Kawasaki

Z750

Motorcycle Service Manual

Quick Reference Guide

General Information	1
Periodic Maintenance	2
Fuel System (DFI)	3
Cooling System	4
Engine Top End	5
Clutch	6
Engine Lubrication System	7
Engine Removal/Installation	8
Crankshaft/Transmission	9
Wheels/Tires	10
Final Drive	11
Brakes	12
Suspension	13
Steering	14
Frame	15
Electrical System	16
Appendix	17

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

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

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

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

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LIST OF ABBREVIATIONS

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

Read OWNER'S MANUAL before operating.

Foreword

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

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

For the duration of the warranty period, 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 vehicle:

- 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 Catalog or 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 system and assists in locating their chapters. Each chapter in turn has its own comprehensive Table of Contents.

The Periodic Maintenance Chart is located in the Periodic Maintenance 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 Periodic Maintenance 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 four 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 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.

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

Table of Contents

Before Servicing 1-2
Model Identification..... 1-7
General Specifications..... 1-8
Technical Information – Air Inlet System 1-10
Technical Information – New Ignition Interlock Sidestand 1-12
Technical Information – Tail/Brake Lights Employing LED 1-13
Technical Information – KAWASAKI LOW EXHAUST EMISSION SYSTEM 1-15
Unit Conversion Table 1-16

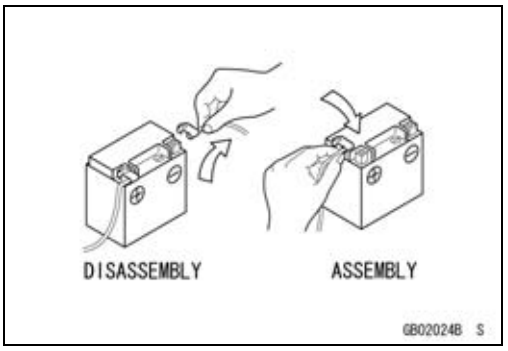
Before Servicing

Before starting to perform an inspection service or carry out a disassembly and reassembly operation on a motorcycle, read the precautions given below. To facilitate actual operations, notes, illustrations, photographs, cautions, and detailed descriptions have been included in each chapter wherever necessary. This section explains the items that require particular attention during the removal and reinstallation or disassembly and reassembly of general parts.

Especially note the following:

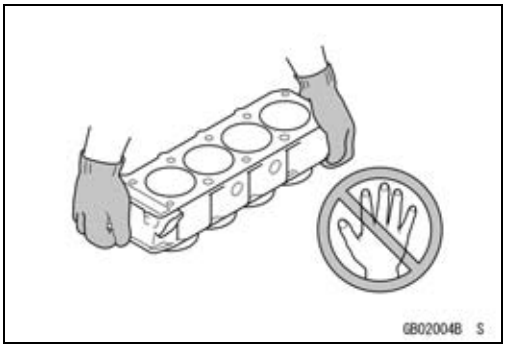
Battery Ground

Before completing any service on the motorcycle, disconnect the battery wires from the battery to prevent the engine from accidentally turning over. Disconnect the ground wire (–) first and then the positive (+). When completed with the service, first connect the positive (+) wire to the positive (+) terminal of the battery then the negative (–) wire to the negative terminal.



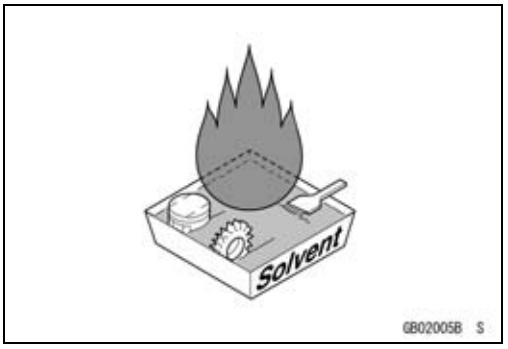
Edges of Parts

Lift large or heavy parts wearing gloves to prevent injury from possible sharp edges on the parts.



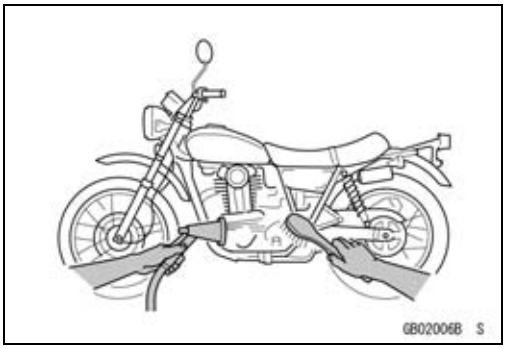
Solvent

Use a high flush point solvent when cleaning parts. High flush point solvent should be used according to directions of the solvent manufacturer.



Cleaning vehicle before disassembly

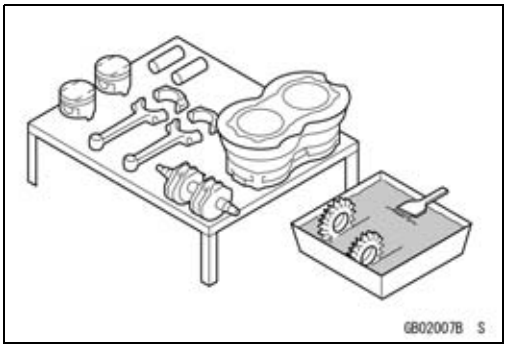
Clean the vehicle thoroughly before disassembly. Dirt or other foreign materials entering into sealed areas during vehicle disassembly can cause excessive wear and decrease performance of the vehicle.



Before Servicing

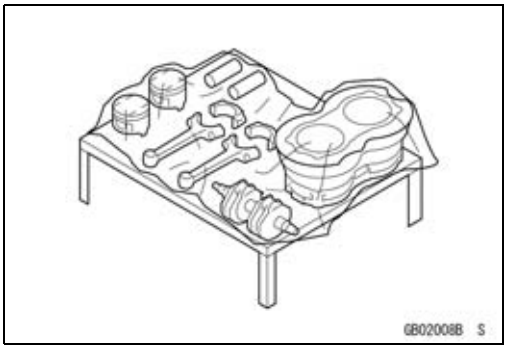
Arrangement and Cleaning of Removed Parts

Disassembled parts are easy to confuse. Arrange the parts according to the order the parts were disassembled and clean the parts in order prior to assembly.



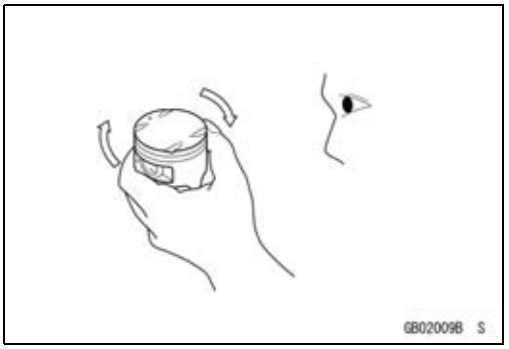
Storage of Removed Parts

After all the parts including subassembly parts have been cleaned, store the parts in a clean area. Put a clean cloth or plastic sheet over the parts to protect from any foreign materials that may collect before re-assembly.



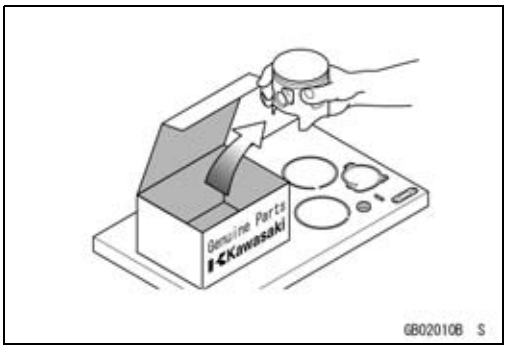
Inspection

Reuse of worn or damaged parts may lead to serious accident. Visually inspect removed parts for corrosion, discoloration, or other damage. Refer to the appropriate sections of this manual for service limits on individual parts. Replace the parts if any damage has been found or if the part is beyond its service limit.



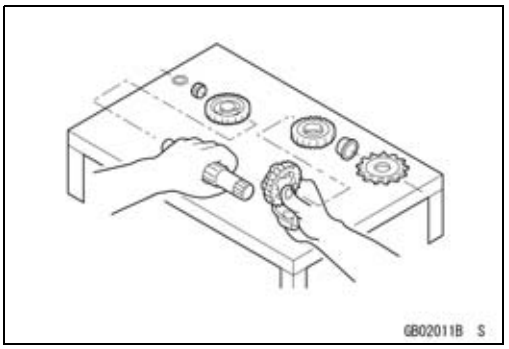
Replacement Parts

Replacement parts must be KAWASAKI genuine or recommended by KAWASAKI. Gaskets, O-rings, oil seals, grease seals, circlips or cotter pins must be replaced with new ones whenever disassembled.



Assembly Order

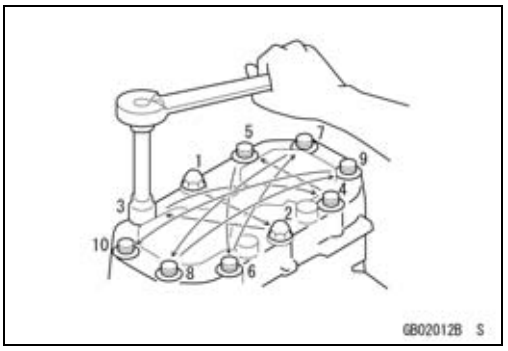
In most cases assembly order is the reverse of disassembly, however, if assembly order is provided in this Service Manual, follow the procedures given.



Before Servicing

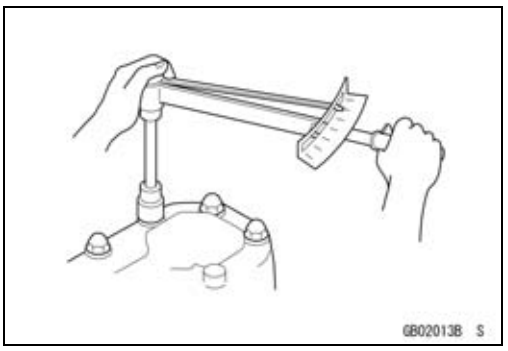
Tightening Sequence

Bolts, nuts, or screws must be tightened according to the specified sequence to prevent case warpage or deformation which can lead to malfunction. If the specified tightening sequence is not indicated, tighten the fasteners alternating diagonally.



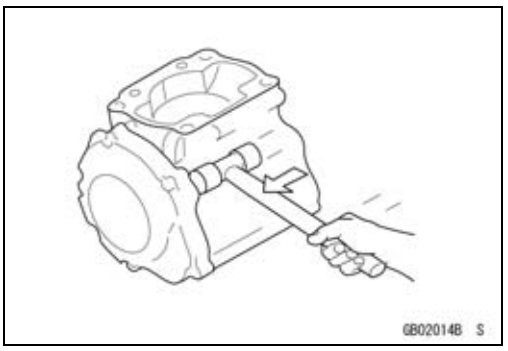
Tightening Torque

Incorrect torque applied to a bolt, nut, or screw may lead to serious damage. Tighten fasteners to the specified torque using a good quality torque wrench. Often, the tightening sequence is followed twice-initial tightening and final tightening with torque wrench.



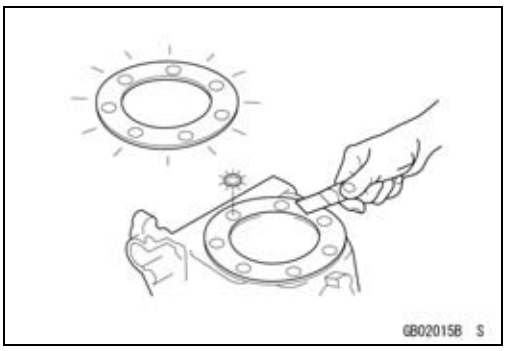
Force

Use common sense during disassembly and assembly, excessive force can cause expensive or hard to repair damage. When necessary, remove screws that have a non -permanent locking agent applied using an impact driver. Use a plastic-faced mallet whenever tapping is necessary.



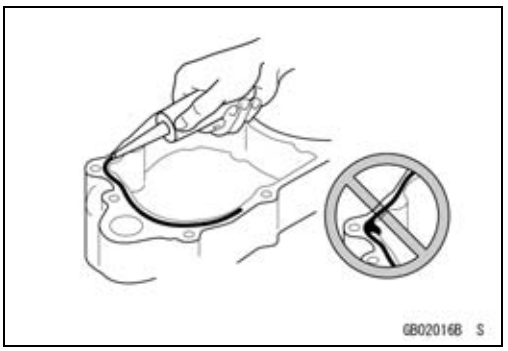
Gasket, O-ring

Hardening, shrinkage, or damage of both gaskets and O-rings after disassembly can reduce sealing performance. Remove old gaskets and clean the sealing surfaces thoroughly so that no gasket material or other material remains. Install new gaskets and replace used O-rings when re-assembling



Liquid Gasket, Locking Agent

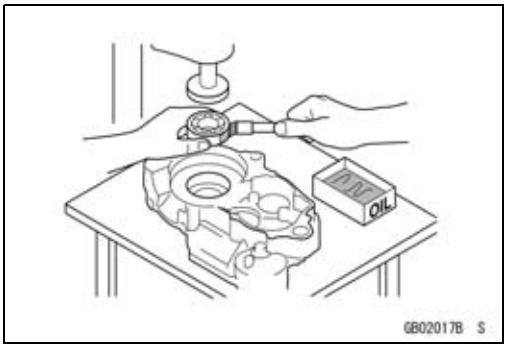
For applications that require Liquid Gasket or a Locking agent, clean the surfaces so that no oil residue remains before applying liquid gasket or locking agent. Do not apply them excessively. Excessive application can clog oil passages and cause serious damage.



Before Servicing

Press

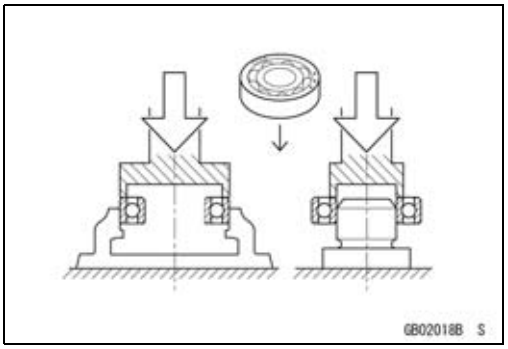
For items such as bearings or oil seals that must be pressed into place, apply small amount of oil to the contact area. Be sure to maintain proper alignment and use smooth movements when installing.



Ball Bearing and Needle Bearing

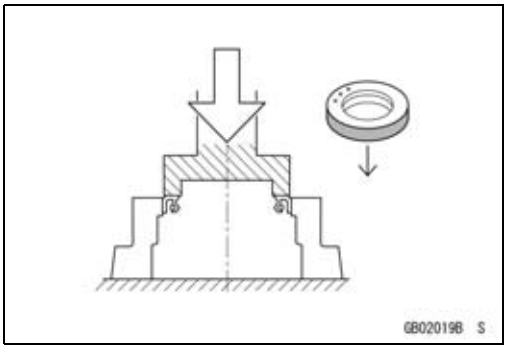
Do not remove pressed ball or needle unless removal is absolutely necessary. Replace with new ones whenever removed. Press bearings with the manufacturer and size marks facing out. Press the bearing into place by putting pressure on the correct bearing race as shown.

Pressing the incorrect race can cause pressure between the inner and outer race and result in bearing damage.



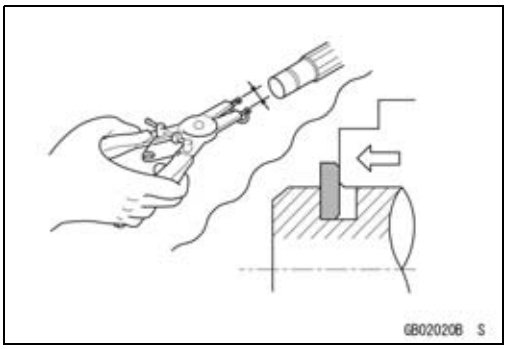
Oil Seal, Grease Seal

Do not remove pressed oil or grease seals unless removal is necessary. Replace with new ones whenever removed. Press new oil seals with manufacture and size marks facing out. Make sure the seal is aligned properly when installing.



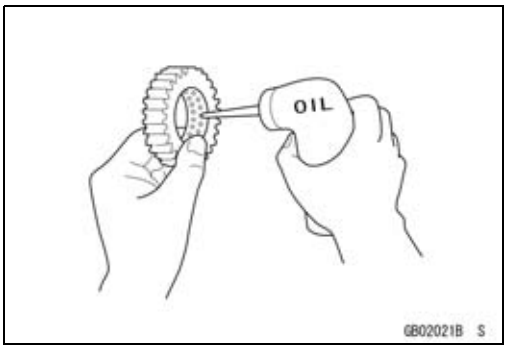
Circlips, Cotter Pins

Replace circlips or cotter pins that were removed with new ones. Install the circlip with its sharp edge facing outward and its chamfered side facing inward to prevent the clip from being pushed out of its groove when loaded. Take care not to open the clip excessively when installing to prevent deformation.



Lubrication

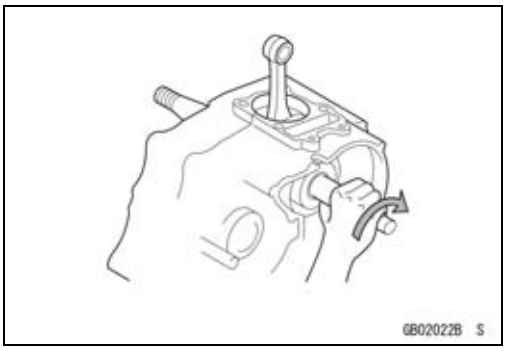
It is important to lubricate rotating or sliding parts during assembly to minimize wear during initial operation. Lubrication points are called out throughout this manual, apply the specific oil or grease as specified.



Before Servicing

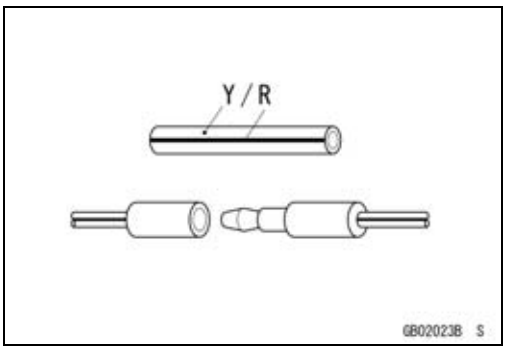
Direction of Engine Rotation

When rotating the crankshaft by hand, the free play amount of rotating direction will affect the adjustment. Rotate the crankshaft to positive direction (clockwise viewed from output side).



Electrical Wires

A two-color wire is identified first by the primary color and then the stripe color. Unless instructed otherwise, electrical wires must be connected to those of the same color.



Model Identification

ZR750–J1 Left Side View:

ZR750–J1 Right Side View:

General Specifications

Items		ZR750–J1
Dimensions:		
Overall length		2 080 mm (81.9 in.)
Overall width		780 mm (30.7 in.)
Overall height		1 055 mm (41.5 in.)
Wheelbase		1 425 mm (56.1 in.)
Road clearance		165 mm (6.5 in.)
Seat height		815 mm (32.1 in.)
Dry mass		195 kg (430.0 lb)
Curb mass:	Front	111 kg (244.8 lb)
	Rear	107 kg (235.9 lb)
Fuel tank capacity		18 L (5.0 US gal.)
Performance:		
Minimum turning radius		2.9 m (9.5 ft)
Engine:		
Type		4-stroke, DOHC, 4-cylinder
Cooling system		Liquid-cooled
Bore and stroke		68.4 × 50.9 mm (2.7 × 2.0 in.)
Displacement		748 mL (45.64 cu in.)
Compression ratio		11.3
Maximum horsepower		79 kW (107 PS) @10 500 r/min (rpm), (MY, AU) 80 kW (109 PS) @11 000 r/min (rpm) (HR) 78.2 kW (106 PS) @11 000 r/min (rpm)
Maximum torque		75 N·m (7.6 kgf·m, 55 ft·lb) @8 200 r/min (rpm), (HR) 73 N·m (7.4 kgf·m, 54 ft·lb) @8 200 r/min (rpm)
Carburetion system		FI (Fuel Injection) KEIHIN TTK34 × 4
Starting system		Electric starter
Ignition system		Battery and coil (transistorized)
Timing advance		Electronically advanced (digital igniter)
Ignition timing		From 10° BTDC @1 100 r/min (rpm) to 37° BTDC @5 800 r/min (rpm)
Spark plug		NGK CR9EK or ND U27ETR
Cylinder numbering method		Left to right, 1-2-3-4
Firing order		1-2-4-3
Valve timing:		
Inlet	Open	38° BTDC
	Close	66° ABDC
	Duration	284°
Exhaust	Open	57° BBDC
	Close	31° ATDC
	Duration	268°
Lubrication system		Forced lubrication (wet sump)
Engine oil:		
Type		API SE, SF or SG API SH or SJ with JASO MA

General Specifications

Items		ZR750–J1
Viscosity		SAE 10W-40
Capacity		3.8 L (4.0 US qt)
Drive Train:		
Primary reduction system:		
Type		Gear
Reduction ratio		1.714 (84/49)
Clutch type		Wet multi disc
Transmission:		
Type		6-speed, constant mesh, return shift
Gear ratios:	1st	2.571 (36/14)
	2nd	1.941 (33/17)
	3rd	1.555 (28/18)
	4th	1.333 (28/21)
	5th	1.200 (24/20)
	6th	1.095 (23/21)
Final drive system:		
Type		Chain drive
Reduction ratio		2.867 (43/15)
Overall drive ratio		5.382 @Top gear
Frame:		
Type		Tubular, diamond
Caster (rake angle)		24.5°
Trail		104 mm (4.1 in.)
Front tire:	Type	Tubeless
	Size	120/70 ZR17 M/C (58W)
Rear tire:	Type	Tubeless
	Size	180/55 ZR17 M/C (73W)
Front suspension:	Type	Telescopic fork (upside-down)
	Wheel travel	120 mm (4.7 in.)
Rear suspension:	Type	Swingarm (uni-trak)
	Wheel travel	126 mm (5.0 in.)
Brake Type:	Front	Dual discs
	Rear	Single disc
Electrical Equipment:		
Battery		12 V 8 Ah
Headlight:	Type	Semi-sealed beam
	Bulb	12 V 55 W × 2/55 W (Hi/Lo)
Tail/brake light		12 V 0.5/3.8 W (LED), (CA) 12 V 0.5/5W (LED)
Alternator:	Type	Three-phase AC
	Rated output	24 A/14 V @5 000 r/min (rpm)

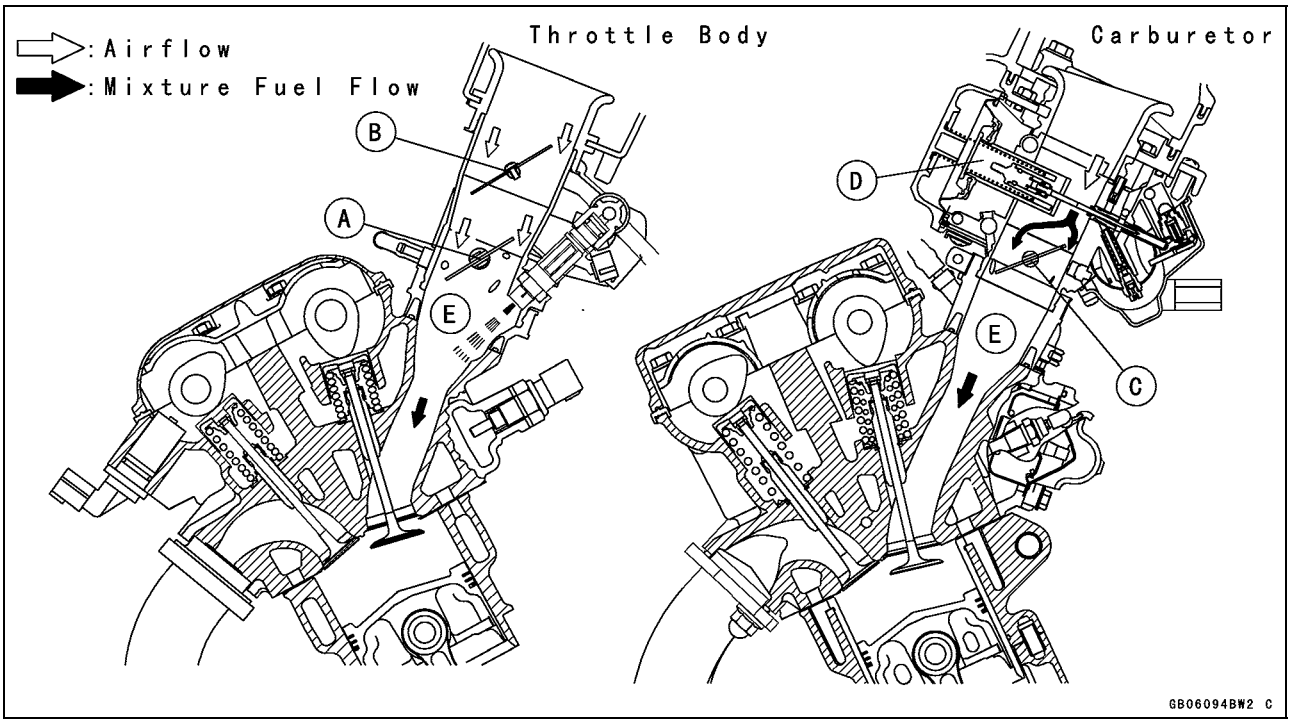
Specifications are subject to change without notice, and may not apply to every country.
(AU): Australia Model
(CA): Canada Model
(MY): Malaysia Model
(HR): with Honeycomb Catalytic Converter Model (Restricted model)

Technical Information – Air Inlet System

Subthrottle Control System

The ZR750–J1 employs large bore throttle bodies to increase power output. However, sudden changes in throttle opening can cause hesitation and jerky throttle response with a single butterfly valve in a large bore. Therefore two throttle valves are placed in each inlet tract, the main throttle valve located closest to the cylinder and a subthrottle valve placed further up the inlet tract. The main throttle valve is operated by the rider when the throttle grip is turned clockwise or counterclockwise, while the subthrottle valve is operated by a stepping motor controlled by the ECU. The subthrottle valve automatically adjusts air inlet to more precisely match engine demand, so that when the main throttle is opened quickly there is no hesitation or jerky response.

The subthrottle valves allow the fuel injection system to provide smooth throttle response, similar to that of a constant velocity carburetor, no matter how quickly the throttle is opened.



A. Main Throttle Valve
B. Subthrottle Valve
C. Throttle Valve
D. Vacuum Piston
E. Inlet Air

Technical Information – Air Inlet System

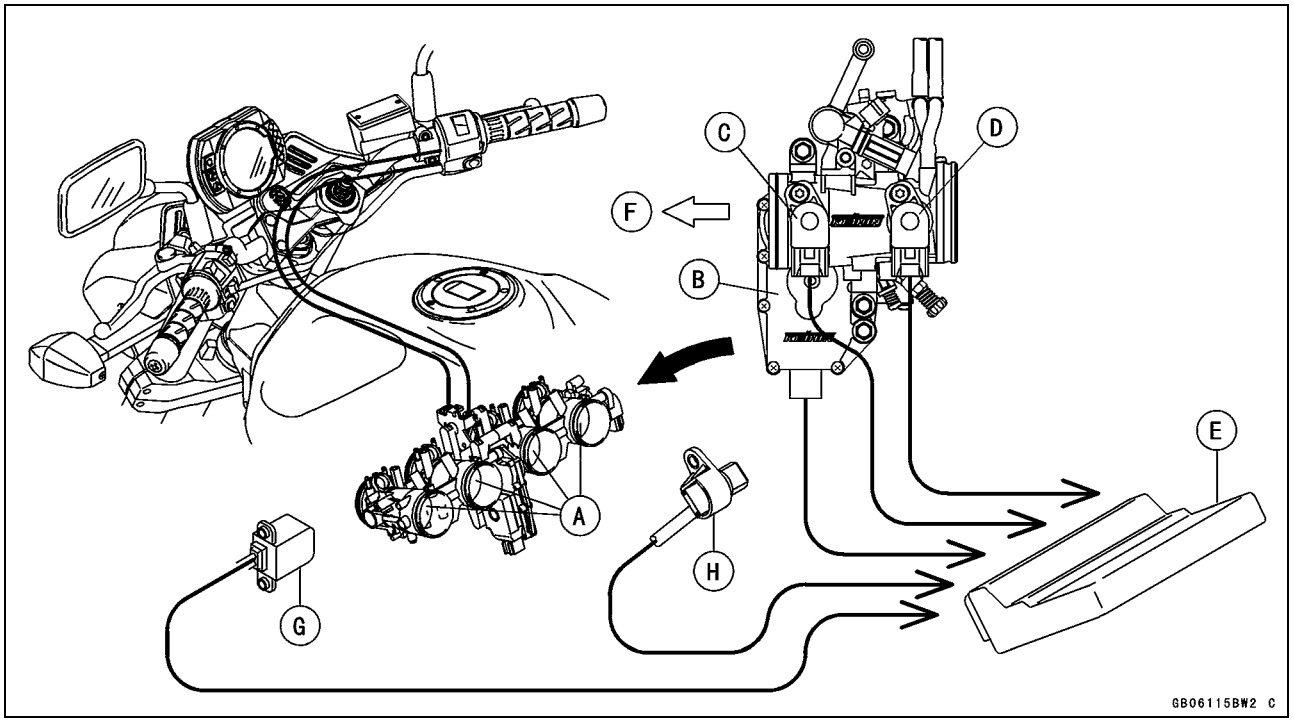
Operation

The subthrottle control system consists of the subthrottle valve, subthrottle valve actuator with a stepping motor built in it, ECU, and subthrottle sensor. The subthrottle valve is built in the each throttle body.

The subthrottle control system operates on the signal supplied from the ECU. The open/close operation of the subthrottle valve is performed by the subthrottle actuator which is controlled by the ECU to change the current direction into the motor of the subthrottle valve actuator.

The subthrottle sensor detects the subthrottle valve actuator movement by measuring voltage and the ECU determines the subthrottle valve angle based on the operation map.

When turning the ignition switch ON, every time the ECU automatically drives the subthrottle valve from fully closed position to fully opened position. The ECU memorizes these positions and turns back the subthrottle valve to the original point to confirm the subthrottle valve idling voltage.



A. Subthrottle Valves
B. Subthrottle Valve Actuator
C. Subthrottle Sensor
D. Main Throttle Sensor
E. ECU (Electric Control Unit)
F. Air Cleaner Side
G. Crankshaft Sensor
H. Speed Sensor

Technical Information – New Ignition Interlock Sidestand

Outline

The New Ignition Interlock Sidestand System applied to ZR750–J1 models that cannot function if gears are engaged and/or the sidestand is not lifted upward even though clutch lever pulled in, which differs from the traditional one. Refer to the tables below as to the engine starts and/or the driving at each condition.

New Ignition Interlock Sidestand System

	Side Stand	Gear Position	Clutch Lever	Engine Start	Engine Run
A	Up	Neutral	Released	Starts	Continue running
B	Up	Neutral	Pulled in	Starts	Continue running
C	Up	In Gear	Released	Doesn't start	Continue running
D	Up	In Gear	Pulled in	Starts	Continue running
E	Down	Neutral	Released	Starts	Continue running
F	Down	Neutral	Pulled in	Starts	Continue running
G	Down	In Gear	Released	Doesn't start	Stops
H	Down	In Gear	Pulled in	*Doesn't start*	*Stops*

Current Ignition Interlock Sidestand System

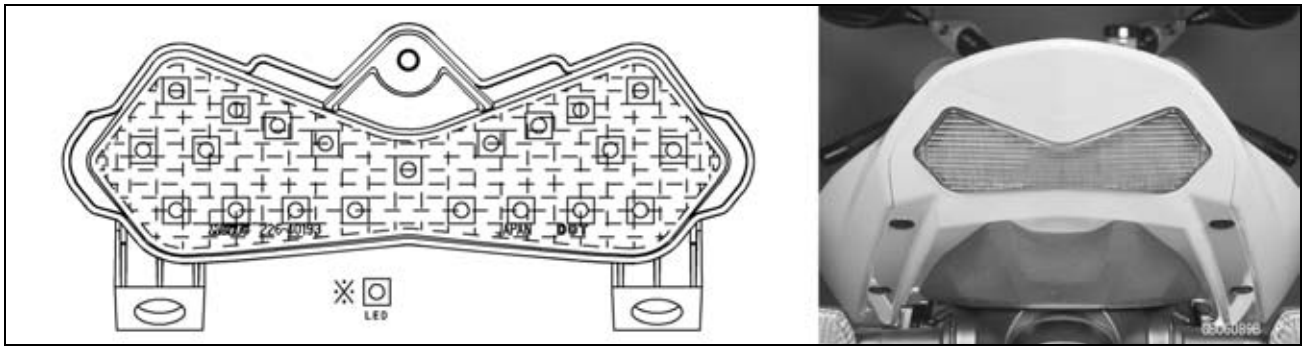
	Side Stand	Gear Position	Clutch Lever	Engine Start	Engine Run
A	Up	Neutral	Released	Starts	Continue running
B	Up	Neutral	Pulled in	Starts	Continue running
C	Up	In Gear	Released	Doesn't start	Continue running
D	Up	In Gear	Pulled in	Starts	Continue running
E	Down	Neutral	Released	Starts	Continue running
F	Down	Neutral	Pulled in	Starts	Continue running
G	Down	In Gear	Released	Doesn't start	Stops
H	Down	In Gear	Pulled in	*Start*	*Continue running*

Technical Information – Tail/Brake Lights Employing LED

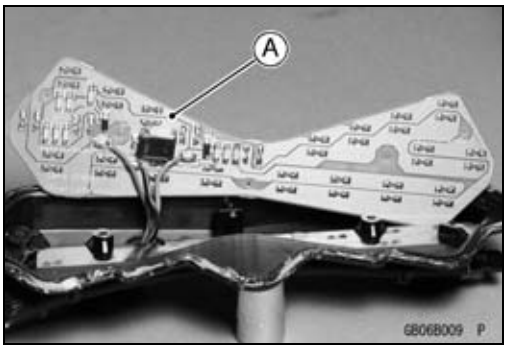
Outline

This model employs a tail/brake light containing 21 Light Emitting Diodes (LED). The LED emits luminous beams over a longer life span than those emitted from a traditional electric heated bulb (more than 5 times longer), uses lower voltage, expends lower wattage (approx. 1/5), and is quicker responsing.

Due Position of LED Installation

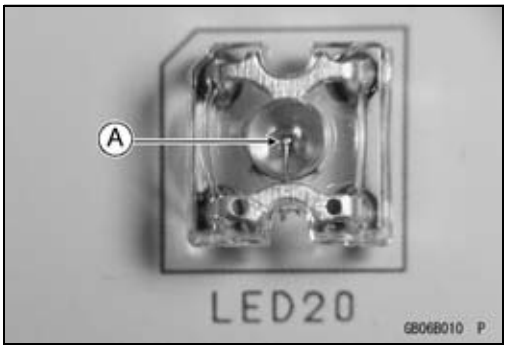


The resistors, the diodes, and the Zener diodes are mounted in the electronic circuits [A] of the LED, which supplies the steady current and voltage to the light.

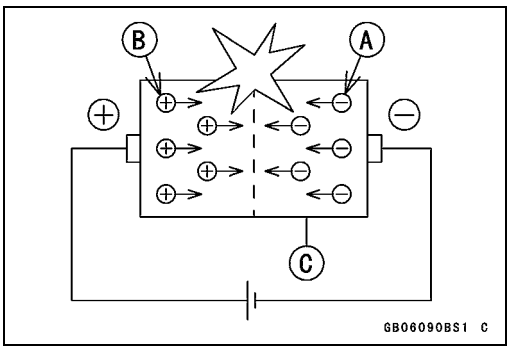


Light Emitting Diode (LED)

The Light Emitting Diode (LED) [A] is an element of semi-conductor diode that converts applied voltage to light.



The LED emits luminous beams by the collision of negative charge electrons [A] and positive charge holes [B] when applied the forward voltage and current to the PN junction diode [C].



Technical Information – Tail/Brake Lights Employing LED

The emitting color differs according to the materials of semi-conductors.

Materials of Semi-Conductor and Emitting Color

Materials of Semi-Conductor	Emitting Color
GaAsP, GaAlAs	Red
GaP	Green
GaN	Blue

Ga: Gallium
As: Arsenic
P: Phosphorus
N: Nitrogen
Al: Aluminum

Technical Information – KAWASAKI LOW EXHAUST EMISSION SYSTEM

Since the emission regulations become more severe, Kawasaki has adopted a type of simplified KAWASAKI LOW EXHAUST EMISSION SYSTEM (KLEEN), which have no catalyst protection system, according to each regulation of different countries.

The muffler with built-in catalyst has the same durability as the conventional muffler, however, do not use leaded gasoline and do not coast with the ignition system OFF. Running the engine without ignition damages catalyst.

Refer to the ZX900E Service Manual (Part No. 99924–1255) for more information about the KLEEN (theory, maintenance, and handling precautions), including the secondary air injection system.

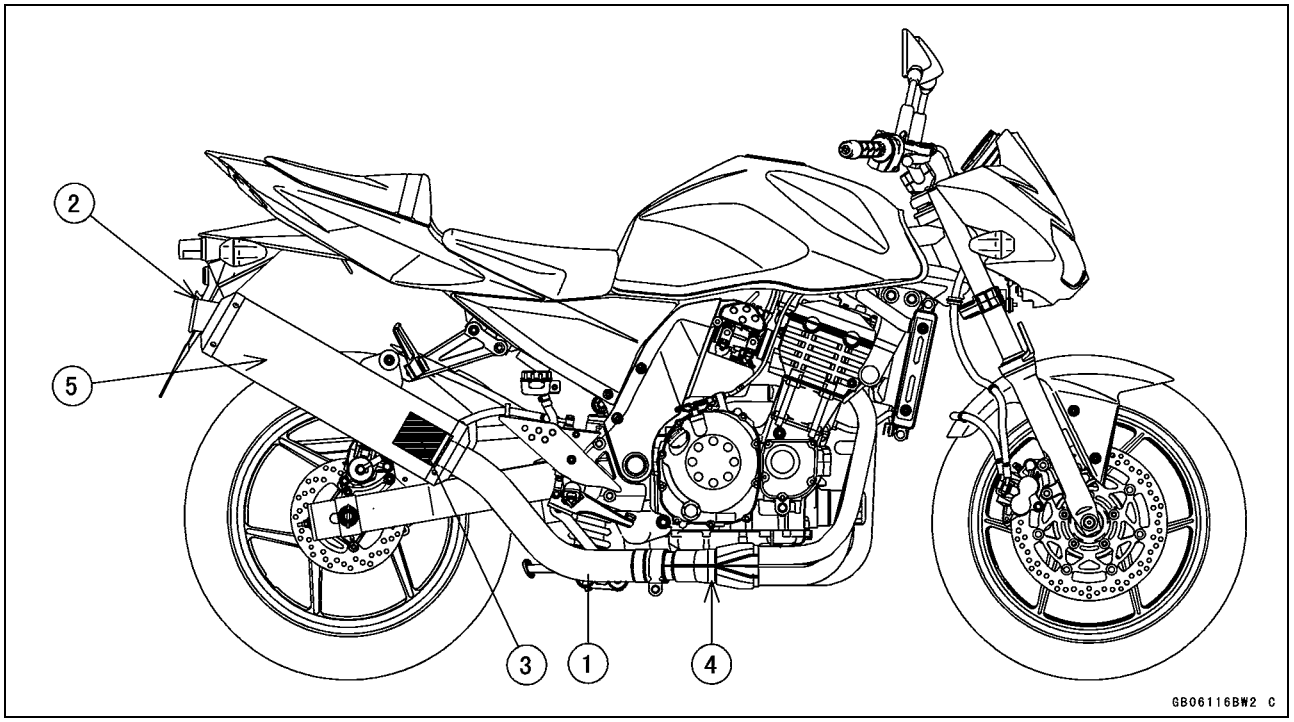
Honeycomb Type Catalytic Converter

○The converter is a three-way catalytic converter, and its surface is covered with alumina upon which platinum and rhodium are applied, and has a cylindrical metallic honeycomb structure made by bending a corrugated sheet and a flat sheet of stainless steel into a spiral of increasing diameter. The honeycomb structure is convenient for the catalytic converter because it has a large surface area but small size to react effectively and has low exhaust resistance. In addition, its inherent strength helps resist vibration, and has simple structure welded directly on the silencer.

○Generally, the temperature of the exhaust gas must be higher than activation temperature, so the converters are installed in the exhaust manifold rear end where the temperature of exhaust gas is still high. And, the converters will be activated even under low load conditions.

○After the exhaust gas is diluted with the secondary air injection, the catalytic converter works well because of rich oxygen to reduce CO, HC, and NO_x. Accordingly, we can keep the exhaust gas emission within regulation.

○This type of converter works more efficiently as a three-way catalytic converter to reduce CO, HC, and NO_x than the pipe type catalytic converter because of its more and denser catalysts.



1. Manifold
2. Silencer
3. Honeycomb Type Catalyst
4. Mark for Manifold
5. Mark for Silencer

Unit Conversion Table

Prefixes for Units:

Prefix	Symbol	Power
mega	M	× 1 000 000
kilo	k	× 1 000
centi	c	× 0.01
milli	m	× 0.001
micro	μ	× 0.000001

Units of Mass:

kg	×	2.205	=	lb
g	×	0.03527	=	oz

Units of Volume:

L	×	0.2642	=	gal (US)
L	×	0.2200	=	gal (imp)
L	×	1.057	=	qt (US)
L	×	0.8799	=	qt (imp)
L	×	2.113	=	pint (US)
L	×	1.816	=	pint (imp)
mL	×	0.03381	=	oz (US)
mL	×	0.02816	=	oz (imp)
mL	×	0.06102	=	cu in

Units of Force:

N	×	0.1020	=	kg
N	×	0.2248	=	lb
kg	×	9.807	=	N
kg	×	2.205	=	lb

Units of Length:

km	×	0.6214	=	mile
m	×	3.281	=	ft
mm	×	0.03937	=	in

Units of Torque:

N·m	×	0.1020	=	kgf·m
N·m	×	0.7376	=	ft·lb
N·m	×	8.851	=	in·lb
kgf·m	×	9.807	=	N·m
kgf·m	×	7.233	=	ft·lb
kgf·m	×	86.80	=	in·lb

Units of Pressure:

kPa	×	0.01020	=	kgf/cm²
kPa	×	0.1450	=	psi
kPa	×	0.7501	=	cmHg
kgf/cm²	×	98.07	=	kPa
kgf/cm²	×	14.22	=	psi
cmHg	×	1.333	=	kPa

Units of Speed:

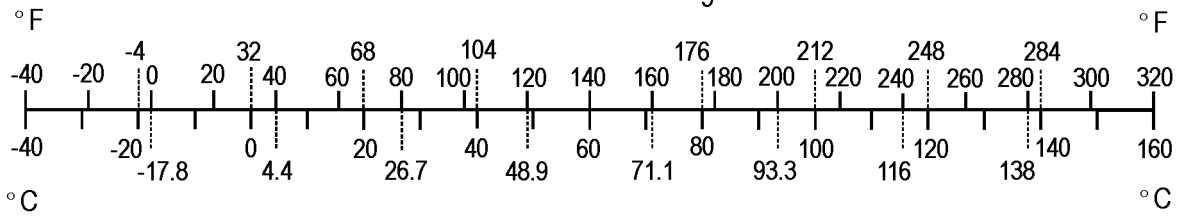
km/h	×	0.6214	=	mph

Units of Power:

kW	×	1.360	=	PS
kW	×	1.341	=	HP
PS	×	0.7355	=	kW
PS	×	0.9863	=	HP

Units of Temperature:

$\frac{9(°C+40)}{5} - 40 = °F$ $\qquad$ $\frac{5(°F+40)}{9} - 40 = °C$



Periodic Maintenance

Table of Contents

Periodic Maintenance Chart 2-2
Torque and Locking Agent..... 2-5
Specifications 2-10
Special Tools 2-12
Periodic Maintenance Procedures..... 2-13
Fuel System (DFI)..... 2-13
Fuel Hose and Connection Inspection..... 2-13
Throttle Control System Inspection..... 2-14
Idle Speed Inspection 2-15
Engine Vacuum Synchronization Inspection..... 2-15
Air Cleaner Element Cleaning..... 2-18
Cooling System..... 2-20
Radiator Hose and Connection Inspection..... 2-20
Coolant Change..... 2-20
Engine Top End 2-22
Air Suction Valve Inspection 2-22
Valve Clearance Inspection 2-22
Clutch..... 2-23
Clutch Adjust Inspection 2-23
Engine Lubrication System..... 2-24
Engine Oil Change..... 2-24
Oil Filter Change..... 2-25
Wheels/Tires..... 2-25
Tire Wear Inspection..... 2-25
Air Pressure Inspection..... 2-26
Final Drive..... 2-27
Drive Chain Slack Inspection..... 2-27
Drive Chain Slack Adjustment 2-27
Drive Chain Wear Inspection 2-28
Drive Chain Lubrication..... 2-29
Brakes..... 2-29
Brake Pad Wear Inspection 2-29
Rear Brake Light Switch Inspection/Adjustment..... 2-29
Caliper Fluid Seal Damage..... 2-30
Caliper Dust Seal/Friction Boot Damage..... 2-30
Master Cylinder Inspection (Visual Inspection)..... 2-31
Brake Fluid Level Inspection..... 2-32
Brake Fluid Change 2-32
Brake Line Bleeding..... 2-34
Brake Hoses and Connections Inspection..... 2-36
Suspension..... 2-37
Front Fork Oil Leak Check..... 2-37
Rear Shock Absorber Oil Leak Check..... 2-37
Steering 2-37
Steering Inspection 2-37
Steering Adjustment..... 2-37
Steering Stem Bearing Lubrication..... 2-38
Electrical System 2-39
Spark Plug Inspection..... 2-39
General Lubrication 2-41
Lubrication 2-41
Nut, Bolt, and Fastener Tightness .. 2-42
Tightness Inspection..... 2-42

2-2 PERIODIC MAINTENANCE

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.**

Periodic Inspection:

FREQUENCY	Whichever comes first	* ODOMETER READING km × 1000 (mile × 1000)							
	⬇	1	6	12	18	24	30	36	See
INSPECTION	Every	(0.6)	(4)	(7.5)	(12)	(15)	(20)	(24)	Page
Steering system:									
Steering play - inspect	year	●		●		●		●	2–37
Steering stem bearings - lubricate	2 years					●			2–38
Brake system:									
Brake hoses leak - inspect		●	●	●	●	●	●	●	2–36
Brake hoses damage - inspect		●	●	●	●	●	●	●	2–36
Brake hose installation condition - inspect		●	●	●	●	●	●	●	2–36
Brake operation (effectiveness, play-drag) - inspect	year	●	●	●	●	●	●	●	—
Brake pad wear - inspect #			●	●	●	●	●	●	2–29
Brake fluid level - inspect	6 month	●	●	●	●	●	●	●	2–32
Brake light switch operation - inspect		●	●	●	●	●	●	●	2–29
Wheels and tires:									
Tire air pressure - inspect	year			●		●		●	2–26
Wheels/tires damage - inspect				●		●		●	2–25
Tire tread wear, abnormal wear - inspect				●		●		●	2–25
Wheel bearings damage - inspect	year			●		●		●	—
Suspensions:									
Front forks/rear shock absorber operation (damping and smooth stroke)				●		●		●	—
Front forks/rear shock absorber oil leak - inspect	year			●		●		●	2–37
Rocker arm wear - inspect				●		●		●	—
Rocker arm operation				●		●		●	—
Tie rods operation				●		●		●	—
Drive train:									
Drive chain lubrication condition - inspect #	1 000 km								2–29
Drive chain slack - inspect #	1 000 km								2–27
Drive chain wear - inspect #				●		●		●	2–28
Drive chain guide wear - inspect				●		●		●	—
Electrical system:									
Spark plug condition - inspect				●		●		●	2–39
Lights and switches operation	year			●		●		●	—
Headlight aiming - inspect	year			●		●		●	—
Side stand switch operation	year			●		●		●	—

Periodic Maintenance Chart

FREQUENCY / INSPECTION	Whichever comes first ➡ / ⬇ Every	* ODOMETER READING km × 1000 (mile × 1000) 1 (0.6)	6 (4)	12 (7.5)	18 (12)	24 (15)	30 (20)	36 (24)	See Page
Engine stop switch operation	year			●		●		●	—
Fuel system (DFI):									
Air cleaner element - clean #					●				2–18
Throttle control system (play, smooth return, no drag) - inspect	year	●		●		●		●	2–14
Choke operation - inspect	year	●		●		●		●	—
Engine vacuum synchronization - inspect				●		●		●	2–15
Engine vacuum synchronization - adjust		When necessary							2–15
Idle speed - inspect		●		●		●		●	2–15
Fuel hoses leak - inspect		●		●		●		●	2–13
Fuel hoses damage - inspect	year	●		●		●		●	2–13
Fuel hoses installation condition - inspect	year			●		●		●	2–13
Cooling system:									
Coolant level - inspect		●		●		●		●	—
Radiator hoses leak - inspect	year	●		●		●		●	2–20
Radiator hoses damage - inspect	year	●		●		●		●	2–20
Radiator hoses installation condition - inspect	year	●		●		●		●	2–20
Engine top end:									
Air suction system damage - inspect				●		●		●	2–22
Intake/exhaust valve clearance - inspect						●			2–22
Chassis:									
Chassis parts lubricate	year			●		●		●	2–41
Bolts and nuts tightness - inspect		●		●		●		●	2–42

2-4 PERIODIC MAINTENANCE

Periodic Maintenance Chart

Periodic Replacement Parts:

FREQUENCY / CHANGE/REPLACE ITEM	Whichever comes first ⬇ Every	* ODOMETER READING km × 1000 (mile × 1000) ➡ 1 (0.6)	12 (7.5)	24 (15)	36 (24)	48 (30)	See Page
Brake hoses	4 years					●	2–36
Brake fluid (front and rear)	2 years			●		●	2–32
Rubber parts of master cylinder and caliper	4 years					●	2–30
Spark plug			●	●	●	●	2–39
Air cleaner element #					●		2–18
Engine oil #	year	●	●	●	●	●	2–24
Oil filter	year	●	●	●	●	●	2–25
Fuel hoses	4 years					●	2–13
Coolant	3 years				●		2–20
Radiator hoses and O-rings	3 years				●		2–20

: Service more frequently when operating in severe conditions; dusty, wet, muddy, high speed or frequent starting/stopping.

Throttle control system inspection: Inspection of throttle grip play.

Torque and Locking Agent

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

Letters used in the “Remarks” column mean:
- **AL:** Tighten the two clamp bolts alternately two times to ensure even tightening torque.
- **G:** Apply grease to the threads.
- **L:** Apply a non-permanent locking agent to the threads.
- **MO:** Apply molybdenum disulfide grease oil solution.
- **O:** Apply oil to the threads and seating surface.
- **R:** Replacement Parts
- **S:** Tighten the fasteners following the specified sequence.
- **Si:** Apply silicone grease (ex. PBC grease).
- **SS:** Apply silicone sealant.

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.

Basic Torque for General Fasteners

Threads dia. (mm)	Torque		
	N·m	kgf·m	ft·lb
5	3.4 ~ 4.9	0.35 ~ 0.50	30 ~ 43 in·lb
6	5.9 ~ 7.8	0.60 ~ 0.80	52 ~ 69 in·lb
8	14 ~19	1.4 ~1.9	10.0 ~ 13.5
10	25 ~ 34	2.6 ~ 3.5	19.0 ~ 25
12	44 ~ 61	4.5 ~ 6.2	33 ~ 45
14	73 ~ 98	7.4 ~ 10.0	54 ~ 72
16	115 ~ 155	11.5 ~ 16.0	83 ~ 115
18	165 ~ 225	17.0 ~ 23.0	125 ~ 165
20	225 ~ 325	23 ~ 33	165 ~ 240

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Fuel System:				
Inlet air pressure sensor bolt	12	1.2	104 in·lb	
Water temperature sensor	25	2.5	18	
Vehicle-down sensor bolts	2.0	0.20	17 in·lb	
Camshaft position sensor bolt	12	1.2	104 in·lb	
Camshaft position sensor rotor bolt	12	1.2	104 in·lb	L
Throttle cable plate bolt	6.0	0.60	52 in·lb	
Throttle body assy holder clamp bolts	2.0	0.20	17 in·lb	
Choke link holder screws	2.1	0.21	18 in·lb	
Delivery pipe screws	3.4	0.35	30 in·lb	
Bypass screws	0.2	0.02	1.7 in·lb	
Air cleaner duct holder screws	3.8	0.39	34 in·lb	
Air cleaner housing mounting bolts	9.8	1.0	87 in·lb	
Air cleaner duct clamp bolts	2.0	0.20	17 in·lb	
Air cleaner housing screws	1.2	0.12	10 in·lb	
Air cleaner housing tapping screws	1.2	0.12	10 in·lb	
Speed sensor bolt	6.9	0.70	62 in·lb	L
Fuel pump bolts	9.8	1.0	87 in·lb	L, S
Fuel level sensor bolts	6.9	0.70	62 in·lb	
Cooling System:				
Radiator hose clamp screws	2.0	0.20	17 in·lb	
Radiator fan bolts	8.3	0.85	74 in·lb	
Water pump impeller bolt	9.8	1.0	87 in·lb	
Water pump cover bolts	11	1.1	95 in·lb	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Water pump drain bolt	11	1.1	95 in·lb	
Water pipe bolts	11	1.1	95 in·lb	
Thermostat housing ground bolt	7.0	0.70	61 in·lb	
Thermostat bracket bolt	7.0	0.70	61 in·lb	
Radiator upper bolts	7.0	0.70	61 in·lb	
Radiator lower bolts	7.0	0.70	61 in·lb	
Radiator screen bolt	7.0	0.70	61 in·lb	
Coolant reserve tank screws	7.0	0.70	61 in·lb	
Radiator fan switch	18	1.8	13	
Water temperature sensor	25	2.5	18	
Engine Top End:				
Air suction valve cover bolts	9.8	1.0	87 in·lb	
Cylinder head cover bolts	9.8	1.0	87 in·lb	S
Camshaft cap bolts	12	1.2	104 in·lb	S
Camshaft chain guide bolts	12	1.2	104 in·lb	S
Cylinder head bolts (M10 new bolts)	54	5.5	40	MO, S (Washer)
Cylinder head bolts (M10 used bolts)	49	5.0	36	MO, S (Washer)
Cylinder head bolts (M6)	12	1.2	104 in·lb	S
Cylinder head jacket plugs	22	2.2	16	L
Throttle body holder bolts	13	1.3	113 in·lb	
Throttle body assy holder clamp bolts	2.0	0.20	17 in·lb	
Camshaft sensor bolt	12	1.2	104 in·lb	
Camshaft sensor rotor bolt	12	1.2	104 in·lb	L
Front camshaft chain guide bolt (upper)	25	2.5	18	
Front camshaft chain guide bolt (lower)	12	1.2	104 in·lb	
Rear camshaft chain guide bolt	25	2.5	18	
Camshaft chain tensioner mounting bolts	11	1.1	95 in·lb	
Camshaft chain tensioner cap bolt	28	2.9	21	
Spark plugs	13	1.3	113 in·lb	
Coolant drain plug (Cylinder)	9.8	1.0	87 in·lb	
Exhaust pipe manifold holder nuts	17	1.7	12	
Muffler body clamp bolt	17	1.7	12	
Muffler body mounting bolt	30	3.0	22	
Crankshaft sensor cover bolts	11	1.1	95 in·lb	
Clutch:				
Clutch lever clamp bolts	7.8	0.80	69 in·lb	
Clutch cover mounting bolts	11	1.1	95 in·lb	
Oil filler plug	1.5	0.15	13 in·lb	
Clutch spring bolts	8.8	0.90	78 in·lb	
Clutch hub nut	135	14	100	R

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Engine Lubrication:				
Oil filler plug	1.5	0.15	13 in·lb	
Engine oil drain bolt	20	2.0	14	
Oil filter	31	3.2	23	EO, R
Holder mounting bolt	76	7.8	56	EO
Oil pan bolts	11	1.1	95 in·lb	
Oil pipe holder bolts	13	1.3	113 in·lb	L
Oil pressure relief valve	15	1.5	11	L
Oil pressure switch	15	1.5	11	SS
Oil pressure switch terminal bolt	1.5	0.15	13 in·lb	
Water pump cover bolts	11	1.1	95 in·lb	
Water pump impeller bolt	9.8	1.0	87 in·lb	
Coolant drain plug (water pump)	11	1.1	95 in·lb	
Oil passage plugs	20	2.0	14	L
Engine Removal/Installation:				
Adjusting collar locknut	49	5.0	36	S
Engine mounting bolts and nuts	44	4.5	33	S
Front engine bracket bolts	44	4.5	33	S
Rear engine bracket bolts	25	2.5	18	S
Engine ground cable terminal bolt	9.8	1.0	87 in·lb	
Crankshaft/Transmission:				
Breather plate bolts	9.8	1.0	87 in·lb	L
Crankcase bolts (M9, L = 81 mm)	42	4.3	31	MO, S
Crankcase bolts (M9, L = 95 mm)	42	4.3	31	MO, S
Crankcase bolts (M8)	27	2.8	20	S
Crankcase bolts (M7)	20	2.0	14	S
Crankcase bolts (M6)	12	1.2	104 in·lb	S
Starter motor clutch bolts	12	1.2	104 in·lb	L
Oil pipe holder bolts	13	1.3	113 in·lb	L
Shift drum bearing holder bolt	13	1.3	113 in·lb	L
Shift drum bearing holder screw	5.4	0.55	48 in·lb	L
Connecting rod big end nuts	see the text	←	←	←
Crankshaft position rotor bolt	40	4.1	30	
Oil pressure switch	15	1.5	11	SS
Oil pressure switch terminal bolt	1.5	0.15	13 in·lb	
Oil passage plugs	20	2.0	14	L
Crankshaft sensor cover bolts	11	1.1	95 in·lb	
Shift pedal mounting bolt	34	3.5	25	L
Gear positioning lever bolt	12	1.2	104 in·lb	
Shift shaft return spring pin	29	3.0	22	L
Shift drum cam holder bolt	12	1.2	104 in·lb	L
Footpeg bracket bolts	34	3.5	25	L
Shift lever bolt	6.9	0.70	61 in·lb	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Tie-rod locknuts	6.9	0.70	61 in·lb	
Neutral switch	15	1.5	11	
Wheels/Tires:				
Front axle clamp bolt	34	3.5	25	
Front axle	108	11	80	
Rear axle nut	108	11	80	
Final Drive:				
Engine sprocket nut	125	13	92	MO
Engine sprocket cover bolts	9.8	1.0	87 in·lb	
Speed sensor cover bolts	6.9	0.70	61 in·lb	L
Rear sprocket nuts	59	6.0	43	
Speed sensor bolt	6.9	0.70	61 in·lb	L
Brakes:				
Bleed valves	7.8	0.80	69 in·lb	
Brake hose banjo bolts	25	2.5	18	
Brake lever pivot bolt	1.0	0.10	9 in·lb	
Brake lever pivot bolt locknut	5.9	0.60	52 in·lb	
Front brake reservoir cap screws	1.0	0.10	9 in·lb	
Front brake light switch screws	1.0	0.10	9 in·lb	
Front master cylinder clamp bolts	8.8	0.90	78 in·lb	S
Front caliper mounting bolts	34	3.5	25	
Front brake disc mounting bolts	27	2.8	20	L
Rear brake disc mounting bolts	27	2.8	20	L
Rear Caliper mounting bolts	25	2.5	18	
Rear master cylinder mounting bolts	25	2.5	18	
Rear master cylinder push rod locknut	18	1.8	13	
Suspension:				
Front fork clamp bolts (Upper)	20	2.0	14	
Front fork clamp bolts (Lower)	20	2.0	14	AL
Front fork top plugs	25	2.5	18	
Front fork bottom Allen bolts	30	3.1	22	L
Front axle clamp bolt	34	3.5	25	
Rear shock absorber nuts (upper and lower)	34	3.5	25	
Swingarm pivot shaft nut	108	11	80	
Swingarm pivot shaft locknut	98	10	72	
Uni-trak				
Rocker arm nut	34	3.5	25	
Tie-rod nuts	59	6.0	43	
Steering:				
Steering stem head bolt	108	11	80	
Steering stem nut	27	2.8	20	
Handlebar clamp bolts	25	2.5	18	S

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Handlebar lower clamp nuts	34	3.5	25	
Switch housing screws	3.5	0.36	31 in·lb	
Front fork clamp bolts (Upper)	20	2.0	14	
Front fork clamp bolts (Lower)	20	2.0	14	AL
Frame:				
Footpeg bracket bolts	34	3.5	25	L
Side stand bolt	44	4.5	33	
Side stand switch bolt	8.8	0.90	78 in·lb	
Front fender bracket bolts	8.8	0.90	78 in·lb	L
Front fender bolts	3.9	0.40	35 in·lb	L
Side stand bracket bolts	49	5.0	36	
Electrical System:				
Spark plugs	13	1.3	113 in·lb	
Alternator rotor bolt	110	11	81	
Stator coil bolts	11	1.1	95 in·lb	
Alternator lead holding plate bolt	11	1.1	95 in·lb	L
Engine ground cable terminal bolt	9.8	1.0	87 in·lb	
Alternator cover bolts	11	1.1	95 in·lb	
Crankshaft sensor cover bolts	11	1.1	95 in·lb	
Crankshaft sensor bolts	5.9	0.60	52 in·lb	
Camshaft position sensor bolt	12	1.2	104 in·lb	L
Timing rotor bolt	39	4.0	29	
Starter motor mounting bolts	11	1.1	95 in·lb	
Switch housing screws	3.5	0.36	31 in·lb	
Radiator fan switch	18	1.8	13	
Water temperature sensor	25	2.5	18	SS
Oil pressure switch	15	1.5	11	SS
Oil pressure switch terminal bolt	1.5	0.15	13 in·lb	G
Neutral switch	15	1.5	11	
Speed sensor bolt	6.9	0.70	61 in·lb	
Fuel level sensor bolts	6.9	0.70	61 in·lb	
Front brake light switch screw	1.0	0.10	9 in·lb	
Meter mounting screws	1.2	0.12	10 in·lb	
Tail/brake light mounting screws	1.2	0.12	10 in·lb	
License plate light mounting screws	1.2	0.12	10 in·lb	
Headlight mounting bolts	5.9	0.60	52 in·lb	
Starter lockout switch screws	–	–	–	L
Starter motor clutch bolts	12	1.2	104 in·lb	L
Starter relay cable terminal bolts	3.9	0.40	35 in·lb	L
Regulator/rectifier bolts	6.9	0.70	61 in·lb	
Regulator/rectifier bracket bolts	6.9	0.70	61 in·lb	
Speed sensor cover bolts	6.9	0.70	61 in·lb	L
Side stand switch bolt	8.8	0.90	78 in·lb	

Specifications

Item	Standard	Service Limit
Fuel System:		
Throttle grip free play	2 ~ 3 mm (0.08 ~ 0.12 in.)	– – –
Idle speed	1 100 ±50 r/min (rpm)	– – –
Bypass screws (turn out)	2 ±1/4 (for reference)	– – –
Engine vacuum	29.7 ±1.333 kPa (225 ±10 mmHg)	– – –
Air cleaner element	Paper filter	– – –
Cooling System:		
Coolant:		
Type (recommended)	Permanent type of antifreeze	– – –
Color	Green	– – –
Mixed ratio	Soft water 50%, Coolant 50%	– – –
Freezing point	–35°C (–31°F)	– – –
Total amount	2.9 L (3.1 US qt)	– – –
Engine Top End:		
Valve clearance:		
Inlet	0.15 ~ 0.24 mm (0.0059 ~ 0.0094 in.)	– – –
Exhaust	0.22 ~ 0.31 mm (0.0087 ~ 0.0122 in.)	– – –
Clutch:		
Clutch lever free play	2 ~ 3 mm (0.08 ~ 0.12 in.)	– – –
Engine Lubrication System:		
Engine oil:		
Type	API SE, SF or SG API SH or SJ with JASO MA	– – –
Viscosity	SAE 10W-40	– – –
Capacity	3.1 L (3.3 US qt) (when filter is not removed)	– – –
	3.3 L (3.5 US qt) (when filter is removed)	– – –
	3.8 L (4.0 US qt) (when engine is completely dry)	– – –
Level	Between upper and lower level lines (after idling or running)	– – –
Wheels/Tires:		
Tread depth:		
Front		
BRIDGESTONE	3.4 mm (0.13 in.)	1 mm (0.04 in.) 1.6 mm (0.06 in.) (AT, CH, DE)
Rear		
BRIDGESTONE	5.8 mm (0.23 in.)	Up to 130 km/h (80 mph): 2 mm (0.08 in.) Over 130 km/h (80 mph): 3 mm (0.12 in.)

