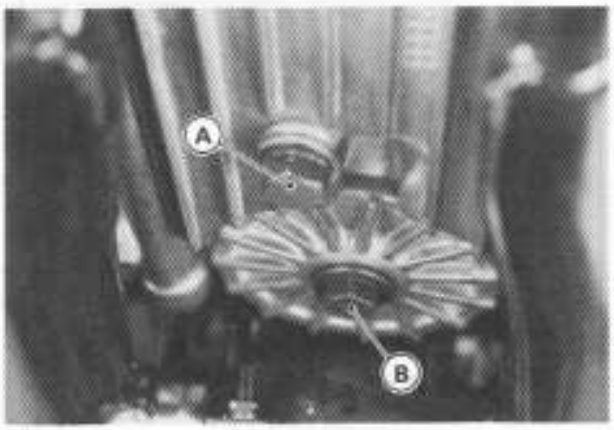
○Racing the engine before the oil reaches every part can cause engine seizure.

○If the 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 Change

●Set the motorcycle up on its center stand after warming up the engine.

●Remove the engine drain plug to drain the oil.



A. Drain Plug B. Oil Filter Mounting Bolt

○The oil in the filter can be drained by removing the filter mounting bolt and taking off the filter from the bolt.

★Replace the drain plug gasket with a new one if it is damaged.

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

○Tighten the oil filter mounting bolt to the specified torque (see Exploded View).

●Pour in the specified type and amount of oil.

Engine Oil

Grade:	**SE or SF class**
Viscosity:	**SAE 10W40, 10W50, 20W40, or 20W50**
Amount:	**3.8 L (engine is completely dry)**
	3.2 L (filter is removed)
	3.0 L (filter is not removed)

Oil Filter Change

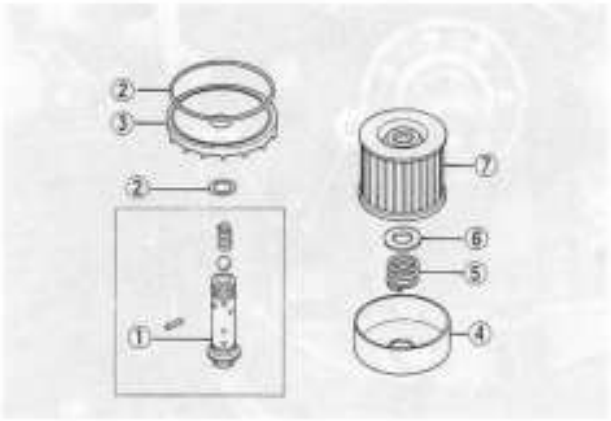
●Drain the engine oil.

●Remove the oil filter mounting bolt and take off the filter assembly.

●Holding the filter steady, turn the mounting bolt to work the filter free.

NOTE

○The oil filter bypass valve is assembled in the mounting bolt.



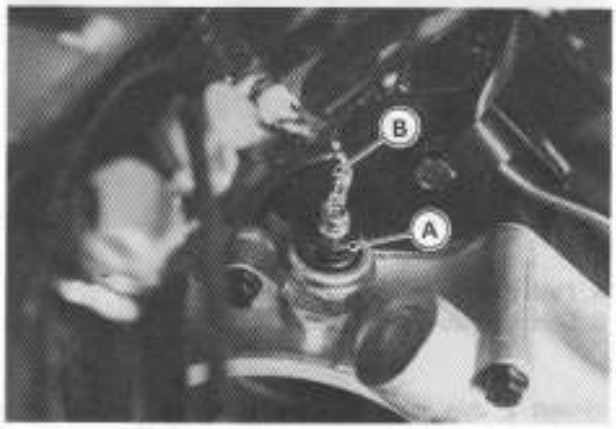
1. Mounting Bolt
2. O-ring
3. Filter Cover
4. Oil Fence
5. Spring
6. Washer
7. Filter

•When installing the oil filter, be careful of the following.
•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.
○Tighten the filter mounting bolt to the specified torque (see Exploded View).
☆Replace the O-rings with new ones if they are damaged.
○Pour in the specified type and amount of oil.

Oil Pan

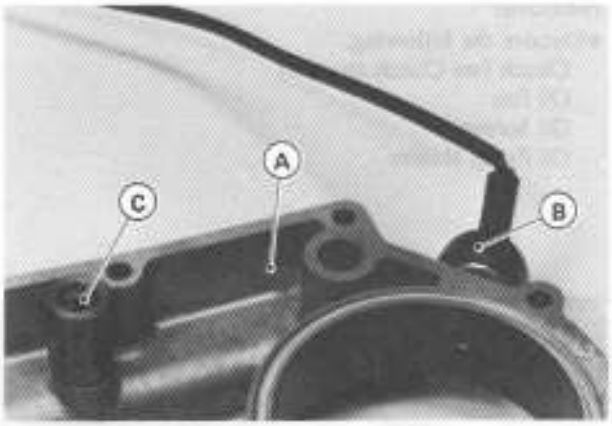
Removal

•Remove the following.
Fairings (Upper and Lower)
Engine Oil
Oil Filter
Radiator (see Coupling System chapter)
Oil Cooler
Mufflers (see Engine Top End chapter)
Oil Hoses
Oil Pressure Switch Lead



A. Oil Pressure Switch B. Switch Lead

•Remove the oil pan bolts and take off the oil pan.
○Remove the oil pressure switch and relief valve as necessary.



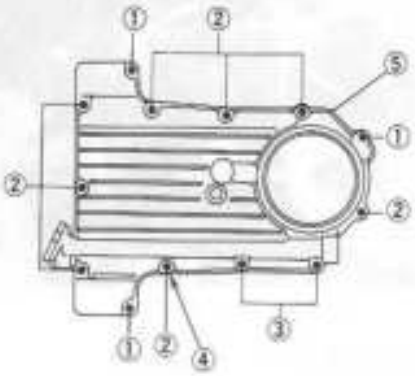
A. Oil Pan C. Relief Valve
B. Oil Pressure Switch

Installation

•Be careful of the following.
○Apply a non-permanent locking agent to the threads of the relief valve, and tighten it to the specified torque (see Exploded View).
○Apply a non-permanent locking agent to the threads of the oil pressure switch, and tighten it to the specified torque (see Exploded View).
○Replace the gasket with a new one.
○Replace the O-rings with new ones if they are damaged. The O-rings must be installed with the flat side facing to the crankcase.
○Tighten the oil pan bolts to the specified torque (see Exploded View).

NOTE

○*One of the oil pan bolts in installed with the clamp.*

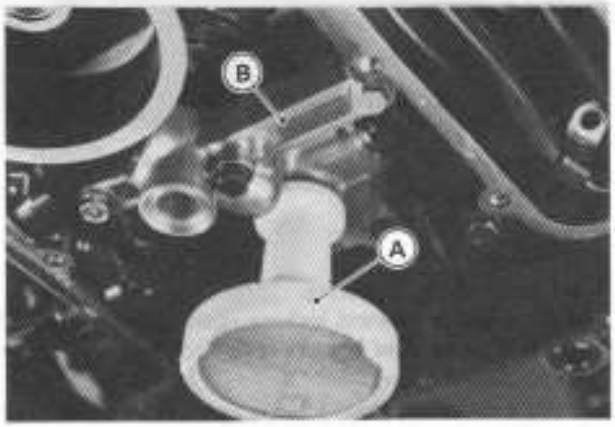


1. Bolts 40 mm
2. Bolts 25 mm
3. Bolts 55 mm
4. Clamp
5. Oil Pan

Oil Pump

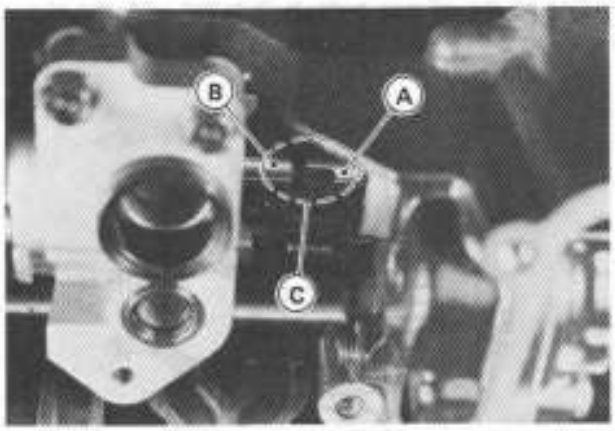
Removal

●Remove the following.
Clutch (see Clutch chapter)
Oil Pan
Oil Screen
Oil Pump Holder



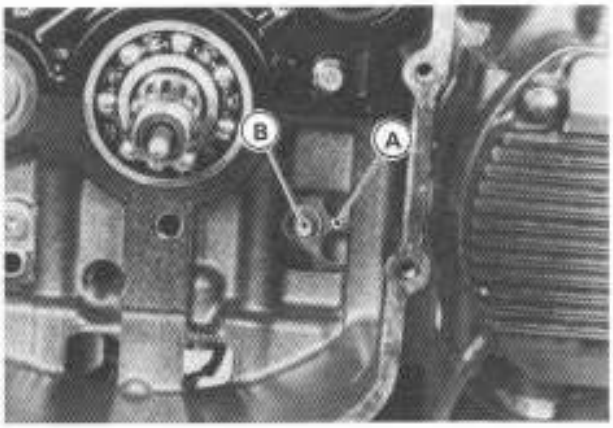
A. Oil Screen B. Oil Pump Holder

●Turn the crankshaft until the catches of the water pump shaft and oil pump shaft are vertical.



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

●Remove the oil pump sprocket bolt and pull out the sprocket.



A. Oil Pump Sprocket B. Bolt

●Remove the oil pump mounting bolts, and take off the oil pump assembly.

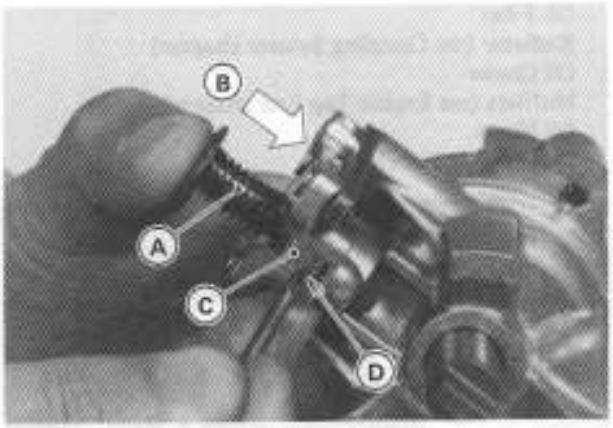
Installation

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

NOTE

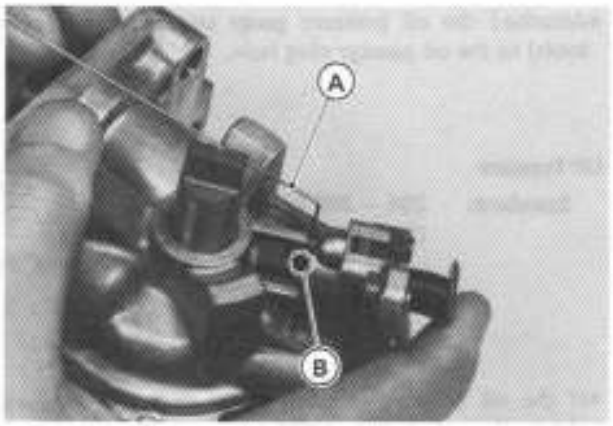
○*If the oil pump sprocket was removed, engage the chain on the sprocket before installing the oil pump.*

○Compress the rod of the alternator chain tensioner on the oil pump.
○Release the stopper and push into the rod.



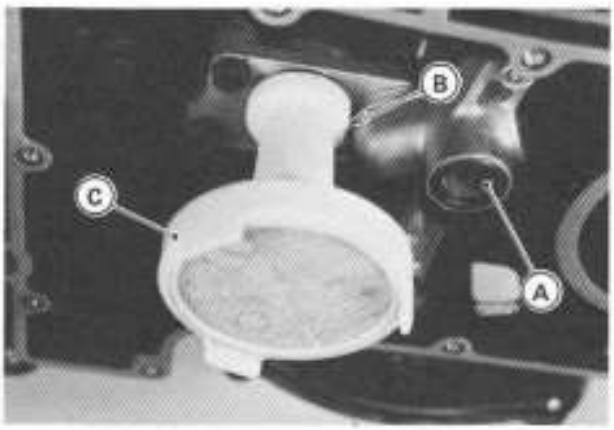
A. Push Rod C. Stopper
B. Compress down. D. Push.

○Insert a thin wire into the push rod hole to keep the rod from pushing out. Remove this wire after installing the oil pump.



A. Thin Wire B. Push Rod Hole

○Apply a non-permanent locking agent to the threads of the oil pump mounting bolts, and tighten them to the specified torque (see Exploded View).
○Replace the O-rings with new ones if they are damaged. The O-rings must be installed with the flat side facing to the crankcase.
○Install the oil screen so that the notch on the screen comes to the holder side.

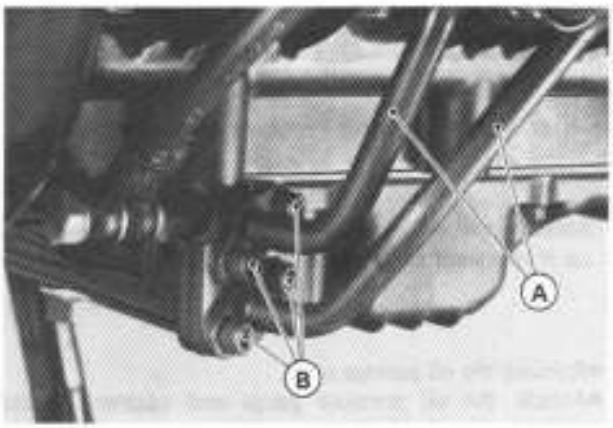


A. Holder C. Oil Screen
B. Notch

Oil Cooler

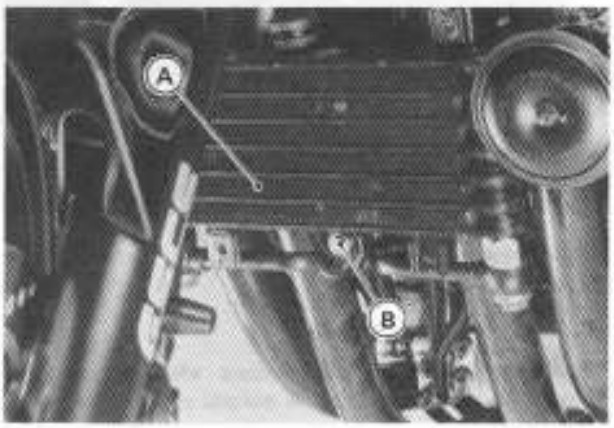
Removal

●Remove the following.
Engine Oil
Lower Fairing
Radiator Screen
Radiator
○Remove the oil pipes from the oil pan.



A. Oil Pipes B. Mounting Allen Bolts

Oil Cooler Mounting Bolt



A. Oil Cooler B. Mounting Bolt

NOTE

○*If the oil hoses are to be removed from the cooler, loosen the banjo bolts at the bottom of the cooler before removing the cooler.*

Installation

●Installation is the reverse of removal. Note the following.
○Replace the washer on each side of the hose fitting with a new one if the banjo bolt was removed.
○Install the O-rings between the oil pipes and the oil pan.
○After installing the oil cooler, tighten the banjo bolts to the specified torque (see Exploded View).

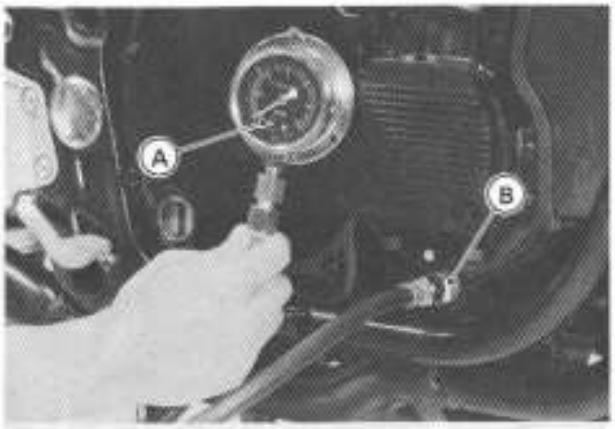
Oil Pressure Measurement

Relief Valve Opening Pressure Measurement

NOTE

○*Measure the oil pressure before the engine is warmed up if you want to test relief valve opening pressure.*

●Remove the oil passage plug.
●Attach the oil pressure gauge and adapter (special tools) to the plug hole.



A. Oil Pressure Gauge : 57001-164
B. Adapter: 57001-1233

●Read the maximum oil pressure while running the engine at various speeds. A normal relief valve keeps, the maximum oil pressure between the specified valves.

Relief Valve Opening Pressure

Standard: 430 – 590 kPa
(4.4 – 6.0 kg/cm², 63 – 85 psi)

★If the reading is much higher than the standard or is much lower than the standard, find the cause immediately.

Oil Pressure Measurement

NOTE

○*Measure the oil pressure after the engine is warmed up.*

●Attached the oil pressure gauge and adapter (special tools) to the oil passage plug hole.

Oil Pressure

Standard: 294 – 390 kPa
(3.0 – 4.0 kg/cm², 43 – 57 psi)
@4 000 r/min (rpm), 90°C (194°F)
of oil temp.

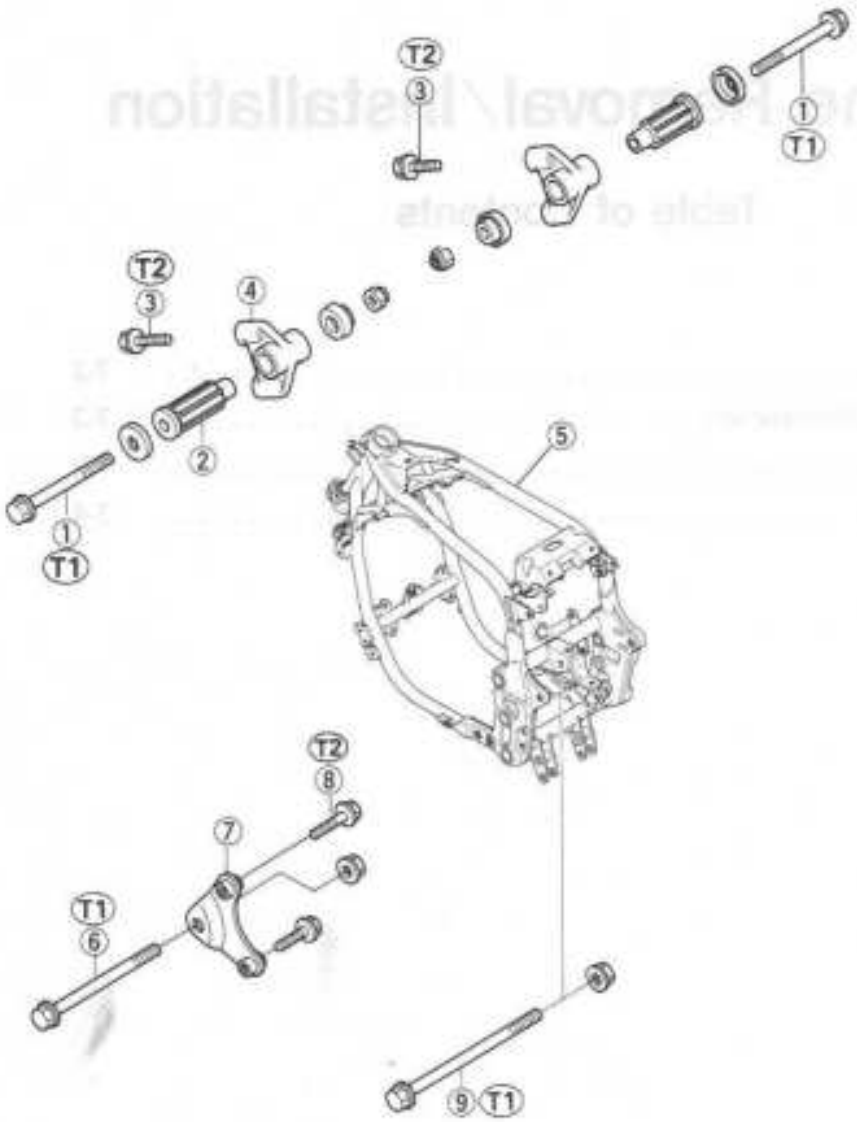
★If the oil pressure is much lower than the standard, check the oil pump, relief valve, and/or crankshaft bearing insert wear immediately.

Engine Removal/Installation

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Exploded View



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2. Dampers
3. Bracket Bolts
4. Engine Mounting Brackets (Front)
5. Main Frame
6. Engine Mounting Bolt
7. Engine Mounting Bracket (Rear)
8. Bracket Bolts
9. Engine Mounting Bolt

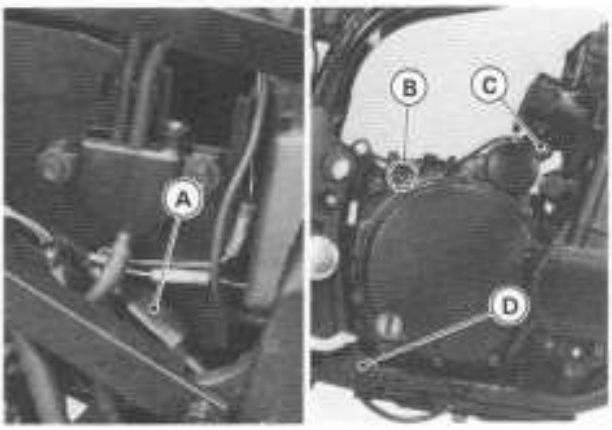
T1: 44 N-m (4.5 kg-m, 33 ft-lb)
T2: 19 N-m (1.9 kg-m, 13.5 ft-lb)

Engine Removal/Installation

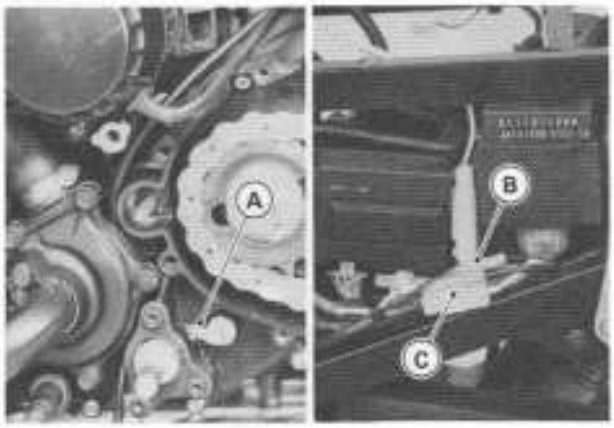
Removal

●Remove the following.
Fairings
Engine Oil (see Engine Lubrication chapter)
Coolant (see Cooling System chapter)
Fuel Tank
Baffle Plates
Ignition Coils
Radiator
Oil Cooler
Oil Pipes
Clutch Slave Cylinder (see Clutch chapter)
Engine Sprocket Cover
Engine Sprocket (see Final Drive chapter)
Shift Pedal
Mufflers
Carburetors

●Disconnect wirings from the engine and free them from the clamps.
Pickup Coil Leads
Battery Ground Lead
Starter Motor Lead
Oil Pressure Switch Wire
Side Stand Switch Leads
Alternator Leads
Neutral Switch Wiring



A. Pickup Coil Lead Connector
B. Battery Ground Lead Terminal
C. Starter Motor Lead Terminal
D. Oil Pressure Switch Terminal

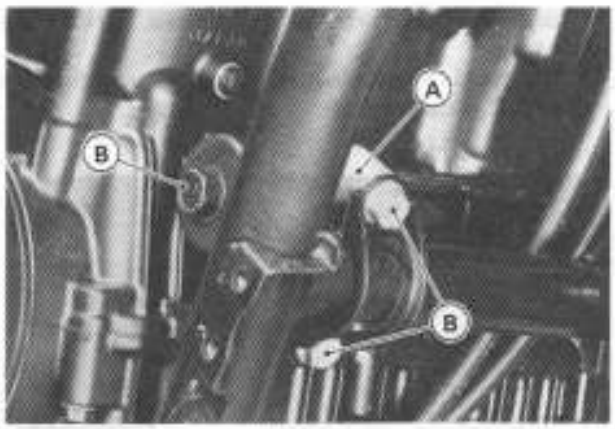


A. Neutral Switch Terminal
B. Side Stand Switch Lead Connector
C. Alternator Lead Connector

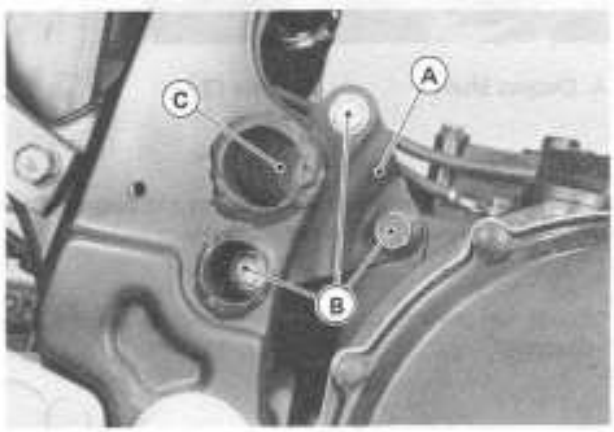
NOTE

○*The drive chain can not be removed from the output shaft when the engine is mounted on the frame.*

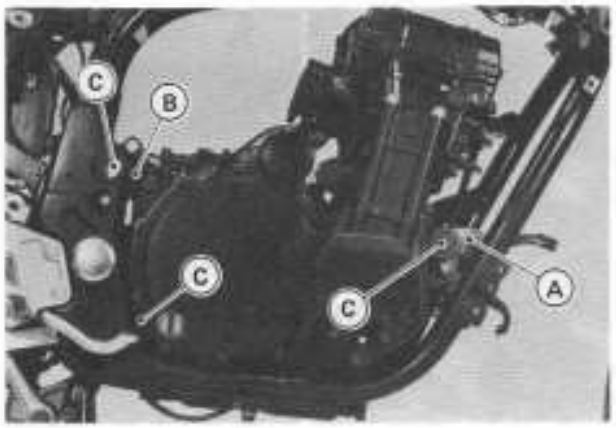
●Support the engine with a stand, and remove the engine mounting bolts and bracket bolts.



A. Bracket (Front)
B. Bracket Bolts
C. Engine Mounting Bolt



A. Bracket (Rear)
B. Bracket Bolts
C. Engine Mounting Bolt



A. Bracket (Front)
B. Bracket (Rear)
C. Engine Mounting Bolt

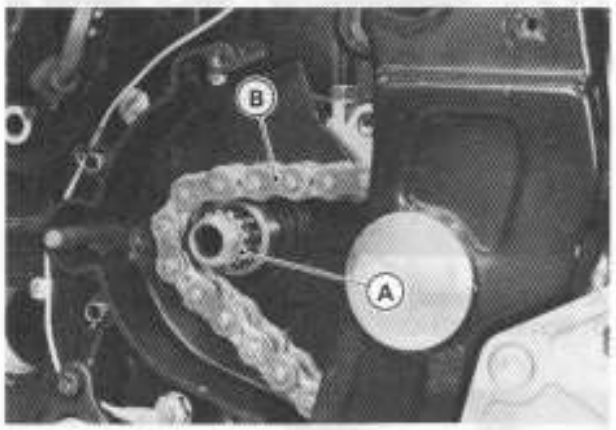
NOTE

○Lift up the engine and move it right to free the output shaft from the drive chain, and then remove the engine.

Installation

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

○Before positioning the engine correctly, hang the drive chain on the output shaft.



A. Output Shaft
B. Drive Chain

NOTE

○The drive chain can not be hung on the output shaft after the engine is positioned correctly.

○Route the wirings correctly (see General Information chapter).

Crankshaft/Transmission

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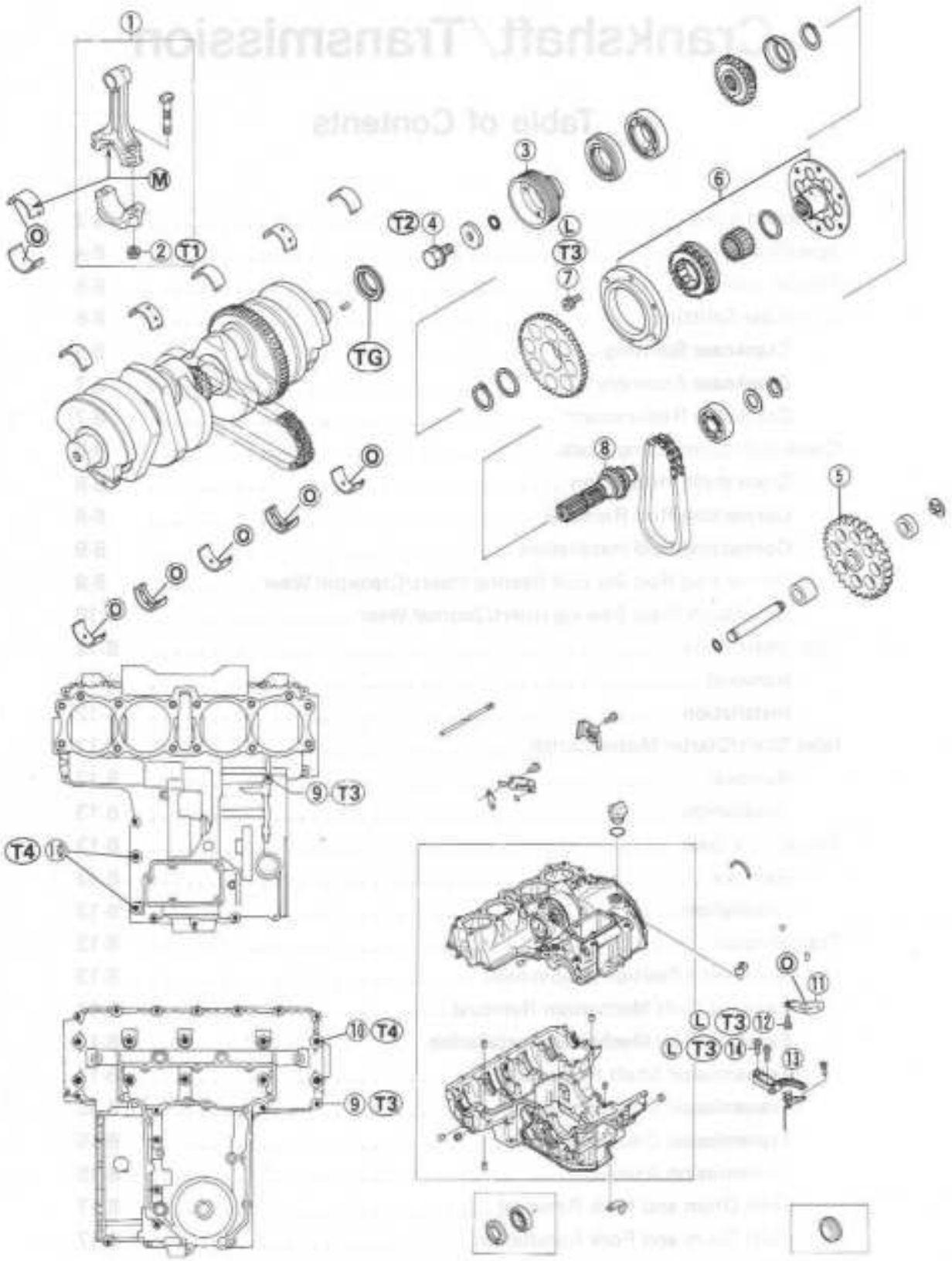
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Exploded View





1. Connecting Rods
2. Big End Cap Nuts
3. Pulley
4. Pulley Bolt
5. Starter Idle Gear
6. Starter Clutch
7. Starter Clutch Allen Bolts
8. Idler Shaft
9. Crankcase Bolts (6 mm)
10. Crankcase Bolts (8 mm)
11. Chain Guide
12. Chain Guide Mounting Allen Bolt
13. Chain Tensioner
14. Chain Tensioner Mounting Allen Bolts
15. Shift Drum Holding Plate
16. Plate Mounting Allen Bolts
17. Shift Rod
18. Shift Drum
19. Shift Rod Holding Plate
20. Plate Mounting Allen Bolt
21. Shift Shaft
22. Shift Return Spring Bolt
23. External Shift Mechanism Cover
24. Neutral Switch
25. Shift Pedal Pivot Bolt
26. Shift Pedal

L : Apply a non-permanent locking agent to the threads.
M : Apply molybdenum disulfide grease.
TG : Apply a high temperature grease.
O : Apply engine oil.
T1 : 36 N·m (3.7 kg-m, 27 ft-lb)
T2 : 39 N·m (4.0 kg-m, 29 ft-lb)
T3 : 12 N·m (1.2 kg-m, 104 in-lb)
T4 : 27 N·m (2.8 kg-m, 20 ft-lb)
T5 : 25 N·m (2.5 kg-m, 18.0 ft-lb)
T6 : 15 N·m (1.5 kg-m, 11.0 ft-lb)
T7 : 49 N·m (5.0 kg-m, 36 ft-lb)

Specifications

Item		Standard	Service Limit
Crankshaft/Connecting Rods:			
Connecting rod big end side clearance		0.13 – 0.30 mm	0.50 mm
Connecting rod big end bearing insert/crankpin clearance		0.036 – 0.066 mm	0.10 mm
Crankpin diameter:		34.984 – 35.000 mm	34.97 mm
Marking	None	34.984 – 34.992 mm	– – –
	O	34.993 – 35.000 mm	– – –
Connecting rod big end bore diameter:		38.000 – 38.015 mm	– – –
Marking	None	38.000 – 38.008 mm	– – –
	O	38.009 – 38.016 mm	– – –
Connecting rod big end bearing insert thickness:	Brown	1.470 – 1.475 mm	– – –
	Black	1.475 – 1.480 mm	– – –
	Blue	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
O	None	Blue	92028-1407
None	None	Black	92028-1408
O	O		
None	O	Brown	92028-1409

Crankshaft runout		– – –	0.05 mm TIR
Crankshaft main bearing insert/journal clearance		0.012 – 0.036 mm	0.08 mm
Crankshaft main journal diameter:		33.984 – 34.000 mm	33.96 mm
Marking	None	33.984 – 33.992 mm	– – –
	1	33.993 – 34.000 mm	– – –
Crankcase main bearing bore diameter:		37.000 – 37.016 mm	– – –
Marking	O	37.000 – 37.008 mm	– – –
	None	37.009 – 37.016 mm	– – –
Crankshaft main bearing insert thickness:			
	Brown	1.490 – 1.494 mm	– – –
	Black	1.494 – 1.498 mm	– – –
	Blue	1.498 – 1.502 mm	– – –

Item	Standard	Service Limit
Crankshaft main bearing insert selection:		

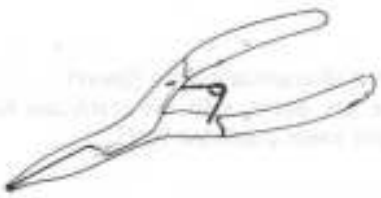
Crankcase Main Bearing Bore Diameter Marking	Crankshaft Main Journal Diameter Marking	Bearing Insert*		
		Size Color	Part Number	Journal Nos.
○	1	Brown	92028-1447	1, 3, 5
			92028-1444	2, 4
None	1	Black	92028-1446	1, 3, 5
○	None		92028-1443	2, 4
None	None	Blue	92028-1445	1, 3, 5
			92028-1442	2, 4

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

Transmission:		
Shift fork ear thickness	4.9 – 5.0 mm	4.8 mm
Gear shift fork groove width	5.05 – 5.15 mm	5.3 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

Special Tools

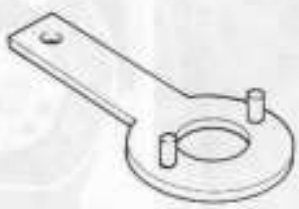
Circlip Pliers: 57001-144



Liquid Gasket: 92104-1003
Silicone Sealant: 56019-120



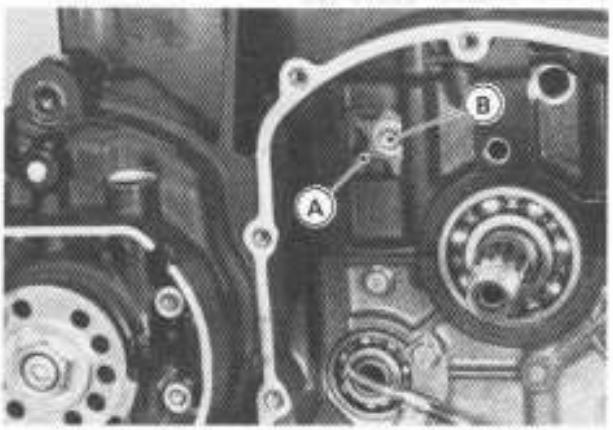
Pulley Holder: 57001-1237



Crankcase Splitting

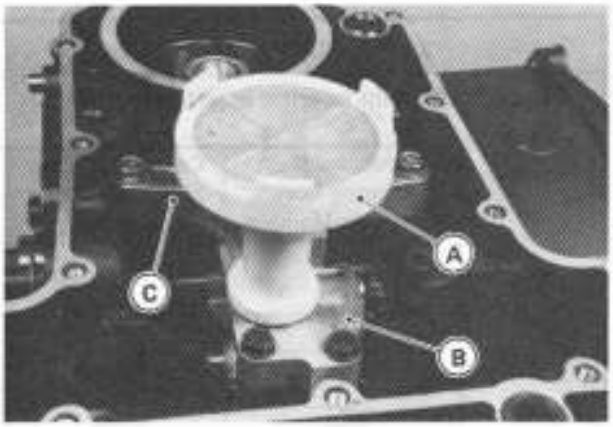
Crankcase Splitting

- Remove the engine (see Engine Removal/Installation chapter).
- Set the engine on a clean surface and hold the engine steady while parts are being removed.
- Remove the following.
  - Engine Right Side
    - Clutch Cover
    - Pickup Coil Cover
    - Pickup Coils
  - Engine Left Side
    - Water Pump (with Pipe and Hose)
    - External Shift Mechanism
- Remove the following.
  - Clutch
  - Alternator
  - Starter Motor
  - Crankcase Bolts (Upper)
- Remove the following if the crankshaft is to be removed.
  - Cylinder Head
  - Cylinder Block
  - Pistons
- Turn the engine upside down and remove the following.
  - Engine Bottom End
    - Oil Filter
    - Oil Pan
- Remove the oil pump sprocket bolt and take off the sprocket with the chain.



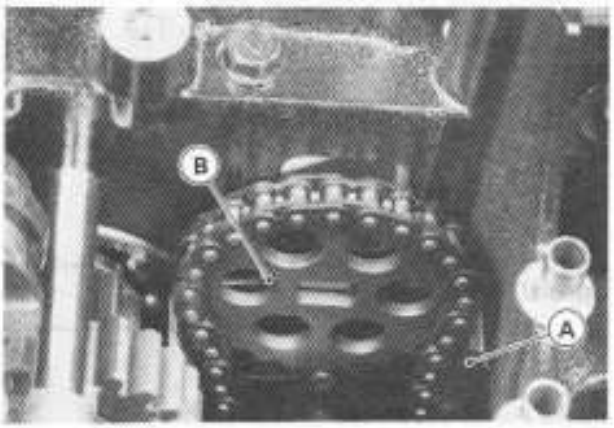
A. Sprocket B. Bolt

- Remove the oil screen.
- Remove the oil pump and oil pump holder.



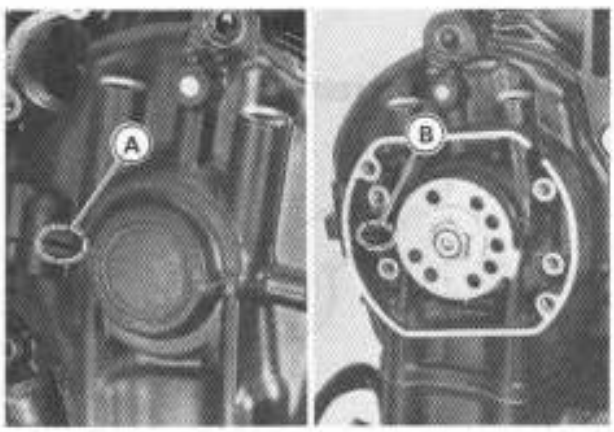
A. Oil Screen C. Oil Pump Holder
B. Oil Pump

○Remove the oil pump chain guide, and free the sprocket from the chain.



A. Chain Guide B. Sprocket

- Remove the all crankcase bolts (lower).
- Using the pry point, split the crankcase halves apart (remove the lower crankcase half).



A. Pry Point (Left) B. Pry Point (Right)

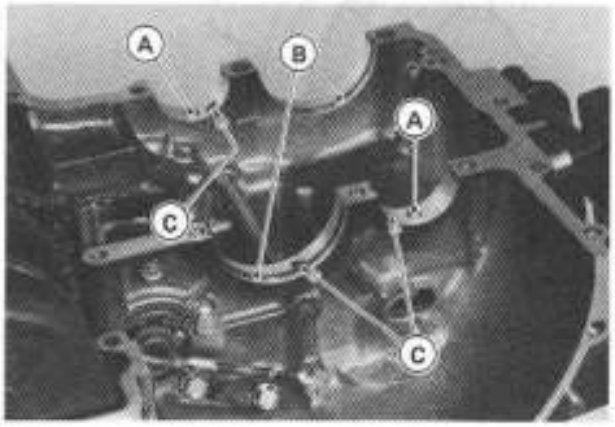
Crankcase Assembly

•Be careful of the following.

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

○Using compressed air, blow out the oil passages in the crankcase halves.

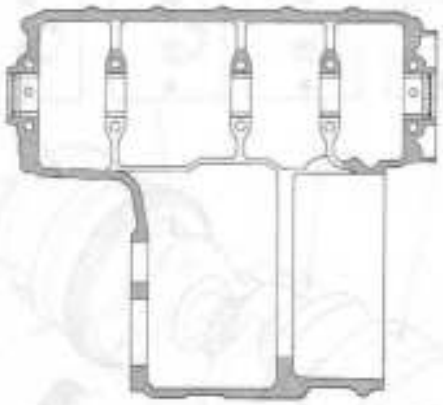
○Install the set pins and set rings.



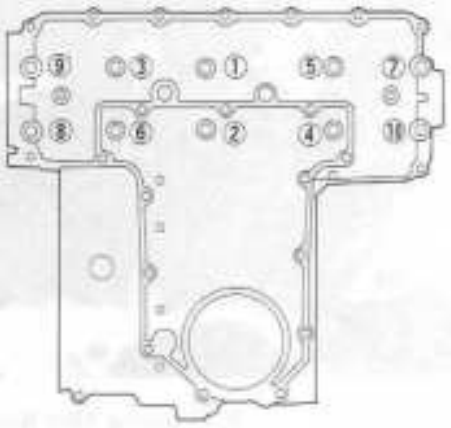
A. Set Pin
B. Set Rings
C. Oil Passage

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

○Apply a silicone sealant to the mating surface of the lower crankcase half.



○Following the tightening sequence, torque the 8 mm bolts first to about one half of the specification (see Exploded View), and finally to the specification in the same sequence.



•Check the following.

○Drive shaft and output shaft turn freely.

○Neutral finder operates properly (while spinning the output shaft, gears can be be shifted from neutral to 2nd).

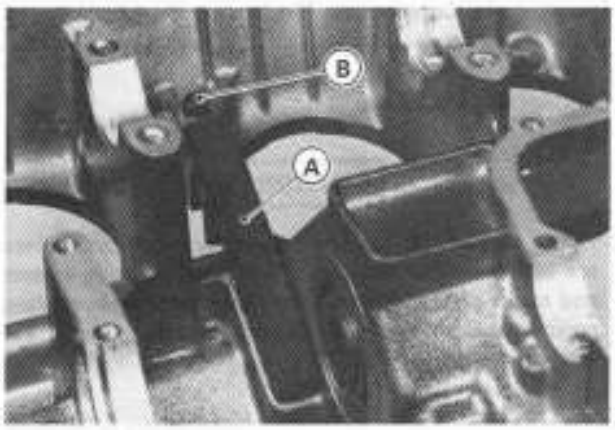
Crankcase Replacement

CAUTION

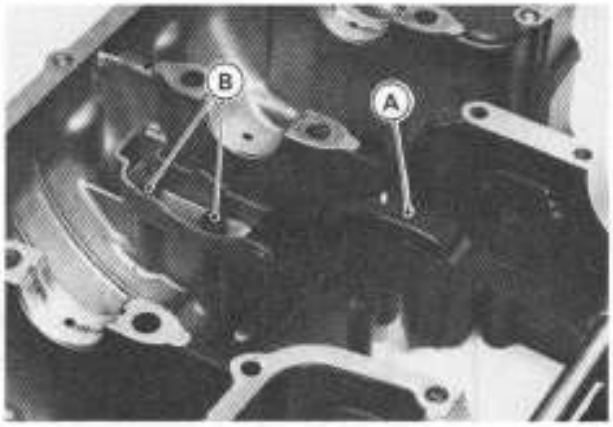
○The upper and lower crankcase halves are machined at the factory in the assembled state, so the crankcase halves must be replaced as a set.

•Remove the usable parts from the old case, and install them on the new cases. Note the following.