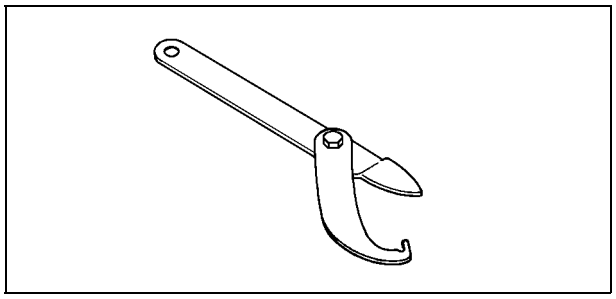
Specifications

Item	Standard	Service Limit
Air pressure: (when cold)		
Front	Up to 180 kg (397 lb) load: 250 kPa (2.5 kgf/cm², 36 psi)	– – –
Rear	Up to 180 kg (397 lb) load: 290 kPa (2.9 kgf/cm², 42 psi)	– – –
Final Drive:		
Drive chain slack	25 ~ 35 mm (1.0 ~ 1.4 in.)	– – –
Drive chain 20-link length	317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)	323 mm (12.7 in.)
Brakes:		
Brake fluid:		
Grade	DOT4	– – –
Brake pad lining thickness:		
Front	4.5 mm (0.18 in.)	1 mm (0.04 in.)
Rear	5 mm (0.20 in.)	1 mm (0.04 in.)
Brake light timing:		
Front	Pulled ON	– – –
Rear	ON after about 10 mm (0.39 in.) of pedal travel	– – –
Electrical System:		
Spark plug gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 mm)	– – –

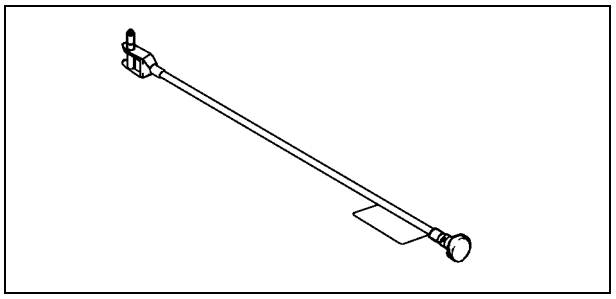
AT: Republic of Austria
CH: Swiss Confederation
DE: Federal Republic of Germany

Special Tools

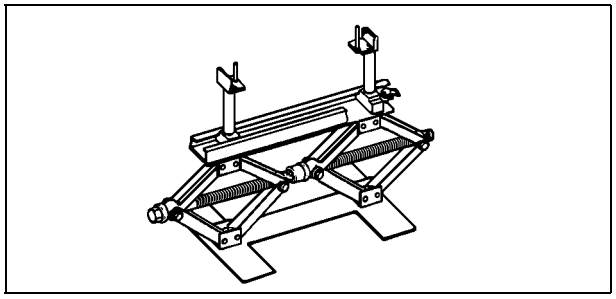
Steering Stem Nut Wrench:
57001–1100



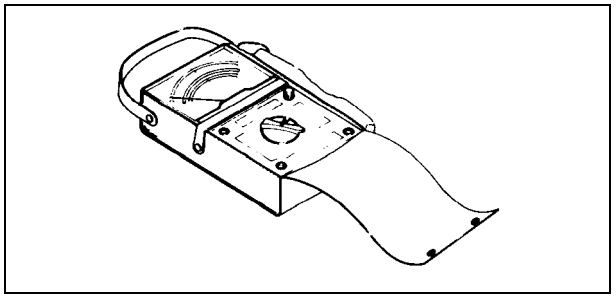
Pilot Screw Adjuster, C:
57001–1292



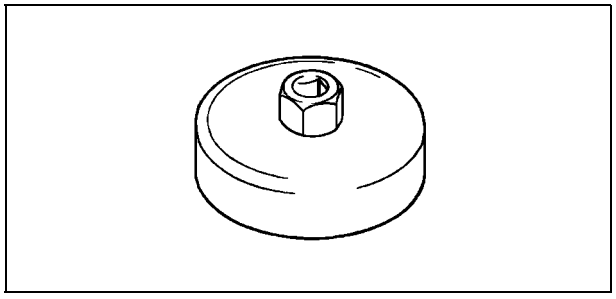
Jack:
57001–1238



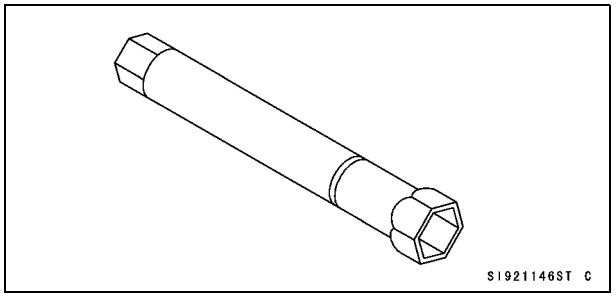
Hand Tester:
57001–1394



Oil Filter Wrench:
57001–1249



Spark Plug Wrench (Owner's Tool):
92110–1146



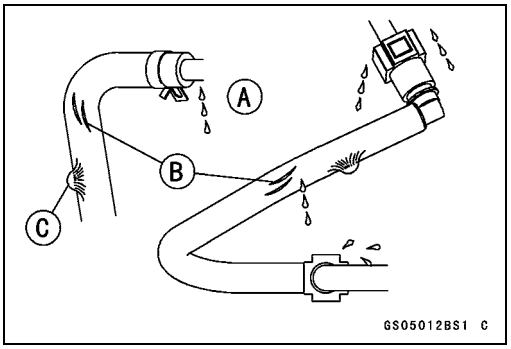
Periodic Maintenance Procedures

Fuel System (DFI)

Fuel Hose and Connection Inspection

○The fuel hoses are designed to be used throughout the motorcycle's life without any maintenance, however, if the motorcycle is not properly handled, the high pressure inside the fuel line can cause fuel to leak [A] or the hose to burst. Remove the fuel tank (see Fuel System (DFI) chapter) and check the fuel hoses.

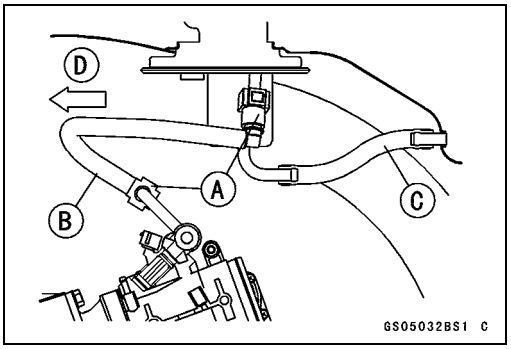
★Replace the hose if any fraying, cracks [B] or bulges [C] are noticed.



- Check that the hoses are routed according to Cable, Wire, and Hose Routing section in the Appendix chapter.

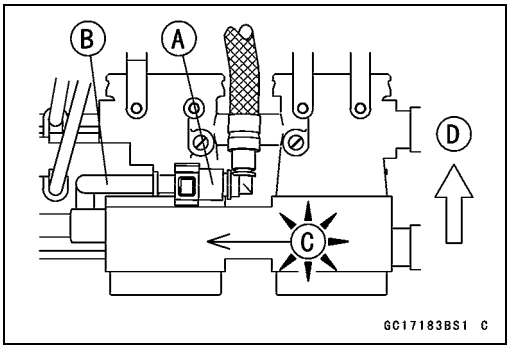
★Replace the hose if it has been sharply bent or kinked.

Hose Joints [A]
Pump Outlet Hose [B]
Pump Inlet Hose [C]
Front [D]



- Insert the pump outlet hose joint [A] straight onto the delivery pipe [B] until the hose joint clicks [C].

Front [D]

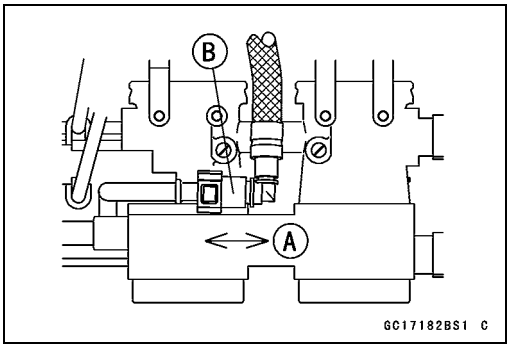


- Push and pull [A] the hose joint [B] back and forth more than two times, and make sure it is locked and doesn't come off. When the hose joint is correctly installed, it should slide on the delivery pipe about 5 mm (0.20 in.).

★If it does not slide, reinstall the hose joint.

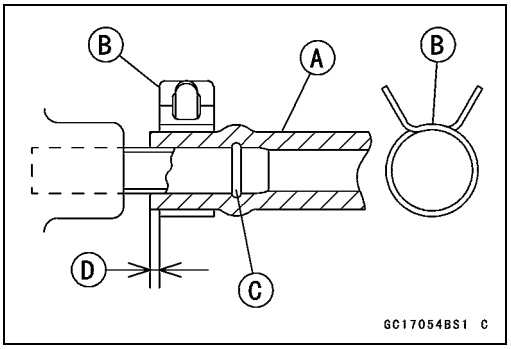
⚠ WARNING

Make sure the hose joint is installed correctly on the delivery pipe by sliding the joint, or the fuel could leak.



- Check that the inlet hose [A] is onto the pipe fully and the plate clamps [B] are installed beyond the raised rib [C].

1 ~ 2 mm (0.039 ~ 0.079 in.) [D]



Periodic Maintenance Procedures

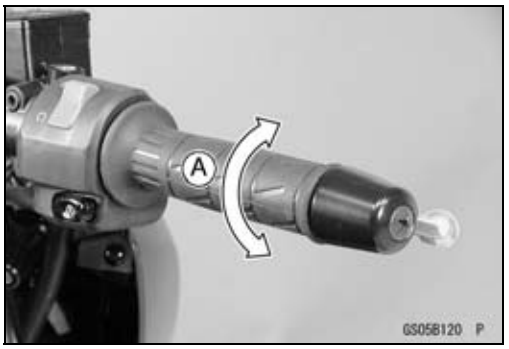
Throttle Control System Inspection

Throttle Grip Play Inspection

- Check the throttle grip free play [A].

★If the free play is incorrect, adjust the throttle cable.

Throttle Grip Free Play
Standard: 2 ~ 3 mm (0.08 ~ 0.12 in.)



- Check that the throttle grip moves smoothly from close to full open, and the throttle closes quickly and completely in all steering positions by the return spring.

★If the throttle grip doesn't return properly, check the throttle cable routing, grip free play, and cable damage. Then lubricate the throttle cable.

- Run the engine at the idle speed, and turn the handlebar all the way to the right and left to ensure that the idle speed doesn't change.

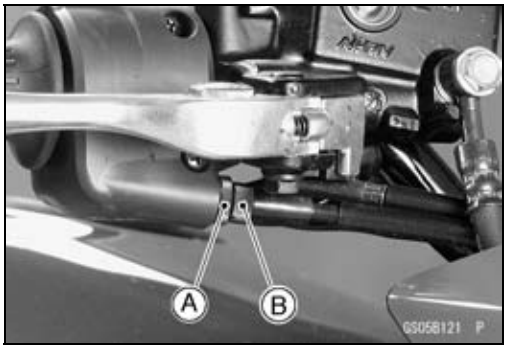
★If the idle speed increases, check the throttle grip free play and the cable routing.

★If necessary, adjust the throttle cable as follows.

- Loosen the locknut [A].
- Turn the adjuster [B] until the proper amount of free play can be obtained.
- Tighten the locknut against the adjuster securely.

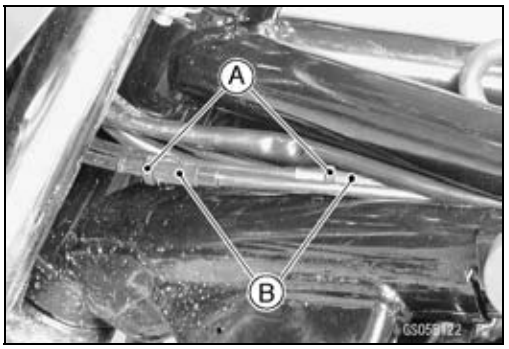
★If the throttle grip free play can not be adjusted with the adjuster, use the adjusters in the middle of the throttle cables.

- Loosen the locknut, and screw the adjuster at the upper end of the accelerator cable all the way in.
- Tighten the locknut against the adjuster securely.
- Remove the fuel tank (see Fuel System (DFI) chapter).



- Loosen the locknuts [A], and turn the lower adjusters [B] until the proper amount of throttle grip free play is obtained.
- Tighten the locknuts against the adjusters securely.

★If the throttle grip free play can not be adjusted with the lower adjusters, use the adjuster at the upper end of the cable again.



Periodic Maintenance Procedures

Idle Speed Inspection

- Start the engine and warm it up thoroughly.
- With the engine idling, turn the handlebar to both sides.

★If handlebar movement changes the idle speed, the throttle cables may be improperly adjusted or incorrectly routed or damaged. Be sure to correct any of these conditions before riding (see Cable, Wire, and Hose Routing section in the Appendix chapter).

⚠ WARNING

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

- Check idle speed.

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

Idle Speed
Standard: 1 100 ±50 r/min (rpm)

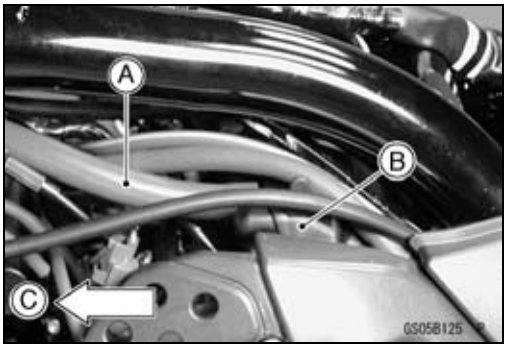
Engine Vacuum Synchronization Inspection

NOTE

○*These procedures are explained on the assumption that the inlet and exhaust systems of the engine are in good condition.*

- Situate the motorcycle so that it is vertical.
- Remove the fuel tank (see Fuel System (DFI) chapter).
- Pull off the vacuum hoses and the rubber cap(s) from the right fitting of each throttle body.
- Pull off the vacuum switch valve hose (thick) [A] from the air cleaner housing [B].

Front [C]

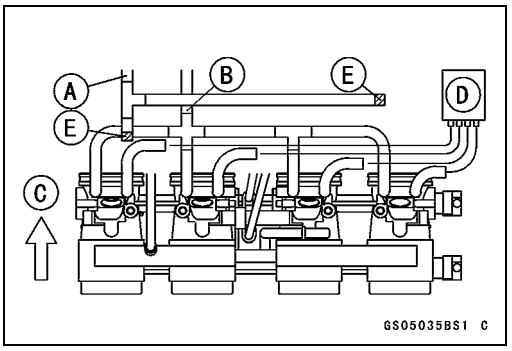


CAUTION

Do not remove the inlet air pressure sensor hoses on the left fitting of each throttle body.

- Connect a commercially available vacuum gauge to these right fittings of the throttle body as shown.
- Connect a highly accurate tachometer to one of the stick coil primary leads.
- Plug:

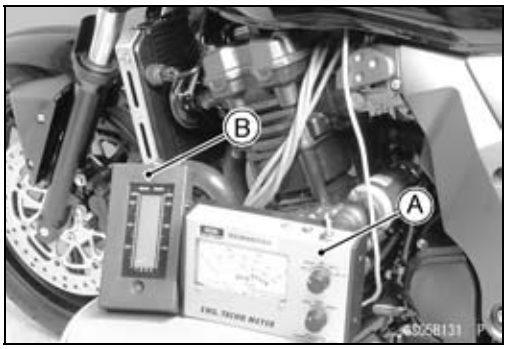
Vacuum Switch Valve Hose (thick) and its Air Cleaner Housing Hole
Vacuum Hoses of Throttle Assy (see the next figure)
Vacuum Switch Valve Hose (small) [A]
Inlet Air Pressure Sensor Hose [B]
Front [C]
Vacuum Gauge [D]
Plugs [E]



Periodic Maintenance Procedures

- Install the fuel tank (see Fuel System (DFI) chapter).
- Start the engine and warm it up thoroughly.
- Check the idle speed.
  Tachometer [A]

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



CAUTION

Do not measure the idle speed by the tachometer of the meter unit.

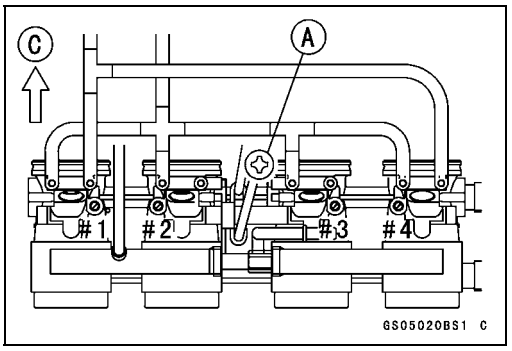
★While idling the engine, inspect the engine vacuum, using the vacuum gauge [B].

Engine Vacuum
Standard: 29.7 ±1.333 kPa (225 ±10 mmHg) at Idle Speed 1 100 ±50 r/min (rpm)

★If any vacuum is not within the specifications, first synchronize the #3 and #4 throttle valves to the #1 and #2 throttle valves by using the center adjusting screw [A].

Special Tool - Pilot Screw Adjuster, C: 57001–1292 [B]

Front [C]



Example:
#1: 165 mmHg
#2: 190 mmHg
#3: 170 mmHg
#4: 200 mmHg

- With the engine at the correct idle speed, equalize the highest vacuum of #3 and #4 (example 200 mmHg) to the highest vacuum of #1 and #2 (example 190 mmHg) by turning the center adjusting screw.

NOTE

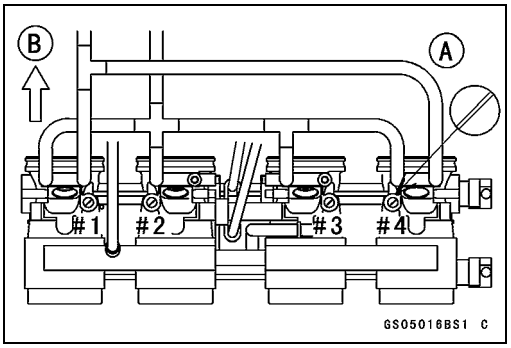
○*After adjustment, the final vacuum measurement between the highest throttle valves may not be 200 mmHg (in this example). The goal is to have the highest two vacuums between the left (1 and 2) and right (3 and 4) banks be the same.*

- Open and close the throttle after each measurement and adjust the idle speed as necessary.
- Once the throttle valves have been synchronized, inspect the main throttle sensor's output voltage to ensure proper operation (procedure is at the end of this section).

Periodic Maintenance Procedures

★If any one vacuum measurement is out of the standard measurement after synchronization, adjust the bypass screws [A].
Front [B]

Special Tool - Pilot Screw Adjuster, C: 57001–1292



- Adjust the lowest vacuum between #1 and #2 to the highest of #1 and #2.
- Adjust the lowest vacuum between #3 and #4 to the highest of #3 and #4.
- Open and close the throttle valves after each measurement and adjust the idle speed as necessary.
- Inspect the vacuums as before.

★If all vacuums are within the specification, finish the engine vacuum synchronization.
★If any vacuum can not be adjusted within the specification, remove the bypass screws #1 ~ #4 and clean them.

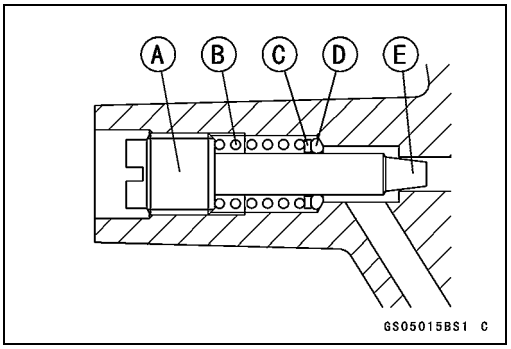
○Turn in the bypass screw and count the number of turns until it seats fully but not tightly. Record the number of turns.

Torque - Bypass Screw: 0.2 N·m (0.02 kgf·m, 1.7 in·lb)

CAUTION
Do not over tighten them. They could be damaged, requiring replacement.

- Remove the bypass screw [A], spring [B], washer [C] and O-ring [D].

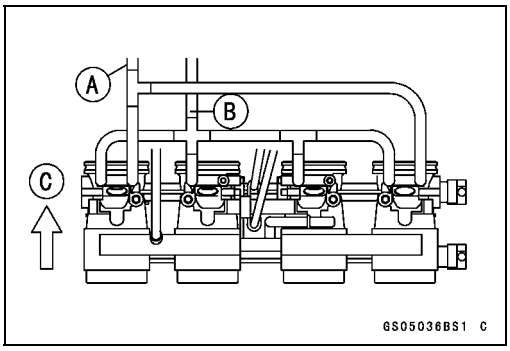
○Check the bypass screw and its hole for carbon deposits.
★If any carbon accumulates, wipe the carbon off the bypass screw and the hole, using a cotton pad penetrated with a high-flash point solvent.
○Replace the O-ring with a new one.
○Check the tapered portion [E] of the bypass screw for wear or damage.
★If the bypass screw is worn or damaged, replace it.



- Turn in the bypass screw until it seats fully but not tightly.

Torque - Bypass Screw: 0.2 N·m (0.02 kgf·m, 1.7 in·lb)

Periodic Maintenance Procedures



- Back out the same number of turns counted when first turned in. This is to set the screw to its original position.

NOTE

○*A throttle body has different "turns out" of the bypass screw for each individual unit. When setting the bypass screw, use the "turns out" determined during disassembly. Use the specifications in this manual only if the original number is unknown.*

- Repeat the same procedure for other bypass screws.
- Repeat the synchronization.

★If the vacuums are correct, check the output voltage of the main throttle sensor (see Output Voltage Inspection of Main Throttle Sensor in the Fuel System (DFI) chapter).

Main Throttle Sensor Output Voltage
Connections to ECU
Meter (+) → Y/W lead (terminal 2)
Meter (–) → BR/BK lead (terminal 14)
Standard:
0.99 ~ 1.03 V DC (at idle throttle opening)

★If the output voltage is out of the range, check the throttle input voltage (see Input Voltage Inspection of Main Throttle Sensor in the Fuel System (DFI) chapter).

- Remove the vacuum gauge hoses and install the vacuum hoses and rubber caps on the original position as shown.
  Vacuum Switch Valve Hose (small) [A]
  Inlet Air Pressure Sensor Hose [B]
  Front [C]

Air Cleaner Element Cleaning

NOTE

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

○*After riding through rain or on muddily roads, the element should be cleaned immediately.*

⚠ WARNING

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

CAUTION

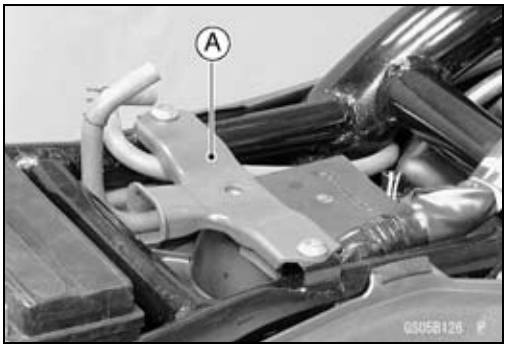
If dirt gets through into the engine, excessive engine wear and possibly engine damage will occur.

⚠ WARNING

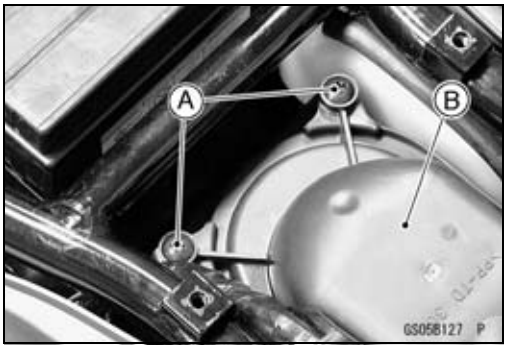
Clean the element in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light.
Because of the danger of highly flammable liquids, do not use gasoline or a low flash-point solvent to clean the element.

Periodic Maintenance Procedures

- Remove the fuel tank (see Fuel System (DFI) chapter).
- Remove the fuel tank bracket bolts and bracket [A].

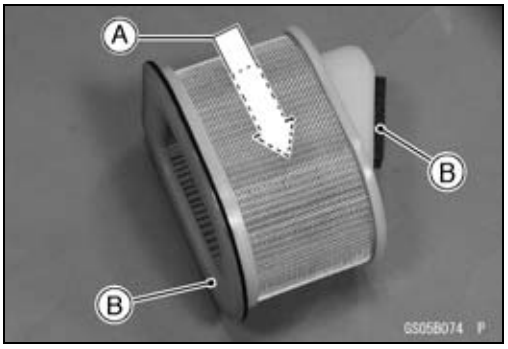


- Remove:
  Air Cleaner Duct Holder Screws [A]
- Remove the air cleaner duct holder [B] backward.



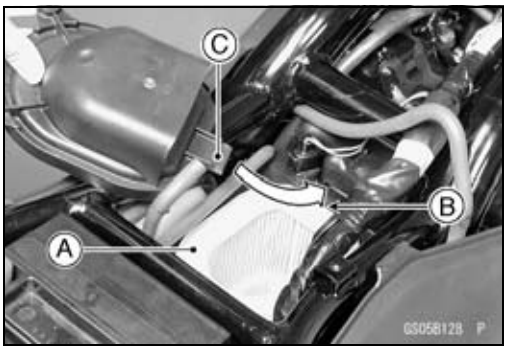
- Clean the element by tapping it lightly to loosen dust.
- Blow away the remaining dust by applying compressed air [A] from the outside to the inside (from the clean side to the dirty side).
- Visually inspect the element for no tears or no breaks and inspect the sponge gaskets [B] also.

★If the element or gasket has any tears or breaks, replace the element.



- Install the element [A] with the flat side [B], facing forwards.
- Fit the tongue [C] of the air cleaner duct holder into the slot of the housing the air cleaner duct holder.

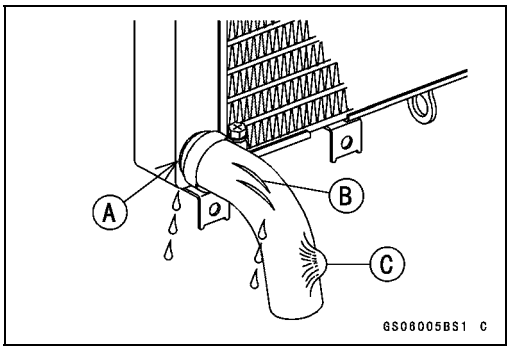
Torque - Air Cleaner Duct Holder Screws: 3.8 N·m (0.39 kgf·m, 34 in·lb)



Periodic Maintenance Procedures

Cooling System

Radiator Hose and Connection Inspection



○The high pressure inside the radiator hose can cause coolant to leak [A] or the hose to burst if the line is not properly maintained. Visually inspect the hoses for signs of deterioration. Squeeze the hoses. A hose should not be hard and brittle, nor should it be soft or swollen.

★Replace the hose if any fraying, cracks [B] or bulges [C] are noticed.

● Check that the hoses are securely connected and clamps are tightened correctly.

Torque - Radiator Hose Clamp Screws: 2.0 N·m (0.20 kgf·m, 17 in·lb)

Coolant Change

⚠ WARNING

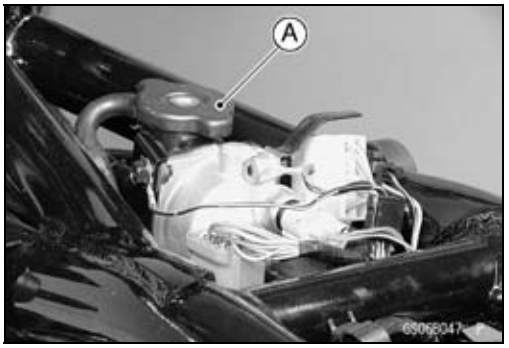
To avoid burns, do not remove the radiator cap or try to change the coolant when the engine is still hot. Wait until it cools down.
Coolant on tires will make them slippery and can cause an accident and injury.
Since coolant is harmful to the human body, do not use for drinking.

● Place a container under the water pump drain bolt [A], then remove the drain bolt.

● Remove the fuel tank (see Fuel System (DFI) chapter).

● Remove the radiator cap [A] in two steps. First turn the cap counterclockwise to the first stop. Then push and turn it further in the same direction and remove the cap.

○The coolant will drain from the radiator and engine.

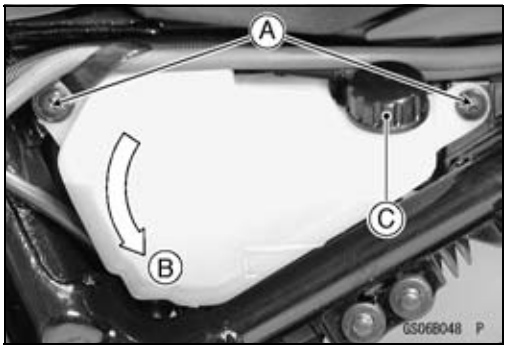


● Remove :
Left Side Cover (see Frame chapter)
Reserve Tank Screws [A]

● Turn over [B] the reserve tank, remove the cap [C], and pour the coolant into a suitable container.

● Install the reserve tank.

Torque - Coolant Reserve Tank Screws: 7.0 N·m (0.70 kgf·m, 61 in·lb)



● Tighten the drain bolt with the gasket.

○Replace the drain bolt gasket with a new one.

Torque - Water Pump Drain Bolt: 11 N·m (1.1 kgf·m, 95 in·lb)

Periodic Maintenance Procedures

- When filling the coolant, choose a suitable mixture ratio by referring to the coolant manufacturer's directions.

CAUTION

Soft or distilled water must be used with the antifreeze in the cooling system.
If hard water is used in the system, it causes scale accumulation in the water passages, and considerably reduces the efficiency of the cooling system.

Water and Coolant Mixture Ratio (when shipping)

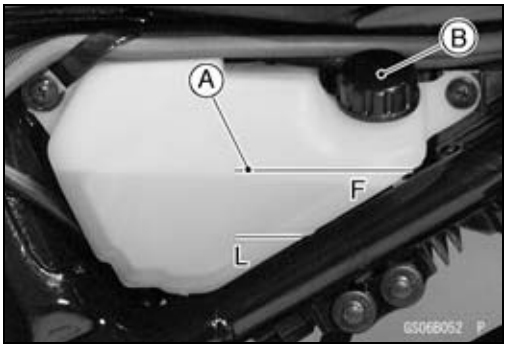
Soft Water	**:**	**50%**
Coolant	**:**	**50%**
Freezing Point	**:**	**−35°C (−31°F)**
Total Amount	**:**	**2.9 L (3.1 US qt)**

- Fill the radiator up to the filler neck [A] with coolant.

NOTE

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

- Check the cooling system for leaks.
- Tap the radiator hoses to force any air bubbles caught inside.
- Fill the radiator up to the filler neck with coolant.



- Fill the reserve tank up to the "F" (full) level line [A] with coolant and install the cap [B].
- Install the fuel tank (see Fuel System (DFI) chapter).
- Start the engine and warm it up thoroughly until the radiator fan turns on and then stop the engine.
- Check the coolant level in the reserve tank several times while the engine is cooling down, and replenish as necessary.

★If the coolant level is lower than the "L" level line, add coolant to the "F" level line.

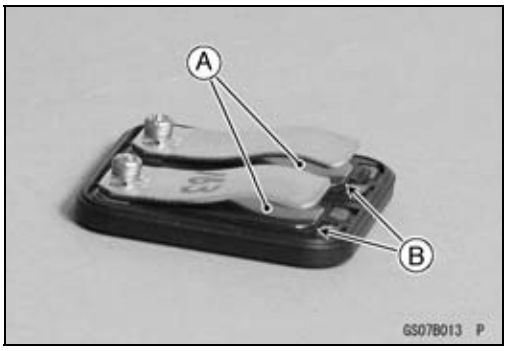
CAUTION

Do not add more coolant above the "F" level line.

Periodic Maintenance Procedures

Engine Top End

Air Suction Valve Inspection



- Remove the air suction valve (see Engine Top End chapter).
- Visually inspect the reeds for cracks, folds, warps, heat damage or other damage.

★If there is any doubt as to the condition of the reeds [A], replace the air suction valve as an assembly.

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

CAUTION

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

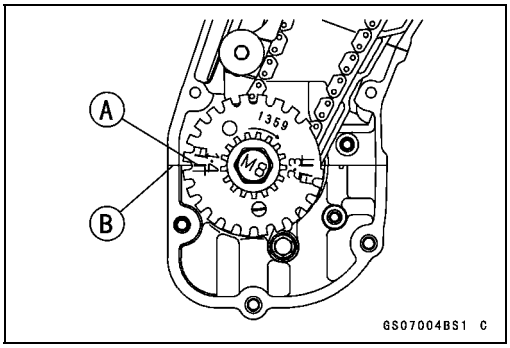
Valve Clearance Inspection

NOTE

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

- Remove:
  Pickup Coil Cover
  Cylinder Head Cover (see Engine Top End chapter)

- Position the crankshaft at 1,4 piston TDC.
  TDC Mark [A] for #1, 4 Pistons
  Timing Mark (crankcase halves mating surface) [B]

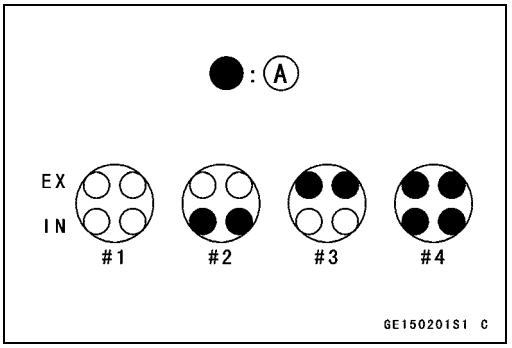


- Using the thickness gauge [A], measure the valve clearance between the cam and the valve lifter.

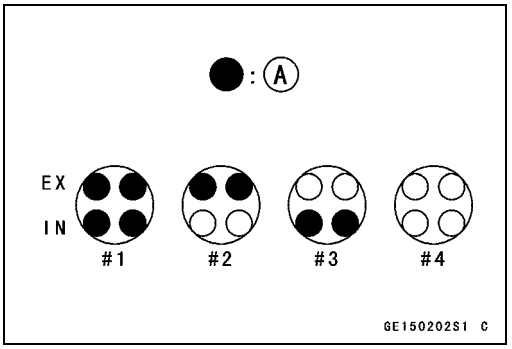
Valve Clearance
Standard:
Inlet: 0.15 ~ 0.24 mm (0.0059 ~ 0.0094 in.)
Exhaust: 0.22 ~ 0.31 mm (0.0087 ~ 0.0122 in.)

Periodic Maintenance Procedures

○**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 Valve [A]



○**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 Valve [A]



★If the valve clearance is not within the specified range, first record the clearance, and then adjust it.

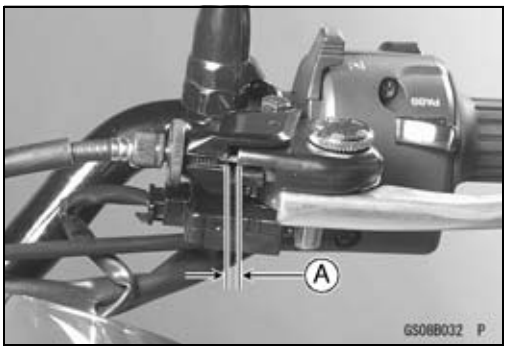
Clutch

Clutch Adjust Inspection

- Pull the clutch lever just enough to take up the free play [A].
- Measure the gap between the lever and the lever holder.

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

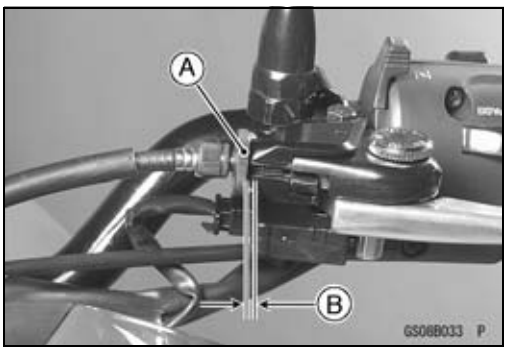
Clutch Lever Free Play
Standard: 2 ~ 3 mm (0.08 ~ 0.12 in.)



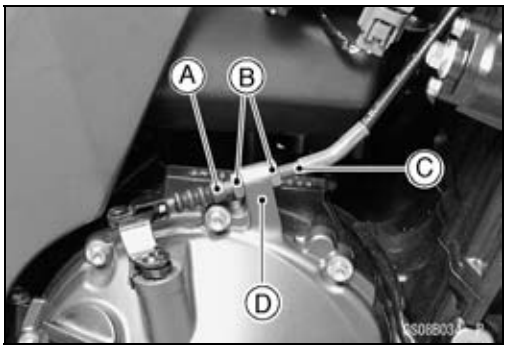
⚠ WARNING

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

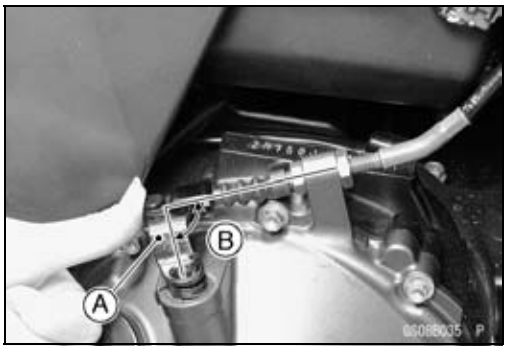
- Turn the adjuster [A] so that 5 ~ 6 mm (0.20 ~ 0.24 in.) [B] of threads are visible.



Periodic Maintenance Procedures



- Slide the dust cover [A] at the clutch cable lower end out of place.
- Loosen both adjusting nuts [B] at the clutch cover as far as they will go.
- Pull the clutch outer cable [C] tight and tighten the adjusting nuts against the cover [D].
- Slip the rubber dust cover back onto place.
- Turn the adjuster at the clutch lever until the free play is correct.



- Push the release lever [A] toward the front of the motorcycle until it becomes hard to turn.

○At this time, the release lever should have the proper angle shown.
60° [B]

★If the angle is wrong, check the clutch and release parts for wear.

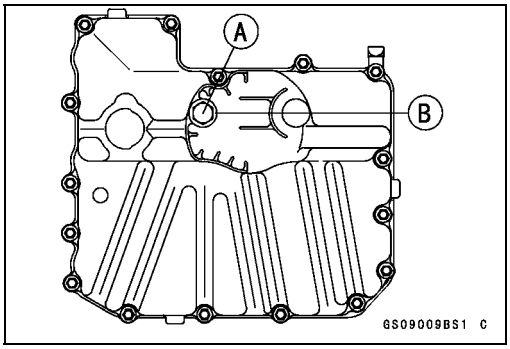
⚠ WARNING

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

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

Engine Lubrication System

Engine Oil Change



- Situate the motorcycle so that it is vertical after warming up the engine.
- Remove the engine oil drain bolt [A] to drain the oil.

○The oil in the oil filter can be drained by removing the filter (see Oil Filter Change).

★Replace the drain bolt gasket [B] with a new one.

- Tighten the drain bolt.

Torque - Engine Oil Drain Bolt: 20 N·m (2.0 kgf·m, 14 ft·lb)

- Pour in the specified type and amount of oil.

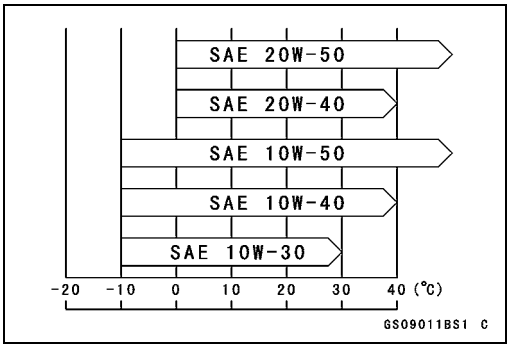
Engine Oil

Grade:	**API SE, SF or SG**
	API SH or SJ with JASO MA
Viscosity:	**SAE 10W-40**
Capacity:	**3.1 L (3.3 US qt) (when filter is not removed)**
	3.3 L (3.5 US qt) (when filter is removed)
	3.8 L (4.0 US qt) (when engine is completely dry)

Periodic Maintenance Procedures

NOTE

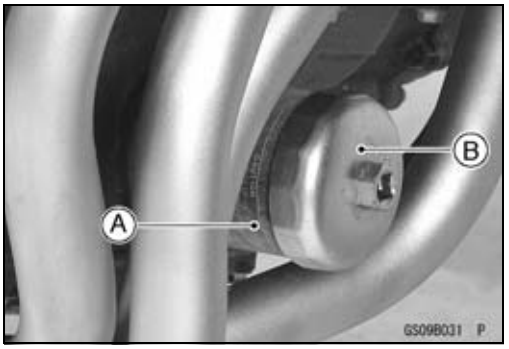
○*Although 10W-40 engine oil is the recommended oil for most conditions, the oil viscosity may need to be changed to accommodate atmospheric conditions in your riding area.*



Oil Filter Change

- Drain the engine oil (see Engine Oil Change).
- Remove the oil filter [A] with the oil filter wrench [B].

Special Tool - Oil Filter Wrench: 57001–1249



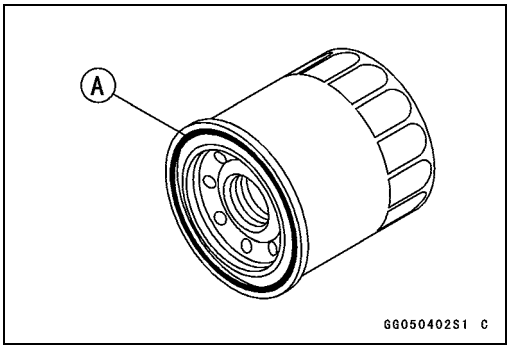
- Replace the filter with a new one.
- Apply engine oil to the gasket [A] before installation.
- Tighten the filter with the oil filter wrench.

Torque - Oil Filter: 31 N·m (3.2 kgf·m, 23 ft·lb)

NOTE

○*Hand tightening of the oil filter can not be allowed since it does not reach to this tightening torque.*

- Pour in the specified type and amount of oil (see Engine Oil Change).



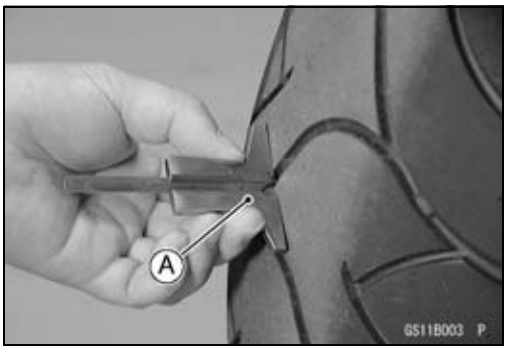
Wheels/Tires

Tire Wear Inspection

As the tire tread wears down, the tire becomes more susceptible to puncture and failure. An accepted estimate is that 90% of all tire failures occur during the last 10% of tread life (90% worn). So it is false economy and unsafe to use the tires until they are bald.

- Remove any imbedded stones or other foreign particles from the tread.
- Visually inspect the tire for cracks and cuts, replacing the tire in case of damage. Swelling or high spots indicate internal damage, requiring tire replacement.
- Measure the tread depth at the center of the tread with a depth gauge [A]. Since the tire may wear unevenly, take measurement at several places.

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



Periodic Maintenance Procedures

Tread Depth
Front:
Standard: 3.4 mm (0.13 in.)
Service Limit: 1 mm (0.04 in.)
1.6 mm (0.06 in.) (AT, CH, DE)
Rear:
Standard: 5.8 mm (0.23 in.)
Service Limit: 2 mm (0.08 in.)
(Up to 130 km/h (80 mph))
3 mm (0.12 in.)
(Over 130 km/h (80 mph))

⚠ WARNING

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

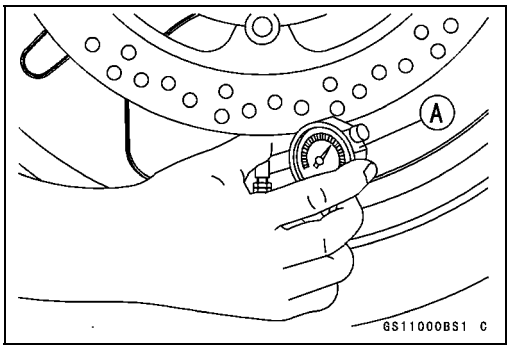
NOTE

○*Most countries may have their own regulations a minimum tire tread depth: be sure to follow them.*
○*Check and balance the wheel when a tire is replaced with a new one.*

Air Pressure Inspection

- Remove the air valve cap.
- Measure the tire air pressure with an air pressure gauge [A] when the tires are cold (that is, when the motorcycle has not been ridden more than a mile during the past 3 hours).

★Adjust the tire air pressure according to the specifications if necessary.



Air Pressure (when cold)

Front	Up to 180 kg (397 lb)	250 kPa (2.5 kgf/cm², 36 psi)
Rear		290 kPa (2.9 kgf/cm², 42 psi)

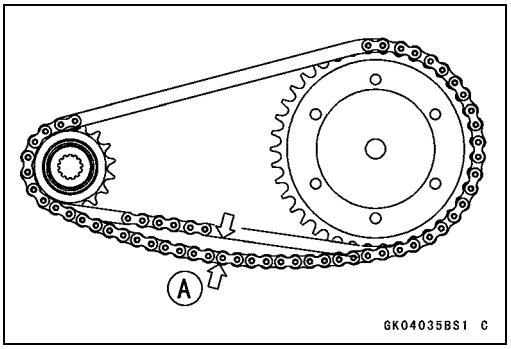
- Install the air valve cap certainly after air pressure inspection.

Torque - Air Valve Cap: 0.15 N·m (0.015 kgf·m, 1.3 in·lb)

Periodic Maintenance Procedures

Final Drive

Drive Chain Slack Inspection



NOTE

○*Check the slack with the motorcycle setting on its side stand.*

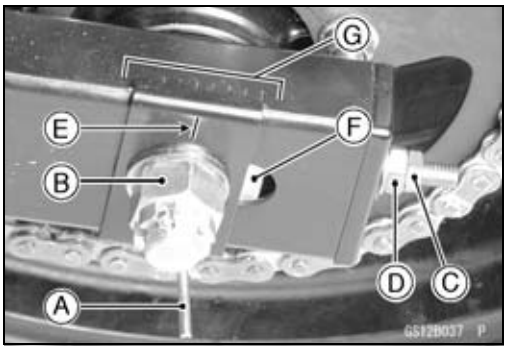
○*Clean the chain if it is dirty, and lubricate it if it appears dry.*

- Check the wheel alignment (see Wheel Alignment Inspection).
- Rotate the rear wheel to find the position where the chain is tightest.
- Measure the vertical movement (chain slack) [A] midway between the sprockets.

★If the chain slack exceeds the standard, adjust it.

Chain Slack
Standard: 25 ~ 35 mm (1.0 ~ 1.4 in.)

Drive Chain Slack Adjustment



- Remove the cotter pin [A], and loosen the axle nut [B].
- Loosen the both chain adjuster locknuts [C].

★If the chain is too loose, turn out the left and right chain adjuster [D] evenly.

★If the chain is too tight, turn in the left and right chain adjusters evenly, and kick the wheel forward.

- Turn both chain adjusters evenly until the drive chain has the correct amount of slack. To keep the chain and wheel properly aligned, the notch [E] on the left wheel alignment indicator [F] should align with the same swingarm mark or position [G] that the right indicator notch aligns with.

⚠ WARNING

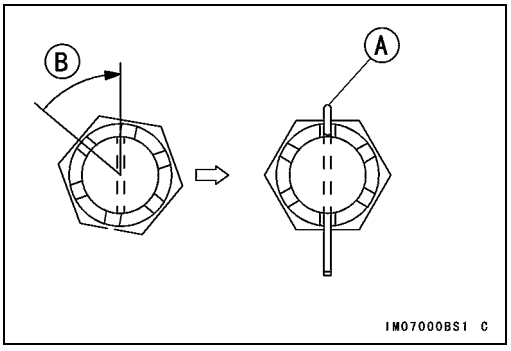
Misalignment of the wheel will result in abnormal wear and may result in an unsafe riding condition.

- Tighten both chain adjuster locknuts securely.
- Tighten the axle nut.

Torque - Rear Axle Nut: 108 N·m (11 kgf·m, 80 ft·lb)

- Turn the wheel, measure the chain slack again at the tightest position, and readjust if necessary.

- Insert a new cotter pin [A].



NOTE

○*When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axle, tighten the nut clockwise [B] up to next alignment.*

○*It should be within 30 degree.*

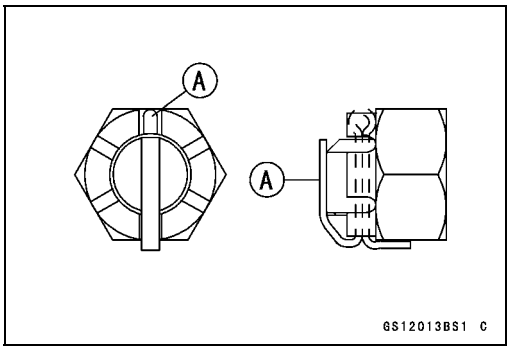
○*Loosen once and tighten again when the slot goes past the nearest hole.*

Periodic Maintenance Procedures

● Bend the cotter pin [A] over the nut.

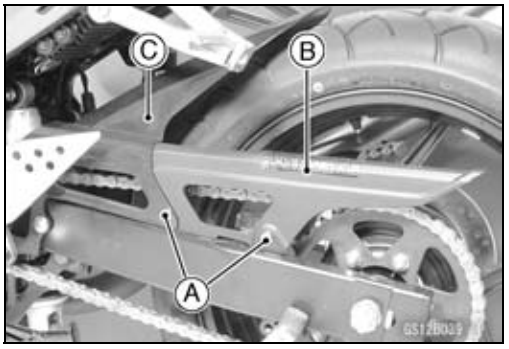
⚠ WARNING

If the rear axle nut is not securely tightened or the cotter pin is not installed, an unsafe riding condition may result.

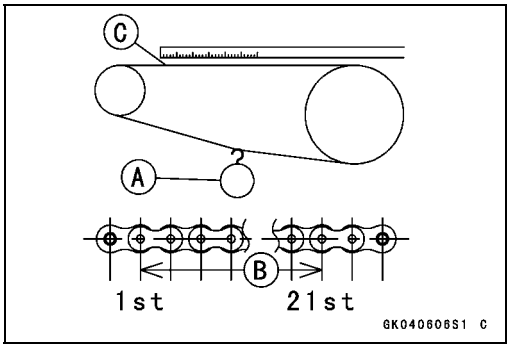


Drive Chain Wear Inspection

● Remove:
Chain Cover Screws [A]
Chain Cover [B]
Mud Guard [C] (see Frame chapter)



● Rotate the rear wheel to inspect the drive chain for damaged rollers, and loose pins and links.
★If there is any irregularity, replace the drive chain.
★Lubricate the drive chain if it appears dry.
● Stretch the chain taut by hanging a 98 N (10 kg, 20 lb) weight [A] on the chain.
● Measure the length of 20 links [B] on the straight part [C] of the chain from the pin center of the 1st pin to the pin center of the 21st pin. Since the chain may wear unevenly, take measurements at several places.
★If any measurements exceed the service limit, replace the chain. Also, replace the front and rear sprockets when the drive chain is replaced.



Drive Chain 20-link Length
Standard: 317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)
Service Limit: 323 mm (12.7 in.)

⚠ WARNING

If the drive chain wear exceeds the service limit, replace the chain or an unsafe riding condition may result. A chain that breaks or jumps off the sprockets could snag on the engine sprocket or lock the rear wheel, severely damaging the motorcycle and causing it to go out of control.
For safely, use only the standard chain. It is an endless type and should not be cut for installation.

Standard Chain
Make: ENUMA
Type: EK520MVXL
Link: 112 Links

Periodic Maintenance Procedures

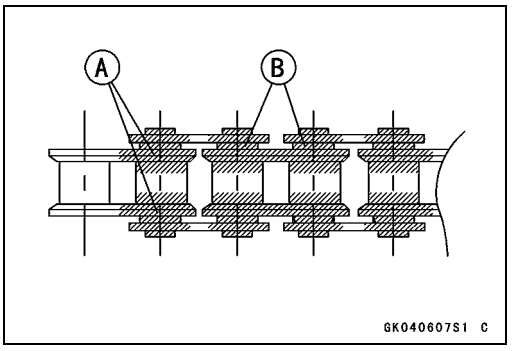
Drive Chain Lubrication

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

CAUTION

The O-rings between the side plates seal in the lubricant between the pin and the bushing. To avoid damaging the O-rings and resultant loss of lubricant, observe the following rules.
Use only kerosene or diesel oil for cleaning an O -ring drive chain. Any other cleaning solution such as gasoline or trichloroethylene will cause deterioration and swelling of the O-ring. Immediately blow the chain dry with compressed air after cleaning. Complete cleaning and drying the chain within 10 minutes.

- Apply oil to the sides of the rollers so that oil will penetrate to the rollers and bushings. Apply the oil to the O-rings so that the O-rings will be coated with oil.
- Wipe off any excess oil.
  Oil Applied Areas [A]
  O-rings [B]



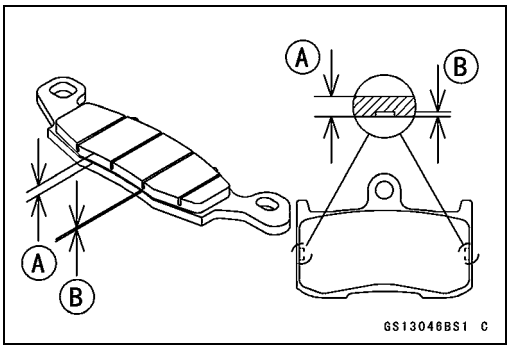
Brakes

Brake Pad Wear Inspection

- Remove the brake pads (see Brakes chapter).
- Check the lining thickness [A] of the pads in each caliper.
- ★If the lining thickness of either pad is less than the service limit [B], replace both pads in the caliper as a set.

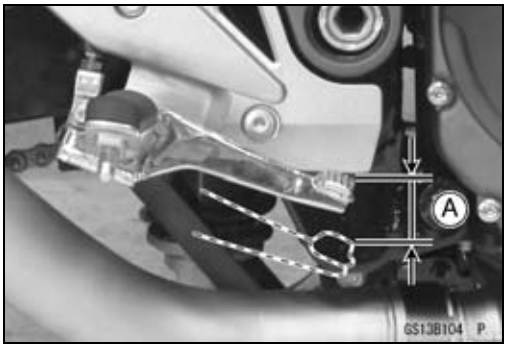
Pad Lining Thickness

Standard:	**Front**	**4.5 mm (0.18 in.)**
	Rear	**5 mm (0.20 in.)**
Service Limit:		**1 mm (0.04 in.)**



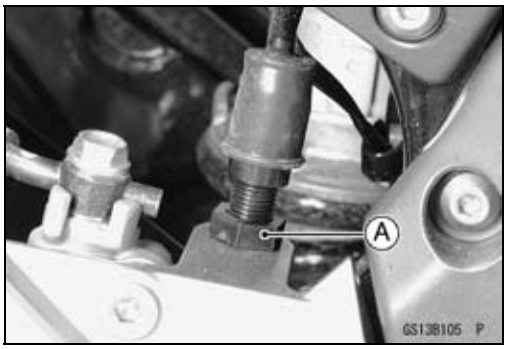
Rear Brake Light Switch Inspection/Adjustment

- Turn on the ignition switch.
- Check the operation of the rear brake light switch by depressing the brake pedal. The brake light should go on after about **10 mm (0.39 in.)** of the pedal travel [A].



Periodic Maintenance Procedures

★If it does not, adjust and inspect the brake light switch.
- While holding the switch body, turn the adjusting nut [A] to adjust the switch.



CAUTION

To avoid damaging the electrical connections inside the switch, be sure that the switch body does not turn during adjustment.

- Remove the right side cover (see Frame chapter).
- Disconnect the connector [A].
- Using a hand tester, inspect to see that only the connection shown in the table have continuity (about zero ohms).

Special Tool - Hand Tester: 57001–1394

Rear Brake Light Switch Connections:

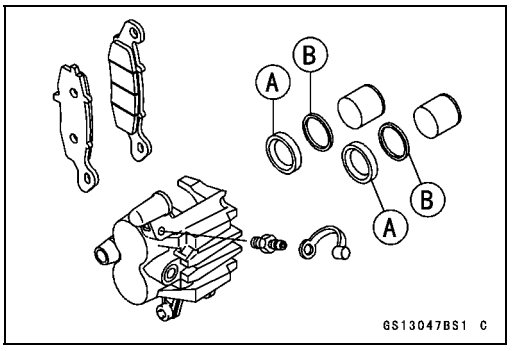
	BR	BL
When brake pedal is pushed down	○—○	
When brake pedal is released		

★If the switch has an open or short, replace it with a new one.

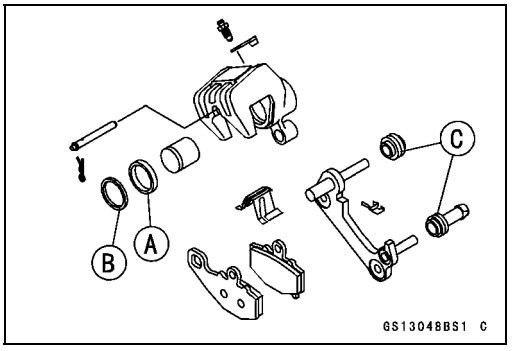
Caliper Fluid Seal Damage

The fluid seals [A] around the piston maintain the proper pad/disc clearance. If the seals are not satisfactory, pad wear will increase, and constant pad drag on the disc will raise brake and brake fluid temperature.
- Remove the calipers (see Brakes chapter).
- Replace the fluid seals under any of the following conditions; (a) fluid leakage around the pad; (b) brakes overheat (c) there is a large difference in inner and outer pad wear; (d) the seal is stuck to the piston.

★If the fluid seal is replaced, replace the dust seals [B] as well. Also, replace all seals every other time the pads are changed.



Caliper Dust Seal/Friction Boot Damage
- Remove the calipers (see Brakes chapter).
- Check that the dust seals [B] and friction boots [C] are not cracked, worn, swollen, or otherwise damaged.
- If they show any damage, remove the caliper bracket and replace them.



Periodic Maintenance Procedures

Master Cylinder Inspection (Visual Inspection)

- Remove the master cylinders (see Brakes chapter).
- Disassemble the front and rear master cylinders.
- Check that there are no scratches, rust or pitting on the inner wall [A] of each master cylinder and on the outside of each piston [B].

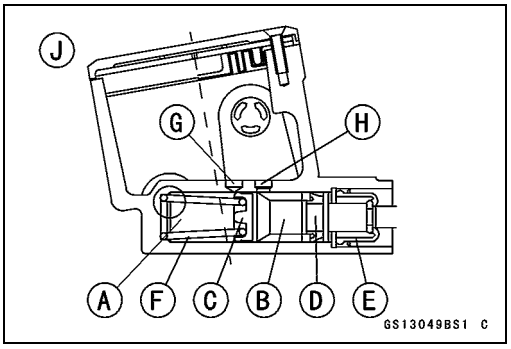
★If a master cylinder or piston shows any damage, replace them.

- Inspect the primary cup [C] and secondary cup [D].

★If a cup is worn, damaged softened (rotted), or swollen, the piston assembly should be replaced to renew the cups.

★If fluid leakage is noted at the brake lever, the piston assembly should be replaced to renew the cups.

Front Master Cylinder [J]



- Check the dust covers [E] for damage.

★If they are damaged, replace them.

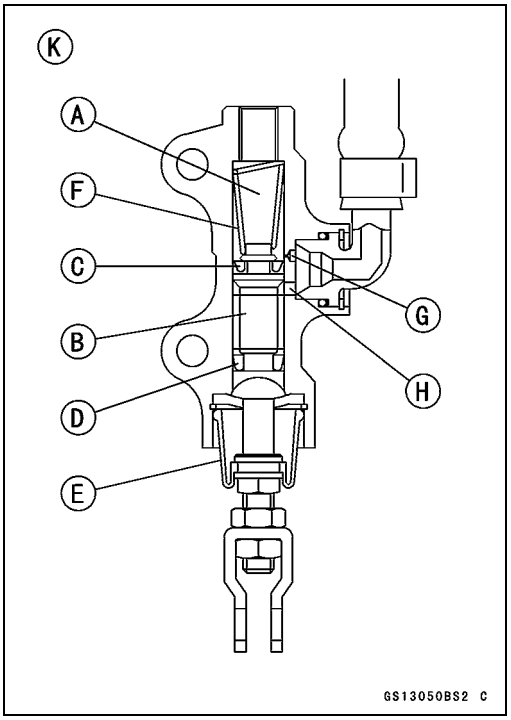
- Check the piston return springs [F] for any damage.

★If the springs are damaged, replace them.

- Check that relief port [G] and supply port [H] are not plugged.

★If the relief port becomes plugged, the brake pads will drag on the disc. Blow the ports clean with compressed air.

Rear Master Cylinder [K]



Periodic Maintenance Procedures

Brake Fluid Level Inspection

● Check that the brake fluid level in the front brake reservoir [A] is above the lower level line [B].

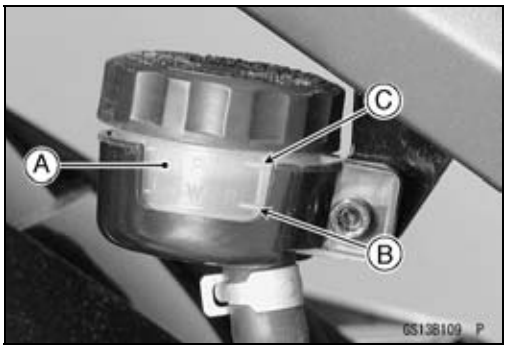
NOTE

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

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

● Check that the brake fluid level in the rear brake reservoir [A] is above the lower level line [B].

★If the fluid level is lower than the lower level line, remove the seats and fill the reservoir to the upper level line [C].



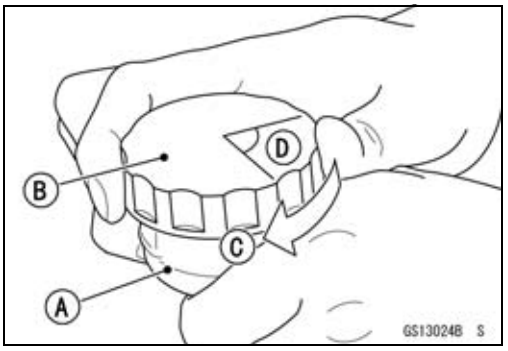
⚠ WARNING

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. After changing the fluid, use only the same type and brand of fluid thereafter.

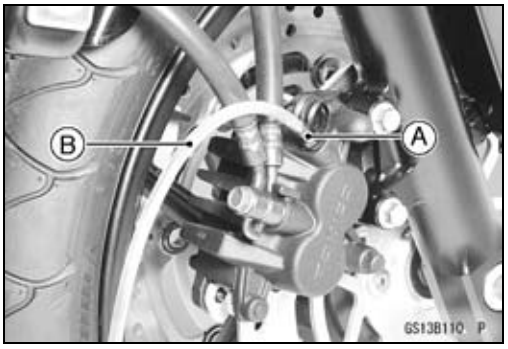
Recommended Disc Brake Fluid
Grade: DOT4

● Follow procedure below to rear brake fluid reservoir cap correctly.

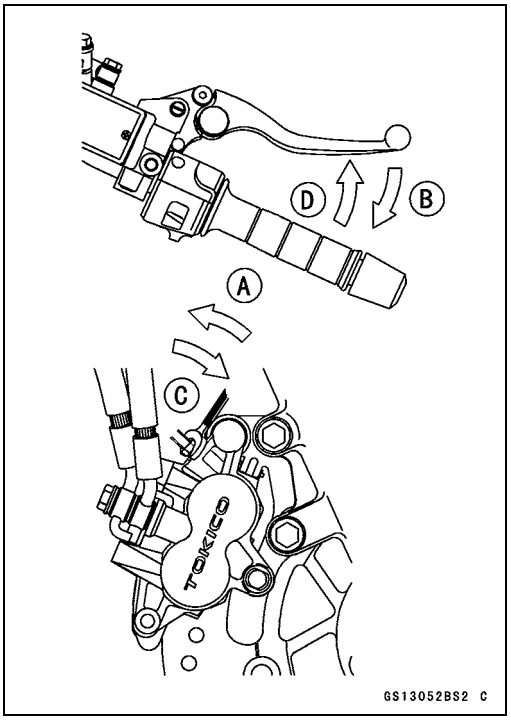
○First, tighten the rear brake fluid reservoir cap [B] clockwise [C] by hand until slight resistance is felt indicating that the cap is seated on the reservoir body, then tighten the cap an additional 1/6 turn [D] while holding the brake fluid reservoir body [A].



Periodic Maintenance Procedures



- Level the brake fluid reservoir.
- Remove the reservoir cap and diaphragm.
- Remove the rubber cap from the bleed valve [A] on the caliper.
- Attach a clear plastic hose [B] to the bleed valve, and run the other end of the hose into a container.
- Fill the reservoir with fresh specified brake fluid.



- Change the brake fluid:

○Repeat this operation until fresh brake fluid comes out from the plastic hose or the color of the fluid changes.

1. Open the bleed valve [A].
2. Apply the brake and hold it [B].
3. Close the bleed valve [C].
4. Release the brake [D].

NOTE

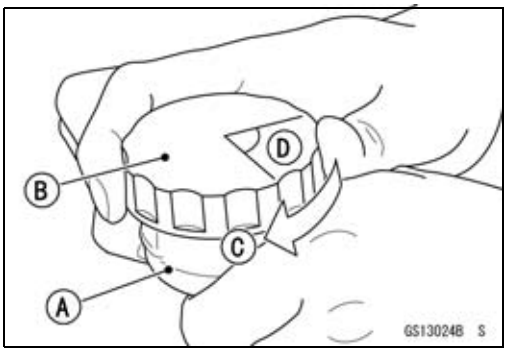
○*The fluid level must be checked often during the changing operation and replenished with fresh brake fluid. If the fluid in the reservoir runs out any time during the changing operation, the brakes will need to be bled since air will have entered the brake line.*

○*Front Brake: Repeat the above steps for the other caliper.*

○*Rear Brake: Repeat the above steps for the other bleed valve.*

- Remove the clear plastic hose.
- Install the reservoir cap.
- Tighten:

Torque - Front Brake Reservoir Cap Screws: 1.0 N·m (0.10 kgf·m, 9 in·lb)



- Follow procedure below to rear brake fluid reservoir cap correctly.

○First, tighten the rear brake fluid reservoir cap [B] clockwise [C] by hand until slight resistance is felt indicating that the cap is seated on the reservoir body, then tighten the cap an additional 1/6 turn [D] while holding the brake fluid reservoir body [A].

- Tighten the bleed valve, and install the rubber cap.

Torque - Bleed Valve: 7.8 N·m (0.80 kgf·m, 69 in·lb)

- After changing the fluid, check the brake for good braking power, no brake drag, and no fluid leakage.

★If necessary, bleed the air from the lines.

Periodic Maintenance Procedures

Brake Line Bleeding

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

⚠ WARNING

Be sure to bleed the air from the brake line whenever brake lever or pedal action feels soft or spongy after the brake fluid is changed, or whenever a brake line fitting has been loosened for any reason.

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.*

- Remove the reservoir cap and diaphragm.
- Fill the reservoir with fresh brake fluid to the upper level line in the reservoir.
- With the reservoir cap off, slowly pump the brake lever several times until no air bubbles can be seen rising up through the fluid from the holes at the bottom of the reservoir.

○Bleed the air completely from the master cylinder by this operation.

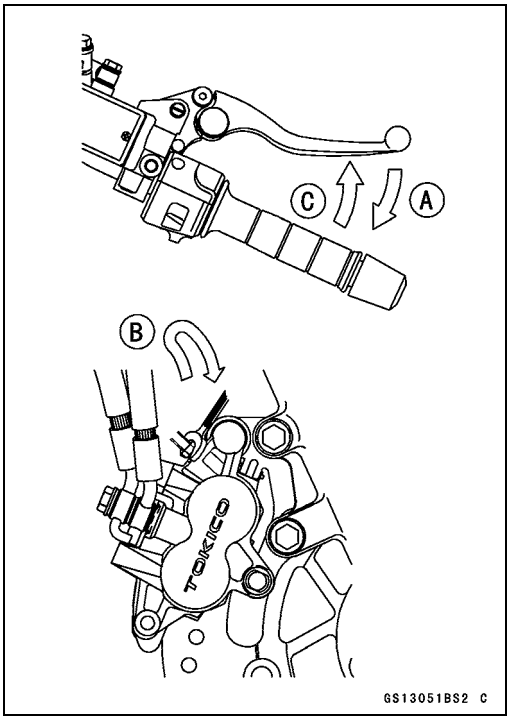
- Remove the rubber cap from the bleed valve on the caliper.
- Attach a clear plastic hose to the bleed valve, and run the other end of the hose into a container.

Periodic Maintenance Procedures

● Bleed the brake line and the caliper:
○Repeat this operation until no more air can be seen coming out into the plastic hose.
1. Pump the brake lever until it becomes hard, and apply the brake and hold it [A].
2. Quickly open and close [B] the bleed valve while holding the brake applied.
3. Release the brake [C].

NOTE

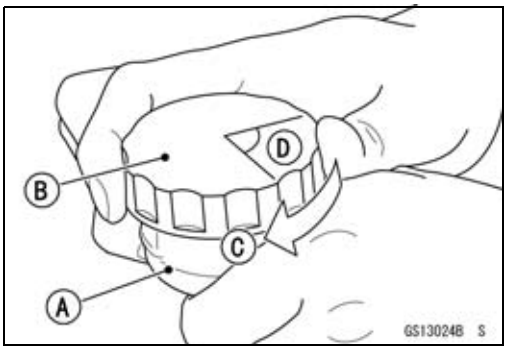
○*The fluid level must be checked often during the bleeding operation and replenished with fresh brake fluid as necessary. If the fluid in the reservoir runs completely out any time during bleeding, the bleeding operation must be done over again from the beginning since air will have entered the line.*
○*Tap the brake hose lightly from the caliper to the reservoir for more complete bleeding.*
○*Front Brake: Repeat the above steps for the other caliper.*



● Remove the clear plastic hose.
● Install the reservoir cap.
● Tighten:

Torque - Front Brake Reservoir Cap Screws: 1.0 N·m (0.10 kgf·m, 9 in·lb)

● Follow procedure below to rear brake fluid reservoir cap correctly.
○First, tighten the rear brake fluid reservoir cap [B] clockwise [C] by hand until slight resistance is felt indicating that the cap is seated on the reservoir body, then tighten the cap an additional 1/6 turn [D] while holding the brake fluid reservoir body [A].



● Tighten the bleed valve, and install the rubber cap.

Torque - Bleed Valve: 7.8 N·m (0.80 kgf·m, 69 in·lb)

● Check the fluid level.
● After bleeding is done, check the brake for good braking power, no brake drag, and no fluid leakage.

Periodic Maintenance Procedures

⚠ WARNING

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

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

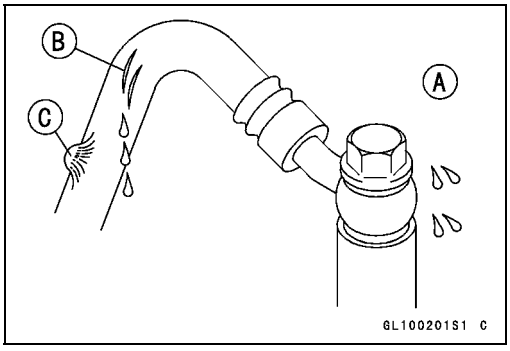
Brake Hoses and Connections Inspection

- Inspect the brake hose and fittings for deterioration, cracks and signs of leakage.

○The high pressure inside the brake line can cause fluid to leak [A] or the hose to burst if the line is not properly maintained. Bend and twist the rubber hose while examining it.

★Replace the hose if any cracks [B] or bulges [C] are noticed.

★Tighten any loose fittings.



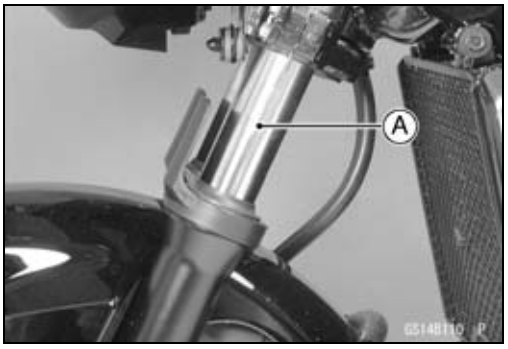
Periodic Maintenance Procedures

Suspension

Front Fork Oil Leak Check

- Visually inspect the front forks [A] for oil leakage, scoring or scratches on the inner surface of the inner tubes.

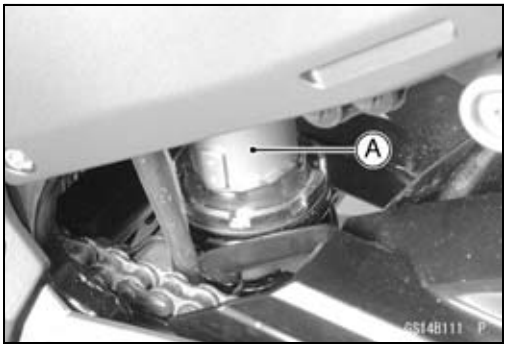
★Replace or repair any defective parts, if necessary.



Rear Shock Absorber Oil Leak Check

- Visually inspect the shock absorber [A] for oil leakage.

★If the oil leakage is found on it, replace the shock absorber with a new one.



Steering

Steering Inspection

- Lift the front wheel off the ground using the jack.

Special Tool - Jack: 57001–1238

- With the front wheel pointing straight ahead, alternately tap each end of the handlebar. The front wheel should swing fully left and right from the force of gravity until the fork hits the stop.

★If the wheel binds or catches before the stop, the steering is too tight.

- Feel for steering looseness by pushing and pulling the forks.

★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.*

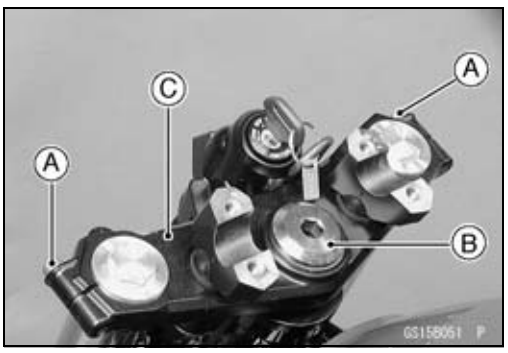
○*Be sure the wires and cables are properly routed.*

○*The bearings must be in good condition and properly lubricated in order for any test to be valid.*

Steering Adjustment

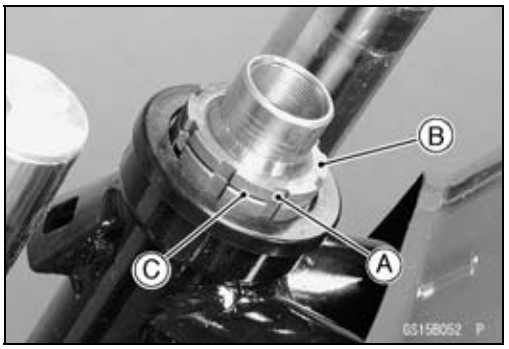
★Adjust the steering, if necessary.

- Remove:
  Inner Cover (see Frame chapter)
  Fairing and Bracket (see Frame chapter)
  Handlebar (see Steering chapter)
- Loosen the upper fork clamp bolts [A] on both side.
- Remove the steering stem head bolt plug and the stem head bolt [B].
- Remove the steering stem head [C] together with the handlebar installed.



Periodic Maintenance Procedures

- Bend the claw washer tabs [A].
- Remove the steering stem locknut [B] and claw washer [C].



- Adjust the steering.

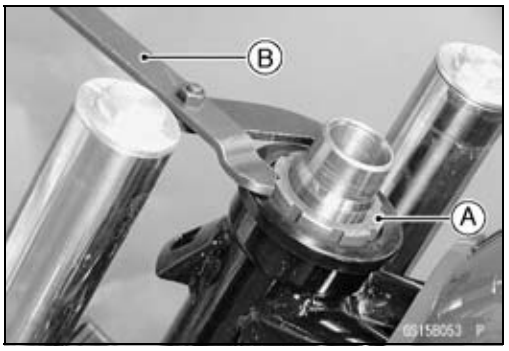
Special Tool - Steering Stem Nut Wrench: 57001–1100 [B]

★If the steering is too tight, loosen the stem nut [A] a fraction of a turn.

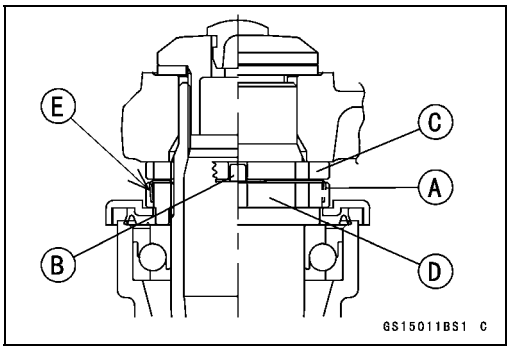
★If the steering is too loose, tighten the stem nut a fraction of a turn.

NOTE

○*Turn the stem nut 1/8 turn at time maximum.*



- Install the claw washer [A] so that its bent side [B] faces upward, and engage the bent claws with the grooves of stem locknut [C].
- Hand tighten the stem locknut until it touches the claw washer.
- Tighten the stem locknut clockwise until the claws are aligned with the grooves (ranging from 2nd to 4th) of stem nut [D], and bend the 2 claws downward [E].



- Tighten:

Torque - Steering Stem Head Bolt: 108 N·m (11 kgf·m, 80 ft·lb)
Front Fork Clamp Bolts (Upper): 20 N·m (2.0 kgf·m, 14 ft·lb)

- Check the steering again.

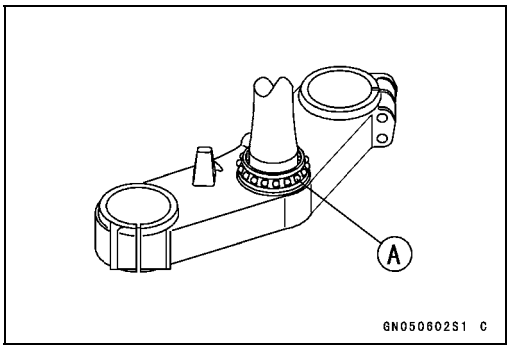
★If the steering is still too tight or too loose, repeat the adjustment.

Steering Stem Bearing Lubrication

- Remove the steering stem (see Steering chapter).
- Using a high flash-point solvent, wash the upper and lower ball bearings in the cages, and wipe the upper and lower outer races, which are press-fitted into the frame head pipe, clean off grease and dirt.
- Visually check the outer races and the ball bearings.

★Replace the bearing assemblies if they show wear or damage.

- Pack the upper and lower ball bearings [A] in the cages with grease, and apply a light coat of grease to the upper and lower outer races.
- Install the steering stem, and adjust the steering.



Periodic Maintenance Procedures

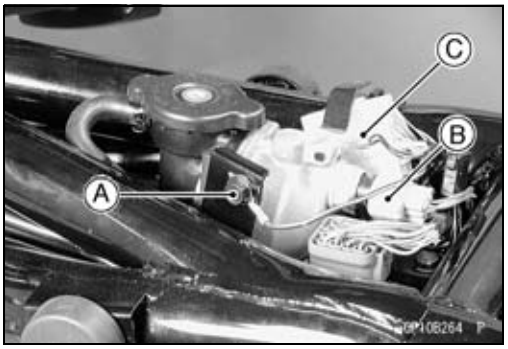
Electrical System

Spark Plug Inspection

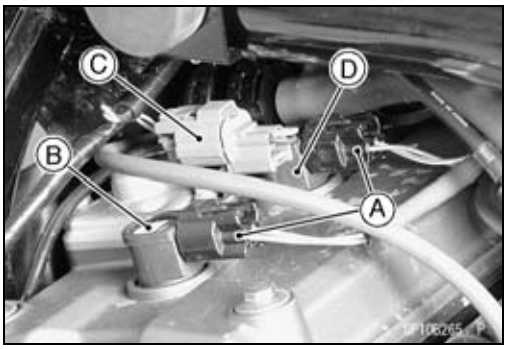
- Remove:
  Fuel Tank (see Fuel System (DFI) chapter)

- Unscrew the thermostat bracket bolt [A].
- Disconnect:
  Water Temperature Sensor Connector [B]
  Left Switch Housing Connector [C]

○If removing the spark plug #2 or #3.



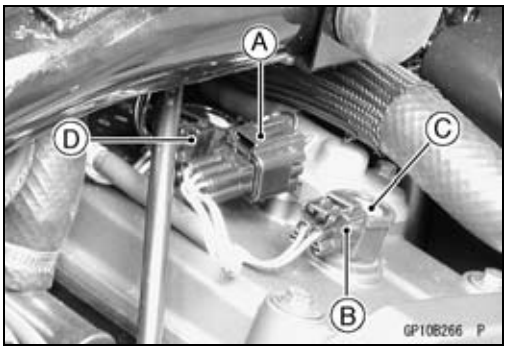
- Disconnect:
  Stick Coil Connectors [A]
- Pull out the stick coil #1 [B].
- Take out the camshaft position sensor connector [C] from the bracket.
- Pull out the stick coil #2 [D].



CAUTION

Do not pry the connector part of the coil while removing the coil.

- Remove the stick coil sub harness connector [A] from the bracket.
- Remove:
  Stick Coil Connector #4 [B] (disconnect)
  Stick Coil #4 [C]
  Stick Coil Connector #3 [D] (disconnect)
- Pull the main harness upward and remove the stick coil #3.



- Remove the spark plugs using the 16 mm plug wrench [A].

Owner's Tool - Spark Plug Wrench, 16 mm: 92110–1146

Periodic Maintenance Procedures

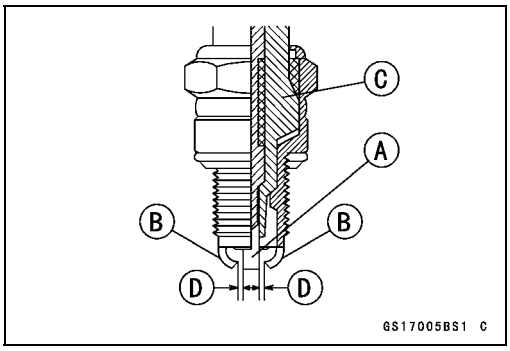
- Clean the spark plug, preferably in a sandblasting device, and then clean off any abrasive particles. The plug may also be cleaned using a high-flash point solvent and a wire brush or other suitable tool.

★If the spark plug center electrode [A] and/or side electrode [B] are corrected or damaged, or if the insulator [C] is cracked, replace the plug. Use the standard spark plug or its equivalent.

- Measure the gaps [D] with a wire-type thickness gauge.

★If the gap is incorrect, carefully bend the side electrode with a tool to obtain the correct gap.

Spark Plug Gap: 0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)



- Insert the spark plug vertically into the plug hole with the spark plug installed in the plug wrench [A].

Owner's Tool - Spark Plug Wrench, 16 mm: 92110–1146

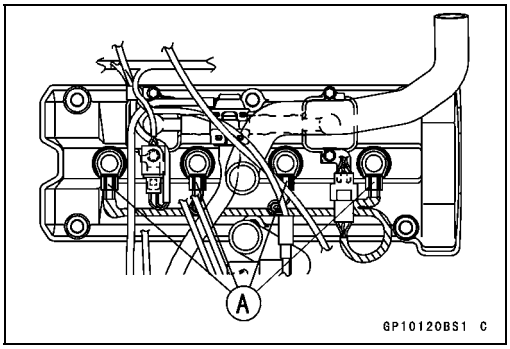
- Tighten:

Torque - Spark Plugs: 13 N·m (1.3 kgf·m, 113 in·lb)

- Insert the coils as shown being careful of the coil heads [A] direction.

○Fit the coils securely.

CAUTION
Do not tap the coil head while installing the coil.



○Be sure the stick coils are installed by pulling up [A] it lightly.

- Connect the connectors.
- Install:

Thermostat Bracket Bolt (see Cooling System chapter)
Fuel Tank (see Fuel System (DFI) chapter)

Periodic Maintenance Procedures

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

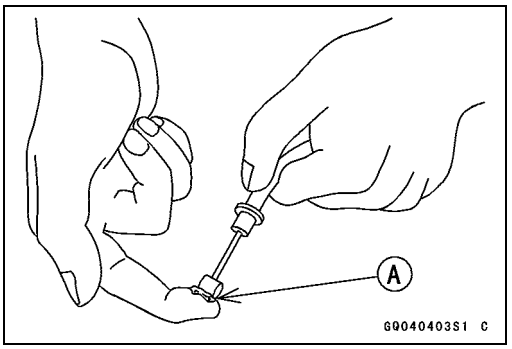
○*Whenever the vehicle has been operated under wet or rainy conditions, or especially after using a high-pressure water spray, perform the general lubrication.*

Pivots: Lubricate with Motor Oil

Rear Brake Rod Joint

Points: Lubricate with Grease

Throttle and Choke Inner Cable Upper Ends [A]
Clutch Lever Pivot
Brake Lever Pivot (Apply silicone grease)
Brake Pedal Pivot
Side Stand

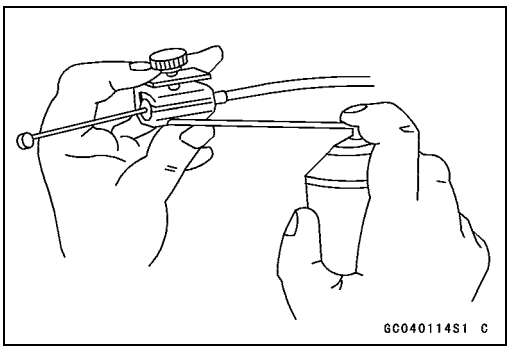


Cables: Lubricate with Cable Lubricant

Choke Cable
Throttle Cables
Clutch Cable

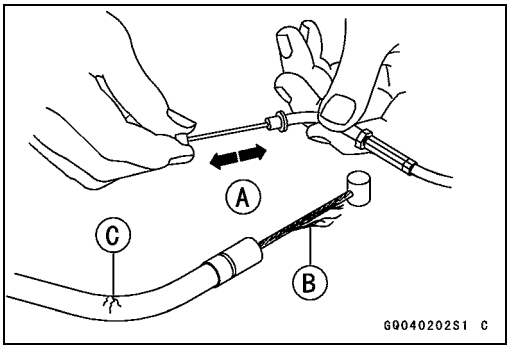
- Lubricate the cables by seeping the oil between the cable and housing.

○The cable may be lubricated by using a commercially available pressure cable lubricator with an aerosol cable lubricant.



- With the cable disconnected at both ends, the cable should move freely [A] within the cable housing.

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



Periodic Maintenance Procedures

Nut, Bolt, and Fastener Tightness

Tightness Inspection

● Check the tightness of the bolts and nuts listed here. Also, check to see that each cotter pin is in place and in good condition.

NOTE

○*For the engine fasteners, check the tightness of them when the engine is cold (at room temperature).*

★If there are loose fasteners, retighten them to the specified torque, following the specified tightening sequence. Refer to the appropriate chapter for torque specifications. If torque specifications are not in the appropriate chapter, see the Standard Torque Table in this section. For each fastener, first loosen it by 1/2 turn, then tighten it.

★If cotter pins are damaged, replace them with new ones.

Nut, Bolt and Fastener to be checked

Wheels:
- Front Axle
- Front Axle Clamp Bolt
- Rear Axle Nut
- Rear Axle Nut Cotter Pin

Brakes:
- Front Master Cylinder Clamp Bolts
- Caliper Mounting Bolts
- Rear Master Cylinder Mounting Bolts
- Brake Lever Pivot Nut
- Brake Pedal Bolt
- Brake Rod Joint Cotter Pin

Suspension:
- Front Fork Clamp Bolts
- Front Fender Mounting Bolts
- Rear Shock Absorber Mounting Nuts
- Swingarm Pivot Shaft Nut
- Swingarm Pivot Shaft Lock Nut
- Uni-trak Link Nuts

Steering:
- Stem Head Bolt
- Handlebar Clamp Bolts

Engine:
- Throttle Cable Adjuster Locknuts
- Engine Mounting Bolts and Nuts
- Muffler Mounting Bolts
- Exhaust Pipe Holder Nuts
- Muffler Connecting Clamp Bolt
- Clutch Lever Pivot Nut
- Radiator Upper and Lower Bolts

Others:
- Sidestand Bolt
- Footpeg Stay Bolts

Fuel System (DFI)

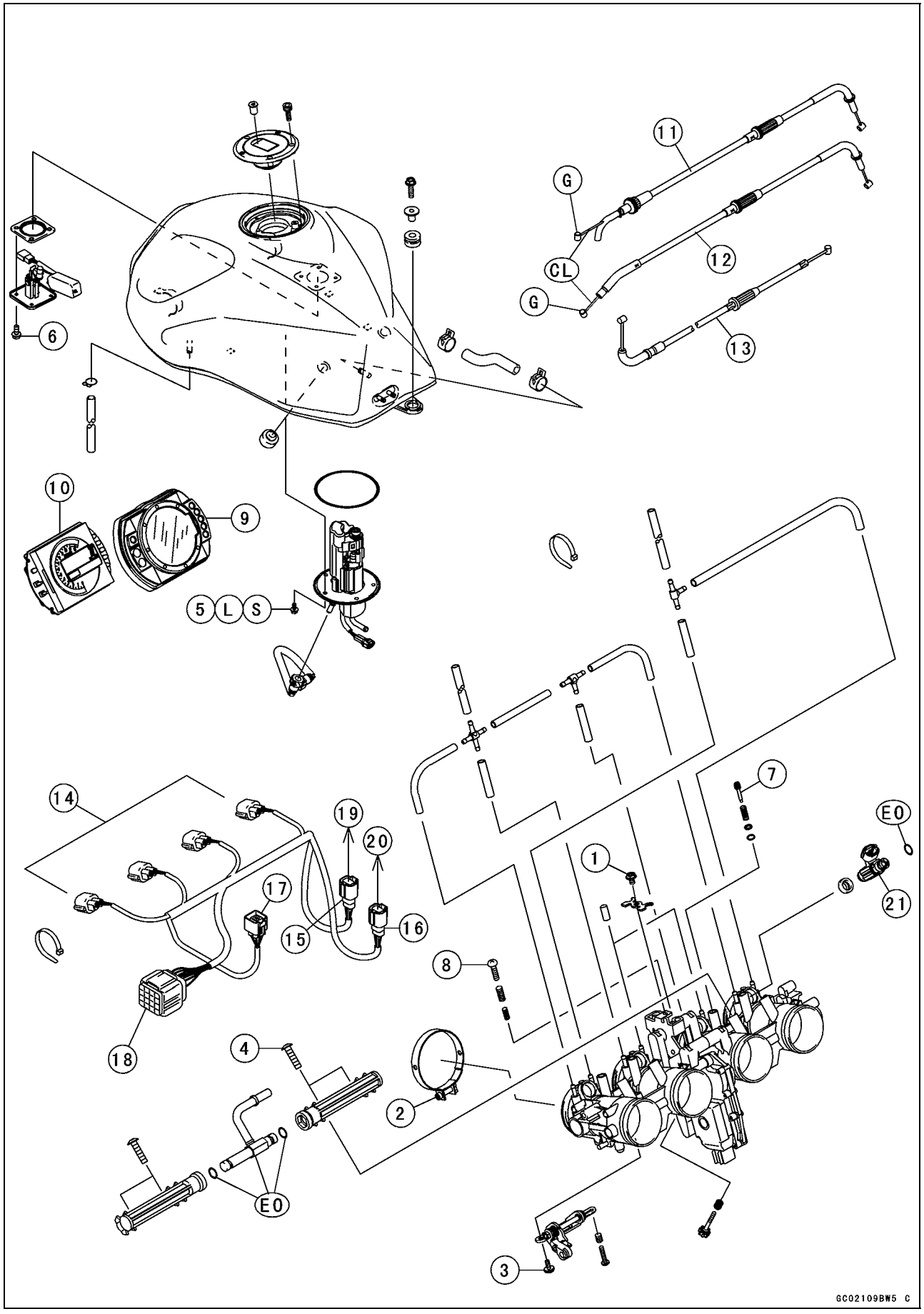
Table of Contents

Exploded View 3-4
DFI Parts Location 3-8
DFI Wiring Diagram 3-10
Specifications 3-12
Special Tools 3-14
DFI Servicing Precautions 3-15
  DFI Servicing Precautions 3-15
Troubleshooting the DFI System 3-17
  Outline 3-17
    Outline 3-17
  Inquiries to Rider 3-21
    Inquiries to Rider 3-21
DFI System Troubleshooting Guide 3-24
  DFI System Troubleshooting Guide 3-24
Self-Diagnosis 3-33
  Self-diagnosis Outline 3-33
    Self-diagnosis Outline 3-33
  Self-diagnosis Procedures 3-33
    Self-diagnosis Procedures 3-33
  Service Code Clearing Procedures 3-34
    Service Code Clearing Procedures 3-34
  How to Read Service Codes 3-36
    How to Read Service Codes 3-36
  How to Erase Service Codes 3-36
    How to Erase Service Codes 3-36
  Service Code Table 3-37
    Service Code Table 3-37
  Backups 3-38
    Backups 3-38
Main Throttle Sensor (Service Code 11) 3-40
  Main Throttle Sensor Removal/Adjustment 3-40
  Input Voltage Inspection 3-40
  Output Voltage Inspection 3-41
  Resistance Inspection 3-42
Inlet Air Pressure Sensor (Service Code 12) 3-43
  Removal 3-43
  Installation 3-43
  Input Voltage Inspection 3-43
  Output Voltage Inspection 3-44
Inlet Air Temperature Sensor (Service Code 13) 3-47
  Removal/Installation 3-47
  Output Voltage Inspection 3-47
  Sensor Resistance Inspection 3-48
Water Temperature Sensor (Service Code 14) 3-49
  Removal/Installation 3-49
  Output Voltage Inspection 3-49

Sensor Resistance Inspection 3-50
Atmospheric Pressure Sensor (Service Code 15) 3-51
Removal 3-51
Input Voltage Inspection 3-51
Output Voltage Inspection 3-52
Crankshaft Sensor (Service Code 21) 3-54
Crankshaft Sensor Removal/Installation 3-54
Crankshaft Sensor Inspection 3-54
Camshaft Position Sensor (Service Code 23) 3-55
Camshaft Position Sensor Removal/Installation 3-55
Camshaft Position Sensor Inspection 3-55
Speed Sensor (Service Code 24, 25) 3-56
Speed Sensor Removal/Installation 3-56
Speed Sensor Inspection 3-56
Input Voltage Inspection 3-56
Output Voltage Inspection 3-56
Vehicle-down Sensor (Service Code 31) 3-58
Removal 3-58
Installation 3-58
Inspection 3-58
Subthrottle Sensor (Service Code 32) 3-61
Subthrottle Sensor Removal/Adjustment 3-61
Input Voltage Inspection 3-61
Output Voltage Inspection 3-62
Resistance Inspection 3-63
Stick Coils (#1, #2, #3, #4: Service Code 51, 52, 53, 54) 3-64
Removal/Installation 3-64
Input Voltage Inspection 3-64
Subthrottle Valve Actuator (Service Code 62) 3-66
Subthrottle Valve Actuator Removal 3-66
Audible Inspection 3-66
Visual Inspection 3-66
Resistance Inspection 3-66
Input Voltage Inspection 3-67
FI Indicator LED Light 3-68
LED Light Inspection 3-69
ECU 3-70
ECU Removal 3-70
ECU Installation 3-70
ECU Power Supply Inspection 3-70
DFI Power Source 3-73
ECU Fuse Removal 3-73
ECU Fuse Installation 3-73
ECU Fuse Inspection 3-73
ECU Main Relay Removal 3-73
ECU Main Relay Inspection 3-73
Fuel Line 3-74
Fuel Pressure Inspection 3-74
Fuel Flow Rate Inspection 3-75
Fuel Pump 3-77
Fuel Pump Removal 3-77
Fuel Pump Installation 3-77
Operation Inspection 3-78
Operating Voltage Inspection 3-78
Pressure Regulator Removal 3-79
Pump Screen, Fuel Filter Cleaning 3-79
Fuel Pump 3-80

Fuel Pump Relay Removal 3-80
Fuel Pump Relay Inspection 3-80
Fuel Injectors 3-81
Removal/Installation 3-81
Audible Inspection 3-81
Power Source Voltage Inspection 3-81
Output Voltage Inspection 3-82
Injector Signal Test 3-83
Injector Resistance Inspection 3-84
Injector Unit Test 3-84
Injector Fuel Line Inspection 3-84
Throttle Grip and Cables 3-87
Throttle Grip Play Inspection/Adjustment 3-87
Choke Lever Operation 3-87
Choke Lever Play Inspection 3-87
Choke Lever Play Adjustment 3-87
Cable Removal/Installation 3-87
Cable Lubrication and Inspection 3-87
Throttle Body Assy 3-88
Idle Speed Inspection 3-88
Engine Vacuum Synchronization Inspection/ Adjustment 3-88
High Altitude Performance Adjustment 3-88
Throttle Body Assy Removal 3-88
Throttle Body Assy Installation 3-90
Throttle Body Assy Disassembly 3-91
Throttle Body Assy Assembly 3-92
Air Cleaner 3-93
Element Removal/Installation 3-93
Air Cleaner Oil Draining 3-93
Air Cleaner Housing Removal 3-93
Fuel Tank 3-94
Fuel Tank Removal 3-94
Fuel Tank Installation 3-95
Fuel Tank and Cap Inspection 3-96
Fuel Tank Cleaning 3-96

Exploded View



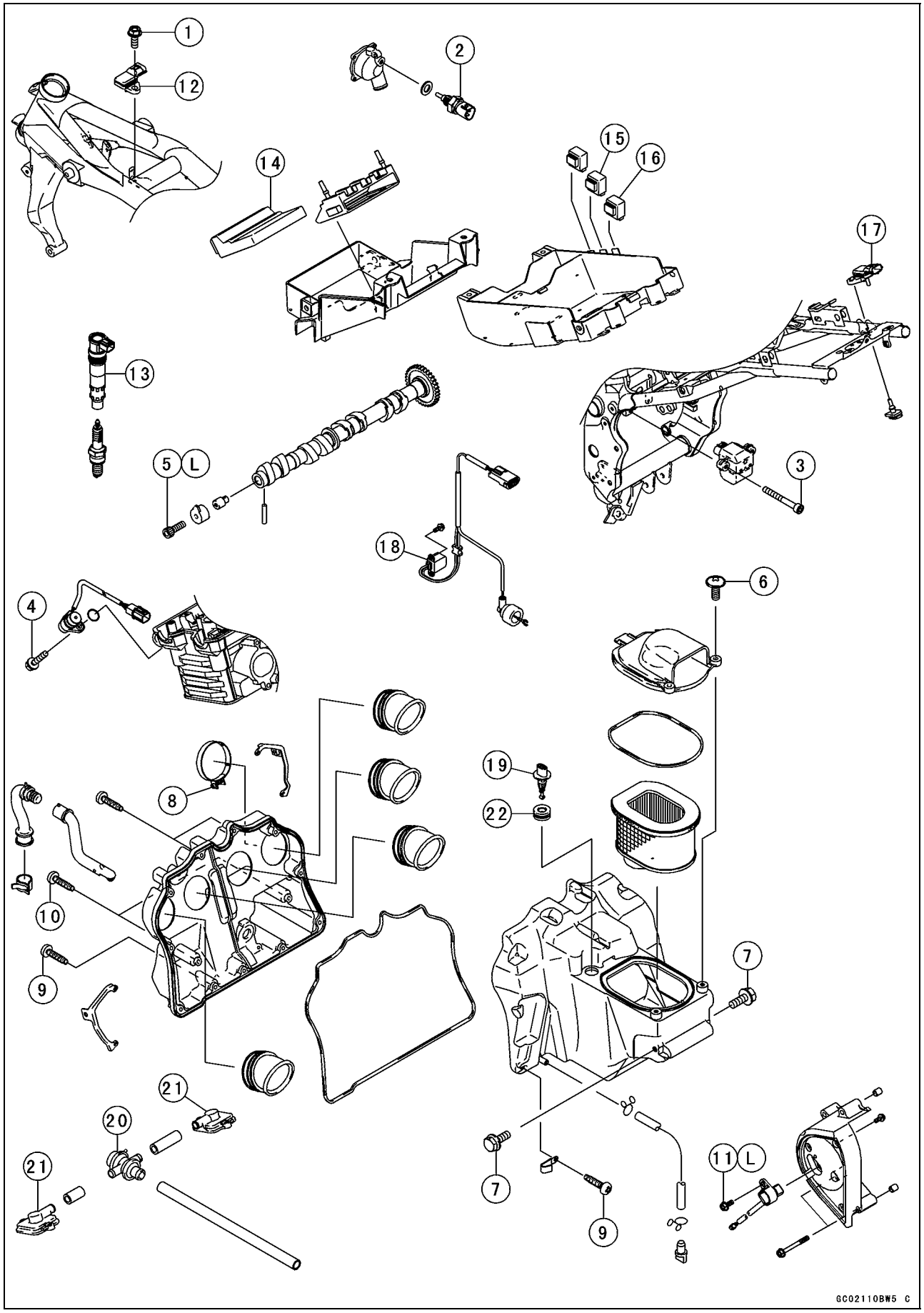
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Throttle cable plate bolt	6.0	0.60	52 in·lb	
2	Throttle body assy holder clamp bolts	2.0	0.20	17 in·lb	
3	Choke link holder screws	2.1	0.21	18 in·lb	
4	Delivery pipe screws	3.4	0.35	30 in·lb	
5	Fuel pump bolts	9.8	1.0	87 in·lb	L,S
6	Fuel level sensor bolts	6.9	0.7	62 in·lb	
7	Bypass screws	0.2	0.02	1.7 in·lb	

8. Center adjusting screw
9. FI indicator LED light
10. Meter unit
11. Throttle cable (accelerator)
12. Throttle cable (decelerator)
13. Choke cable
14. Injector connectors
15. Main throttle sensor connector (grey)
16. Subthrottle sensor connector (black)
17. Subthrottle valve actuator connector
18. Throttle body assy connector
19. Main throttle sensor
20. Subthrottle sensor
21. Injectors

CL: Apply cable lubricant.
EO: Apply engine oil to the seals and O-rings.
G: Apply grease.
L: Apply a non-permanent locking agent.
S: Follow the specified tightening sequence.

Exploded View



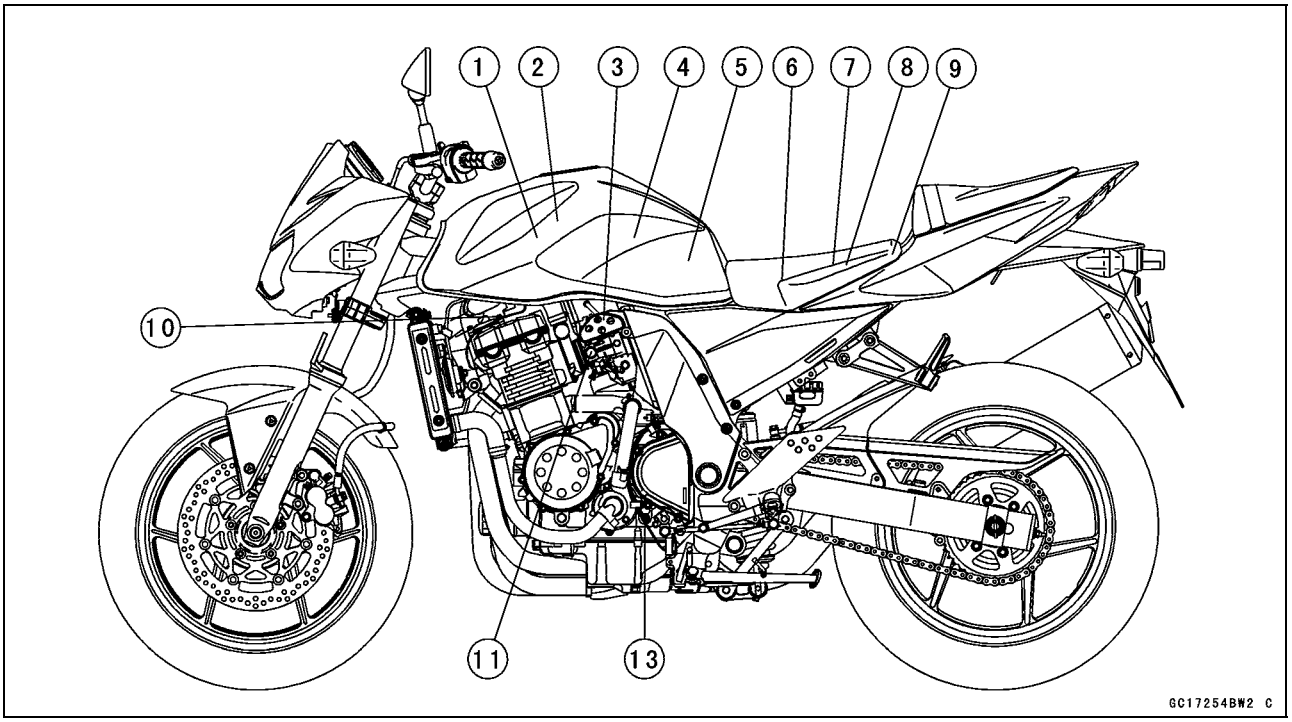
Exploded View

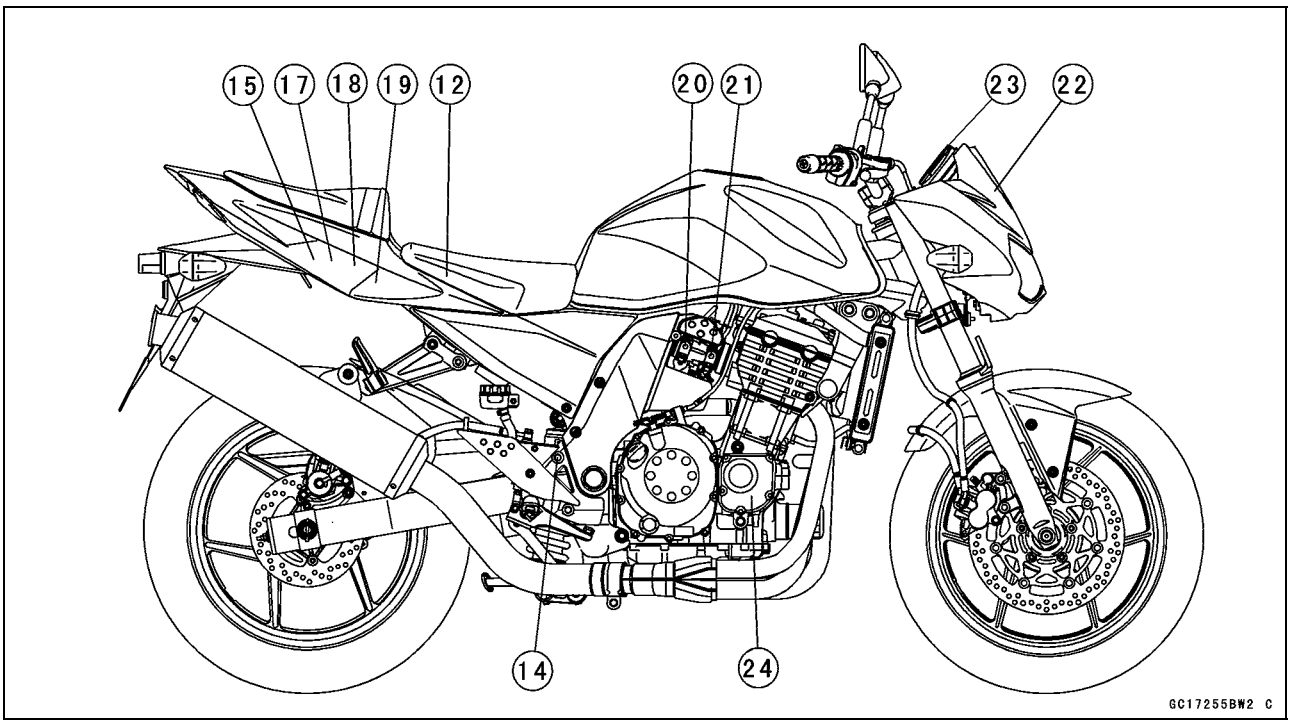
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Inlet air pressure sensor bolt	12	1.2	104 in·lb	
2	Water temperature sensor	25	2.5	18	
3	Vehicle down sensor bolts	2.0	0.20	17 in·lb	
4	Camshaft position sensor bolt	12	1.2	104 in·lb	
5	Camshaft position sensor rotor bolt	12	1.2	104 in·lb	L
6	Air cleaner duct holder screws	3.8	0.39	34 in·lb	
7	Air cleaner housing mounting bolts	9.8	1.0	87 in·lb	
8	Air cleaner duct clamp bolts	2.0	0.20	17 in·lb	
9	Air cleaner housing screws	1.2	0.12	10 in·lb	
10	Air cleaner housing tapping screws	1.2	0.12	10 in·lb	
11	Speed sensor bolt	6.9	0.70	62 in·lb	L

12. Inlet air pressure sensor
13. Stick coils (see Electrical System chapter)
14. ECU
15. Fuel pump relay
16. ECU main relay
17. Atmospheric pressure sensor
18. Crankshaft sensor (see Electrical System chapter)
19. Inlet air temperature sensor
20. Vacuum switch valve (see Engine Top End chapter)
21. Air suction valves
22. Grommet

L: Apply a non-permanent locking agent.

DFI Parts Location

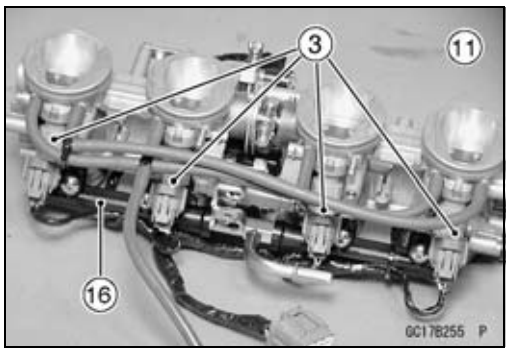


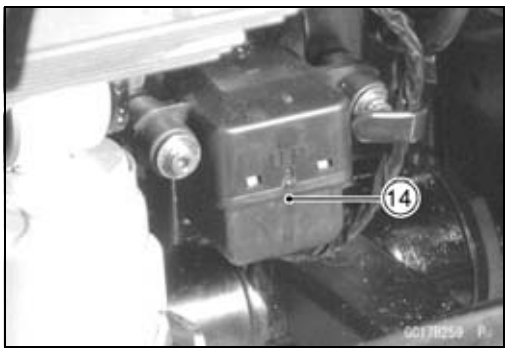


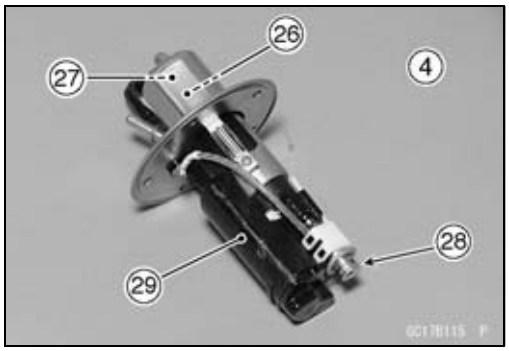
DFI: DFI Parts (this chapter)

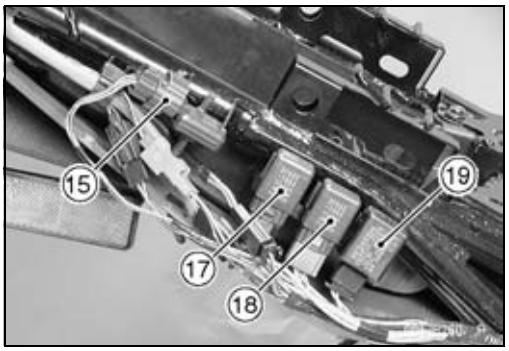
1. Water temperature Sensor (DFI)
2. Inlet Air Pressure Sensor (DFI)
3. Injectors (DFI)
4. Fuel Pump (DFI)
5. Inlet Air Temperature Sensor (DFI)
6. Sealed Battery
7. Junction Box
8. ECU Fuse 15 A
9. ECU (DFI)
10. Stick Coils
11. Throttle Body Assy
12. Self-diagnosis Terminal
13. Neutral Switch
14. Vehicle Down Sensor (DFI)
15. Atmospheric Pressure Sensor (DFI)
16. Delivery Pipe
17. ECU Main Relay
18. Fuel Pump Relay (DFI)
19. Turn Signal Relay
20. Subthrottle Sensor (DFI)
21. Main Throttle Sensor (DFI)
22. Ignition Switch
23. FI Indicator LED Light (DFI)
24. Crankshaft Sensor
25. Camshaft Position Sensor
26. Fuel Pump Screen
27. Return Fuel Check Valve
28. Pressure Regulator
29. Fuel Filter

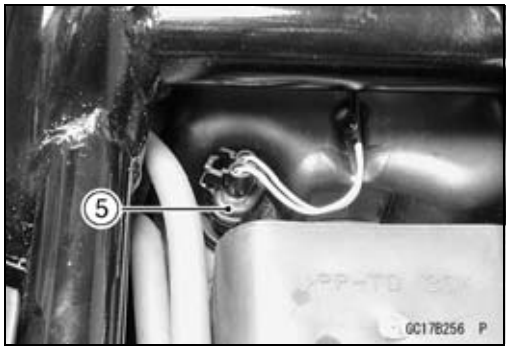
DFI Parts Location

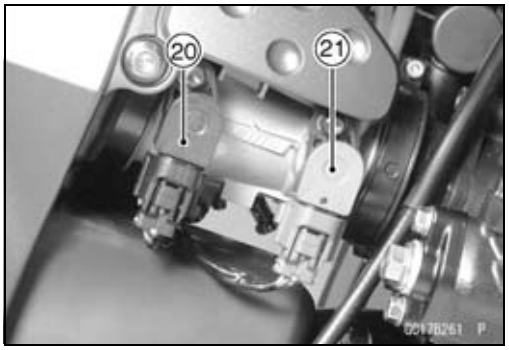


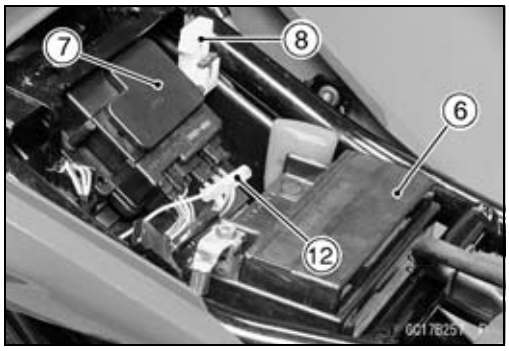


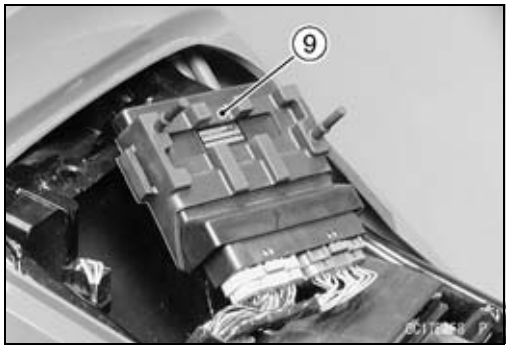






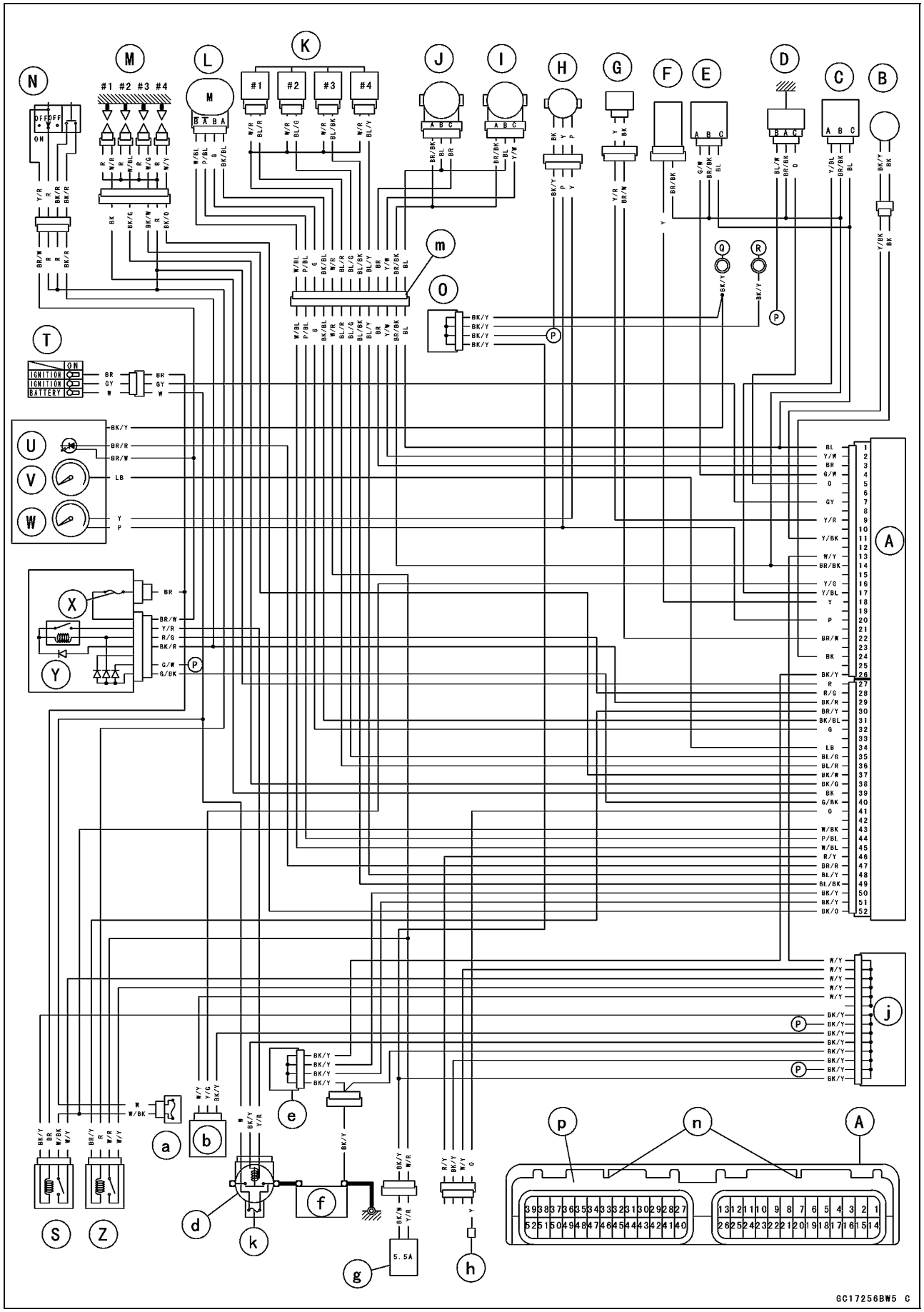






[1], [2], [10], [13], [22] and [24] are not included.