○Apply a non-permanent locking agent to the threads of the Allen bolts of the alternator chain tensioner and guide mounting (see Exploded View).

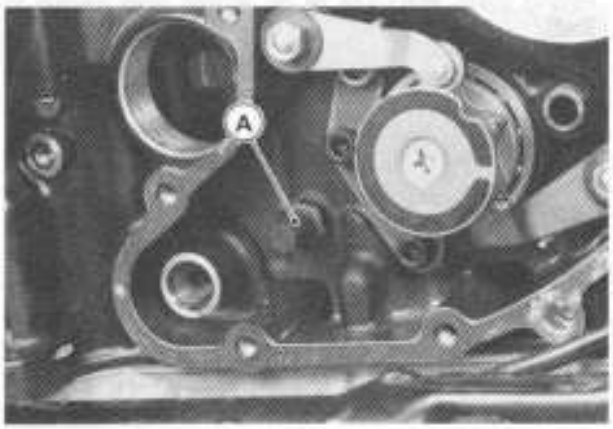


A. Chain Guide
B. Mounting Allen Bolts



A. Chain Tensioner B. Mounting Allen Bolts

○Apply a non-permanent locking agent to the threads of the shift return spring bolt (see Exploded View).



A. Return Spring Bolt

Crankshaft/Connecting Rods

Crankshaft Installation

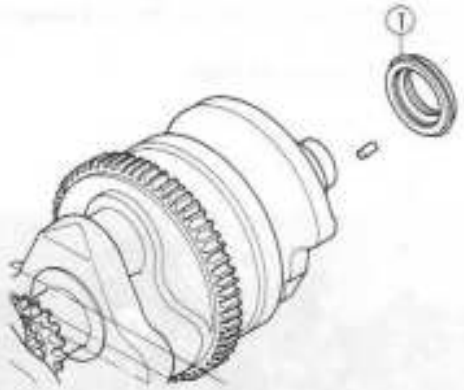
CAUTION

○If the crankshaft, bearing inserts, or crankcase halves are replaced with new ones, select the bearing inserts and check clearance with a plastigage before assembling engine to be sure the correct bearing inserts are installed.

●Replace the oil seals at the both ends of the crankshaft with new ones if they are damaged.

NOTE

○*Apply a high temperature grease to the lips of the right side oil seal.*



1. Oil Seal

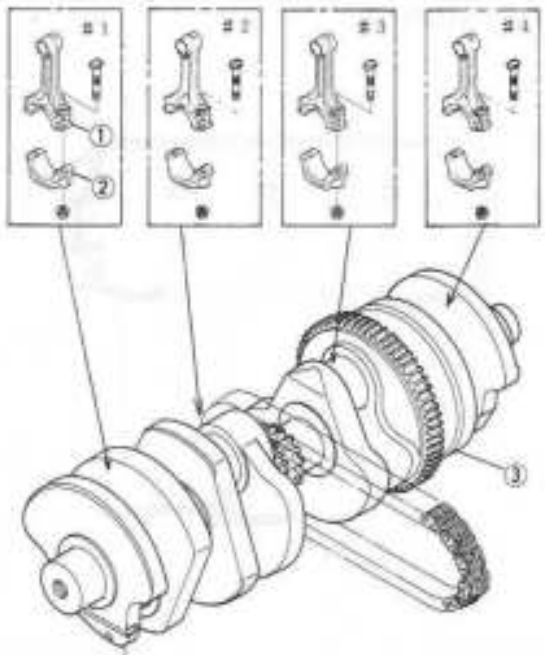
●Apply engine oil to the crankshaft main bearing inserts.

Connecting Rod Removal

●Remove the crankshaft.
●Remove the connecting rods from the crankshaft.

NOTE

○*Mark and record the locations of the connecting rods and their big end caps so that they can be re-assembled in their original positions.*

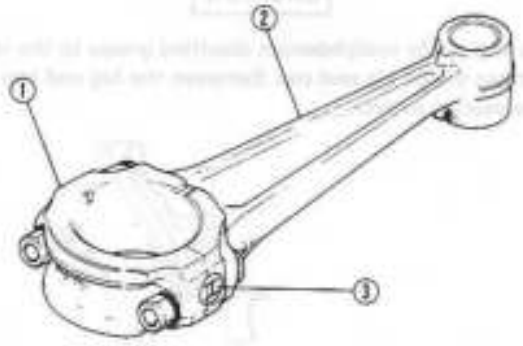


1. Connecting Rod
2. Big End Cap
3. Crankshaft

Connecting Rod Installation

CAUTION

○To minimize vibration, a pair of connecting rod (left two rods or right two) should have the same weight mark.



1. Big End Cap
2. Connecting Rod
3. Weight Mark, Alphabet

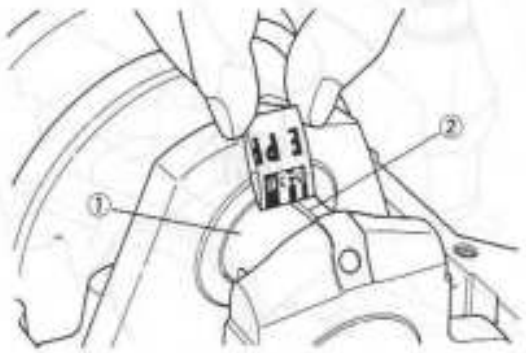
CAUTION

○If the connecting rods, bearing inserts, or crankshaft are replaced with new ones, select the bearing insert and check clearance with a plastigage before assembling engine to be sure the correct bearing inserts are installed.

•Apply engine oil to the big end bearing inserts.
•Tighten the big end cap nuts to the specified torque (see Exploded View).

Connecting Rod Big End Bearing Insert/Crankpin Wear

•Measure the bearing insert/crankpin clearance with a plastigage.



1. Crankpin
2. Plastigage

NOTE

○Tighten the big end cap nuts to the specified torque (see Exploded View).
○Do not move the connecting rod and crankshaft during clearance measurement.

Connecting Rod Big End
Bearing Insert/Crankpin Clearance

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

★If clearance is within the standard, no bearing replacement is required.
★If clearance is between 0.066 mm and the service limit (0.10 mm), replace the bearing inserts with inserts painted blue. Check insert/crankpin clearance with the 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.

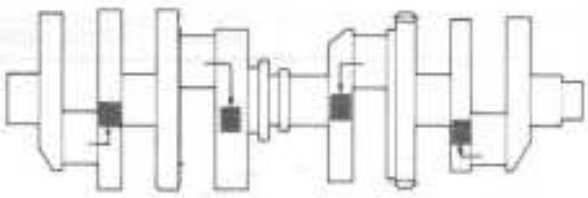
Crankpin Diameter

Standard:	**34.984 – 35.000 mm**
Service Limit:	**34.97 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:	**34.984 – 34.992 mm**
○ :	**34.993 – 35.000 mm**



Crankpin Diameter Marks, "○" mark or no mark

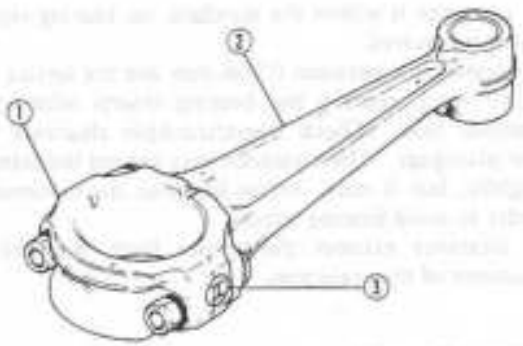
•Measure the connecting rod big end inside diameter, and mark each connecting rod big end in accordance with the inside diameter.

NOTE

○Tighten the cap nuts to the specified torque (see Exploded View).
○The mark already on the big end should almost coincide with the measurement.

Connecting Rod Big End Inside Diameter Marks

None:	**38.000 – 38.008 mm**
○ :	**38.009 – 38.016 mm**

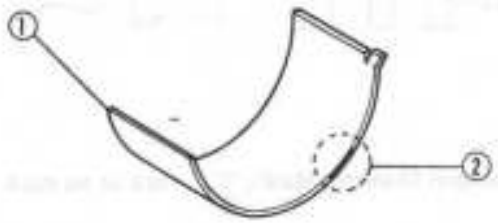


1. Big End Cap
2. Connecting Rod
3. Diameter Mark, "○" mark or no mark

•Select the proper bearing insert in accordance with the combination of the connecting rod and crankshaft coding.

Big End Bearing Insert Selection

Con-rod Big End Bore Diameter Marking	Crankpin Diameter Mark	Bearing Insert	
		Size Color	Part Number
○	None	Blue	92028-1407
None	None	Black	92028-1408
○	○		
None	○	Brown	92028-1409



1. Bearing Insert
2. Color Size Mark

•Install the new inserts in the connecting rod and check insert/crankpin clearance with the plastigage.
•Apply a molybdenum disulfide grease to the upper inner surface of the connecting rod big end (between the connecting rod big end and the bearing insert).

CAUTION

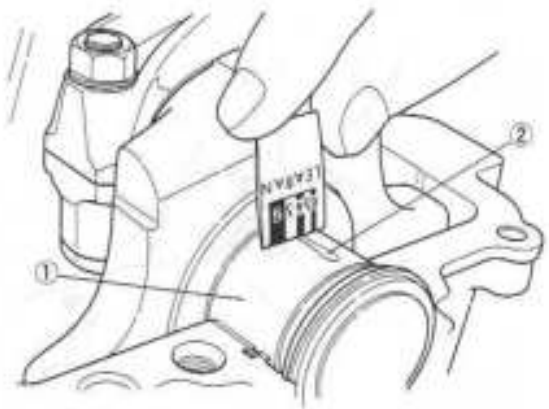
○Do not apply molybdenum disulfied grease to the inner surface of the big end cap (between the big end cap and the bearing insert).



1. Apply molybdenum disulfide grease.
2. Do not apply grease.
3. Big End Cap

Crankshaft Main Bearing Insert/Journal Wear

•Measure the bearing insert/crankshaft main journal clearance with a plastigage.



1. Crankshaft Main Journal
2. Plastigage

NOTE

○*Tighten the crankcase bolts to the specified torque (see Exploded View).*
○*Do not turn the crankshaft during clearance measurement.*

Crankshaft Main Bearing Insert/Journal Clearance

Standard:	**0.012 – 0.036 mm**
Service Limit:	**0.08 mm**

★If clearance is within the standard, no bearing replacement is required.
★If clearance is between 0.036 mm and the service limit (0.08 mm), replace the bearing inserts with inserts painted blue. Check insert/journal clearance with the 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.

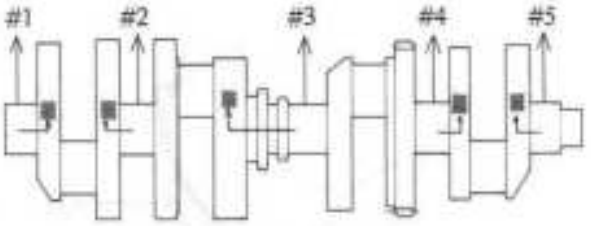
Crankshaft Main Journal Diameter

Standard:	**33.984 – 34.000 mm**
Service Limit:	**33.96 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:	**33.984 – 33.992 mm**
1 :	**33.993 – 34.000 mm**



Crankshaft Main Journal Diameter Marks, "1" mark or no mark

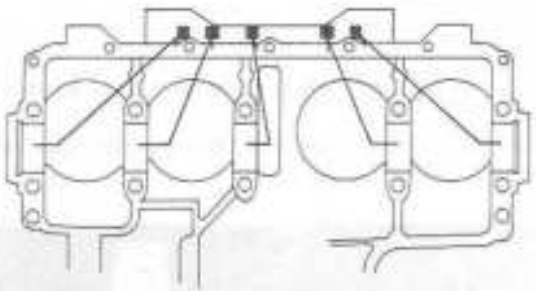
●Measure the main bearing bore diameter, and mark the upper crankcase half in accordance with the bore diameter.

NOTE

○*Tighten the crankcase bolts to the specified torque (see Exploded View).*
○*The mark already on the upper crankcase half should almost coincide with the measurement.*

Crankcase Main Bearing Bore Diameter Marks

○ :	**37.000 – 37.008 mm**
None:	**37.009 – 37.016 mm**



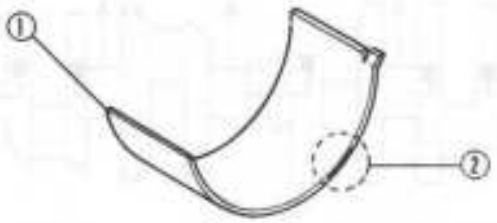
Crankcase Main Bearing Bore Diameter Marks, "○" mark or no mark

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

Main Bearing Insert Selection

Crankcase Main Bearing Bore Diameter Mark	Crankshaft Main Journal Diameter Mark	Bearing Insert*		
		Size Color	Part Number	Journal Nos.
○	1	Brown	92028-1447	1, 3, 5
			92028-1444	2, 4
None	1	Black	92028-1446	1, 3, 5
○	None		92028-1443	2, 4
None	None	Blue	92028-1445	1, 3, 5
			92028-1442	2, 4

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



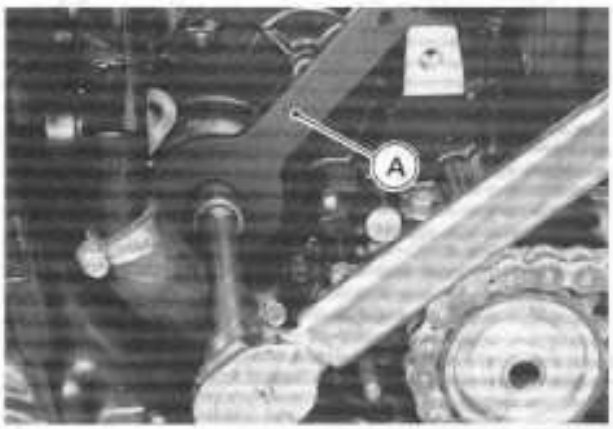
1. Bearing Insert 2. Size Color Mark

•Install the new inserts in the crankcase halves and check insert/journal clearance with plastigage.

Idler Shaft Pulley

Removal

•Remove the following.
Clutch Slave Cylinder
Engine Sprocket Cover
Alternator
•Using the pulley holder (special tool), loosen the pulley bolt.
•Using the 6 mm bolts and pull out the idler shaft pulley.



A. Pulley Holder: 57001-1237

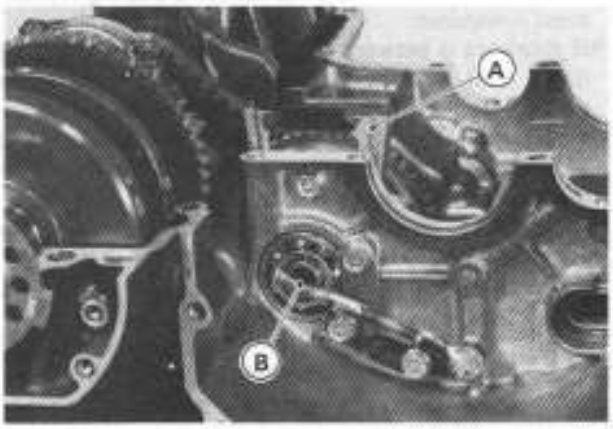
Installation

•Installation is the reverse of removal. Note the following.
○After installing the alternator, adjust the alternator belt (see Electrical System chapter).

Idler Shaft/Starter Motor Clutch

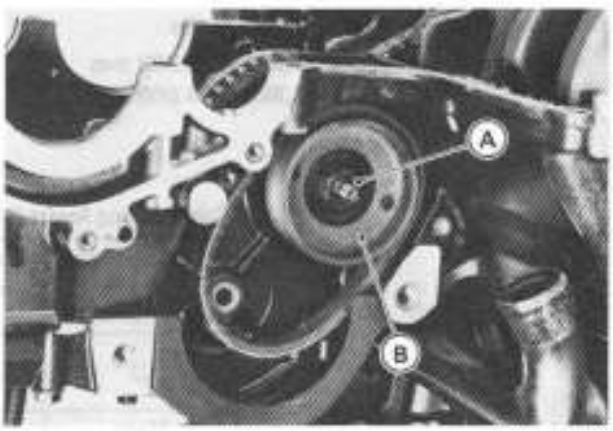
Removal

•Remove the engine (see Engine Removal/Installation chapter).
•Remove the following.
Lower Crankcase Half (Crankcase Splitting)
Oil-Pump Drive Chain Guide
Oil Nozzle for Idler Shaft



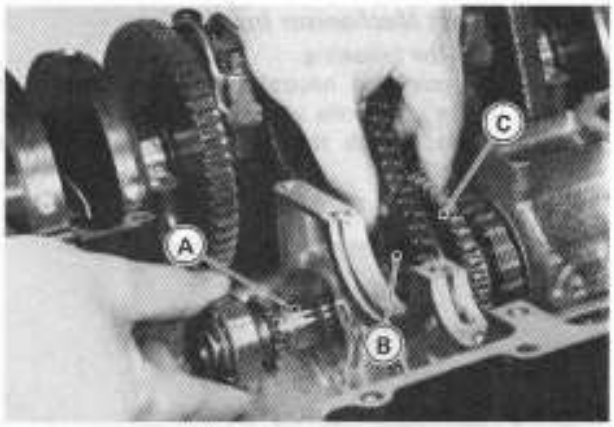
A. Chain Guide B. Oil Nozzle

Idler Shaft Pulley (see Idler Shaft Pulley)



A. Bolt B. Pulley

•Pull out the idler shaft.



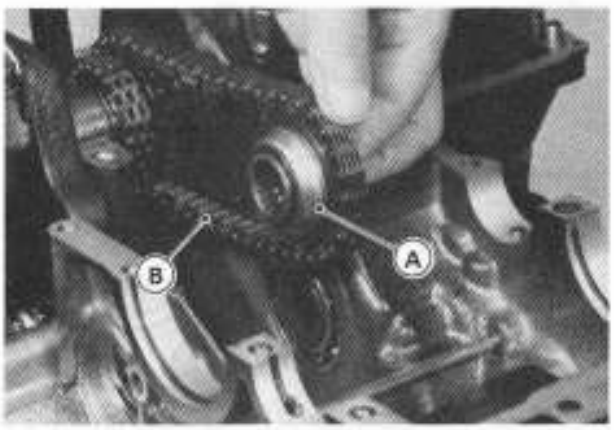
A. Idler Shaft
B. Starter Motor Clutch
C. Starter Motor Clutch Gear

●Remove the starter motor clutch and the idler shaft sprocket.

Installation

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

○Engage the idler shaft sprocket with the chain with the boss side facing to the correct side as shown in the figure.



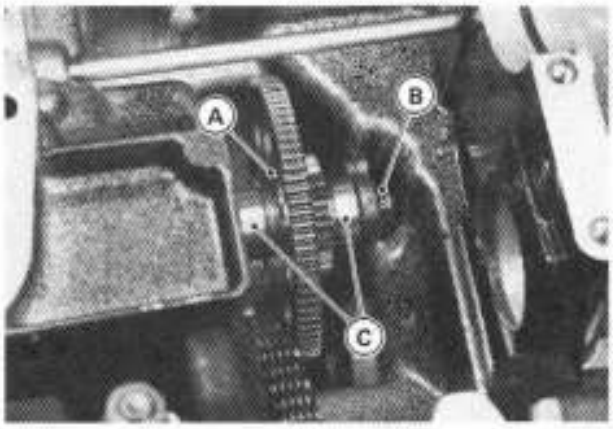
A. Sprocket
B. Chain

Starter Idle Gear

Removal

●Remove the idler shaft.

●Remove the circlip on the starter idle gear shaft.



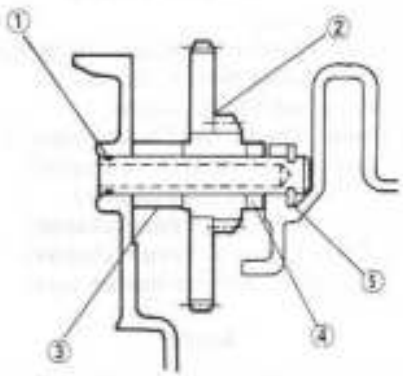
A. Starter Idle Gear
B. Circlip
C. Collar

●Pull out the shaft and take off the starter idle gear.

Installation

●Be careful of the following.

○Install the starter idle gear and shaft correctly as shown in the figure.



1. O-ring
2. Starter Idle Gear
3. Collar (Longer)
4. Collar (Shorter)
5. Circlip

Transmission

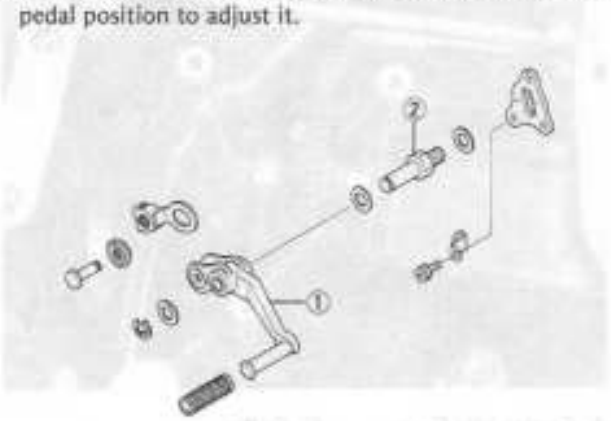
Shift Pedal Position Adjustment

The shift pedal position can be adjusted to suit to the rider.

●Adjustment is done at of the shift pedal mounting. Remove the following.

Lower Fairing
Shift Pedal

●Loosen the shift pedal pivot bolt and alter the shift pedal position to adjust it.



1. Shift Pedal 2. Pivot Bolt

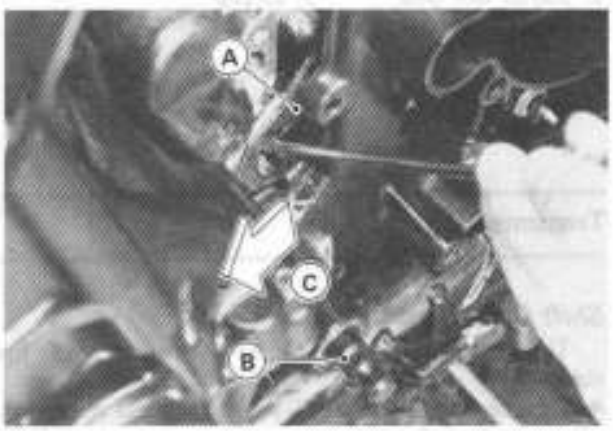
●Be careful of the following.
○Tighten the shift pedal pivot bolt to the specified torque (see Exploded View).

External Shift Mechanism Removal

●Remove the following.
Engine Oil (see Engine Lubrication System chapter)
Coolant (see Cooling System chapter)
Lower Fairing (see Frame chapter)
Clutch Sleeve Cylinder (see Clutch chapter)
Engine Sprocket (see Final Drive chapter)
Rear Wheel (see Wheel/Tires chapter)
Water Pump (see Cooling System chapter)
Alternator (see Electrical System chapter)
●Remove the external shift mechanism cover.

NOTE

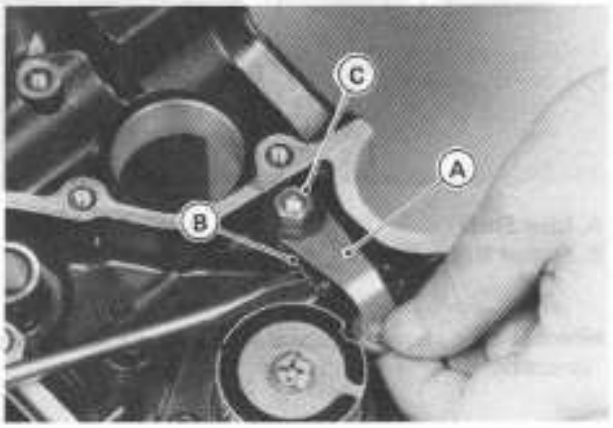
○*Remove the shift shaft pushing the shift mechanism arm toward the shaft.*



A. Shift Mechanism Arm C. Push.
B. Shift Shaft

External Shift Mechanism Installation

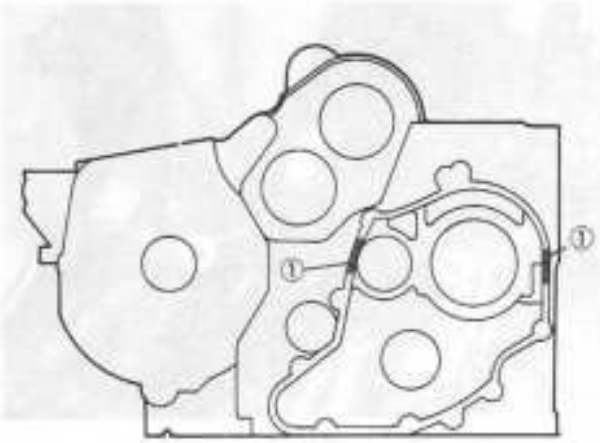
●Be careful of the following.
○Install the gear and neutral positioning levers and springs to the stud bolts and install the nuts (do not tighten them). Hook the springs on the levers and tighten the nuts.



A. Lever C. Nut
B. Spring

NOTE

○*The gear and neutral positioning levers are identical.*
○*Apply a silicone sealant to the crankcase halves mating surface on the front and rear sides of the external shift mechanism cover mount.*



1. Silicone Sealant Applied Areas

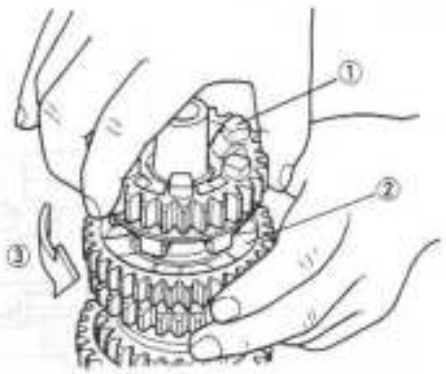
○After installing the alternator, adjust the alternator belt (se Electrical System chapter).

Transmission Shafts Removal

●Remove the engine.
●Split the crankcase.
●Remove the drive shaft and output shaft.

Transmission Shaft Installation

●Be careful of the following.
○Apply engine oil to the sliding portion of the gears and bearings.
○Check to see that the set pins and set rings are in place.
○Install the drive shaft and output shaft to the upper crankcase half.



1. 5th Gear
2. 3rd Gear
3. Spin quickly.

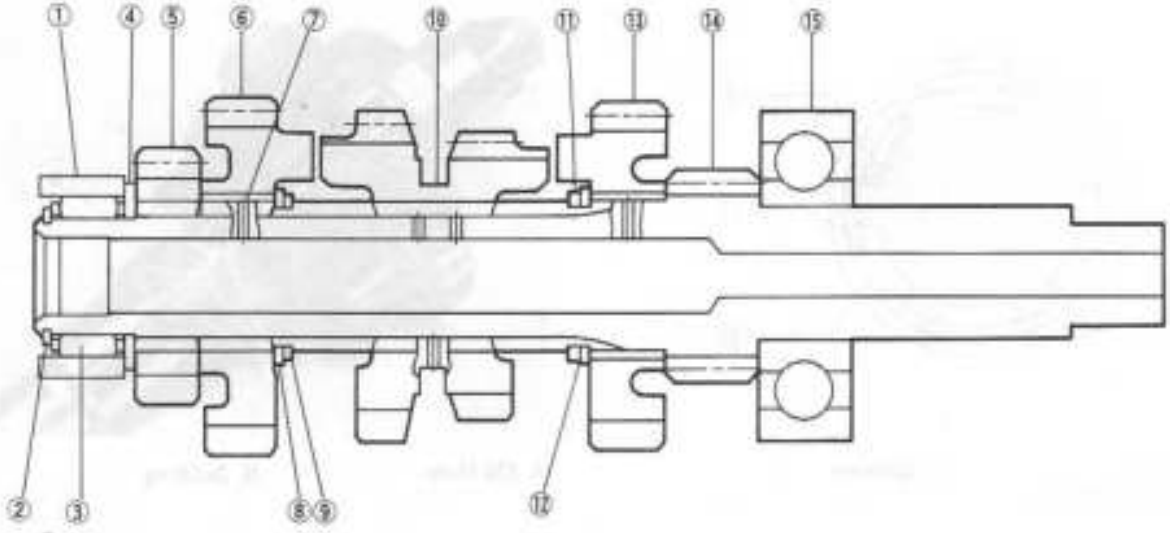
Transmission Disassembly

●Remove the transmission shafts.
●Using the circlip pliers (special tool: 57001-144) to remove the circlips, disassemble the transmission shafts.
●The 5th gear on the output shaft has three steel balls assembled into it for the positive neutral finder mechanism. Remove the 5th gear as the following.
○Set the output shaft in a vertical position holding the 3rd gear.
○Spin the 5th gear quickly and pull it off upward.

Transmission Assembly

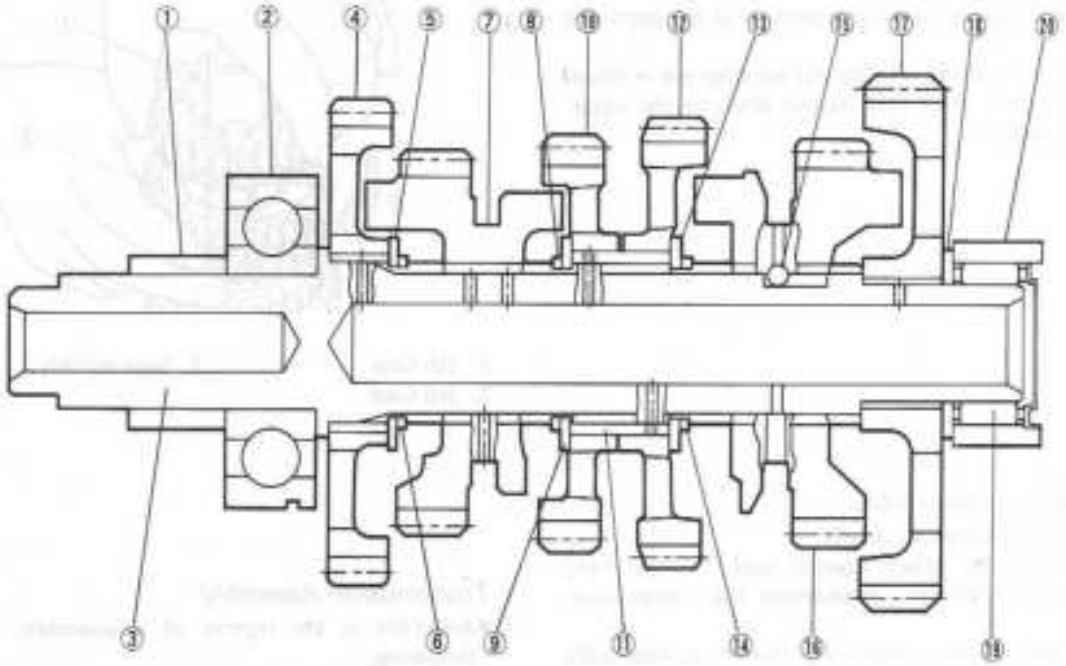
●Assembly is the reverse of disassembly. Note the following.
○Replace any circlip that were removed with new ones.
○Install the circlips so that the opening is aligned with a spline groove.
○Install the toothed washers so that the teeth are not aligned with the circlip opening.

Drive Shaft

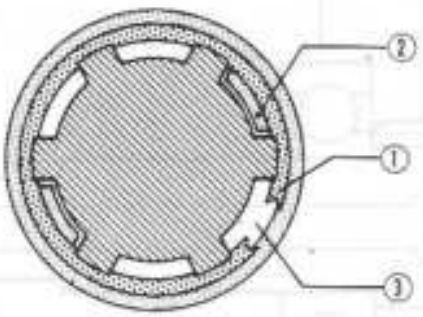


1. Bearing Outer Race
2. Circlip
3. Needle Bearing
4. Thrust Washer
5. 2nd Gear
6. Top (6th) Gear
7. Bushing
8. Toothed Washer
9. Circlip
10. 3rd/4th Gear
11. Circlip
12. Washer
13. 5th Gear
14. 1st Gear (Drive Shaft)
15. Ball Bearing

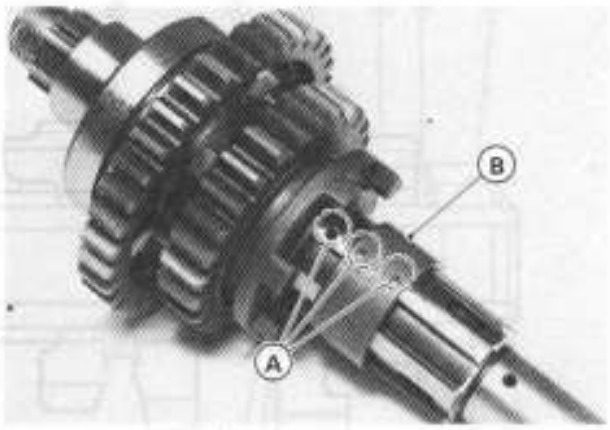
Output Shaft



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



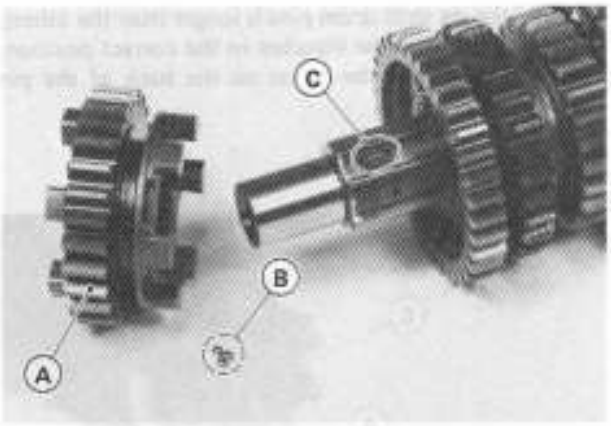
1. Circlip
2. Toothed Washer
3. Groove



A. Oil Hole
B. Bushing

○Install the gear bushings on the shafts with their oil holes aligned with the shaft oil holes.

○Fit the steel balls into the 5th gear holes that are smaller than the other holes as seen from the outside of the gear, and then install the gear on the shaft so that the steel balls align with the recesses in the shaft.



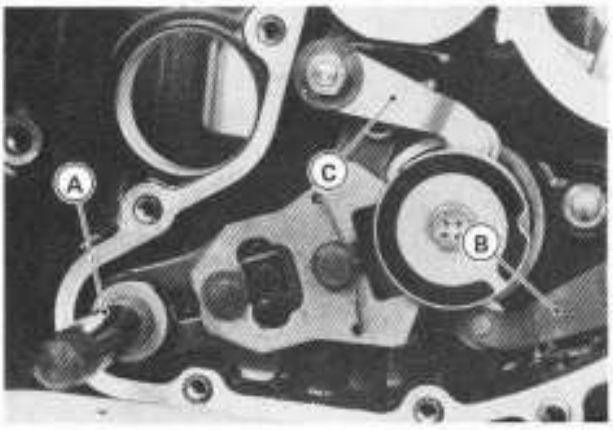
A. 5th Gear
B. Steel Balls
C. Recess

CAUTION

○Do not apply grease to the steel balls to hold them in place. This will cause the positive neutral finder mechanism to malfunction.

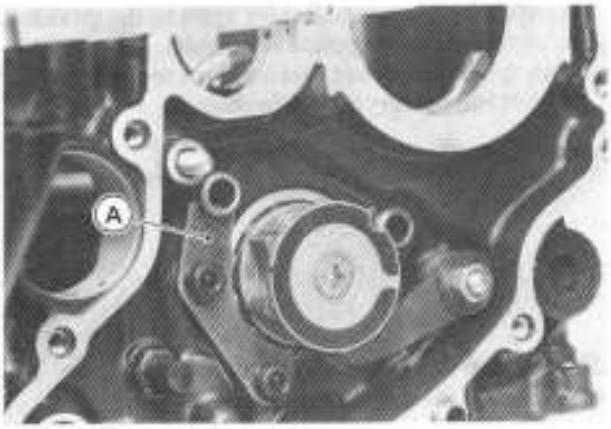
Shift Drum and Fork Removal

●Remove the following.
Engine (Removal)
Lower Crankcase Half (Crankcase Splitting)
External Shift Mechanism

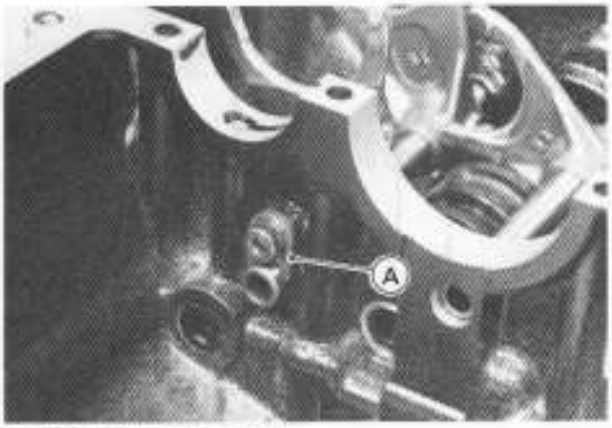


A. Shift Shaft
B. Gear Positioning Lever
C. Neutral Positioning Lever

●Remove the shift drum holding plate.
●Remove the shift rod holding plate.



A. Shift Drum Holding Plate

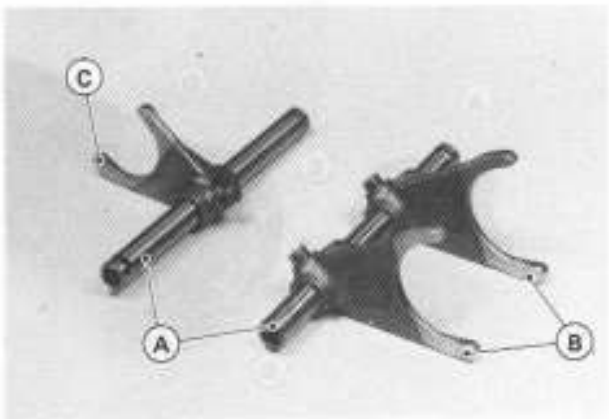


A. Shift Rod Holding Plate

●Pull out the shift rods and take off the shift forks.
●Pull out the shift drum.

Shift Drum and Fork Installation

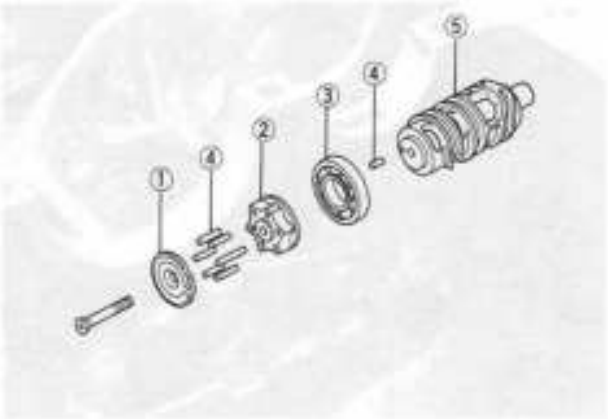
●Installation is the reverse of removal. Note the following.
○The shift forks for the output shaft are identical.
○The shift rods are identical.



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

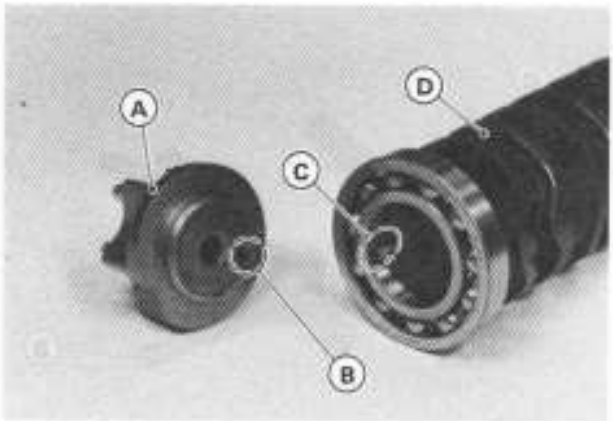
○Apply a non-permanent locking agent to the threads of the shift drum holding plate Allen bolts.
○Apply a non-permanent locking agent to the threads of the shift rod holding plate Allen bolt.

Shift Drum Disassembly/Assembly
●Disassemble the shift drum as shown.



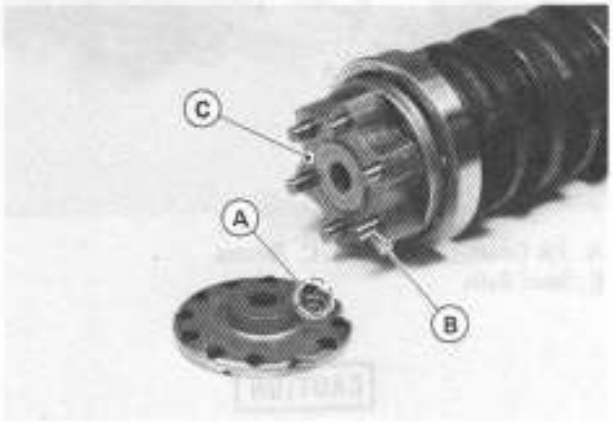
1. Pin Plate
2. Bearing Holder
3. Bearing
4. Pins
5. Shift Drum

●When assembling the shift drum, be careful of the following.
○Install the bearing holder on the shift drum so that the hole on the back of the holder aligns with the dowel pin on the drum.



A. Bearing Holder
B. Hole
C. Dowel Pin
D. Shift Drum

○One of the six shift drum pins is longer than the others. The long pin must be installed in the correct position, and must fit into the recess on the back of the pin plate.



A. Recess on Pin Plate
B. Long Pin
C. Bearing Holder

○Apply a non-permanent locking agent to the threads of the pin plate screw.