DFI Wiring Diagram



DFI Wiring Diagram

Terminal Names
1. Power Supply to Sensors
2. Main Throttle Sensor Signal
3. Subthrottle Sensor Signal
4. Atmospheric Pressure Sensor Signal
5. Water Temperature Sensor Signal (+)
6. Unused
7. Ignition Switch Signal
8. Unused
9. Camshaft Position Sensor Signal (+)
10. Unused
11. Crankshaft Sensor Signal (+)
12. Unused
13. Power Supply to ECU, Injectors, and Fuel Pump
14. Ground to sensors
15. Unused
16. Vehicle-down Sensor Signal
17. Inlet Air Pressure Sensor Signal
18. Inlet Air Temperature Sensor Signal (+)
19. Unused
20. Speed Sensor Signal
21. Unused
22. Camshaft Position Sensor Signal (–)
23. Unused
24. Crankshaft Sensor Signal (–)
25. Unused
26. ECU Power Source Circuit Ground to Battery (–) Terminal
27. Engine Stop Switch Signal
28. Starter Lockout Switch Signal
29. Electric Starter Button Signal
30. Fuel Pump Relay Signal
31. Subthrottle Valve Actuator Drive Signal
32. Subthrottle Valve Actuator Drive Signal
33. Unused
34. Tachometer Signal
35. Injector #2 Signal
36. Injector #1 Signal
37. Stick Coil #3 Signal
38. Stick Coil #2 Signal
39. Stick Coil #1 Signal
40. Interlock Circuit Signal
41. Self-diagnosis Signal (generated by grounding this terminal and shown by FI indicator LED light)
42. Unused
43. Battery Power ON-OFF Signal
44. Subthrottle Valve Actuator Drive Signal
45. Subthrottle Valve Actuator Drive Signal
46. External Diagnosis System Signal
47. FI Indicator LED Light Signal
48. Injector #4 Signal
49. Injector #3 Signal
50. DFI System Ground
51. Ignition System Ground
52. Stick Coil #4 Signal

Part Name
A. ECU (Electronic Control Unit)
B. Crankshaft Sensor
C. Inlet Air Pressure Sensor
D. Water Temperature Sensor
E. Atmospheric Pressure Sensor
F. Inlet Air Temperature Sensor
G. Camshaft Position Sensor
H. Speed Sensor
I. Main Throttle Sensor
J. Subthrottle Sensor
K. Injectors #1, #2, #3, #4
L. Subthrottle Valve Actuator
M. Stick Coils #1, #2, #3, #4
N. Engine Stop Switch
O. Joint Connector D
P. see Electrical System chapter
Q. Ground Terminal
R. Ground Terminal
S. ECU Main Relay
T. Ignition Switch
U. FI Indicator LED Light
V. Tachometer
W. Speedometer
X. Ignition Fuse 10 A
Y. Junction Box
Z. Fuel Pump Relay
a. ECU Fuse 15 A
b. Vehicle-down Sensor
d. Starter Relay
e. Joint Connector C
f. Sealed Battery
g. Fuel Pump
h. Self-diagnosis Terminal
j. Joint Connector B
k. Main Fuse 30 A
m. Throttle Body Assy Connector
n: Connector Locks
p: ECU Connector

Specifications

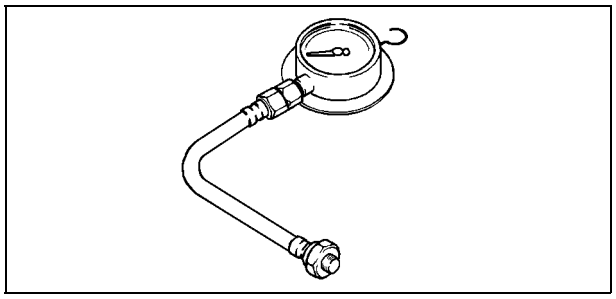
Item	Standard
Digital Fuel Injection System	
Idle Speed	1 100 ±50 r/min (rpm)
Throttle Assy:	
Type	Four barrel type
Bore	ϕ34 mm (1.34 in.)
ECU (Electronic Control Unit):	
Make	Denso
Type	Digital memory type, with built in IC igniter, sealed with resin
Usable engine speed	100 ~ 12 240 r/min (rpm)
Fuel Pressure (high pressure line):	
Right after Ignition SW ON	310 kPa (3.2 kgf/cm², 46 psi) with fuel pump running
After 3 sec from Ignition SW ON	290 kPa (2.9 kgf/cm², 43 psi) with fuel pump stopped
With engine idling	310 kPa (3.2 kgf/cm², 46 psi) with fuel pump running
Fuel Pump:	
Type	In-tank friction pump
Discharge	67 mL or more for 3 seconds
Fuel Injectors:	
Type	INP-285
Nozzle type	One spray type with 4 holes
Resistance	about 11.7 ~ 12.3 Ω at 20°C (68°F)
Main Throttle Sensor:	Non-adjustable and non-removable
Input voltage	4.75 ~ 5.25 V DC between BL and BR/BK leads
Output voltage at idle throttle opening	0.99 ~ 1.03 V DC between Y/W and BR/BK leads
Output voltage at full throttle opening	4.19 ~ 4.39 V DC between Y/W and BR/BK leads
Resistance	4 ~ 6 kΩ
Inlet Air Pressure Sensor or Atmospheric Pressure Sensor:	
Input voltage	4.75 ~ 5.25 V DC between BL and BR/BK leads
Output voltage	3.74 ~ 4.26 V DC at standard atmospheric pressure (see this text for details)
Inlet Air Temperature Sensor:	
Resistance	1.6 ~ 3.7 kΩ at 20°C (68°F) 0.24 ~ 0.43 kΩ at 80°C (176°F)
Output voltage at ECU	about 2.25 ~ 2.50 V @20°C (68°F)
Water Temperature Sensor:	
Resistance	see Electrical System chapter
Output voltage at ECU	about 2.80 ~ 2.97 V @20°C (68°F)
Speed Sensor:	
Input voltage at sensor	about 9 ~ 11 V DC at Ignition SW ON
Output voltage at sensor	about 0.05 ~ 0.07 V DC at Ignition SW ON and 0 km/h
Vehicle-down Sensor:	
Detection method	Magnetic flux detection method
Detection angle	More than 60 ~ 70° for each bank

Specifications

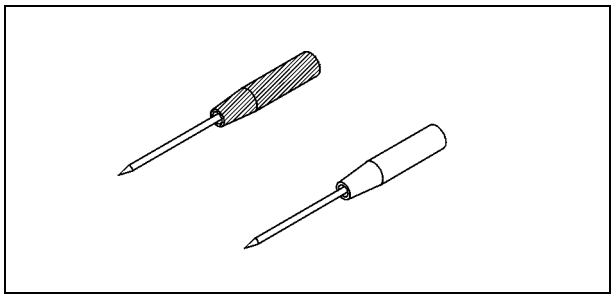
Item	Standard
Detection time	Within 0.5 ~ 1.0 sec.
Output voltage	with the sensor tilted 60 ~ 70° or more: 3.7 ~ 4.4 V
	with sensor arrow mark pointed up: 0.4 ~ 1.4 V
Subthrottle Sensor:	Non-adjustable and non-removal
Input voltage	4.75 ~ 5.25 V DC between BL and BR/BK leads
Output voltage at idle throttle opening	0.48 ~ 0.52 V DC between BR and BR/BK leads
Output voltage at full throttle opening	3.6 ~ 3.8 V DC between BR and BR/BK leads
Resistance	4 ~ 6 kΩ
Subthrottle Valve Actuator:	
Resistance	about 5 ~ 7 kΩ
Input voltage	about 8.5 ~ 10.5 V DC
Throttle Grip and Cables	
Throttle grip free play	2 ~ 3 mm (0.08 ~ 0.12 in.)
Choke Cable	
Choke cable free play	0 ~ 0.5 mm (0 ~ 0.02 in.)

Special Tools

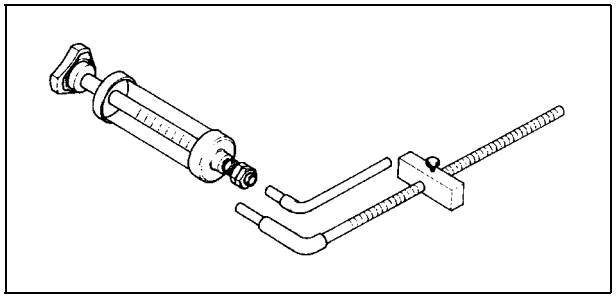
Oil Pressure Gauge:
57001–125



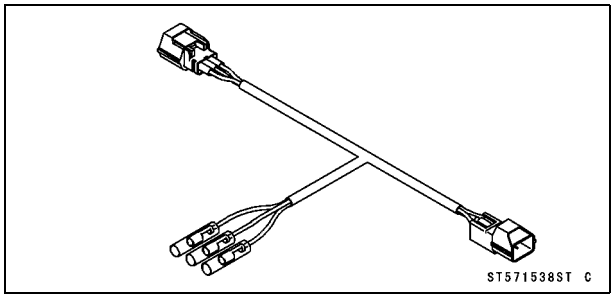
Needle Adapter Set:
57001–1457



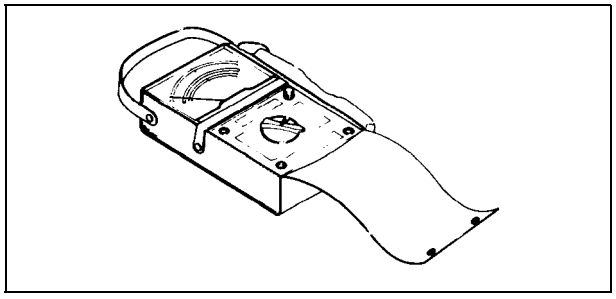
Fork Oil Level Gauge:
57001–1290



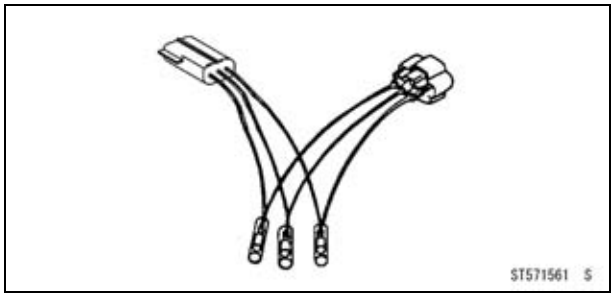
Throttle Sensor Setting Adapter:
57001–1538



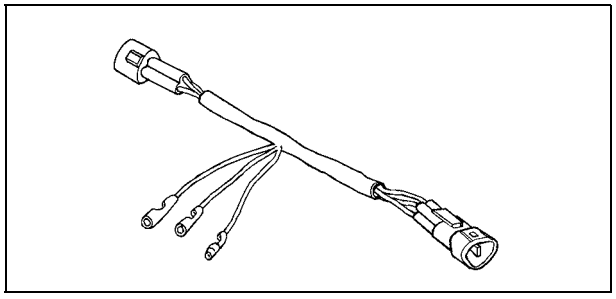
Hand Tester:
57001–1394



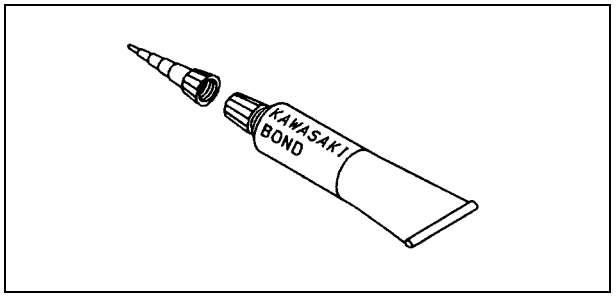
Sensor Harness Adapter:
57001–1561



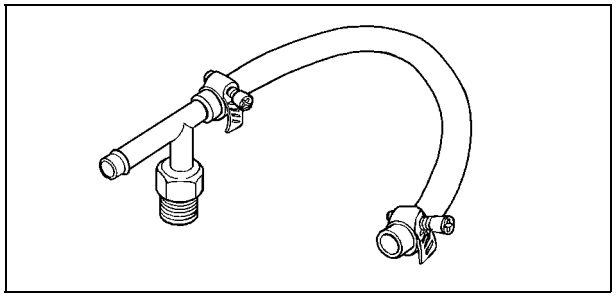
Throttle Sensor Setting Adapter:
57001–1400



Kawasaki Bond (Silicone Sealant):
56019–120



Fuel Pressure Gauge Adapter:
57001–1417



DFI Servicing Precautions

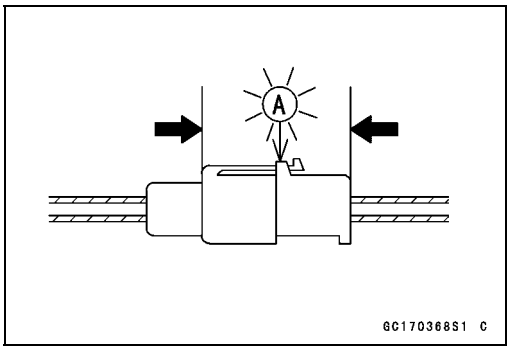
DFI Servicing Precautions

There are a number of important precautions that should be followed servicing the DFI system.

- This DFI system is designed to be used with a 12 V sealed battery as its power source. Do not use any other battery except for a 12 V sealed battery as a power source.
- Do not reverse the battery cable connections. This will damage the ECU.
- To prevent damage to the DFI parts, do not disconnect the battery cables or any other electrical connections when the ignition SW (switch) is on or while the engine is running.
- Take care not to short the leads that are directly connected to the battery positive (+) terminal to the chassis ground.
- When charging, remove the battery from the motorcycle. This is to prevent ECU damage by excessive voltage.
- Do not turn the ignition SW ON while any of the DFI electrical connectors are disconnected. The ECU memorizes service codes.
- Do not spray water on the electrical parts, DFI parts, connectors, leads, and wiring. Never water a vehicle with connectors unplugged because seals don't work and terminals could corrode.
- If a transceiver is installed on the motorcycle, make sure that the operation of the DFI system is not influenced by electric wave radiated from the antenna. Check operation of the system with the engine at idle. Locate the antenna as far as possible away from the ECU.
- When any fuel hose is disconnected, do not turn on the ignition SW. Otherwise, the fuel pump will operate and fuel will spout from the fuel hose.
- Do not operate the fuel pump if the pump is completely dry. This is to prevent pump seizure.
- Before removing the fuel system parts, blow the outer surfaces of these parts clean with compressed air.
- When any fuel hose is disconnected, fuel may spout out by residual pressure in the fuel line. Cover the hose joint with a piece of clean cloth to prevent fuel spillage.
- To prevent corrosion and deposits in the fuel system, do not add to fuel any fuel antifreeze chemicals.
- Whenever the DFI electrical connections are to be disconnected, first turn off the ignition SW (switch). Conversely, make sure that all the DFI electrical connections are firmly reconnected before starting the engine.

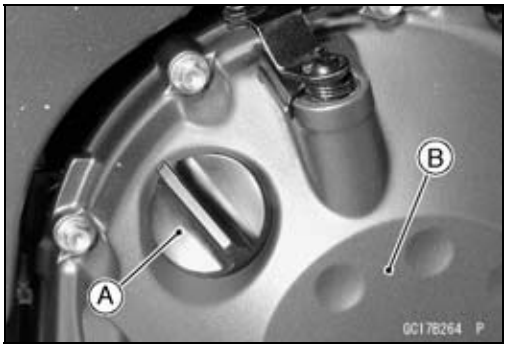
DFI Servicing Precautions

○Whenever the DFI electrical connections are to be disconnected, first turn off the ignition SW (switch), and disconnect the battery (–) terminal. Do not pull the lead, only the connector. Conversely, make sure that all the DFI electrical connections are firmly reconnected before starting the engine.
○When disconnecting the vehicle-down sensor connector, raise the lock of the connector. Push the lock of the other connectors.



○To maintain the correct fuel/air mixture (F/A), there must be no inlet air leaks in the DFI system. Be sure to install the oil filler plug [A] after filling the engine oil.
Clutch Cover [B]

Torque - Oil Filler Plug: 1.5 N·m (0.15 kgf·m, 13 in·lb)



Troubleshooting the DFI System

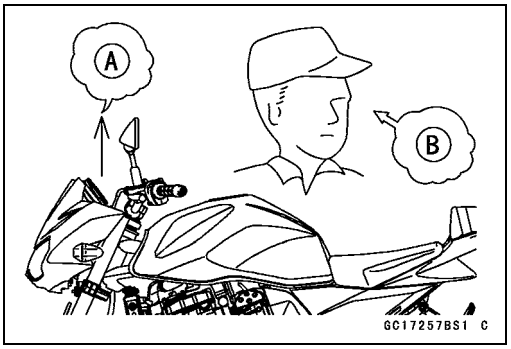
Outline

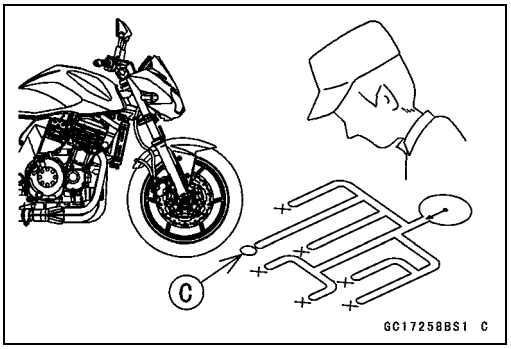
Outline

When an abnormality in the system occurs, the FI indicator LED (Light Emitting Diode) light goes on to alert the rider on the meter panel. In addition, the condition of the problem is stored in the memory of the ECU (electronic control unit). With the engine stopped and turned in the self-diagnosis mode, the service code [A] is indicated by the number of times the FI indicator LED light blinks.

When due to a malfunction, the FI indicator LED light remains lit, ask the rider about the conditions [B] under which the problem occurred and try to determine the cause [C].

- First, conduct a self-diagnosis inspection and then a non -self-diagnosis inspection. The non–self–diagnosis items are not indicated by the FI indicator LED light. Don't rely solely on the DFI self-diagnosis function, use common sense.





Even when the DFI system is operating normally, the FI indicator LED light [A] may light up under strong electrical interference. No repair needed. Turn the ignition SW (switch) OFF to stop the indicator light.

When the FI indicator LED light goes on and the motorcycle is brought in for repair, check the service codes.

When the repair has been done, the LED light doesn't go on. But the service codes stored in memory are not erased to preserve the problem history, and the LED light can display the codes in the self-diagnosis mode. The problem history is referred when solving unstable problems.

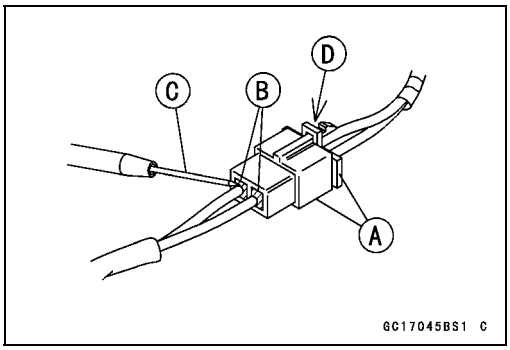
When the motorcycle is down, the vehicle-down sensor is turned OFF and the ECU shuts off the fuel injectors and ignition system. The FI indicator LED light blinks but the fault code cannot be displayed. The ignition SW is left ON. If the starter button is pushed, the electric starter turns but the engine doesn't start. To start the engine again, raise the motorcycle, turn the ignition SW OFF, and then ON. The vehicle-down sensor is turned ON and the LED light goes OFF.

Troubleshooting the DFI System

○The DFI part connectors [A] have seals [B], including the ECU.

● Join the connector and insert the needle adapters (special tool) [C] inside the seals [B] from behind the connector until the adapter reaches the terminal.

Special Tool - Needle Adapter Set: 57001–1457



CAUTION
Insert the needle adapter straight along the terminal in the connector to prevent short-circuit between terminals.

● Make sure that measuring points are correct in the connector, noting the position of the lock [D] and the lead color before measurement. Do not reverse connections of the hand tester or a digital meter.

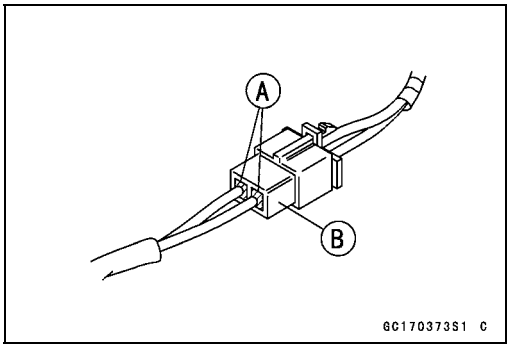
● Be careful not to short-circuit the leads of the DFI or electrical system parts by contact between adapters.

● Turn the ignition SW ON and measure the voltage with the connector joined.

CAUTION
Incorrect, reverse connection or short circuit by needle adapters could damage the DFI or electrical system parts.

○After measurement, remove the needle adapters and apply silicone sealant to the seals [A] of the connector [B] for waterproofing.

Silicone Sealant (Kawasaki Bond: 56019–120) – Seals of Connector



● Always check battery condition before replacing the DFI parts. A fully charged battery is a must for conducting accurate tests of the DFI system.

● Trouble may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the problem. If the problem was caused by some other item or items, they too must be repaired or replaced, or the new replacement part will soon fail again.

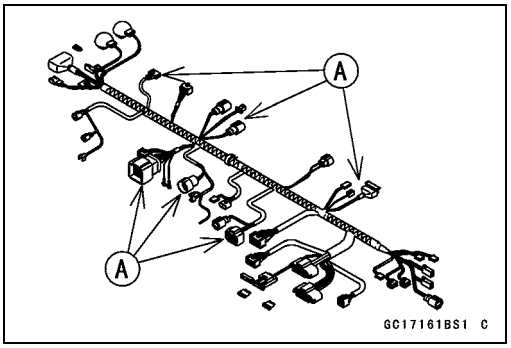
● Measure coil winding resistance when the DFI part is cold (at room temperature)

● Make sure all connectors in the circuit are clean and tight, and examine wires for signs of burning, fraying, short, etc. Deteriorated wires and bad connections can cause reappearance of problems and unstable operation of the DFI system.

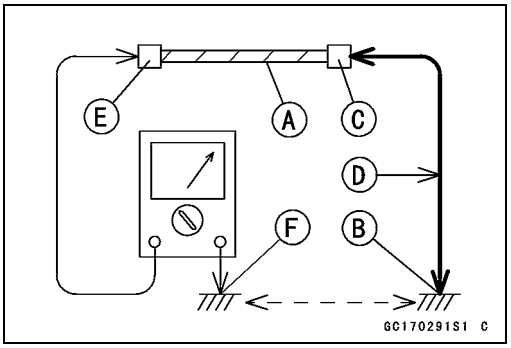
★If any wiring is deteriorated, replace the wiring.

Troubleshooting the DFI System

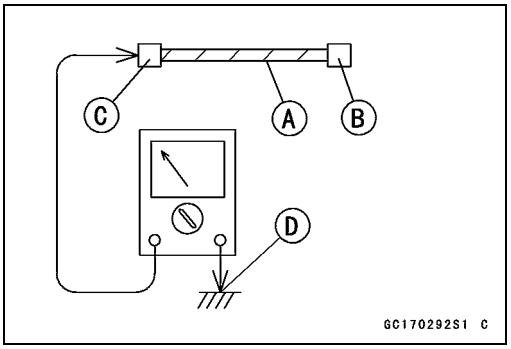
● Pull each connector [A] apart and inspect it for corrosion, dirt, and damage.
★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it. Connect the connectors securely.
● Check the wiring for continuity.
○Use the wiring diagram to find the ends of the lead which is suspected of being a problem.
○Connect the hand tester between the ends of the leads.
○Set the tester to the × 1 Ω range, and read the tester.
★If the tester does not read 0 Ω, the lead is defective. Replace the lead or the main harness or the sub harness.



○If both ends of a harness [A] are far apart, ground [B] the one end [C], using a jumper lead [D] and check the continuity between the end [E] and the ground [F]. This enables to check a long harness for continuity. If the harness is open, repair or replace the harness.



○When checking a harness [A] for short circuit, open one end [B] and check the continuity between the other end [C] and ground [D]. If there is continuity, the harness has a short circuit to ground, and it must be repaired or replaced.



● Narrow down suspicious locations by repeating the continuity tests from the ECU connectors.
★If no abnormality is found in the wiring or connectors, the DFI parts are the next likely suspects. Check the part, starting with input and output voltages. However, there is no way to check the ECU itself.
★If an abnormality is found, replace the affected DFI part.
★If no abnormality is found in the wiring, connectors, and DFI parts, replace the ECU.

○Lead Color Codes:

BK: Black	G: Green	P: Pink
BL: Blue	GY: Gray	PU: Purple
BR: Brown	LB: Light blue	R: Red
CH: Chocolate	LG: Light green	W: White
DG: Dark green	O: Orange	Y: Yellow

Troubleshooting the DFI System

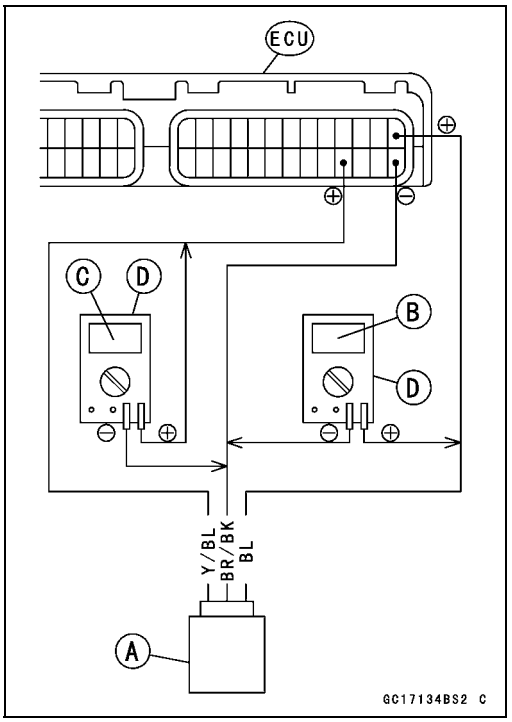
○There are two ways to inspect the DFI system. One is voltage Check Method and the other is Resistance Check Method.

(Voltage Check Method)

○This method is conducted by measuring the input voltage [B] to a sensor [A] first, and then the output voltage [C] from the sensor.

○Sometimes this method can detect a fault of the ECU.

- Refer to each sensor inspection section for detail in this chapter.
- Use a fully charged battery and a digital meter [D] which can be read two decimal places voltage or resistance.



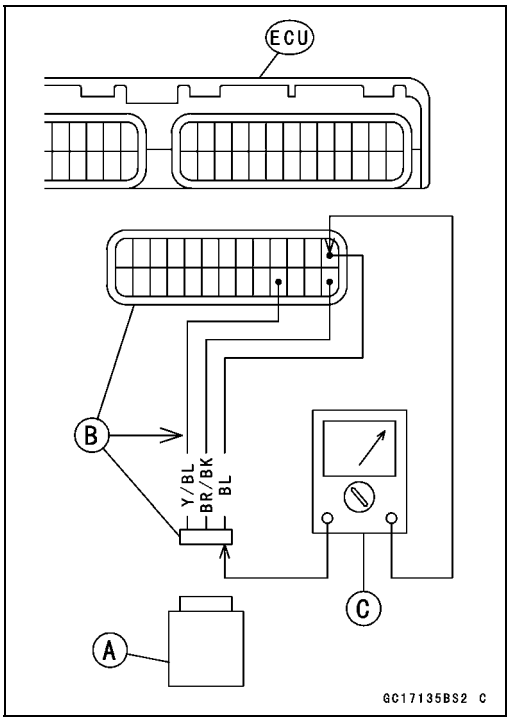
(Resistance Check Method)

○This method is simple. No need for a fully charged battery and the needle adapter. Just do the following especially when a sensor [A] is suspect.

- Turn the ignition SW OFF and disconnect the connectors.
- Inspect the sensor resistance, using a digital meter (see each sensor inspection in this chapter).
- Inspect the wiring and connectors [B] for continuity, using the hand tester [C] (analog tester) rather than a digital meter.

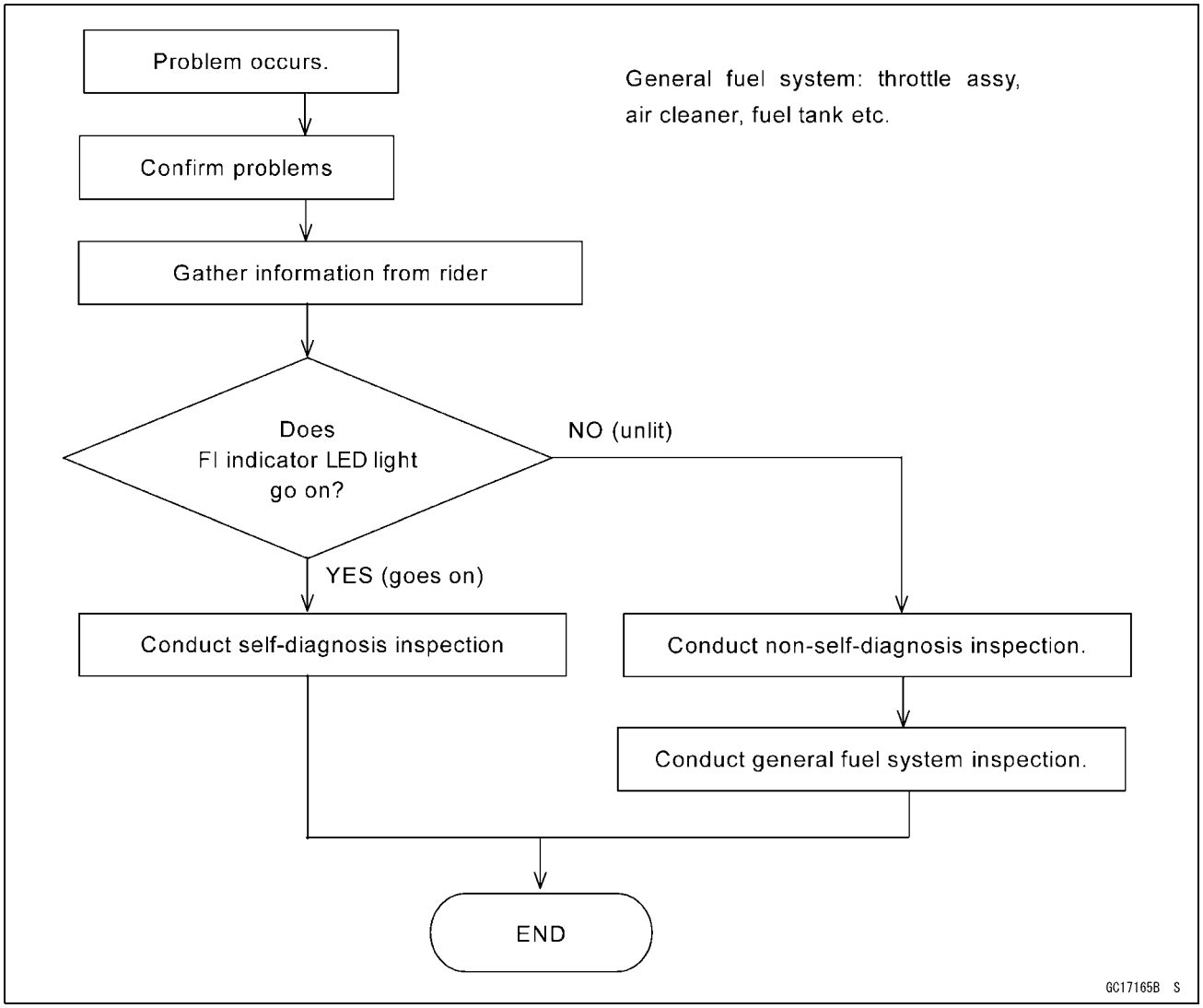
Special Tool - Hand Tester: 57001–1394

★If the sensor, the wiring and connections are good, inspect the ECU for its ground and power supply (see this chapter). If the ground and power supply are good, the ECU is suspect. Replace the ECU.



Troubleshooting the DFI System

DFI Diagnosis Flow Chart



Inquiries to Rider

Inquiries to Rider

○Each rider reacts to problems in different ways, so it is important to confirm what kind of symptoms the rider has encountered.

○Try to find out exactly what problem occurred under exactly what conditions by asking the rider; knowing this information may help you reproduce the problem.

○The following sample diagnosis sheet will help prevent you from overlooking any areas, and will help you decide if it is a DFI system problem, or a general engine problem.

Troubleshooting the DFI System

Sample Diagnosis Sheet

Rider name:	**Registration No. (license plate No.):**	**Year of initial registration:**
Model:	**Engine No.:**	**Frame No.:**
Date problem occurred:		**Mileage:**
Environment when problem occurred.		
Weather	□ fine, □ cloudy, □ rain, □ snow, □ always, □ other:	
Temperature	□ hot, □ warm, □ cold, □ very cold, □ always	
Problem frequency	□ chronic, □ often, □ once	
Road	□ street, □ highway, □ mountain road (□ uphill, □ downhill), □ bumpy, □ pebble	
Altitude	□ normal, □ high (about 1000 m or more)	
Motorcycle conditions when problem occurred.		
FI indicator LED light	□ light up immediately after ignition SW ON, and goes off after 1 ~ 2 seconds (normal)	
	□ lights blinks immediately after ignition SW ON, and stays on (DFI problem)	
	□ lights up immediately after ignition SW ON, but goes off after about 10 seconds (DFI problem)	
	□ unlights (LED light, ECU or its wiring fault)	
	□ sometimes lights up (probably wiring fault)	
Starting difficulty	□ starter motor not rotating	
	□ starter motor rotating but engine doesn't turn over	
	□ starter motor and engine don't turn over	
	□ no fuel flow (□ no fuel in tank, □ no fuel pump sound)	
	□ engine flooded (do not crank engine with throttle opened, which promotes engine flooding)	
	□ no spark	
	□ choke lever is not pulled fully when using the lever (pull it fully when using)	
	□ other	
Engine stops	□ right after starting	
	□ when opening throttle grip	
	□ when closing throttle grip	
	□ when moving off	
	□ when stopping the motorcycle	
	□ when cruising	
	□ other	

Troubleshooting the DFI System

Poor running at low speed	□ choke lever pulled out fully (push it in fully)
	□ very low choke speed (adjust choke cable)
	□ very low idle speed, □ very high idle speed, □ rough idle speed
	□ battery voltage is low (charge the battery)
	□ spark plug loose (tighten it)
	□ spark plug dirty, broken, or gap maladjusted (remedy it)
	□ backfiring
	□ afterfiring
	□ hesitation when acceleration
	□ engine oil viscosity too high
	□ brake dragging
	□ engine overheating
	□ clutch slipping
	□ other
Poor running or no power at high speed	□ choke lever pulled out fully (push it in fully)
	□ spark plug loose (tighten it)
	□ spark plug dirty, broken, or gap maladjusted (remedy it)
	□ spark plug incorrect (replace it)
	□ knocking (fuel poor quality or incorrect, → use high-octane gasoline)
	□ brake dragging
	□ clutch slipping
	□ engine overheating
	□ engine oil level too high
	□ engine oil viscosity too high
	□ other

DFI System Troubleshooting Guide

DFI System 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.*
- *The ECU may be involved in the DFI electrical and ignition system troubles. If these parts and circuits checked out good, be sure to check the ECU for ground and power supply. If the ground and power supply are checked good, replace the ECU.*

Engine Doesn't Start, Starting Difficulty

Symptoms or possible Causes	Actions (chapter)
Starter motor not rotating:	
Ignition and engine stop switches not ON	Turn both switches ON.
Starter lockout switch or neutral switch trouble	Inspect (see chapter 16)
Starter motor trouble	Inspect (see chapter 16).
Battery voltage low	Inspect and charge (see chapter 16).
Starter relays not contacting or operating	Inspect the starter relay (see chapter 16).
Starter button not contacting	Inspect and replace (see chapter 16).
Starter system wiring open or shorted	Inspect the wiring (see chapter 16).
Ignition switch trouble	Inspect and replace (see chapter 16).
Engine stop switch trouble	Inspect and repair or replace (see chapter 16).
Main 30 A or ignition fuse blown	Inspect and replace (see chapter 16).
Starter motor rotating but engine doesn't turn over :	
Starter clutch trouble	Inspect (see chapter 9).
Starter idle gear trouble	Inspect (see chapter 9).
Engine won't turn over :	
Valve seizure	Inspect and replace (see chapter 5).
Cylinder, piston seizure	Inspect and replace (see chapter 5).
Camshaft seizure	Inspect and replace (see chapter 5).
Connecting rod small end seizure	Inspect and replace (see chapter 9).
Connecting rod big end seizure	Inspect and replace (see chapter 9).
Crankshaft seizure	Inspect and replace (see chapter 9).
Transmission gear or bearing seizure	Inspect and replace (see chapter 9).
Balancer bearing seizure	Inspect and replace (see chapter 9).
No fuel flow :	
No or little fuel in tank	Supply fuel (see Owner's Manual).
Fuel pump not rotating	Inspect (see chapter 3).
Fuel injector trouble	Inspect and replace (see chapter 3).
Fuel tank air vent obstructed	Inspect and repair (see chapter 3).
Fuel filter or pump screen clogged	Inspect and replace fuel pump (see chapter 3).
Fuel pressure regulator clogged	Inspect and replace fuel pump (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Engine flooded :	
Spark plug dirty, broken or gap maladjusted	Clean spark plugs and adjust plug gap (see chapter 2).

DFI System Troubleshooting Guide

Symptoms or possible Causes	Actions (chapter)
Starting technique faulty	When flooded, don't crank engine with throttle fully opened.
No spark or spark weak :	
Ignition and engine stop switches not ON	Turn both switches ON .
Clutch lever not pulled in and gear not in neutral whether sidestand up or not	Pull the lever in and shift the gear in neutral.
Though clutch lever pulled in, sidestand up and gear not in neutral	Sidestand down and clutch lever pulled in whether gear in neutral or not
Vehicle-down sensor coming off	Reinstall (see chapter 3).
Vehicle-down sensor trouble	Inspect (see chapter 3) .
ECU ground or power supply trouble	Inspect (see chapter 3) .
Battery voltage low	Inspect and charge (see chapter 16).
Spark plug dirty, broken or gap maladjusted	Clean spark plug and adjust plug gap (see chapter 2).
Spark plug cap trouble	Inspect stick coil (see chapter 16).
Spark plug cap shorted or not in good contact	Reinstall or inspect stick coil (see chapter 16).
Spark plug incorrect	Replace it with the correct plug (see chapter 16).
IC igniter in ECU trouble	Inspect (see chapter 16).
Neutral, starter lockout or sidestand switch trouble	Inspect each switch (see chapter 16).
Crankshaft sensor trouble	Inspect (see chapter 16).
Stick coil trouble	Inspect (see chapter 16).
Ignition switch shorted	Inspect and replace (see chapter 16).
Engine stop switch shorted	Inspect and repair or replace (see chapter 16) .
Starter system wiring shorted or open	Inspect and repair or replace (see chapter 16).
Main 30 A or ignition fuse blown	Inspect and replace (see chapter 16).
Fuel/air mixture incorrect :	
Air cleaner clogged, poorly sealed or missing	Clean or reinstall (see chapter 3).
Leak from oil filler cap, crankcase breather hose or air cleaner drain hose	Inspect and repair or replace (see chapter 3).
Water or foreign matter in fuel	Change fuel. Inspect and clean fuel system (see chapter 3).
Fuel pressure regulator trouble	Inspect fuel pressure and replace fuel pump (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Fuel pressure may be low	Inspect (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Inlet air pressure sensor trouble	Inspect (see chapter 3).
Atmospheric pressure sensor trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Crankshaft sensor trouble	Inspect (see chapter 3).
Compression low :	
Spark plug loose	Reinstall (see chapter 16).
Cylinder head not sufficiently tightened down	Tighten (see chapter 5).

DFI System Troubleshooting Guide

Symptoms or possible Causes	Actions (chapter)
Cylinder, piston worn	Inspect and replace (see chapter 5).
Piston ring bad (worn, weak, broken or sticking)	Inspect and replace (see chapter 5).
Piston ring/groove clearance excessive	Inspect and replace (see chapter 5).
Cylinder head gasket damaged	Replace (see chapter 5).
Cylinder head warped	Inspect and replace (see chapter 5).
No valve clearance	Adjust (see chapter 2).
Valve guide worn	Inspect and replace (see chapter 5).
Valve spring broken or weak	Inspect and replace (see chapter 5).
Valve not seating properly (valve bent, worn or carbon accumulating on seating surface)	Inspect and repair or replace (see chapter 5).

Poor Running at Low Speed

Symptoms or Possible Causes	Actions (chapter)
Spark weak :	
Battery voltage low	Inspect and charge (see chapter 16).
Spark plug dirty, broken or gap maladjusted	Clean spark plugs and adjust plug gap (see chapter 2).
Spark plug cap trouble	Inspect the stick coil (see chapter 16).
Spark plug cap shorted or not in good contact	Reinstall or inspect stick coil (see chapter 16).
Spark plug incorrect	Replace it with the correct plug (see chapter 16).
IC igniter in ECU trouble	Inspect (see chapter 16).
Crankshaft sensor trouble	Inspect (see chapter 16).
Stick coil trouble	Inspect (see chapter 16).
Fuel/air mixture incorrect :	
Little fuel in tank	Supply fuel (see Owner's Manual).
Air cleaner clogged, poorly sealed, or missing	Clean element or inspect sealing (see chapter 3).
Air cleaner duct loose	Reinstall (see chapter 3).
Air cleaner O-ring damaged	Replace (see chapter 3).
Fuel tank air vent obstructed	Inspect and repair (see chapter 3).
Throttle body assy loose	Reinstall (see chapter 3).
Throttle body assy O-ring damage	Replace (see chapter 3).
Choke lever pulled	Push it (see chapter 3).
Fuel filer or pump screen clogged	Inspect and replace fuel pump (see chapter 3).
Fuel pressure regulator clogged	Inspect fuel pressure and replace fuel pump (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Inlet air pressure sensor trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Thermostat trouble	Inspect and replace (see chapter 4).
Unstable (rough) idling :	
Fuel injector trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Crankshaft sensor trouble	Inspect (see chapter 3).
Throttle valves not synchronizing	Inspect (see chapter 2).

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions (chapter)
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Atmospheric pressure sensor trouble	Inspect (see chapter 3).
Fuel pressure too low or too high	Inspect (see chapter 3).
Battery voltage low	Inspect and charge (see chapter 16).
Incorrect idle speed :	
Water temperature sensor trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Engine stalls easily :	
Fuel pump trouble	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Camshaft position sensor trouble	Inspect (see chapter 3).
Fuel pressure too low or too high	Inspect (see chapter 3).
Inlet air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Fuel pressure too low or too high	Inspect (see chapter 3).
Fuel pressure regulator trouble	Inspect fuel pressure and replace fuel pump (see chapter 3).
Crankshaft sensor trouble	Inspect (see chapter 16).
Stick coil trouble	Inspect (see chapter 16).
Compression Low :	
Spark plug loose	Reinstall (see chapter 16).
Cylinder head not sufficiently tightened down	Tighten (see chapter 5).
No valve clearance	Adjust (see chapter 2).
Cylinder, piston worn	Inspect and replace (see chapter 5).
Piston ring bad (worn, weak, broken or sticking)	Inspect and replace (see chapter 5).
Piston ring/groove clearance excessive	Inspect and replace (see chapter 5).
Cylinder head gasket damaged	Replace (see chapter 5).
Cylinder head warped	Inspect and replace (see chapter 5).
Valve guide worn or stem seal damaged	Inspect and replace (see chapter 5).
Valve spring broken or weak	Inspect and replace (see chapter 5).
Valve not seating properly (valve bent, worn or carbon accumulating on seating surface)	Inspect and repair or replace (see chapter 5).
Camshaft cam worn	Inspect and replace (see chapter 5).
Hesitation :	
Too low fuel pressure	Inspect (see chapter 3).
Clogged fuel line	Inspect and repair (see chapter 3).
Cracked or obstructed inlet air pressure sensor hose	Inspect and repair or replace (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions (chapter)
Main throttle sensor trouble	Inspect (see chapter 3).
Subthrottle sensor trouble	Inspect (see chapter 3).
Subthrottle valve actuator trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Atmospheric pressure sensor trouble	Inspect (see chapter 3).
Inlet air pressure sensor trouble	Inspect (see chapter 3).
Loose injector connectors	Remedy (see chapter 3).
Crankshaft sensor trouble	Inspect and repair or replace (see chapter 16).
Stick coil trouble	Inspect and repair or replace (see chapter 16).
Loose terminal of battery (–) lead or engine ground lead	Inspect and repair (see chapter 16).
Delay of ignition timing	Inspect crankshaft sensor and IC igniter in ECU (see chapter 16).
Poor acceleration :	
Choke lever pulled	Push it (see chapter 3).
Too low fuel pressure	Inspect (see chapter 3).
Water or foreign matter in fuel	Change fuel. Inspect and clean fuel system (see chapter 3).
Clogged fuel filter or pump screen	Inspect and replace fuel pump (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Atmospheric pressure sensor trouble	Inspect (see chapter 3).
Subthrottle sensor trouble	Inspect (see chapter 3).
Subthrottle valve actuator trouble	Inspect (see chapter 3).
Stick coil trouble	Inspect and replace (see chapter 16).
Engine oil level to high	Repair (see chapter 7).
Spark plug dirty, broken or gap maladjusted	Clean spark plugs and adjust plug gap (see chapter 2).
Stumble :	
Too low fuel pressure	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Main throttle sensor malfunction	Inspect (see chapter 3).
Subthrottle sensor trouble	Inspect (see chapter 3).
Subthrottle valve actuator trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Inlet air pressure sensor trouble	Inspect (see chapter 3).
Surge :	
Unstable fuel pressure	Fuel pressure regulator trouble (Inspect and replace fuel pump) or kinked fuel line (Inspect and repair fuel line) (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Backfiring when deceleration :	

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions (chapter)
Spark plug dirty, broken or gap maladjusted	Clean spark plugs and adjust plug gap (see chapter 2).
Too low fuel pressure	Inspect (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Atmospheric pressure sensor trouble	Inspect (see chapter 3).
Inlet air pressure sensor trouble	Inspect (see chapter 3).
Vacuum switch valve broken	Inspect and replace (see chapter 5).
Air suction valve trouble	Inspect and replace (see chapter 5).
After fire :	
Crankshaft sensor trouble	Inspect (see chapter 16).
Spark plug burned or gap maladjusted	Adjust plug gap or replace plug (see chapter 2).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Atmospheric pressure sensor trouble	Inspect (see chapter 3).
Inlet air pressure sensor trouble	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Run-on (dieseling) :	
Ignition switch trouble	Inspect and replace (see chapter 16).
Engine stop switch trouble	Inspect and repair or replace (see chapter 16).
Fuel injector trouble	Inspect (see chapter 3).
Loose terminal of battery (–) lead or ECU ground lead	Inspect and repair (see chapter 16).
Carbon accumulating on valve seating surface	Repair (see chapter 5).
Engine overheating	(see Overheating of Troubleshooting Guide, see chapter 17)
Other :	
Engine oil viscosity too high	Change (see chapter 2).
Drive train trouble	Inspect drive chain (see chapter 2) and sprocket (see chapter 11).
Brake dragging	Inspect caliper fluid seal damage or clogging of master cylinder relief and supply ports (see chapter 12).
Clutch slipping	Inspect friction plates for wear (see chapter 6).
Engine overheating	(see Overheating of Troubleshooting Guide, see chapter 17)
Vacuum switch valve trouble	Inspect and replace (see chapter 5).
Air suction valve trouble	Inspect and replace (see chapter 5).
Intermittent any DFI fault and its recovery	Check that DFI connectors are clean and tight, and examine wires for signs of burning or fraying (see chapter 3).

DFI System Troubleshooting Guide

Poor Running or No Power at High Speed:

Symptoms or Possible Causes	Actions (chapter)
Firing incorrect :	
Spark plug dirty, broken or maladjusted	Clean spark plug and adjust plug gap (see chapter 2).
Spark plug cap trouble	Inspect stick coil (see chapter 16).
Spark plug cap shorted or not in good contact	Reinstall or inspect stick coil (see chapter 16).
Spark plug incorrect	Replace it with the correct plug (see chapter 16).
IC igniter in ECU trouble	Inspect (see chapter 16).
Crankshaft sensor trouble	Inspect (see chapter 16).
Stick coil trouble	Inspect (see chapter 16).
Fuel/air mixture incorrect :	
Choke lever pulled	Push it (see chapter 3).
Air cleaner clogged, poorly sealed or missing	Clean element or inspect sealing (see chapter 3).
Air cleaner duct loose	Reinstall (see chapter 3).
Air cleaner O-ring damaged	Replace (see chapter 3).
Water or foreign matter in fuel	Change fuel. Inspect and clean fuel system (see chapter 3).
Throttle body assy loose	Reinstall (see chapter 3).
Throttle body assy O-ring damaged	Replace (see chapter 3).
Fuel tank air vent obstructed	Inspect and repair (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Fuel pump operates intermittently and often ECU fuse blows.	Pump bearings may wear. Replace the pump (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Atmospheric pressure sensor trouble	Inspect (see chapter 3).
Inlet air pressure sensor trouble	Inspect (see chapter 3).
Cracked or obstructed inlet air pressure sensor hose	Inspect and repair or replace (see chapter 3).
Injector clogged	Visually inspect and replace (see chapter 3).
Compression low :	
Spark plug loose	Reinstall (see chapter 16).
Cylinder head not sufficiently tightened down	Tighten (see chapter 5).
No valve clearance	Adjust (see chapter 2).
Cylinder, piston worn	Inspect and replace (see chapter 5).
Piston ring bad (worn, weak, broken or sticking)	Inspect and replace (see chapter 5).
Piston ring/groove clearance excessive	Inspect and replace (see chapter 5).
Cylinder head gasket damaged	Replace (see chapter 5) .
Cylinder head warped	Inspect and replace (see chapter 5).
Valve spring broken or weak	Inspect and replace (see chapter 5).
Valve not seating properly (valve bent , worn or carbon accumulating on the seating surface)	Inspect and repair or replace (see chapter 5).
Knocking :	
Carbon built up in combustion chamber	Repair (see chapter 5).

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions (chapter)
Fuel poor quality or incorrect (Use the gasoline recommended in the Owner's Manual)	Change fuel (see chapter 3).
Spark plug incorrect	Replace it with the correct plug (see chapter 16).
Stick coil trouble	Inspect (see chapter 16).
IC igniter in ECU trouble	Inspect (see chapter 16).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Atmospheric pressure sensor trouble	Inspect (see chapter 3).
Miscellaneous :	
Subthrottle sensor trouble	Inspect (see chapter 3).
Subthrottle valve actuator trouble	Inspect (see chapter 3).
Speed sensor trouble	Inspect (see chapter 3).
Throttle valves won't fully open	Inspect throttle cable and lever linkage (see chapter 3).
Brake dragging	Inspect caliper fluid seal damage or clogging of master cylinder relief and supply ports (see chapter 12).
Clutch slipping	Inspect friction plates for wear (see chapter 6).
Engine overheating - water temperature sensor, crankshaft sensor or speed sensor trouble	(see Overheating of Troubleshooting Guide in chapter 17).
Engine oil level too high	Repair (see chapter 7).
Engine oil viscosity too high	Change (see chapter 3).
Drive train trouble	Inspect drive chain (see chapter 2) and sprockets (see chapter 11).
Camshaft cam worn	Inspect and replace (see chapter 5).
Vacuum switch valve trouble	Inspect and replace (see chapter 5).
Air suction valve trouble	Inspect and replace (see chapter 5).
Catalytic converters melt down due to muffler overheating (KLEEN)	Replace muffler (see chapter 5).
Exhaust Smokes Excessively :	
(White smokes)	
Piston oil ring worn	Inspect and replace (see chapter 5).
Cylinder worn	Inspect and replace (see chapter 5).
Valve oil seal damaged	Replace (see chapter 5).
Valve guide worn	Replace the guide (see chapter 5).
Engine oil level too high	Repair (see chapter 7).
(Black smoke)	
Air cleaner clogged	Clean (see chapter 3).
Choke lever pulled	Push it (see chapter 3).
Too high fuel pressure	Inspect (see chapter 3) .
Injector stuck open	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect and replace (see chapter 3).
Inlet air temperature sensor trouble	Inspect and replace (see chapter 3).
(Brown smoke)	
Air cleaner duct loose	Reinstall (see chapter 3).
Air cleaner O-ring damaged	Replace (see chapter 3).

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions (chapter)
Too low fuel pressure	Inspect fuel line and fuel pump (see chapter 3).
Water temperature sensor trouble	Inspect and replace (see chapter 3).
Inlet air temperature sensor trouble	Inspect and replace (see chapter 3).

Self-Diagnosis

Self-diagnosis Outline

Self-diagnosis Outline

The self-diagnosis system has three modes and can be switched to another mode by grounding the self-diagnosis terminal.

User Mode:

The ECU notifies the rider of troubles in DFI system and ignition system by lighting the FI indicator when DFI system and ignition system parts are faulty, and initiates fail-safe function. In case of serious troubles, the ECU stops the injection/ignition/starter motor operation.

Dealer Mode 1:

The FI indicator LED light emits service code(s) to show the problem(s) which the DFI system and ignition system has at the moment of diagnosis.

Dealer Mode 2:

The FI indicator light LED emits service code(s) to show the problem(s) which the DFI system and ignition system had in the past.

Self-diagnosis Procedures

Self-diagnosis Procedures

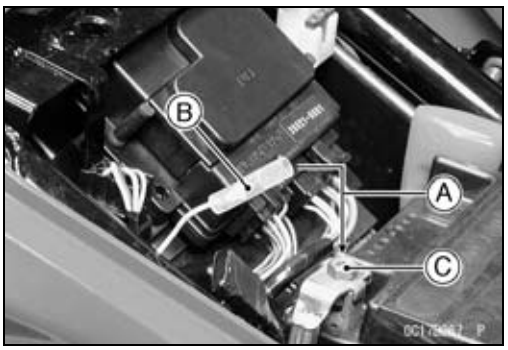
○When a problem occurs with the DFI system and ignition system, the DFI indicator LED light [A] goes on.

NOTE

○*Use a fully charged battery when conducting self-diagnosis. Otherwise, the LED light blinks very slowly or doesn't blink.*

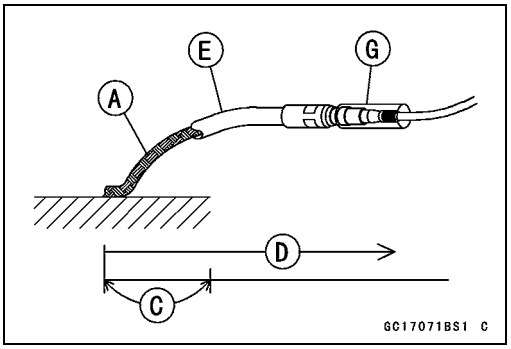
○*Keep the self-diagnosis terminal grounded during self -diagnosis, with an auxiliary lead.*

- Remove the seats (see Frame chapter).
- Ground [A] the self-diagnosis terminal [B] (yellow lead) to the battery (–) terminal [C] or battery (–) lead connector, using a wire.



- Turn on the ignition switch.
- Connect an auxiliary lead [E] to the self-diagnosis terminal [G] for grounding.
- To enter the self-diagnosis dealer mode 1, ground [A] the self-diagnosis indicator terminal to the battery (–) terminal for more than 2 seconds [C], and then keep it grounded continuously [D].

○Count the blinks of the LED light to read the service code. Keep the auxiliary lead ground until you finish reading the service code.

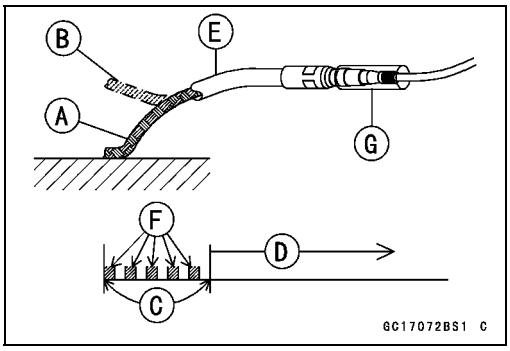


Self-Diagnosis

- To enter the self-diagnosis dealer mode 2, open [B] and ground [A] the lead more than five times [F] within 2 seconds [C] after the lead is first grounded, and then keep it grounded continuously [D] for more than 2 seconds.

○Count the blinks of the LED light to read the service code. Keep the auxiliary lead ground until you finish reading the service code.

Auxiliary Lead [E]
Self-diagnosis Terminal [G]



NOTE

○*To enter the dealer mode 2 from the dealer mode 1, turn off the ignition switch once.*

Service Code Clearing Procedures

Service Code Clearing Procedures

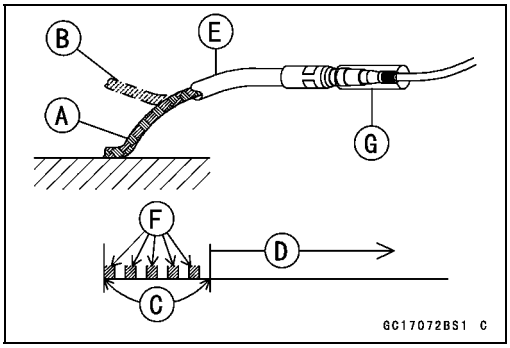
- Enter the self-diagnosis dealer mode 2 (see Self -diagnosis Procedures).

NOTE

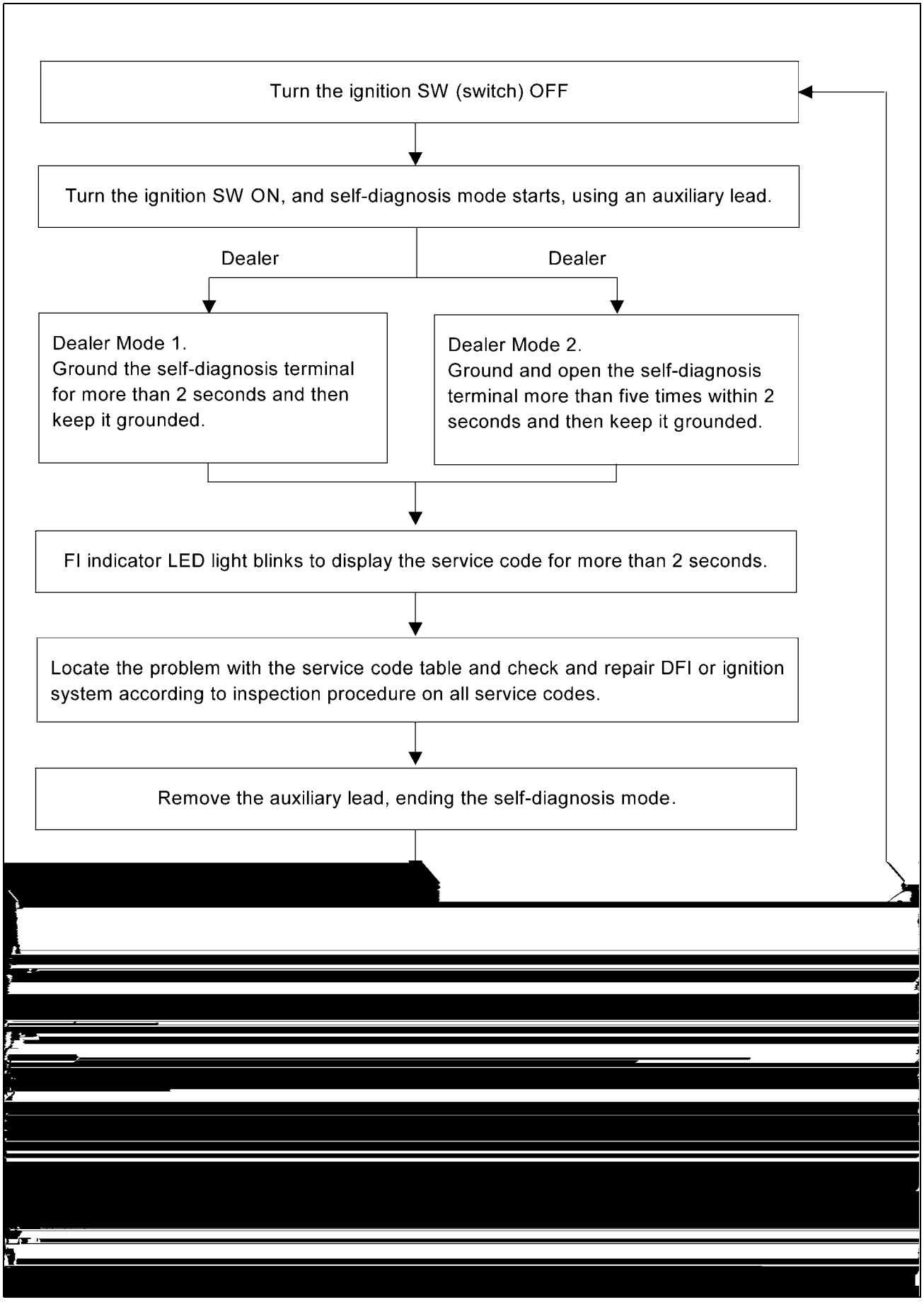
○*Make sure to keep the grounding until the following opening and grounding starts.*

- Pull the clutch lever in more than 5 seconds, and then release it.
- Repeat opening [B] and grounding [A] the lead (self-diagnosis terminal) more than five times [F] within 2 seconds [C] after the lead is grounded, and then keep it grounded continuously [D] for more than 2 seconds.

Auxiliary Lead [E]
Self-diagnosis Terminal [G]



Self-Diagnosis

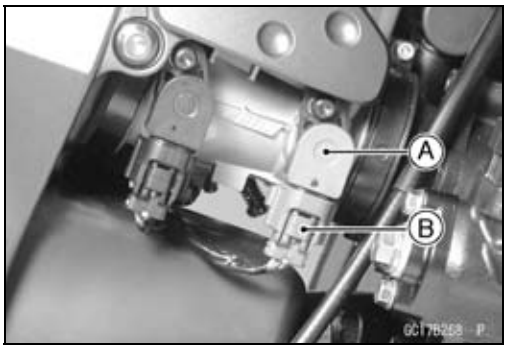


Main Throttle Sensor (Service Code 11)

Main Throttle Sensor Removal/Adjustment

CAUTION

Do not remove or adjust the main throttle sensor [A] since it has been adjusted and set with precision at the factory.
Never drop the sensor, especially on a hard surface. Such a shock to the sensor can damage it.



Main Throttle Sensor Connector (gray) [B]

Input Voltage Inspection

NOTE

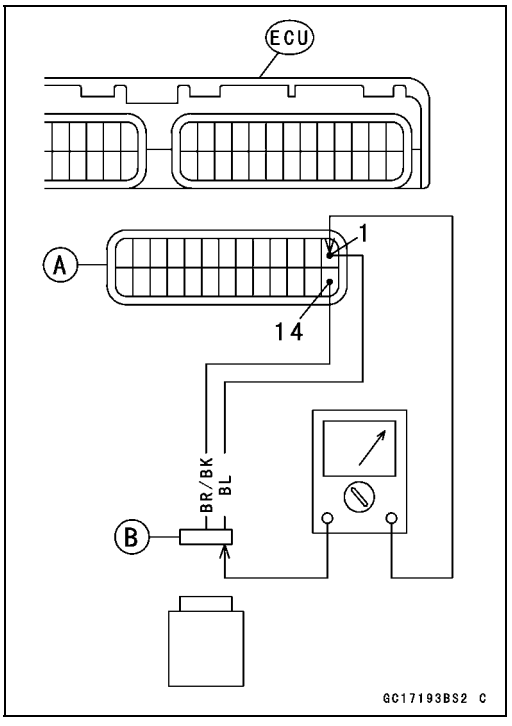
○*Be sure the battery is fully charged.*

- Turn the ignition switch OFF.
- Disconnect the main throttle sensor (gray) [A] and connect the harness adapter [B] between these connectors.
- Connect a digital meter to the harness adapter lead.

Special Tool - Throttle Sensor Harness Adapter : 57001–1538

- Measure the sensor input voltage with the engine stopped and with the connector joined.
- Turn the ignition switch ON.

Main Throttle Sensor Input Voltage
Connections to Adapter
Meter (+) → R (sensor BL) lead
Meter (–) → BK (sensor BR/BK) lead
Standard : 4.75 ~ 5.25 V DC



- Turn the ignition switch OFF.

★If the input voltage is normal, check the sensor output voltage.

★If the input voltage is less than the standard, remove the ECU and check the wiring between these connectors.

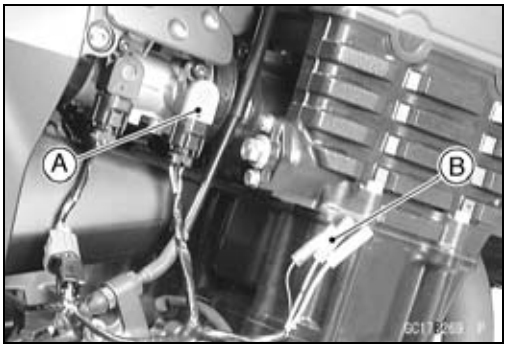
○Disconnect the ECU and sensor connectors.

Wiring Connection
ECU Connector [A] ←→ Throttle Sensor Connector [B]
BL lead (ECU terminal 1)
BR/BK lead (ECU terminal 14)

★If the wiring is good, check the ECU for its ground and power supply (see ECU section).

Main Throttle Sensor (Service Code 11)

Output Voltage Inspection



- Measure the output voltage at the main throttle sensor in the same way as input voltage inspection, Note the following.
- Disconnect the main throttle sensor (gray) [A] and connect the harness adapter [B] between these connectors.

Special Tool - Throttle Sensor Harness Adapter : 57001–1538

- Start the engine and warm it up thoroughly.
- Check idle speed to ensure the throttle opening is correct.

Idle Speed
Standard: 1 100 ±50 r/min (rpm)

★If the idle speed is out of the specified range, adjust it (see Idle Speed Inspection in the Periodic Maintenance chapter).

- Turn off the ignition switch.
- Measure the output voltage of the sensor with the engine stopped, and with the connector joined.
- Turn the ignition SW ON.

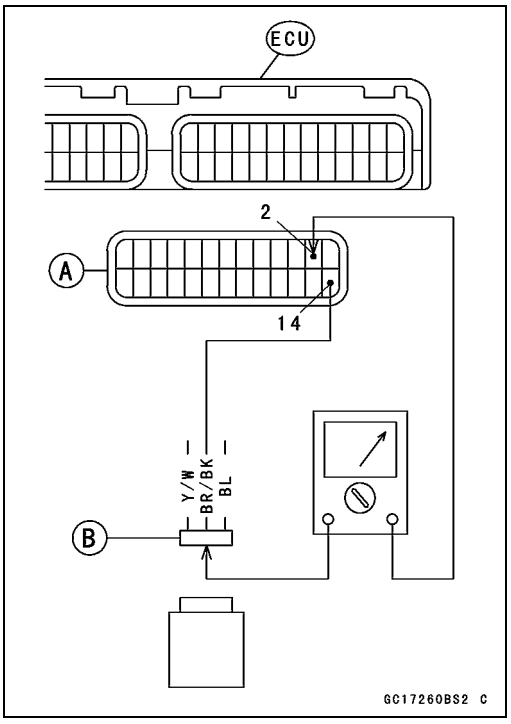
Main Throttle Sensor Output Voltage
Connections to Adapter
Meter (+) → W (sensor Y/W) lead
Meter (–) → BK (sensor BR/BK) lead
Standard :
0.99 ~ 1.03 V DC (at idle throttle opening)
4.19 ~ 4.39 V DC (at full throttle opening)

★If the output voltage is out of the standard, inspect the main throttle sensor resistance.

★If the output voltage is normal, check the wiring for continuity.

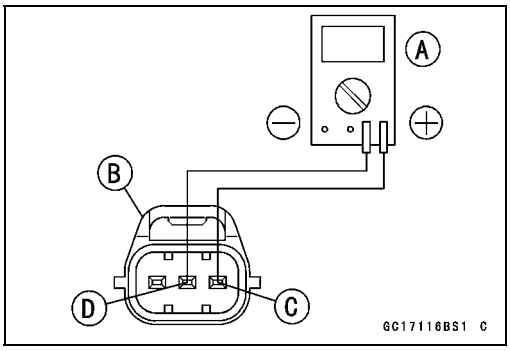
Wiring Connection
ECU Connector [A] ←→ Throttle Sensor Connector [B]
Y/W lead (ECU terminal 2)
BR/BK lead (ECU terminal 14)

★If the wiring is good, check the ECU for its ground and power supply (see ECU section).



Main Throttle Sensor (Service Code 11)

Resistance Inspection

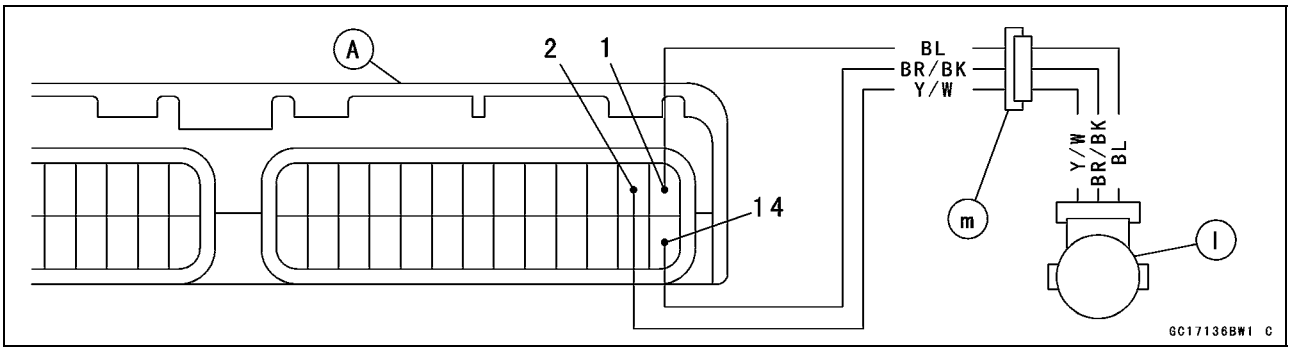


- Turn the ignition switch OFF.
- Disconnect the main throttle sensor connector.
- Connect a digital meter [A] to the main throttle sensor connector [B].
- Measure the main throttle sensor resistance.

Main Throttle Sensor Resistance
Connections: BL lead [C] ⟷ BR/BK lead [D]
Standard: 4 ~ 6 kΩ

★If the reading is out of the range, replace the throttle body assy.

★If the reading is within the range, but the problem still exists, replace the ECU (see this chapter).



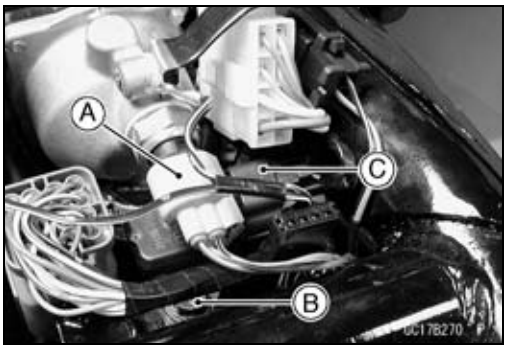
A. ECU
I. Main Throttle Sensor
m. Throttle Body Assy Connector

Inlet Air Pressure Sensor (Service Code 12)

CAUTION

Never drop the sensor, especially on a hard surface. Such a shock to the part can damage it.

Removal



- Remove:
  Fuel Tank (see Fuel System chapter)
  Water Temperature Sensor Connector [A]
  Inlet Air Pressure Sensor Bolt [B]
- Raise the inlet air pressure sensor [C] and disconnect the inlet air pressure sensor connector and the vacuum hose.

Installation

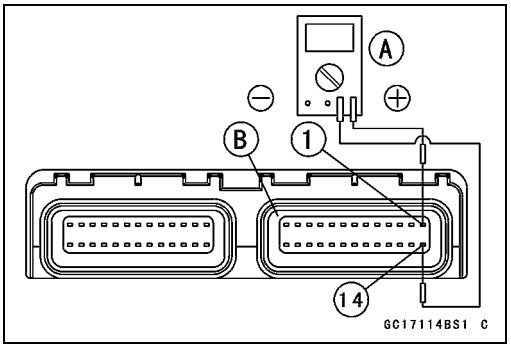
NOTE

○*The inlet air pressure sensor is the same part as the atmospheric sensor except that the sensor has a vacuum hose and different wiring.*

- Install:
  Vacuum Hose
  Inlet Air Pressure Sensor

Torque - Inlet Air Pressure Sensor Bolt: 12 N·m (1.2 kgf·m, 104 in·lb)

Input Voltage Inspection



NOTE

○*Be sure the battery is fully charged.*
○*The inspection is the same as "Input Voltage Inspection" of the main throttle sensor or the atmospheric pressure sensor.*

- Turn the ignition switch OFF.
- Remove the ECU (see this chapter). Do not disconnect the ECU connectors.
- Connect a digital voltmeter [A] to the connector [B] with the needle adapter set.

Special Tool - Needle Adapter Set: 57001–1457

- Measure the input voltage with the engine stopped, and with the connectors joined.
- Turn the ignition switch ON.

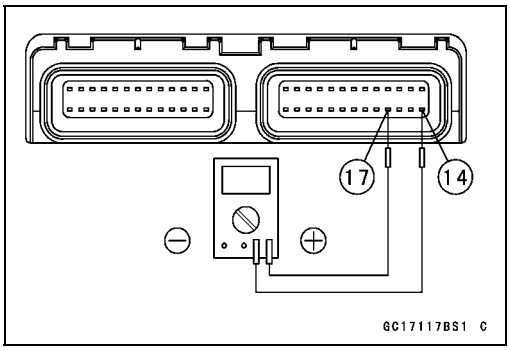
Inlet Air Pressure Sensor Input Voltage
Connections to ECU
Meter (+)→ BL lead (terminal 1)
Meter (–) → BR/BK lead (terminal 14)

Standard: 4.75 ~ 5.25 V DC

★If the reading is within the standard range, check the sensor output voltage.
★If the reading is less than the standard range, remove the ECU and check the wiring between these connectors.
★If the wiring is good, check the ECU for its ground and power supply (see ECU section).

Inlet Air Pressure Sensor (Service Code 12)

Output Voltage Inspection



NOTE

○*The output voltage changes according to the local atmospheric pressure.*

● Measure the output voltage at the ECU in the same way as input voltage inspection. Note the following.

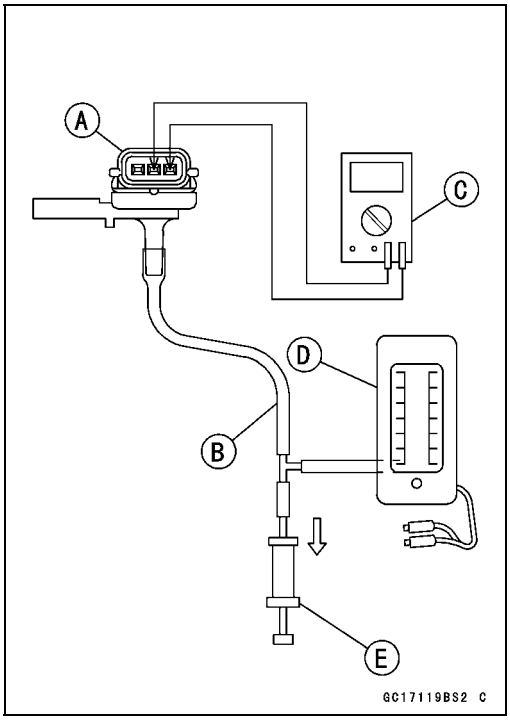
Inlet Air Pressure Sensor Output Voltage
Connections to ECU
Meter (+) → Y/BL lead (terminal 17)
Meter (–) → BR/BK lead (terminal 14)

Usable Range: 3.74 ~ 4.26 V DC at the standard atmospheric pressure (101.32 kPa, 76 cmHg abs.)

● Turn the ignition switch OFF.
★If the output voltage is within the usable range, check the ECU for its ground, and power supply (see this chapter).
★If the output voltage is out of the usable range, remove the fuel tank and check the wiring. If the output voltage is 4.8 V, the ECU is normal.

★If the wiring is good, check the sensor for various vacuum.
★If the output voltage for various vacuum is normal check the ECU for its ground, and power supply (see ECU section).
● Remove the inlet air pressure sensor [A] and disconnect the vacuum hose from the sensor.
○Do not disconnect the sensor connector.
● Connect an auxiliary hose [B] to the inlet air pressure sensor.
● Temporarily install the inlet air pressure sensor.
○Connect a commercially available digital meter [C], vacuum gauge [D], the fork oil level gauge [E] and the harness adapter to the inlet air pressure sensor.

Special Tools - Fork Oil Level Gauge: 57001–1290
Sensor Harness Adapter: 57001–1561



Inlet Air Pressure Sensor Output Voltage
Connection to Adapter
Meter (+) → BL (sensor Y/BL) lead
Meter (–) → Y/W (sensor BR/BK) lead

○Turn the ignition switch ON.
○Measure the inlet air pressure sensor output voltage from various vacuum readings, while pulling the handle of the fork oil level gauge.
○Check the inlet air pressure sensor output voltage, using the following formula and chart.

Suppose:
Pg : Vacuum Pressure (gauge) to Sensor
Pl : Local Atmospheric Pressure (absolute) measured by a barometer
Pv : Vacuum Pressure (absolute) to Sensor
Vv : Sensor Output Voltage (v)

Inlet Air Pressure Sensor (Service Code 12)

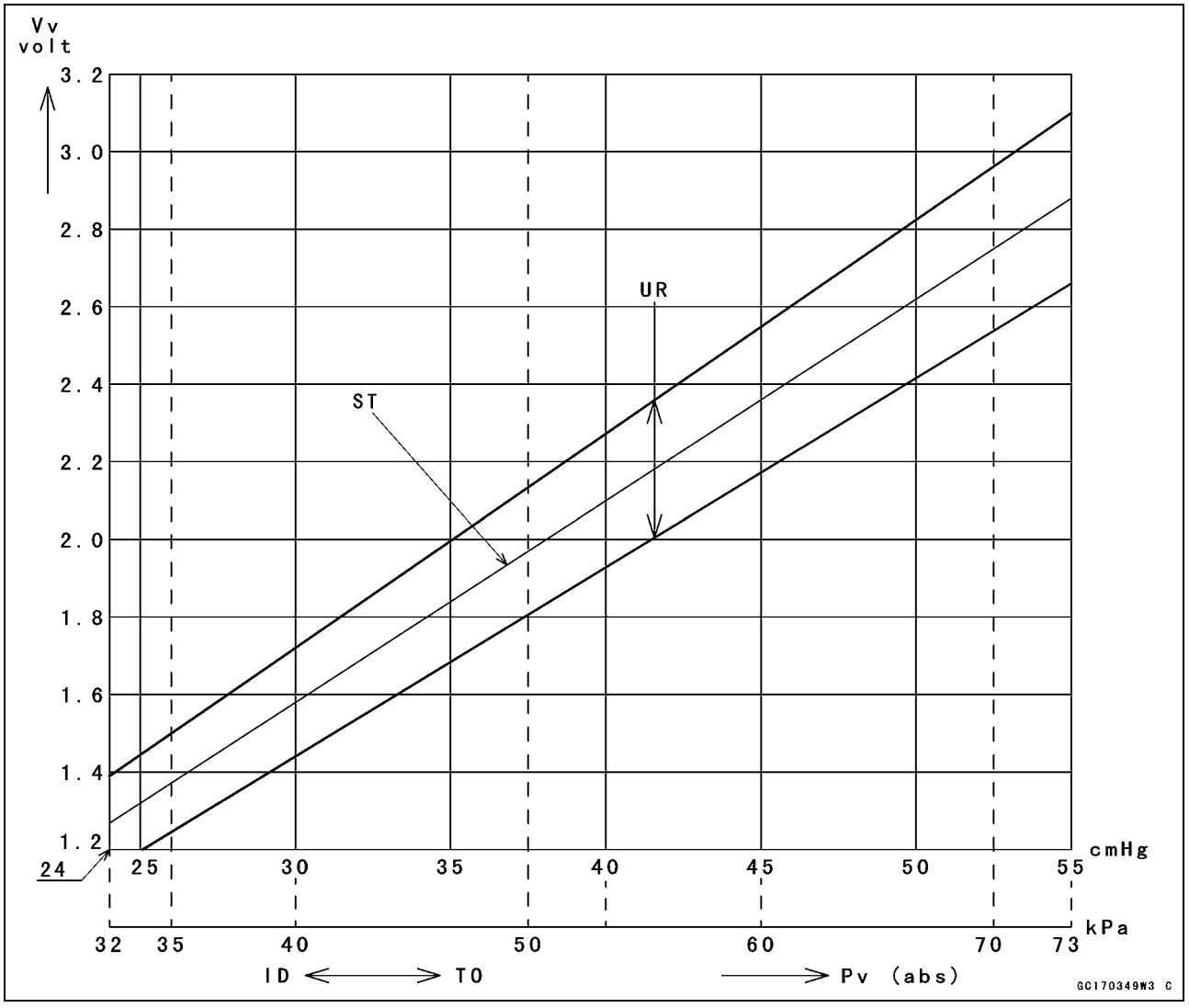
then
Pv = Pl – Pg

For example, suppose the following data is obtained:
Pg = 8 cmHg (vacuum gauge reading)
Pl = 70 cmHg (barometer reading)
Vv = 3.2 V (digital volt meter reading)

then
Pv = 70 – 8 = 62 cmHg (abs)

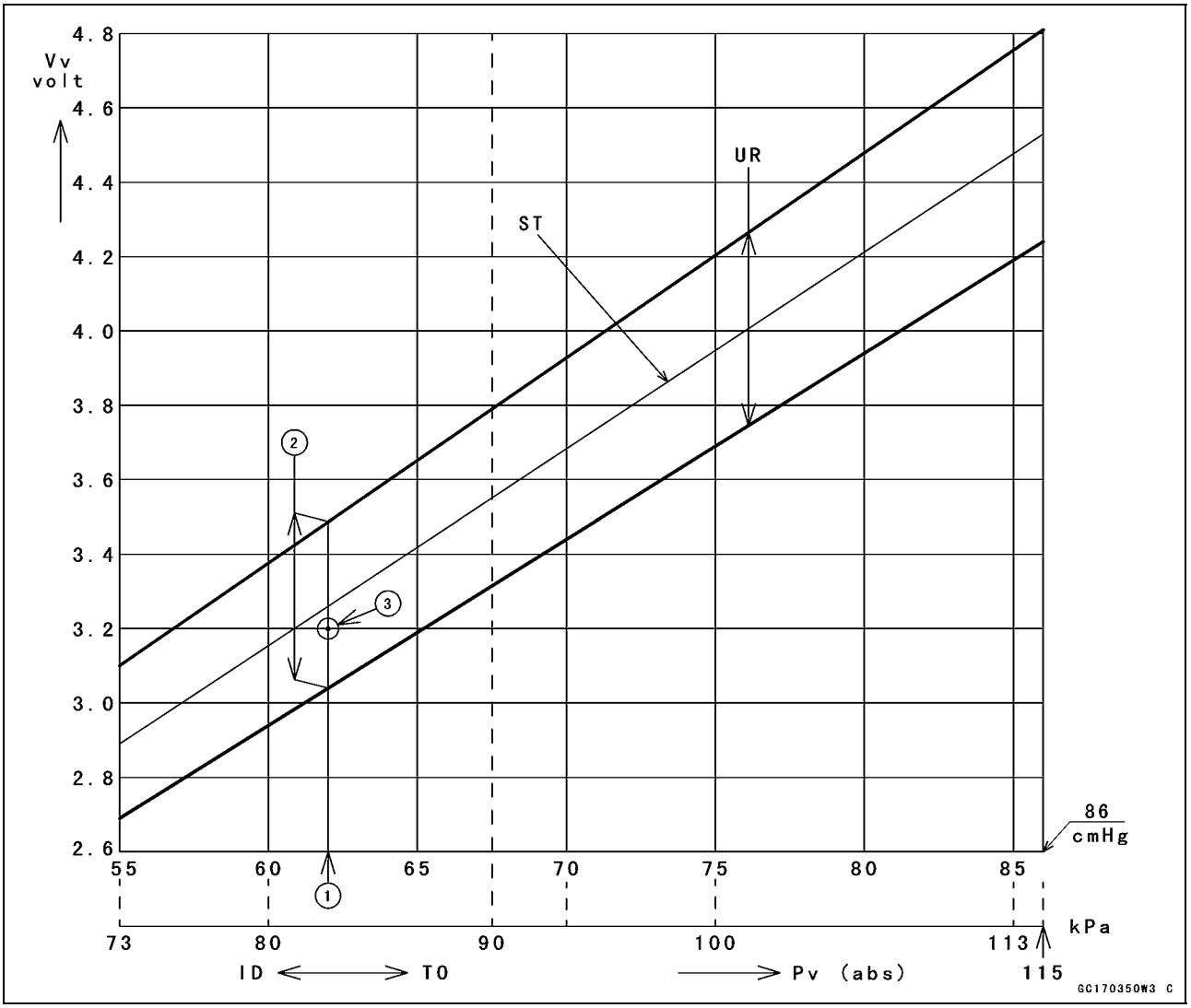
Plot this Pv (62 cmHg) at a point [1] on the chart and draw a vertical line through the point. Then, you can get the usable range [2] of the sensor output voltage.
Usable range = 3.04 ~ 3.49 V

Plot Vv (3.2 V) on the vertical line. → Point [3].
Results: In the chart, Vv is within the usable range and the sensor is normal.
Pv = 24 ~ 55 cmHg



Inlet Air Pressure Sensor (Service Code 12)

Pv = 55 ~ 86 cmHg



Vv: Inlet Air Pressure Sensor Output Voltage (V) (Digital Meter Reading)

Pv: Throttle Vacuum Pressure (absolute)

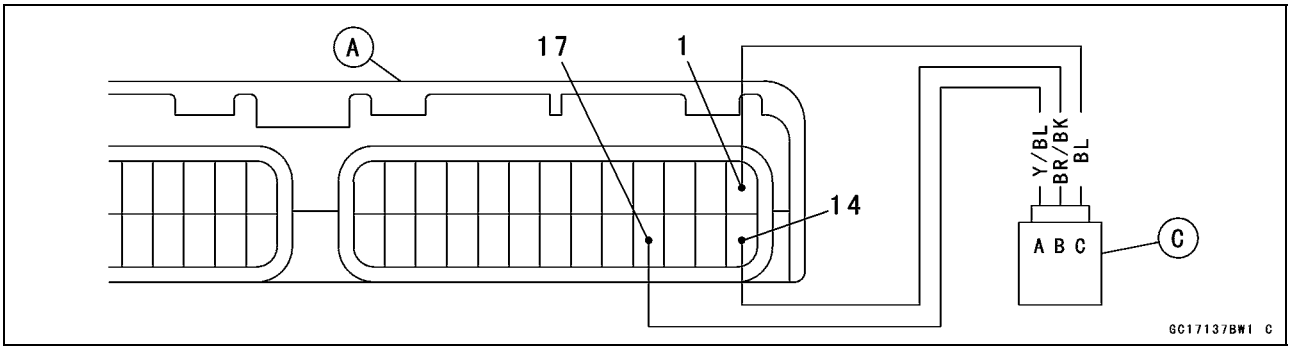
Ps: Standard Atmospheric Pressure (absolute)

ID: Idling

TO: Throttle Full Open

ST: Standard of Sensor Output Voltage (v)

UR: Usable Range of Sensor Output Voltage (v)



A. ECU

C. Inlet Air Pressure Sensor

Inlet Air Temperature Sensor (Service Code 13)

Removal/Installation

CAUTION

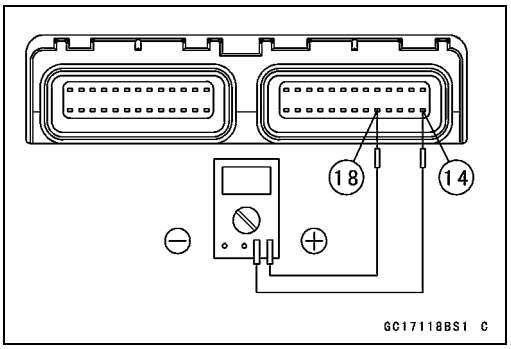
Never drop the sensor, especially on a hard surface. Such a shock to the sensor can damage it.

- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the connector [A] from the inlet air temperature sensor.
- Pull out the inlet air temperature sensor.
- Put the inlet air temperature sensor into the grommet.

Output Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*
○*The output voltage changes according to the inlet air temperature.*



- Remove the ECU (see this chapter). Do not disconnect the ECU connectors.
- Connect a digital voltmeter to the ECU connector, using needle adapter set.

Special Tool - Needle Adapter Set: 57001–1457

- Measure the sensor output voltage with the engine stopped and the connector joined.
- Turn the ignition switch ON.

Inlet Air Temperature Sensor Output Voltage
Connections to ECU Connector
Meter (+) → Y lead (terminal 18)
Meter (–) → BR/BK lead (terminal 14)

Standard: **about 2.25 ~ 2.50 V at inlet air temperature 20°C (68°F)**

- Turn the ignition switch OFF.

★If the output voltage is out of the standard, remove the fuel tank and check the wiring. And if the output voltage is 4.8 V, the ECU is normal.

★If the output voltage is within the standard, check the ECU for its ground, and power supply (see ECU section in this chapter).

★If the wiring is good, check the sensor resistance.

- Remove the needle adapter set, and apply silicone sealant to the seals of the connector for waterproofing.

Silicone Sealant (Kawasaki Bond: 56019–120) –
Seals of ECU Connectors

Inlet Air Temperature Sensor (Service Code 13)

Sensor Resistance Inspection

- Remove the inlet air temperature sensor (see this section).
- Suspend the sensor [A] in a container of machine oil so that the heat-sensitive portion is submerged.
- Suspend a thermometer [B] with the heat-sensitive portion [C] located in almost the same depth with the sensor.

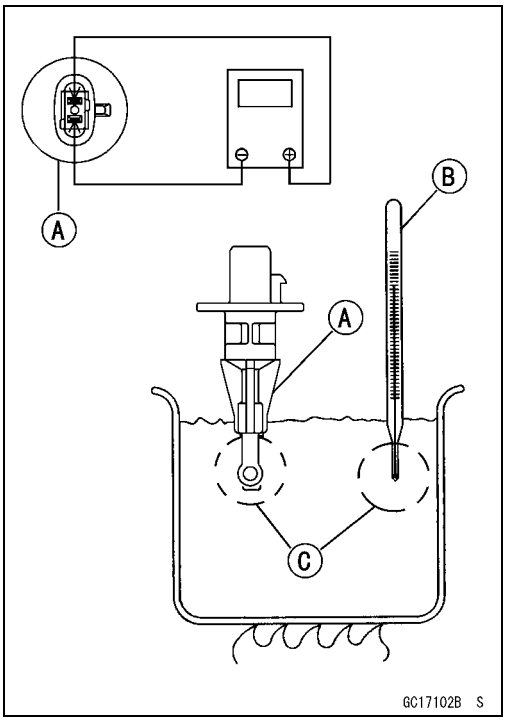
NOTE

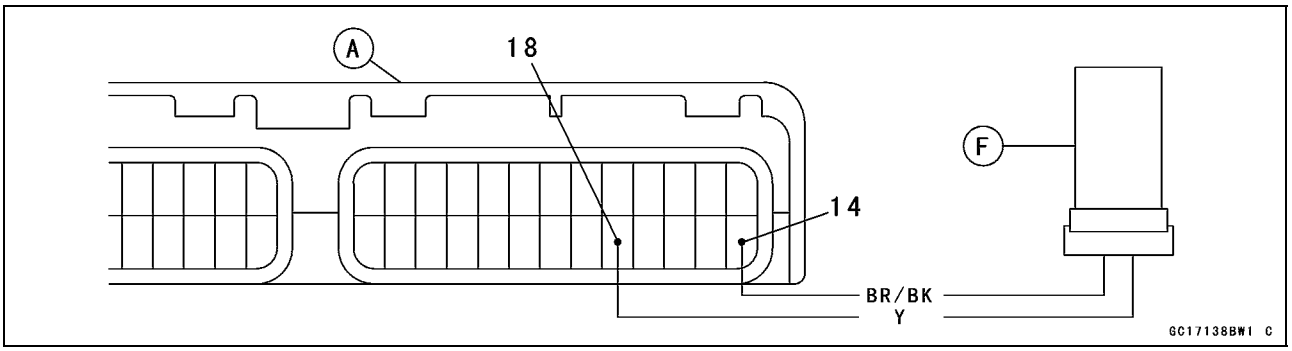
○*The sensor and thermometer must not touch the container side or bottom.*

- Place the container over a source of heat and gradually raise the temperature of the oil while stirring the oil gently for even temperature.
- Using a digital meter, measure the internal resistance of the sensor across the terminals at the temperatures shown in the table.

Inlet Air Temperature Sensor Resistance
Standard: 1.6 ~ 3.7 kΩ at 20°C (68°F)
0.24 ~ 0.43 kΩ at 80°C (176°F)

★If the measurement is out of the range, replace the sensor.
★If the measurement is within the specified, replace the ECU.





A. ECU
F. Inlet Air Temperature Sensor

Water Temperature Sensor (Service Code 14)

Removal/Installation

CAUTION

Never drop the sensor, especially on a hard surface. Such a shock to the sensor can damage it.

- Remove the fuel tank (see Fuel Tank Removal).
- Drain the coolant (see Cooling System chapter).
- Disconnect the sensor connector, and unscrew the water temperature sensor [A].

Torque - Water Temperature Sensor: 25 N·m (2.5 kgf·m, 18 ft·lb)

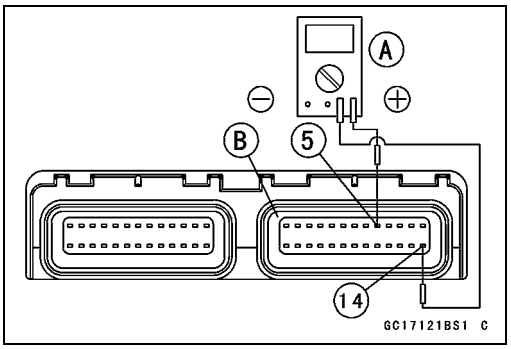
- Fill the engine with coolant and bleed the air from the cooling system (see Coolant Change in the Periodic Maintenance chapter).

Output Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

- Remove the ECU (see this chapter). Do not disconnect the connectors.



- Connect a digital voltmeter [A] to the ECU connector [B] with the needle adapter set.

Special Tool - Needle Adapter Set: 57001–1457

- Measure the sensor output voltage with the engine stopped and the connector joined.
- Turn the ignition switch ON.

Water Temperature Sensor Output Voltage
Connections to ECU
Meter (+) → O lead (terminal 5)
Meter (–) → BR/BK lead (terminal 14)

Standard: about 2.80 ~ 2.97 V at 20°C (68°F)

NOTE

○*The output voltage changes according to the coolant temperature in the engine.*

- Turn the ignition switch OFF.

★If the output voltage is within the standard, check the ECU for its ground, and power supply (see this chapter).

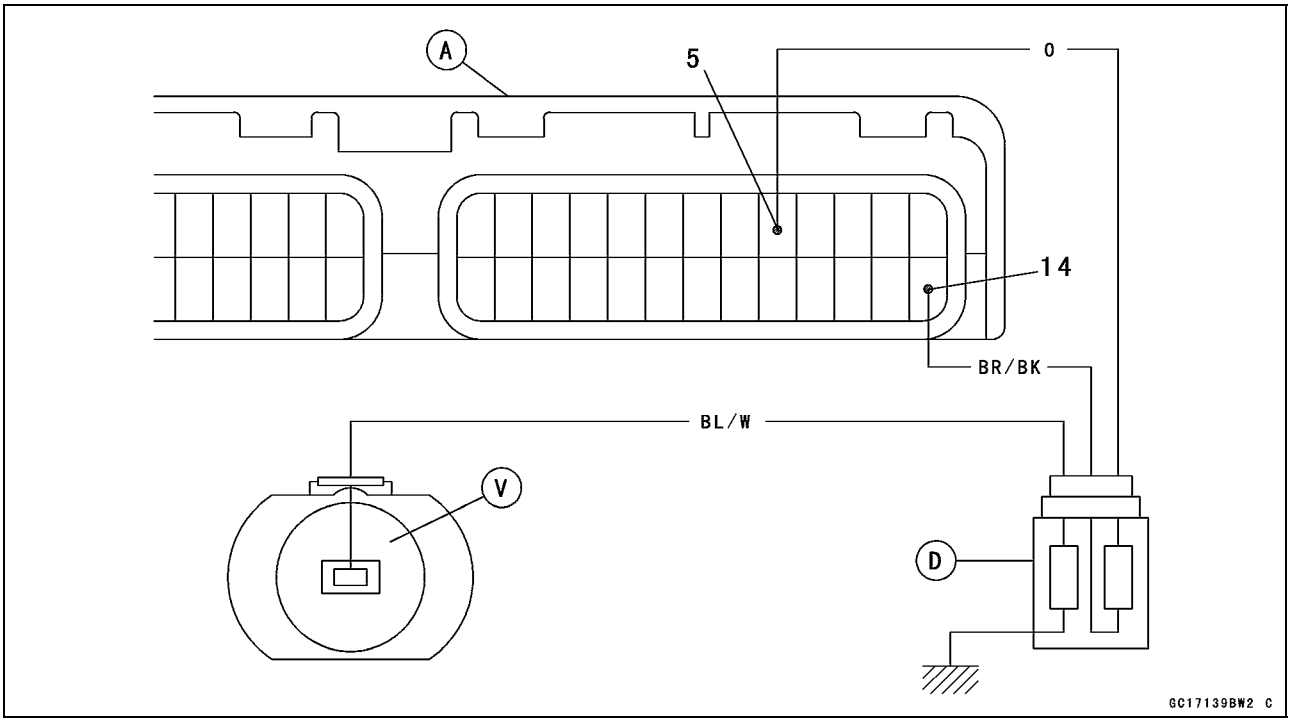
★If the output voltage is out of the standard, remove the fuel tank and check the wiring. And if the output voltage is 4.8 V, the ECU is normal.

★If the wiring is good, check the water temperature sensor resistance.

- Remove the needle adapter set, and apply silicone sealant to the seals of the connector for waterproofing.

Silicone Sealant (Kawasaki Bond: 56019–120) –
Seals of ECU Connectors

Water Temperature Sensor (Service Code 14)



A. ECU
D. Water Temperature Sensor
V. Coolant Temperature Gauge in Tachometer

Sensor Resistance Inspection

- Remove the water temperature sensor (see this section).
- Refer to the Electrical System chapter for water temperature sensor inspection.

Atmospheric Pressure Sensor (Service Code 15)

CAUTION

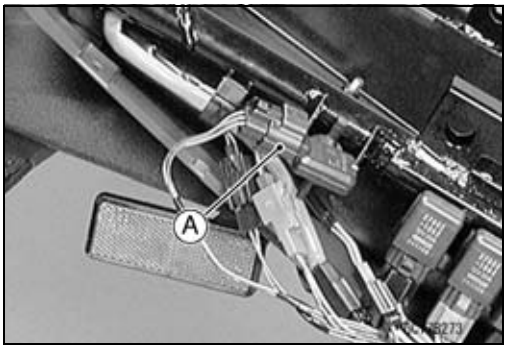
Never drop the sensor, especially on a hard surface. Such a shock to the sensor can damage it.

NOTE

○*The atmospheric pressure sensor is the same part as the inlet air pressure sensor except that the inlet air pressure sensor has the vacuum hose and different wiring.*

Removal

- Turn the ignition switch off.
- Remove the seat cover (see Frame chapter).
- Remove the atmospheric pressure sensor [A] from the rubber damper in the frame.
- Disconnect the sensor connector.



Input Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

○*The inspection is the same as "Input Voltage Inspection" of the throttle sensor and the inlet air pressure sensor.*

- Turn the ignition switch OFF.
- Remove the ECU (see this chapter). Do not disconnect the ECU connectors.
- Connect a digital voltmeter [A] to the connector [B], with the needle adapter set.

Special Tool - Needle Adapter Set: 57001–1457

- Measure the input voltage with the engine stopped, and with the connectors joined.
- Turn the ignition switch ON.

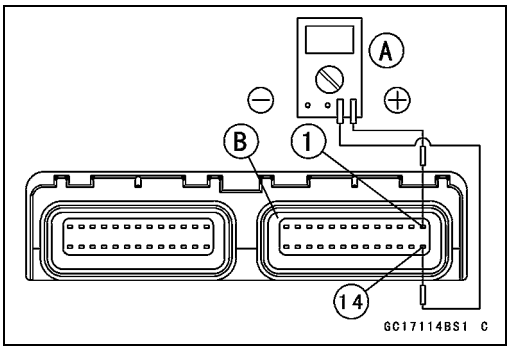
Atmospheric Pressure Sensor Input Voltage
Connections to ECU
Meter (+) → BL lead (terminal 1)
Meter (–) → BR/BK lead (terminal 14)

Standard: 4.75 ~ 5.25 V DC

★If the reading is within the standard range, check the sensor output voltage.

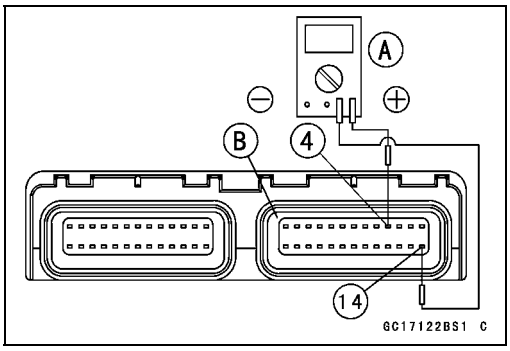
★If the reading of input voltage is less than the standard range, remove the ECU and check the wiring between these connections.

★If the wiring is good, check the ECU for its ground and power supply (see ECU section).



Atmospheric Pressure Sensor (Service Code 15)

Output Voltage Inspection



● Measure the output voltage at the ECU in the same way as input voltage inspection. Note the following.
Digital Meter [A]
ECU Connector [B]

Atmospheric Pressure Sensor Output Voltage
Connections to ECU

Meter (+) → G/W lead (terminal 4)

Meter (–) → BR/BK lead (terminal 14)

Usable Range: 3.74 ~ 4.26 V DC at the standard atmospheric pressure (101.32 kPa, 76 cmHg abs.)

NOTE

○*The output voltage changes according to the local atmospheric pressure.*

● Turn the ignition switch OFF.

★If the output voltage is within the usable range, check the ECU for its ground, and power supply (see this chapter).

★If the output voltage is out of the standard, remove the seat cover and check the wiring. And if the output voltage is 4.8 V, the ECU is normal.

★If the wiring is good, check the sensor for various vacuum.

★If the output voltage for various vacuum is normal, check the ECU for its ground, and power supply (see ECU section).

○Determine the local altitude (elevation).

★If you know the local atmospheric pressure using a barometer, substitute the atmospheric pressure for Pv (throttle vacuum) in the vacuum sensor chart (see inlet air pressure sensor section in this chapter).

○Get the usable range of the atmospheric pressure sensor output voltage in the same way as Output Voltage Inspection of the inlet air pressure sensor and check if Va (output voltage) is within the usable range or not.

★If you know the local altitude, use the following chart.

For example:

Suppose the local altitude is 1300 m (4200 ft) and the sensor output voltage Va is 3.3 V.

Plot this H (1300 m) at a point [1] on the following chart and draw a vertical line through the point.

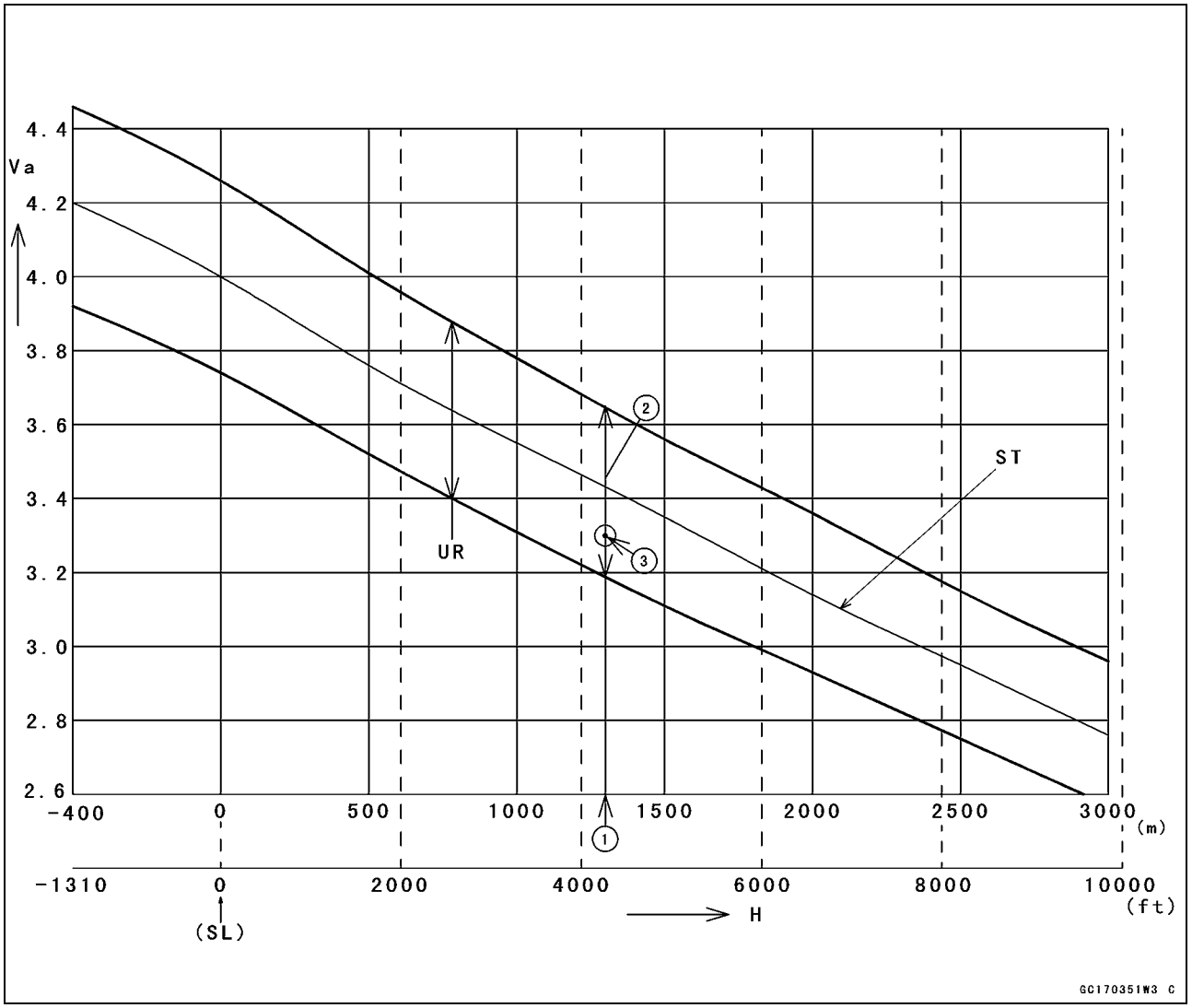
Then, you can get the usable range [2] of the sensor output voltage.

Usable Range = 3.2 ~ 3.64 V

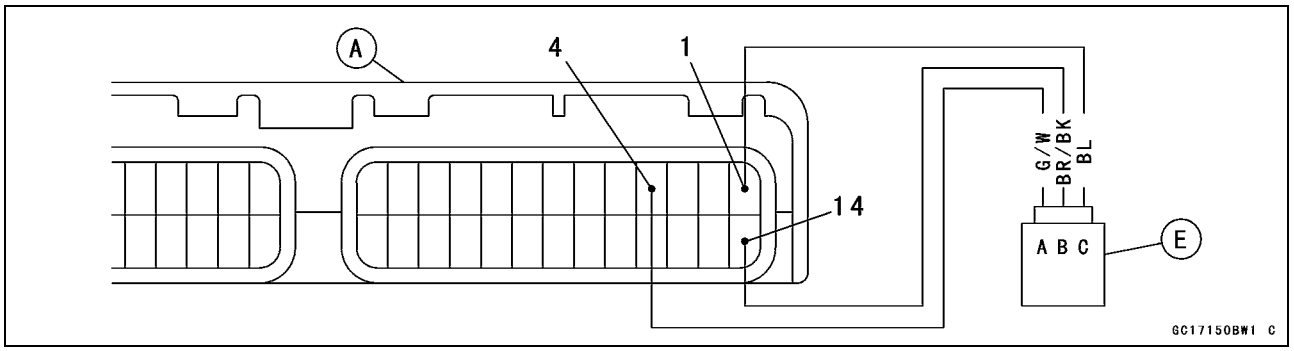
Plot Va (3.3 V) on the vertical line → Point [3]

Results: In the chart, Va is within the usable range and the sensor is normal.

Atmospheric Pressure Sensor (Service Code 15)



Va: Atmospheric Pressure Sensor Output Voltage (v)
ST: Standard of Sensor Output Voltage (v)
H: Altitude (m or feet)
UR: Usable Range of Sensor Output Voltage (v)



A. ECU
E. Atmospheric Pressure Sensor

Crankshaft Sensor (Service Code 21)

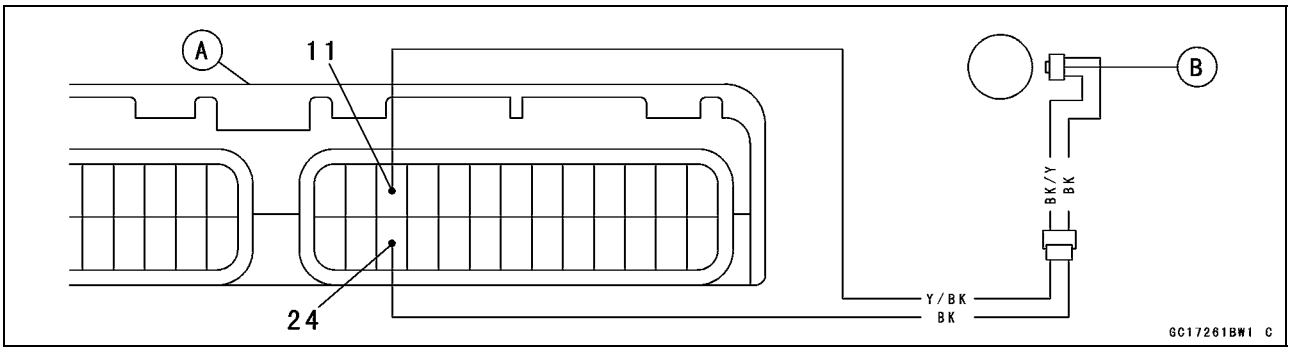
Start the engine and switch the diagnosis mode to Dealer 1 mode to know all the problem that the DFI system has at the time of self-diagnosis. If the engine cannot be started, the self-diagnosis system does not detect dynamic condition of the crankshaft sensor. In this case, turn off the ignition switch and turn it on again to enter the Dealer 2 mode. In this mode, the system tells all the troubles which the DFI system had in both static and dynamic conditions.

Crankshaft Sensor Removal/Installation

- See the Ignition System section in the Electrical System chapter.

Crankshaft Sensor Inspection

- The crankshaft sensor has no power source, and when the engine stops, the crankshaft sensor generates no signals.
- Crank the engine and measure the peak voltage of the crankshaft sensor (see Electrical System chapter) in order to check the sensor.
- Check the wiring for continuity, using the following diagram.



A. ECU
B. Crankshaft Sensor

Camshaft Position Sensor (Service Code 23)

Start the engine and switch the diagnosis mode to Dealer 1 mode to know all the problem that the DFI system has at the time of self-diagnosis. If the engine cannot be started, the self-diagnosis system does not detect dynamic condition of the camshaft position sensor. In this case, turn off the ignition switch and turn it on again to enter the Dealer 2 mode. In this mode, the system tells all the troubles which the DFI system had in both static and dynamic conditions.

Camshaft Position Sensor Removal/Installation

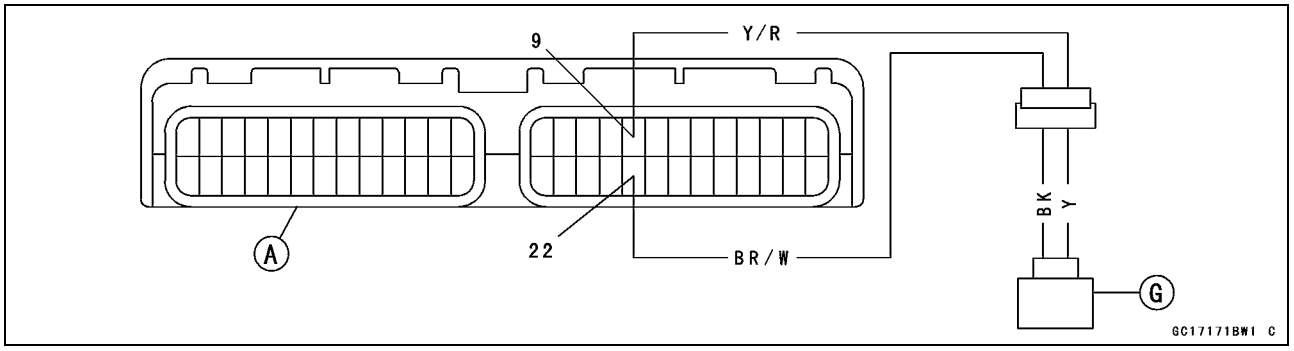
The camshaft position sensor detects the position of the camshaft, and distinguishes the cylinder.

- See the Ignition system section in the Electric System chapter.

Camshaft Position Sensor Inspection

○The camshaft position sensor has no power source, and when the engine stops, the camshaft position sensor generates no signal.

- Crank the engine and measure the peak voltage of the camshaft position sensor (see Electrical System chapter) in order to check the sensor.
- Check the wiring for continuity, using the following diagram.



A. ECU
G. Camshaft Position Sensor

Speed Sensor (Service Code 24, 25)

Speed Sensor Removal/Installation

● See the Switches and Sensors section in the Electrical System chapter.

Speed Sensor Inspection

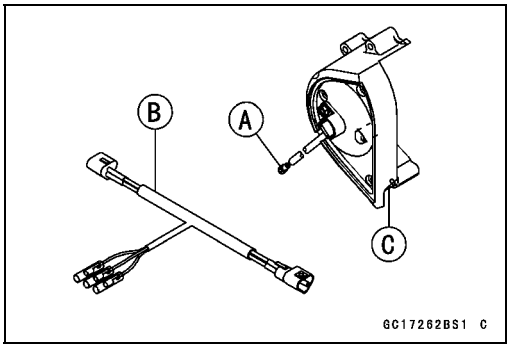
● See the Switches and Sensors section in the Electrical System chapter.

Input Voltage Inspection

NOTE

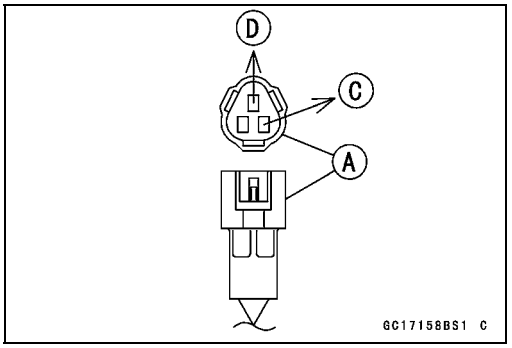
○*Be sure the battery is fully charged.*

● Turn the ignition switch OFF.
● Disconnect the speed sensor connector [A] and connect the harness adapter [B] between the harness connector and speed sensor connector.
Engine Sprocket Cover [C]
● Connect a digital meter to the harness adapter leads.



Special Tool - Throttle Sensor Setting Adapter: 57001–1400

● Measure the sensor input voltage with the engine stopped, and with the connector joined.
● Turn the ignition switch ON.



Speed Sensor Input Voltage
Connection to Adapter
Meter (+) → BL (sensor P) lead [C]
Meter (−) → BK/BL (sensor BK) lead [D]

Standard: About 9 ~ 11 V DC at Ignition SW ON

★If the reading is out of the range, check the wiring (see wiring diagram in this section), and meter (see Electrical System chapter).
★If the reading is good, check the output voltage.
● Turn the ignition switch OFF.

Output Voltage Inspection

● Before this inspection, inspect the input voltage (see Input Voltage Inspection).

NOTE

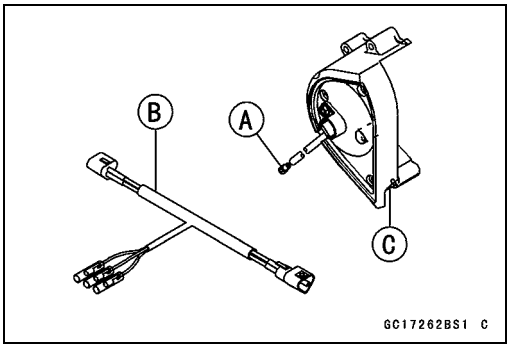
○*Be sure the battery is fully charged.*

● Turn the ignition switch OFF.

Speed Sensor (Service Code 24, 25)

- Disconnect the speed sensor connector [A] and connect the harness adapter [B] between the harness connector and speed sensor connector.
  Engine Sprocket Cover [C]
- Connect a digital meter to the harness adapter leads.

Special Tool - Throttle Sensor Setting Adapter: 57001–1400



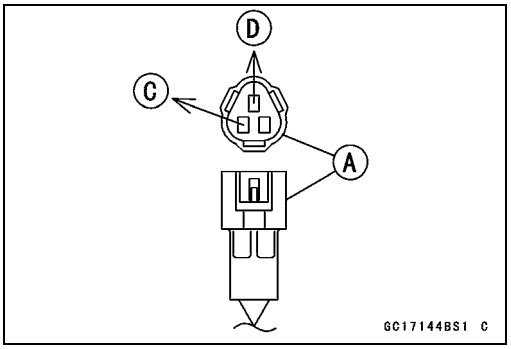
- Measure the sensor output voltage with the engine stopped, and with the connector joined.
- Turn the ignition switch ON.

Speed Sensor Output Voltage at Sensor Connections to Adapter

Meter (+) → Y/W (sensor Y) lead [C]

Meter (–) → BK/BL (sensor BK) lead [D]

Standard: About 0.05 ~ 0.07 V DC

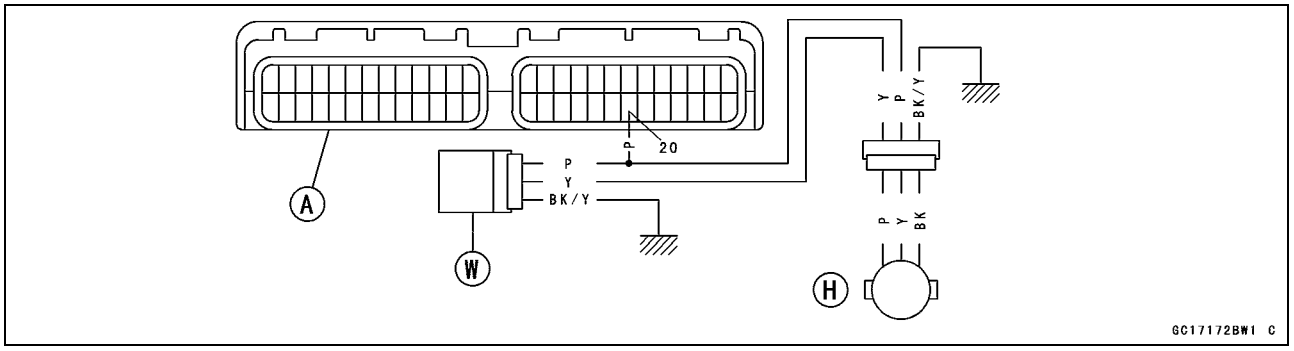


NOTE

○*If you rotate the engine sprocket, the output voltage will be increased.*

★If the reading is out of the range, check the speed sensor operation (see Electrical System chapter) and the wiring to ECU (see wiring diagram in this section).

★If the reading, speed sensor operation and wiring are good, check the ECU for its ground, and power supply (see ECU section).



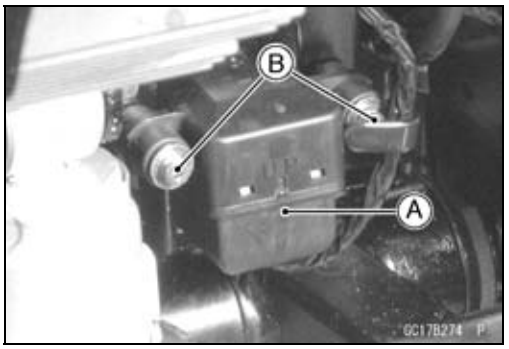
A. ECU H. Speed Sensor W. Speedometer Unit

Vehicle-down Sensor (Service Code 31)

Removal

CAUTION

Never drop the down-sensor, especially on a hard surface. Such a shock to the sensor can damage it.

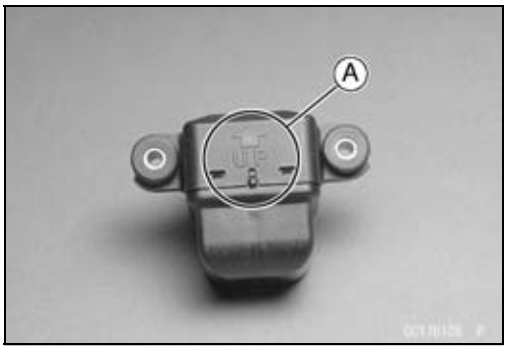


- Remove:
  Connection and Vehicle-down Sensor [A]
  Bolts [B]

Installation

- The UP mark [A] of the sensor should face upward.

Torque - Vehicle-down Sensor Bolts: 2.0 N·m (0.20 kgf·m, 17 in·lb)



⚠ WARNING

Incorrect installation of the vehicle-down sensor could cause sudden loss of engine power. The rider could lose balance during certain riding situations like leaning over in a turn with the potential for an accident resulting in injury or death. Ensure that the down sensor is held in place by the sensor brackets.

Inspection

NOTE

○*Be sure the battery is fully charged.*

- Connect a digital volt meter [A] to the connector of the vehicle-down sensor [B] with the needle adapter set [C].

Vehicle-down Sensor Power Source Voltage Connections to Sensor

Meter (+) → W/Y lead [D]

Meter (–) → BK/Y lead [E]

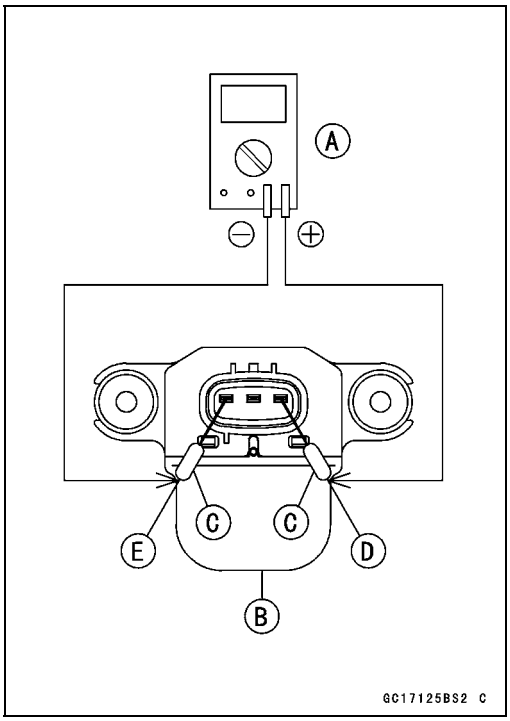
- Turn the ignition switch ON, and measure the power source voltage with the connector joined.

Power Source Voltage at Sensor
Standard: Battery Voltage (12.6 V or more)

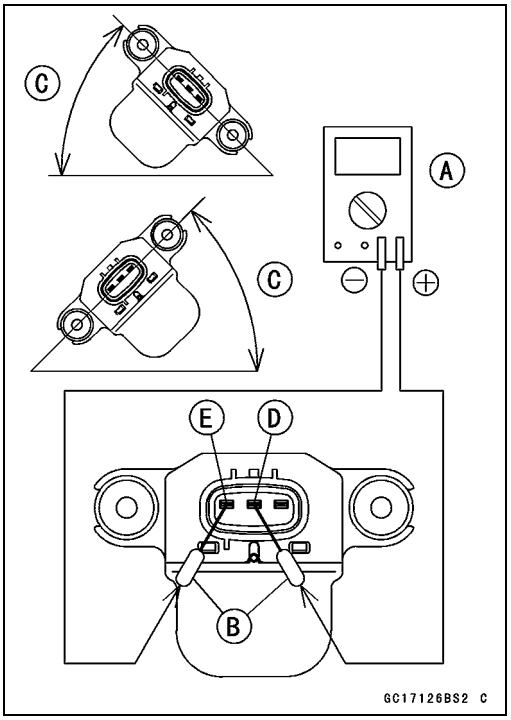
- Turn the ignition switch OFF.

★If there is no battery voltage, check the following:
Battery (see Electrical System chapter)
ECU Main Fuse 15 A
Wiring for Vehicle-down Sensor Power Source (see next diagram)

★If the power source is normal, check the output voltage.



Vehicle-down Sensor (Service Code 31)



- Turn the ignition switch OFF.
- Remove the sensor.
- Connect a digital volt meter [A] to the connector with needle adapter set [B].

Special Tool - Needle Adapter Set: 57001–1457

Vehicle-down Sensor Output Voltage
Connections to Sensor
Meter (+) → Y/G lead [D]
Meter (–) → BK/Y lead [E]

- Hold the sensor vertically.
- Turn the ignition switch ON, and measure the output voltage with the connector joined.

○Tilt the sensor 60 ~ 70° or more [C] right or left, then hold the sensor almost vertical with the arrow mark pointed up, and measure the output voltage.