Wheels/Tires

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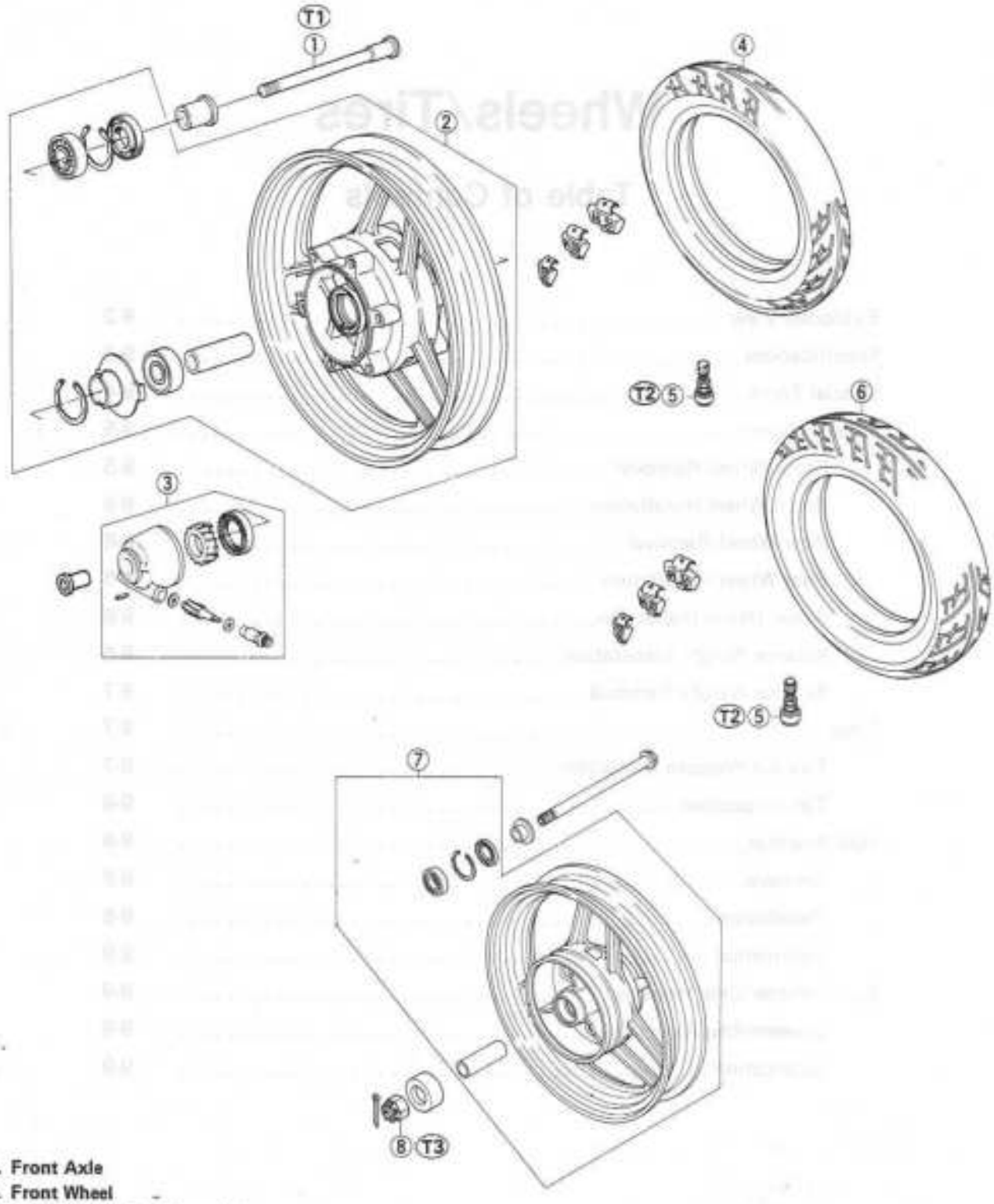
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Exploded View



1. Front Axle
2. Front Wheel
3. Speedometer Gear Assembly
4. Front Tire
5. Air Valve
6. Rear Tire
7. Rear Wheel
8. Rear Axle Nut

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

Specifications

Item		Standard	Service Limit
Wheels:			
Rim runout:	Axial	– – –	0.5 mm
	Radial	– – –	0.8 mm
Axle runout/100 mm:		Less than 0.05 mm	0.2 mm 0.7 mm : Repair Limit
Wheel balance		Less than 10 g	– – –
Balance weights		10 g, 20 g, 30 g	– – –
Tires:			
Tire tread depth:	Front	4.4 mm	1 mm
	Rear	6.6 mm	2 mm: Up to 130 km/h (80 mph) 3 mm: Over 130 km/h (80 mph)

Standard tire:

Front	US Canada	110/90 V16 DUNLOP K205F Tubeless or 110/90 V16 METZELER ME33 LASER Tubeless
	Other	110/90 V16 V250 DUNLOP K205F Tubeless or 110/90 V16 METZELER ME33 LASER Tubeless
Rear	US Canada	140/70 V18 DUNLOP K205 Tubeless or 140/70 VB18 METZELER ME99A2 Tubeless
	Other	140/70 V18 V250 DUNLOP K205 Tubeless or 140/70 VB18 METZELER ME99A2 Tubeless

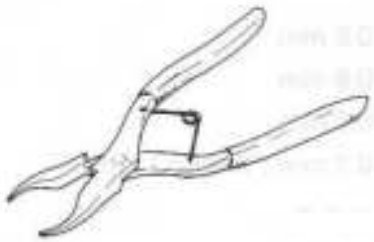
Tire air pressure:

Front	Up to 97.5 kg (215 lb) load	225 kPa (2.25 kg/cm², 32 psi)
	97.5 – 182 kg (215 – 401 lb) load	250 kPa (2.50 kg/cm², 36 psi)
	Over 210 km/h (130 mph)*	
Rear	Up to 97.5 kg (215 lb) load	250 kPa (2.50 kg/cm², 36 psi)
	97.5 – 182 kg (215 – 401 lb) load	290 kPa (2.90 kg/cm², 41 psi)
	Over 210 km/h (130 mph)**	

* Except for US and Canada
** Except for US, Canada, and Switzerland

Special Tools

Circlip Pliers: 57001-143



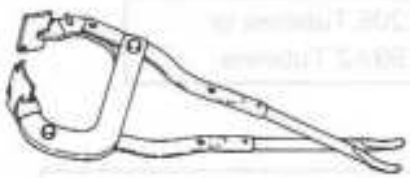
Bearing Driver Set: 57001-1129



Rim Protector: 57001-1063



Bead Breaker: 57001-1072



Tire Iron: 57001-1073



Wheels (Rims)

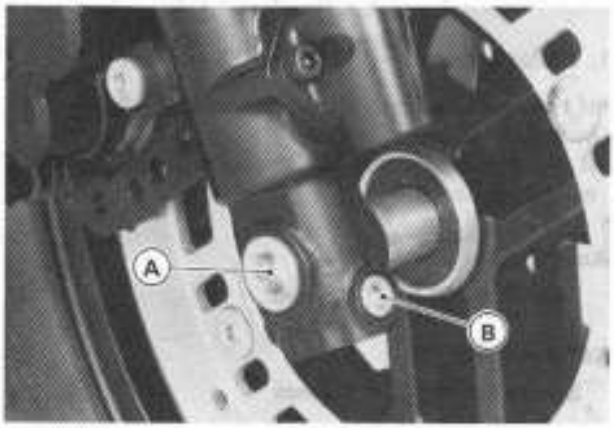
Front Wheel Removal

●Remove the following parts.
Speedometer Cable Lower End
Right or Left Side Brake Caliper Mounting Bolts



A. Brake Caliper B. Speedometer Cable

Right Side Axle Clamp Bolt (Loosen)
Axle (Loosen)



A. Axle B. Axle Clamp Bolt

●Use a jack 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 fork.

CAUTION

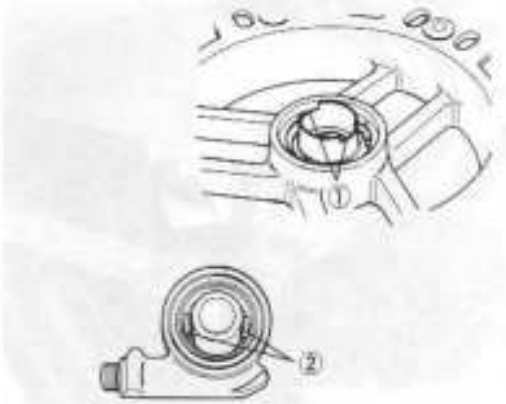
○Do not lay the wheel down on one of the discs. This can damage or warp the disc. Place blocks under the wheel so that the discs do not touch the ground.

Front Wheel Installation

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

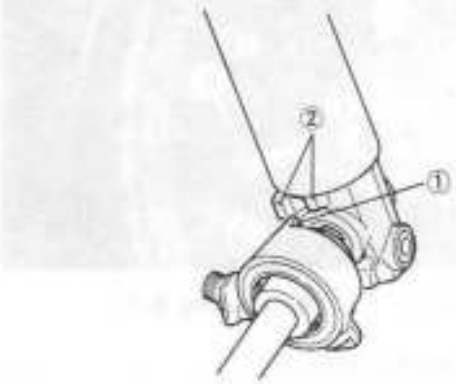
NOTE

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



1. Notches 2. Projections

○Fit the speedometer gear housing stop to the fork leg stop.



1. Housing Stop 2. Fork Leg Stop

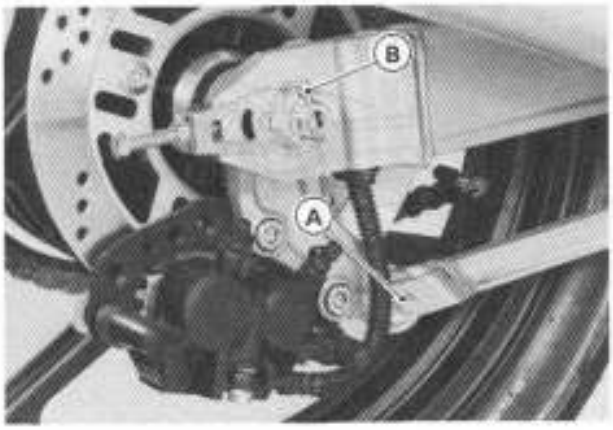
○Fit the collar on the right hand side of the hub.
●Tighten the axle nut to the specified torque (see Exploded View).
●Tighten the axle clamp nut to the specified torque (see Exploded View).
●Check the front brake.

WARNING

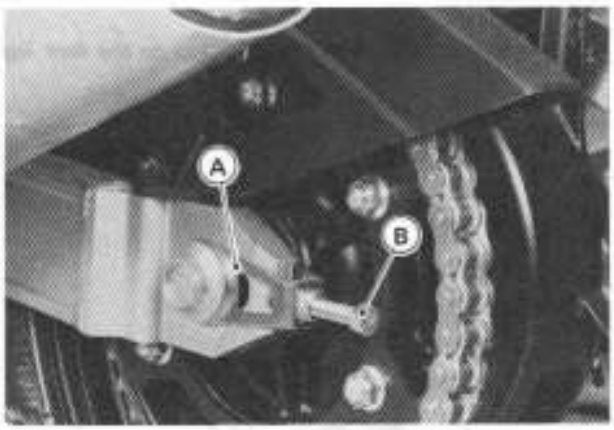
○Do not attempt to drive the motorcycle until a full brake lever is obtained by pumping the brake lever until the pads are against the disc. The brakes will not function on the first application of the lever if this is not done.

Rear Wheel Removal

●Remove or loosen the following parts.
Chain Case (Remove)
Axle Nut Cotter Pin (Remove)
Torque Link Nut (Loosen)
Chain Adjusting Bolt Locknut, Adjusting Bolt (Fully Loosen)
Drive Chain (Fully Loosen)



A. Torque Link Nut B. Cotter Pin



A. Chain Adjuster B. Adjusting Bolt

Axle and Axle Nut (Remove)

●Pull the drive chain toward the left, and remove the rear wheel.

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. Note the following.

○Adjust the drive chain after installation (see Final Drive chapter).

○Tighten the axle nut to the specified torque (see Exploded View).

○Replace the cotter pin with new one.

○Tighten the torque link nut to the specified torque (see Exploded View).

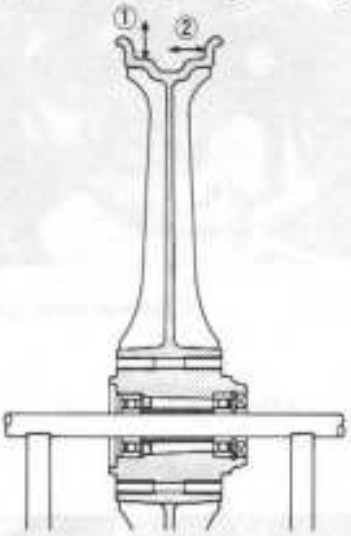
WARNING

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

Wheel (Rim) Inspection

●Remove the tire from the wheel.

●Measure the rim runout by using the dial gauge.



1. Radial Runout 2. Axial Runout

★If rim runout exceeds the service limit, check the wheel bearings.

★If the problem is not due to the bearings, the wheel must be replaced.

Axial Runout
Service Limit: 0.5 mm

Radial Runout
Service Limit: 0.8 mm

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.**

Balance Weight Installation

●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

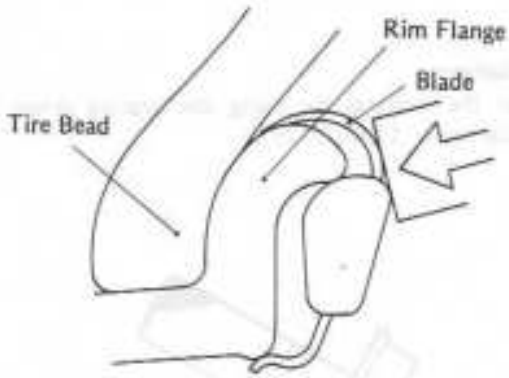
○If the balance weight has any play on the rim flange, the blade and/or clip have been stretched. Replace the loose balance weight.
○Do not reuse used balance weights.

Balance Weight

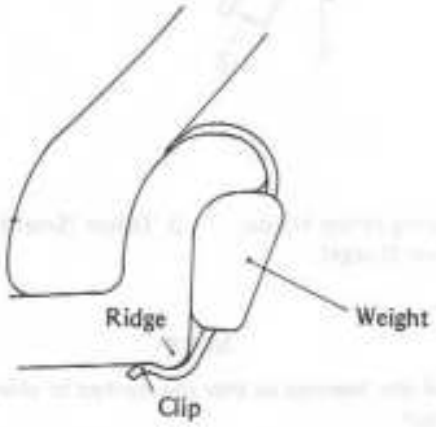
Part Number	Weight (grams)
41075-1014	10
41075-1015	20
41075-1016	30

Installing Balance Weight

(a) Press or lightly hammer the weight in.



(b) Installation completed.



Balance Weight Removal

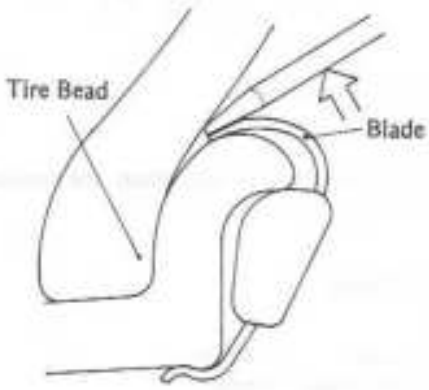
(a)When the tire is not on the rim.
●Push the blade portion toward the outside with a regular tip screw driver, and slip the weight off the rim flange.
●Discard the used balance weight.

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 Air Pressure Inspection

NOTE

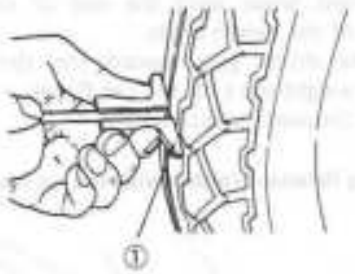
○Measure the tire pressure when the tire are cold (that is, when the motorcycle has not been ridden more than a mile during the past 3 hours).

Tire Air Pressure (when cold)

	Load	Air Pressure
Front	Up to 97.5 kg (215 lb)	225 kPa (2.25 kg/cm², 32 psi)
	97.5 – 182 kg (215 – 401 lb) or Over 210 km/h (130 mph)	250 kPa (2.50 kg/cm², 36 psi)
Rear	Up to 97.5 kg (215 lb)	250 kPa (2.50 kg/cm², 36 psi)
	97.5 – 182 kg (215 – 401 lb) or Over 210 km/h (130 mph)	290 kPa (2.90 kg/cm², 41 psi)

Tire Inspection

- Visually inspect the tire for cracks and cuts, replacing the tire in case of bad damage.
- Measure the tread depth at the center of the tread with a depth gauge.



1. Depth Gauge

★If any measurement is less than the service limit, replace the tire.

Tire Tread Depth

Front

Standard: 4.4 mm

Service Limit: 1 mm

Rear

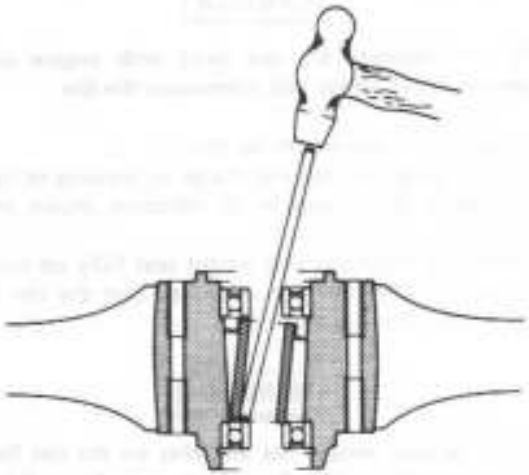
Standard: 6.6 mm

Service Limit: 2 mm Up to 130 km/h (80 mph)
3 mm Over 130 km/h (80 mph)

Hub Bearings

Removal

- Remove the hub bearings by tapping the inner race.

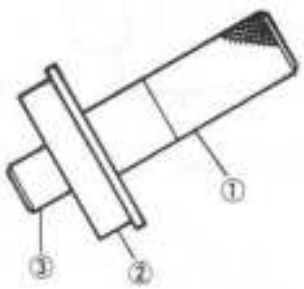


CAUTION

○**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.**

Installation

- Install the bearings by using the bearing driver set (special tools: 57001-1129).



1. Bearing Driver Holder
2. Driver (Large)
3. Driver (Small)

NOTE

○*Install the bearings so that the marked or shielded sides face out.*

Lubrication

NOTE

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

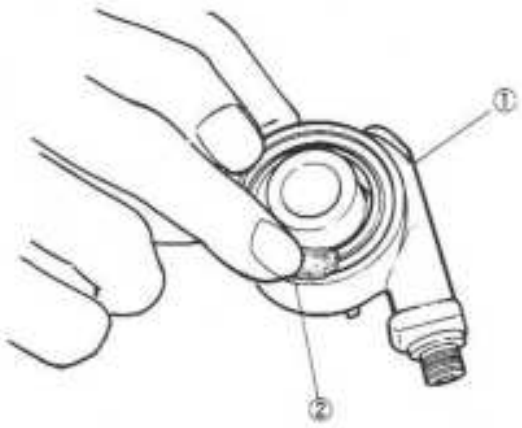
●For front hub bearing, turn each bearing back and forth while checking for roughness or binding.
★If roughness or binding is found, replace the bearing.
★If it is noisy, does not spin smoothly, or has any rough spots, it must be replaced.
★If the bearing is to be used again, rewash it with a quality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



1. Grease

Lubrication

●Clean and grease the speedometer gear housing.



1. Speedometer Gear Housing
2. Grease.

Speedometer Gear Housing

Disassembly and Assembly

NOTE

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

●Install the speedometer gear housing so that it fits in the speedometer gear drive notches (see Front Wheel Installation).

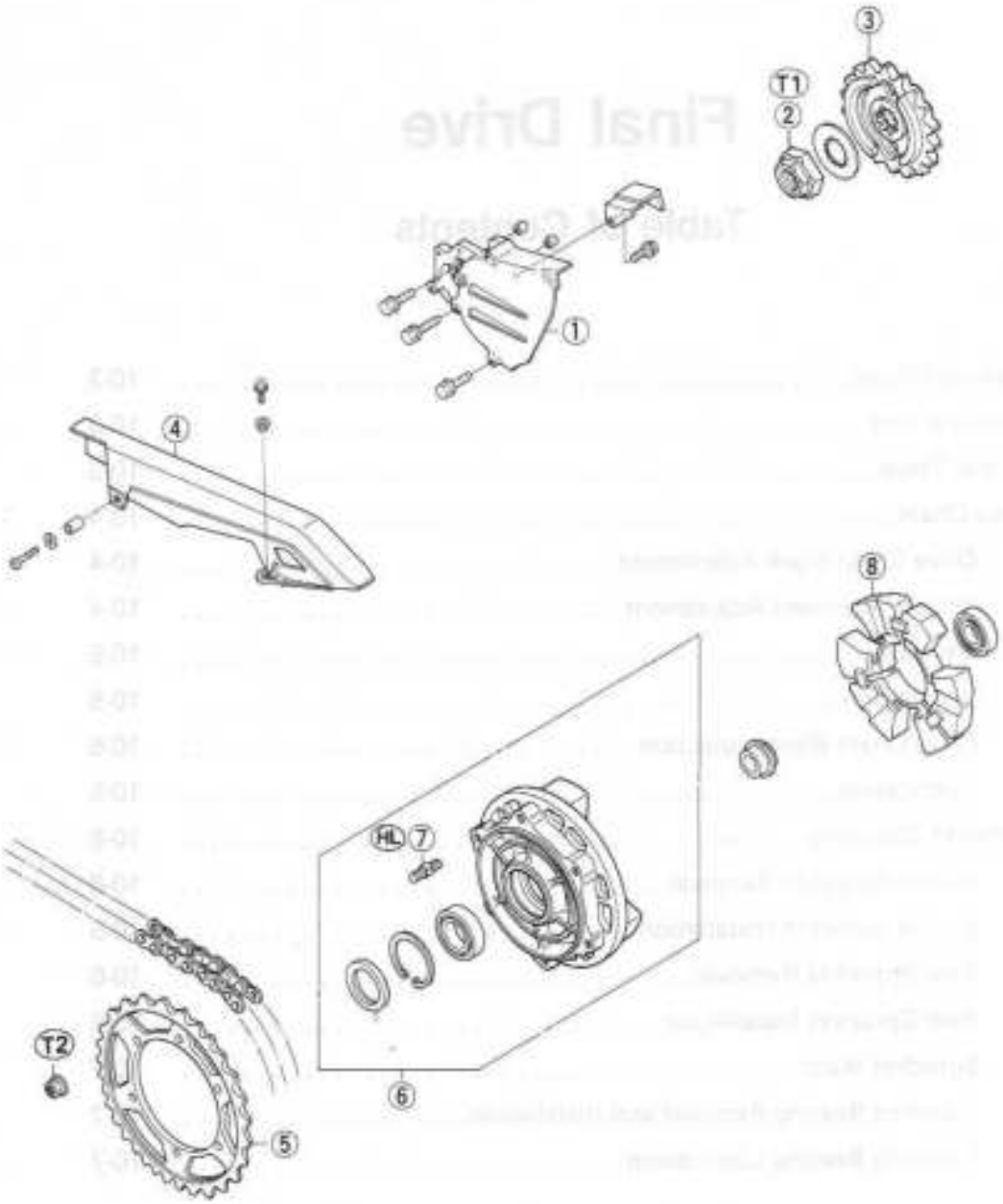
Final Drive

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Exploded View



1. Engine Sprocket Cover
2. Engine Sprocket Nut
3. Engine Sprocket
4. Chain Case
5. Rear Sprocket
6. Rear Wheel Coupling
7. Rear Sprocket Stud Bolts
8. Coupling Damper

L : Apply a non-permanent locking agent to the threads.
T1 : 98 N-m (10.0 kg-m, 72 ft-lb)
T2 : 86 N-m 98.8 kg-m, 64 ft-lb)

Specifications

Item	Standard	Service Limit
Drive Chain:		(Usable Range)
Drive chain slack	35 – 40 mm	35 – 45 mm
Drive chain 20-link length	317.5 – 318.4 mm	323 mm
Sprockets:		
Rear sprocket diameter	Less than 0.4 mm	0.5 mm

Special Tools

Circlip Pliers: 57001-143



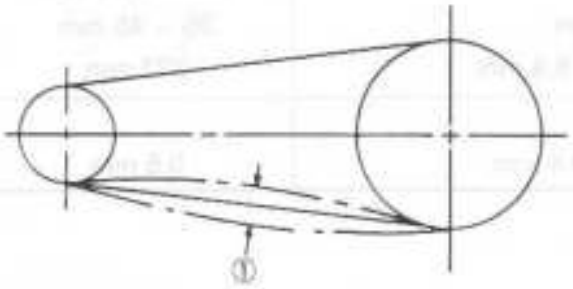
Bearing Driver Set: 57001-1129



Drive Chain

Drive Chain Slack Adjustment

●Set the motorcycle up on its center stand, and check the chain slack within the standard value.

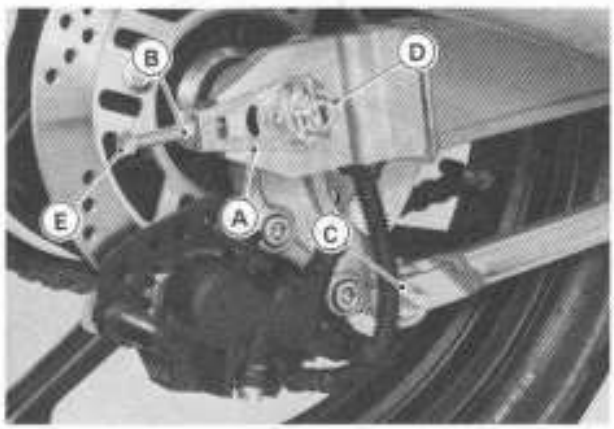


1. Chain Slack

Drive Chain Slack

Standard:	**35 – 40 mm**
Too Tight:	**Less than 35 mm**
Too Loose:	**More than 45 mm**

○Check to see if wheel alignment is properly adjusted.
●Adjust the chain slack as follows.
○Loosen the torque link nut (rear).
○Loosen the left and right chain adjusting bolt locknuts.



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

○Remove the axle cotter pin, and loosen the axle nut.
○Turn in or out both the chain adjusting bolts evenly, adjust the chain so that the chain slack will be within the standard value.

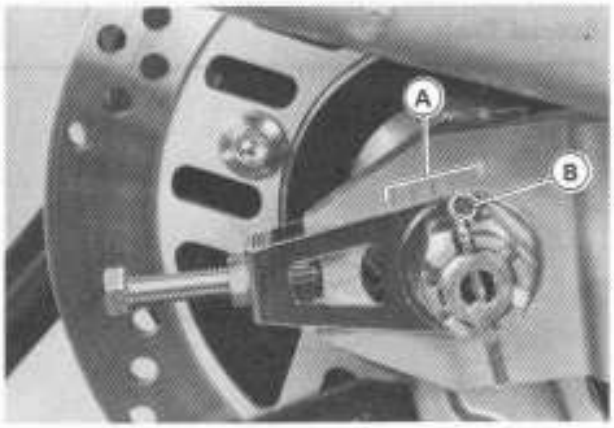
NOTE

○***The notch on the left side adjuster should align with the same swing arm mark that the right side adjuster notch aligns with.***

○Tighten the axle nut to the specified torque (see Exploded View).
○Tighten the both chain adjusting bolts, and then tighten both locknut securely.
○Tighten the torque link nut (rear) to the specified torque (see Exploded View).
○Insert the new cotter pin through the axle and nut, and spread its ends.

Wheel Alignment Adjustment

●Set the motorcycle up on its center stand, and check to see if wheel alignment is properly adjusted.
○The left and right notches on the chain adjuster should point to the same marks or positions on the swing arm.



A. Marks
B. Notch

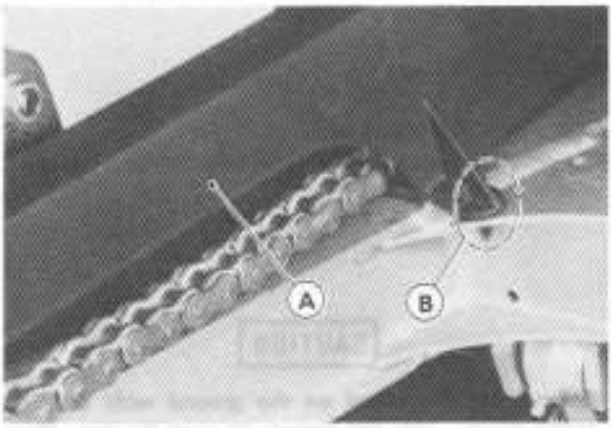
WARNING

○**Misalignment of the wheel will result in abnormal wear, and may result in an unsafe riding condition.**

●Adjust the wheel alignment as follow.
○Loosen the torque link nut.
○Loosen the left and right chain adjusting bolt locknuts.
○Remove the axle cotter pin, and loosen the axle nut.
○Turn the chain adjusting bolts so that the notches on the adjusters point to the same marks or positions on the swing arm on both sides.
○Tighten the bolts and nuts, and install the new axle cotter pin (see Chain Slack Adjustment).

Removal

●Remove the following parts.
Chain Case



A. Chain Case B. Hook

Clutch Slave Cylinder (see Clutch chapter)
Engine Sprocket (see Engine Sprocket Removal)
Rear Wheel (see Wheel/Tires chapter)
Swing Arm (see Suspension chapter)

●Take the drive chain off the frame.

Installation

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

○Adjust the drive chain after installation.

○Tighten the swing arm pivot shaft nut to the specified torque (see Exploded View in Suspension chapter).

○Tighten the engine sprocket nut to the specified torque (see Exploded View).

○Tighten the shock absorber nuts to the specified torque (see Exploded View in Suspension chapter).

○Tighten the uni-trak tie-rod nuts 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).

○Tighten the axle nut to the specified torque (see Exploded View in Wheels/Tires chapter).

○Replace the cotter pin with new one.

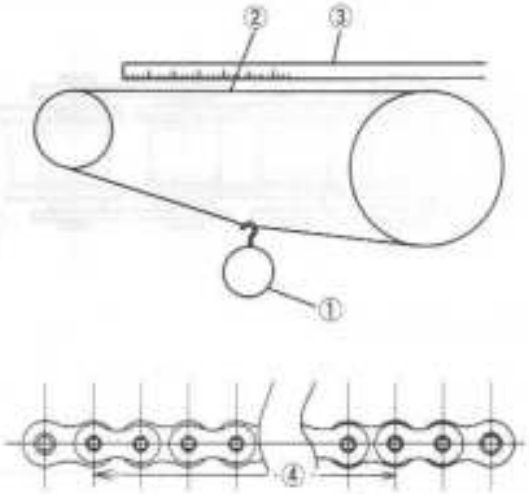
WARNING

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

Drive Chain Wear Inspection

●Stretch the chain taut hanging a 98 N (10 kg, 20 lb) weight on the chain.

●Measure the length of 20 links on the straight part of the chain from pin center of the 1st pin to pin center of the 21st pin. Since the chain may wear unevenly, take measurements at several places.



1. Weight
2. Straight Part
3. Ruler
4. Measure this length.

Drive Chain 20-Link Length

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

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

WARNING

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

Lubrication

CAUTION

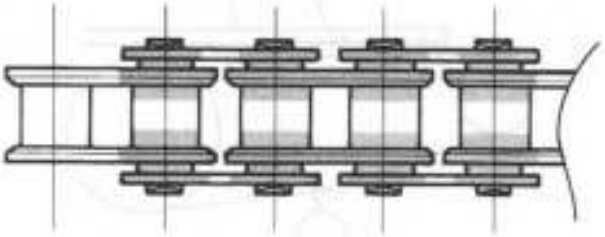
○The O-rings between the side plates seal in the lubricant between the pin and the bushing. To avoid damaging the O-rings and resultant loss of lubricant, observe the following rules.

○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.

•If a special lubricant is not available, a heavy oil such as SEA90 is preferred to a lightly oil because it will stay on the chain longer and provide better lubrication.

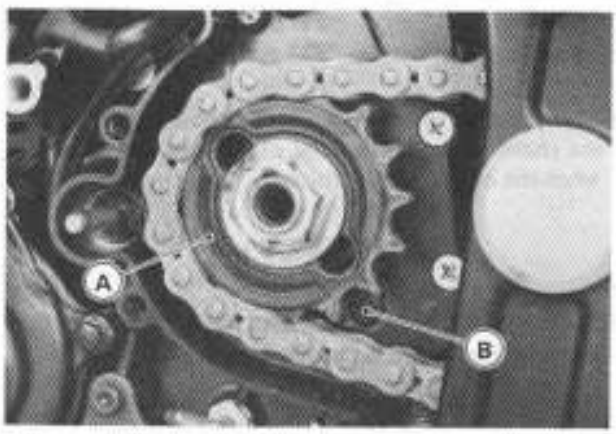


Oil Applied Areas

Sprocket, Coupling

Engine Sprocket Removal

•Remove the clutch slave cylinder.
•Remove the engine sprocket cover.
•Loosen the engine sprocket nut by using the steel rod and rod hole.



A. Sprocket B. Rod Hole

•Remove the chain case.
•Loosen the axle nut, chain adjusting bolts, and then push the wheel forward until the chain is too loose.
•Take the drive chain off the rear sprocket toward the coupling side.
•Pull the engine sprocket off the output shaft with the drive chain, and then separate them.

Engine Sprocket Installation

•Installation is the reverse of removal. Note the following.
○Tighten the engine sprocket nut to the specified torque (see Exploded View).
○Tighten rear axle nut to the specified torque (see Exploded View in Wheels/Tires chapter).
○Tighten the torque link nut (rear) to the specified torque (see Exploded View in Brakes chapter).

Rear Sprocket Removal

•Remove the rear wheel (see Wheels/Tires chapter).

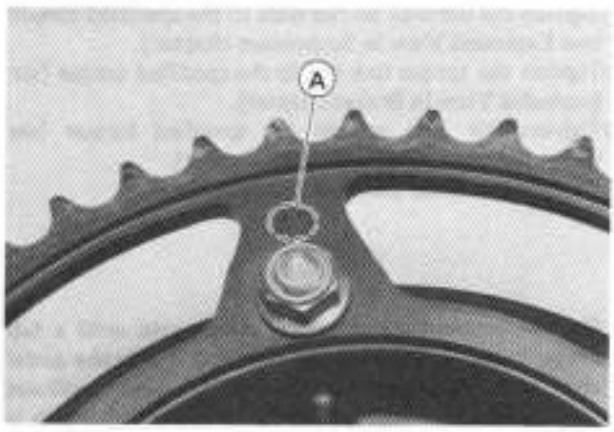
CAUTION

○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 rear sprocket nuts.
•Remove the rear sprocket and remove the coupling from the rear wheel.

Rear Sprocket Installation

•Installation is the reverse of removal. Note the following.
○Install the sprocket facing the tooth number marking outward.



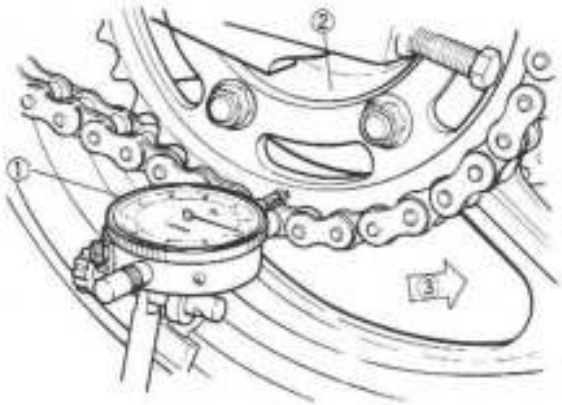
A. Tooth Number Marking

○Tighten the rear sprocket nuts to the specified torque (see Exploded View).
○Tighten the rear axle nut to the specified torque (see Exploded View in Wheels/Tires chapter).
○Tighten the torque link nut to the specified torque (see Exploded View in Brakes chapter).

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.



1. Rear Sprocket
2. Dial Gauge
3. Turn

Coupling Bearing Removal and Installation

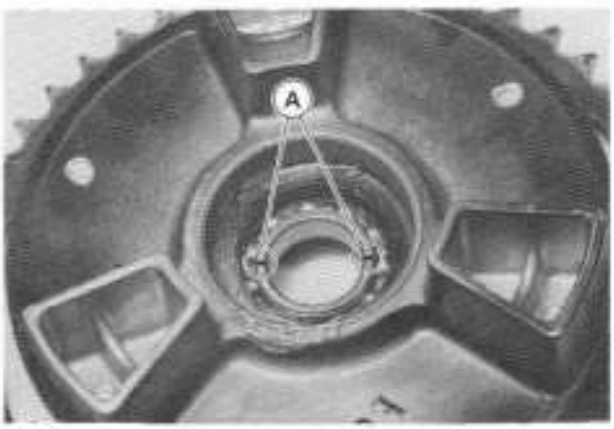
●Note the following.

○Remove the bearing slowly by using a press.

CAUTION

○**Do not tap the inner race with a hammer, or the bearing may be damaged, and cause the outer race not to be removed from the coupling.**

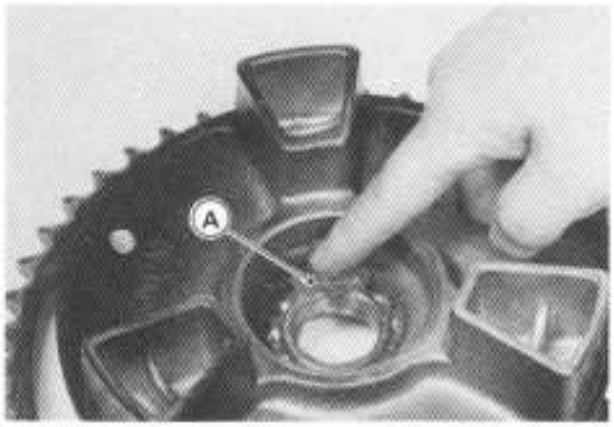
○Install the coupling bearing with the notched side facing to toward the hub.



A. Notches

Coupling Bearing Lubrication

●Apply a little grease to the inside of the rear coupling.



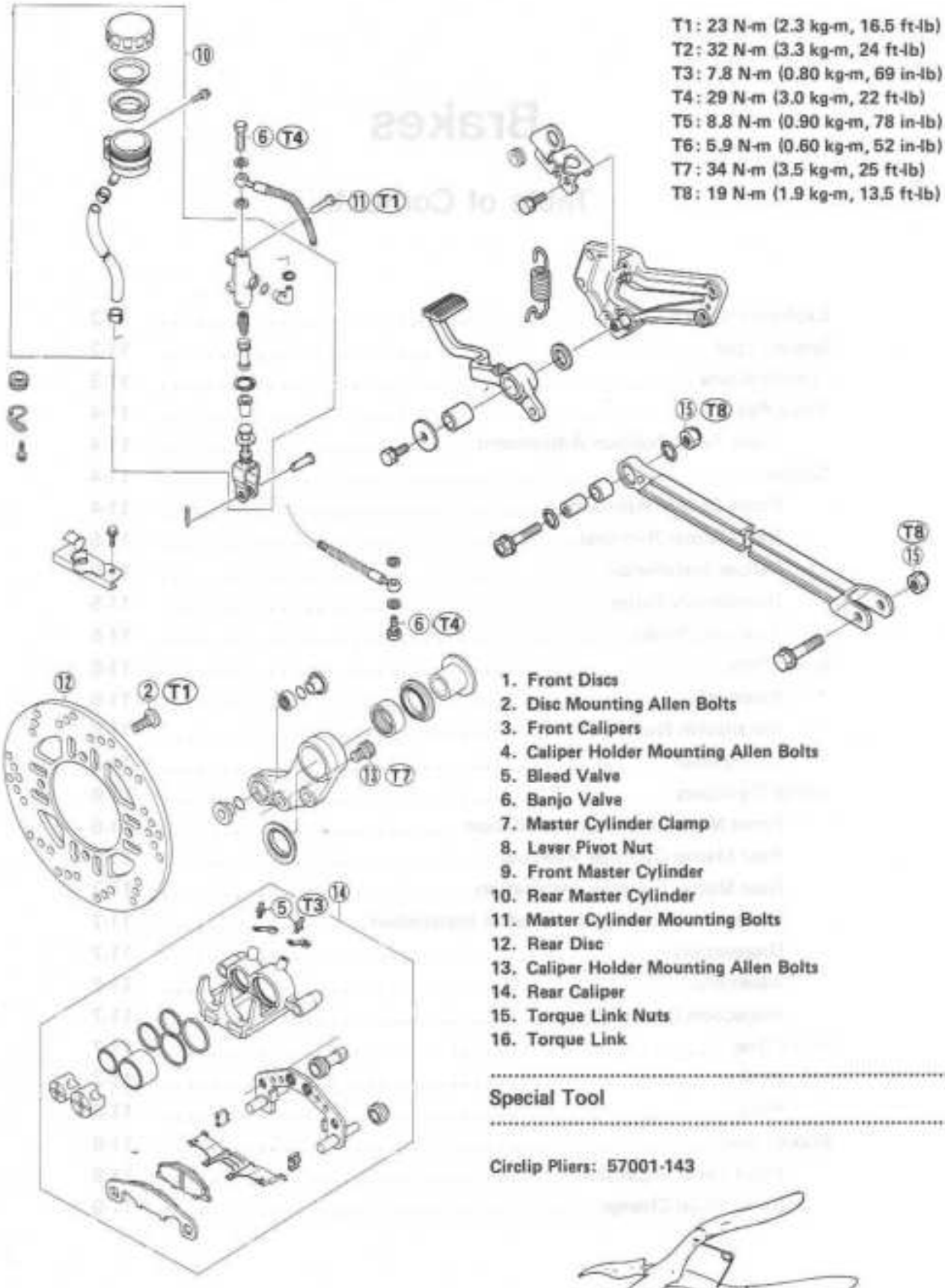
A. Grease.

Brakes

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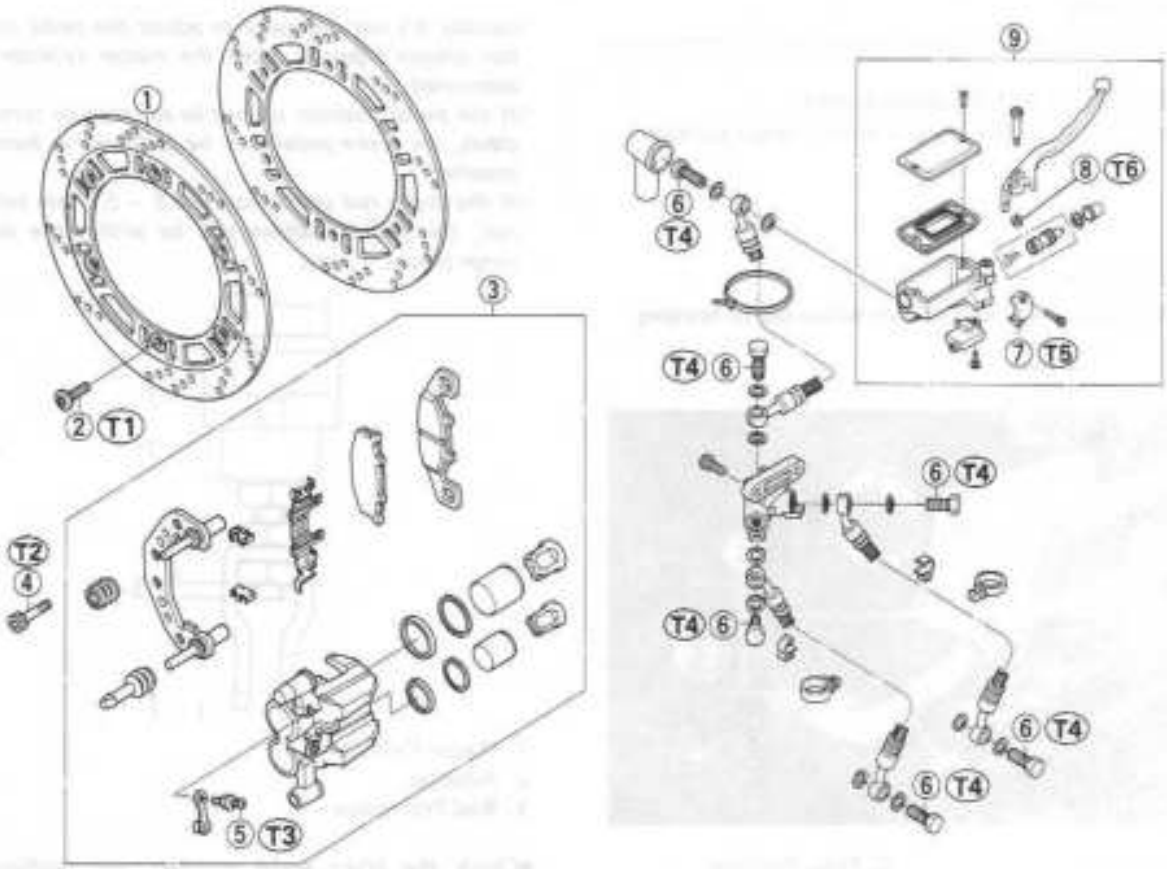
Exploded View



1. Front Discs
2. Disc Mounting Allen Bolts
3. Front Calipers
4. Caliper Holder Mounting Allen Bolts
5. Bleed Valve
6. Banjo Valve
7. Master Cylinder Clamp
8. Lever Pivot Nut
9. Front Master Cylinder
10. Rear Master Cylinder
11. Master Cylinder Mounting Bolts
12. Rear Disc
13. Caliper Holder Mounting Allen Bolts
14. Rear Caliper
15. Torque Link Nuts
16. Torque Link

Special Tool

Circlip Pliers: 57001-143



Specifications

Item		Standard	Service Limit
Brake Pedal:			
Brake pedal position		45 mm below top of footpeg	– – –
Brake Pads:			
Pad lining thickness		4.35 mm	1 mm
Brake Discs:			
Disc thickness:	Front	4.8 – 5.1 mm	4.5 mm
	Rear	5.8 – 6.1 mm	5.0 mm
Disc runout		Under 0.15 mm	0.3 mm
Brake Fluid:			
Grade		D.O.T.4	
Brand (recommended)		Castrol Girling-Universal	
		Castrol GT (LMA)	
		Castrol Disc Brake Fluid	
		Check Shock Premium Heavy Duty	

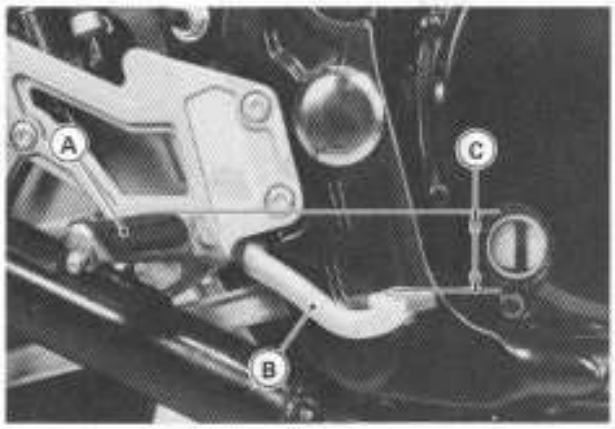
Brake Pedal

Brake Pedal Position Adjustment

•Check that the brake pedal is in the correct position.

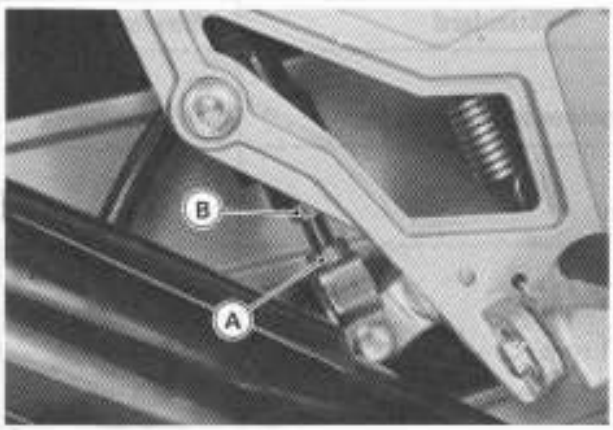
Pedal Position

Standard: About 45 mm below top of footpeg



A. Footpeg
B. Brake Pedal
C. Pedal Position

*If it is not, adjust the brake pedal position at the adjuster under the rear master cylinder.

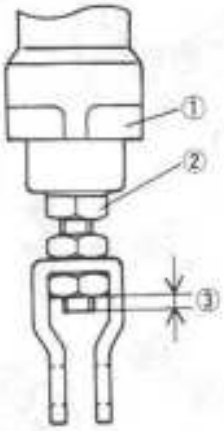


A. Locknut
B. Adjuster

•Loosen the clevis locknut and move the clevis up or down by turning the adjuster to adjust the brake pedal position.
•Tighten the locknut to the specified torque (see Exploded View).

NOTE

○*Usually it's not necessary to adjust the pedal position, but always adjust it when the master cylinder is disassembled.*
○*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 4 mm).*



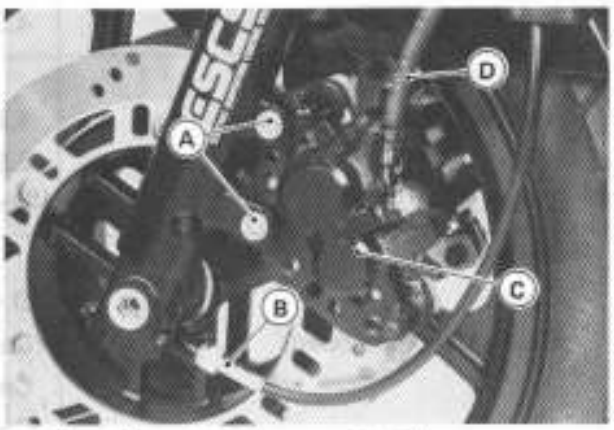
1. Master Cylinder
2. Adjuster
3. Rod Protrusion

•Check the brake pedal position, and readjust it if necessary.

Caliper

Front Caliper Removal

•Disconnect the speedometer cable lower end (left side caliper removal).
•Loosen the banjo bolt at the caliper, and tighten it loosely.
•Remove the caliper mounting bolts and take off the caliper.



A. Caliper Mounting Bolts
B. Cable Lower End
C. Caliper
D. Brake Hose

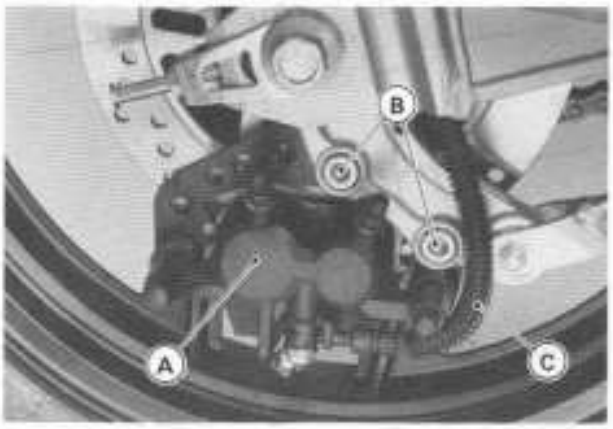
- Disconnect the brake hose from the caliper.
- *If the caliper is to be disassembled after removal and if compressed air is not available, remove the piston using the following steps before disconnecting the brake hose from the caliper.
  - Remove the pads.
  - Pump the brake lever or pedal to remove the caliper piston.

NOTE

- *Immediately wipe up any brake fluid that spills.*

Rear Caliper Removal

- Remove the rear caliper is the same way to the front caliper.



A. Caliper
B. Caliper Mounting Bolts
C. Brake Hose

Caliper Installation

- Note the following.
  - 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.
  - 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.

WARNING

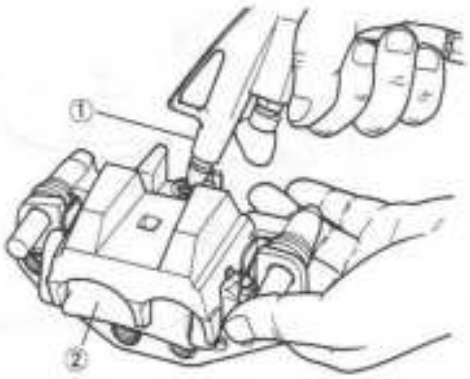
- **Do not attempt to drive the motorcycle until a full brake lever or pedal is obtained by pumping the brake lever or pedal until the pads are against the disc. The brakes will not function on the first application of the lever or pedal if this is not done.**

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.**



1. Apply compressed air. 2. Cloth

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.



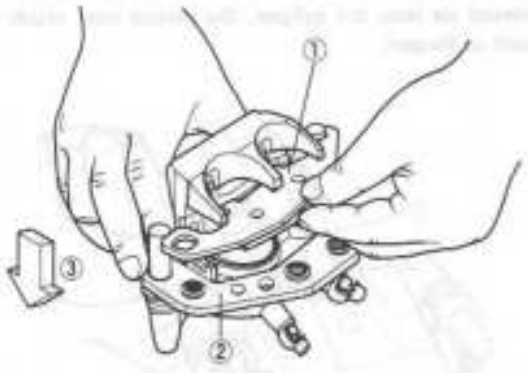
1. Anti-rattle Spring

Brake Pads

Removal

- Remove the caliper (see Front or Rear Caliper Removal).

●Take off the piston side pad from the caliper holder.
●Push the caliper holder to the piston side, and then remove the pad from the caliper holder shaft.



1. Pad
2. Caliper Holder
3. Push the caliper holder.

Installation Notes

●Push the caliper pistons in by hand as far as they 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

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

Pad Lining Thickness

Standard:	**4.35 mm**
Service Limit:	**1 mm**

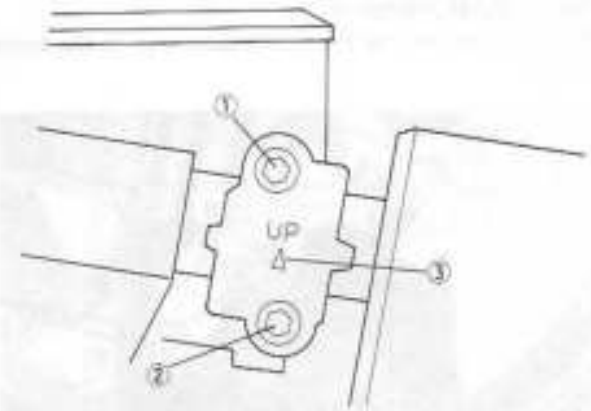


1. Lining Thickness
2. Service Limit

Master Cylinders

Front Master Cylinder Installation

●When installing the front master cylinder, note the following.
○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.

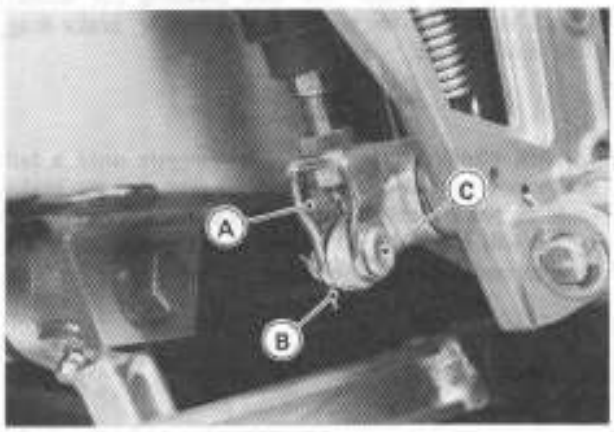


1. Tighten upper clamp bolts first.
2. Lower Clamp Bolt
3. Arrow Mark

○Use a new flat washer on each side of the brake hose fitting.
○Tighten the banjo bolts to the specified torque (see Exploded View).

Rear Master Cylinder Removal

●Note the following.
○Remove the cotter pin and then pull the joint pin out of the push rod clevis and brake pedal.



A. Clevis
B. Cotter Pin
C. Joint Pin

Rear Master Cylinder Installation

•Note the following.

○Use a new flat washer on each side of the brake hose fitting. Be sure that the metal pipe is properly fitted into the U-shaped notch in the master cylinder.

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

○Tighten the rear master cylinder mounting bolts (2) to the specified torque (see Exploded View).

Inspection and Adjustment after Installation

•Check and adjust the following items.

Brake Pedal Position
Rear Brake Light Switch Position
Brake Line Air Bleed
Brake Drag
Braking Power
Brake Fluid Leak

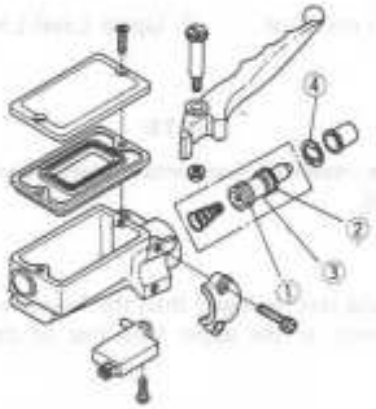
Disassembly

•Remove the following parts.

Dust Cover
Retainer
Piston with Secondary Cup
Primary Cup
Spring

CAUTION

○Do not remove the secondary cup from the piston since removal will damage them.



1. Primary Cup
2. Secondary Cup
3. Piston
4. Retainer

Assembly

•Note the following

○Before assembly, clean all parts including the master cylinder with brake fluid or alcohol.

○Apply brake fluid to the removed parts and to the inner wall of the cylinder.

CAUTION

○Except for the disc pads and disc; use only disc brake fluid, isopropyl alcohol, or ethyl alcohol, for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, Engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely, and will eventually deteriorate the rubber used in the disc brake.

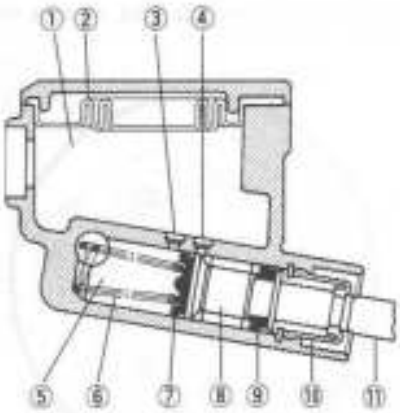
○Take care not to scratch the piston or the inner wall of the cylinder.

Inspection (Visually)

•Check that there are no scratches, wear, rust or pitting on the following parts.

Inside of the Master Cylinder
Outside of the Piston
Primary Cups
Secondary Cups
Dust Covers
Return Springs
Relief and Supply Port Plugged

★If they are damaged, replace them.

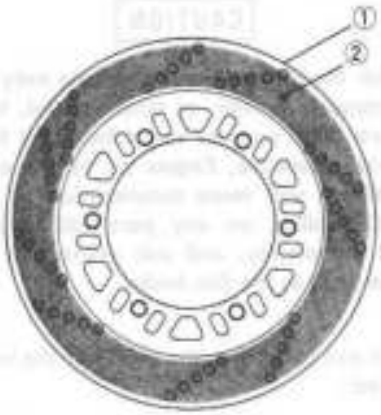


1. Reservoir
2. Diaphragm
3. Relief Port
4. Supply Port
5. Cylinder
6. Return Spring
7. Primary Cup
8. Piston
9. Secondary Cup
10. Dust Cover
11. Brake Lever

Brake Disc

Wear

★Replace the disc if it has worn past the service limit.



1. Brake Disc 2. Measuring Area

Front Disc Thickness

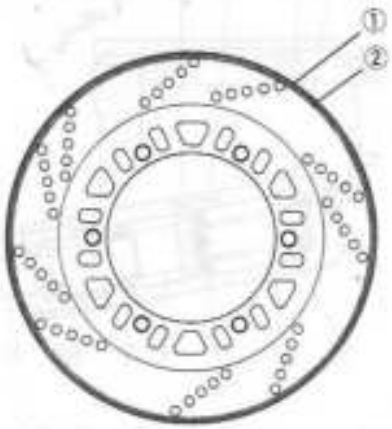
Standard:	**4.8 – 5.1 mm**
Service Limit:	**4.5 mm**

Rear Disc Thickness

Standard:	**5.8 – 6.1 mm**
Service Limit:	**5 mm**

Warp

★If runout exceeds the service limit, replace the disc.



1. Brake Disc 2. Measuring Area

Disc Runout

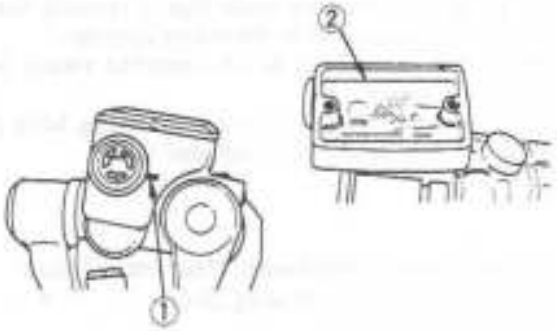
Standard:	**Under 0.15 mm**
Service Limit:	**0.3 mm**

Brake Fluid

Fluid Level Inspection

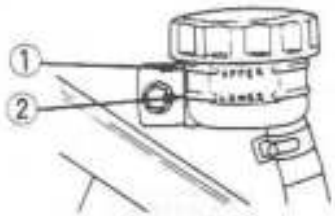
●Check the brake fluid level in the reservoir.

Front Brake Fluid Reservoir



1. Lower Level Line 2. Upper Level Line

Rear Brake Fluid Reservoir



1. Lower Level Line 2. Upper Level Line

NOTE

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

★If the fluid level is lower than the lower level line, fill the reservoir to the upper level line 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.

Recommended Disc Brake Fluid

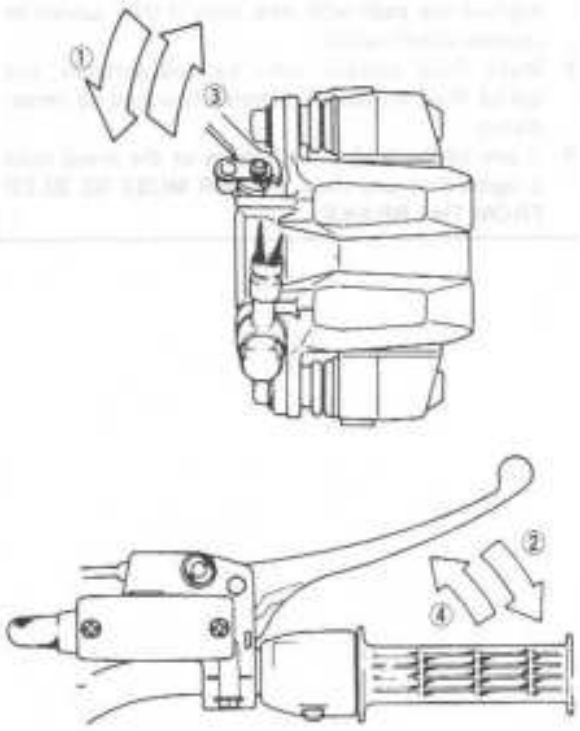
Type	D.O.T.4
Brand	Check Shock Premium Heavy Duty
	Castrol Girling-Universal
	Castrol GT (LMA)
	Castrol Disc Brake Fluid

Brake Fluid Change

NOTE

○*The procedure to change the front brake fluid is as follows. Changing the rear brake fluid is the same as for the front brake.*

●Remove the reservoir cap, and remove the rubber cap on the bleed valve.
●Attach a clear plastic hose to the bleed valve on the caliper, and run the other end of the hose into a container.
●Change the brake fluid as follows.



1. Open the bleed valve.
2. Apply the brake and hold it.
3. Close the bleed valve
4. Release the brake.

○Check the fluid level in the reservoir often, replenishing it as necessary.
○Repeat this operation until fresh brake fluid comes out from the plastic hose or the color of the fluid changes.

NOTE

○*Front Brake: Repeat the above steps one more time for the other caliper.*
○*Rear Brake: Repeat the above steps one more time for the other bleed valve.*

○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.

WARNING

○**Do not mix two brands of fluid. 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 is already in the reservoir are unidentified.**

Recommended Disc Brake Fluid

Type	D.O.T.4
Brand	Check Shock Premium Heavy Duty
	Castrol Girling-Universal
	Castrol GT (LMA)
	Castrol Disc Brake Fluid

Bleeding the Brake Line

NOTE

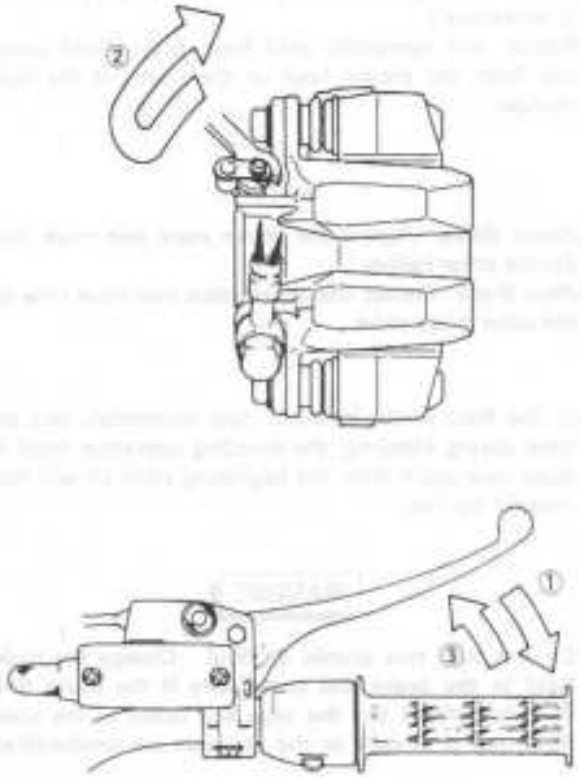
○*The procedure to bleed the front brake line is as follows. Bleeding the rear brake line is the same as for the front brake.*

●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.

NOTE

○*Hit the brake hose lightly going from the caliper to the reservoir side and let the air off from the reservoir when the brake lever has a sponge feeling.*

●Connect a clear plastic hose to the bleed valve at the caliper, running the other end of the hose into a container.
●Bleed the brake line as follows:



1. Hold the brake applied.
2. Quickly open and close the valve.
3. Release the brake.

○The fluid level must be checked several times during the bleeding operation and replenished as necessary.
○Repeat this operation until no more air can be seen coming out into the plastic hose.

NOTE

○*Front Brake: Repeat the above steps one more time for the other caliper.*
○*Rear Brake: Repeat the above steps one more time for the other bleed valve.*
○*If the brake lever action still feels soft or spongy, tap the brake hose with suitable mean from bottom to top end or air will rise up to the top part of the hose, slowly pump the brake lever as the same manner as above.*

○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.

WARNING

○**When working with the disc brake, observe the precautions listed below.**

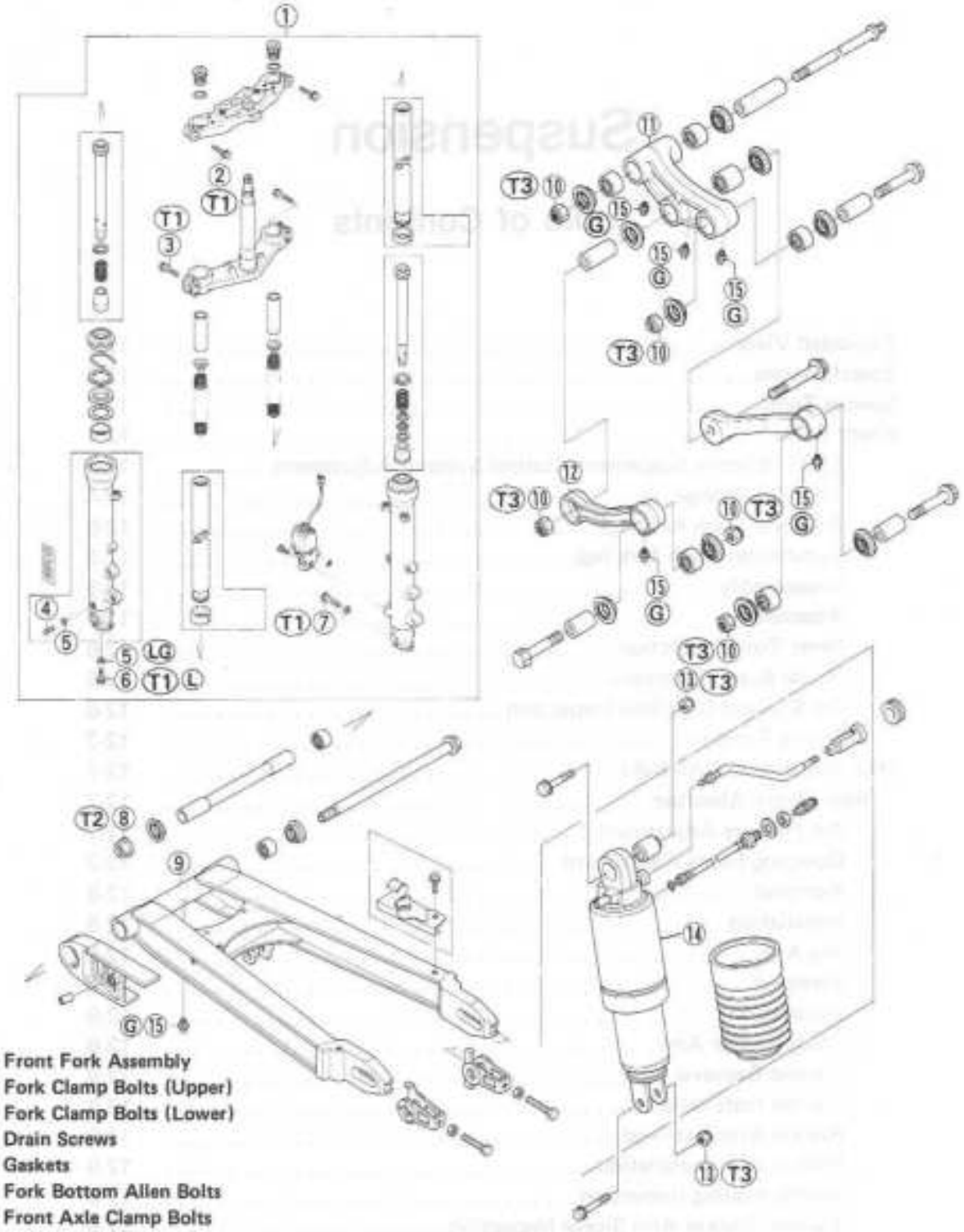
1. Never reuse old brake fluid.
2. Do not use fluid from a container that has been left unsealed or that has been open for a long time.
3. Do not mix two types and brands of fluid for use in the brake. This lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.
4. Don't leave the reservoir cap off for any length of time to avoid moisture contamination of the fluid.
5. Don't change the fluid in the rain or when a strong wind is blowing.
6. Except for the disc pads and discs, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, motor oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely and will eventually reach and break down the rubber used in the disc brake.
7. When handling the disc pads or disc, be careful that no disc brake fluid or any oil gets on them. Clean off any fluid or oil that inadvertently gets on the pads or disc with a high flash-point solvent. Do not use one which will leave an oily residue. Replace the pads with new ones if they cannot be cleaned satisfactorily.
8. Brake fluid quickly ruins painted surfaces; any spilled fluid should be completely wiped up immediately.
9. If any of the brake line fittings or the bleed valve is opened at any time, the **AIR MUST BE BLED FROM THE BRAKE.**

Suspension

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Exploded View



1. Front Fork Assembly
2. Fork Clamp Bolts (Upper)
3. Fork Clamp Bolts (Lower)
4. Drain Screws
5. Gaskets
6. Fork Bottom Allen Bolts
7. Front Axle Clamp Bolts
8. Swing Arm Pivot Nut
9. Swing Arm
10. Tie-rod and Rocker Arm Mounting Nuts
11. Rocker Arm
12. Tie-rods
13. Shock Absorber Mounting Nuts
14. Rear Shock Absorber
15. Grease Nipples

L : Apply a non-permanent locking agent to the threads.
LG : Apply liquid gasket to the threads.
G : Force molybdenum disulfide grease into the nipple.
T1 : 21 N-m (2.1 kg-m, 15.0 ft-lb)
T2 : 88 N-m (9.0 kg-m, 65 ft-lb)
T3 : 59 N-m (6.0 kg-m, 43 ft-lb)

Specifications

Item		Standard	Service Limit
Front Fork:			
ESCS adjuster position		2 of 3 positions	– – –
Fork oil:	Viscosity	SAE 10W20	– – –
	Amount/Unit	380 ±4 mL	– – –
		325 mL: When changing oil	– – –
Fork oil level:	Left	120 ±2 mm (Fully compressed)	– – –
	Right	149 ±2 mm (Fully compressed)	– – –
Fork spring free length		413 mm	405 mm
Rear Suspension:			
Rear shock absorber air pressure		0 (Atomospheric Pressure)	
		(Usable Range)	
	One rider or normal riding	0 – 150 kPa (0 – 1.5 kg/cm², 21 psi)	
	Two rider or high speed riding	50 – 150 kPa (0.5 – 1.5 kg/cm², 7.1 – 21 psi)	
Rear shock absorber damper adjuster position		2 of 4 positions	

Special Tools

Front Fork Cylinder Holder Handle: 57001-183



Front Fork Cylinder Holder Handle Adapter: 57001-1057



Bearing Driver Set: 57001-1129



Front Outer Tube Weight: 57001-1218



Front Oil Seal Driver: 57001-1219



Front Fork

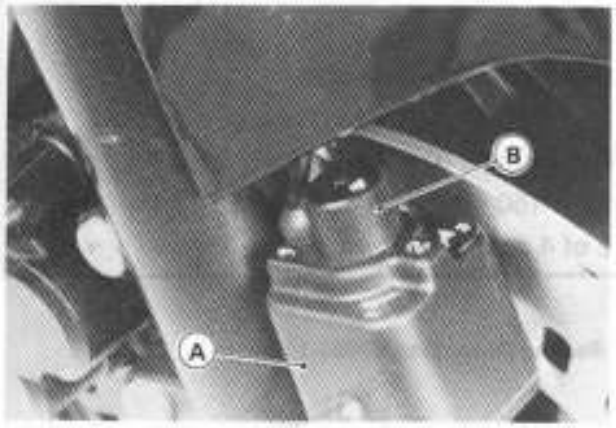
ESCS (Electric Suspension Control System) Adjustment

●The ESCS adjuster on the right fork leg can be adjusted for 3 positions.

ESCS Adjuster

Position	1	2	3
Damping Force	Soft	Moderate	Strong

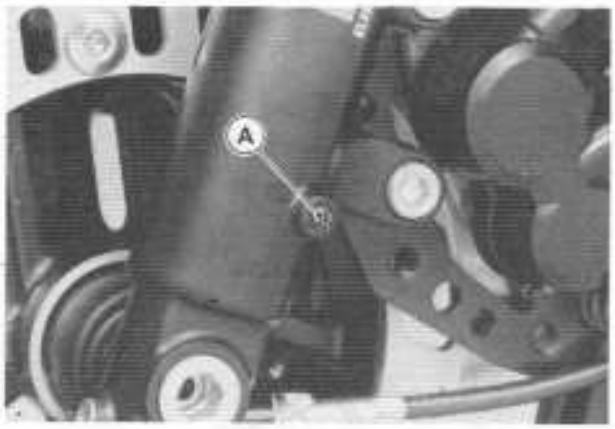
*Standard Position is 2



A. ESCS Unit B. Adjuster

Fork Oil Change

●Remove the following.
Handlebar Holder
Fork Top Plug
Fork Spring
Drain Screw (Each Fork Leg)



A. Drain Screw

●Allow the oil to drain into a suitable container. If you pump the fork legs to force out the oil, be sure to catch the oil in a container as it squirts out.

NOTE

○*Apply a liquid gasket to the threads of the drain screw and gasket.*

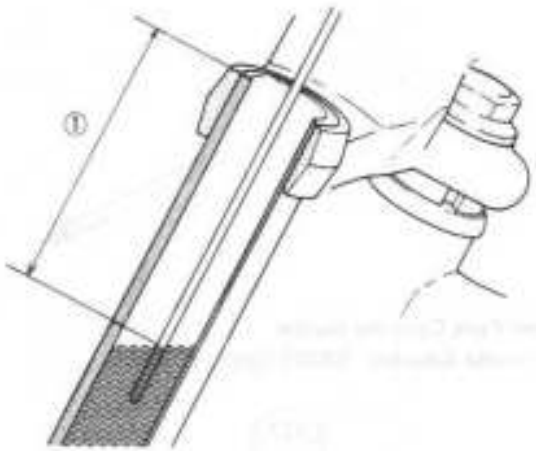
Front Fork Oil

Viscosity	**SAE 10W20**
Amount per side	
When changing oil:	**About 325 mL**
After disassembly and completely dry:	**380 ±4 mL**

NOTE

○*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.



A. Oil Level

Fork Oil Level (Fully Compressed)

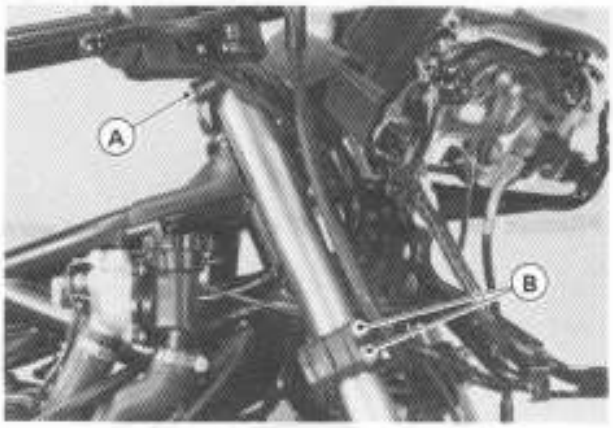
Left Side	**120 ±2 mm**
Right Side	**149 ±2 mm**

★If the oil is above or below the specified level, remove or add oil and recheck the oil level.

●Change the oil of the other fork leg in the same manner.

Removal (each fork leg)

●Remove the following.
Caliper (from the fork leg to be removed.)
Front Wheel (see Wheels/Tires chapter)
Front Fender
Inner Fairing
ESCS Wiring (R.H. fork leg only)
●Loosen the upper and lower fork clamp bolts.
●With a twisting motion, work the fork leg down and out.



A. Upper Clamp Bolts B. Lower Clamp Bolts

Installation (each fork leg)

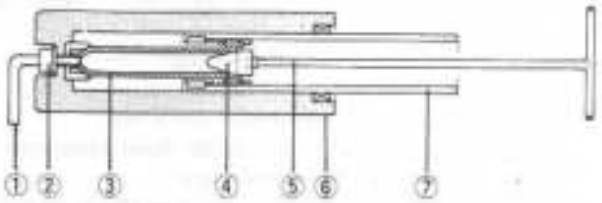
●Perform the following.
○Install the removed parts.
○If the fork leg was disassembled, check the fork oil level.
○Tighten the upper and lower fork clamp bolts to the specified torque (see Exploded View).
○Tighten the caliper mounting bolts to the specified torque (see Exploded View in Brake chapter).
○Connect the ESCS unit wire connectors (R.H. fork leg only).
○Check the front brake after Installation.

WARNING

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

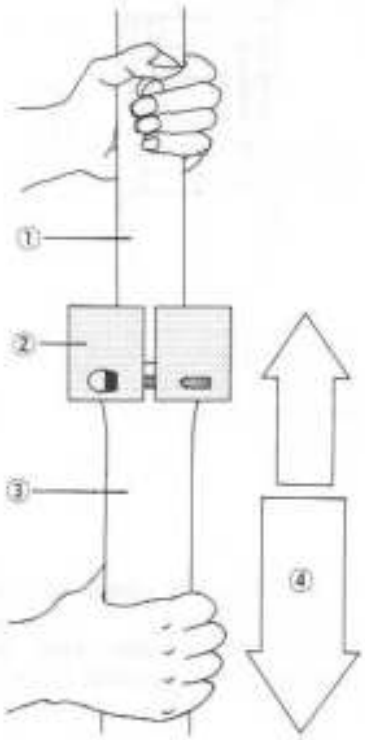
Disassembly

●Perform the following.
○Remove the handlebar holder.
○Loosen the top plug.
○Remove the front fork.
○Remove the top plug.
○Pour 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.



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

○Remove the piston and cylinder unit and the short spring from the top of the front fork tube.
○Remove the dust seal from the outer tube.
○Remove the retainer and washer from the outer tube.
○Mount the weight (special tool) on the top of the outer tube, by fitting the step of the weight (special tool) to the top corner of the outer tube.
○Holding the inner tube by hand in a vertical position, stroke the outer tube several times and pull it down.



1. Inner Tube
2. Fork Outer Tube Weight: 57001-1218
3. Outer Tube
4. Stroke

○Take the cylinder base off the outer tube.

Assembly

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

○Check the top plug O-rings for damage.

☆Replace them with new ones if damaged.

○Replace the oil seal removed with a new one.

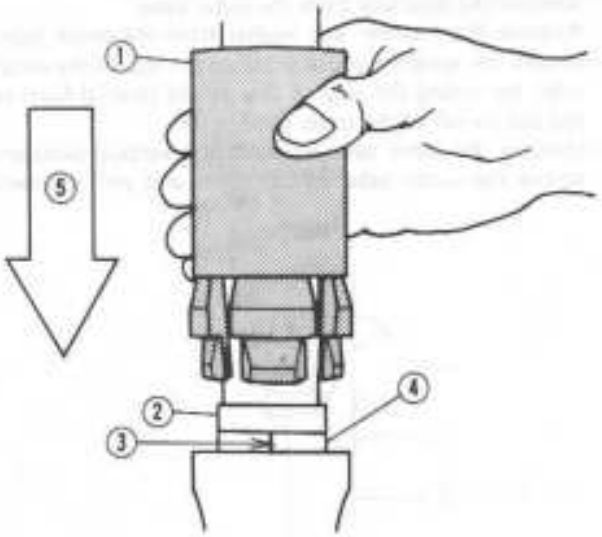
○Inspect the guide bush (see Guide Bush Inspection).

☆Replace it with new ones if necessary.

○Apply a non-permanent locking agent to the Allen bolt.

○Tighten the Allen bolt to the specified torque (see Exploded View), using the front fork cylinder holder handle and holder adapter (special tools) to stop the cylinder from turning.

○Install the guide bush (with a used guide bush on it by tapping the used guide bush with the fork oil seal driver (special tool) until it stops. The slit of the bush must be faced toward the left or right.



1. Driver: 57001-1219
2. Used Guide Bush
3. Slit (toward the left or right)
4. New Guide Bush
5. Tap

○Use the fork oil seal driver (special tool) to install the oil seal in the front fork.

○Tighten the handlebar holder Allen bolts to the specified torque (see Exploded View in Steering chapter).

Inner Tube Inspection

★If the inner tube is damaged, replace it.

●Nicks or rust damage can sometimes be repaired by using a wet-stone to remove sharp edges or raised areas which cause seal damage.

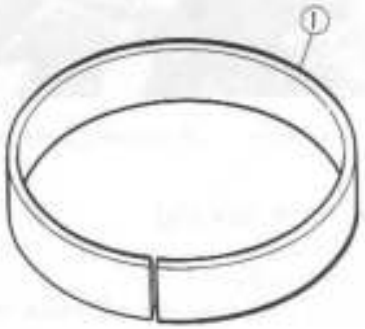
★If the damage is not repairable, replace the inner tube. Since damage to the inner tube damages the oil seal, replace the oil seal whenever the inner tube is repaired or replaced.

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

★Replace the guide bushes if they are damaged or worn.



1. Guide Bush

Oil Seal and Dust Seal Inspection

★If dust seal is any damage or wear, replace it.

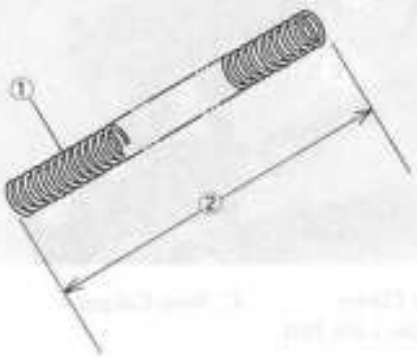
●Replace the oil seal with a new one whenever it has been removed.



1. Oil Seal
2. Dust Seal

Spring Tension

★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.



1. Fork Spring
2. Free Length

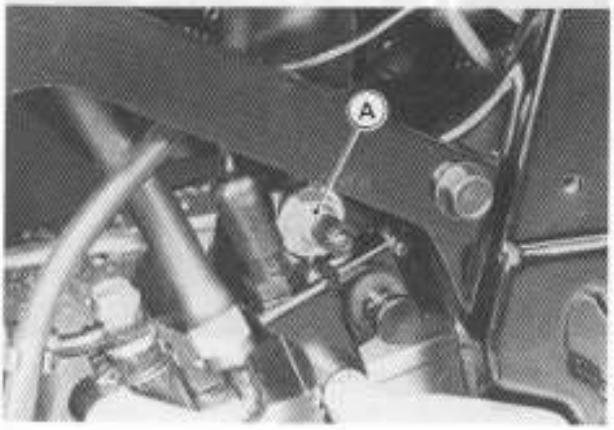
Rear Suspension (Uni-trak)

Rear Shock Absorber:

Air Pressure Adjustment

●Note the following.

Put the motorcycle up on its center stand to raise the rear wheel off the ground. Use air pressure gauge 52005-1003 which is specially made for air suspensions. Check and adjust the air pressure when the rear shock absorber is cold (room temperature).



A. Air Valve

NOTE

○*Do not use tire gauges for checking air pressure. They may not indicate the correct air pressure because of air leaks that occur when the gauge is applied to the valve.*

Air Pressure kPa (kg/cm², psi)

	Usable Range
One Rider or Normal Riding	Atmospheric Pressure ~ 150 (1.5, 21)
Two Riders or High Speed Riding	50 (05., 7.1) ~ 150 (1.5, 21)

NOTE

○*The recommended air pressure is atmospheric pressure for average rider with no accessories.*

WARNING

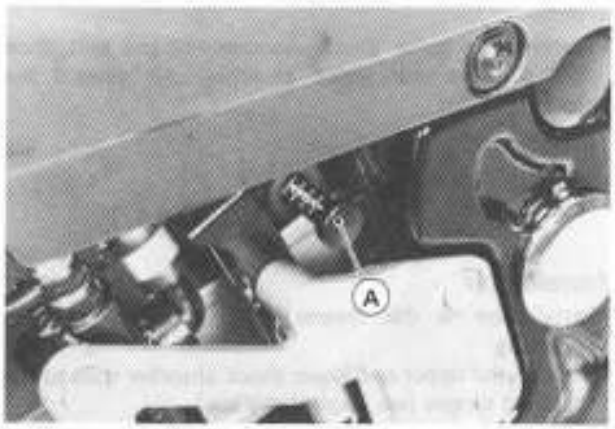
○**Be sure to adjust the air pressure within the usable range. Pressure too high or too low can produce a hazardous riding condition.**

○**Only air or nitrogen gas can be used. Never inject oxygen or any kind of explosive gas.**

○**Do not incinerate the rear shock absorber.**

Damping Force Adjustment

●Push and pull the adjusting stick to the desired number until you feel a click. The numbers on the adjusting stick show the setting position.



A. Adjusting Stick

NOTE

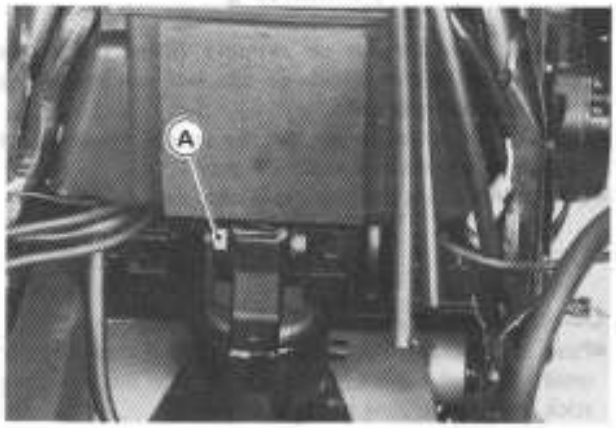
○*The damping force can be left soft for average riding. But it should be adjusted harder for high speed riding, or riding with a passenger. If the damping feels too soft or too still, adjust it in accordance with the following table:*

Rebound Damping Adjustment

Adjuster Position	Damping Force	Setting	Load	Road	Speed
1	Stronger	Soft	Light	Good	Low
2	↓	↕	↕	↕	↕
3	↓	↕	↕	↕	↕
4	↓	Hard	Heavy	Bad	High

Removal

●Remove the following.
Side Cover
Air Valve
Damper Adjusting Stick
Rod (Adjusting Stick)
Rear Frame (see Frame chapter)
Upper Shock Absorber Nut (Do not remove it yet.)
Lower Shock Absorber Nut
Tie Rod Lower Bolt



A. Upper Shock Absorber Nut

●Remove the upper shock absorber nut and bolt, then take off the rear shock absorber unit toward the ground.

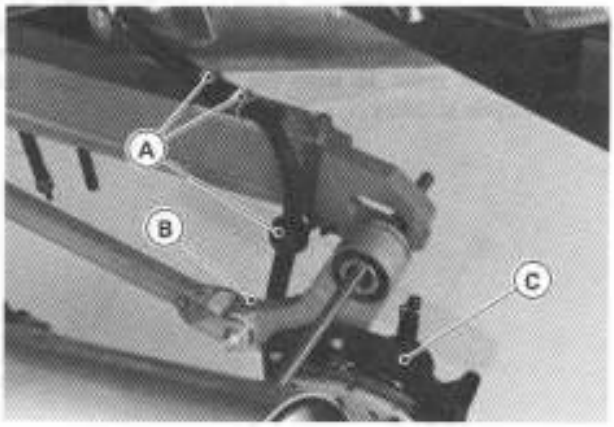
Installation

●Installation is the reverse of removal. Note the following.
○Tighten the upper and lower shock absorber nuts to the specified torque (see Exploded View).
○Tighten the tie-rod nut to the specified torque (see Exploded View).

Swing Arm:

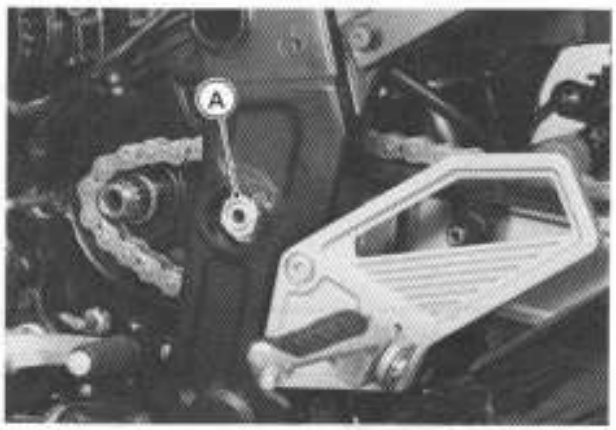
Removal

●Remove the following
Engine Sprocket (see Final Drive chapter)
Rear Wheel (see Wheels/Tires chapter)
Torque Link Nut (Rear)
Rear Caliper and Brake Hose



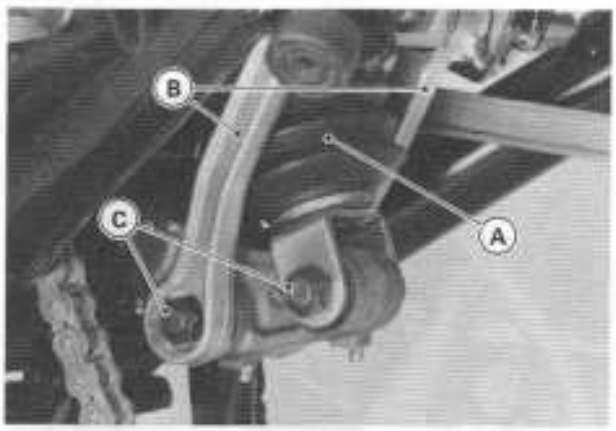
A. Hose Clamp
B. Torque Link Nut
C. Rear Caliper

Swing Arm Pivot Nut (Do not remove the pivot shaft.)



A. Pivot Nut

Lower Shock Absorber Nut (Do not remove the bolt.)



A. Shock Absorber
B. Tie-Rod
C. Nut

Tie-Rod Nut Lower (Do not remove the bolt.)

•Remove the tie-rod bolt, shock absorber bolt, and swing arm pivot shaft while supporting the swing arm.
•Remove the swing arm toward the rear.

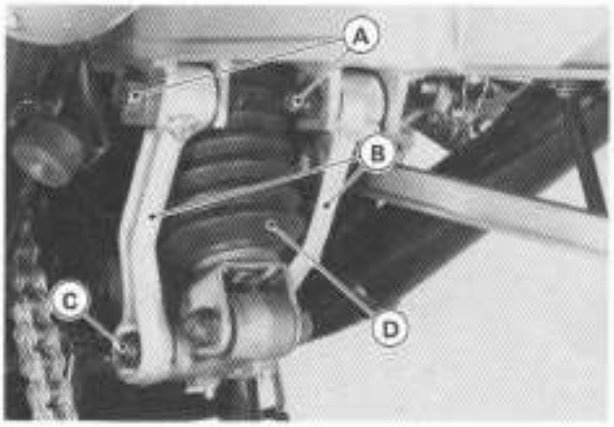
Installation

•Installation is reverse of removal. Note the following.
○Tighten the swing arm pivot nut to the specified torque (see Exploded View).
○Tighten the lower shock absorber nut to the specified torque (see Exploded View).
○Tighten the tie-rod lower nut to the specified torque (see Exploded View).
○Tighten the torque link nut to the specified torque (see Exploded View in Brake chapter).
○Adjust the drive chain after installation (see Final Drive chapter).

Tie-Rod, Rocker Arm:

Tie-Rod Removal

•Remove the tie-rod lower bolt.