Output Voltage at Sensor
Standard: with sensor tilted 60 ~ 70° or more right or left: 3.7 ~ 4.4 V
with sensor arrow mark pointed up: 0.4 ~ 1.4 V

NOTE

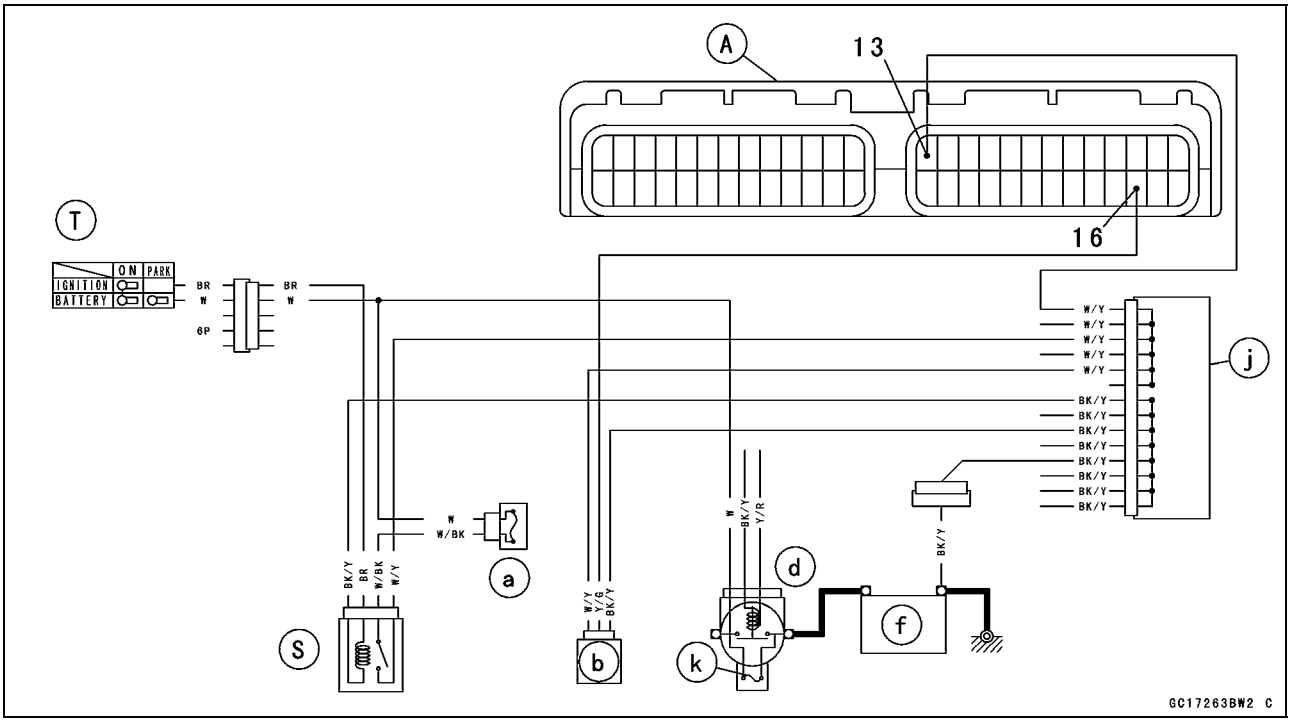
○*If you need to test again, turn the ignition switch OFF, and then ON.*

- Turn the ignition switch OFF.
- Remove the needle adapter set, and apply silicone sealant to the seals of the connector for waterproofing.

Silicone Sealant (Kawasaki Bond: 56019–120) –
Seals of Vehicle-down Sensor Connector

★If the output voltage is normal, the wiring is suspect. Check the wiring.
★If the wiring is good, check the ECU for its ground and power supply (see ECU section).
★If the output voltage is out of the specified, replace the vehicle-down sensor.

Vehicle-down Sensor (Service Code 31)



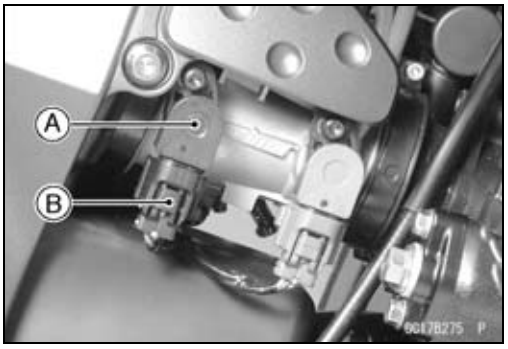
A. ECU
S. ECU Main Relay
T. Ignition Switch
a. ECU Fuse 15 A
b. Vehicle-down Sensor
d. Starter Relay
f. Sealed Battery
j. Joint Connector B
k. Main Fuse 30 A

Subthrottle Sensor (Service Code 32)

Subthrottle Sensor Removal/Adjustment

CAUTION

Do not remove or adjust the subthrottle sensor [A] since it has been adjusted and set with precision at the factory.
Never drop the sensor, especially on a hard surface. Such a shock to the sensor can damage it.



Subthrottle Sensor Connector (black) [B]

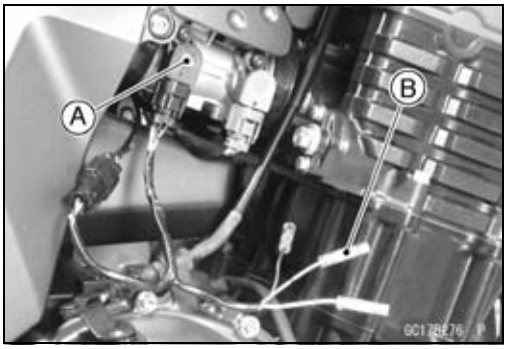
Input Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

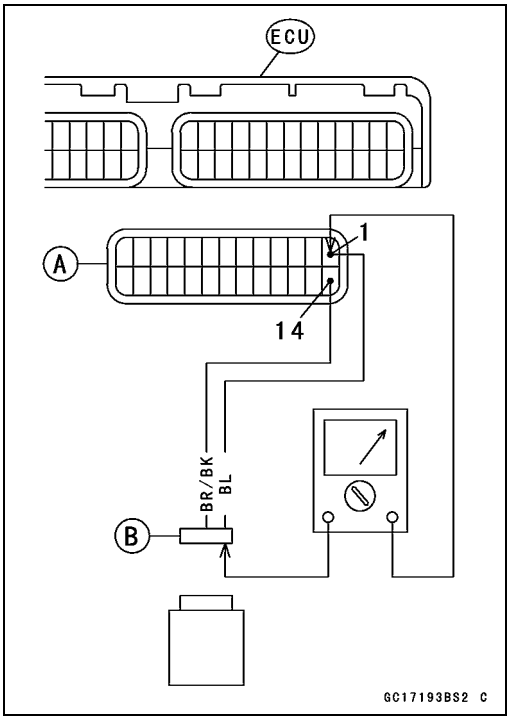
- Turn the ignition switch OFF.
- Disconnect the subthrottle sensor (black) [A] and connect the harness adapter [B] between these connectors.
- Connect a digital meter to the harness adapter lead.

Special Tool - Throttle Sensor Harness Adapter : 57001–1538



- Measure the sensor input voltage with the engine stopped and with the connector joined.
- Turn the ignition switch ON.

Subthrottle Sensor Input Voltage
Connections to Adapter
Meter (+) → R (sensor BL) lead
Meter (–) → BK (sensor BR/BK) lead
Standard : 4.75 ~ 5.25 V DC



- Turn the ignition switch OFF.

★If the input voltage is normal, check the sensor output voltage.

★If the input voltage is less than the standard, remove the ECU and check the wiring between these connectors.

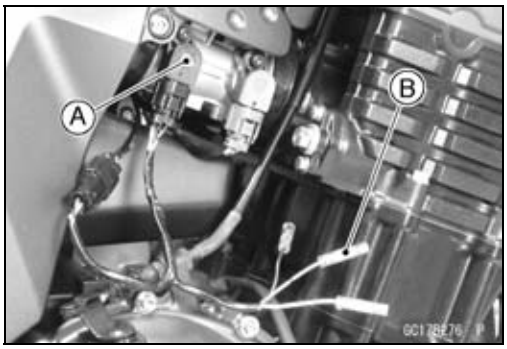
○Disconnect the ECU and sensor connectors.

Wiring Connection
ECU Connector [A] ←→
Subthrottle Sensor Connector [B]
BL lead (ECU terminal 1)
BR/BK lead (ECU terminal 14)

★If the wiring is good, check the ECU for its ground and power supply (see ECU section).

Subthrottle Sensor (Service Code 32)

Output Voltage Inspection



- Remove the throttle body assy (see Throttle Body Assy Removal).
- Measure the output voltage at the subthrottle sensor in the same way as input voltage inspection. Note the following.
- Disconnect the subthrottle sensor (black) [A] and (black) connect the harness adapter [B] between these connectors.

Special Tool - Throttle Sensor Harness Adapter: 57001–1538

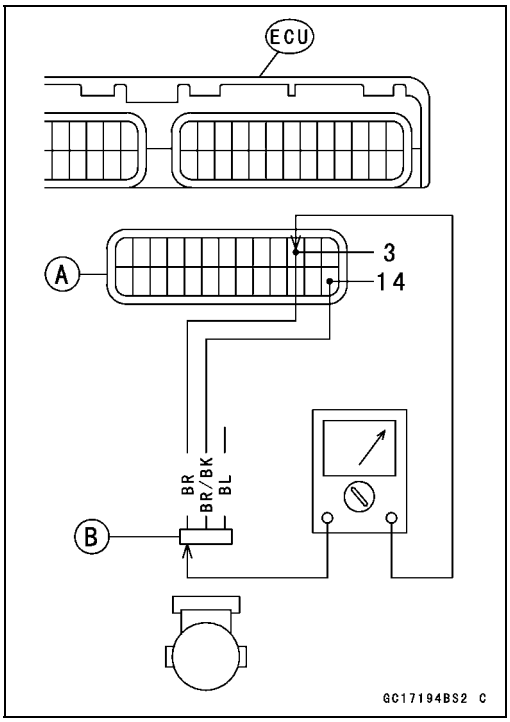
- Measure the output voltage of the sensor with the engine stopped, and with the connector joined.
- Turn the ignition switch ON.
- Measure the output voltage when the subthrottle valve is fully opened or completely closed by hand.

Main Throttle Sensor Output Voltage
Connections to Adapter
Meter (+) → W (sensor BR) lead
Meter (–) → BK (sensor BR/BK) lead
Standard :
0.48 ~ 0.52 V DC (at idle throttle opening)
3.6 ~ 3.8 V DC (at full throttle opening)

★If the output voltage is out of the standard, inspect the subthrottle sensor resistance.
★If the output voltage is normal, check the wiring for continuity.

Wiring Connection
ECU Connector [A] ←→
Subthrottle Sensor Connector [B]
BR lead (ECU terminal 3)
BR/BK lead (ECU terminal 14)

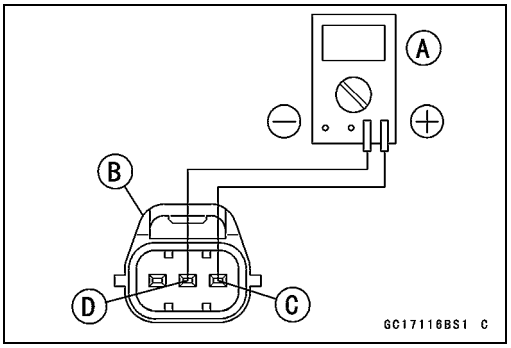
★If the wiring is good, check the ECU for its ground and power supply (see ECU section).



Subthrottle Sensor (Service Code 32)

Resistance Inspection

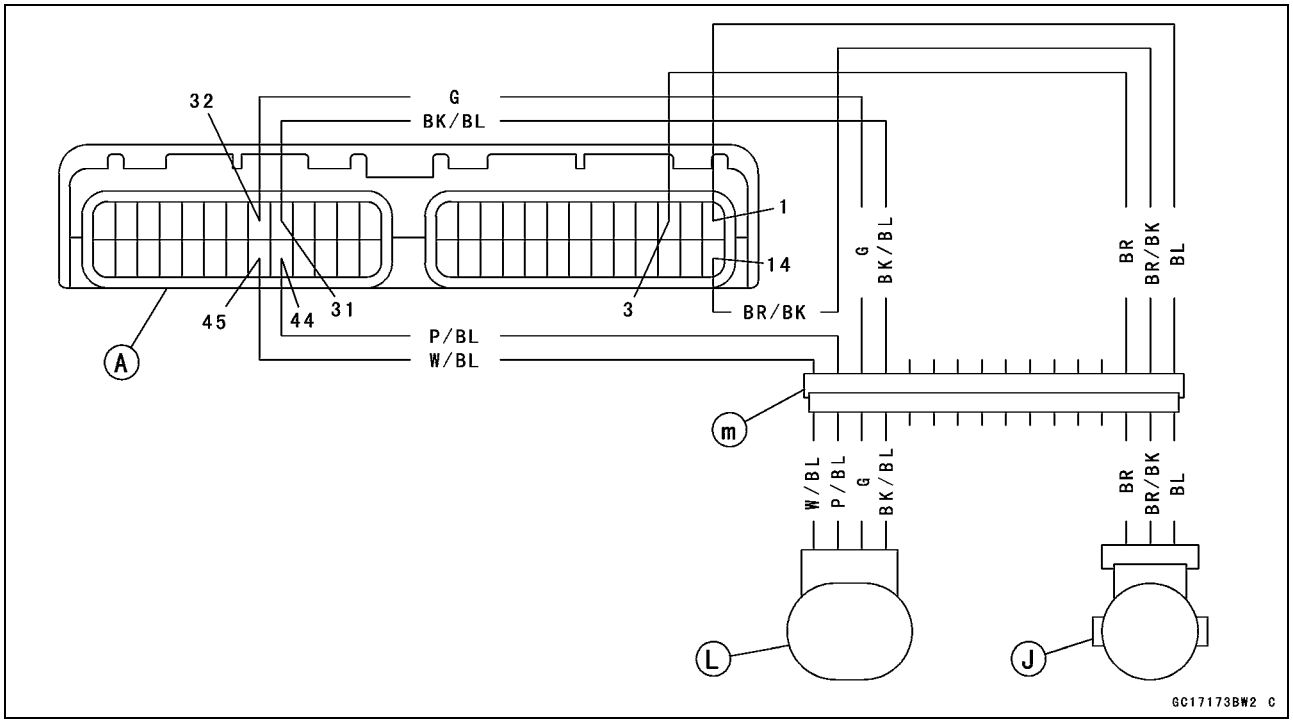
- Turn the ignition switch OFF.
- Disconnect the subthrottle sensor connector.
- Connect a digital meter [A] to the subthrottle sensor connector [B].
- Measure the subthrottle sensor resistance.



Throttle Sensor Resistance
Connections: BL lead [C] ←→ BR/BK lead [D]
Standard: 4 ~ 6 kΩ

★If the reading is out of the range, replace the throttle body assy.

★If the reading is within the range, but the problem still exists, replace the ECU (see this chapter).



A. ECU
J. Subthrottle Sensor
L. Subthrottle Valve Actuator
m. Throttle Body Assy Connector

Stick Coils (#1, #2, #3, #4: Service Code 51, 52, 53, 54)

Stick Coil #1: Ignition Coil (Service Code 51)
Stick Coil #2: Ignition Coil (Service Code 52)
Stick Coil #3: Ignition Coil (Service Code 53)
Stick Coil #4: Ignition Coil (Service Code 54)

Removal/Installation

CAUTION

Never drop the stick coils, especially on a hard surface. Such a shock to the stick coil can damage it.

- See the Ignition System section in the Electrical System chapter.

Input Voltage Inspection

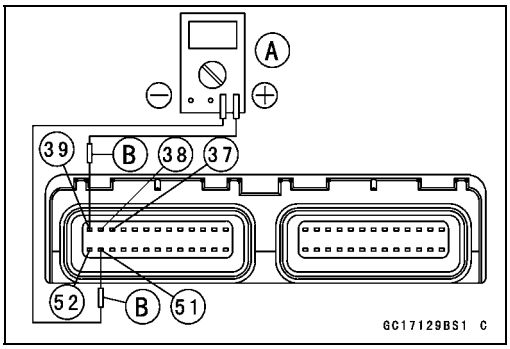
NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch OFF.
- Remove the ECU (see this chapter). Do not disconnect the ECU connector.
- Connect a digital voltmeter [A] as shown, with the needle adapter set [B].

○Measure the input voltage to each primary winding of the ignition coils with the engine stopped, and with the connectors joined.

- Turn the ignition switch ON.



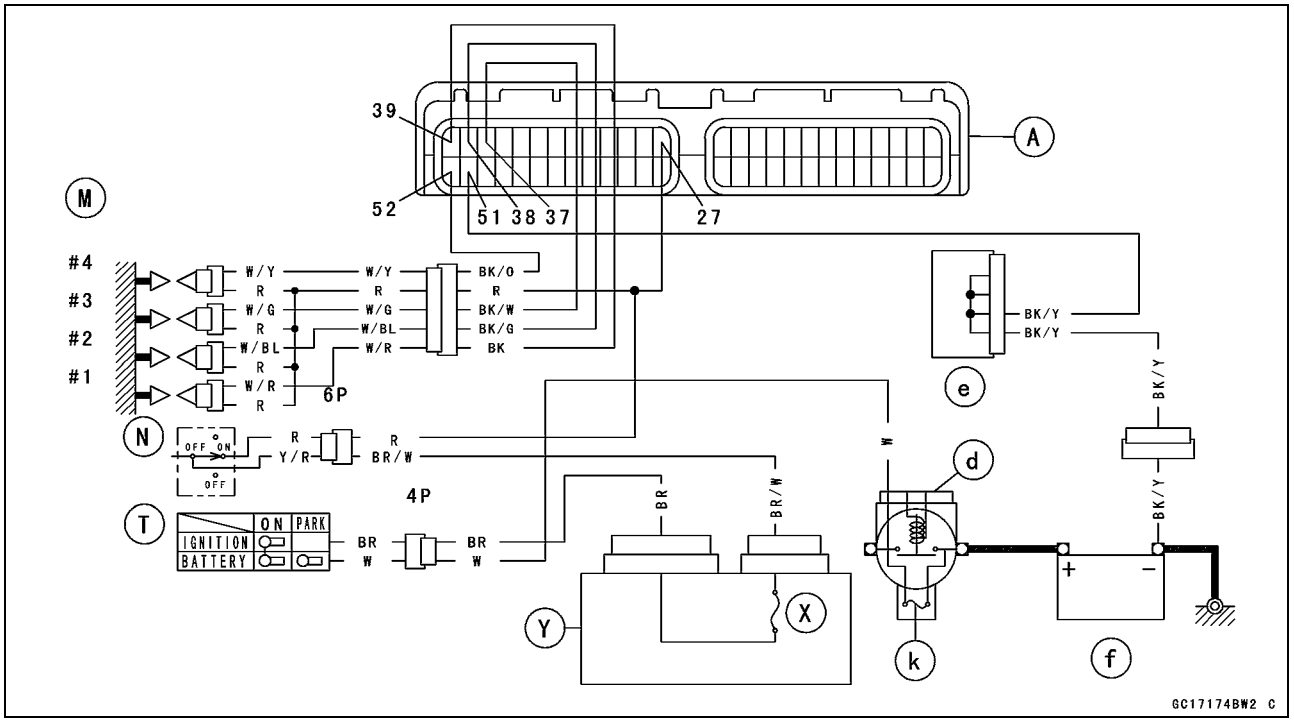
Stick Coil Input Voltage at ECU
Connections for Stick Coil #1
Meter (+) → BK lead (terminal 39)
Meter (–) → BK/Y lead (terminal 51)
Connections for Stick Coil #2
Meter (+) → BK/G lead (terminal 38)
Meter (–) → BK/Y lead (terminal 51)
Connections for Stick Coil #3
Meter (+) → BK/W lead (terminal 37)
Meter (–) → BK/Y lead (terminal 51)
Connections for Stick Coil #4
Meter (+) → BK/O lead (terminal 52)
Meter (–) → BK/Y lead (terminal 51)

Input Voltage at ECU
Standard: Battery Voltage (12.6 V or more)

★If the reading is out of the standard, check the wiring (see next wiring diagram).

★If the reading is good, the input voltage is normal. Crank the engine, and check the peak voltage of the stick coils (see Electrical System chapter) in order to check the primary coils.

Stick Coils (#1, #2, #3, #4: Service Code 51, 52, 53, 54)



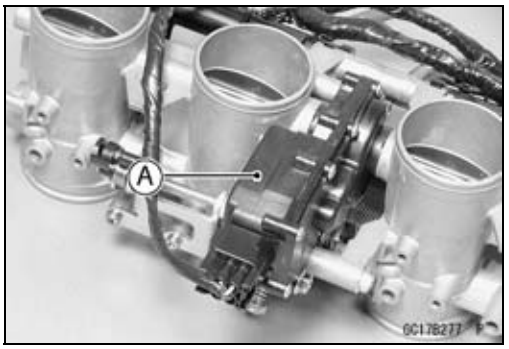
A. ECU
M. Stick Coils
N. Engine Stop Switch
T. Ignition Switch
X. Ignition Fuse 10 A
Y. Junction Box
d. Starter Relay
e. Joint Connector C
f. Sealed Battery
k. Main Fuse 30 A

Subthrottle Valve Actuator (Service Code 62)

Subthrottle Valve Actuator Removal

CAUTION

Do not remove the subthrottle valve actuator [A] since it has been adjusted and set with precision at the factory.
Never drop the actuator , especially on a hard surface. Such a shock to the actuator can damage it.



Audible Inspection

NOTE

○*Be sure the battery is fully charged.*

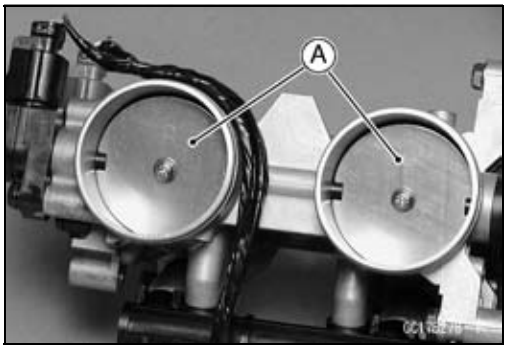
- Turn the ignition switch ON and ensure that the actuator valves open and close (make light sounds) several times within seconds, and then close at the idle throttle opening position.
- Turn the ignition switch OFF.

★If the actuator does not work as described above, do the visual inspection.

Visual Inspection

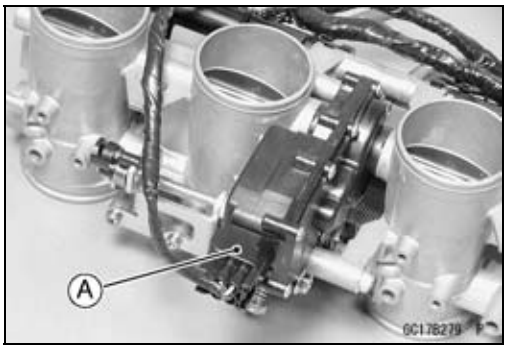
- Remove the throttle body assy (see Throttle Body Assy Removal).
- Turn the ignition switch ON.
- Check to see that all the subthrottle valves [A] open and close smoothly.

★If the subthrottle valves do not operate, check the actuator internal resistance (see Resistance Inspection).



Resistance Inspection

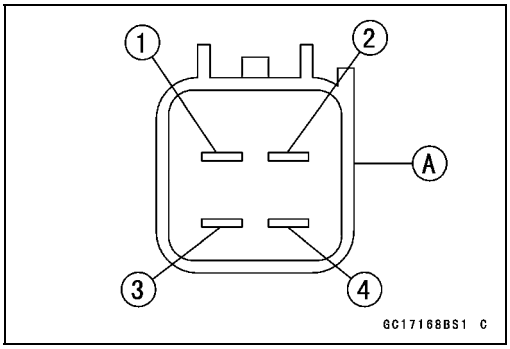
- Turn the ignition switch OFF.
- Remove the throttle body assy (see Throttle Body Assy Removal).
- Disconnect the subthrottle valve actuator connector [A].



- Connect a digital meter to the subthrottle valve actuator connector [A].
- Measure the subthrottle valve actuator resistance.

Subthrottle Valve Actuator Resistance
Connections: BK/BL lead [1] ←→ P/BL lead [2]
G lead [3] ←→ W/BL lead [4]
Standard: About 5 ~ 7 kΩ

Special Tool - Hand Tester : 57001–1394

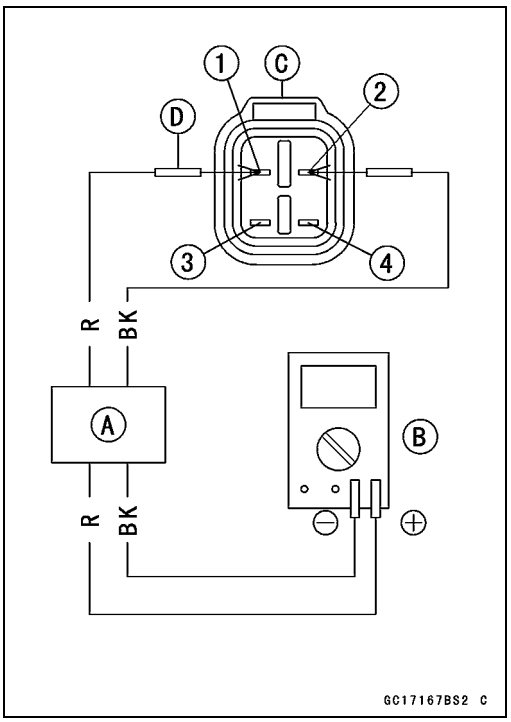


★If the reading is out of the range, replace the actuator along with the throttle body assy.

★If the reading is within the range, check the input voltage (see Input Voltage Inspection).

Subthrottle Valve Actuator (Service Code 62)

Input Voltage Inspection



NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch OFF.
- Remove the throttle body assy (see Throttle Body Assy Removal).
- Connect the peak voltage adapter [A] and a digital meter [B] to the connector [C], using the needle adapter set [D].

Recommended Tool - Peak Voltage Adapter
Type: KEK-54–9–B
Brand: KOWA SEIKI

Special Tool - Needle Adapter Set: 57001–1457

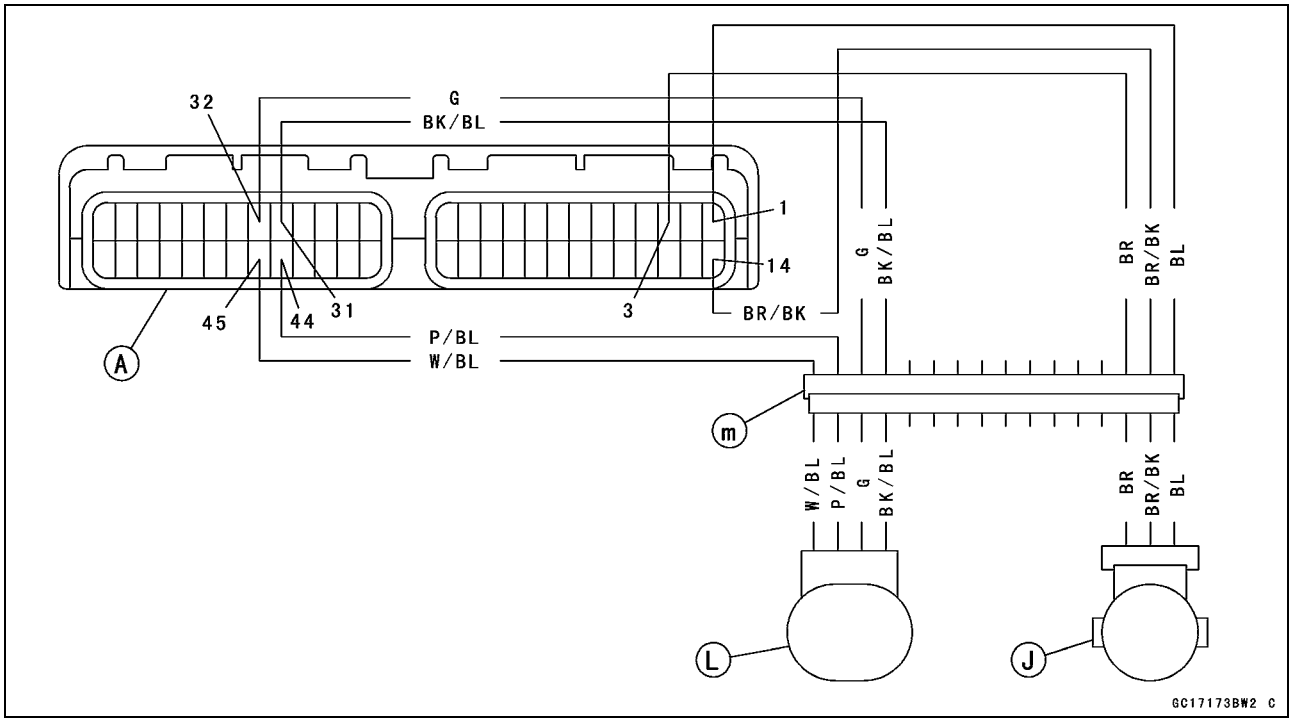
Subthrottle Valve Actuator Input Voltage
Connections to Harness Connector

(I) Meter (+) → BK/BL lead [1]
Meter (–) → P/BL lead [2]
(II) Meter (+) → G lead [3]
Meter (–) → W/BL lead [4]

- Measure the actuator input voltage with the engine stopped, and with the connector joined.
- Turn the ignition switch ON.

Input Voltage at Actuator
Standard: about 8.5 ~ 10.5 V DC

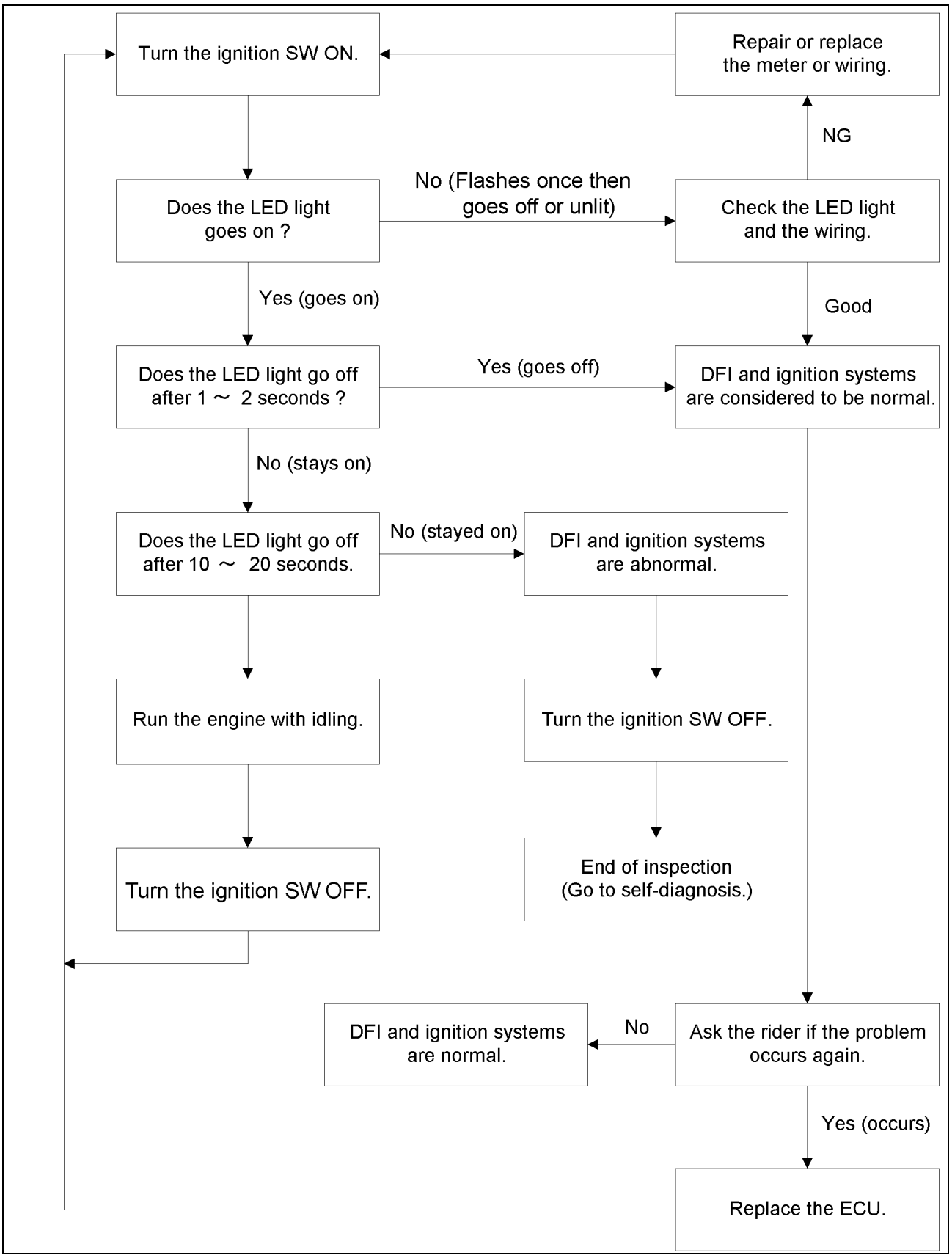
★If the reading is within the standard but the actuator doesn't operate, replace it.
★If the reading is out of the range, check the wiring to ECU (see wiring diagram in this section).
★If the wiring is good, check the ECU for its ground and power supply (see ECU section).



A. ECU
J. Subthrottle Sensor
L. Subthrottle Valve Actuator
m. Throttle Body Assy Connector

FI Indicator LED Light

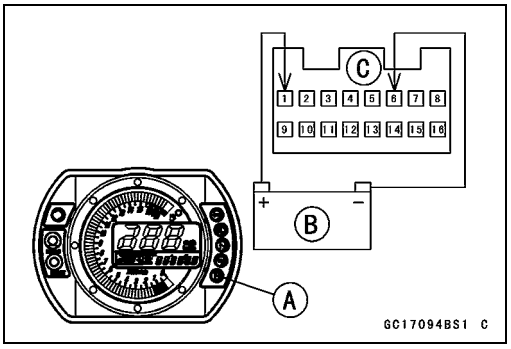
Inspection Flow Chart



FI Indicator LED Light

LED Light Inspection

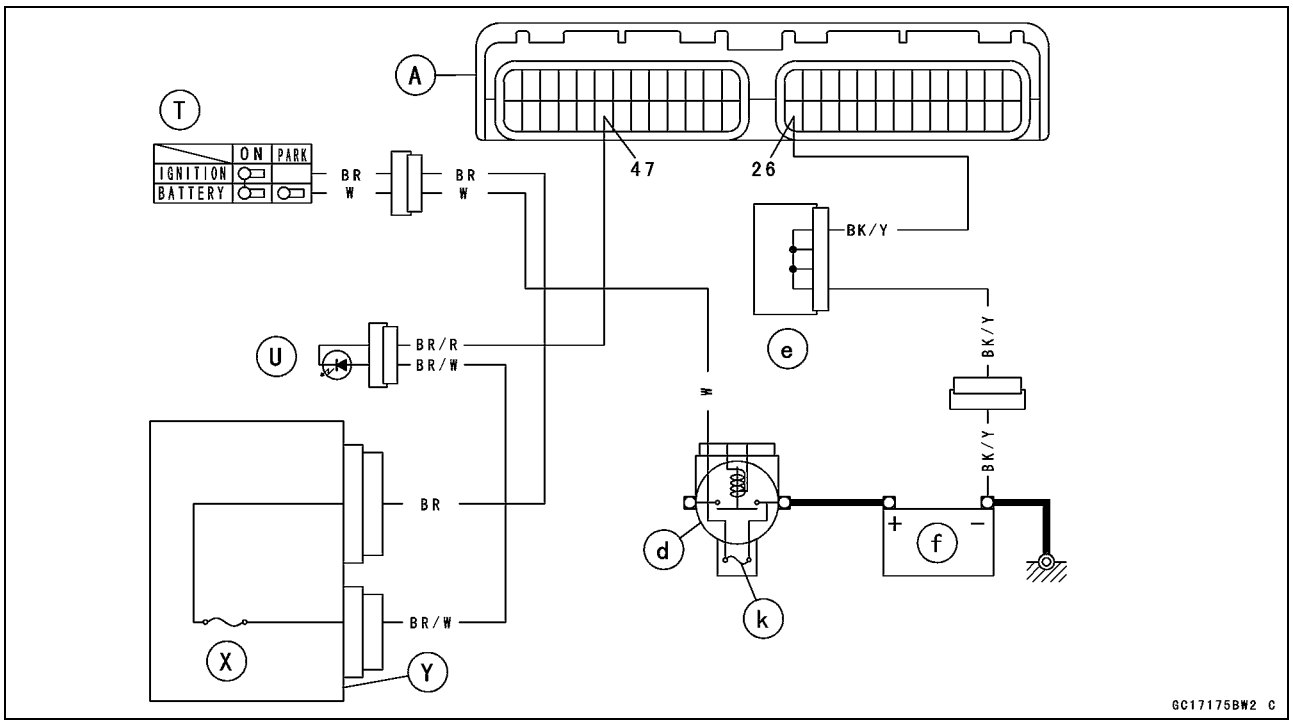
- Remove the meter unit (see Electrical System chapter).
- Using two auxiliary leads, supply battery power to the FI indicator LED light [A].
  12 V Battery [B]



FI Indicator LED Light Check

Connector:	**Meter Connector [C] (disconnected)**
Connection:	**BR/W Lead Terminal [1] of the Meter → Battery (+) Terminal**
	BR/R Lead Terminal [6] of the Meter → Battery (–) Terminal
Criterion:	**The LED light should light.**

★If the LED light does not go on, replace the meter unit.



A. ECU
T. Ignition Switch
U. FI Indicator LED Light
X. Ignition Fuse 10 A
Y. Junction Box
d. Starter Relay
e. Joint Connector C
f. Sealed Battery
k. Main Fuse 30 A

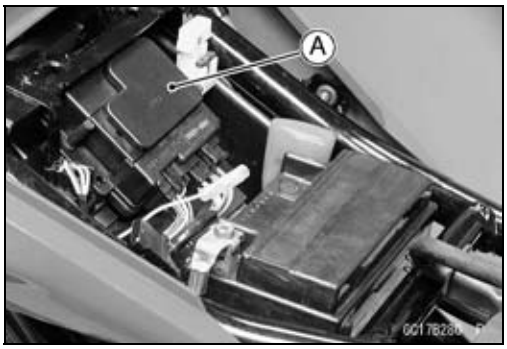
ECU

CAUTION

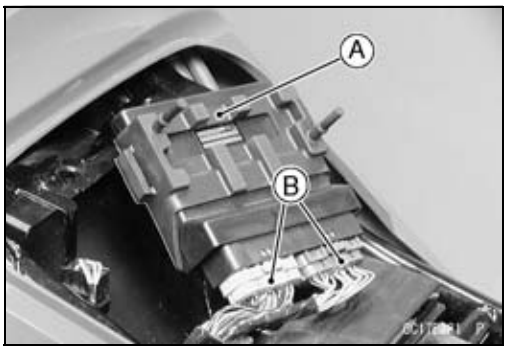
Never drop the ECU, especially on a hard surface. Such a shock to the ECU can damage it.

ECU Removal

● Remove:
Seats (see Frame chapter)
Junction Box [A]

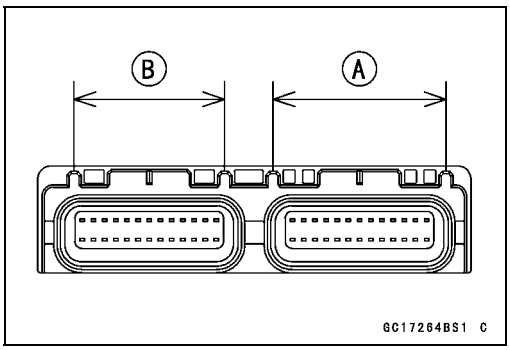


● Take the ECU [A] out along with the harness.
● Disconnect the ECU lead connectors [B].



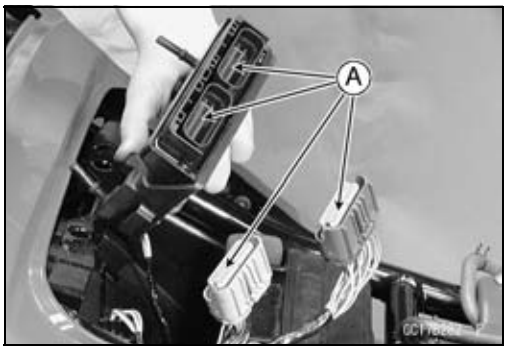
ECU Installation

● Connect the ECU connectors, noting the length of the locks.
Longer Lock [A]
Shorter Lock [B]



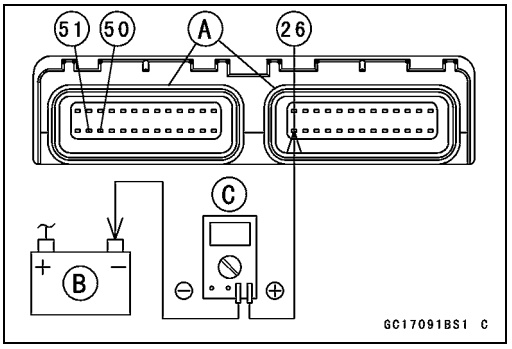
ECU Power Supply Inspection

● Visually inspect the terminals [A] of the ECU connectors.
★If the connector is clogged with mud or dust, blow it off with compressed air.
★Replace the main harness if the terminals of the main harness connectors are cracked, bent, or otherwise damaged.
★Replace the ECU if the terminals of the ECU connectors are cracked, bent, or otherwise damaged.



ECU

● With the ECU connectors [A] connected, check the following ground lead for continuity with the ignition switch OFF, using a tester and needle adapter set.



ECU Grounding Inspection

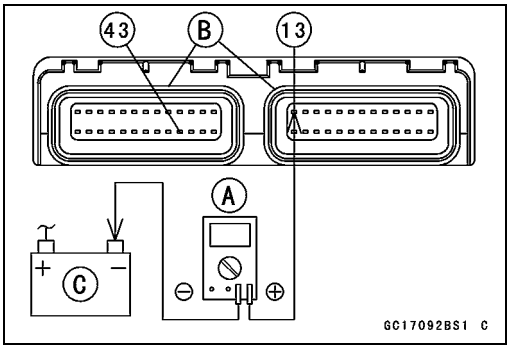
26, 50, or 51 (BK/Y) Terminal	←→	**Battery (–) Terminal: 0 Ω**
Engine Ground	←→	**Battery (–) Terminal: 0 Ω**

★If no continuity, check the connector, the engine ground lead, or main harness, and repair or replace them if necessary.
Battery [B]
Tester [C]

Special Tool - Needle Adapter Set: 57001–1457

● Check the ECU power source voltage with a digital meter [A].

○Position the terminal in accordance with terminal numbers of ECU connectors [B] in this chapter figure.
Battery [C]



ECU Power Source Inspection

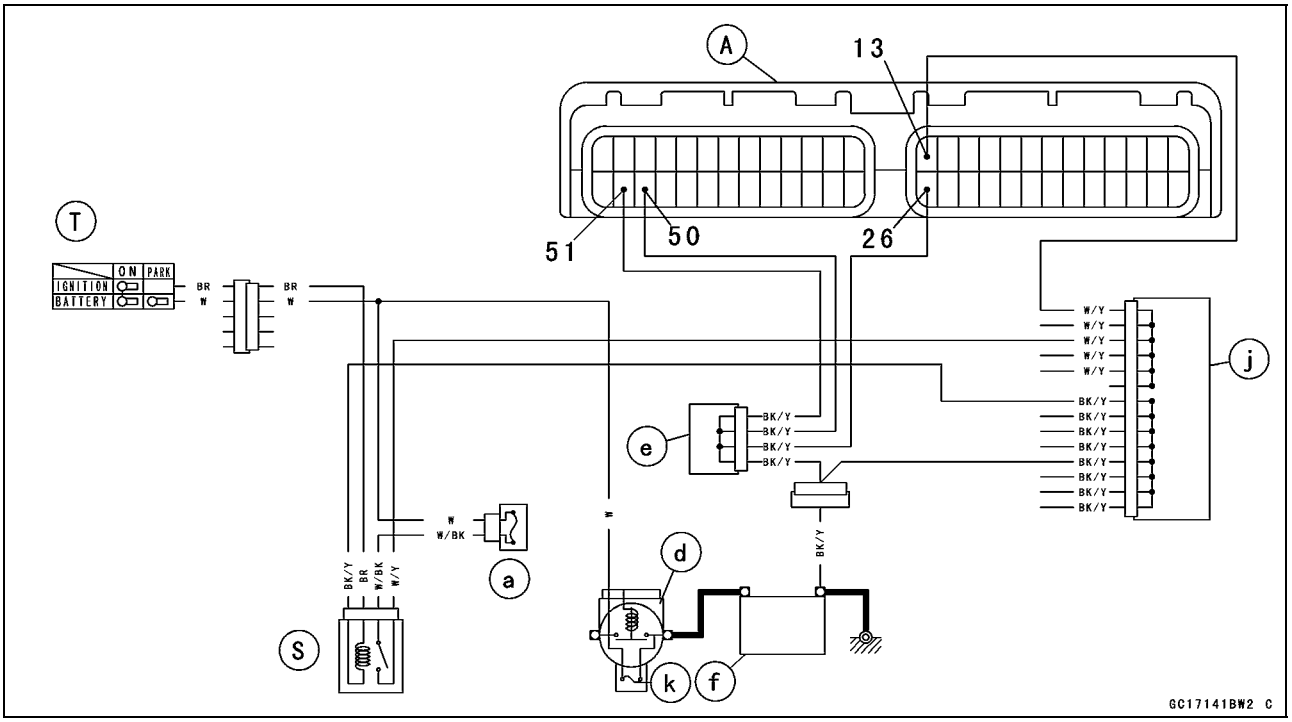
Meter Connections:	**between Terminal 13 (W/Y) and Battery (–) Terminal**
	between Terminal 43 (W/BK) and Battery (–) Terminal
Ignition SW OFF:	**Terminal 13 (W/Y) : 0 V,**
	Terminal 43 (W/BK) : 12.6 V or more
Ignition SW ON:	**Both: Battery Voltage (12.6 V or more)**

★If the meter does not read as specified, check the following:
Main Fuse 30 A (see Electrical System chapter)
ECU Fuse 15 A (see DFI Power Source section)
ECU Main Relay (see DFI Power Source section)
Power Source Wiring (see wiring diagram below)

★If the inspection checks good, the ECU is damaged. Replace the ECU. The ECU itself cannot be checked or serviced.

ECU

ECU Power Source Circuit



A. ECU
S. ECU Main Relay
T. Ignition Switch
a. ECU Fuse 15 A
d. Starter Relay
e. Joint Connector C
f. Sealed Battery
j. Joint Connector B
k. Main Fuse 30 A

DFI Power Source

ECU Fuse Removal

- Refer to the Electrical System chapter for the ECU fuse removal.

ECU Fuse Installation

★If a fuse fails during operation, inspect the DFI system to determine the cause, and then replace it with a new fuse of proper amperage.

- Refer to the Electrical System chapter for the ECU fuse installation.

ECU Fuse Inspection

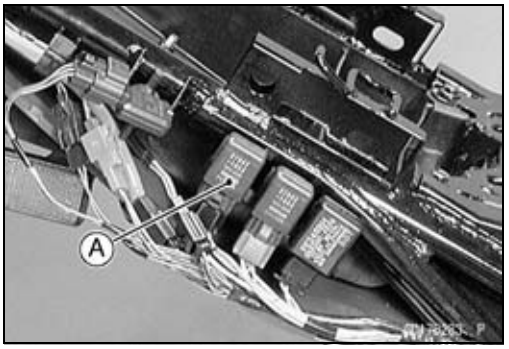
- Refer to the Electrical System chapter for the ECU fuse inspection.

ECU Main Relay Removal

CAUTION

Never drop the relay, especially on a hard surface. Such a shock to the relay can damage it.

- Remove the seat cover (see Frame chapter).
- Remove the ECU main relay [A] from the tongue of the storage compartment and disconnect the connector.

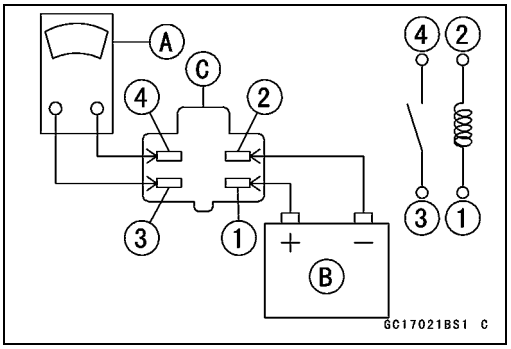


ECU Main Relay Inspection

- Remove the ECU main relay (see above).
- Connect the hand tester [A] and one 12 V battery [B] to the relay connector [C] as shown.

Special Tool - Hand Tester: 57001–1394

Relay Coil Terminals [1] and [2]
Relay Switch Terminals [3] and [4]



Testing Relay

Tester range: **1 Ω range**

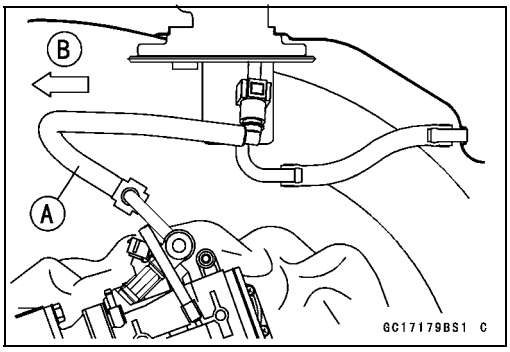
Criteria: **When battery is connected → 0 Ω**

When battery is disconnected → ∞ Ω

★If the relay does not work as specified, replace the relay.

Fuel Line

Fuel Pressure Inspection



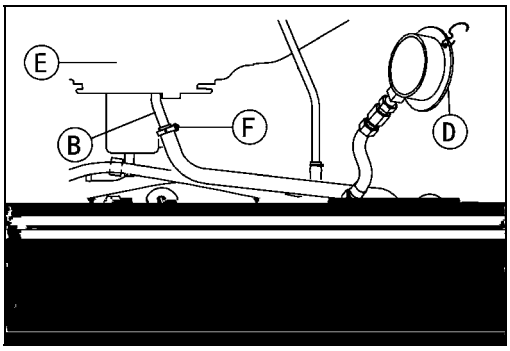
NOTE

○*This inspection can determine which trouble the DFI system has, mechanical or electrical trouble.*
○*It is preferable to measure the fuel pressure while running the motorcycle just when trouble occurred in order to know symptom well.*
○*Be sure the battery is fully charged.*

- Remove the fuel tank (see Fuel Tank Removal).
- Be sure to place a piece of cloth around the pump outlet pipe and the delivery pipe.
- Remove the fuel pump outlet hose [A].
  Front [B]

⚠ WARNING

Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.
When the fuel hose is disconnected, fuel spills out from the hose and the pipe because of residual pressure. Cover the hose connection with a piece of clean cloth to prevent fuel spillage.



- Install the fuel pressure gauge adapter [A] between the fuel pump outlet pipe [B] and the delivery pipe [C].
- Connect the pressure gauge [D] to the fuel pressure gauge adapter (right side view).

Special Tools - Oil Pressure Gauge: 57001–125
Fuel Pressure Gauge Adapter: 57001–1417

⚠ WARNING

Do not try to start the engine with the fuel hoses disconnected.

- Temporarily, install the fuel tank [E]
  Clamps [F]

- Turn the ignition switch ON. The fuel pump will turn for 3 seconds, and then stop.

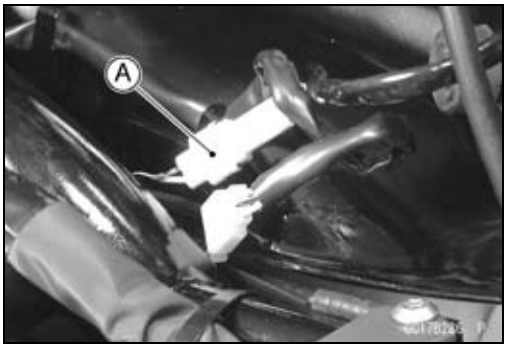
CAUTION

Do not drive the fuel pump without the fuel in the fuel tank.

- Measure the fuel pressure with the engine stopped.

Fuel Pressure
Right after Ignition SW ON, with pump running:
Standard: 310 kPa (3.2 kgf/cm², 44 psi)
After 3 seconds from Ignition SW ON, with pump stopped:
Standard: 290 kPa (3.0 kgf/cm², 43 psi) (residual fuel pressure)
The system should hold the residual pressure about 30 seconds.

Fuel Pump



- Connect the hand tester (25 V DC) to the fuel pump connector [A] with needle adapter set.

Special Tools - Hand Tester: 57001–1394
Needle Adapter Set: 57001–1457

○Measure the operating voltage with the engine stopped, and with the connector joined.
- Turn the ignition switch ON.

○The tester needle should indicate battery voltage for 3 seconds, and then 0 V.

Pump Operating Voltage at Pump Connections to Pump Connectors

Tester (+) → Y/R Lead

Tester (–) → BK/W Lead

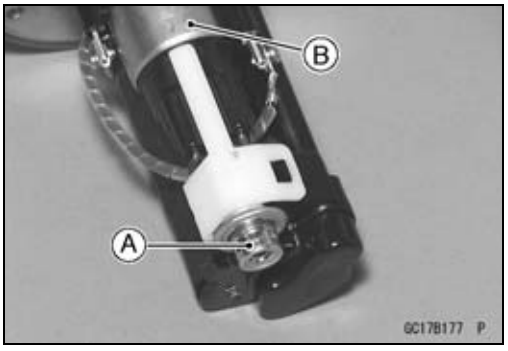
Operating Voltage at Pump Connector

Standard: Battery Voltage (12.6 V or more) for 3 seconds, and then 0 V.

★If the reading stays on battery voltage, and never shows 0 V. Check the ECU and fuel pump relay.
★If the voltage is in specification, but the pump doesn't work, replace the pump.
★If there is still no battery voltage, check the pump relay (see this chapter).

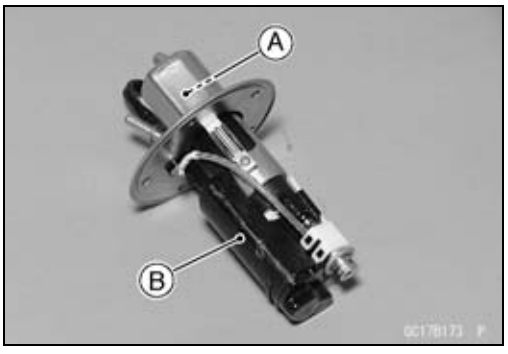
Pressure Regulator Removal

○The pressure regulator [A] is built into the fuel pump [B] and cannot be removed.



Pump Screen, Fuel Filter Cleaning

○The pump screen [A] and fuel filter [B] are built into the pump and cannot be cleaned or checked.
★If the pump screen or fuel filter is suspected of clogging or being damaged, replace it with the fuel pump as a set.

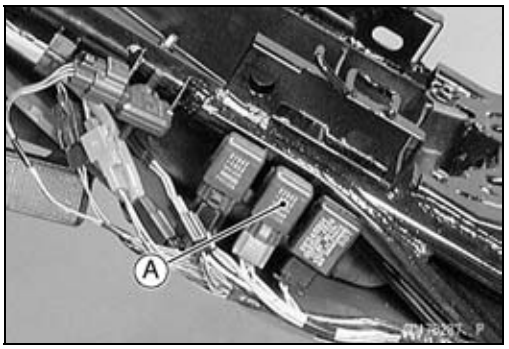


Fuel Pump

Fuel Pump Relay Removal

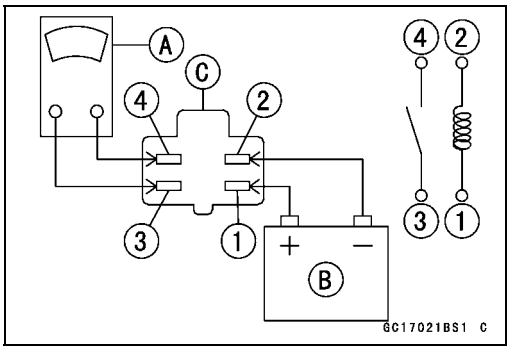
CAUTION

Never drop the relay, especially on a hard surface. Such a shock to the relay can damage it.



- Remove the seat cover (see Frame chapter).
- Remove the fuel pump relay [A] from the tongue of the storage compartment.
- Disconnect the connector.

Fuel Pump Relay Inspection



- Remove the fuel pump relay (see above).
- Connect the hand tester [A] and one 12 V battery [B] to the relay connector [C] as shown.

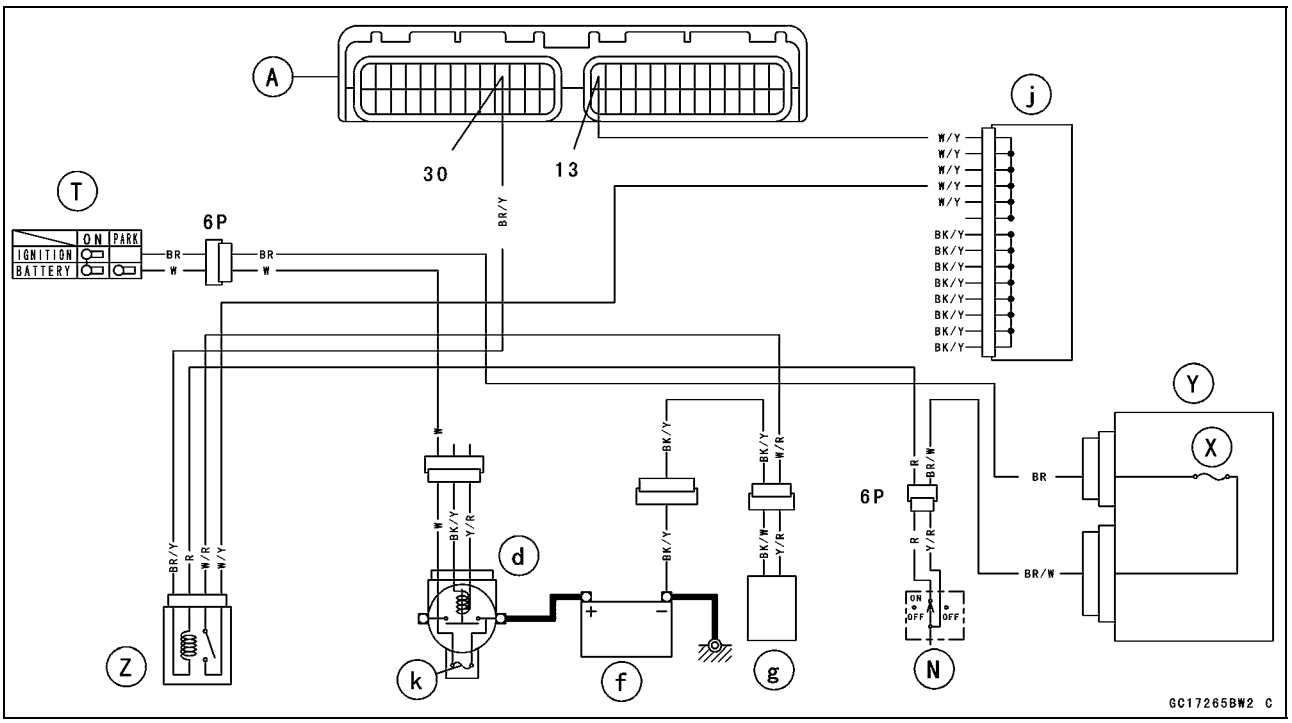
Special Tool - Hand Tester: 57001–1394

Relay Coil Terminals [1] and [2]
Relay Switch Terminals [3] and [4]

Testing Relay

Tester range:	**1 Ω range**
Criteria:	**When battery is connected → 0 Ω**
	When battery is disconnected → ∞ Ω

★If the relay does not work as specified, replace the relay.



A. ECU
N. Engine Stop Switch
T. Ignition Switch
X. Ignition Fuse 10 A
Y. Junction Box
Z. Fuel Pump Relay (for fuel pump and injectors)
d. Starter Relay
f. Sealed Battery
g. Fuel Pump
j. Joint Connector B
k. Main Fuse 30 A

Fuel Injectors

Removal/Installation

● Refer to the Throttle Body Assy Disassembly/Assembly.

Audible Inspection

● Start the engine.

● Apply the tip of a screwdriver [A] to the injector [C]. Put the grip end onto your ear, and listen whether the injector is clicking or not.

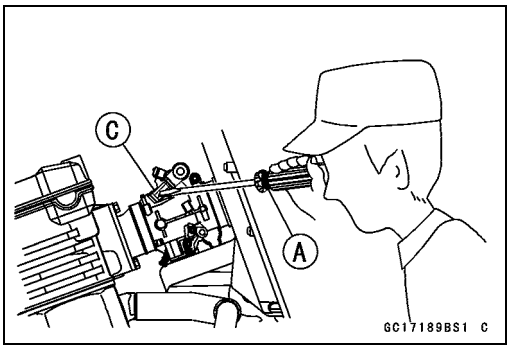
○A sound scope [B] can also be used.

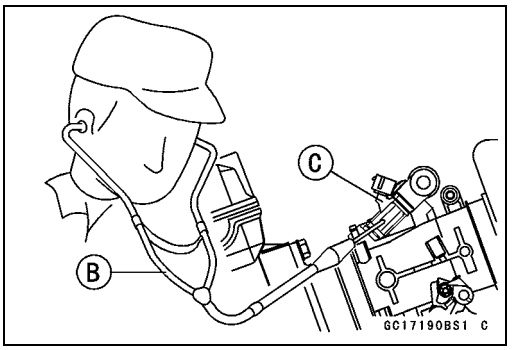
● Do the same for the other injectors.

★If all the injectors click at a regular intervals, the injectors are good. The trouble may be related to the fuel line, requiring fuel pressure inspection (see Fuel Line section in this chapter).

○The click interval becomes shorter as the engine speed rises.

★If any injector(s) doesn't click, the DFI circuit or the injector is suspect. Perform "Power Source Voltage Inspection", first.





Power Source Voltage Inspection

● Remove the ECU (see ECU section). Do not disconnect the ECU connector.

● Connect a digital meter [A] to the ECU connector [B], using the needle adapter [C].

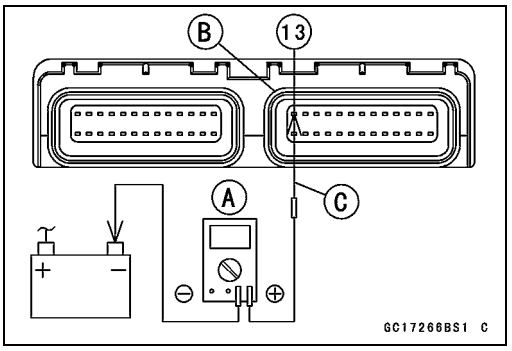
Special Tool - Needle Adapter Set: 57001–1457

○Measure the power source voltage with the engine stopped, and with the connector joined.

● Turn the ignition switch ON.