A. Tie-Rod Upper Bolt
B. Tie-Rods
C. Tie-Rod Lower Bolt
D. Rear Shock Absorber

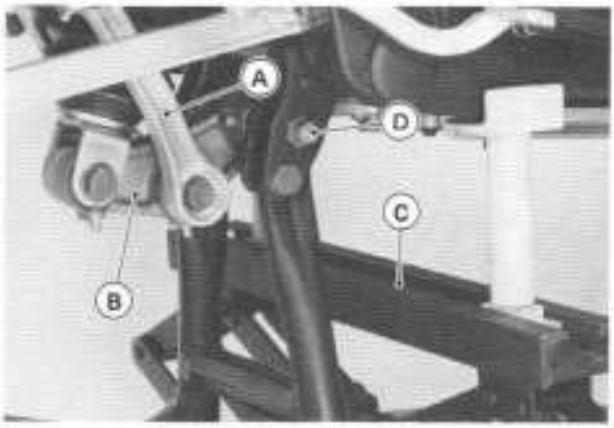
•Remove the tie-rod upper bolt and take the tie-rod off.
•Remove the other tie-rod.

Tie-Rod Installation

•Tighten the tie-rod upper and lower bolts to the specified torque (see Exploded View).

Rocker Arm Removal

•Perform the following.
○Remove the fairings (Upper and Lower).
○Remove the radiator (see Cooling System chapter).
○Remove the muffler (see Engine Top End chapter).
○Put a suitable stand under the engine.
○Retract the center stand, and remove the springs.
○Remove the lower shock absorber nut. Do not remove the bolt.
○Remove the tie-rod lower nut. Do not remove the bolt.
○Remove the tie-rod bolt and shock absorber bolt while supporting the swing arm.



A. Tie-Rod
B. Rocker Arm
C. Stand
D. Rocker Arm Shaft

○Remove the nut and pull out the rocker arm shaft and remove the rocker arm from the bottom side of the frame.

Rocker Arm Installation

•Installation is reverse of removal. Note the following.
○Apply Molybdenum Disulfide Grease to the inside of the needle bearings.
○Tighten the rocker arm shaft nut to the specified torque (see Exploded View).
○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).

Needle Bearing Inspection

★If there is any doubt as to the condition of either needle bearing, replace the bearing and sleeve as a set.

Tie-Rod, Rocker Arm Sleeve Inspection

★If there is visible damage, replace the sleeve and needle bearing as a set.

Tie-Rod, Rocker Arm Needle Bearing Lubrication

There is a grease nipple on the tie-rod and rocker arm for lubrication.

•Force the Molybdenum Disulfide Grease into the nipple until it comes out at both sides of the tie-rod or rocker arm, and wipe off any excess.

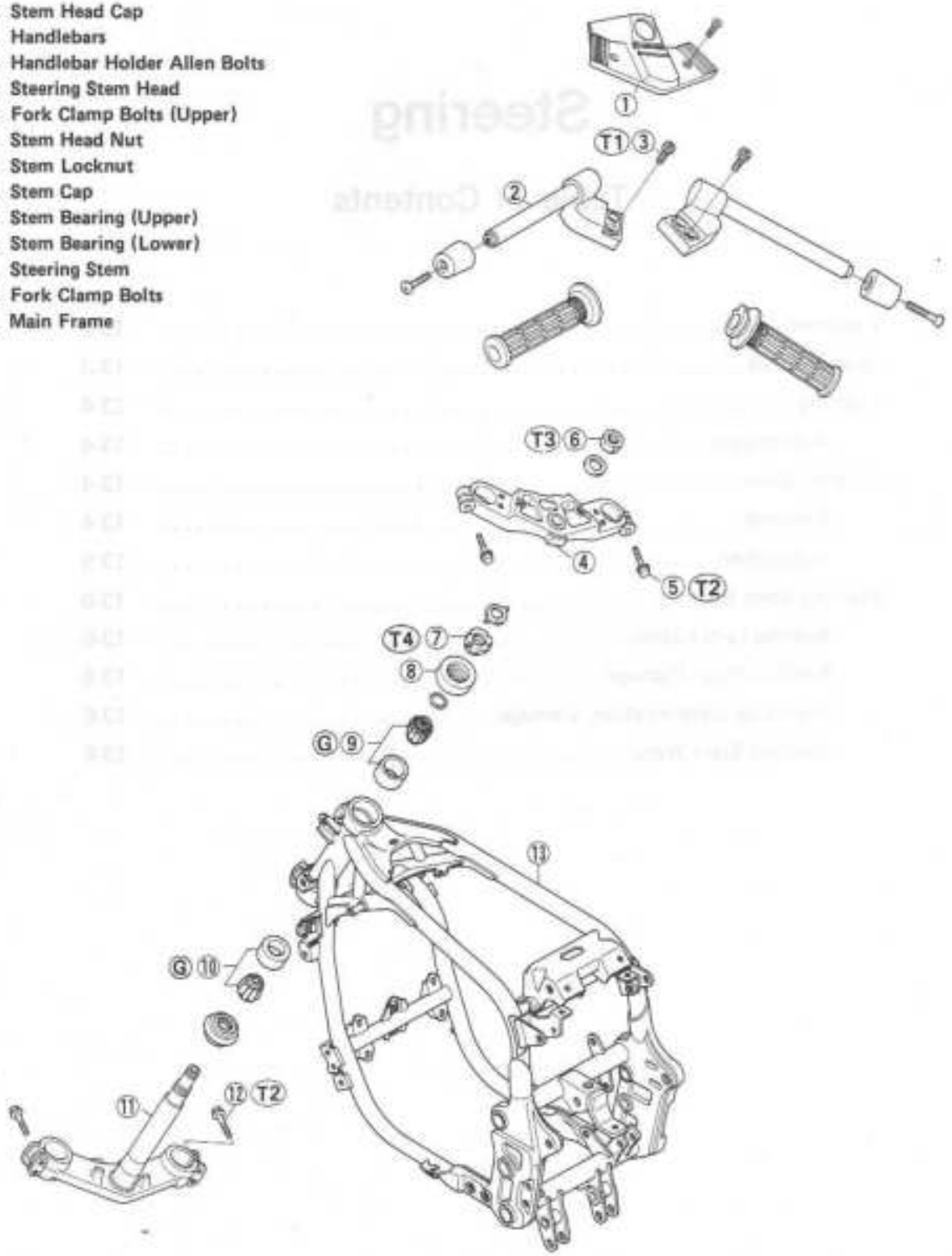
Steering

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Exploded View

1. Stem Head Cap
2. Handlebars
3. Handlebar Holder Allen Bolts
4. Steering Stem Head
5. Fork Clamp Bolts (Upper)
6. Stem Head Nut
7. Stem Locknut
8. Stem Cap
9. Stem Bearing (Upper)
10. Stem Bearing (Lower)
11. Steering Stem
12. Fork Clamp Bolts
13. Main Frame



G : Apply grease.
T1: 19 N-m (1.9 kg-m, 13.5 ft-lb)
T2: 21 N-m (2.1 kg-m, 15.0 ft-lb)
T3: 39 N-m (4.0 kg-m, 29 ft-lb)
T4: 4.9 N-m (0.50 kg-m, 43 in-lb)

Special Tools

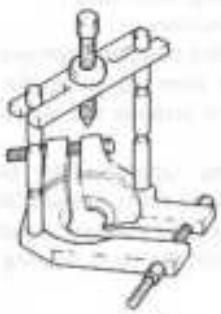
Stem Bearing Driver: 57001-137



Adapter: 57001-1074



Bearing Puller: 57001-158



Adapter: 57001-317



Pole: 57001-1190



Stem Nut Wrench: 57001-1100



Stem Bearing Remover: 57001-1107



Driver Press Shaft: 57001-1075



Driver: 57001-1106



Driver: 57001-1076



Steering

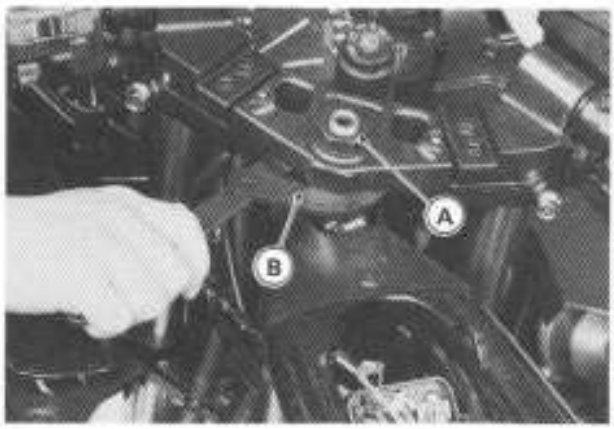
Adjustment

●Check the steering is as follows.
○Set the motorcycle on its center stand.
○Remove the lower fairing.
○Use a jack under the engine to lift the front wheel off the ground.
○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.
○Feel for steering looseness by pushing and pulling the forks.
★If the wheel binds or catches before the stop, the steering is too tight.
★If you feel looseness, the steering is too loose.

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.*

★Adjust the steering if necessary.
●Remove the following parts.
Fuel Tank
Fork Lower Clamp Bolts (both sides)
Stem Head Cap
Stem Head Nut (Loosen)
●Adjust the steering with the stem nut wrench (special tool).



A. Stem Head Nut
B. Stem Nut Wrench: 57001-1100

★If the steering is too tight, loosen the stem locknut a fraction of a turn.
★If the steering is loose, tighten the locknut a fraction of a turn.

NOTE

○*Turn the locknut 1/8 turn at a time maximum.*

●Tighten the steering stem head nut to the specified torque (see Exploded View).
●Tighten the front fork lower clamp bolts to the specified torque (see Exploded View in Suspension chapter).
●Check the steering again.
★If the steering is still too tight or too loose, repeat the adjustment.
●Install the removed parts.

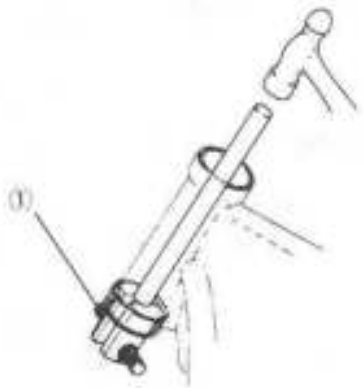
Steering Stem

Removal

●Remove the following parts.
Fuel Tank
Fairing
Handlebars
Both Front Calipers
Front Wheel
Front Fender
Front Fork Legs
●Remove the mounting bolts, free the brake hose joint from the stem base, and remove the front brake assembly as a set.
●Remove the cap, stem head nut and flat washer.
●Remove the steering stem head.
●Take off the lockwasher.
●Push up on the stem base, and remove the steering stem locknut with the stem cap using the stem nut wrench (special tool), then remove the steering stem and stem base (single unit).
●Remove the upper tapered roller bearing inner race.
●To remove the outer races pressed into the head pipe, install the stem bearing remover (special tool) as shown below, and hammer the stem bearing remover to drive it out.

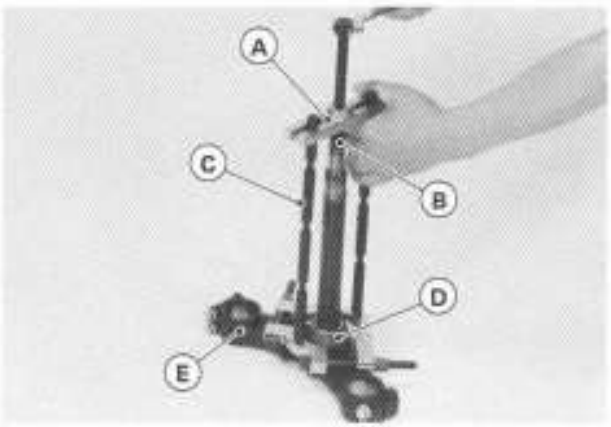
NOTE

○*If either steering stem bearing is damaged, it is recommended that both the upper and lower bearings (including outer races) should be replaced with new ones.*



1. Stem Bearing Remover: 57001-1107

●Remove the lower inner race (with its grease seal) which is pressed onto the steering stem, with the steering stem bearing puller and adapters (special tools).

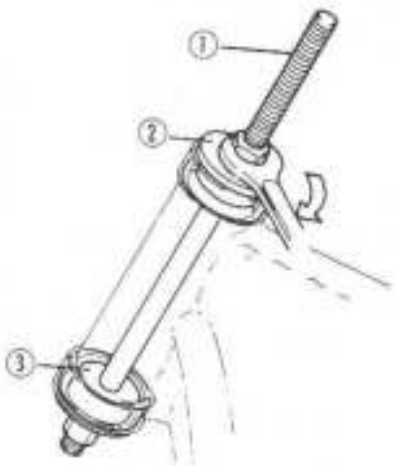


A. Bearing Puller: 57001-158
B. Adapter: 57001-317
C. Pole: 57001-1190
D. Inner Race
E. Stem Base

Installation

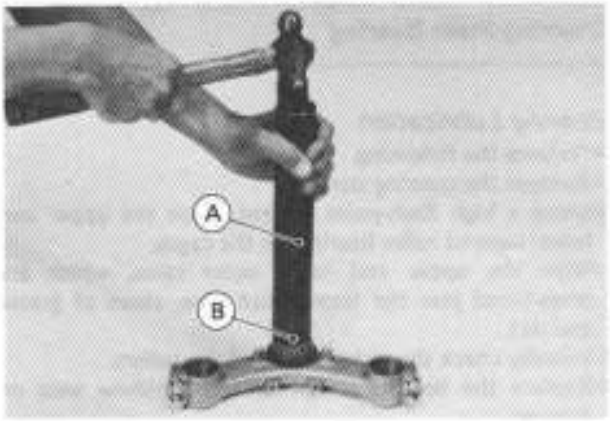
●Installation is reverse of removal. Note the following.

○Apply grease to the outer races, and then drive them into the head pipe using the drivers and the driver press shaft (special tools).



1. Driver Press Shaft: 57001-1075
2. Driver: 57001-1106
3. Driver: 57001-1076

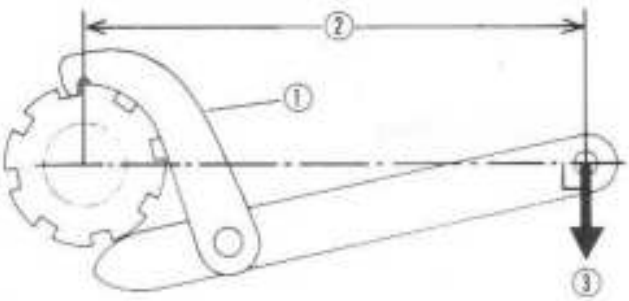
○Apply grease to the lower tapered roller bearing, and drive it onto the steering stem using the stem bearing driver and adapter (special tools: 57001-137 and 57001-1074).



A. Stem Bearing Driver: 57001-137
B. Adapter: 57001-1074

●The following four steps should be performed after steering bearing installation. This procedure settles the bearings in place.

○Using the stem nut wrench, tighten the stem locknut to 39 N-m (4.0 kg-m, 29 ft-lb) of torque. (To tighten the steering stem locknut to the specified torque, hook the wrench on the stem locknut, and pull the wrench at the hole by 22.2 kg force in the direction shown.)



1. Stem Nut Wrench: 57001-1100
2. 180 mm
3. 22.2 kg

○Check that there is no play and the steering stem turns smoothly without the rattle.

☆If not, the steering stem bearing may be damaged.

○Again back out the stem locknut a fraction of a turn until it turns lightly.

○Turn the stem locknut lightly clockwise until it just becomes hard to turn. Do not overtighten, or the steering will be too tight.

●Check and adjust the following after installation.

Steering Adjustment
Clutch Hose
Throttle Cables
Choke Cable
Front Brake

Steering Stem Bearing

Bearing Lubrication

●Perform the following.
○Remove the steering stem.
○Using a high flash-point solvent, wash the upper and lower tapered roller bearings in the cages.
○Wipe the upper and lower outer races, which are press-fitted into the frame head pipe, clean of grease and dirt.
○Visually check the outer races and the rollers.
★Replace the bearing assemblies if they show wear or damage.
○Pack the upper and lower tapered roller bearings in the cages with grease, and apply light coat of grease to the upper and lower outer races.
○Install the steering stem, and adjust the steering.

Bearing Wear, Damage

★Replace the bearing assemblies if they show damage.

Stem Cap Deterioration, Damage

★Replace the grease seal if necessary.

Steering Stem Warp

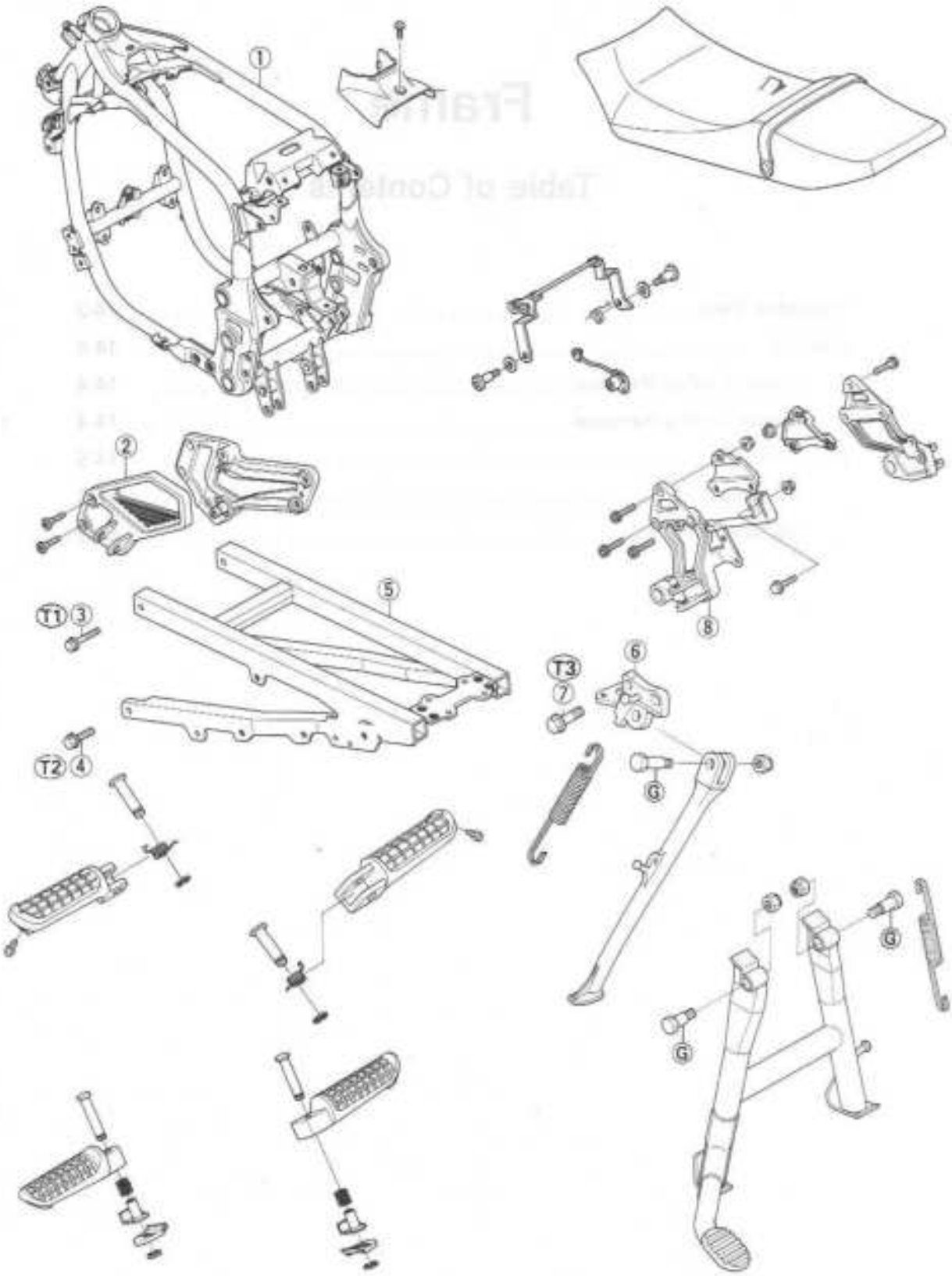
★If the steering stem shaft is bent, replace the steering stem.

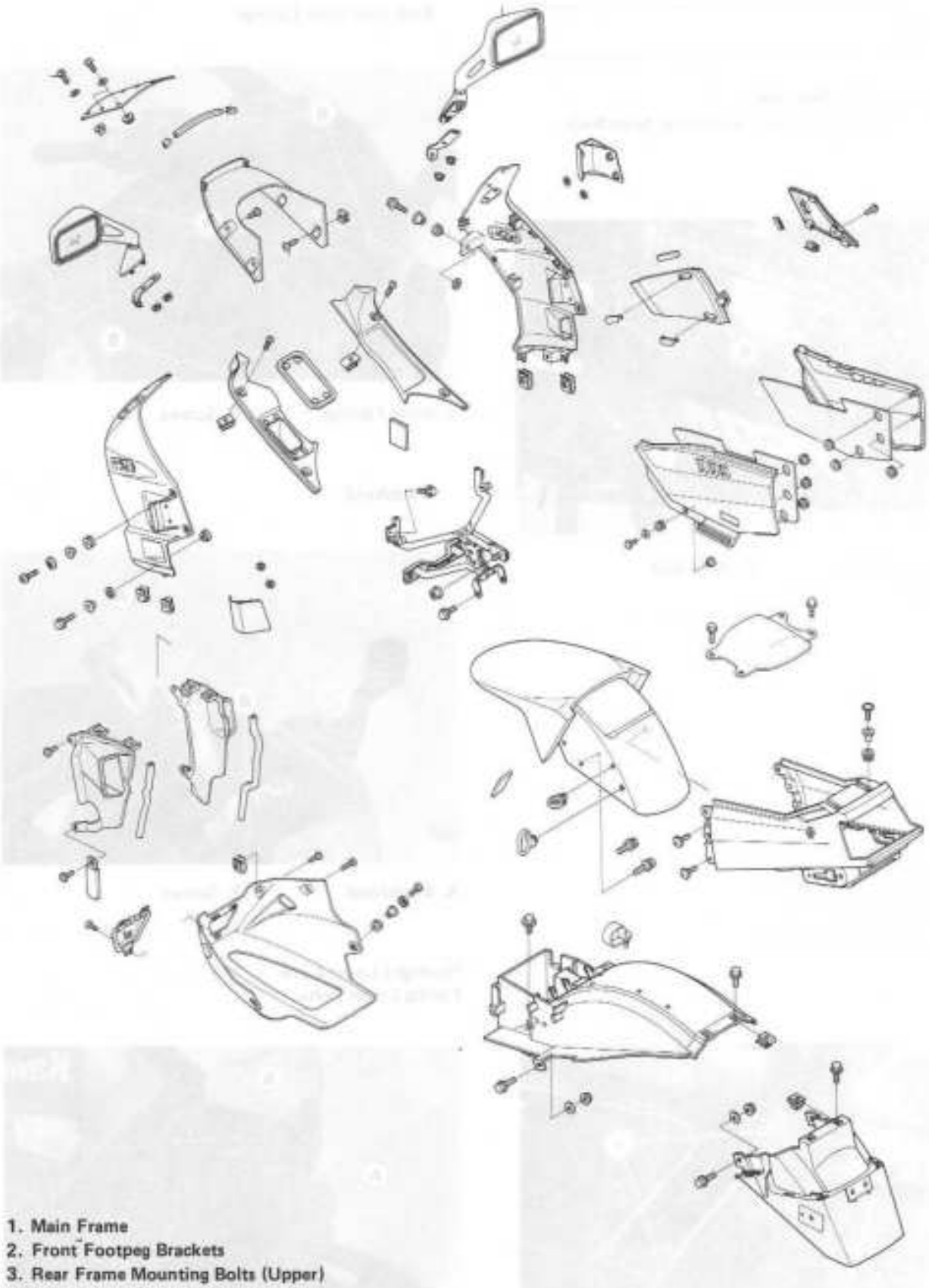
Frame

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Exploded View





1. Main Frame
2. Front Footpeg Brackets
3. Rear Frame Mounting Bolts (Upper)
4. Rear Frame Mounting Bolts (Lower)
5. Rear Frame
6. Side Stand Bracket
7. Bracket Mounting Bolts
8. Muffler Brackets

G : Apply grease.
T1: 19 N-m (1.9 kg-m, 13.5 ft-lb)
T2: 44 N-m (4.5 kg-m, 33 ft-lb)
T3: 54 N-m (5.5 kg-m, 40 ft-lb)

Fairings

Lower Fairing Removal

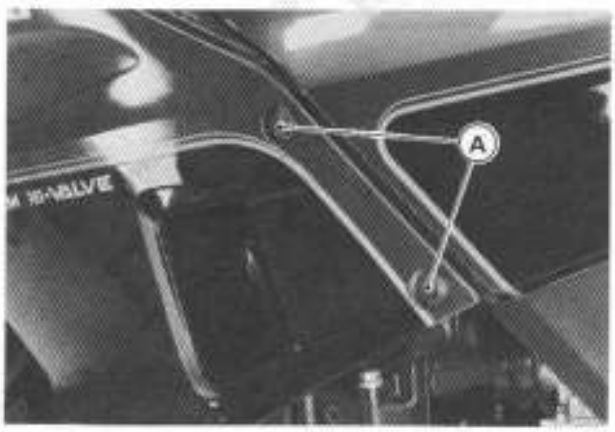
●Remove the mounting screws and the Allen bolts.



A. Lower Fairing
B. Screws
C. Allen Bolt

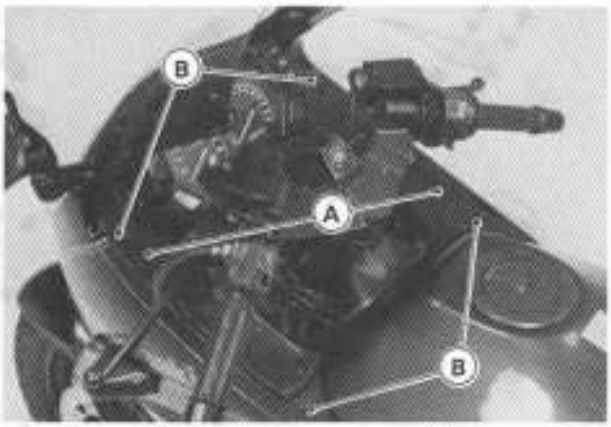
Upper Fairing Removal

●Remove the following.
Lower Fairing
Fairing Side Allen Bolts



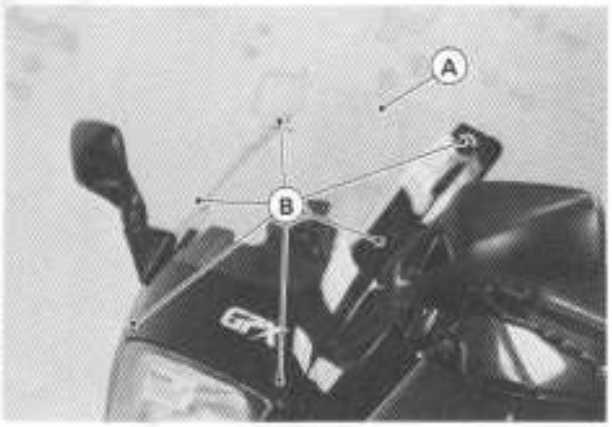
A. Side Allen Bolts

Both Side Inner Fairings



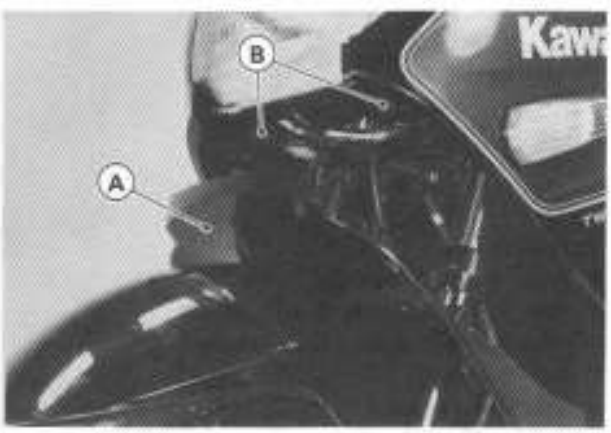
A. Inner Fairings B. Screws

Windshield



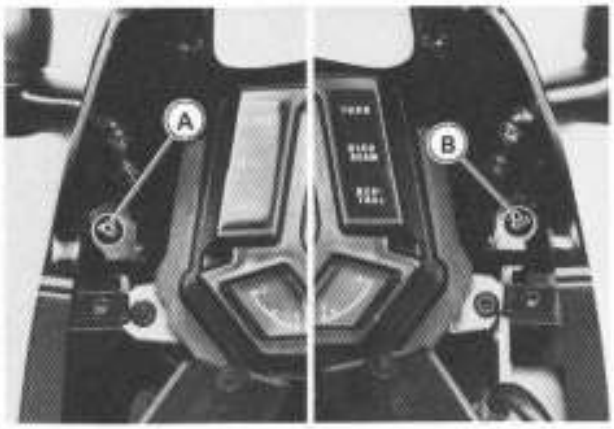
A. Windshield B. Screws

Headlight Lower Cover
Fairing Lower Bolts



A. Headlight Lower Cover B. Lower Bolts

Fairing Upper Bolts



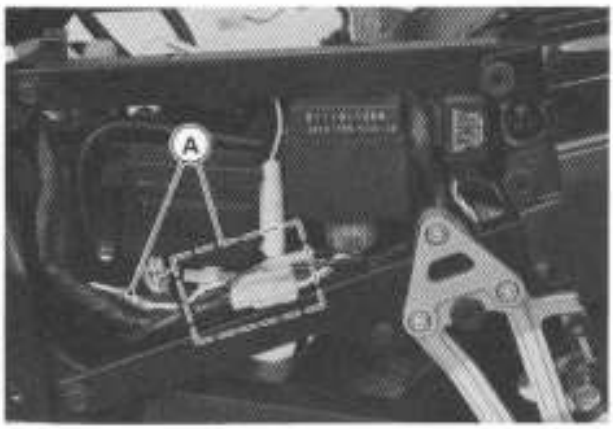
A. Fairing Upper Bolt (L.H.)
B. Fairing Lower Bolt (R.H.)

- Remove the fairing. Remove the following parts at this time.
  - Headlight Socket
  - Reservoir Tank Tube
- Remove the following parts if necessary.
  - Turn Signal Wire Connector
  - ESCS Relay
  - Headlight Unit
  - Coolant Reservoir Tank

Rear Frame

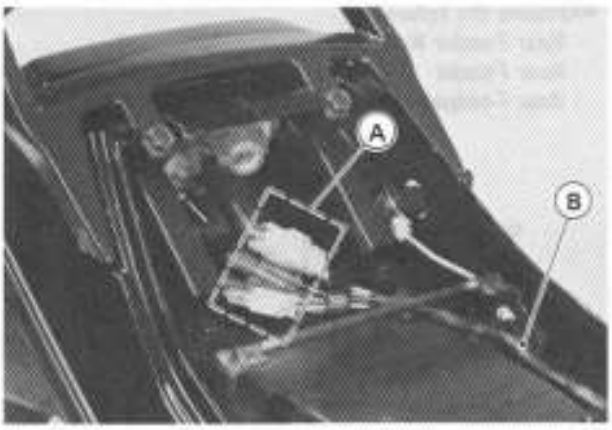
Removal

- Remove the following.
  - Seat
  - Knee Pads (both Sides)
  - Side Covers (both Sides)
  - Air Cleaner Housing Cover
  - Battery
  - Wiring (Left Side)



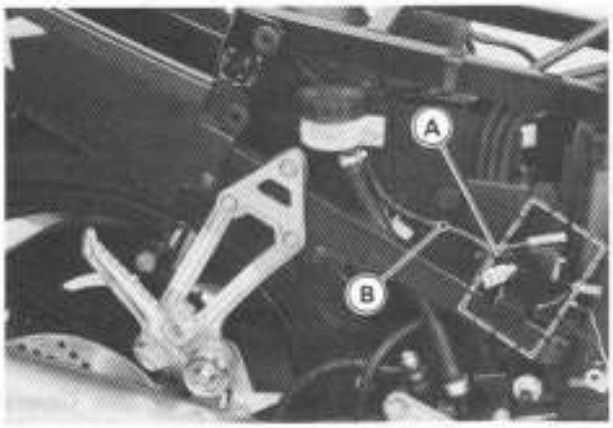
A. Left Side Connector

Wiring (Rear)



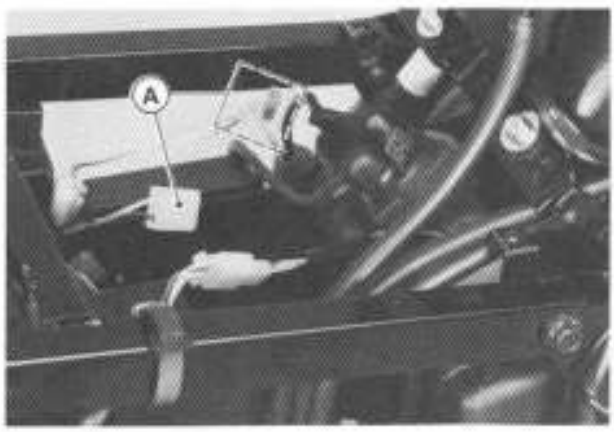
A. Rear Side Connector B. Wiring Harness

Wiring (Right Side)



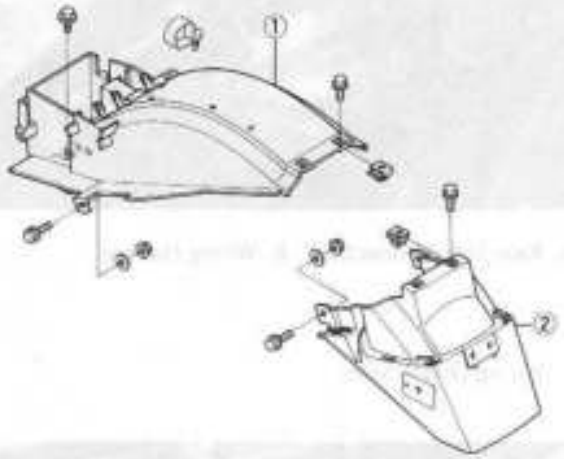
A. Right Side Connector B. Wiring Harness

Wiring (Medium)



A. Medium Connector

Rear Master Cylinder Bolt
Muffler Mounting Bolts (both Sides)
●Remove the rear frame with rear fender.
●Remove the following.
Rear Fender Rear Section
Rear Fender
Rear Footpeg Bracket.



1. Rear Fender 2. Rear Fender Rear Section

Installation

●Installation is reverse of removal. Note the following.
○Route the wiring harness correctly (see General Information).
○Route the hoses and tubes correctly (see General Information).
○Tighten the frame bolts to the specified torque (see Exploded Views).

Electrical System

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Precautions

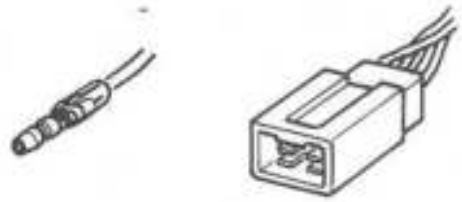
The are numbers of important precautions that are musts when servicing electrical system. Learn and observe all the rules below.

- 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 brought on by some other item or items, they too must be repaired or replaced, or the new replacement will soon fail again.
- Make sure all connectors in the circuit are clean and tight, and examine wires for signs of burning, fraying, etc. Poor wires and bad connections will affect electrical system operation.
- Electrical Connectors

Female Connectors



Male Connectors

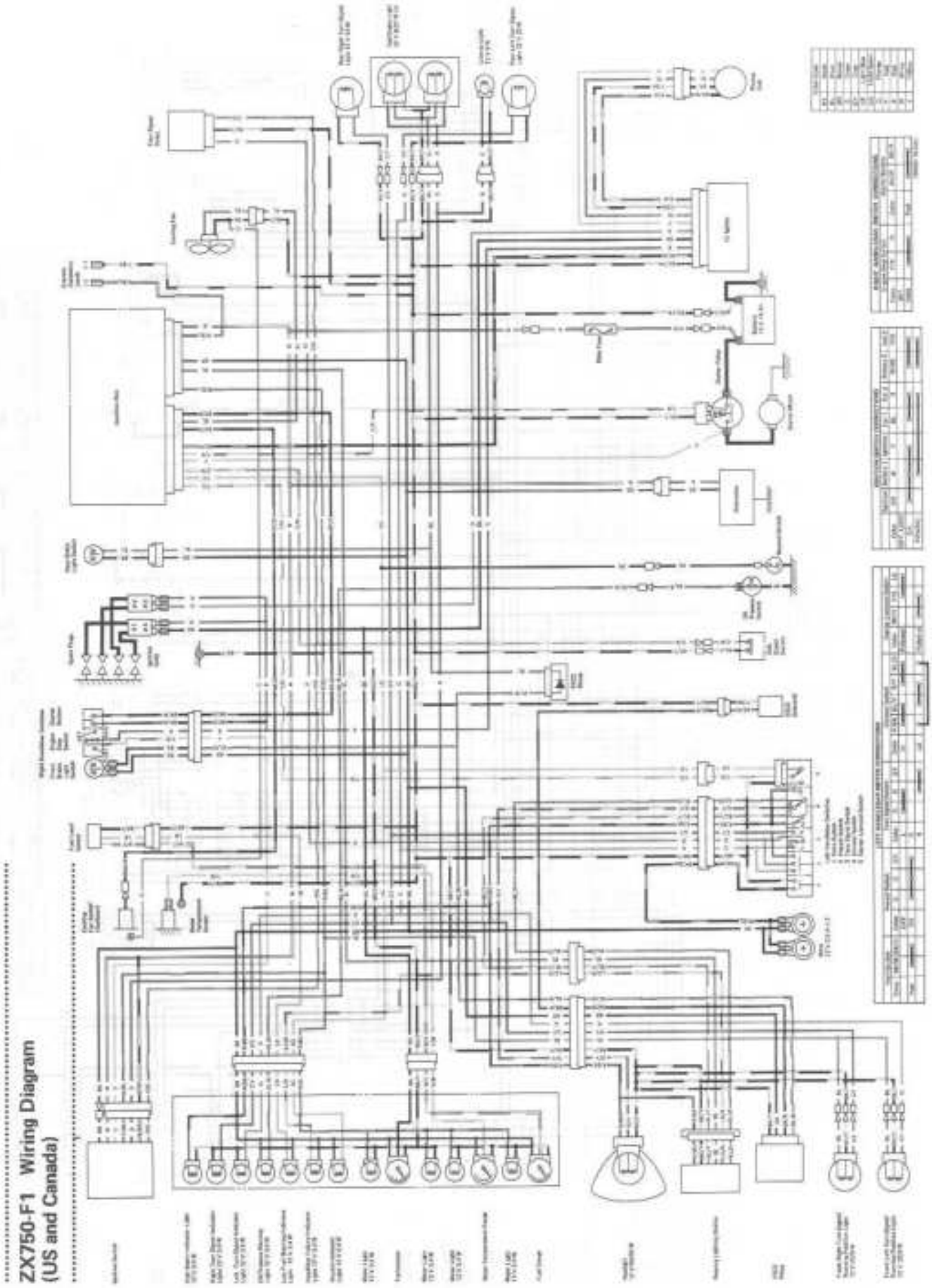


- Color Codes:

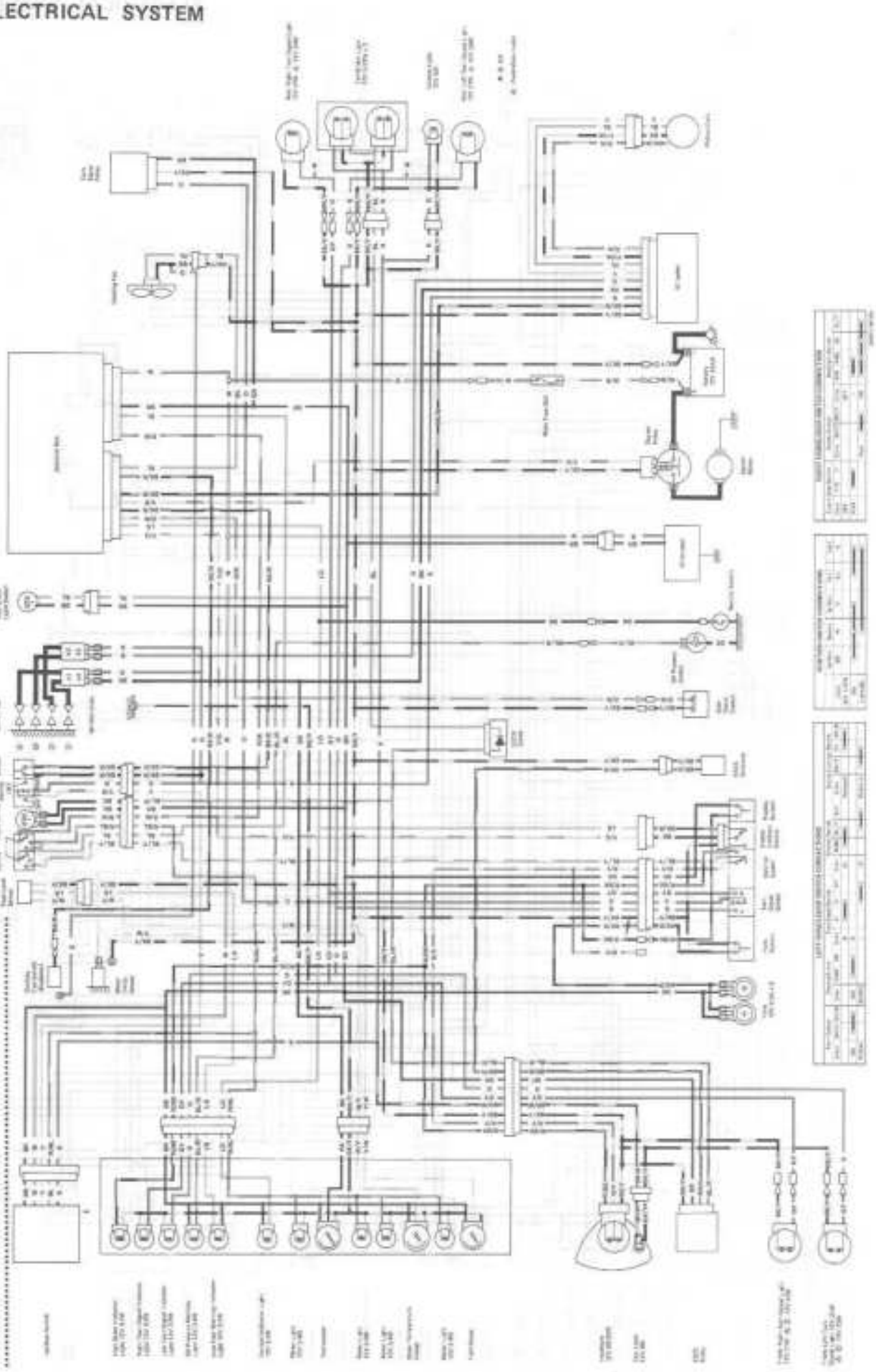
BK	Black
BL	Blue
BR	Brown
CH	Chocolate
DG	Dark green
G	Green
GY	Gray
LB	Light blue
LG	Light green
O	Orange
P	Pink
PU	Purple
R	Red
W	White
Y	Yellow

- Measure coil and winding resistance when the part is cold (at room temperature).

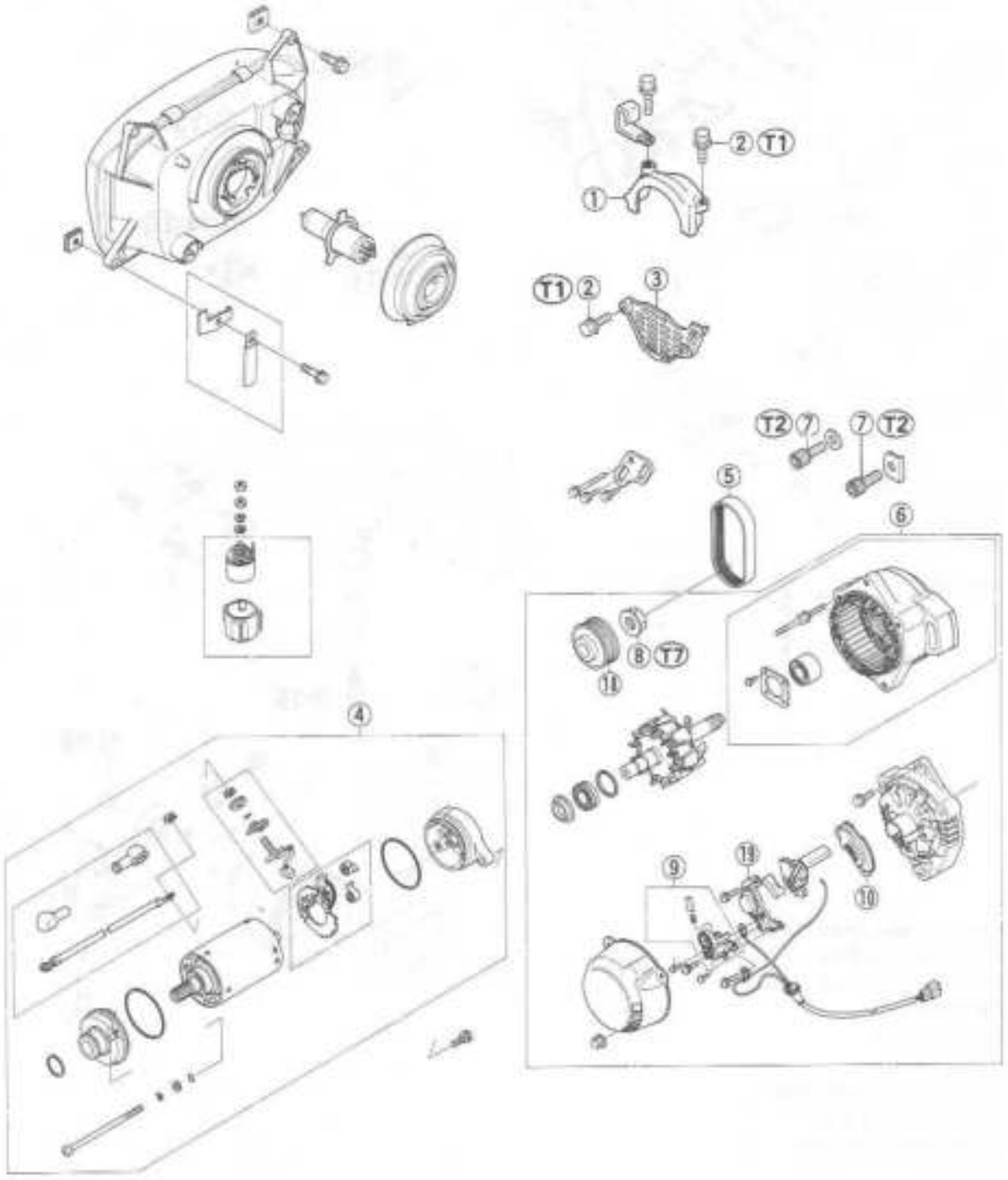
ZX750-F1 Wiring Diagram
(US and Canada)

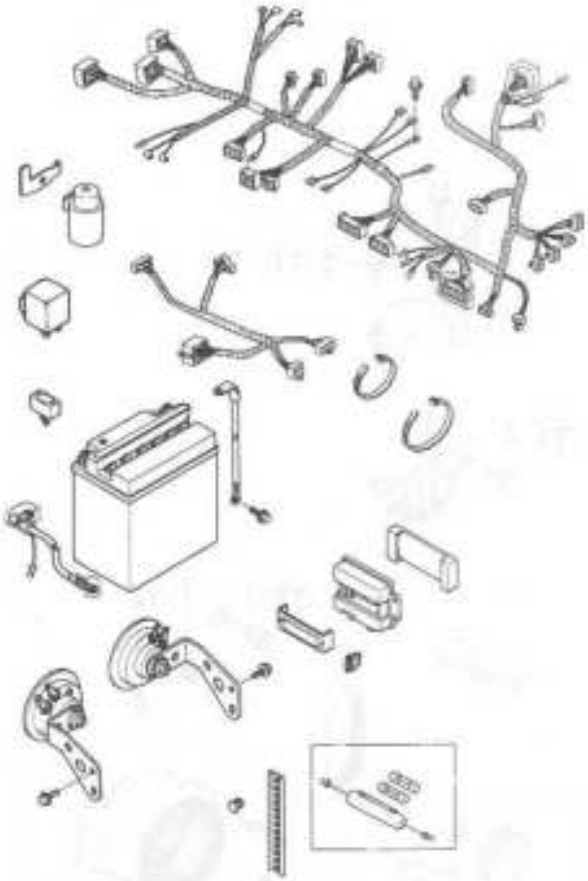


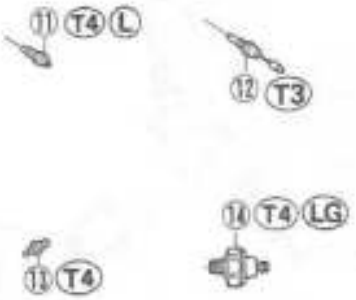
ZX750-F1 Wiring Diagram
(Other than US and Canada)

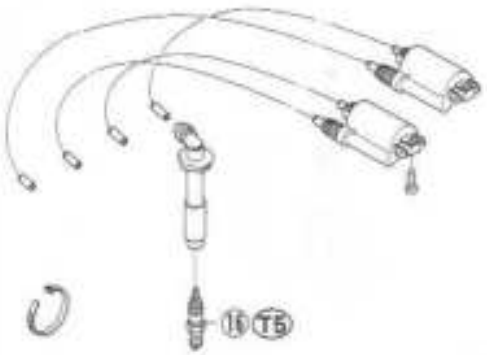


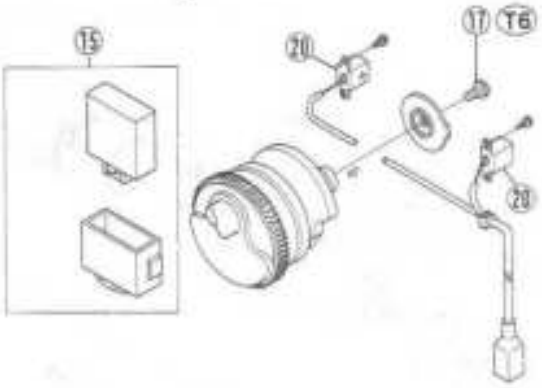
Exploded View





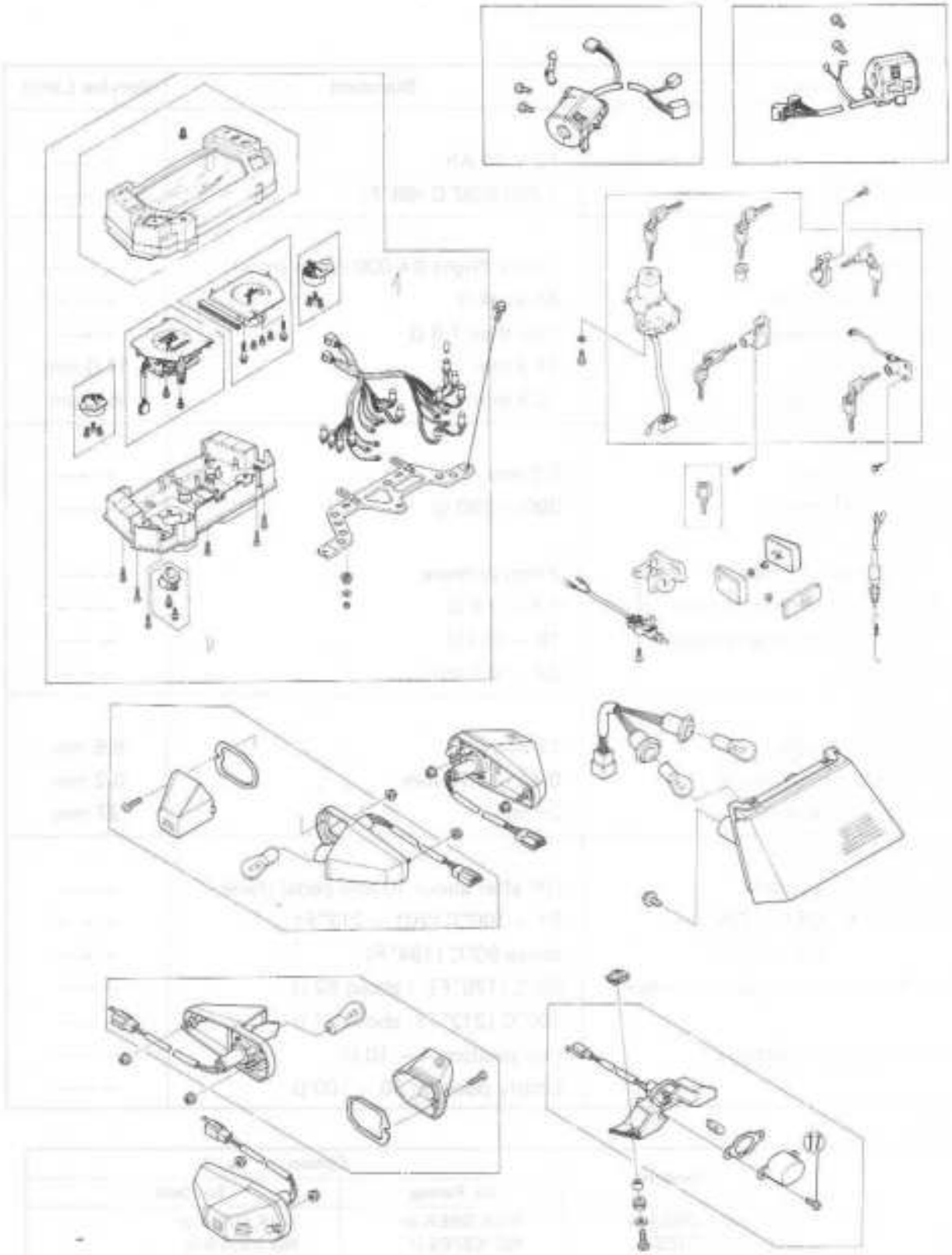






1. Alternator Belt Cover (Upper)
2. Cover Mounting Bolts
3. Alternator Belt Cover (Side)
4. Starter Motor
5. Alternator Belt
6. Alternator
7. Alternator Mounting Bolts
8. Pulley Mounting Nut
9. Carbon Brush Assembly
10. Rectifier
11. Water Temperature Sensor
12. Radiator Fan Switch
13. Neutral Switch
14. Oil Pressure Switch
15. IC Igniter
16. Spark Plugs
17. Timing Rotor Allen Bolt
18. Alternator Pulley
19. Regulator
20. Pickup Coils

L : Apply a non-permanent locking agent to the threads.
LG : Apply liquid gasket to the threads.
T1 : 4.9 N-m (0.50 kg-m, 43 in-lb)
T2 : 39 N-m (4.0 kg-m, 29 ft-lb)
T3 : 7.8 N-m (0.80 kg-m, 69 in-lb)
T4 : 15 N-m (1.5 kg-m, 11.0 ft-lb)
T5 : 14 N-m (1.4 kg-m, 10.0 ft-lb)
T6 : 25 N-m (2.5 kg-m, 18.0 ft-lb)
T7 : 110 N-m (11.0 kg-m, 80 ft-lb)



Specifications

Item	Standard	Service Limit
Battery:		
Type	12 V 14 Ah	– – –
Specific gravity	1.280 @20°C (68°F)	– – –
Alternator:		
Charging voltage	13.5 V Night @4 000 r/min (rpm)	– – –
Rotor coil resistance	About 4 Ω	– – –
Stator coil resistance	Less than 1.0 Ω	– – –
Slip ring diameter	14.4 mm	14.0 mm
Carbon brush length	10.5 mm	4.5 mm
Ignition System:		
Pickup coil air gap	0.5 mm	– – –
Pickup coil resistance	390 – 590 Ω	– – –
Ignition coil:		
3 needle arcing distance	7 mm or more	– – –
Primary winding resistance	1.8 – 2.8 Ω	– – –
Secondary winding resistance	10 – 16 kΩ	– – –
Spark plug gap	0.6 – 0.7 mm	– – –
Starter Motor:		
Carbon brush length	12 mm	8.5 mm
Commutator groove depth	0.45 – 0.75 mm	0.2 mm
Commutator diameter	28 mm	27 mm
Switches and Sensors:		
Rear brake light switch	ON after about 10 mm pedal travel	– – –
Fan switch: 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	– – –
Fuel level sensor resistance	Full position 4 – 10 Ω	– – –
	Empty position 90 – 100 Ω	– – –

Spark Plug

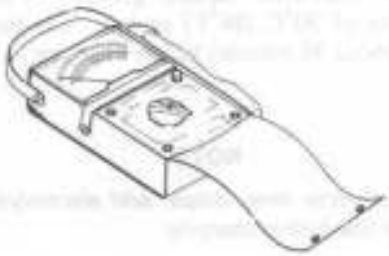
	Standard	Option	
		for Racing	for Cold
US	NGK D8EA or ND X24ES-U	NGK D9EA or ND X27ES-U	NGK D7EA or ND X22ES-U
Canada	NGK DR8ES-L or ND X24EST-U	NGK DR8ES-L or ND X27ESR-U	NGK DR7ES or ND X22ESR-U
Australia Italy South Africa	NGK D9EA or ND X27ES-U	Same as standard	NGK D8EA, D7EA or ND X24ES-U
Other	NGK DR8ES or ND X27ESR-U	Same as standard	NGK DR8ES-L, DR7ES or ND X24ESR-U, X22ESR-U

Special Tools

Electrotester: 57001-980



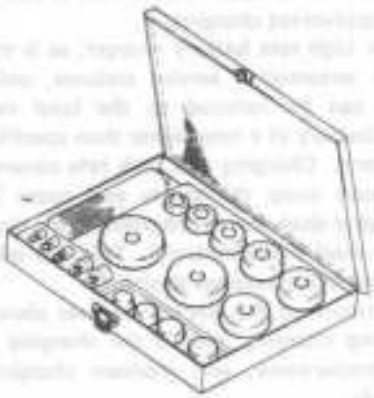
Hand Tester: 57001-983



Spark Plug Wrench: 57001-1024



Bearing Driver Set: 57001-1129



Hexagon Wrench: 57001-1234



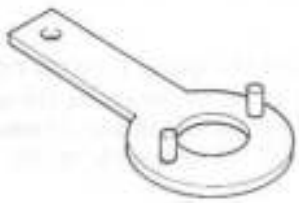
Alternator Tension Wrench: 57001-1235



Socket Wrench: 57001-1236



Pulley Holder: 57001-1237



Battery

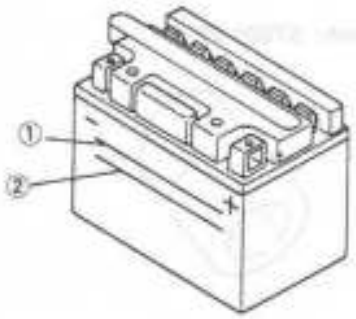
Electrolyte Level Inspection

•Check the level with the electrolyte level gauge on the battery case. The electrolyte level should be between the upper and the lower level lines.

★If the level of electrolyte in any cell is below the lower level line, add only distilled water to cell, until the level is at the upper level line.

CAUTION

○**Ordinary tap water is not a substitute for distilled water and will shorten the life of the battery.**



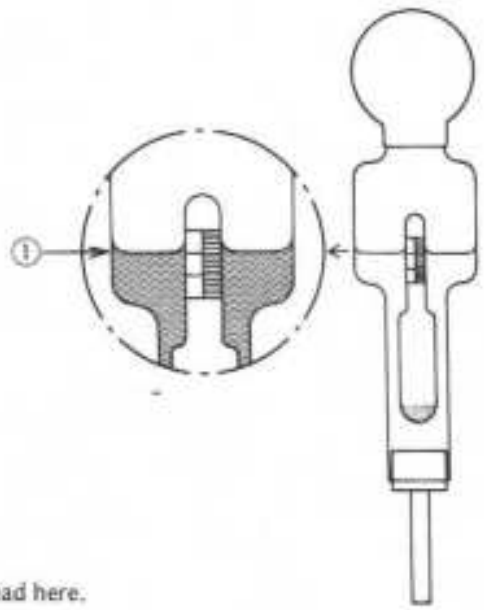
1. Upper Level Line 2. Lower Level Line

Electrolyte Specific Gravity Inspection

•Check battery condition by testing the specific gravity of the electrolyte in each cell with a hydrometer.

○Read the level of the electrolyte on the floating scale.

Hydrometer



1. Read here.

★If the specific gravity is below 1.20 (charge 60%) the battery needs to be charged.

Initial 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.**

•Fill each cell to the upper level line on the battery case with fresh electrolyte (special gravity: 1.280) 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.*

•Set the charging rate at 1/10 the battery capacity, and **charge it for 10 hours.** For example, if the battery is rated at 12 Ah, the charging rate would be 1.2A.

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.**

○**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.**

Ordinary 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

○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.

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.

●Check the electrolyte level after charging.

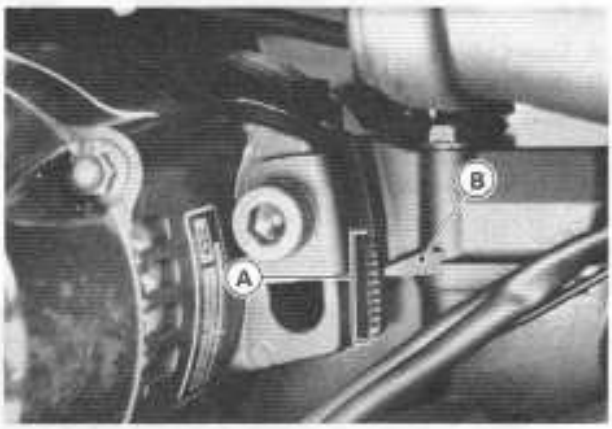
Alternator

Belt Tension Adjustment

NOTE

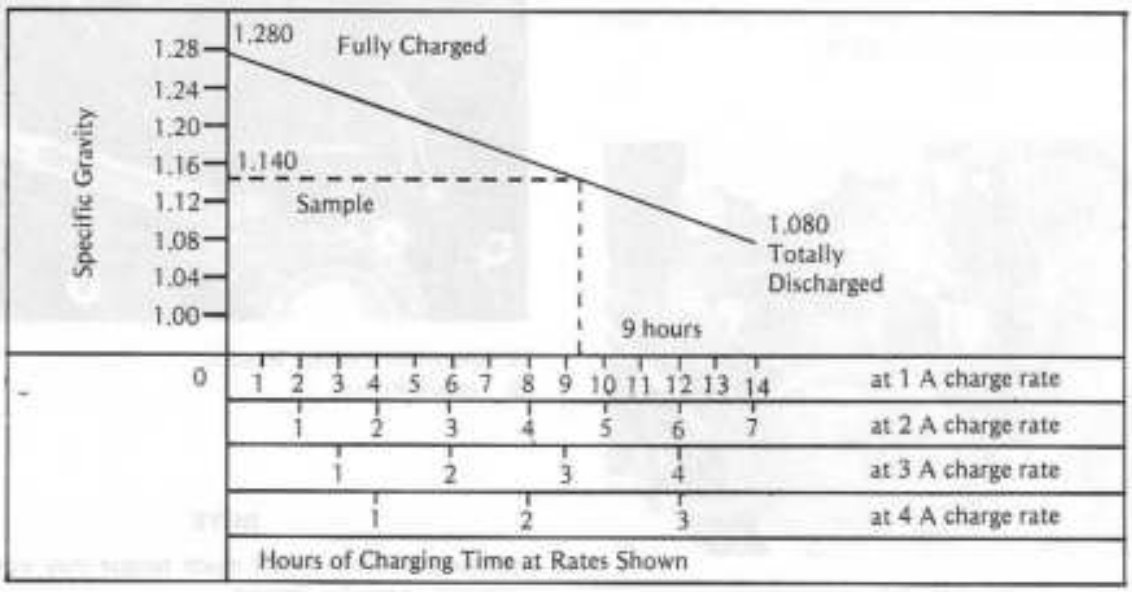
○Belt tension must be adjusted when the engine is cold (room temperature).

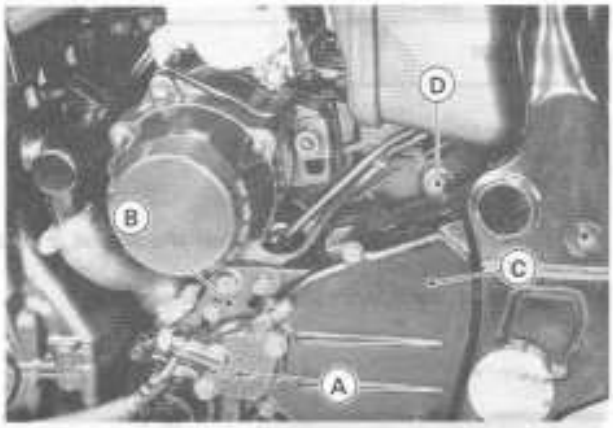
○Before adjustment, note the alternator position.



A. Marks B. Notch

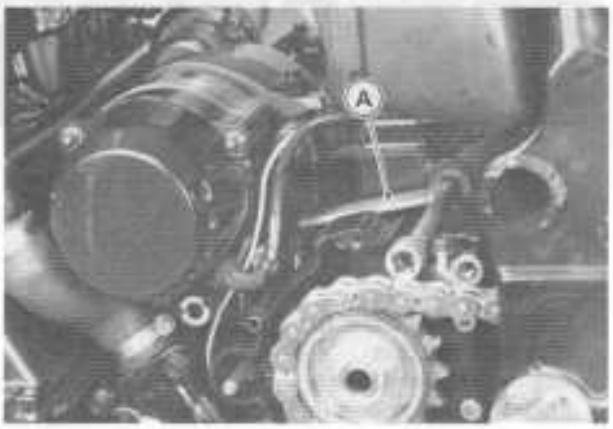
●Remove the following.
Clutch Slave Cylinder (see Clutch chapter)
Alternator Bracket
Engine Sprocket Cover
Engine Mounting Bolt (rear and upper)





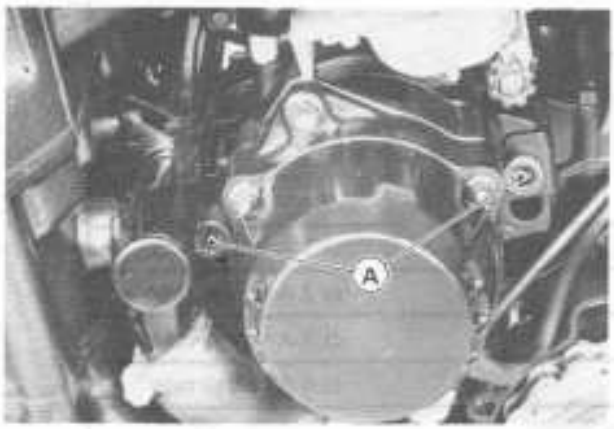
A. Slave Cylinder
B. Bracket
C. Sprocket Cover
D. Engine Mounting Bolt

•Insert the alternator tension wrench (special tool) into the hole at the engine mounting bolt.



A. Alternator Tension Wrench: 57001-1235

•Loosen the alternator mounting bolts with an Allen wrench (special tool: 57001-1234).



A. Alternator Mounting Bolts

•Push the alternator down against to the crankcase, and finger tighten the alternator mounting bolts.

NOTE

○*Using the Allen wrench (special tool), finger-tighten the alternator mounting bolts (0.1 – 0.13 kg-m) with three fingers.*

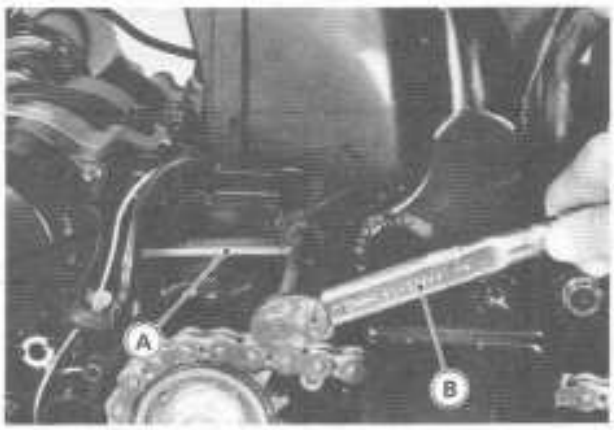


A. Tighten with three fingers.
B. Allen Wrench: 57001-1234

NOTE

○*Do not the overtighten them or the alternator belt can not be adjusted correctly.*

•With a torque wrench on the alternator tension wrench (special tool: 57001-1235), lift the alternator to 13 N-m (1.3 kg-m, 9.5 ft-lb) of toruqe.



A. Alternator Tension Wrench
B. Torque Wrench

NOTE

○*Either too little or too much torque may cause belt slipping or bearing damage.*

•Using another torque wrench on the Allen wrench (special tool: 57001-1234), tighten the alternator mounting bolts to the specified torque (see Exploded View).

NOTE

○*Tighten the alternator mounting bolts while holding the tension wrench (special tool: 57001-1235) to the specification.*

★Check to see that the alternator is in the original position or higher.
★If the alternator is lower than the original position, readjust the alternator belt tension.

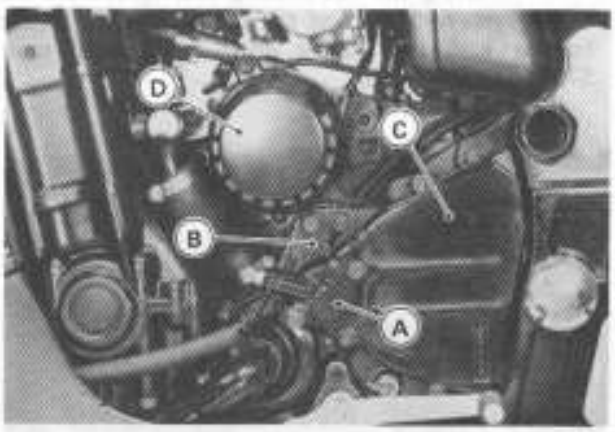
CAUTION

○**When adjusting the alternator belt, be careful that no oil gets on the alternator belt or pulley, or it will cause alternator malfunction and alternator belt damage.**
○**Never spray the alternator area on the left side of the engine with an aerosol lubricant, or it will get inside causing alternator malfunction and alternator belt damage.**

•Install the removed parts.

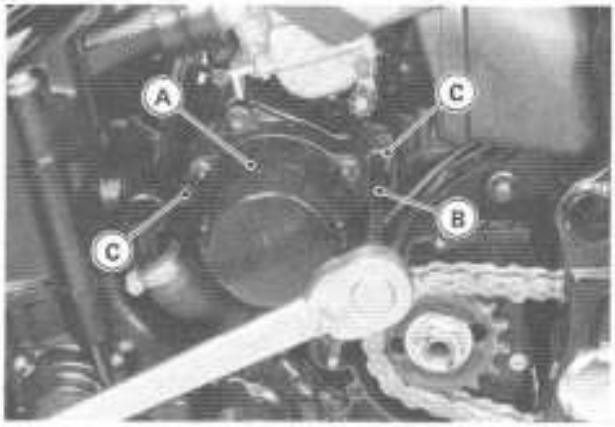
Removal

•Remove the following parts.
Left Side Cover
Alternator Wire Connector
Clutch Slave Cylinder (see Clutch chapter)
Alternator Bracket
Engine Sprocket Cover



A. Slave Cylinder
B. Bracket
C. Sprocket Cover
D. Alternator

•Remove the alternator bolts using an Allen wrench (special tool).



A. Alternator
B. Allen Wrench: 57001-1234
C. Bolts

•Remove the pulley from the belt, and then remove the alternator.

NOTE

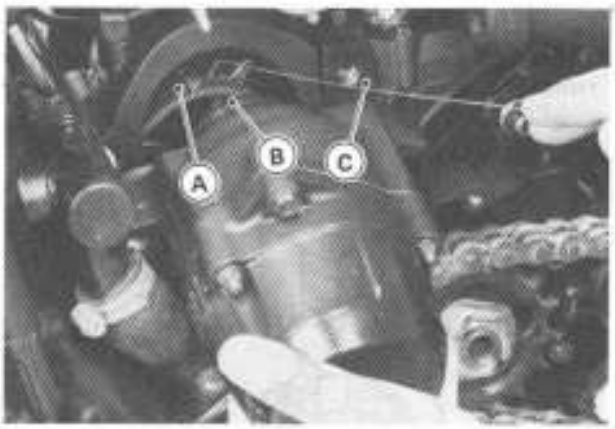
○*To free the alternator wire and connector from the engine, lift the fuel tank and air cleaner housing slightly for extra clearance.*

Installation

•Note the following.
○The alternator belt ribs must fit into the grooves on the alternator pulley.

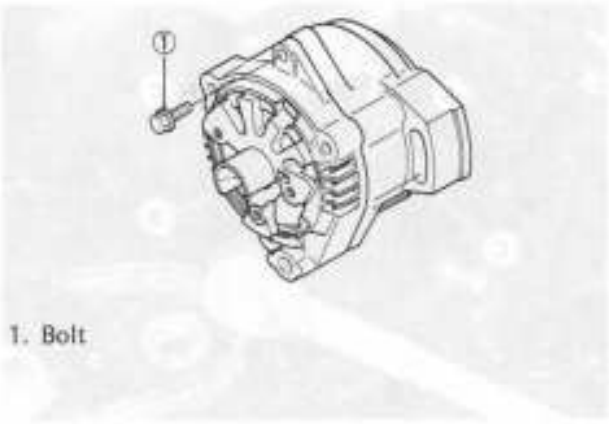
NOTE

○*When engaging the pulley with the belt, hold the belt in position with a bent wire.*



A. Belt
B. Pulley
C. Wire

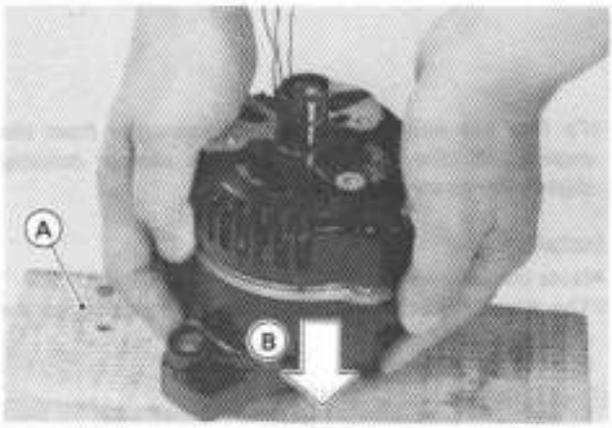
○Before tightening the alternator bolts, adjust the alternator belt (see Belt Tension Adjustment).
○Tighten the alternator bolts to the specified torque (see Exploded View).



1. Bolt

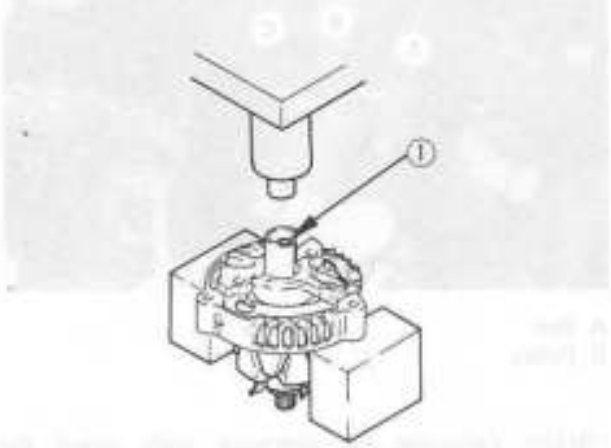
NOTE

○*If the left and right housing are fitted firmly, separate them as shown.*



A. Wood Block B. Drop it lightly.

●Press out the rotor shaft from the LH housing half, and remove the rotor with the bearing.

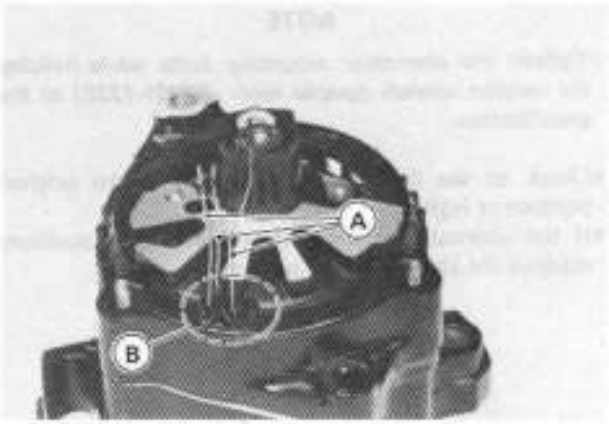


1. Press it lightly.

Assembly

●Note the following.

○Route the alternator wires to the wire hole.



A. Alternator Wires B. Wire Hole

NOTE

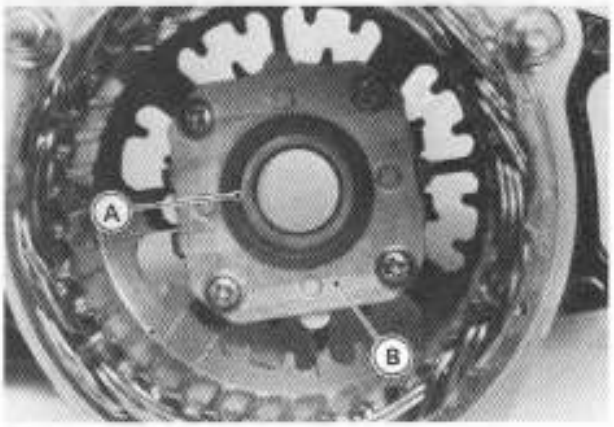
○*When solding the alternator wires to the rectifier terminal, do it quickly. If High temperatures are applied for more than a few seconds, the rectifier's diodes may be damaged.*

○Tighten the pully nut to the specified torque (see Exploded View).

Bearing Replacement

●Note the following.

○When removing the RH housing bearing, remove the bearing retainer first, and tap the bearing out of the housing with the bearing driver set (special tool: 57001-1129).



A. Bearing B. Retainer

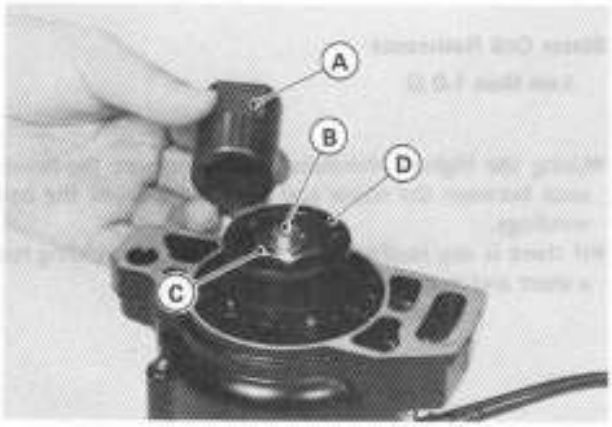
CAUTION

○When installing the alternator belt, be careful that no oil gets on the alternator belt or pulley, or it will cause alternator malfunction and alternator belt damage.

○Never spray the alternator area on the left side of the engine when lubricating with an aerosol lubricant, or it will get inside causing alternator malfunction and alternator belt damage.

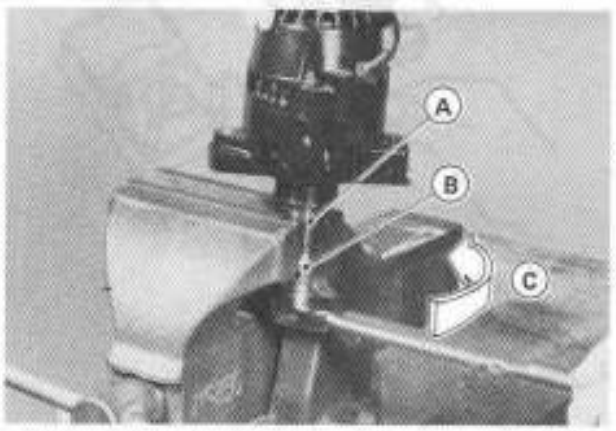
Disassembly

●Fix the alternator to the pully holder (special tool) which is clamped in a vise. (see the below figure.)



A. Pully Holder: 57001-1237
B. Shaft
C. Nut
D. Pully

●Use a 10 mm deep socket to reach through the pully holder, and turn the alternator shaft in the direction shown.



A. Pully Holder
B. Deep Socket
C. Direction of rotation.

CAUTION

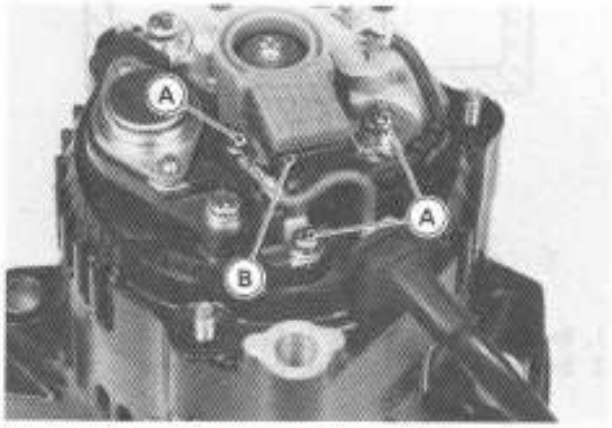
○When loosening the shaft, use a new socket. If a 12 sides poly socket or a worn socket is used, it could damage the hex on the shaft.

○Do not use an air wrench for loosening the shaft. Loosen it by hand only.

○Be sure to turn the shaft in the correct direction.

●Remove the cap nuts and take off the end cover. The following parts can be removed.

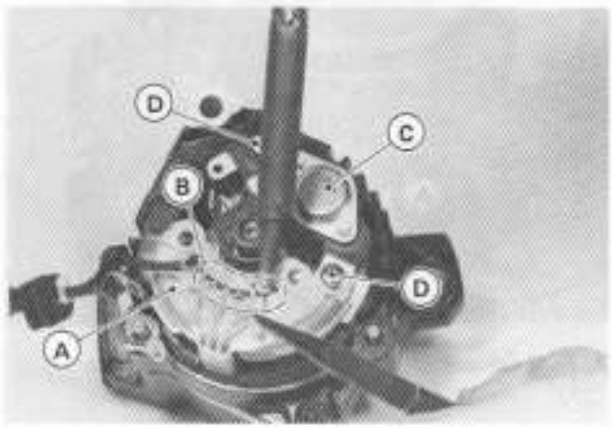
○Carbon brush assembly and rubber seal (remove mounting screws).



A. Screws
B. Brush Assembly

○Regulator (remove mounting screws).

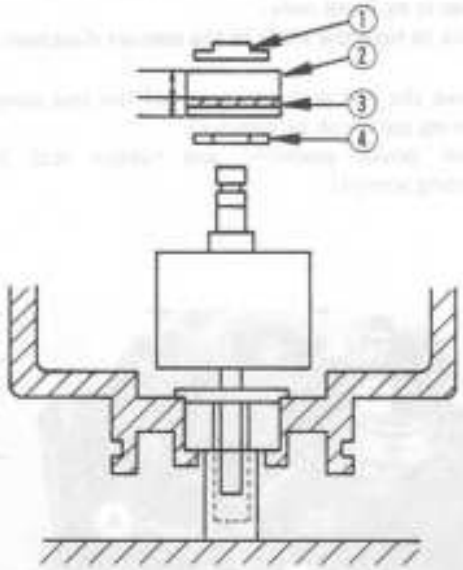
○Rectifier and cover (unsolder stator coil windings).



A. Rectifier
B. Rectifier Lead Terminal
C. Regulator
D. Screws

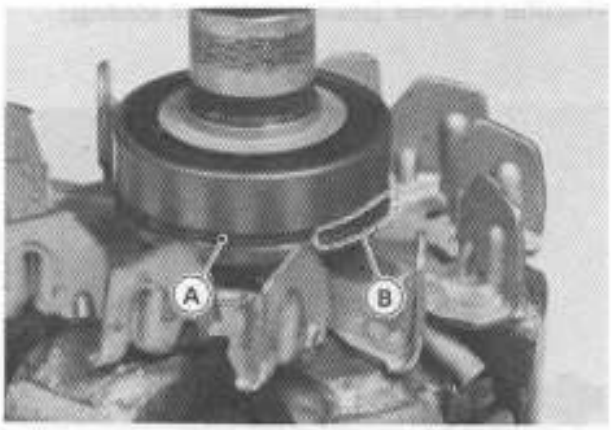
●Unscrew the bolts, and pull off the RH housing half with the stator.

○When removing the LH rotor bearing, pull the bearing off of the rotor shaft with a suitable bearing puller.
○When installing the rotor bearing, press the bearing and bearing covers onto the rotor shaft. The bearing long end from the circlip groove must face in.



1. Bearing Cover
2. Bearing
3. Ring
4. Bearing Cover

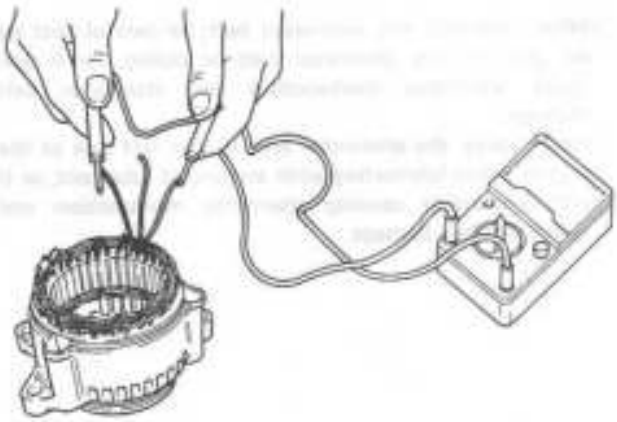
○Position the rotor bearing ring so that its projections it are aligned with the ring positioning groove, and install the LH housing half.



A. Ring Groove
B. Positioning Groove

Stator Coil Inspection

●Connect an ohmmeter (x 1 Ω range) between the coil wires and read the meter.



★If the meter does not read as specified, replace the stator coil.

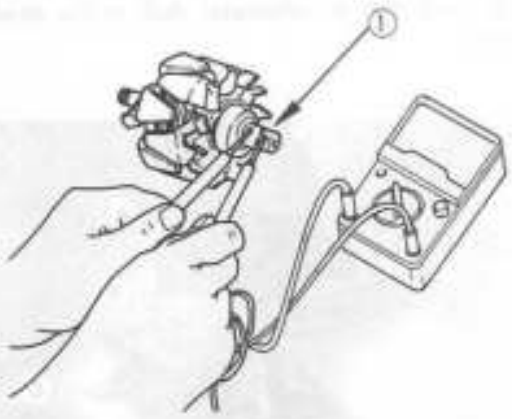
Stator Coil Resistance

Less than 1.0 Ω

●Using the highest ohmmeter range, measure the resistance between the stator coil core and each of the coil windings.
★If there is any reading at all, the stator coil winding has a short and must be replaced.

Rotor Coil Inspection

●Connect an ohmmeter (x 1 Ω range) between the slip rings and read the meter.



1. Slip Ring

★If the meter does not read as specified, replace the rotor.

Rotor Coil Resistance

About 4 Ω

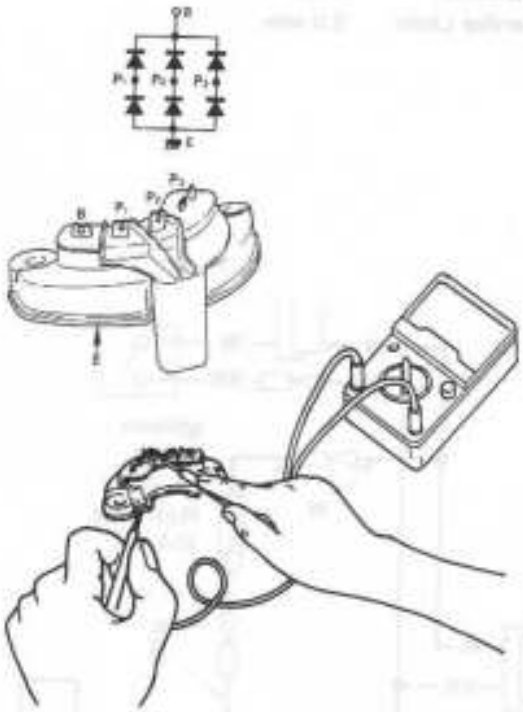
●Using the highest ohmmeter range, measure the resistance between the rotor shaft and each of the slip rings.
★If there is any reading at all, the rotor coil has a short and must be replaced.

Rectifier Inspection

●Set an ohmmeter to the 1 kΩ range.
●Check the resistance of the diode in both directions.
★If any diode shows low or high resistance in both directions, the diode is defective and the rectifier 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 half the scale.*



CAUTION

○**If a megger or a meter with a large-capacity battery is used, the rectifier will be damaged.**

Regulator Inspection

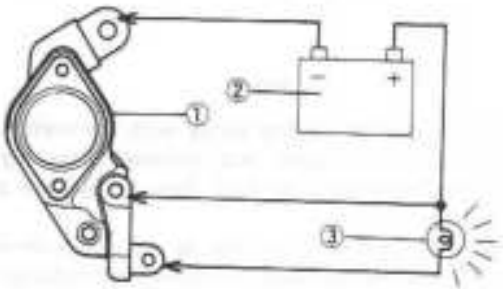
●Prepare testing tools.

Test light:	Bulb rated 12 V 3.4 W
Batteries:	Two 12 V batteries
Test wires:	Three auxiliary wires

CAUTION

○**The test light works as an indicator and also a current limiter to protect the regulator from excessive current. Do not use an ammeter instead of a test light.**

●Connect the test light and the 12 V battery to the regulator as shown.



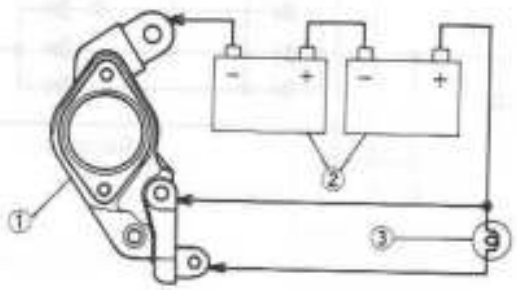
1. Regulator
2. 12 V Battery
3. Bulb 12 V 3.4 W

○The test light should go on at this time.