Injector Power Source Voltage at ECU

Connections: Meter (+) → W/Y (terminal 13)
Meter (–) → Battery (–) Terminal
Service Limit: Voltage (12.6 V or more)



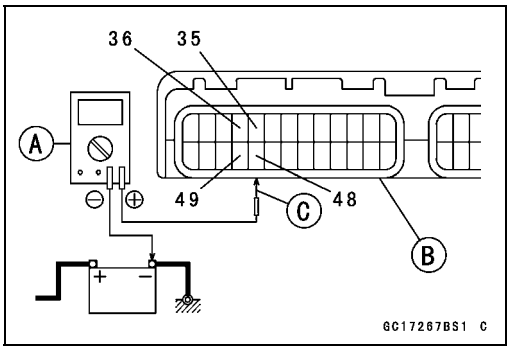
★If the meter doesn't read as specified, check the following.
Main Fuse 30 A (see Electrical System chapter)
Fuel Pump Relay (see DFI Power Source section)
Power Source Wiring (see Wiring Diagram below)

○To check the W/R leads between the injector connector and the fuel pump relay, remove the fuel tank (see Fuel Tank Removal) and the seat cover (see Frame chapter).

★If the power source voltage is normal, check the output voltage of the injectors.

Fuel Injectors

Output Voltage Inspection



- Turn the ignition switch OFF.
- Remove the ECU (see ECU section).
- Connect a digital voltmeter [A] to the ECU connector [B] with the needle adapter set [C].

Special Tool - Needle Adapter Set: 57001-1457

Injector Output Voltage
Connections to Injector #1
Meter (+) → BL/R lead (terminal 36)
Meter (–) → Battery (–) Terminal
Connections to Injector #2
Meter (+) → BL/G lead (terminal 35)
Meter (–) → Battery (–) Terminal
Connections to Injector #3
Meter (+) → BL/BK lead (terminal 49)
Meter (–) → Battery (–) Terminal
Connections to Injector #4
Meter (+) → BL/Y lead (terminal 48)
Meter (–) → Battery (–) Terminal

- Turn the ignition switch ON.

Output Voltage at Injector Connector
Standard: Battery Voltage (12.6 V or more)

★If the output voltage is normal, perform “Injector Signal Test”.
★If the output voltage is out of the standard, turn the ignition switch OFF, remove the fuel tank, and check the injector wiring for continuity.

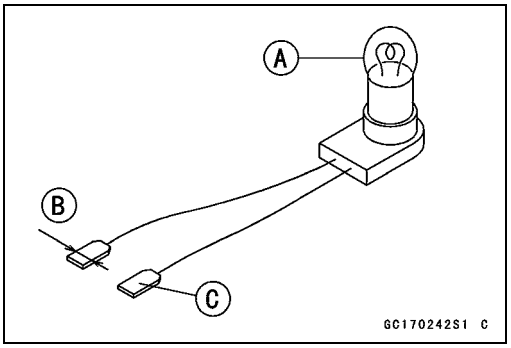
Injector Wiring Inspection

ECU Connector		Injector Connectors
Terminal 36	→	Injector #1 Terminal (BL/R)
Terminal 35	→	Injector #2 Terminal (BL/G)
Terminal 49	→	Injector #3 Terminal (BL/BK)
Terminal 48	→	Injector #4 Terminal (BL/Y)

★If the wiring is good, inspect the resistance of the injectors (see Injector Resistance Inspection in chapter).
- Remove the needle adapter.
- Apply silicone sealant to the seals of the ECU connector for waterproofing.

Fuel Injectors

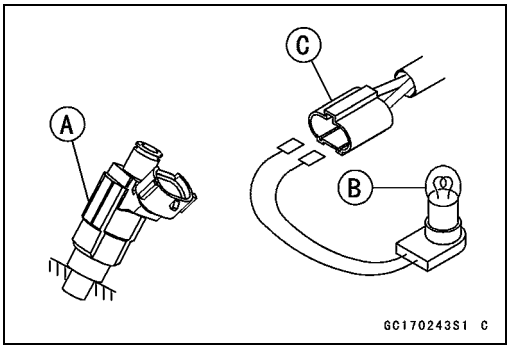
Injector Signal Test



- Prepare two test light sets with male terminals as shown.
  Rating of Bulb [A]: 12 V × 3 ~ 3.4 W
  Terminal Width [B]: 1.8 mm (0.071 in.)
  Terminal Thickness [C]: 0.8 mm (0.031 in.)

CAUTION

Do not use larger terminals than specified above. A larger terminal could damage the injector main harness connector (female), leading to harness repair or replacement.
Be sure to connect bulbs in series. The bulb works as a current limiter to protect the solenoid in the injector from excessive current.



- Remove the fuel tank (see Fuel Tank Removal).
- Remove connectors for injector [A].
- Connect each test light set [B] to the injector sub harness connector [C].
- Turn the ignition switch ON.
- While cranking the engine with the starter motor, watch the test lights.

★If the test lights flicker at regular intervals, the injector circuit in the ECU, and the wiring are good. Perform the “Injector Resistance Inspection”.

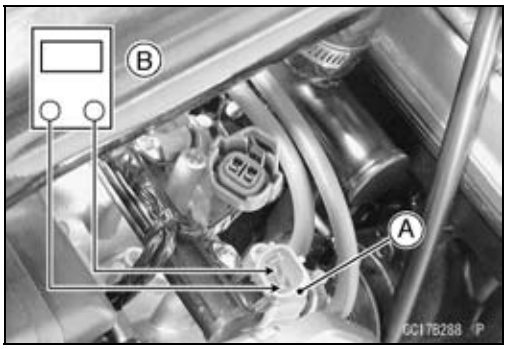
○Injector signals can be also confirmed by connecting the hand tester (× 10 V AC) instead of the test light set to the injector main harness (female) connector. Crank the engine with the starter motor, and check to see if the hand oscillates at regular intervals.

Special Tool - Hand Tester: 57001–1394

★If the test light doesn’t flicker (or the tester needle doesn’t oscillates), check the wiring and connectors again. If the wiring is good, check the injector voltage. If the wiring is good, inspect the ECU for its ground and power supply (see ECU section).

Fuel Injectors

Injector Resistance Inspection



- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the connector from the injector [A] (see Throttle Body Assy Disassembly/Assembly).
- Measure the injector resistance with the hand tester [B].

Special Tool - Hand Tester: 57001–1394

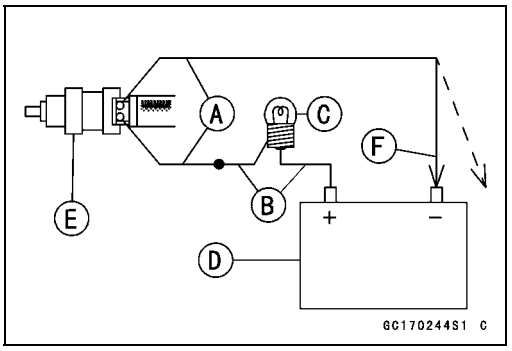
Injector Resistance
Connections to Injector

	Meter (+)		Meter (–)
#1:	**W/R**	←→	**BL/R Terminal**
#2:	**W/R**	←→	**BL/G Terminal**
#3:	**W/R**	←→	**BL/BK Terminal**
#4:	**W/R**	←→	**BL/Y Terminal**

Standard: about 11.7 ~ 12.3 Ω @20°C (68°F)

★If the reading is out of the range, perform the “Injector Unit Test”.
★If the reading is normal, perform the “Injector Unit Test” for confirmation.

Injector Unit Test



- Use two leads [A] and the same test light set [B] as in “Injector Signal Test”.
  Rating of Bulb [C]: 12 V × (3 ~ 3.4) W
  12 V Battery [D]

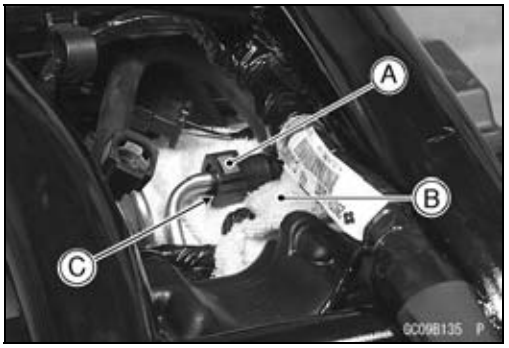
CAUTION

Be sure to connect the bulb in series. The bulb works as a current limiter to protect the solenoid in the injector from excessive current.

- Connect the test light set to the injector [E] as shown.
- Open and connect [F] the end of the lead to the battery (–) terminal repeatedly. The injector should click.

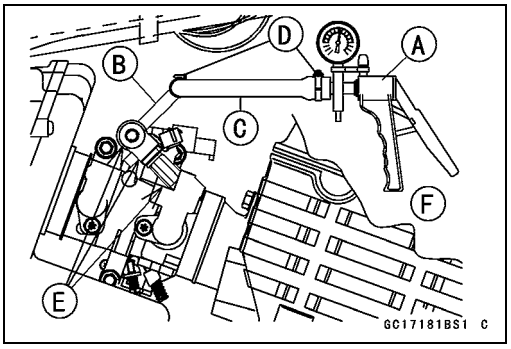
★If the injector does not click, replace the injector.
★If the injector clicks, check the wiring again. If the wiring is good, replace the injector (may be clogged) or ECU.

Injector Fuel Line Inspection



- While pinching the fuel pump outlet hose joint locks [A] with fingers, pull the joint out along the delivery pipe (see Fuel Tank Removal).
  Cloth [B]
  Pump Outlet Hose Joint [C]

Fuel Injectors



● Check the injector fuel line for leakage as follows:

○Connect a commercially available vacuum/pressure pump [A] to the nipple of the delivery pipe [B] with a high-pressure fuel hose [C] (both ends connected with the clamps [D]) as shown.

Torque - Fuel Hose Clamp Screws: 1.5 N·m (0.15 kgf·m, 13 in·lb)

○Apply soap and water solution to the areas [E] as shown.

○Watching the pressure gauge, squeeze the pump lever [F], and build up the pressure until the pressure reaches the maximum pressure.

Injector Fuel Line Maximum Pressure
Standard: 300 kPa (3.06 kgf/cm², 43 psi)

CAUTION
During pressure testing, do not exceed the maximum pressure for which the system is designed.

● Watch the gauge for at least 6 seconds.

★If the pressure holds steady, the system is good.

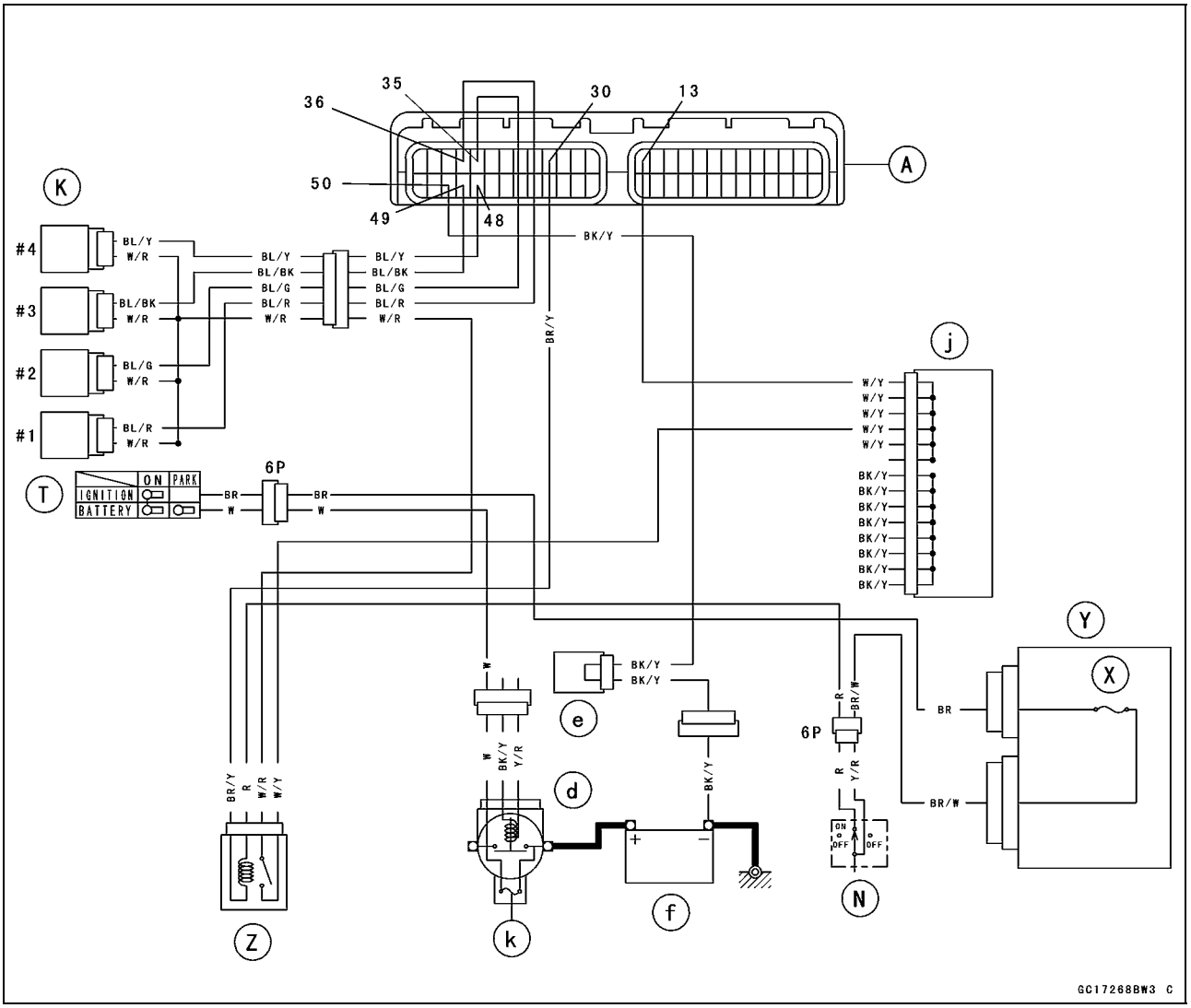
★If the pressure drops at once or if bubbles are found in the area, the line is leaking. Replace the delivery pipe, injectors and related parts.

○Repeat the leak test, and check the fuel line for no leakage.

● Install the pump outlet hose (see Fuel Tank Installation).

● Run the hoses correctly (see Cable, Wire, and Hose Routing section in Appendix chapter).

Fuel Injectors



A. ECU
K. Fuel Injectors
N. Engine Stop Switch
T. Ignition Switch
X. Ignition Fuse 10 A
Y. Junction Box
Z. Fuel Pump Relay (for fuel pump an injectors)
d. Starter Relay
e. Joint Connector C
f. Sealed Battery
j. Joint Connector B
k. Main Fuse 30 A

Throttle Grip and Cables

Throttle Grip Play Inspection/Adjustment

● Refer to the Throttle Control System Inspection in the Periodic Maintenance chapter.

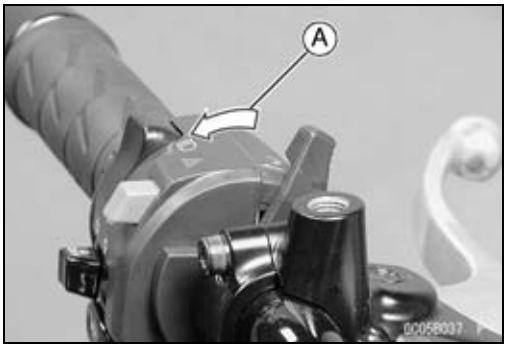
Choke Lever Operation

○Do not use the choke lever except when the engine has a starting difficulty like in cold weather (10°C, 50°F or below) or at high altitude. The DFI system has an automatic choke system, using a water temperature sensor, and an atmospheric pressure sensor, which provide startability.

NOTE

○*Pull [A] the choke lever fully when using. The choke doesn't work with the lever knob halfway.*

○When flooded, do not crank the engine with the throttle fully opened like a carburetor. This promotes engine flooding because more fuel is supplied automatically by the DFI system.



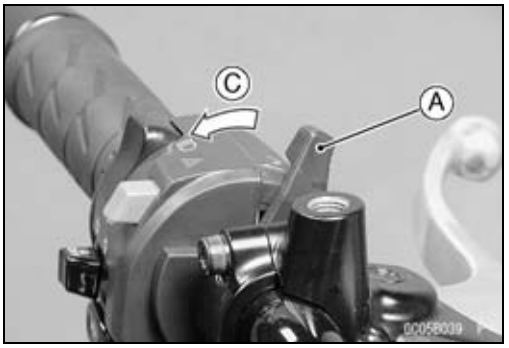
Choke Lever Play Inspection

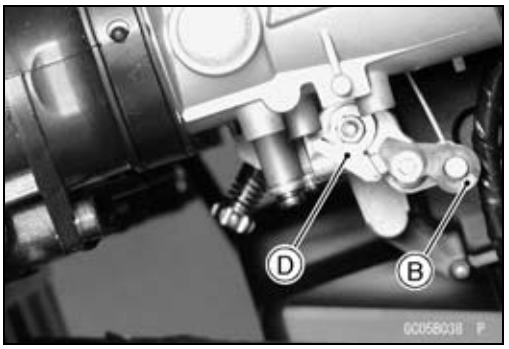
● Push the choke lever [A] fully and ensure by your finger that the choke cam [B] has the specified play.

Choke Lever Free Play
Standard: 0 ~ 0.5 mm (0 ~ 0.02 in.)

● Pull [C] the choke lever fully and ensure that the choke cam turns the choke link [D].

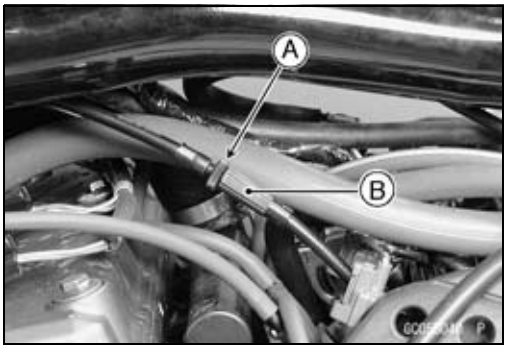
★If the free play is incorrect, adjust the choke cable.





Choke Lever Play Adjustment

● Remove the fuel tank (see Fuel Tank Removal).
● Loosen the locknut [A], and turn the adjuster [B] until the cable has the proper amount of free play.
● Tighten the locknut against the adjuster securely.



Cable Removal/Installation

● Refer to the Throttle Assy section in this chapter for removal/installation of the throttle cables and choke cable.

Cable Lubrication and Inspection

● Refer to the General Lubrication in the Periodic Maintenance chapter.

Throttle Body Assy

Idle Speed Inspection

- Refer to the Idle Speed Inspection in the Periodic Maintenance chapter.

Engine Vacuum Synchronization Inspection/ Adjustment

- Refer to the Engine Vacuum Synchronization Inspection in the Periodic Maintenance chapter.

High Altitude Performance Adjustment

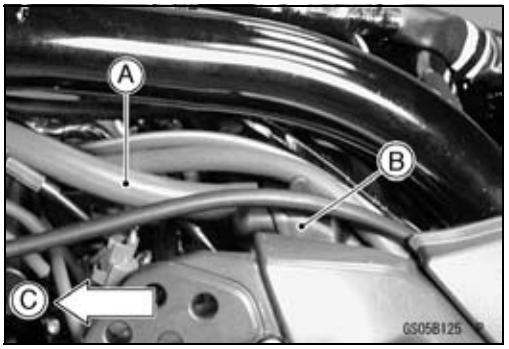
- Any modification is not necessary in this model since the atmospheric pressure sensor senses atmospheric pressure change due to high altitude and the ECU compensates the change.

Throttle Body Assy Removal

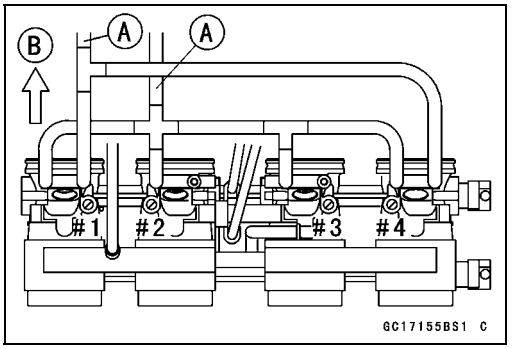
⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Disconnect the battery (–) cable terminal. 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.
Be prepared for fuel spillage: any spilled fuel must be completely wiped up immediately.

- Remove:
  Fuel Tank (see Fuel Tank Removal)
  Vacuum Switch Valve Vacuum Hose [A] (from air cleaner housing [B])
  Front [C]

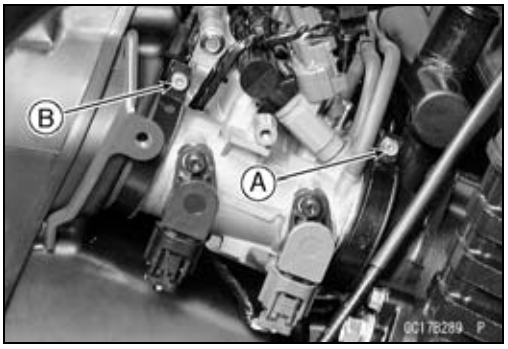


- Remove the vacuum hoses from the positions [A] shown.
  Front [B]



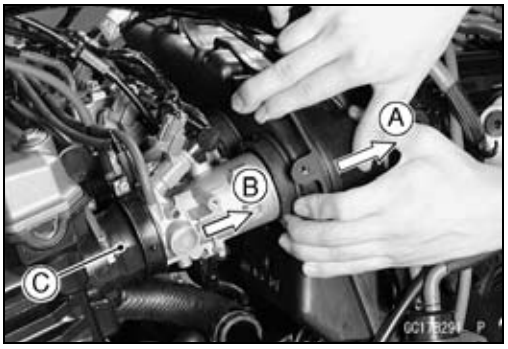
Throttle Body Assy

- Loosen:
  Throttle Assy Holder Clamp Bolts [A]
  Air Cleaner Duct Clamp Bolts [B]

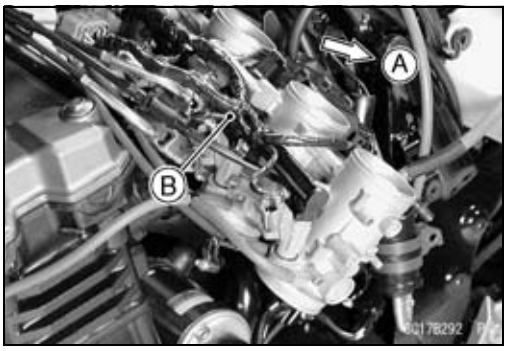


- Remove:
  Right and Left Side Covers (see Frame chapter)
  Coolant Reserve Tank (see Cooling System in the Periodic Maintenance chapter)
  Crankcase Breather Hose
  Right and Left Air Cleaner Housing Mounting Bolts [A]

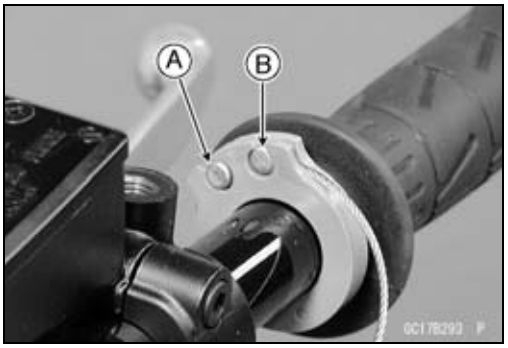
- Move [A] the air cleaner housing backwards.
- Pull [B] the throttle body assy out of the holders [C].



- Slide [A] the throttle body assy [B] right and remove it.

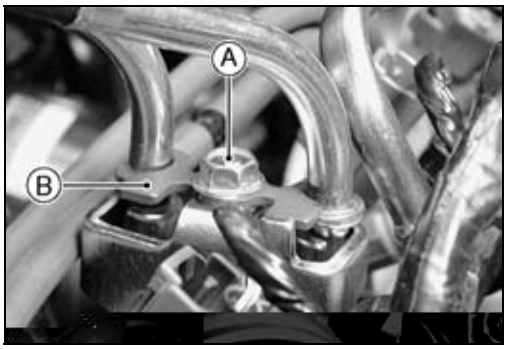


- Loosen the locknut and screw in the throttle cable adjuster fully to give the cables plenty of play.
- Remove the right handlebar switch housing and take out the accelerator cable upper end [A] and the decelerator cable upper end [B].



Throttle Body Assy

- Remove the bolt [A] and the throttle cable plate [B] from the throttle body front side.
- Remove the throttle cable lower ends from the throttle pulley.



- Remove:
  Choke Cable Upper End (From choke lever)
  Choke Cable Lower End [A]
- After removing the throttle body assy, stuff pieces of lint -free, clean cloth into the throttle body holders.

CAUTION

If dirt gets into the engine, excessive engine wear and possible engine damage will occur.

Throttle Body Assy Installation

- Install the holder clamp bolts [A] in the direction shown with each bolt heads, facing outwards.
  Cylinder Head [B]
- Tighten:

Torque - Throttle Body Assy Holder Clamp Bolts: 2.0 N·m (0.20 kgf·m, 17 in·lb)

- Tighten:

Torque - Air Cleaner Duct Clamp Bolts [A]: 2.0 N·m (0.20 kgf·m, 17 in·lb)

- Run the vacuum hoses as shown in the Cable, Wire, and Hose Routing section of the Appendix chapter.

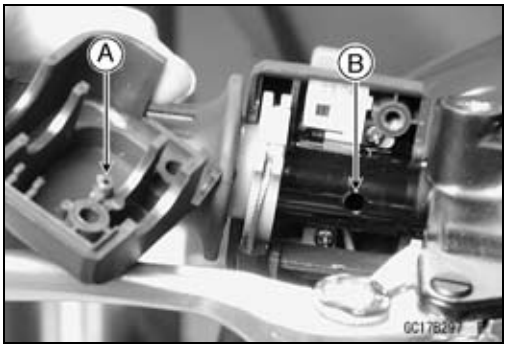
- Fit the accelerator cable end [A] and the decelerator cable end [B] into the throttle pulley.
- Tighten the throttle plate bolt.
- Check fuel leakage from the throttle body assy.

⚠ WARNING

Fuel spilled from the carburetors is hazardous.

Throttle Body Assy

- Apply a thin coating of grease to the throttle cable upper ends.
- Install the upper ends of the throttle cables in the grip.
- Fit the projection [A] of the right switch housing into the hole [B] of the handlebar.
- Turn the throttle grip and make sure that the throttle valves move smoothly and return by spring force.
- Check the throttle grip free play (see Throttle Grip Free Play Inspection).



⚠ WARNING

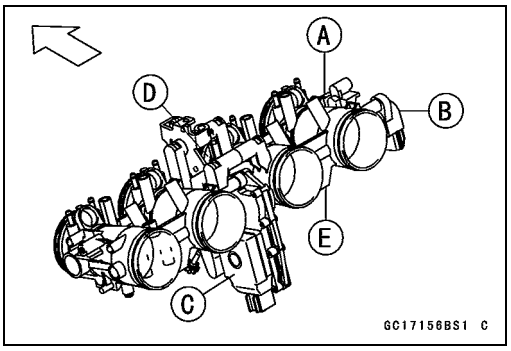
Operation with an incorrectly routed cable could result in an unsafe riding condition.

- Adjust:
  Throttle Grip Free Play
  Choke Lever Free Play
  Idle Speed

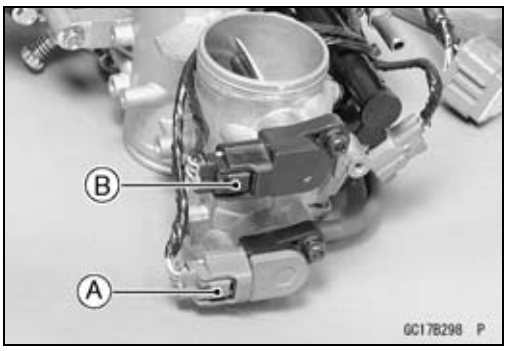
Throttle Body Assy Disassembly

CAUTION

Do not remove, disassemble or adjust the main throttle sensor [A], subthrottle sensor [B], subthrottle valve actuator [C], throttle link mechanism [D] and throttle body assy [E], because they are adjusted or set at the manufacturer. Adjustment of these parts could result in poor performance, requiring replacement of the throttle body assy.



- Remove the throttle body assy (see Throttle Body Assy Removal).
- Push the lock and disconnect:
  Main Throttle Connector (gray) [A]
  Subthrottle Connector (black) [B]
  Subthrottle Valve Actuator Connector

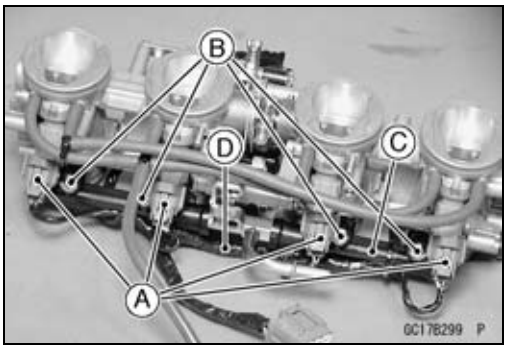


CAUTION

Never drop the throttle body assy , especially on a hard surface. Such a shock to the body assy can damage it.

- Push the lock and disconnect the injector connectors [A].
- Remove:
  Screws [B]
  Delivery Pipe [C] along with harness [D] and injectors

★If necessary, cut straps and take the harness off the delivery pipe.



Throttle Body Assy

CAUTION

Never drop the injector, especially on a hard surface. Such a shock to the injector can damage it.

- Pull out the injectors along with the delivery pipe [A].

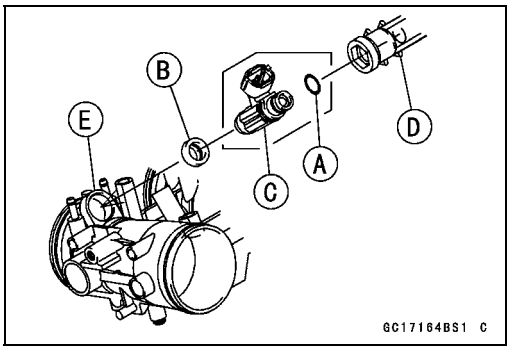
★If necessary, remove the injectors from the delivery pipe. Replace the O-rigs of the indicators.

★If necessary, cut straps and take the harness off the delivery pipe.

Throttle Body Assy Assembly

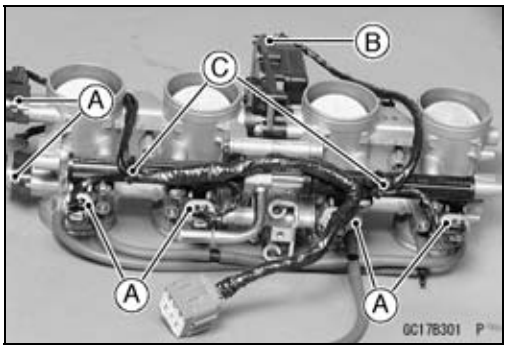
○Replace the O-rings [A] of injectors and the seals [B] with the new ones.

- Before assembling, blow away dirt or dust from the throttle body and delivery pipe by applying compressed air.
- Apply engine oil to the new O-rings of each injector [C], insert them into the delivery pipe [D] and confirm whether the injectors turn smoothly or not.
- Install the injectors along with the delivery pipe assy into the throttle bodies [E].



Torque - Delivery Pipe Screws: 3.4 N·m (0.35 kgf·m, 30 in·lb)

- Connect all the connectors [A], including the subthrottle valve actuator connector [B] and bind the leads with straps [C].
- Insert the each hoses onto the throttle body fittings.
- Install the throttle body assy (see Throttle Body Assy Installation).



Air Cleaner

Element Removal/Installation

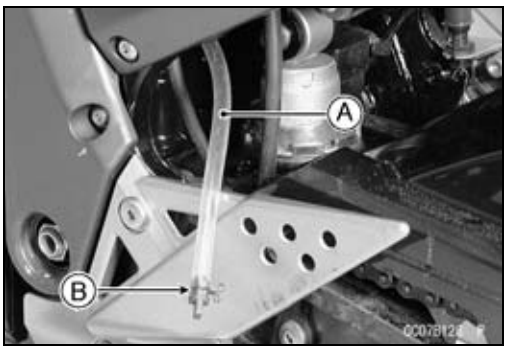
- Refer to the Air Cleaner Element Cleaning in the Periodic Maintenance chapter.

Air Cleaner Oil Draining

A drain hose is connected to the bottom of the air cleaner to drain water or oil accumulated in the cleaner part.

- Visually check the drain hose [A] if the water or oil accumulates.

★If any water or oil accumulates in the hose, remove the plug [B] from the drain hose and drain it.



⚠ WARNING

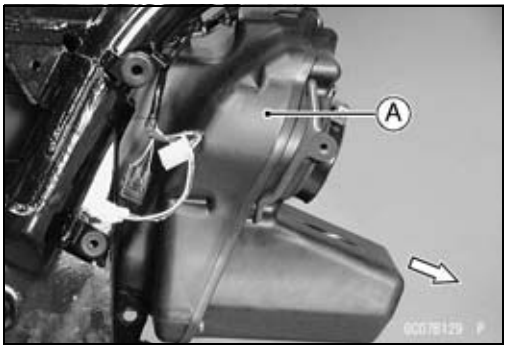
Be sure to reinstall the plug in the drain hose after draining. Oil on tires will make them slippery and can cause an accident and injury.

Air Cleaner Housing Removal

- Remove the engine (see Engine Removal/Installation chapter).

○The throttle body assy is removed during engine removal.

- Remove the right and left air cleaner housing bolts.
- Move the air cleaner housing [A] forwards and remove it from the right side of the frame.

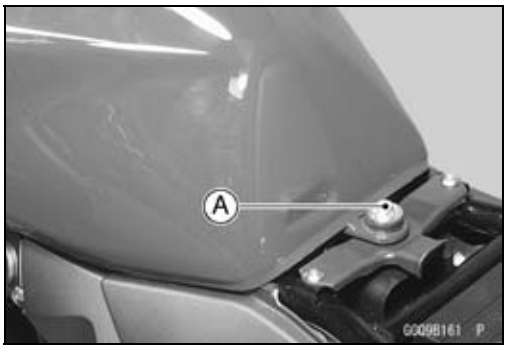


Fuel Tank

Fuel Tank Removal

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch OFF. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.



- Remove:
  Seats (see Frame chapter)
  Fuel Tank Bolt [A]
  Fuel Tank Drain Hose
- Disconnect the battery (–) terminal.

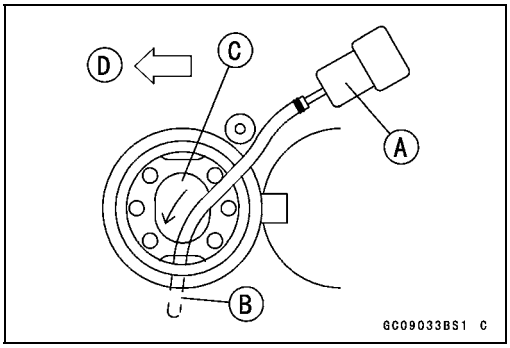
- Turn both ignition switch, and engine stop switch OFF.
- Wait until the engine cools down.
- Open the fuel tank cap [A] to lower the pressure in the tank.

○During tank removal, keep the tank cap open to release pressure in the tank. This makes fuel spillage less.

- Draw the fuel out from the fuel tank with a commercially available pump [A].

○Use a soft plastic hose [B] as a pump inlet hose in order to insert the hose smoothly.

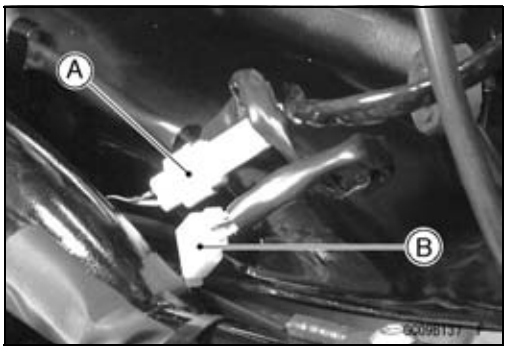
○Put the hose through the fill opening [C] into the tank and draw the fuel out.
  Front [D]



⚠ WARNING

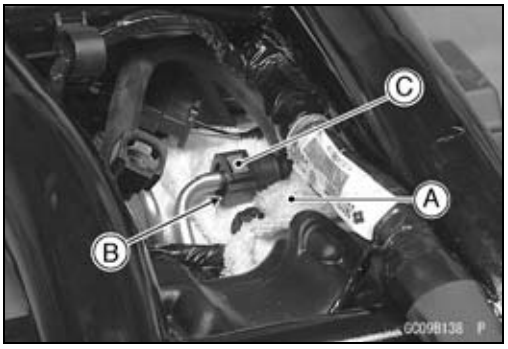
The fuel could not be removed completely from the fuel tank. Be careful for remained fuel spillage.

- Raise the fuel tank and disconnect the fuel pump lead connector [A] and fuel level sensor lead connector [B].



Fuel Tank

- Be sure to place a piece of cloth [A] around the fuel hose pump outlet joint [B].
- While pinching the hose joint locks [C] with fingers, pull the joint out along the delivery pipe.



⚠ WARNING

Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.
When the fuel hose is disconnected, fuel spills out from the hose and the pipe because of residual pressure. Cover the hose connection with a piece of clean cloth to prevent fuel spillage.

- Close the fuel tank cap.
- Remove the fuel tank, and place it on a flat surface.

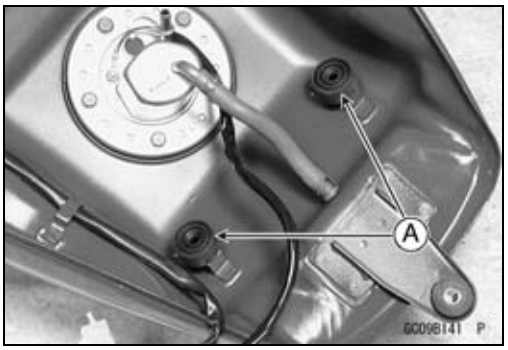
○Do not remove the pump inlet hose [A].

Fuel Tank Installation

- Note the above WARNING (see Fuel Tank Removal).
- Route the hoses correctly (see Appendix chapter).
- Check that the rubber dampers [A] are on the frame and the fuel tank.

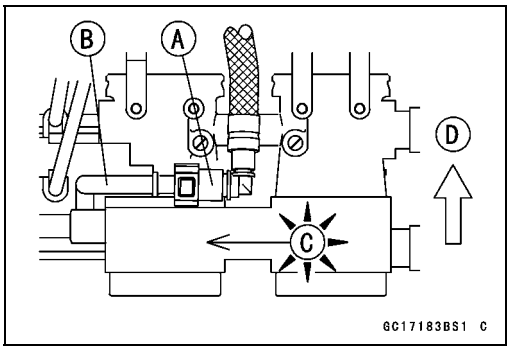
- Check that the dampers [A] are in place on the fuel tank as well.

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



Fuel Tank

● Insert the pump outlet hose joint [A] straight onto the delivery pipe [B] until the hose joint clicks [C].
Front [D]

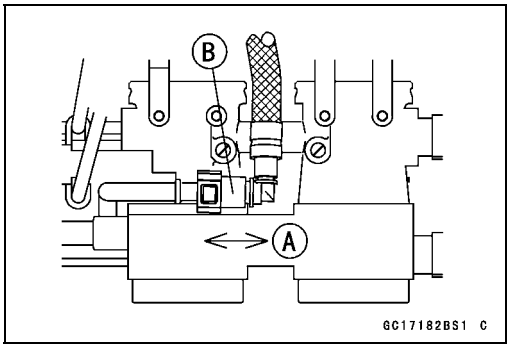


● Push and pull [A] the hose joint [B] back and forth more than two times and make sure it is locked and doesn't come off. When the hose joint is correctly installed, it should slide on the delivery pipe about 5 mm (0.2 in.).

⚠ WARNING

Make sure the hose joint is installed correctly on the delivery pipe by sliding the joint, or the fuel could leak.

★If it does not slide, reinstall the hose joint.



● Connect the fuel pump and the fuel level sensor connectors and the battery (–) lead terminal.

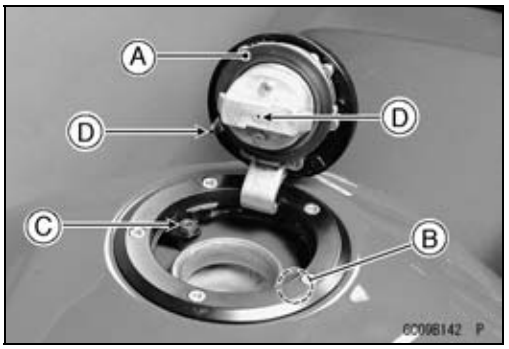
Fuel Tank and Cap Inspection

● Visually inspect the gasket [A] on the tank cap for any damage.

★Replace the gasket if it is damaged.

● Check to see if the water drain pipe [B] and fuel breather pipe [C] in the tank are not clogged. Check the tank cap breather also.

★If they are clogged, remove the tank and drain it, and then blow the breather free with compressed air.



CAUTION

Do not apply compressed air to the air vent holes [D] in the tank cap. This could cause damage and clogging of the labyrinth in the cap.

Fuel Tank Cleaning

⚠ WARNING

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

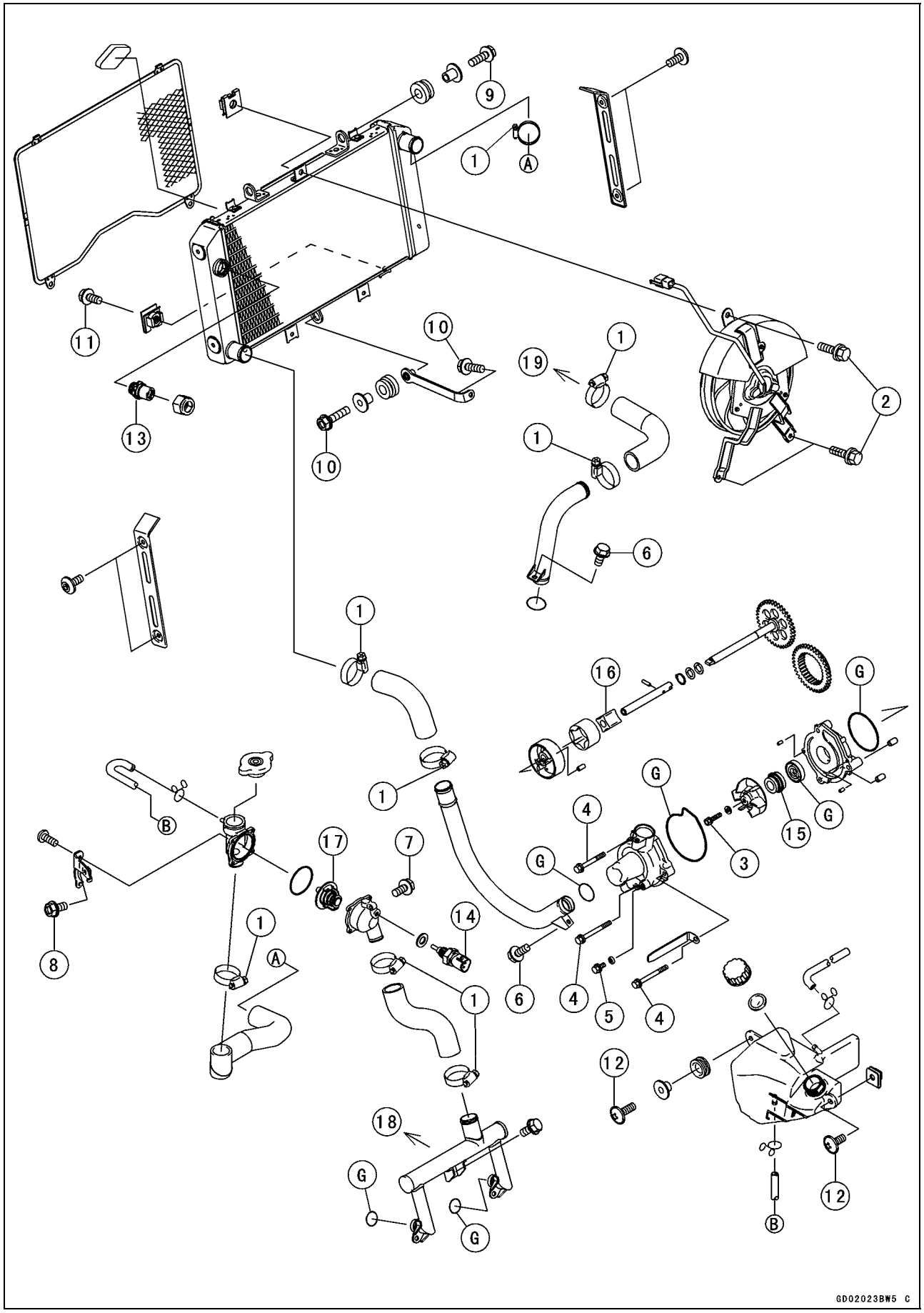
● Remove the fuel tank (see Fuel Tank Removal).
● Remove the fuel pump inlet hose and the fuel pump (see Fuel Pump section in this chapter).
● Pour some high flash-point solvent into the fuel tank and shake the tank to remove dirt and fuel deposits.
● Draw the solvent out of the fuel tank.
● Dry the tank with compressed air.
● Install the fuel pump (see Fuel Pump Installation).
● Install the fuel tank (see Fuel Tank Installation).

Cooling System

Table of Contents

Exploded View 4-2
Coolant Flow Chart 4-4
Specifications 4-6
Special Tools and Sealant 4-7
Coolant 4-8
  Coolant Deterioration Inspection 4-8
  Coolant Level Inspection 4-8
  Coolant Draining 4-8
  Coolant Filling 4-8
  Pressure Testing 4-9
  Cooling System Flushing 4-9
  Coolant Reserve Tank Removal/Installation 4-9
Water Pump 4-10
  Water Pump Removal 4-10
  Water Pump Installation 4-10
  Water Pump Inspection 4-10
  Water Pump Impeller Disassembly/Assembly 4-10
  Water Pump Impeller Inspection 4-10
  Water Pump Housing Disassembly 4-10
  Water Pump Housing Assembly 4-11
  Mechanical Seal Inspection 4-11
Radiator 4-12
  Radiator and Radiator Fan Removal 4-12
  Radiator and Radiator Fan Installation 4-13
  Radiator Inspection 4-13
  Radiator Cap Inspection 4-13
  Radiator Filler Neck Inspection 4-14
Thermostat 4-15
  Thermostat Removal 4-15
  Thermostat Installation 4-15
  Thermostat Inspection 4-15
Hoses and Pipes 4-17
  Hose Installation 4-17
  Hose Inspection 4-17
Radiator Fan Switch, Water Temperature Sensor 4-18
  Radiator Fan Switch Removal 4-18
  Radiator Fan Switch Installation 4-18
  Radiator Fan Switch Inspection 4-18
  Water Temperature Sensor Removal 4-18
  Water Temperature Sensor Inspection 4-18

Exploded View



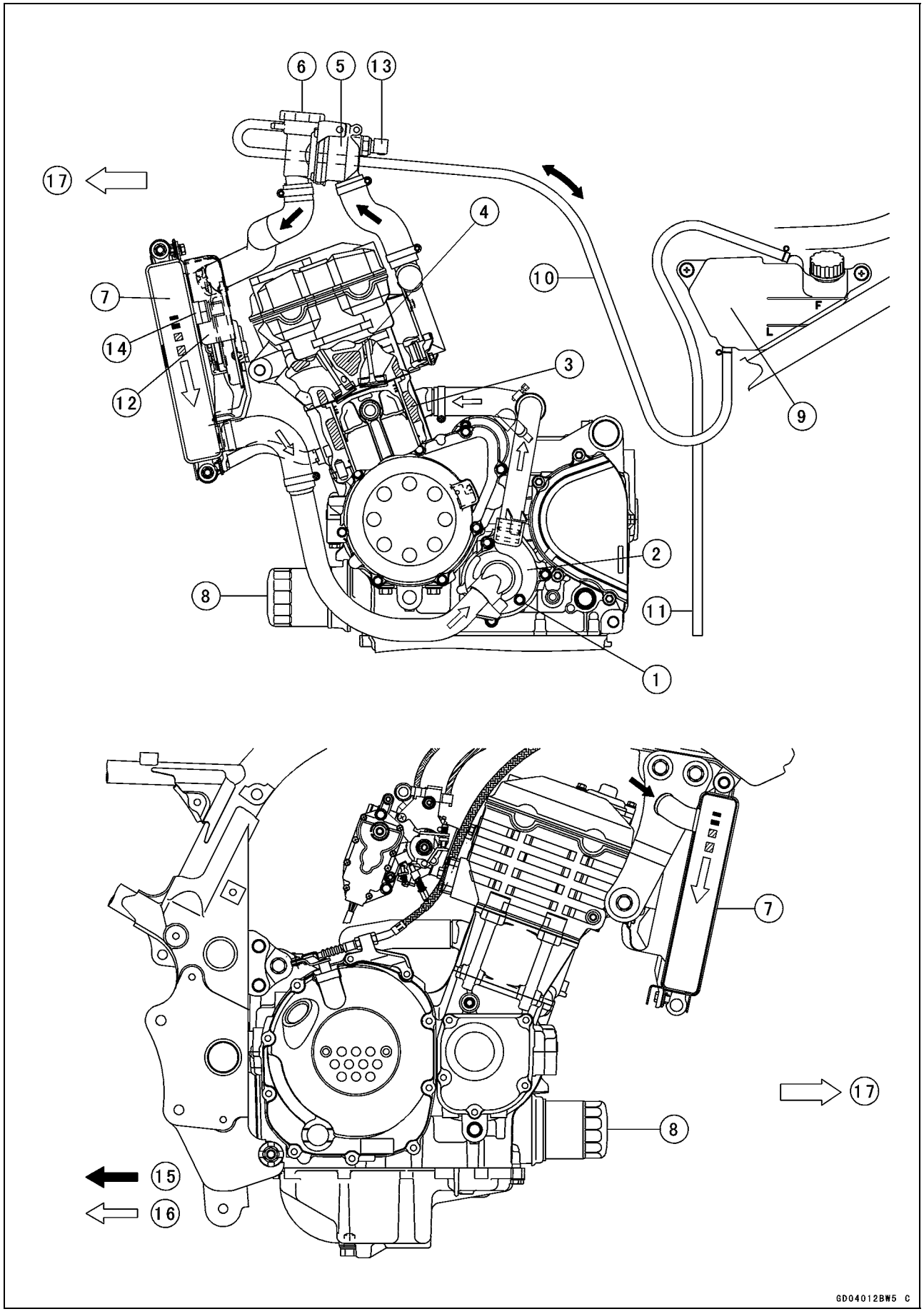
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Radiator hose clamp screws	2.0	0.20	17 in·lb	
2	Radiator fan bolts	8.3	0.85	74 in·lb	
3	Water pump impeller bolt	9.8	1.0	87 in·lb	
4	Water pump cover bolts	11	1.1	95 in·lb	
5	Water pump drain bolt	11	1.1	95 in·lb	
6	Water pipe bolts	11	1.1	95 in·lb	
7	Thermostat housing ground bolt	7.0	0.70	61 in·lb	
8	Thermostat bracket bolt	7.0	0.70	61 in·lb	
9	Radiator upper bolts	7.0	0.70	61 in·lb	
10	Radiator lower bolts	7.0	0.70	61 in·lb	
11	Radiator screen bolt	7.0	0.70	61 in·lb	
12	Coolant reserve tank screws	7.0	0.70	61 in·lb	
13	Radiator fan switch	18	1.8	13	
14	Water temperature sensor	25	2.5	18	

15. Mechanical seal
16. Oil pump rotor
17. Thermostat
18. To cylinder head
19. To cylinder

G: Apply grease.

Coolant Flow Chart



Coolant Flow Chart

1. Drain Bolt
2. Water Pump
3. Cylinder Jacket
4. Cylinder Head Jacket
5. Thermostat Housing
6. Radiator Cap
7. Radiator
8. Oil Filter
9. Reserve Tank
10. Reserve Tank Hose
11. Reserve Tank Overflow Hose
12. Radiator Fan
13. Water Temperature Sensor
14. Radiator Fan Switch
15. Hot Coolant
16. Cold Coolant
17. Front

Permanent type antifreeze is used as a coolant to protect the cooling system from rust and corrosion. When the engine starts, the water pump turns and the coolant circulates.

The thermostat is a wax pellet type which opens or closes with coolant temperature changes. The thermostat continuously changes its valve opening to keep the coolant temperature at the proper level. When coolant temperature is 55°C (131°F) or more, the thermostat closes so that the coolant flow is restricted through the air bleeder hole, causing the engine to warm up more quickly. When coolant temperature is more than 58 ~ 62°C (136 ~ 144°F), the thermostat opens and the coolant flows.

When the coolant temperature goes up beyond 95 ~ 101°C (203 ~ 214°F), the radiator fan switch conducts to operate the radiator fan. The radiator fan draws air through the radiator core when there is not sufficient air flow such as at low speeds. This increases up the cooling action of the radiator. When the coolant temperature goes down from the operation temperature by 3 ~ 8°C (37 ~ 46°F), the fan switch opens and the radiator fan stops.

In this way, this system controls the engine temperature within narrow limits where the engine operates most efficiently even if the engine load varies.

The system is pressurized by the radiator cap to suppress boiling and the resultant air bubbles which can cause engine overheating. As the engine warms up, the coolant in the radiator and the water jacket expands. The excess coolant flows through the radiator cap and hose to the reserve tank to be stored there temporarily. Conversely, as the engine cools down, the coolant in the radiator and the water jacket contracts, and the stored coolant flows back to the radiator from the reserve tank.

The radiator cap has two valves. One is a pressure valve which holds the pressure in the system when the engine is running. When the pressure exceeds 93 ~ 123 kPa (0.95 ~ 1.25 kgf/cm², 14 ~ 17.8 psi), the pressure valve opens and releases the pressure to the reserve tank. As soon as pressure escapes, the valve closes, and keeps the pressure at 93 ~ 123 kPa (0.95 ~ 1.25 kgf/cm², 14 ~ 17.8 psi). When the engine cools down, another small valve (vacuum valve) in the cap opens. As the coolant cools, the coolant contracts to form a vacuum in the system. The vacuum valve opens and allows the coolant from the reserve tank to enter the radiator.

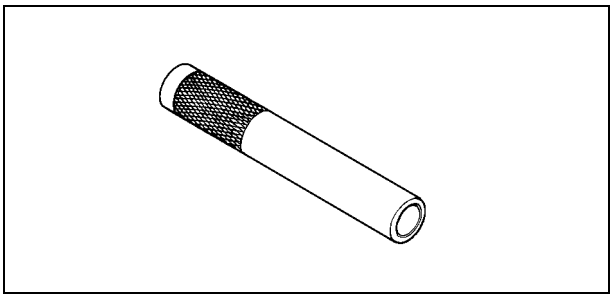
4-6 COOLING SYSTEM

Specifications

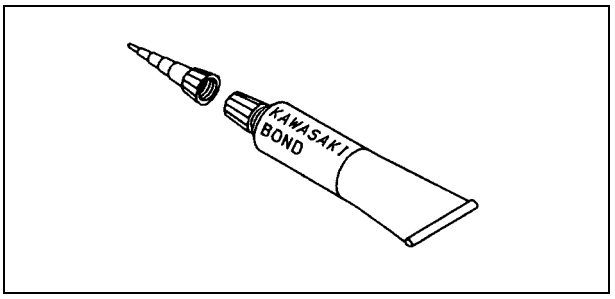
Item	Standard
Coolant provided when shipping:	
Type (recommended)	Permanent type of antifreeze (soft water and ethylene glycol plus corrosion and rust inhibitor chemicals for aluminum engines and radiators)
Color	Green
Mixed ratio	Soft water 50%, coolant 50%
Freezing point	–35°C (–31°F)
Total amount	2.9 L (3.1 US qt) (reserve tank full level, including radiator and engine)
Radiator cap	
Relief pressure:	93 ~ 123 kPa (0.95 ~ 1.25 kgf/cm², 14 ~ 17.8 psi)
Thermostat:	
Valve opening temperature	58 ~ 62°C (136 ~ 144°F)
Valve full opening lift	8 mm (0.31 in.) or more @75°C (167°F)

Special Tools and Sealant

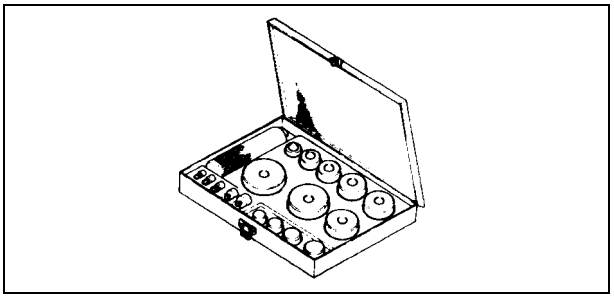
Bearing Driver:
57001–382



Kawasaki Bond (Silicone Sealant):
56019–120



Bearing Driver Set:
57001–1129



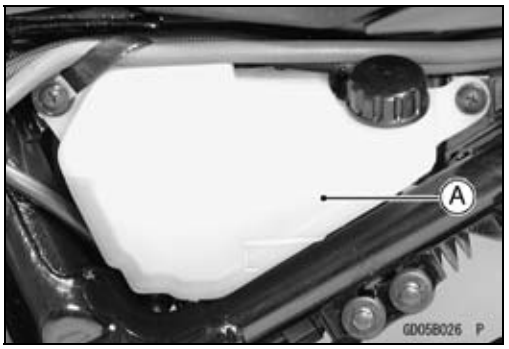
Coolant

Coolant Deterioration Inspection

- Remove the left side cover (see Frame chapter).
- Visually inspect the coolant [A] in the reserve tank.

★If whitish cotton-like wafts are observed, aluminum parts in the cooling system are corroded. If the coolant is brown, iron or steel parts are rusting. In either case, flush the cooling system.

★If the coolant gives off an abnormal smell, check for a cooling system leak. It may be caused by exhaust gas leaking into the cooling system.



Coolant Level Inspection

NOTE

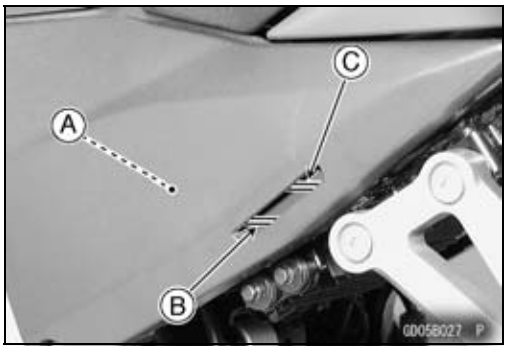
○*Check the level when the engine is cold (room or ambient temperature).*

- Check the coolant level in the reserve tank [A] with the motorcycle held perpendicular (Do not use the sidestand).

★If the coolant level is lower than the “L” level line [B], unscrew the reserve tank cap and add coolant to the “F” level line [C].

“L”: low

”F”: full



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 alone 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 ruins painted surfaces. Immediately wash away any coolant that spills on the frame, engine, wheels or other painted parts.

Coolant Draining

- Refer to the Cooling System in the Periodic Maintenance chapter.

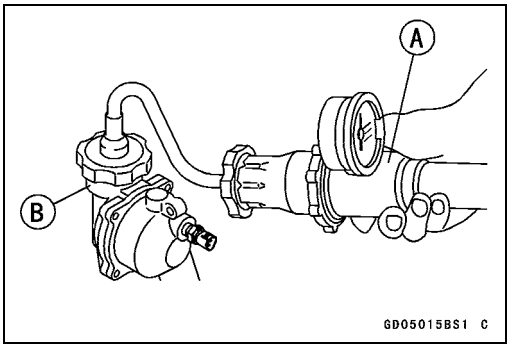
Coolant Filling

- Refer to the Cooling System in the Periodic Maintenance chapter.

Coolant

Pressure Testing

- Remove the fuel tank (see Fuel System (DFI) chapter).
- Remove the radiator cap, and install a cooling system pressure tester [A] on the filler neck [B].



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 kgf/cm², 17.8 psi).

CAUTION

During pressure testing, do not exceed the pressure for which the system is designed. The maximum pressure is 123 kPa (1.25 kgf/cm², 17.8 psi).

- Watch the gauge for at least 6 seconds.

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

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

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

Cooling System Flushing

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

- Drain the cooling system (see Cooling System in the Periodic Maintenance chapter).
- Fill the cooling system with fresh water mixed with a flushing compound.

CAUTION

Do not use a flushing compound which is harmful to the aluminum engine and radiator. Carefully follow the instructions supplied by the manufacturer of the cleaning product.

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

Coolant Reserve Tank Removal/Installation

- The coolant reserve tank is removed and installed during coolant change (see Cooling System in the Periodic Maintenance chapter).

Water Pump

Water Pump Removal

- Refer to the Oil Pump Removal in the Engine Lubrication System chapter.

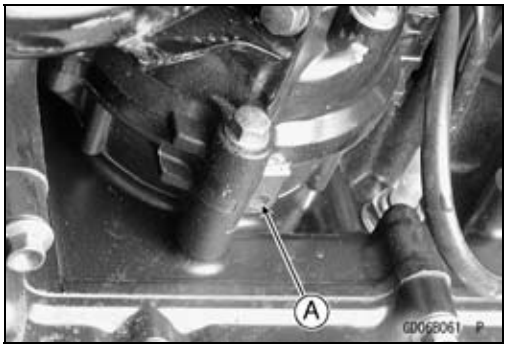
Water Pump Installation

- Refer to the Oil Pump Installation in the Engine Lubrication System chapter.

Water Pump Inspection

- Check the drainage outlet passage [A] at the bottom of the water pump body for coolant leaks.

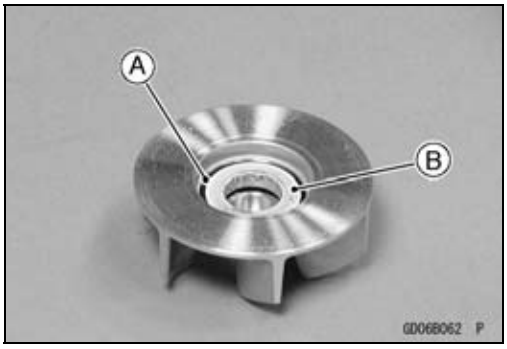
★If the mechanical seal is damaged, the coolant leaks through the seal and drains through the passage. Replace the mechanical seal unit.



Water Pump Impeller Disassembly/Assembly

- The sealing seat and rubber seal may be removed easily by hand.
- Apply coolant around the surfaces of the rubber seal and sealing seat.
- Install the rubber seal [A] and sealing seat [B] into the impeller by pressing them by hand until the seat stops at the bottom of the hole.
- Tighten the water pump impeller bolt by special torque.