CAUTION

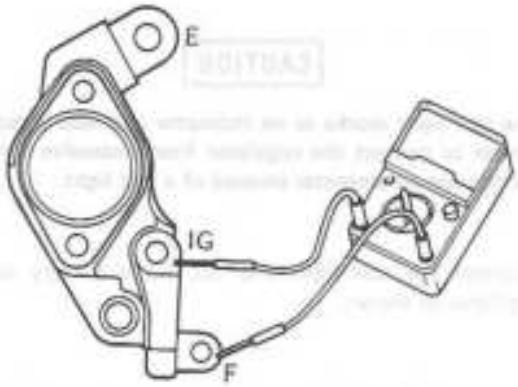
○**Do not contact the regulator metal case with the wires from the battery (+) or (–) terminal during the test.**

★If the test light does not go on, the regulator is damaged and must be replaced.
●Connect the test light and two 12 V batteries to the regulator as shown.



1. Regulator
2. 12 V Batteries
3. Bulb 12 V 3.4 W

○The test light should not go on at this time.
★If the test light goes on, the regulator is damaged and must be replaced.
●Check the resistance in both directions between the terminals of the regulator with an ohmmeter as shown.



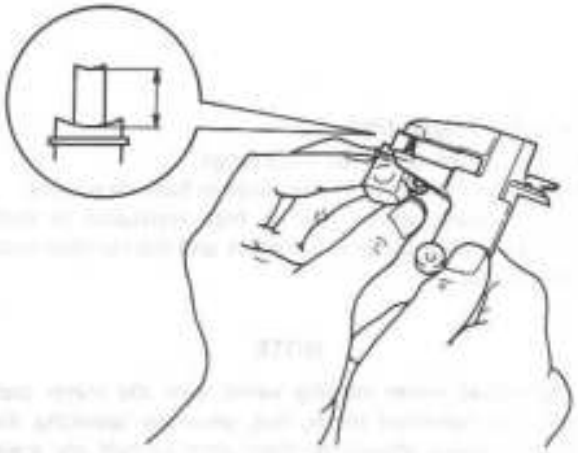
NOTE

○*The actual meter reading varies with the meter used and the individual diode, but, generally speaking, the lower reading should be from zero to half the scale.*

★Meter readings should be close to the values shown in the table. If the resistance is infinity (no reading) or 0 Ω, the regulator is damaged and must be replaced.

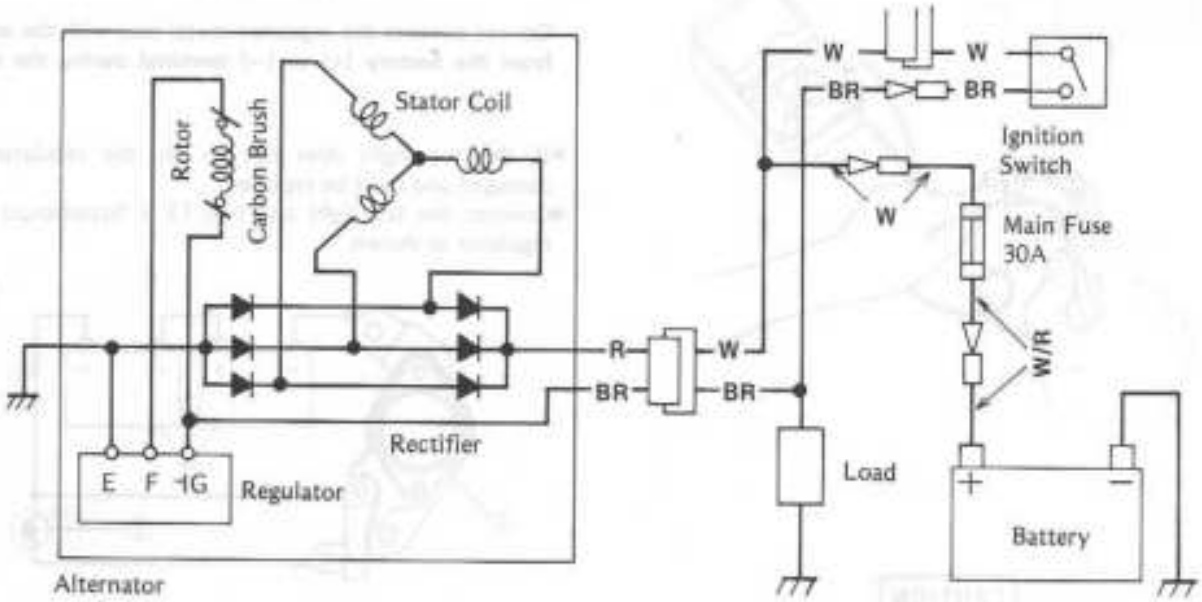
Carbon Brush Inspection

●Measure the length of both carbon brushes that stick out of the housing.
★If either one is worn down to less than the service limit, replace both.



Carbon Brush Length (projecting portion)

Standard:	**10.5 mm**
Service Limit:	**5.0 mm**



Ignition System

WARNING

○The ignition system produces extremely high voltage. Do not touch the spark plugs, high tension coils, or spark plug leads while the engine is running, or you could receive a severe electrical shock.

CAUTION

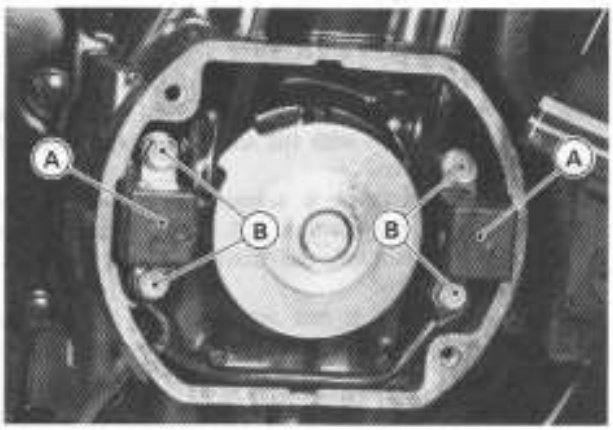
○Do not disconnect the battery leads or any other electrical connections when the ignition switch is on, or while the engine is running. This is to prevent IC igniter damage.

○Do not install the battery backwards. The negative side is grounded. This is to prevent damage to the diodes and IC igniter.

Pickup Coil Removal

●Remove the screws and the Allen bolt to the RH lower fairing.

●Remove the pickup coil cover and coils.

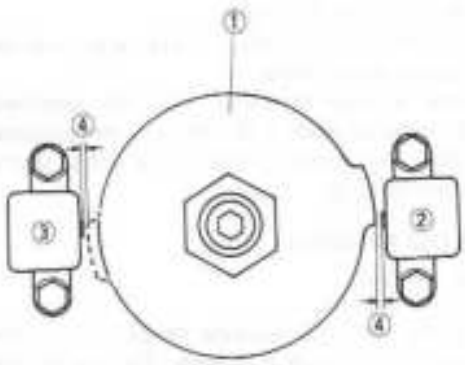


A. Pickup Coils B. Mounting Bolts

Pickup Coil Installation

●Note the following.

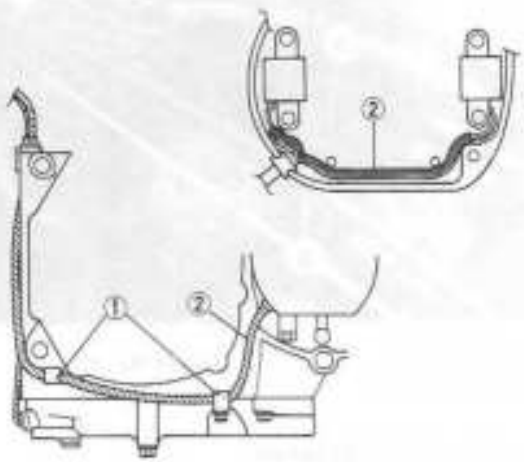
○Install the pickup coils so that the air gaps (clearance between the timing rotor projection and the pickup coil core) of both pickup coils are equal.



1. Timing Rotor
2. #1, #4 Coil
3. #2, #3 Coil
4. Air Gap

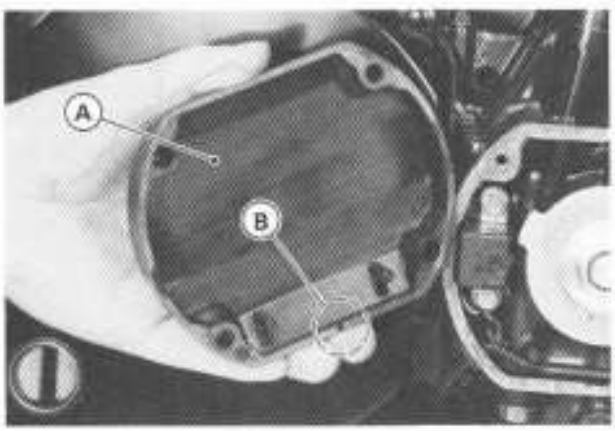
Pickup Coil Air Gap
0.5 mm

○Route the pickup coil lead as shown.



1. Clamp 2. Wire

●The pickup coil cover must be installed with the notched side downward.



A. Pickup Coil Cover B. Notch

Pickup Coil Inspection

•Set the ohmmeter to the x 1 kΩ range, and connect it to the pickup coil wires.

★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

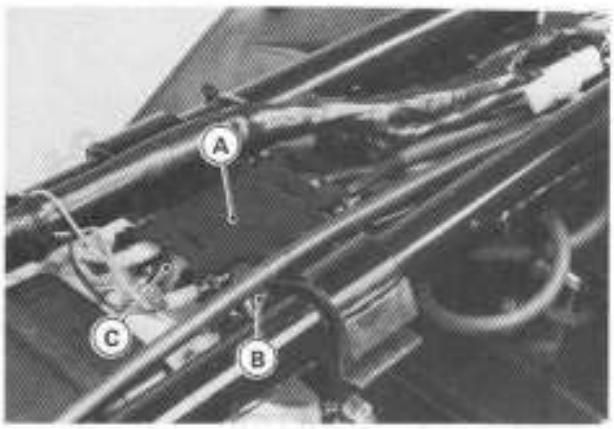
390 – 590 Ω

•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 Removal

•Remove the fuel tank, then remove the ignition coil from the coil bracket.

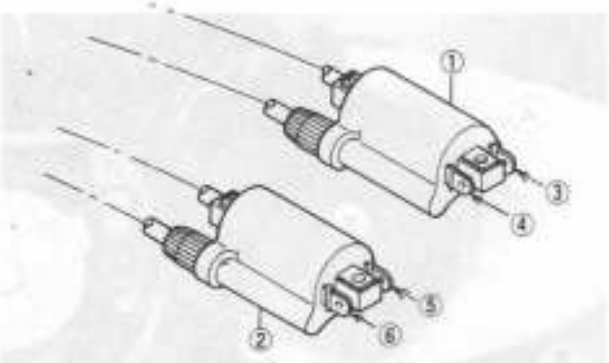


A. Coil Bracket
B. Coil for #1, #4
C. Coil for #2, #3

Ignition Coil Installation

•Connect the primary wires to the coil as follow.

Black Wire	→	to #1, #4 Coil
Green Wire	→	to #2, #3 Coil
Red Wire	→	to both Coil

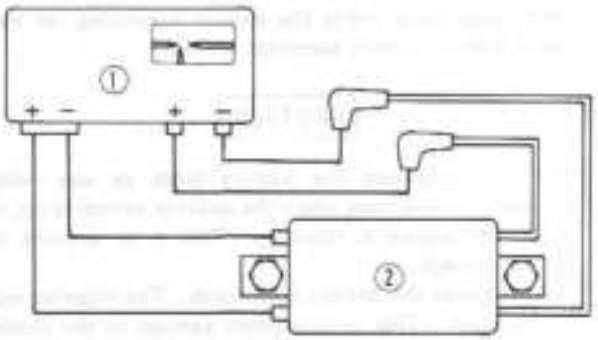


1. #1, #4 Coil
2. #2, #3 Coil
3. Red Wire
4. Black Wire
5. Red Wire
6. Green Wire

Ignition Coil Inspection

NOTE

○*The most accurate test for determining the condition of the ignition coil is made by measuring arcing distance with a suitable tester for the 3-needle method.*



1. Arcing Tester
2. Ignition Coil

WARNING

○**To avoid extremely high voltage shocks, do not touch the coil or lead.**

★If the distance reading is less than the specified value, the ignition coil or spark plug caps are defective.

Ignition Coil Arcing Distance

7 mm or more

•To determine which part is defective, measure the arcing distance again with the spark plug caps removed from the ignition coil.

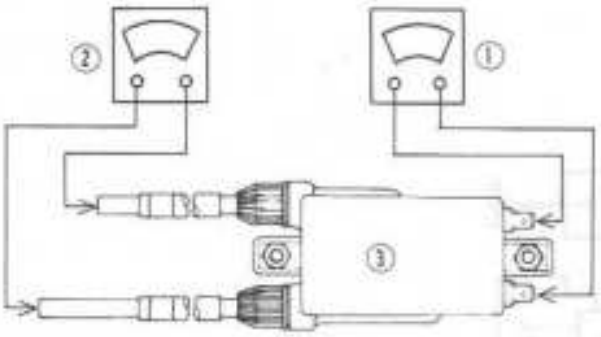
★If the arcing distance is subnormal as before, the trouble is with the ignition coil itself. If the arcing distance is now normal, the trouble is with the spark plug caps.

•If the arcing tester is not available, the coil can be checked for a broken or badly shorted winding with an ohmmeter.

NOTE

○*An ohmmeter cannot detect layer shorts and shorts resulting from insulation breakdown under high voltage.*

•Measure the primary winding resistance as follows.
○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 as follows.
○Connect an ohmmeter between the spark plug leads.
○Set the meter to the x 1 kΩ range, and read the meter.



1. Measure primary winding resistance
2. Measure secondary winding resistance
3. Ignition Coil

•If the meter does not read as specified, replace the coil.

Ignition Coil Winding Resistance

Primary windings:	**1.8 – 2.8 Ω**
Secondary windings:	**10 – 16 kΩ**

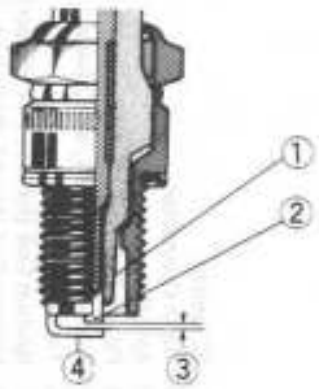
Spark Plug Gap

•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



1. Insulator
2. Center Electrode
3. Plug Gap
4. Side Electrode

IC Igniter Inspection

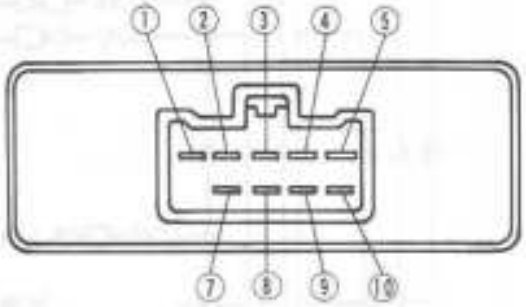
•Set the ohmmeter to the x 1 kΩ range and make the measurements shown in the table.

★If the meter readings are not as specified, replace the IC igniter.

CAUTION

○Use only Hand Tester 57001-983 for this test. A tester other than the Kawasaki Hand Tester may show different readings.

○If a megger or a meter with a large-capacity battery is used, the IC igniter will be damaged.

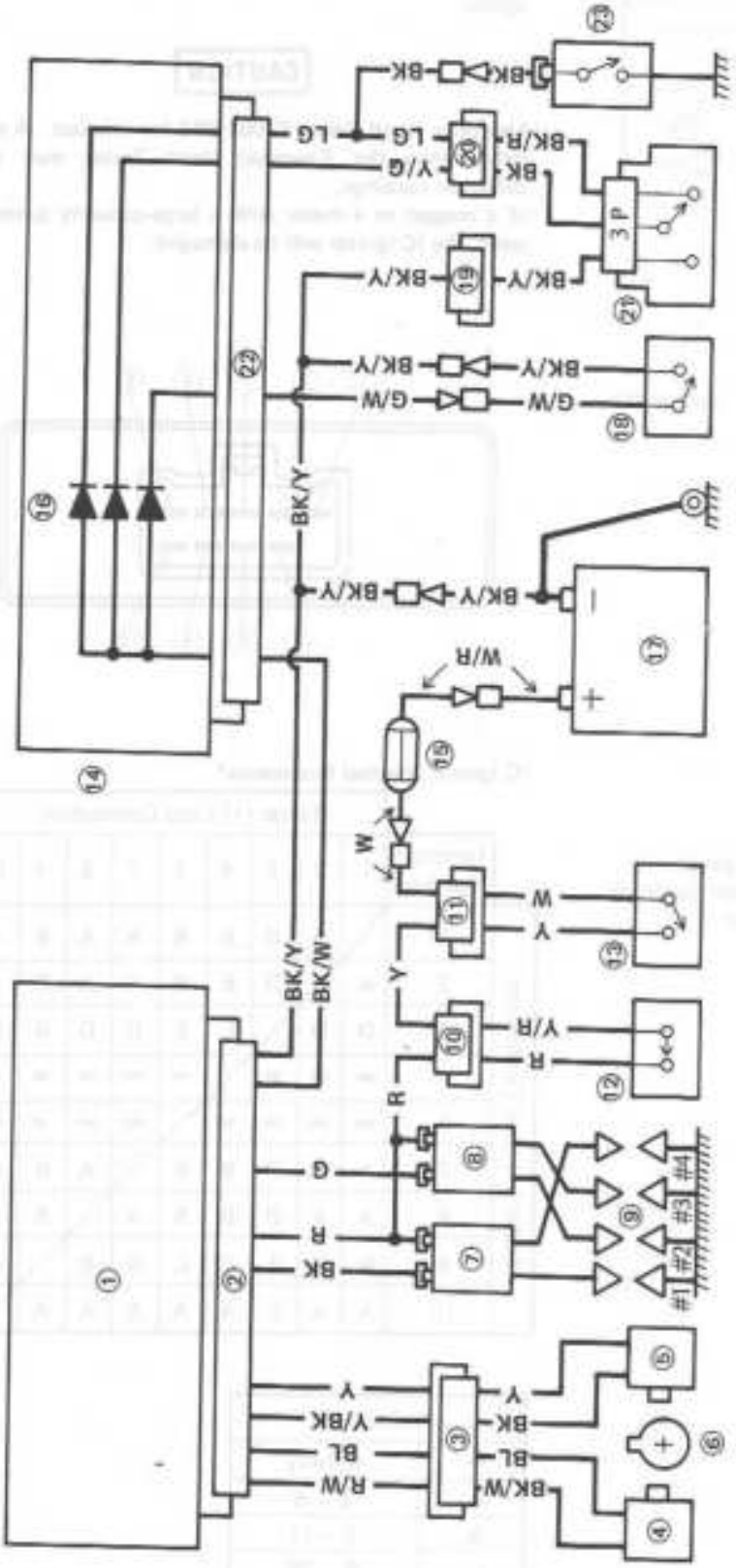


IC Igniter Internal Resistance*

Tester (–) 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	

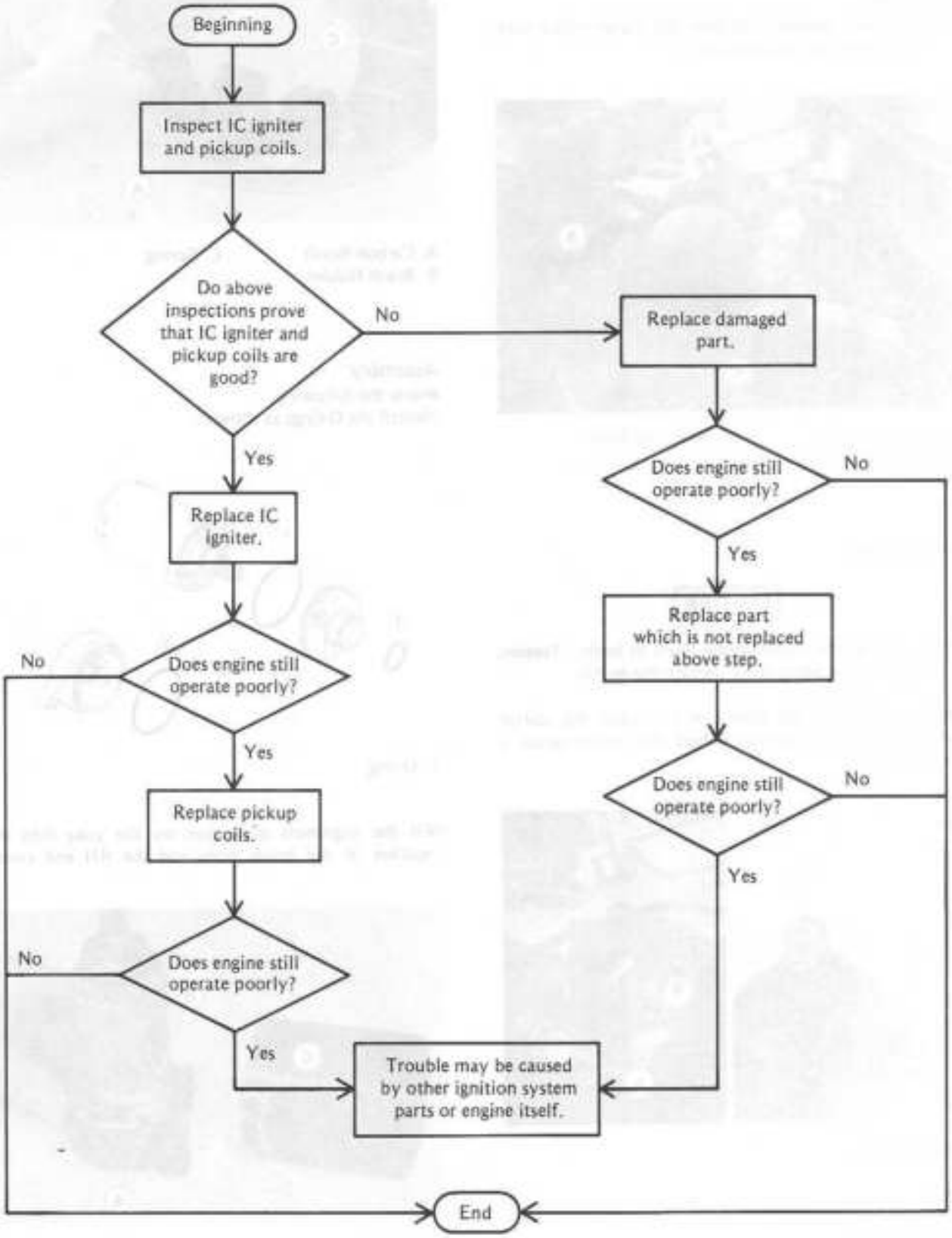
Value (kΩ)	
∞	Infinity
A	2 – 6
B	5 – 11
C	9 – 20
D	15 – 28
E	25 – 55

Ignition Circuit



1. IC Igniter
2. 10pin Connector
3. 4pin Connector
4. Pickup Coil (for #2, #3 Cylinder)
5. Pickup Coil (for #1, #4 Cylinder)
6. Timing Rotor
7. Ignition Coil (for #1, #4 Cylinder)
8. Ignition Coil (for #2, #3 Cylinder)
9. Spark Plug
10. 4pin Connector
11. 6pin Connector
12. Engine Stop Switch
13. Ignition Switch
14. Junction Box
15. Main Fuse 30A
16. Diodes
17. Battery
18. Side Stand Switch
19. 9pin Connector
20. 4pin Connector
21. Starter Lockout Switch
22. 10pin Connector
23. Neutral Switch

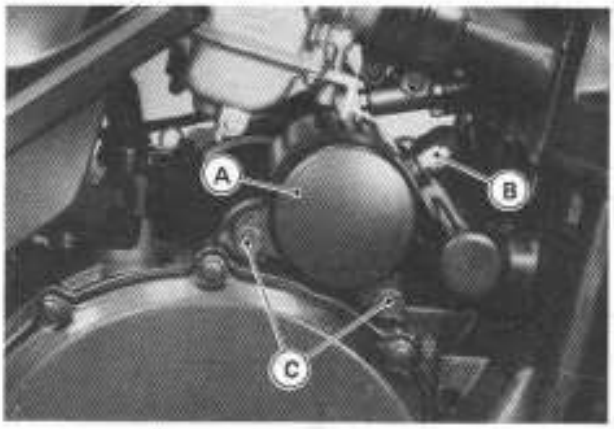
IC Igniter Troubleshooting:



Starter Motor

Removal

•Remove the terminal nut from the starter motor wire, then remove the mounting bolts.



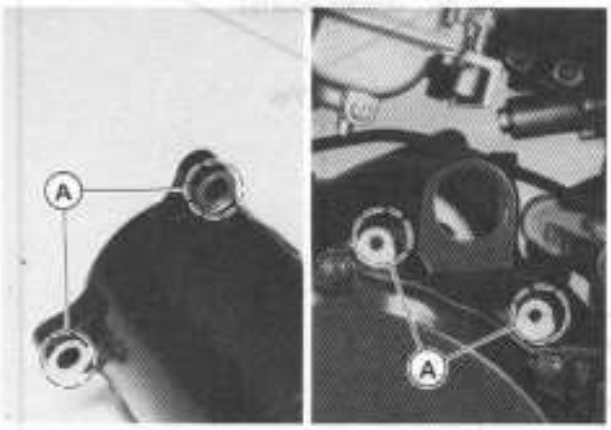
A. Starter Motor
B. Terminal Nut
C. Mounting Bolts

Installation

CAUTION

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

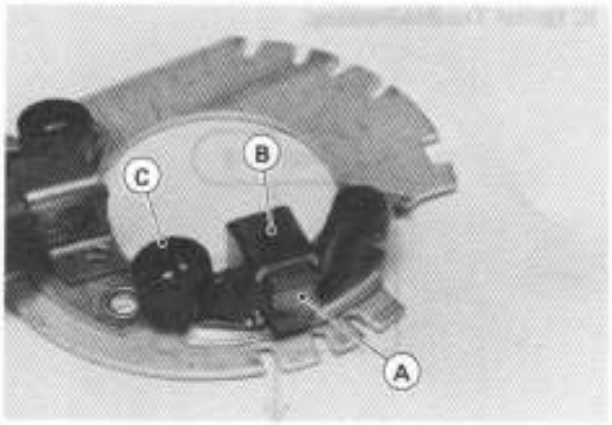
•When installing the starter motor, clean the starter motor lugs and crankcase where the starter motor is grounded.



A. Clean Here

Disassembly

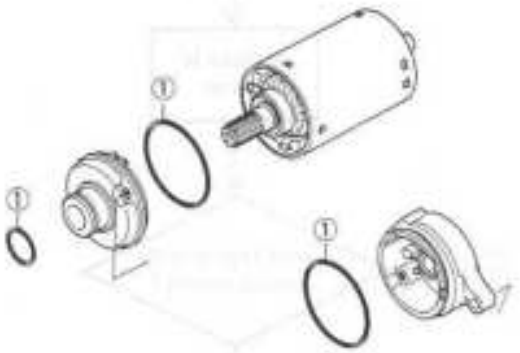
•When removing the carbon brushes, remove the spring first, then take the brush out of the holder.



A. Carbon Brush
B. Brush Holder
C. Spring

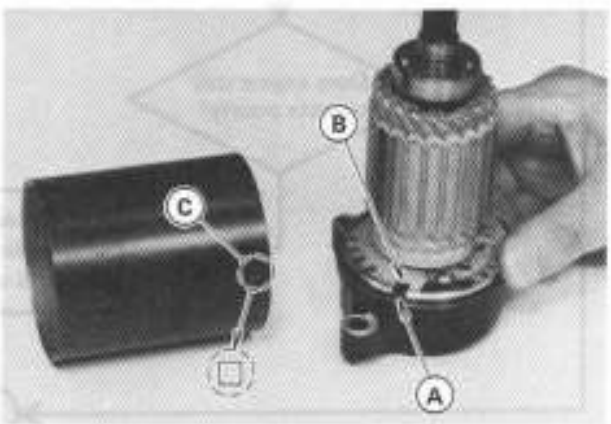
Assembly

•Note the following.
○Install the O-rings as shown.



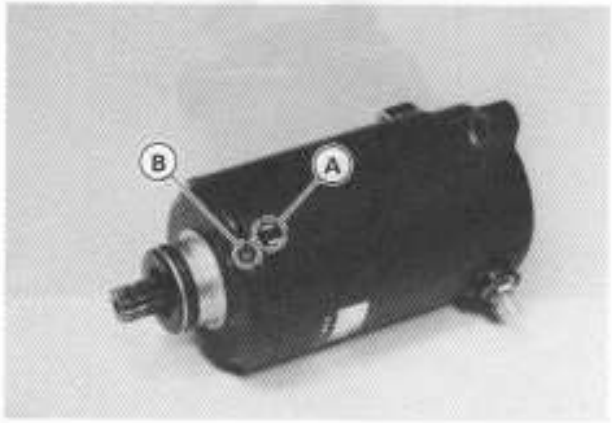
1. O-ring

○Fit the alignment projection on the yoke into the notches in the brush plate and the RH end cover.



A. Notch in the cover.
B. Notch in the brush plate.
C. Make of the yoke.

○Align the LH end cover screw hole with the lines marked on the yoke.



A. Marks on the yoke. B. Screw Hole

Brush Inspection

●Measure the length of each brush.

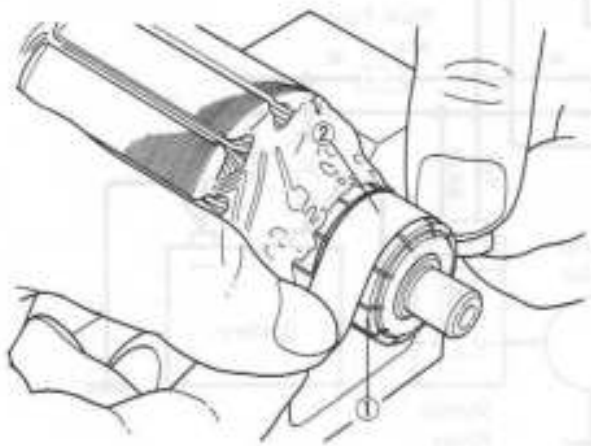
★If any is worn down to the service limit, replace all brushes.

Starter Motor Brush Length

Standard:	**12 mm**
Service Limit:	**8.5 mm**

Commutator Cleaning and Inspection

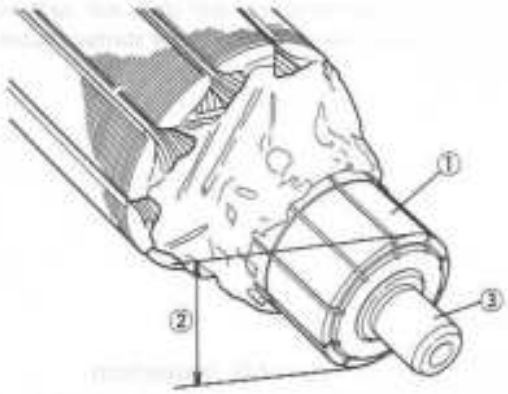
●Smooth the commutator surface if necessary with fine emery cloth, and clean out the grooves as illustrated.



1. Commutator 2. 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.



1. Commutator Segment 3. Shaft
2. Diameter

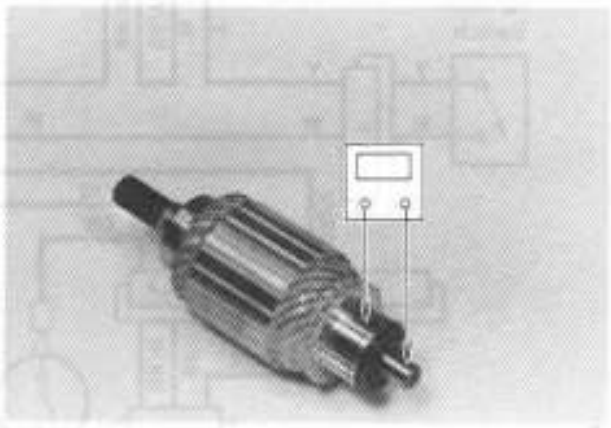
Commutator Diameter

Standard:	**28 mm**
Service Limit:	**27 mm**

Armature Inspection

●Using the x 1 Ω ohmmeter range, measure the resistance between any two commutator segments.

★If there is a high resistance or no reading (∞) between any two segments, a winding is open and the starter motor must be replaced.

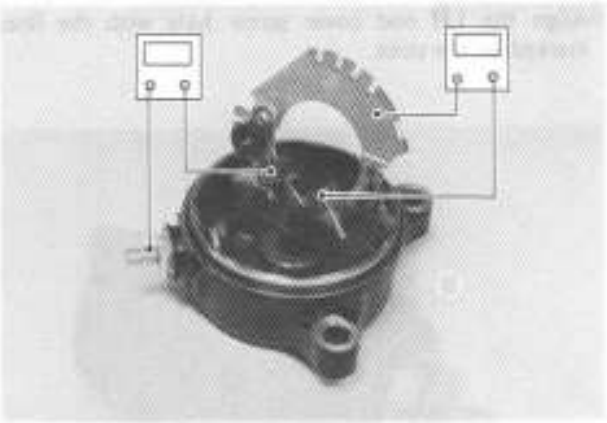


●Using the highest ohmmeter range, measure the resistance between the commutator and the shaft.

★If there is any reading at all, the armature has a short and the starter motor must be replaced.

NOTE

○*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 and Lead Assembly Inspection

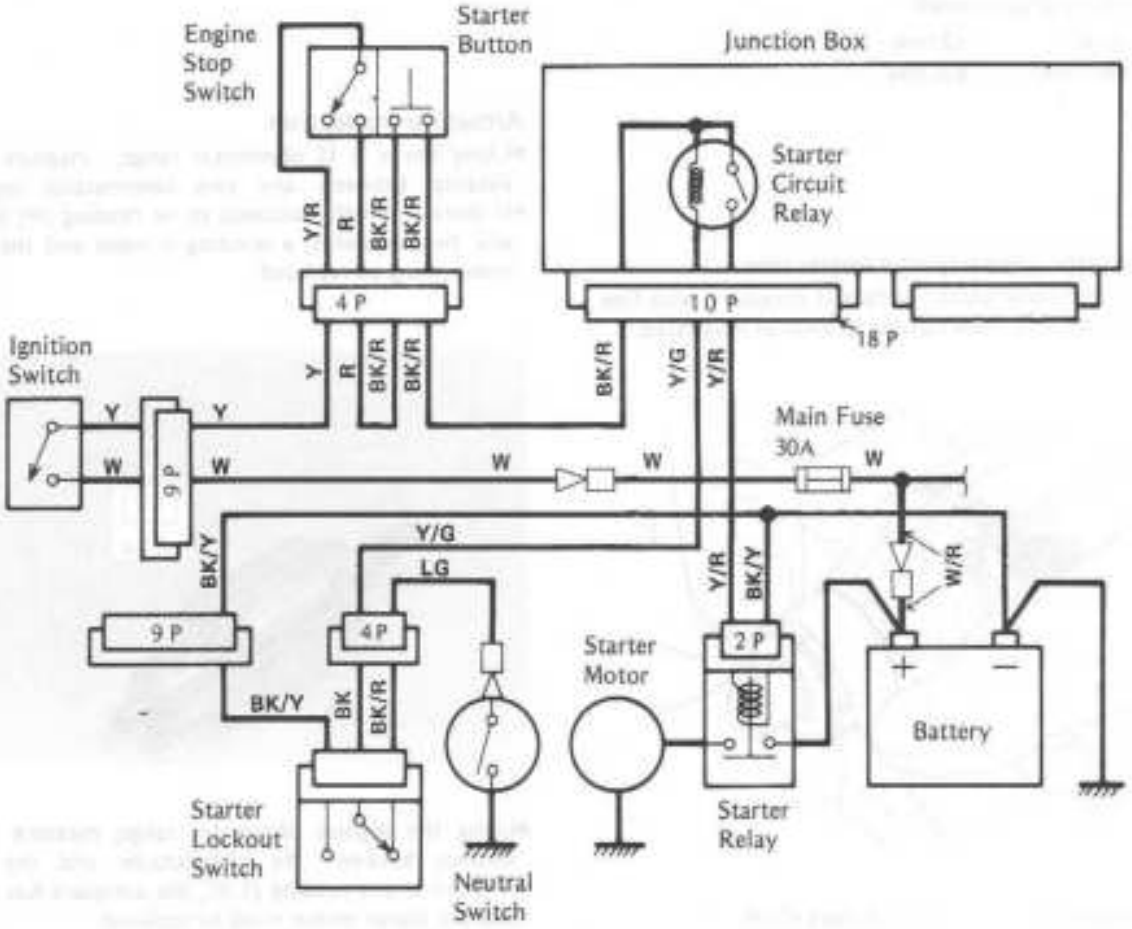
●Using the x 1 Ω ohmmeter range, measure the resistance as follows.

○Between the brush and the terminal bolt.

○Between the brush and brush plate.

★If there is a high resistance or no reading (∞), a lead is open and the brush and lead assembly must be replaced.

Electric Starter Circuit

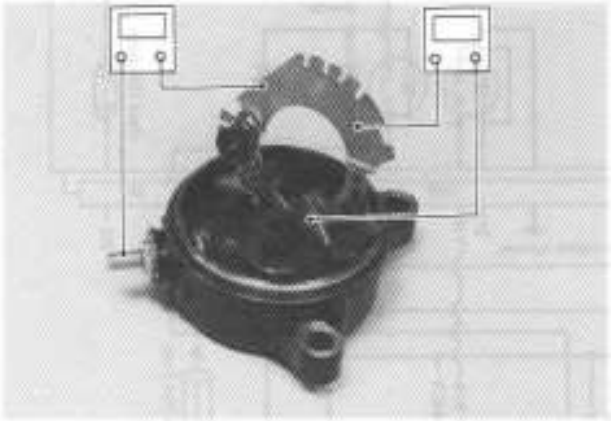


Brush Plate, Terminal Bolt Inspection

•Using the x 1 Ω ohmmeter range, measure the resistance as follows.

○Between the terminal bolt and the brush plate.

○Between the brush holder and the brush plate.



★If there is not close to zero ohms, the brush plate has an open and it must be replaced.

Starter Relay Inspection

•Disconnect the starter motor lead and battery positive (+) lead 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.

•Set the switch positions shown in the table below.

NOTE

○*This test assumes that all switches are working properly, and that all wiring and connections are in good condition.*

★If the relay clicks when the starter button is pushed, 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 switch is pushed.**

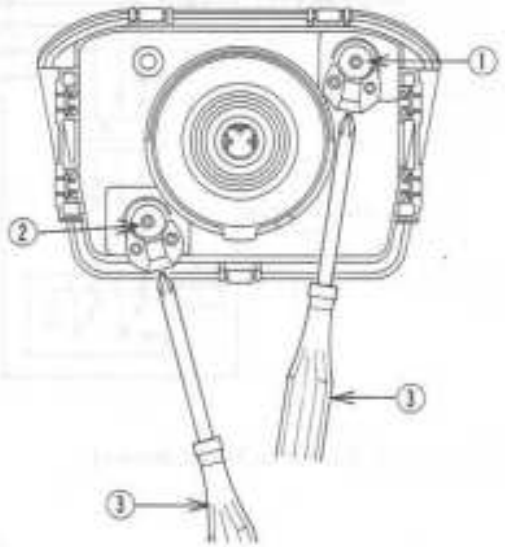
Headlight

Headlight Beam Horizontal Adjustment

•Turn the adjuster on the headlight in or out until the beam points straight ahead.

Headlight Beam Vertical Adjustment

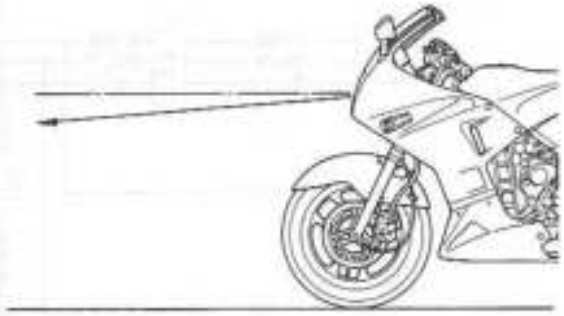
•Turn the adjuster on the headlight in or out to adjust the headlight vertically.



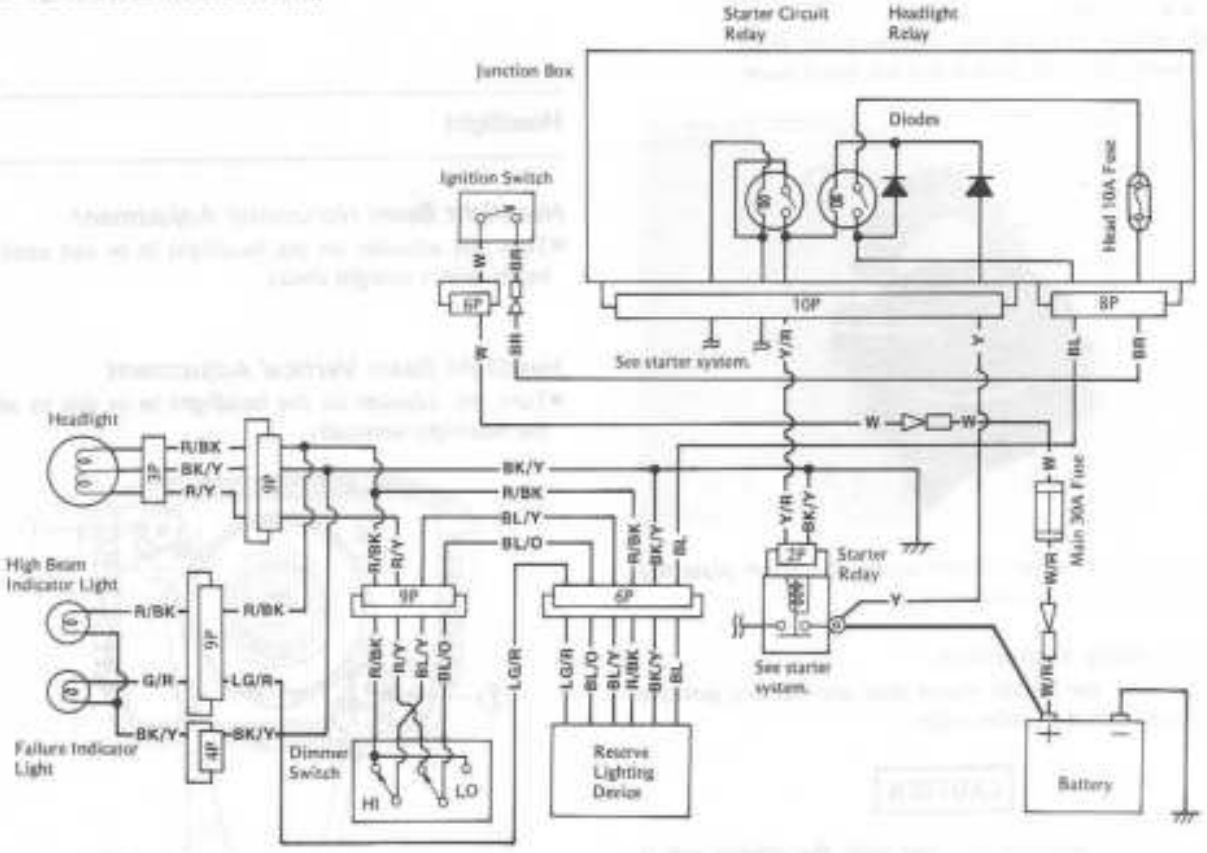
1. Horizontal Adjuster
2. Vertical Adjuster
3. Phillips Screwdriver

NOTE

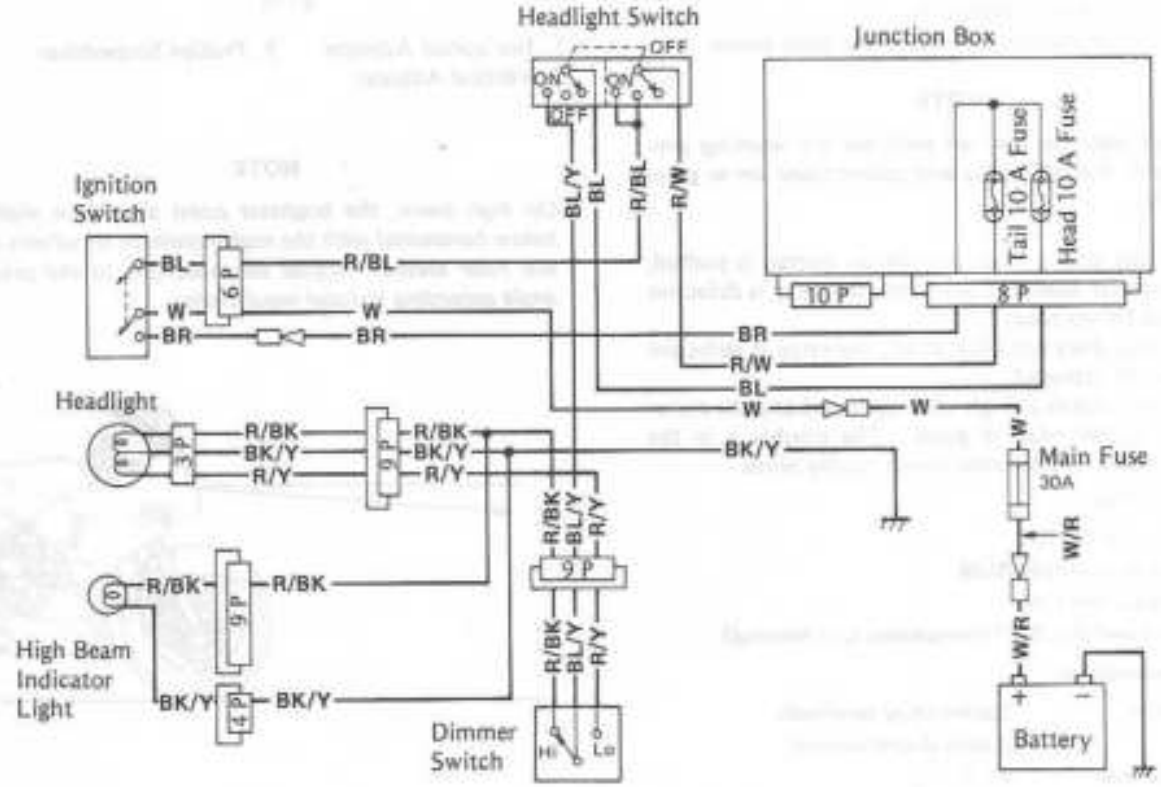
○*On high beam, the brightest point should be slightly below horizontal with the motorcycle on its wheels and the rider seated. Adjust the headlight to the proper angle according to local regulations.*



Headlight Circuit
(US and Canadian Models Shown)



Headlight Circuit (European Model Shown)

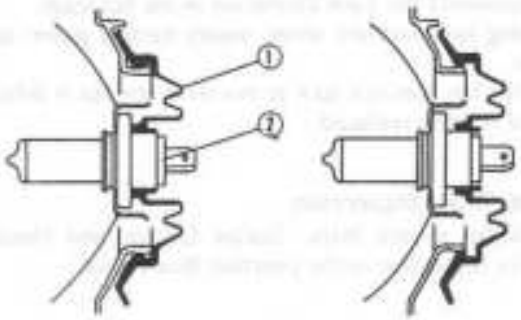


Headlight Bulb Replacement Notes

CAUTION

○**When handling the quartz-halogen bulbs, never touch the glass portion with bare hands. Always use a clean cloth. Oil contamination from hands or dirty rags can reduce bulb life or cause the bulb to explode.**

●Fit the dust cover onto the bulb firmly as shown in the figure.



●After installation, adjust the headlight aim.

Headlight Reserve Lighting System Inspection

The US and Canadian models contain a relay in the headlight circuit. In these models, the headlight does not go on when the ignition switch is first turned on, but the headlight goes on once the starter button is pushed to start the engine, and stays on until the ignition switch is turned off. But the headlight goes out whenever the starter button is pushed to restart the engine after engine stalling.

★If all wirings and components other than the reserve lighting device check out good, the device is defective.

License Plate Light

Bulb Replacement

●Note the following.

●To remove the wedge-base type bulb pull the bulb out of the socket.

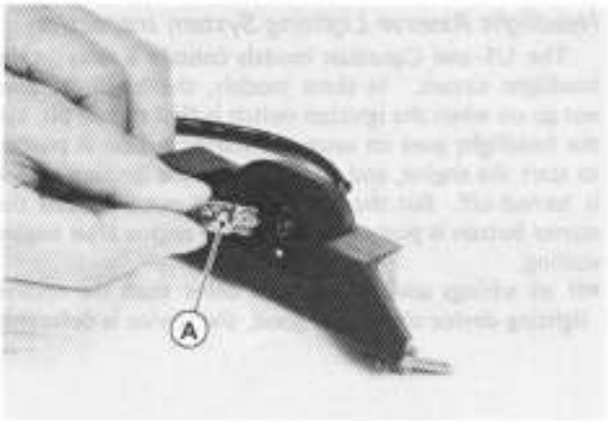
CAUTION

○**Do not use bulb rated for greater wattage than the specified value.**

○**Do not turn the bulb to prevent damage to the bulb.**

Reserve Lighting System Operation (US and Canadian models)

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.



A. Pull the bulb.

Cooling Fan System

Fan System Circuit Inspection

- Ground the red/white wire to the engine with a suitable wire.
- ★If the fan turns, inspect the following.
  Switches (Fan Switches and Oil Temperature Switch)
- ★If the fan does not turn, inspect the following.
  Wires and Connectors
  Junction Box Parts (Fan Relay)
  Fan Relay
  Fan

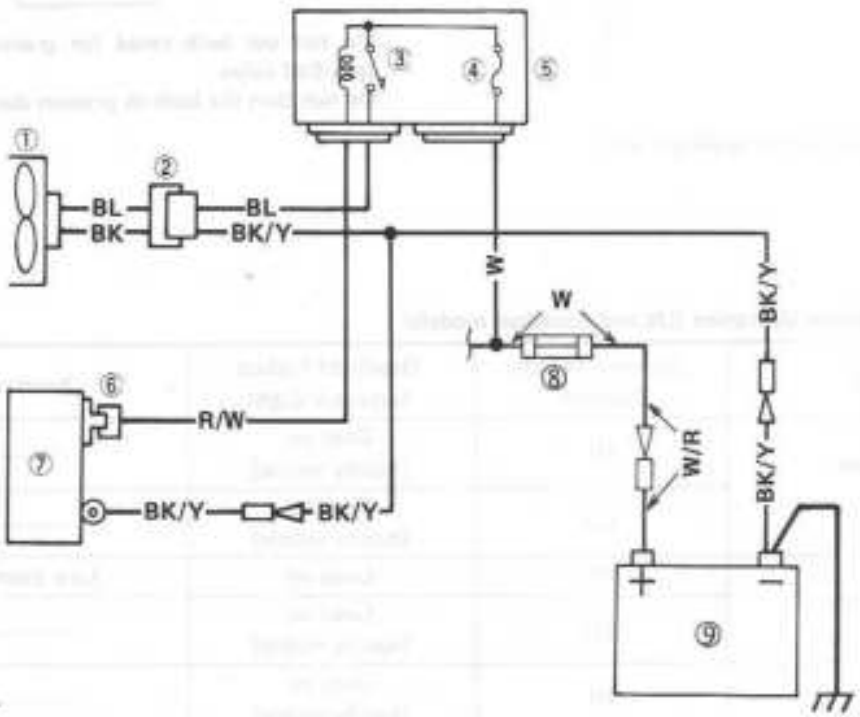
Fan Inspection

- Disconnect the 2-pin connector in the fan leads.
- Using two auxiliary wires, supply battery power to the fan.
- ★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

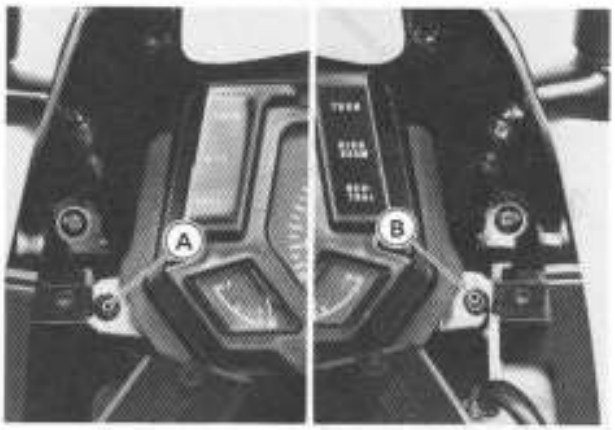


1. Cooling Fan
2. 2pin Connector
3. Fan Relay
5. Junction Box
6. Fan Relay
7. Radiator
8. Main Fuse 30A
9. Battery

Meters, Gauges

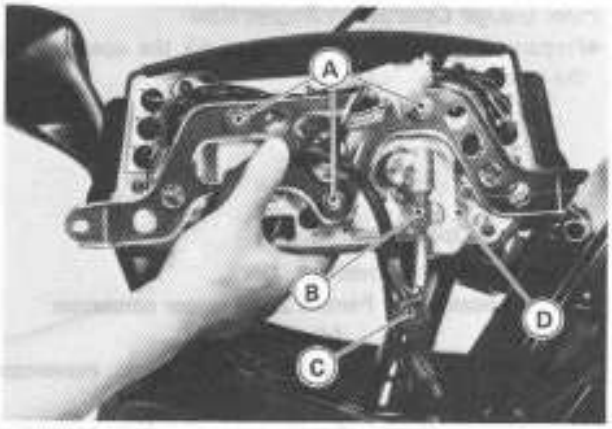
Removal

●Remove the following.
Speedometer Cable Lower End
Windshild
Inner Fairing (Left and Right)
Meter Mounting Bolts (Left and Right)



A. LH Bolt B. RH Bolt

Bracket Bolts
Speedometer Cable Upper End
Wiring Connector



A. Bracket Bolt
B. Cable Upper End
C. Wiring Connector
D. Meter Assembly

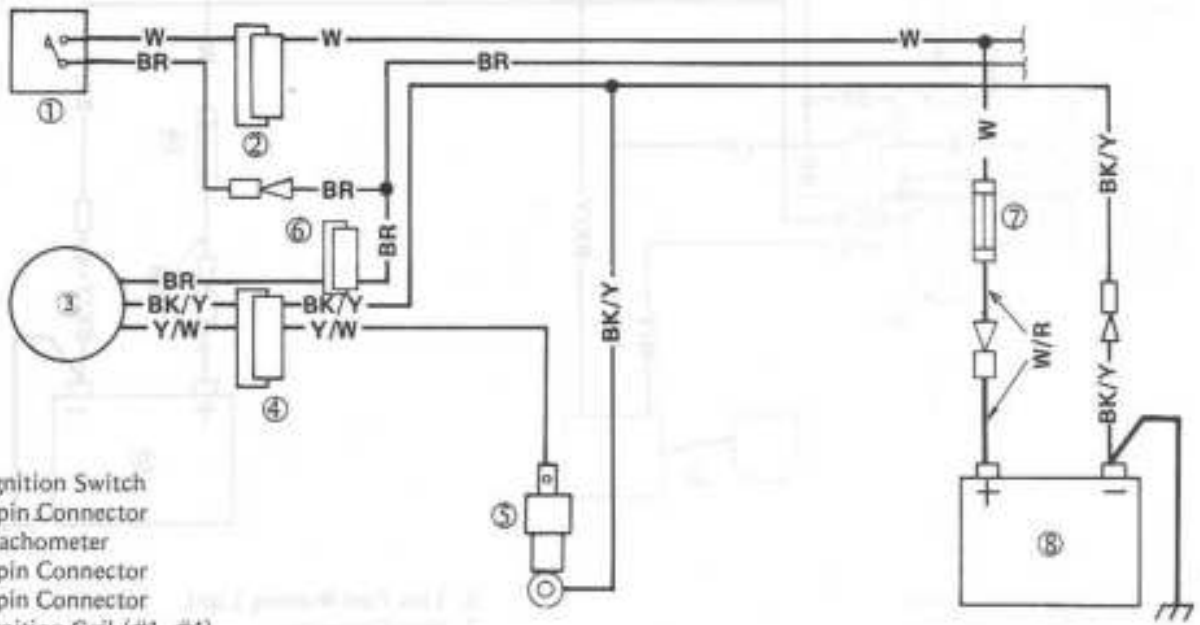
CAUTION

○Place the meter or gauge so that the face is up. If a meter or gauge is left upside down or sideways for any length of time it will malfunction.

Tachometer Inspection

●Check the tachometer circuit wiring.
★If all wiring, main fuse, ignition coil check out good, the unit is defective.

Tachometer Circuit



1. Ignition Switch
2. 6pin Connector
3. Tachometer
4. 4pin Connector
5. 9pin Connector
6. Ignition Coil (#1, #4)
7. Spark Plug
8. Main Fuse 30A
9. Battery

Fuel Gauge Operation Inspection

•Prepare an auxiliary wire, and check the operation of the gauge.

Fuel Gauge Operation Check

Ignition Switch Position: ON

Wire Location: Female 2-pin sensor connector (disconnected)

Results: Gauge should read E when connector wires are opened.

Gauge should read F when connector wires are shorted.

*If the gauge readings are correct, the fuel level sensor is bad. If these readings are not obtained, the trouble is with the gauge and/or wiring.

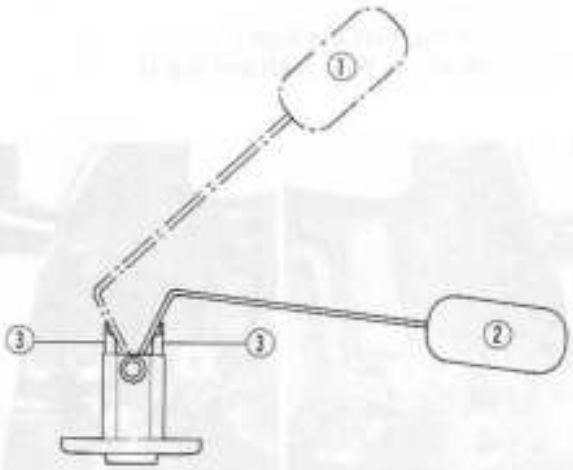
•Check the fuel gauge circuit wiring (see Wiring Inspection).

*If all wiring and components other than the fuel gauge unit check out good the gauge is defective.

Fuel Level Sensor Inspection

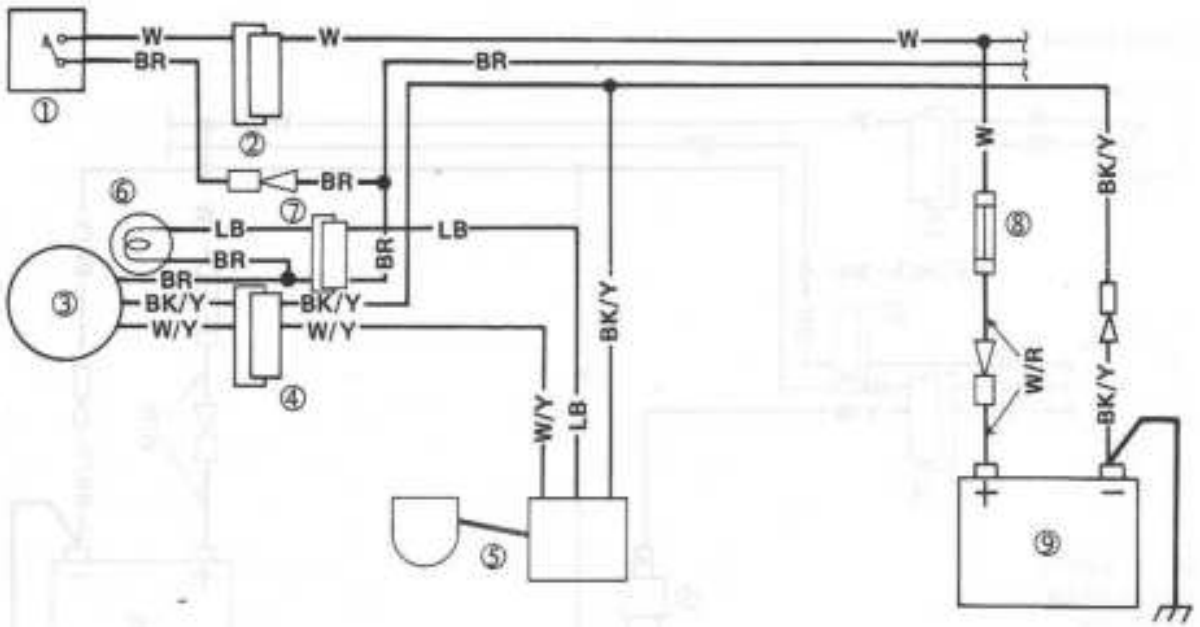
•Check that the float moves up and down smoothly without binding. It should go down under its own weight.

*If the float does not move smoothly, replace the sensor.



1. Float in full position
2. Float in empty position
3. Float arm stop

Fuel Gauge Circuit



1. Ignition Switch
2. 6pin Connector
3. Fuel Gauge
4. 4pin Connector
5. Fuel Level Sensor
6. Low Fuel Warning Light
7. 9pin Connector
8. Main Fuse 30A
9. Battery

●Measure the resistance of the fuel level sensor with an ohmmeter.
★If the ohmmeter does not show the specified values, or the readings do not change smoothly as the float moves up and down, replace the sensor.

Fuel Level Sensor Resistance

Full Position:	**4 – 10 Ω**
Empty Position:	**90 – 100 Ω**

●Inspect the leads and 2-pin connector.
★If they show any signs of damage, replace the sensor.

Water Temperature Gauge Operation Inspection

●Prepare an auxiliary wire, and check the operation of the gauge.

Gauge Operation Test

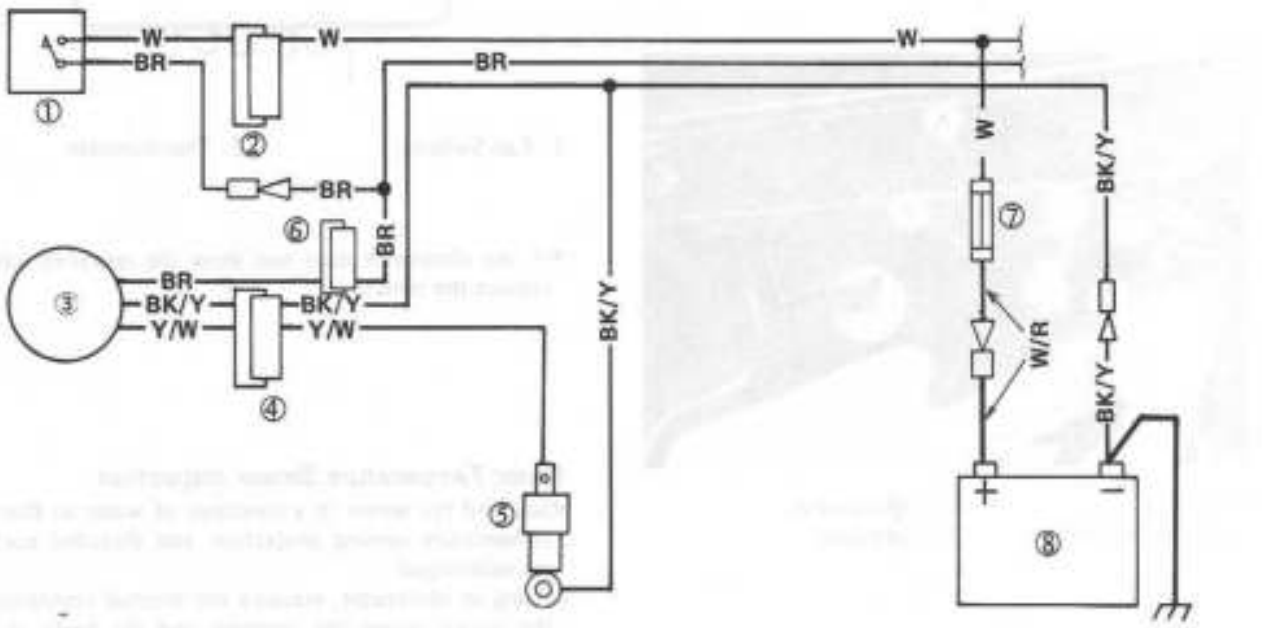
Ignition Switch Position: ON
Wire Location: Female, Sensor Connector (disconnected)
Results: Gauge should read C when sensor wire is opened.
Gauge should read H when connector wire is grounded to engine.

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 gauge is defective.

Water Temperature Gauge Circuit

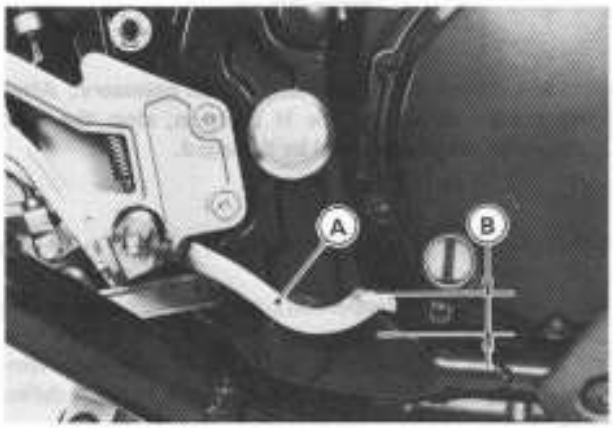


1. Ignition Switch
2. 6pin Connector
3. Water Temperature Gauge
4. 4pin Connector
5. Water Temperature Sensor
6. 9pin Connector
7. Main Fuse
8. Battery

Switches and Sensors

Rear Brake Light Switch Adjustment

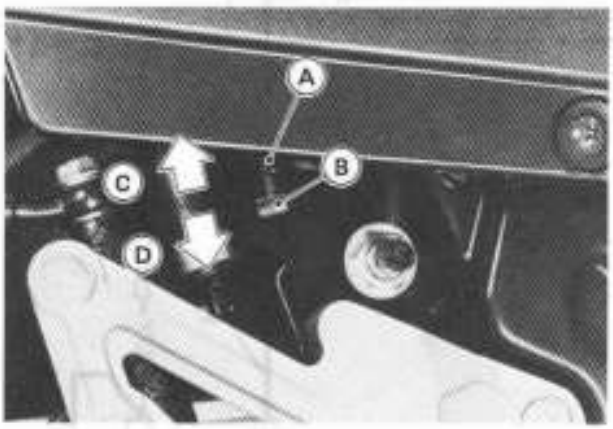
•Check the operation of the rear brake light switch by depressing the brake pedal. The brake light should go on after about 10 mm of pedal travel.



A. Brake Pedal B. 10 mm

★If it does not, adjust the brake light switch.

•Turn the adjusting nut to adjust the switch.



A. Switch
B. Adjusting Nut
C. Light sooner.
D. Light later.

CAUTION

○To avoid damaging the electrical connections inside the switch, be sure that the switch body does not turn during adjustment.

Fan Switch Inspection

•Suspend the switch in a container of water so that the temperature sensing projection and threaded portion are submerged.

•Using an ohmmeter, measure the internal resistance of the sensor across the terminal and the body at the temperature shown in the table.

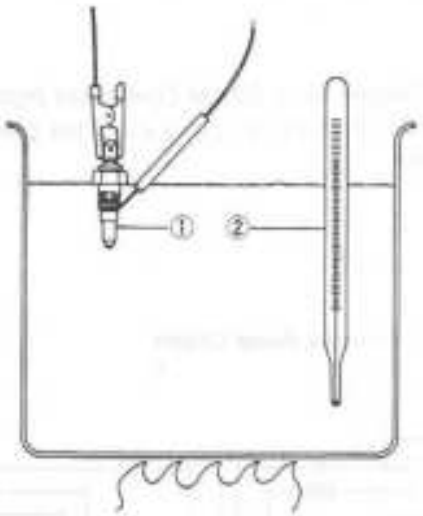
Fan Switch (97°C) Connections

○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



1. Fan Switch 2. Thermometer

★If the ohmmeter does not show the specified values, replace the switch.

Water Temperature Sensor Inspection

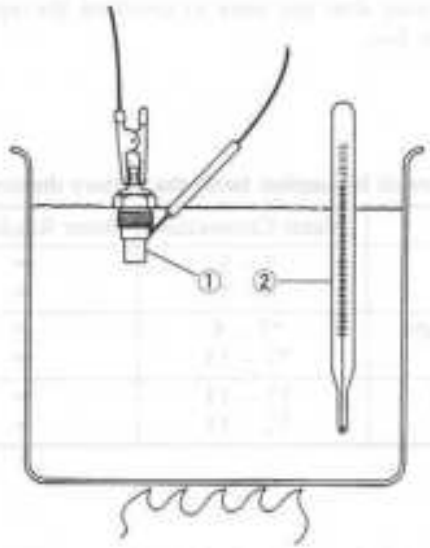
•Suspend the sensor in a container of water so that the temperature sensing projection and threaded portion are submerged.

•Using an ohmmeter, measure the internal resistance of the sensor across the terminal and the body at the temperatures shown in the table.

Internal Resistance of Water Temperature Sensor

80°C (176°F): About 52 Ω

100°C (212°F): About 27 Ω



1. Water Temperature Sensor 2. Thermometer

★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 sensor and thermostat must not touch the container sides or bottom.*

Junction Box

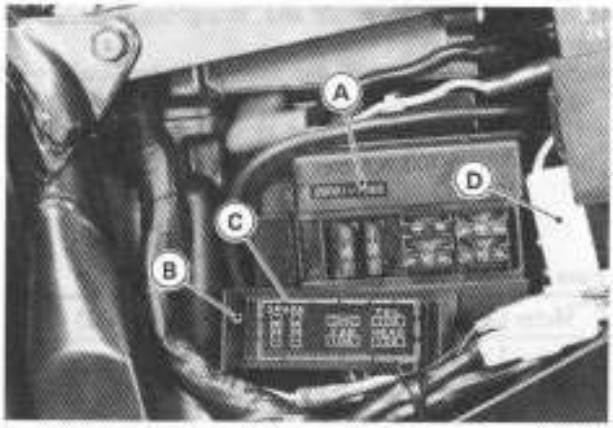
The junction box has fuses, relays and diodes. The relays and diodes can not be removed.

Fuse Removal

- Unlock the hook to lift up the locking arm.
- Pull the fuses straight out of the junction box with needle nose pliers.

Fuse Installation

★If a fuse fails during operation, inspect the electrical system to determine the cause, and then replace it with a new fuse of proper amperage.



A. Junction Box C. Level
B. Fuse Cover D. Main Fuses

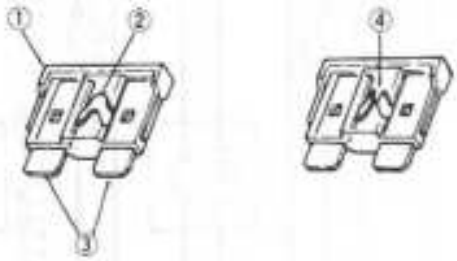
Fuse Inspection

- 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.**



1. Housing 3. Terminals
2. Fuse 4. Blown Element

Junction Box Fuse Circuit Inspection

- Remove the junction box from the motorcycle.
- Pull off the connectors from the junction box.
- Make sure all connector terminals are clean and tight, and none of them have been bent.

★Clean the dirty terminals and, straighten slightly-bent terminals.
●Check conductivity of the numbered terminals with hand tester.
★If the meter does not read as specified, replace the junction box.

Fuse Circuit Inspection

Meter Connection	Meter Reading (Ω)
1 – 2	0
1 – 3A	0
6 – 7	0
6 – 17	0
1 – 7	∞
3A – 8	∞
8 – 17	∞

Fan, Starter Circuit and Headlight Relay Inspection

●Remove the junction box from the motorcycle.
●Check conductivity of the following numbered terminals by connecting an ohmmeter and one 12 V battery to the junction box as shown.

★If the relay does not work as specified, the replace the junction box.

Relay Circuit Inspection (with the battery disconnected)

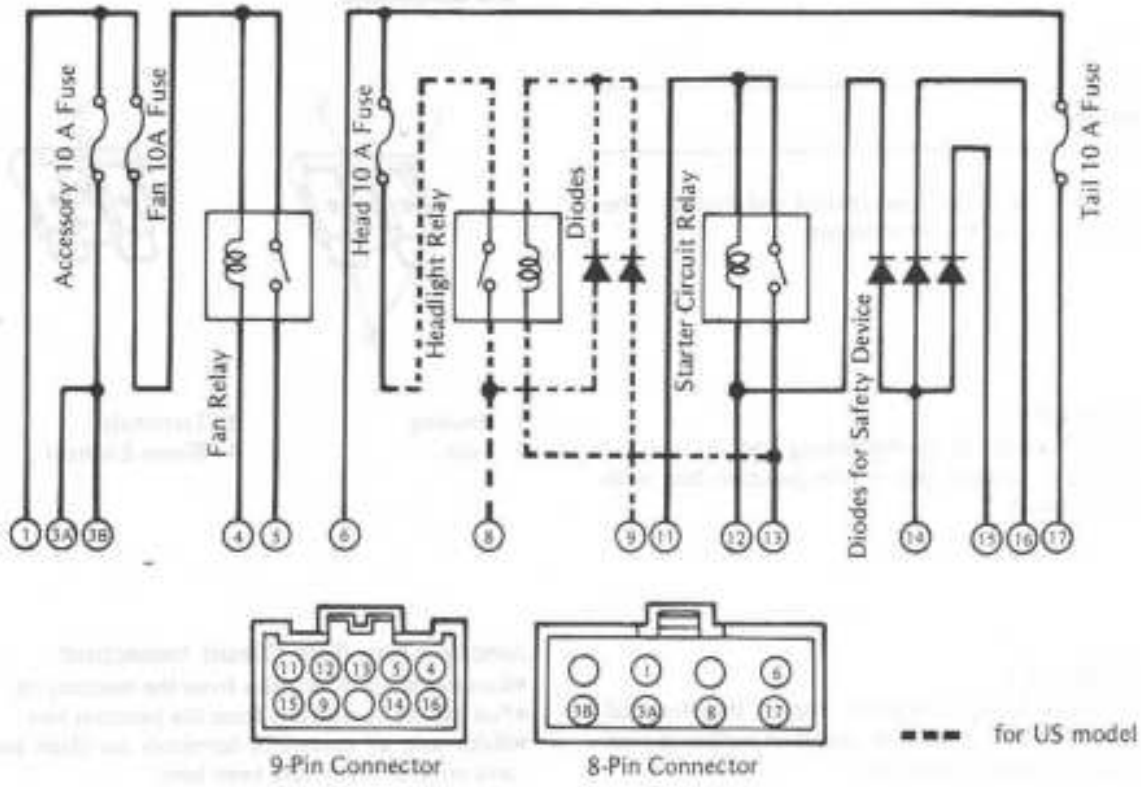
	Meter Connection	Meter Reading (Ω)
Fan Relay	2 – 5 4 – 5	∞ ∞
Headlight Relay	*7 – 8 *7 – 13	∞ ∞
Starter Relay	11 – 13 12 – 13	∞ ∞

Relay Circuit Inspection (with the battery connected)

	Meter Connection	Battery Connection + –	Meter Reading (Ω)
Fan	2 – 5	2 – 4	0
Headlight	*7 – 8	9 – 13	0
Starter	11 – 13	11 – 12	0

*US, Canadian Models only

Junction Box Internal Circuit



Diode Circuit Inspection

- Remove the junction box from the motorcycle.
- Pull off the connectors from the junction box.
- Check conductivity of the following pair of terminals.

Terminals for Diode Circuit Inspection

***13-8, *13-9, 12-14, 15-14, 16-14**

***US, Canadian Models only**

★The resistance should be low in one direction and more than ten times as much in the other direction. If any diode shows low or high in both directions, the diode is defective and the diode assembly 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 one half the scale.*

Appendix

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Lubrication 16-7
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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.

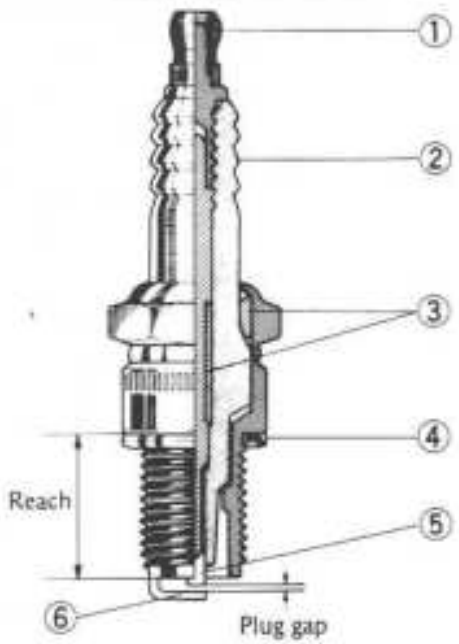
Since spark plug requirements change with the ignition and carburetion adjustments and with riding conditions, whether or not a spark plug of a correct heat range is used should be determined by removing and inspecting the plug.

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 redhot and cause preignition and knocking, which may eventually burn a hole in the top of the piston.

Spark Plug

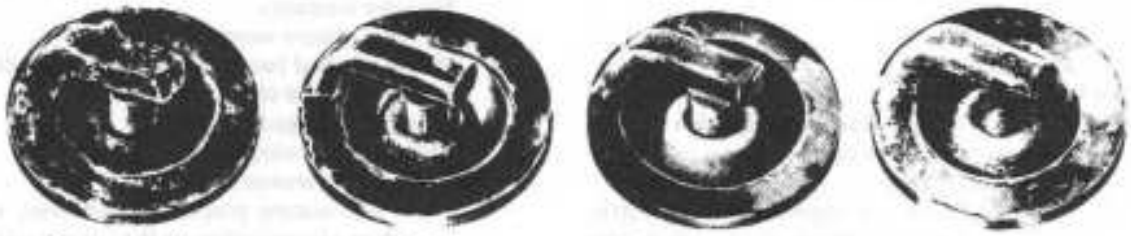


1. Terminal
2. Insulator
3. Cement
4. Gasket
5. Center Electrode
6. Side Electrode

Spark Plug Inspection

- Remove the spark plug and inspect the ceramic insulator.

Spark Plug Condition



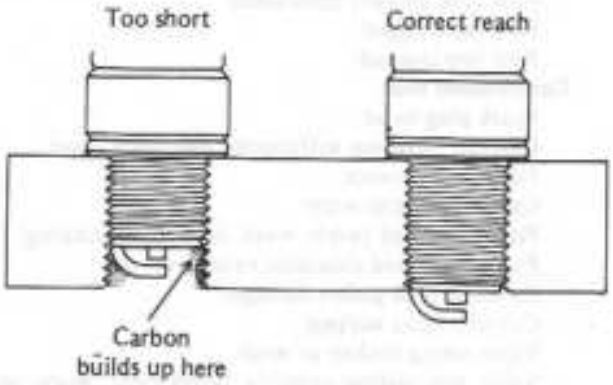
Carbon fouling | Oil fouling | Normal operation | Overheating

*Whether or not the right temperature plug is being used can be ascertained by noting the condition of the ceramic insulator around the electrode. A light brown color indicates the correct plug is being used. If the ceramic is white, the plug is operating at too high a temperature and it should be replaced with the next colder type.

CAUTION

- **If the spark plug is replaced with a type other than the standard plug, make certain the replacement plug has the same thread pitch and reach (length of threaded portion) and the same insulator type (regular type or projected type) as the standard plug.**
- **If the plug reach is too short, carbon will build up on the plug hole threads in the cylinder head, causing overheating and making it very difficult to insert the correct spark plug later.**
- **If the reach is too long, carbon will build up on the exposed spark plug threads causing overheating, preignition, and possibly burning a hole in the piston top. In addition, it may be impossible to remove the plug without damaging the cylinder head.**

Plug Reach



Standard Spark Plug Threads

Diameter:	**12 mm**
Pitch:	**1.25 mm**
Reach:	**19.0 mm**

NOTE

- *The heat range of the spark plug functions like a thermostat for the engine. Using the wrong type of spark plug can make the engine run too hot (resulting in engine damage) or too cold (with poor performance, misfiring, and stalling).*

Troubleshooting Guide

NOTE

- *This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties.*

Engine Doesn't Start, Starting Difficulty:

Starter motor not rotating:
- Starter lockout or neutral switch trouble
- Starter motor trouble
- Battery voltage low
- Relays not contacting or operating
- Starter button not contacting
- Wiring open or shorted
- Ignition switch trouble
- Engine stop switch trouble
- Fuse blown

Starter motor rotating but engine doesn't turn over:
- Starter motor clutch trouble

Engine won't turn over:
- Valve seizure
- Rocker arm seizure
- Cylinder, piston seizure
- Crankshaft seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Transmission gear or bearing seizure
- Camshaft seizure

No fuel flow:
- Fuel tap vacuum hose clogged
- Fuel tank air vent obstructed
- Fuel tap clogged
- Fuel line clogged
- Float valve clogged

Engine flooded:
- Fuel level in carburetor float bowl too high
- Float valve worn or stuck open
- Starting technique faulty
- (When flooded, crank the engine with the throttle fully open to allow more air to reach the engine.)

No spark; spark weak:
- Battery voltage low
- Spark plug dirty, broken, or maladjusted
- Spark plug cap or spark plug lead trouble
- Spark plug cap not in good contact
- Spark plug incorrect
- IC igniter trouble
- Neutral, starter lockout, or side stand switch trouble
- Pickup coil trouble
- Ignition coil trouble
- Ignition or engine stop switch shorted
- Wiring shorted or open
- Fuse blown

Compression Low:
- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston ring bad (worn, weak broken, or sticking)
- Piston ring/land clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

Poor Running or at Low Speed:

Spark weak:
- Battery voltage low
- Spark plug dirty, broken, or maladjusted
- Spark plug cap or spark plug lead 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
- Needle jet (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 gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

Other:
- IC igniter trouble
- Carburetors not synchronizing
- Vacuum piston doesn't slide smoothly
- Engine oil viscosity too high
- Drive train trouble
- Brake dragging
- Air suction valve trouble (US model)
- Vacuum switch valve trouble (US model)

Poor Running or No Power at High Speed:

Firing incorrect:
- Spark plug dirty, broken, or maladjusted
- Spark plug cap shorted or not in good contact
- Spark plug incorrect
- IC igniter trouble
- Pickup coil trouble
- Ignition coil trouble

Fuel/air mixture incorrect:
- Starter plunger stuck open
- Main jet clogged or wrong size
- Jet needle or needle jet worn
- Air jet clogged
- Fuel level in carburetor float bowl too high or too low
- Bleed holes of needle jet (air bleed pipe) clogged
- Air cleaner clogged, poorly sealed, or missing
- Air cleaner duct loose
- Water of foreign matter in fuel
- Carburetor holder loose
- Fuel tank air vent obstructed
- Fuel tap clogged
- Fuel line clogged

Compression low:
- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston ring bad (worn, weak, broken, or sticking)
- Piston ring/land clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface.)

Knocking:
- Carbon built up in combustion chamber
- Fuel poor quality or incorrect
- Spark plug incorrect
- IC igniter trouble

Miscellaneous:
Throttle valve won't fully open
Vacuum piston doesn't slide smoothly
Brake dragging
Clutch slipping
Overheating
Engine oil level too high
Engine oil viscosity too high
Drive train trouble
Air suction valve trouble
Vacuum switch valve trouble

Overheating:

Firing incorrect:
Spark plug, 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 loose
Compression high:
Carbon built up in combustion chamber
Engine load faulty:
Clutch slipping
Engine oil level too high
Engine oil viscosity too high
Drive train trouble
Brake dragging
Lubrication inadequate:
Engine oil level too low
Engine oil poor quality or incorrect
Gauge incorrect:
Water temperature gauge broken
Water temperature sensor broken
Coolant incorrect:
Coolant level too low
Coolant deteriorated
Cooling system component incorrect:
Radiator clogged
Thermostat trouble
Radiator cap trouble
Thermostatic fan switch trouble
Fan relay trouble
Fan motor broken
Fan blade damaged
Water pump not turning
Water pump impeller damaged

Over Cooling:

Gauge incorrect:
Water temperature gauge broken
Water temperature sensor broken
Cooling system component incorrect:
Thermostatic fan switch trouble
Thermostat trouble

Clutch Operation Faulty:

Clutch slipping:
Friction plate worn or warped
Steel plate worn or warped
Clutch spring broken or weak
Clutch slave cylinder 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 slave cylinder trouble
Clutch hub locknut loose

Gear Shifting Faulty:

Doesn't go into gear; shift pedal doesn't return:
Clutch not disengaging
Shift fork bent or seized
Gear stuck on the shaft
Shift return spring weak or broken
Shift return spring pin loose
Pawl spring broken
Shift mechanism arm broken
Jumps out of gear:
Shift fork worn
Gear groove worn
Gear dogs and/or dog holes worn
Shift drum groove worn
Neutral positioning lever spring weak or broken
Shift fork pin worn
Drive shaft, output shaft, and/or gear splines worn
Overshifts:
Neutral positioning lever 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 main bearing worn
Idler shaft sprocket worn or chipped
Camshaft chain tensioner trouble
Camshaft chain, sprocket, guide worn
Air suction valve damaged (US model)
Vacuum switch valve damaged (US model)
Idler shaft chain, sprocket, guide worn
Oil pump shaft chain, sprocket worn

Abnormal Drive Train Noise:

Clutch noise:
Weak or damaged rubber damper
Clutch housing/friction plate clearance excessive
Clutch housing gear worn

Transmission noise:
Bearings worn
Transmission gears worn or chipped
Metal chips jammed in gear teeth
Engine oil insufficient

Drive 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

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 holder mounting bolts loose
Steering stem head nut loose

Handlebar pulls to one side:
Frame bent
Wheel misalignment
Swing arm bent or twisted
Steering maladjusted
Front fork bent
Right/left fork legs unbalanced (oil level, ESCS setting)

Shock absorption unsatisfactory:
(Too hard)
Front fork oil excessive
Front fork oil viscosity too high
Rear shock absorber air pressure too high
Tire air pressure too high
Front fork ESCS mechanism trouble
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
Front fork ESCS mechanism trouble

Brake Doesn't Hold:

Air in the brake line
Pad or disc worn
Brake fluid leak
Disc warped

Contaminated pad
Brake fluid deteriorated
Primary or secondary cup damaged
Master cylinder scratched inside

Battery Discharged:

Battery faulty (e.g., plates sulphated, shorted through sedimentation, electrolyte level too low)
Battery leads making poor contact
Load excessive (e.g., bulb of excessive wattage)
Ignition switch trouble
Alternator trouble
Wiring faulty
Alternator belt loose

Battery Overcharged:

Alternator 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.

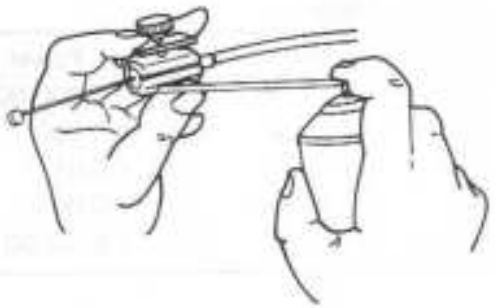
Throttle Inner Cables Lower End
Speedometer Inner Cable*

*Grease the lower part of the inner cable sparingly.

Cables: Lubricate with Motor Oil.

Choke Cable
Throttle Cables

Cable Lubrication



Unit Conversion Table

Prefixes for Units:

Prefix	Symbol	Power
mega	M	x 1,000,000
kilo	k	x 1,000
centi	c	x 0.01
mili	m	x 0.001
micro	μ	x 0.000001

Units of Mass:

kg	x	2.205	=	lb
g	x	0.03527	=	oz

Units of Volume:

L	x	0.2642	=	gal (US)
L	x	0.2200	=	gal (imp)
L	x	1.057	=	qt (US)
L	x	0.8799	=	qt (imp)
L	x	2.113	=	pint (US)
L	x	1.816	=	pint (imp)
mL	x	0.03381	=	oz (US)
mL	x	0.02816	=	oz (imp)
mL	x	0.06102	=	cu in

Units of Force:

N	x	0.1020	=	kg
N	x	0.2248	=	lb
kg	x	9.807	=	N
kg	x	2.205	=	lb

Units of Length:

km	x	0.6214	=	mile
m	x	3.281	=	ft
mm	x	0.03937	=	in

Units of Torque:

N-m	x	0.1020	=	kg-m
N-m	x	0.7376	=	ft-lb
N-m	x	8.851	=	in-lb
kg-m	x	9.807	=	N-m
kg-m	x	7.233	=	ft-lb
kg-m	x	86.80	=	in-lb

Units of Pressure:

kPa	x	0.01020	=	kg/cm^2
kPa	x	0.1450	=	psi
kPa	x	0.7501	=	cm Hg
kg/cm^2	x	98.07	=	kPa
kg/cm^2	x	14.22	=	psi
cm Hg	x	1.333	=	kPa

Units of Speed:

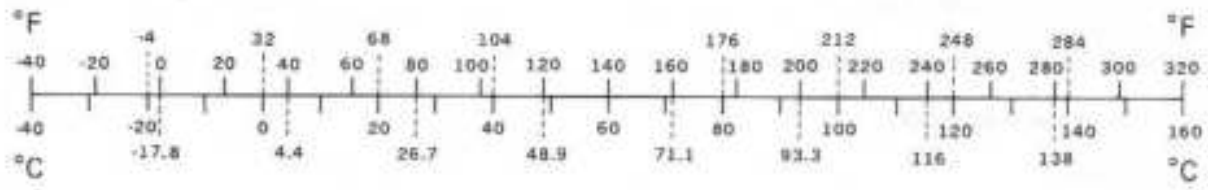
km/h	x	0.6214	=	mph

Units of Power:

kW	x	1.360	=	PS
kW	x	1.341	=	HP
PS	x	0.7355	=	kW
PS	x	0.9863	=	HP

Units of Temperature:

$$\frac{9\,(°C + 40)}{5} - 40 = °F \qquad \frac{5\,(°F + 40)}{9} - 40 = °C$$



MODEL APPLICATION

Year	Model	Beginning Frame No.
1987	ZX750-F1	JKAZXDF1□HB500001 or, ZX750F-000001

□ : This digit in the frame number changes from one machine to another.

KAWASAKI
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MOTORCYCLE GROUP

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