Torque - Water Pump Impeller Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)



Water Pump Impeller Inspection

- Visually inspect the water pump impeller [A].

★If the surface is corroded or if the blades are damaged, replace the impeller.

Water Pump Housing Disassembly

CAUTION
Do not damage the hole wall of the water pump housing.

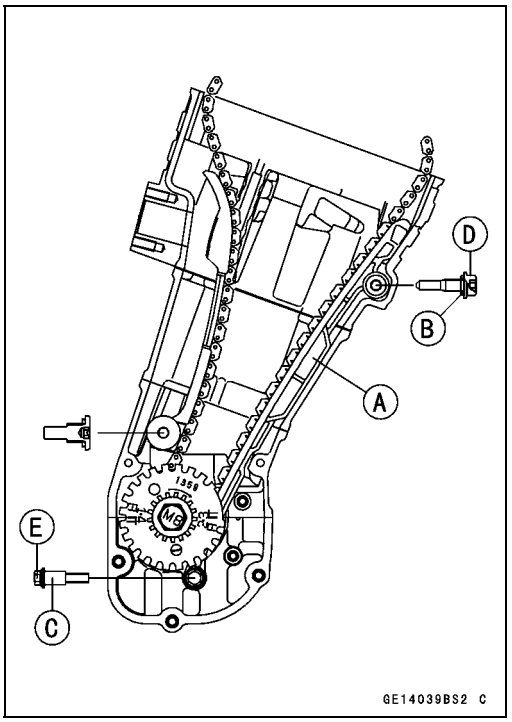
- Insert a bar [A] into the pump housing [B], and hammer evenly around the circumference of the mechanical seal bottom [C].

Cylinder Head

- Install:
  Front Camshaft Chain Guide [A]
  O-ring [B]
  Collar [C]
- Tighten:

Torque - Front Camshaft Chain Guide Bolt (Upper) [D]:
25 N·m (2.5 kgf·m, 18 ft·lb)
Front Camshaft Chain Guide Bolt (Lower) [E]:
12 N·m (1.2 kgf·m, 104 in·lb)

- Install the removed parts (see appropriate chapters).



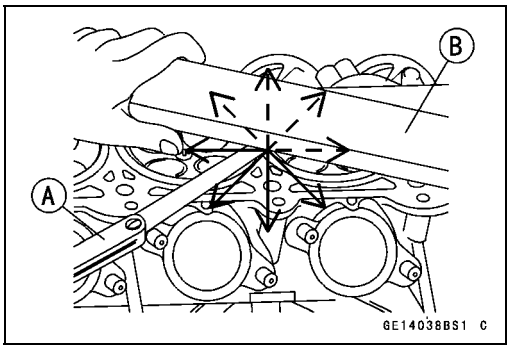
Cylinder Head Warp

- Clean the cylinder head.
- Lay a straightedge across the lower surface of the cylinder head at several positions.
- Use a thickness gauge [A] to measure the space between the straightedge [B] and the head.

Cylinder Head Warp
Standard: – – –
Service Limit: 0.05 mm (0.002 in.)

★If the cylinder head is warped more than the service limit, replace it.

★If the cylinder head is warped less than the service limit, repair the head by rubbing the lower surface on emery paper secured to a surface plate (first No. 200, then No. 400).



Valves

Valve Clearance Inspection

- Refer to the Engine Top End in the Periodic Maintenance chapter.

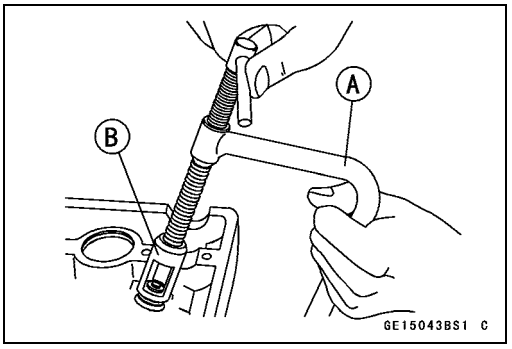
Valve Removal

- Remove the cylinder head (see Cylinder Head Removal).
- Remove the valve lifter and shim.

○Mark and record the valve lifter and shim locations so they can be installed in their original positions.

- Using the valve spring compressor assembly, remove the valve.

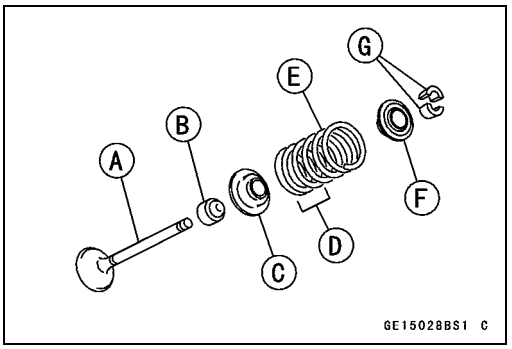
Special Tools - Valve Spring Compressor Assembly: 57001–241 [A]
Adapter, ϕ20: 57001–1154 [B]



Valve Installation

- Replace the oil seal with a new one.
- 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.

Valve Stem [A]
Oil Seal [B]
Spring Seat [C]
Closed Coil End [D]
Valve Spring (White) [E]
Retainer [F]
Split Keepers [G]



Valve Guide Removal

- Remove:

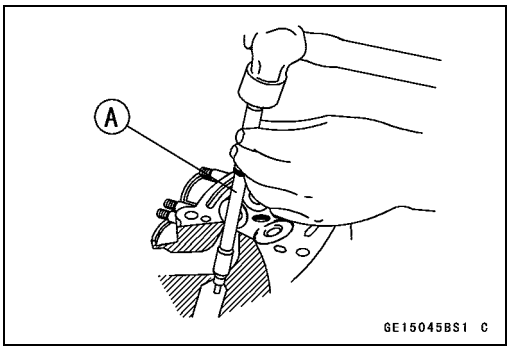
Valve (see Valve Removal)
Oil Seal
Spring Seat

- Heat the area around the valve guide to 120 ~ 150°C (248 ~ 302°F), and hammer lightly on the valve guide arbor [A] to remove the guide from the top of the head.

CAUTION

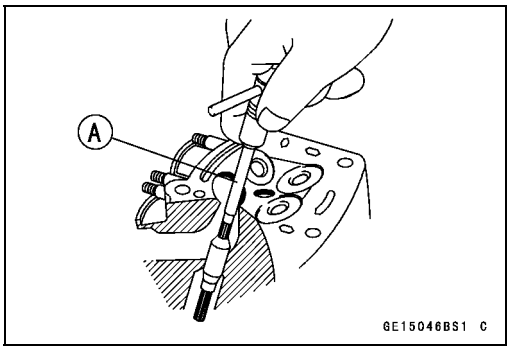
Do not heat the cylinder head with a torch. This will warp the cylinder head. Soak the cylinder head in oil and heat the oil.

Special Tool - Valve Guide Arbor, ϕ4: 57001–1273



Valves

Valve Guide Installation



- Apply oil to the valve guide outer surface before installation.
- Heat the area around the valve guide hole to about 120 ~ 150°C (248 ~ 302°F).
- Drive the valve guide in from the top of the head using the valve guide arbor. The flange stops the guide from going in too far.

Special Tool - Valve Guide Arbor, ϕ4: 57001–1273

- Wait until the cylinder head cools down and then ream the valve guide with the valve guide reamer [A] even if the old guide is reused.

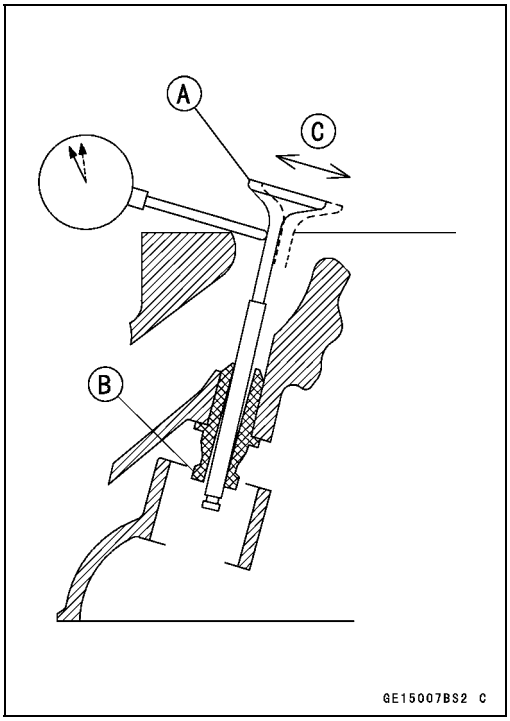
○Turn the reamer in a clockwise direction until the reamer turns freely in the guide. Never turn the reamer counterclockwise or it will be dulled.

○Once the guides are reamed they must be cleaned thoroughly.

Special Tool - Valve Guide Reamer, ϕ4: 57001–1274

Valve-to-Guide Clearance Measurement (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 [A] into the guide [B] and set a dial gauge against the stem perpendicular to it as close as possible to the cylinder head mating surface.
- Move the stem back and forth [C] 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)

Inlet

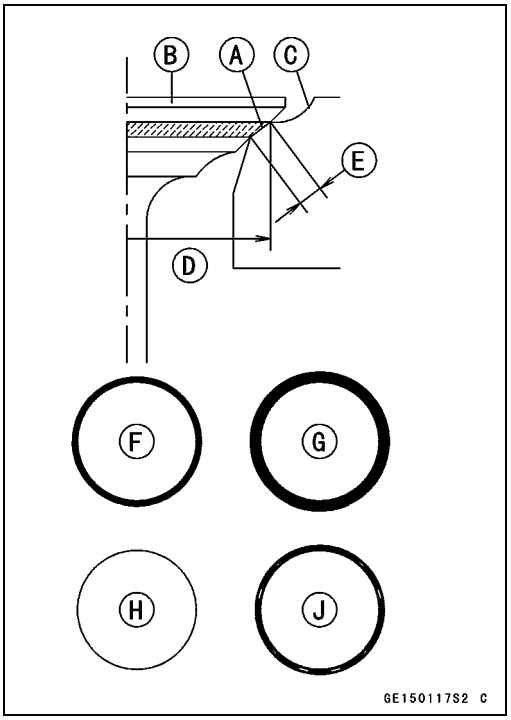
Standard:	**0.03 ~ 0.12 mm (0.0012 ~ 0.0047 in.)**
Service Limit:	**0.33 mm (0.013 in.)**

Exhaust

Standard:	**0.09 ~ 0.18 mm (0.0035 ~ 0.0071 in.)**
Service Limit:	**0.40 mm (0.016 in.)**

Valves

Valve Seat Inspection



- Remove the valve (see Valve Removal).
- Check the valve seating surface [A] between the valve [B] and valve seat [C].

○Measure the outside diameter [D] of the seating pattern on the valve seat.

★If the outside diameter is too large or too small, repair the seat (see Seat Repair).

Valve Seating Surface Outside Diameter
Standard:

Inlet	**26.4 ~ 26.6 mm (1.0276 ~ 1.0472 in.)**
Exhaust	**21.6 ~ 21.8 mm (0.850 ~ 0.858 in.)**

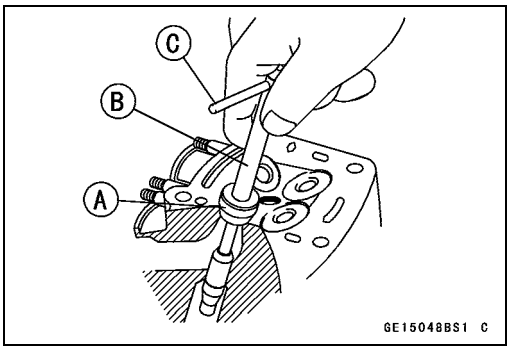
○Measure the seat width [E] of the portion where there is no build-up carbon (white portion) of the valve seat with a vernier caliper.
Good [F]

★If the width is too wide [G], too narrow [H] or uneven [J], repair the seat (see Valve Seat Repair).

Valve Seating Surface Width
Standard:

Inlet	**0.5 ~ 1.0 mm (0.020 ~ 0.039 in.)**
Exhaust	**0.5 ~ 1.0 mm (0.020 ~ 0.039 in.)**

Valve Seat Repair



- Repair the valve seat with the valve seat cutters [A].

Special Tools - Valve Seat Cutter Holder, ϕ4: 57001–1275 [B]
Valve Seat Cutter Holder Bar: 57001–1128 [C]

[For Inlet Valve Seat]

Valve Seat Cutter, 45° - ϕ27.5: 57001–1114
Valve Seat Cutter, 32° - ϕ28: 57001–1119
Valve Seat Cutter, 60° - ϕ27: 57001–1409

[For Exhaust Valve Seat]

Valve Seat Cutter, 45° - ϕ24: 57001–1113
Valve Seat Cutter, 32° - ϕ25 : 57001–1118
Valve Seat Cutter, 60° - ϕ25: 57001–1328

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

Valves

Seat Cutter Operation 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 may fall off.
3. Do not fail to apply engine oil to the valve seat cutter before grinding the seat surface. Also wash off ground particles sticking to the cutter with washing oil.

NOTE

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

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

NOTE

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

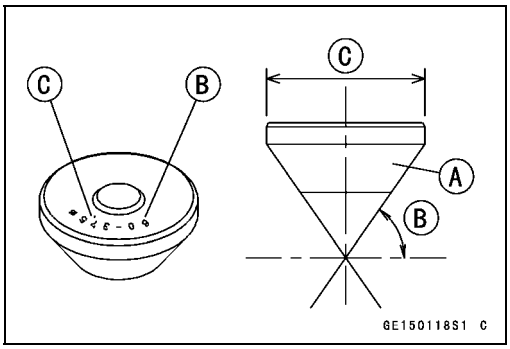
5. After use, wash it with washing oil and apply thin layer of engine oil before storing.

Marks Stamped on the Cutter:

The marks stamped on the back of the cutter [A] represent the following.

60° ..... Cutter angle [B]

ϕ37.5 ..... Outer diameter of cutter [C]



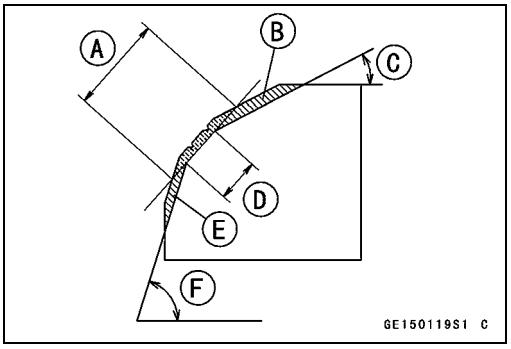
Operating Procedures:

- Clean the seat area carefully.
- Coat the seat with machinist's dye.
- Fit a 45° cutter into 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.

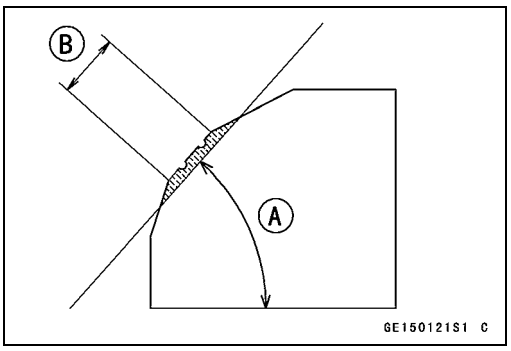
Valves



- 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.

Widened Width [A] of engagement by machining with 45° cutter
Ground Volume [B] by 32° cutter
32° [C]
Correct Width [D]
Ground Volume [E] by 60° cutter
60° [F]



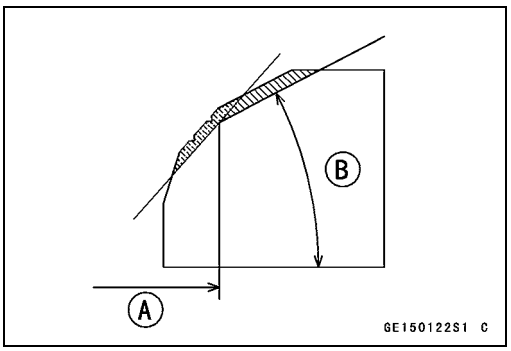
- Measure the outside diameter of the seating surface with a vernier caliper.

★If the outside diameter of the seating surface is too small, repeat the 45° grind [A] until the diameter is within the specified range.

Original Seating Surface [B]

NOTE

○*Remove all pittings of flaws from 45° ground surface.*
○*After grinding with 45° cutter, apply thin coat of machinist's dye to seating surface. This makes seating surface distinct and 32° and 60° grinding operation easier.*
○*When the valve guide is replaced, be sure to grind with 45° cutter for centering and good contact.*



★If the outside diameter [A] 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 [B] until the seat O.D. is within the specified range.

○To make the 32° grind, fit a 32° cutter into 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.

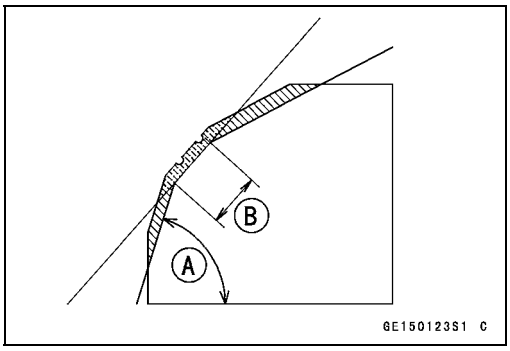
○After making the 32° grind, return to the seat O.D. measurement step above.

- 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.

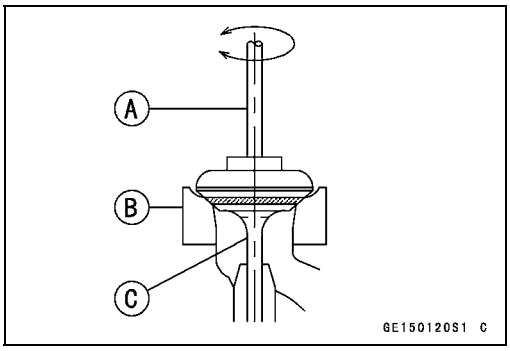
★If the seat width is too narrow, repeat the 45° grind until the seat is slightly too wide, and then return to the seat O.D. measurement step above.

Valves

★If the seat width is too wide, make the 60° [A] grind described below.
★If the seat width is within the specified range, lap the valve to the seat as described below.
● Grind the seat at a 60° angle until the seat width is within the specified range.
○To make the 60° grind, fit 60° cutter into the holder, and slide it into the valve guide.
○Turn the holder, while pressing down lightly.
○After making the 60° grind, return to the seat width measurement step above.
Correct Width [B]

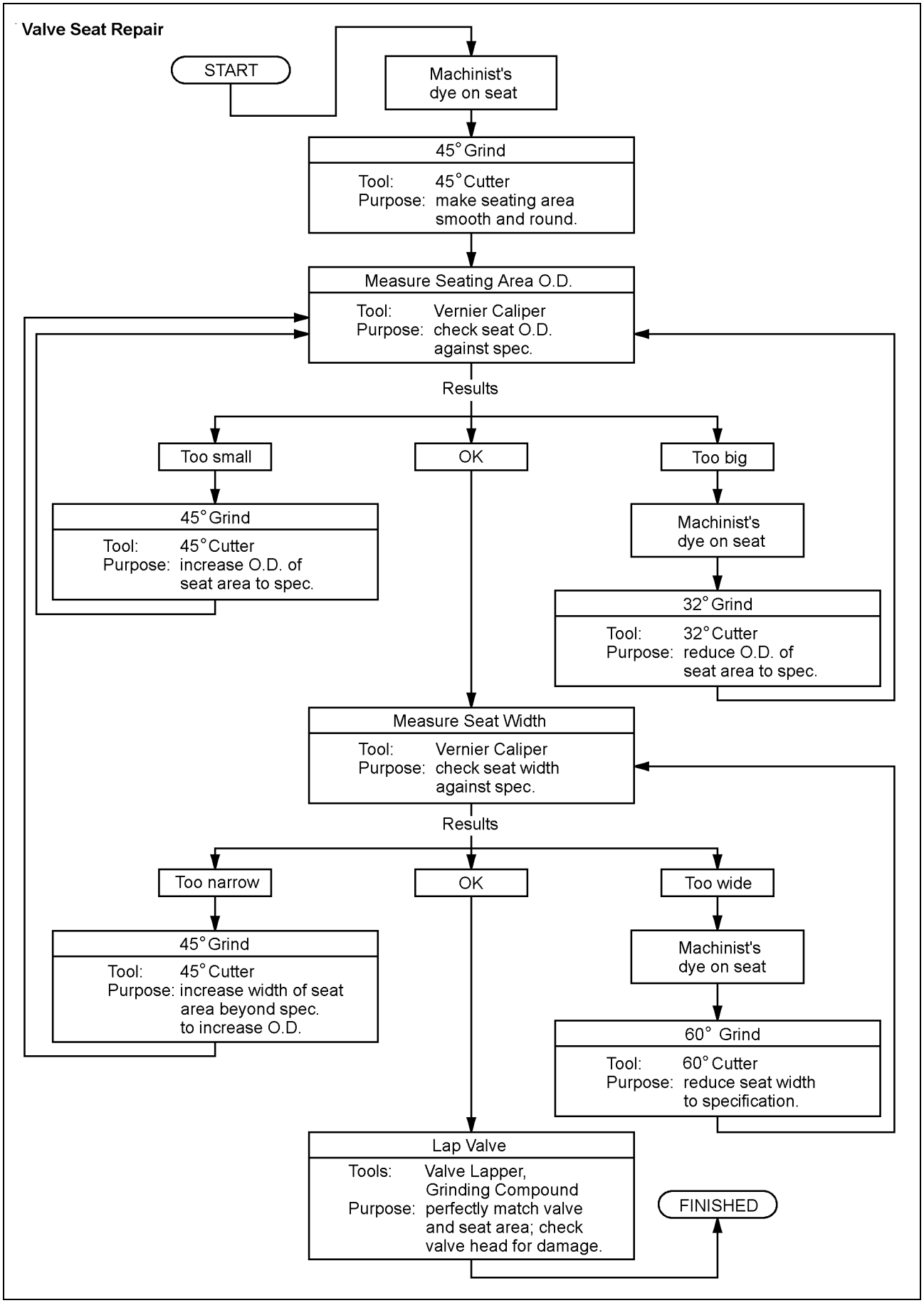


● Lap the valve to the seat, once the seat width and O.D. are within the ranges specified above.
○Put a little coarse grinding compound on the face of the valve in a number of places around the valve head.
○Spin the valve against the seat until the grinding compound produces a smooth, matched surface on both the seat and the valve.
○Repeat the process with a fine grinding compound.
Lapper [A]
Valve Seat [B]
Valve [C]



● 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 Engine Top End in the Periodic maintenance chapter).

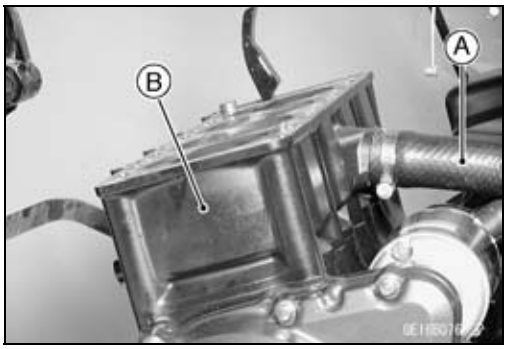
Valves


Valve Seat Repair
START
Machinist's dye on seat
45° Grind
Tool: 45° Cutter
Purpose: make seating area smooth and round.
Measure Seating Area O.D.
Tool: Vernier Caliper
Purpose: check seat O.D. against spec.
Results
Too small
OK
Too big
45° Grind
Tool: 45° Cutter
Purpose: increase O.D. of seat area to spec.
Machinist's dye on seat
32° Grind
Tool: 32° Cutter
Purpose: reduce O.D. of seat area to spec.
Measure Seat Width
Tool: Vernier Caliper
Purpose: check seat width against spec.
Results
Too narrow
OK
Too wide
45° Grind
Tool: 45° Cutter
Purpose: increase width of seat area beyond spec. to increase O.D.
Machinist's dye on seat
60° Grind
Tool: 60° Cutter
Purpose: reduce seat width to specification.
Lap Valve
Tools: Valve Lapper, Grinding Compound
Purpose: perfectly match valve and seat area; check valve head for damage.
FINISHED

Cylinder, Pistons

Cylinder Removal

- Remove:
  Cylinder Head (see Cylinder Head Removal)
  Water Hose [A]
- Remove the cylinder [B].

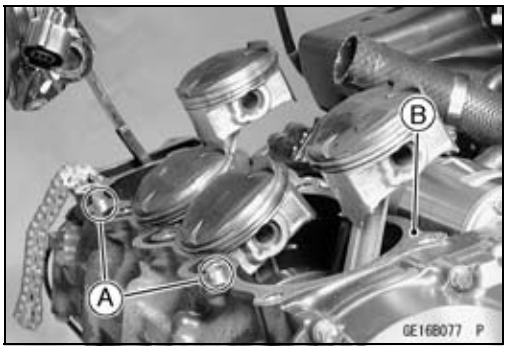


Cylinder Installation

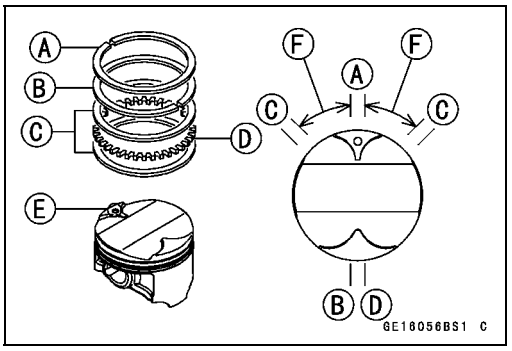
NOTE

○*If a new cylinder is used, use new piston ring.*

- Install the dowel pins [A] and new cylinder gasket [B].
- Apply engine oil to the cylinder bore.



- The piston ring openings must be positioned as shown in the figure. The openings of the oil ring steel rails must be about 30 – 40° of angle from the opening of the top ring.
  Top Ring [A]
  Second Ring [B]
  Oil Ring Steel Rails [C]
  Oil Ring Expander [D]
  Hollow [E]
  30 ~ 40° [F]



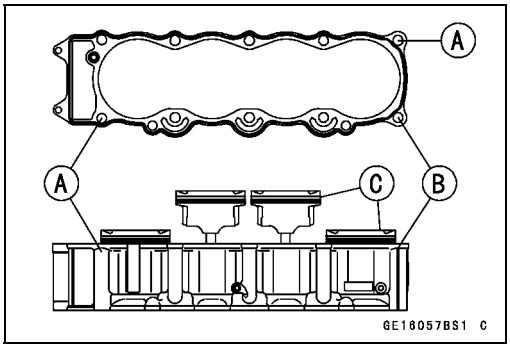
- Position the crankshaft at #2, #3 piston TDC.
- Prepare two auxiliary head bolts with their head cut.

○Install the two cylinder head bolts [A] diagonally in the crankcase.

- Install the cylinder block [B].
  Pistons [C]

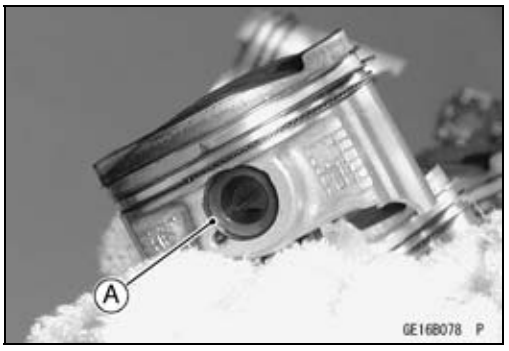
○First insert the #2, #3 pistons, and then rotate the crankshaft at 90° angle.

○Insert the piston rings with your thumbs or the thin (–) screwdriver.



Piston Removal

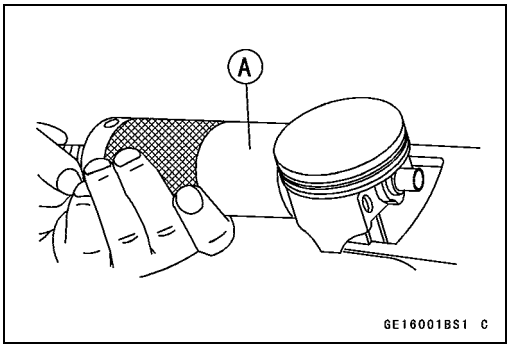
- Remove the cylinder (see Cylinder Removal).
- Place a clean cloth under the pistons and remove the piston pin snap ring [A] from the outside of each piston.



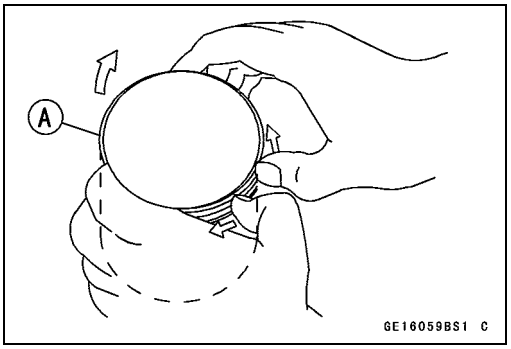
Cylinder, Pistons

- Remove the piston pins.

  Special Tool - Piston Pin Puller Assembly: 57001–910 [A]
- Remove the pistons.



- Carefully spread the ring opening with your thumbs and then push up on the opposite side of the ring [A] to remove it.
- Remove the 3-piece oil ring with your thumbs in the same manner.

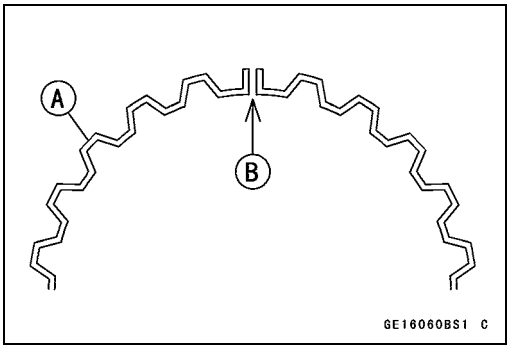


Piston Installation

- Apply molybdenum disulfide oil solution to the oil ring expander, and install the oil ring expander [A] in the bottom piston ring groove so the ends [B] butt together.
- Apply molybdenum disulfide oil solution to the oil ring steel rails, and install the oil ring steel rails, one above the expander and one below it.

○Spread the rail with your thumbs, but only enough to fit the rail over the piston.

○Release the rail into the bottom piston ring groove.

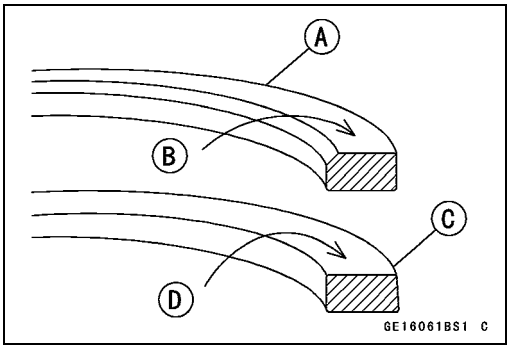


NOTE

○*The oil ring rails have no “top” or “bottom”.*

- Do not mix up the top and second ring.
- Install the top ring [A] so that the "1T" mark [B] faces up.
- Install the second ring [C] so that the "2T" mark [D] faces up.

○Apply molybdenum disulfide oil solution to the piston rings.



Cylinder, Pistons

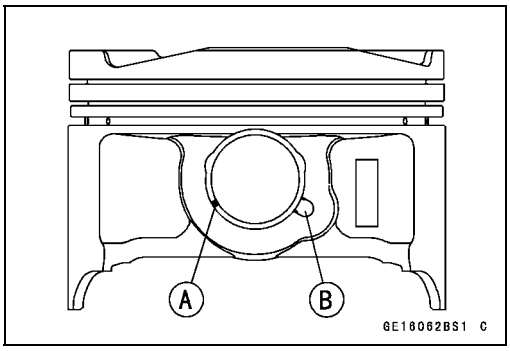
NOTE

○*If a new piston is used, use new piston ring.*

- Install the piston with its marking hollow facing forward.
- Fit a new piston pin snap ring into the side of the piston so that the ring opening [A] does not coincide with the slit [B] of the piston pin hole.

○Apply molybdenum disulfide oil solution to the piston pins and piston journals.

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



CAUTION

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

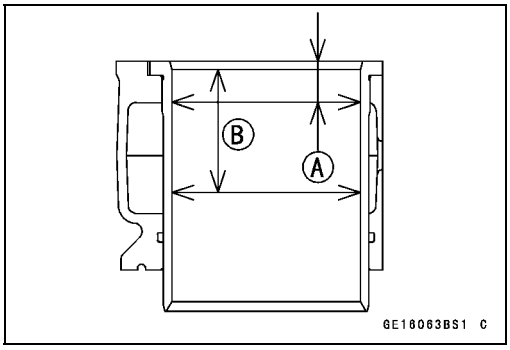
- Install the cylinder (see Cylinder Installation).

Cylinder Wear

- Since there is a difference in cylinder wear in different directions, take a side-to-side and a front-to-back measurement at each of the two locations (total of four measurements) shown in the figure.

★If any of the cylinder inside diameter measurements exceeds the service limit, replace the cylinder.

10 mm (0.39 in.) [A]
60 mm (2.36 in.) [B]



Cylinder Inside Diameter

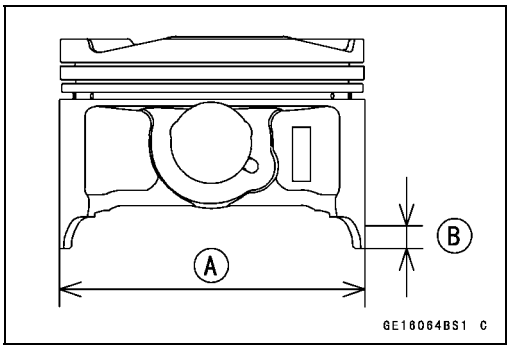
Standard: 68.400 ~ 68.412 mm (2.6929 ~ 2.6934 in.)

Service Limit: 68.50 mm (2.6969 in.)

Piston Wear

- Measure the outside diameter [A] of each piston 5 mm (0.20 in.) [B] up from the bottom of the piston at a right angle to the direction of the piston pin.

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



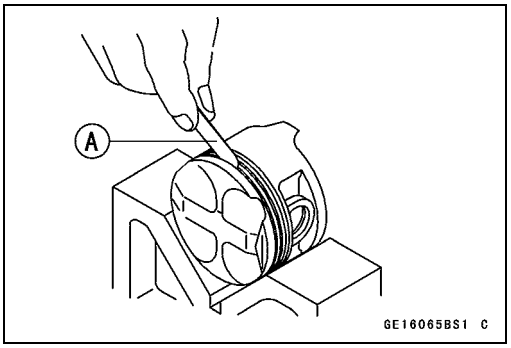
Piston Diameter

Standard: 68.345 ~ 68.360 mm (2.6907 ~ 2.6913 in.)

Service Limit: 68.21 mm (2.6854 in.)

Cylinder, Pistons

Piston Ring, Piston Ring Groove Wear



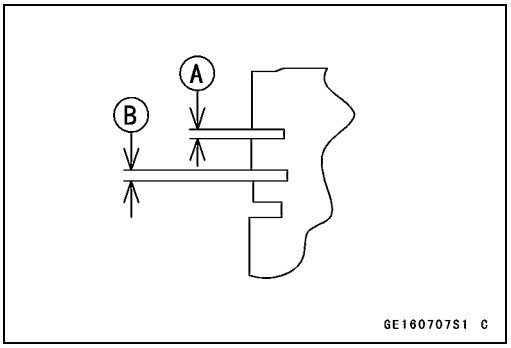
- Check for uneven groove wear by inspecting the ring seating.

★The rings should fit perfectly parallel to groove surfaces. If not, replace the piston and all the piston rings.

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

Piston Ring/Groove Clearance
Top
Standard: 0.04 ~ 0.08 mm (0.0016 ~ 0.0031 in.)
Service Limit: 0.18 mm (0.0071 in.)
Second
Standard: 0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in.)
Service Limit: 0.16 mm (0.0063 in.)

Piston Ring Groove Width



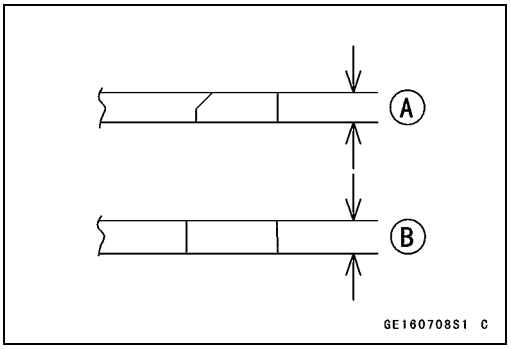
- Measure the piston ring groove width.

○Use a vernier caliper at several points around the piston.

Piston Ring Groove Width
Top [A]
Standard: 0.83 ~ 0.85 mm (0.0327 ~ 0.0335 in.)
Service Limit: 0.93 mm (0.037 in.)
Second [B]
Standard: 0.81 ~ 0.83 mm (0.0319 ~ 0.0327 in.)
Service Limit: 0.91 mm (0.036 in.)

★If the width of any of the two grooves is wider than the service limit at any point, replace the piston.

Piston Ring Thickness



- Measure the piston ring thickness.

○Use the micrometer to measure at several points around the ring.

Piston Ring Thickness
Top [A]
Standard: 0.77 ~ 0.79 mm (0.0303 ~ 0.0311 in.)
Service Limit: 0.70 mm (0.028 in.)
Second [B]
Standard: 0.77 ~ 0.79 mm (0.0303 ~ 0.0311 in.)
Service Limit: 0.70 mm (0.028 in.)

★If any of the measurements is less than the service limit on either of the rings, replace all the rings.

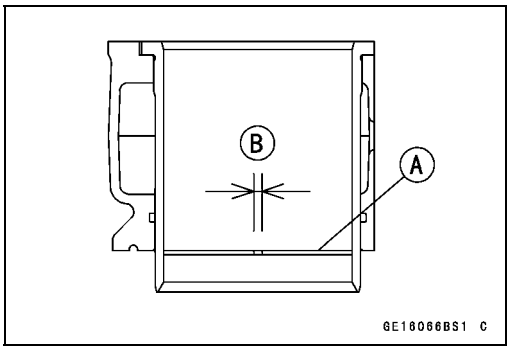
NOTE

○*When using new rings in a used piston, check for uneven groove wear. The rings should fit perfectly parallel to the groove sides. If not, replace the piston.*

Cylinder, Pistons

Piston Ring End Gap

- Place the piston ring [A] 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 [B] between the ends of the ring with a thickness gauge.



Piston Ring End Gap

Top

Standard: **0.30 ~ 0.40 mm (0.0118 ~ 0.0157 in.)**

Service Limit: **0.7 mm (0.028 in.)**

Second

Standard: **0.45 ~ 0.55 mm (0.0177 ~ 0.0217 in.)**

Service Limit: **0.8 mm (0.031 in.)**

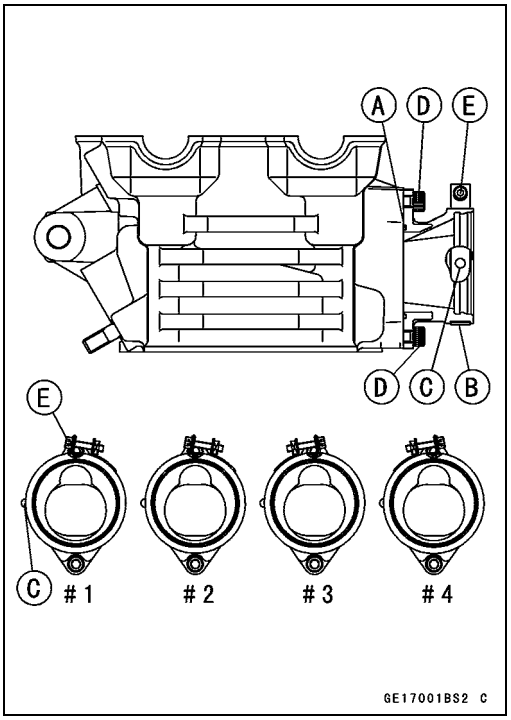
★If the end gap of either ring is greater than the service limit, replace all the rings.

Throttle Body Holder

Throttle Body Holder Installation

- Be sure to install the O-rings [A].
- Install the clamps [B] as shown and so that its hole fit on the projection [C] of the holder.
- Tighten:

Torque - Throttle Body Holder Bolts [D]:
13 N·m (1.3 kgf·m, 113 in·lb)
Throttle Body Assy Holder Clamp Bolts [E]:
2.0 N·m (0.20 kgf·m, 17 in·lb)

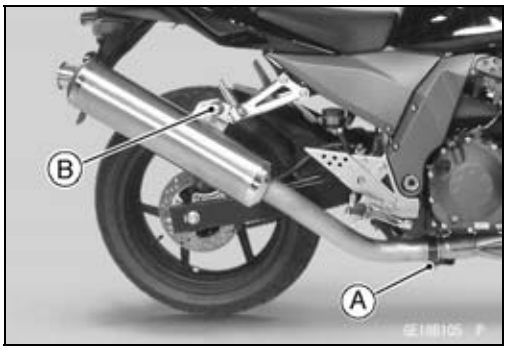


Muffler

⚠ WARNING

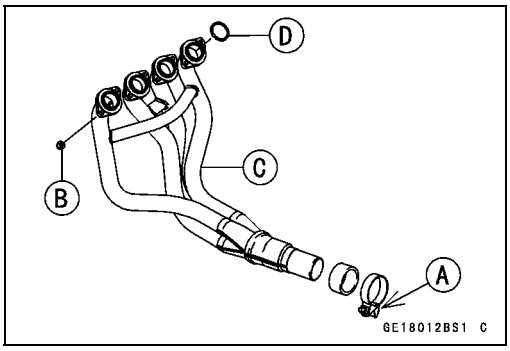
To avoid a serious burn, do not remove the muffler when the engine is still hot. Wait until the muffler cool down.

Muffler Body Removal



- Remove:
  Muffler Body Clamp Bolt [A]
  Muffler Body Mounting Bolt [B]
- Pull the muffler body backward.

Exhaust Pipe Removal



- Remove:
  Radiator Lower Bolt (see Cooling System chapter)
  Muffler Body Clamp Bolt [A]
  Exhaust Pipe Manifold Holder Nuts [B]
  Exhaust Pipe [C]
  Gaskets [D]

Muffler Body and Exhaust Pipe Installation

- Replace the exhaust pipe gaskets [A] and muffler body connection gasket [B] with new ones and install them.

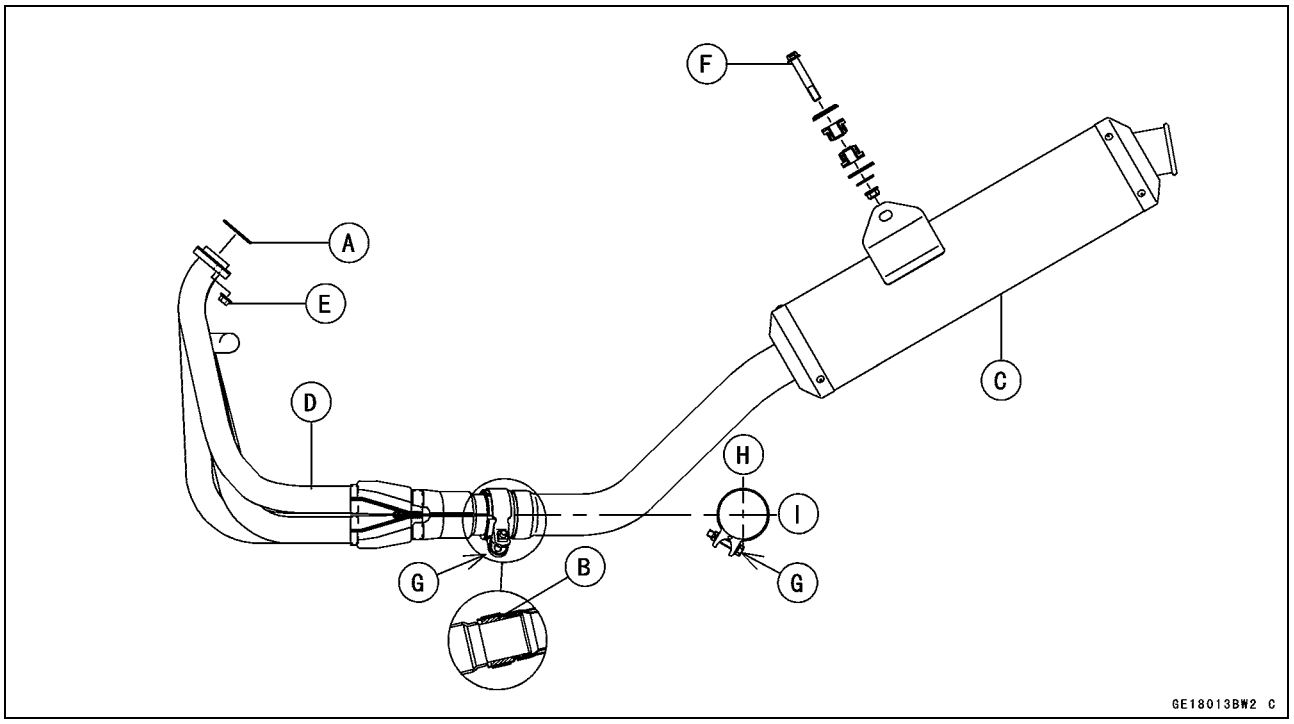
○Install the muffler body connection gasket until it is bottomed so that the chamfer side feces muffler body [C].

- Install:
  Muffler Body
  Exhaust Pipe [D]
- Tighten:

Torque - Exhaust Pipe Manifold Holder Nuts [E]:
17 N·m (1.7 kgf·m, 12 ft·lb)
Muffler Body Mounting Bolt [F]:
30 N·m (3.0 kgf·m, 22 ft·lb)
Muffler Body Clamp Bolt [G]:
17 N·m (1.7 kgf·m, 12 ft·lb)

Muffler

○Install the muffler body clamp bolt as shown.
Upper Side [H]
Outside [I]



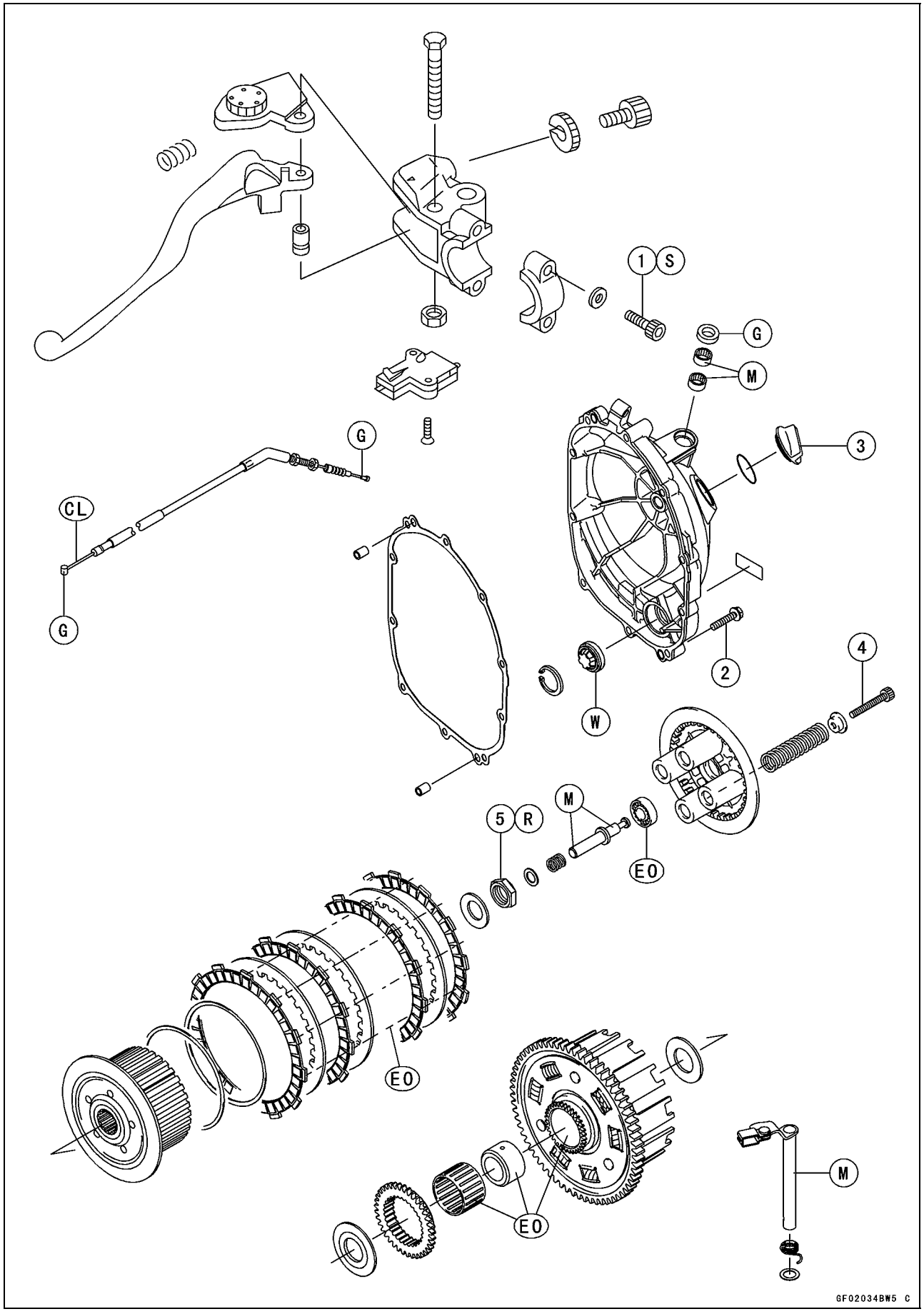
- Thoroughly warm up the engine, wait until the engine cools down, and retighten all the bolts and nuts.

Clutch

Table of Contents

Exploded View 6-2
Specifications 6-4
Special Tool and Sealant 6-5
Clutch Lever and Cable 6-6
  Clutch Lever Free Play Inspection 6-6
  Clutch Lever Free Play Adjustment 6-6
  Cable Removal 6-6
  Cable Installation 6-6
  Cable Lubrication 6-6
  Clutch Lever Installation 6-6
  Clutch Lever Adjustment 6-7
Clutch Cover 6-8
  Clutch Cover Removal 6-8
  Clutch Cover Installation 6-8
  Release Shaft Removal 6-8
  Release Shaft Installation 6-8
  Clutch Cover Disassembly 6-9
  Clutch Cover Assembly 6-9
Clutch 6-10
  Clutch Removal 6-10
  Clutch Installation 6-10
  Clutch Plate Assembly Inspection 6-12
  Clutch Plate Assembly Adjustment 6-12
  Clutch Plate, Wear, Damage Inspection 6-13
  Clutch Plate Warp Inspection 6-13
  Clutch Spring Free Length Measurement 6-13

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Clutch lever clamp bolts	7.8	0.80	69 in·lb	S
2	Clutch cover mounting bolts	11	1.1	95 in·lb	
3	Oil filler plug	1.5	0.15	13 in·lb	
4	Clutch spring bolts	8.8	0.90	78 in·lb	
5	Clutch hub nut	135	14	100	R

CL: Apply cable lubricant.
EO: Apply engine oil.
G: Apply grease.
M: Apply molybdenum disulfide grease.
R: Replacement Parts
S: Follow the specific tightening sequence.
W: Apply water.

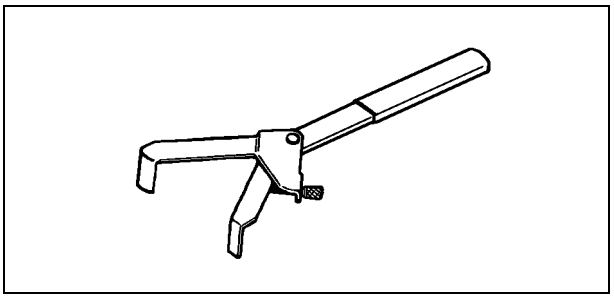
6-4 CLUTCH

Specifications

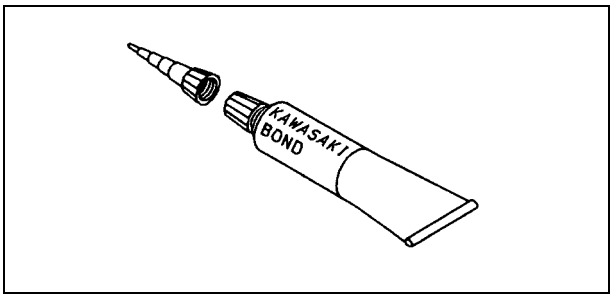
Item	Standard	Service Limit
Clutch Lever Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	– – –
Clutch:		
Clutch plate assembly	37.7 ~ 38.3 mm (1.48 ~ 1.51 in.)	– – –
Friction plate thickness	2.72 ~ 2.88 mm (0.107 ~ 0.113 in.)	2.4 mm (0.094 in.)
Friction and steel plate warp	0.2 mm (0.008 in.) or less	0.3 mm (0.012 in.)
Clutch spring free length	80.6 mm (3.17 in.)	76.6 mm (3.02 in.)

Special Tool and Sealant

Clutch Holder:
57001–1243



Kawasaki Bond (Silicone Sealant):
56019–120

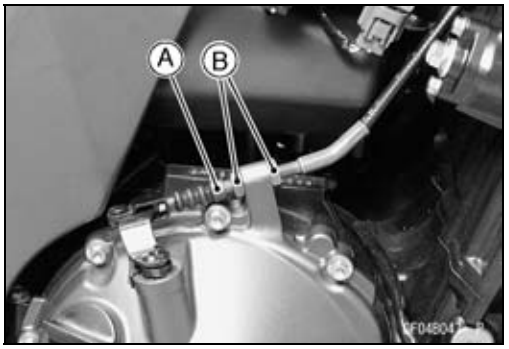


Clutch Lever and Cable

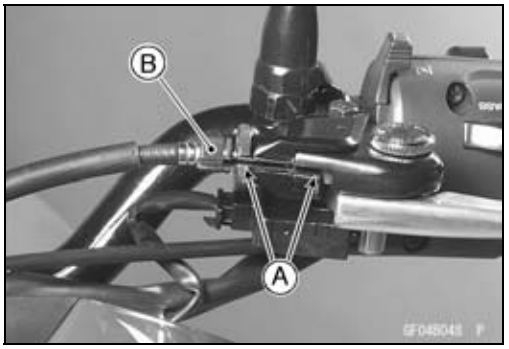
Clutch Lever Free Play Inspection
- Refer to the Clutch in the Periodic Maintenance chapter.

Clutch Lever Free Play Adjustment
- Refer to the Clutch in the Periodic Maintenance chapter.

Cable Removal
- Slide the dust cover [A] at the clutch cable lower end out of place.
- Loosen the nuts [B], and slide the lower end of the clutch cable to give the cable plenty of play.



- Screw in the adjuster.
- Line up the slots [A] in the clutch lever and adjuster [B], and then free the cable from the lever.
- Free the clutch inner cable tip from the clutch release lever.
- Push the release lever toward the front of the motorcycle and tape the release lever to the clutch cover to prevent the release shaft from falling out.
- Pull the clutch cable out of the frame.

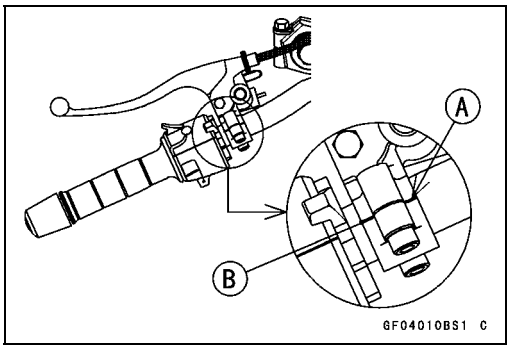


Cable Installation
- Run the clutch cable correctly (see Appendix chapter).
- Adjust the clutch cable (see Clutch in the Periodic Maintenance chapter).

Cable Lubrication
- Refer to the General Lubrication in the Periodic Maintenance chapter.

Clutch Lever Installation
- Install the clutch lever so that the mating surface [A] of the clutch lever clamp is aligned with the punch mark [B].
- Tighten the upper clamp bolt first, and then the lower clamp bolt. There will be a gap at the lower part of the clamp after tightening.

Torque - Clutch Lever Clamp Bolts: 7.8 N·m (0.80 kgf·m, 69 in·lb)



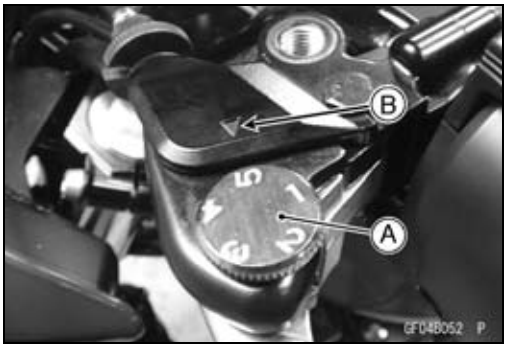
Clutch Lever and Cable

Clutch Lever Adjustment

The adjuster has 5 positions so that the clutch lever position can be adjusted to suit the operator's hand.

- Push the lever forward and turn the adjuster [A] to align the number with the arrow mark [B] on the lever holder.

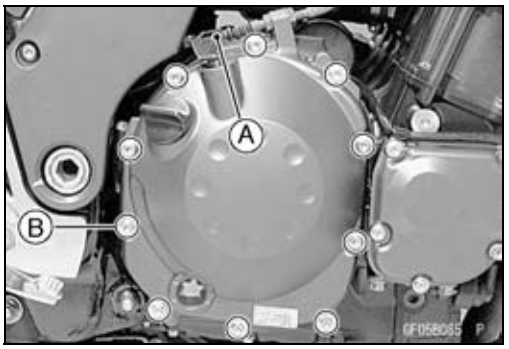
○The distance from the grip to the lever is minimum at number 5 and maximum at number 1.



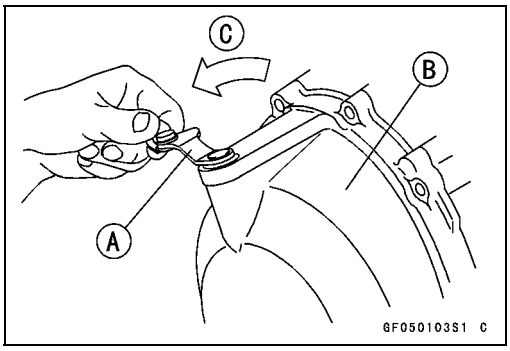
Clutch Cover

Clutch Cover Removal

- Remove:
  Engine Oil (drain, see Engine Lubrication System in the Periodic Maintenance chapter)
  Clutch Cable Lower End [A]
  Clutch Cover Mounting Bolts [B]



- Turn the release lever [A] toward the rear as shown, and remove the clutch cover [B].
  About 90° [C]



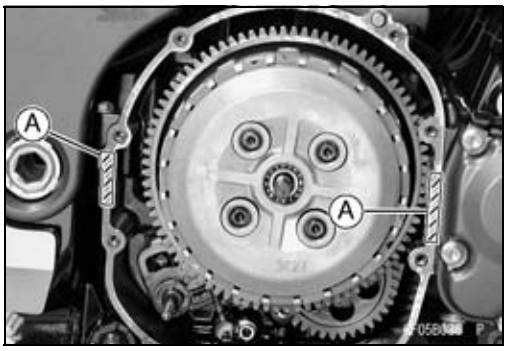
Clutch Cover Installation

- Apply silicone sealant to the area [A] where the mating surface of the crankcase touches the clutch cover gasket.

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

- Replace the clutch cover gasket with a new one.
- Tighten the clutch cover mounting bolts.

  Torque - Clutch Cover Mounting Bolts: 11 N·m (1.1 kgf·m, 95 in·lb)



Release Shaft Removal

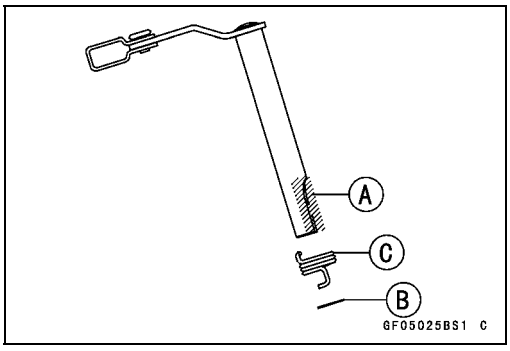
CAUTION

Do not remove the clutch release lever and shaft assembly unless it is absolutely necessary. If removed, the oil seal replacement may be required.

- Remove the clutch cover (see Clutch Cover Removal).
- Pull the lever and shaft assembly straight out of the clutch cover.

Release Shaft Installation

- Apply high-temperature grease to the oil seal lips on the upper ridge of the clutch cover.
- Apply oil to the needle bearings in the hole of the clutch cover.
- Apply molybdenum disulfide grease to the pusher-holding portion [A] on the release shaft.
- Install the washer [B] and spring [C].
- Insert the release shaft straight into the upper hole of the clutch cover.

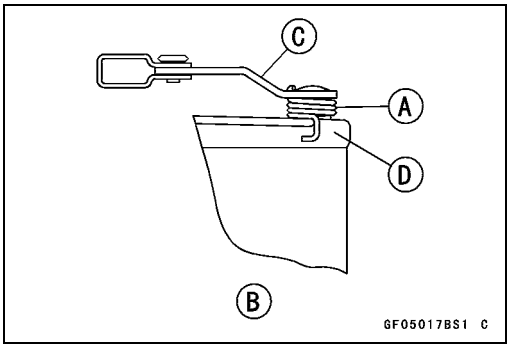


CAUTION

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

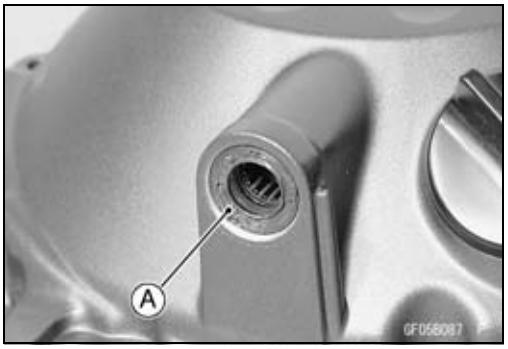
Clutch Cover

● Fit the spring [A] as shown.
Viewed from Rear [B]
Release Shaft [C]
Clutch Cover [D]

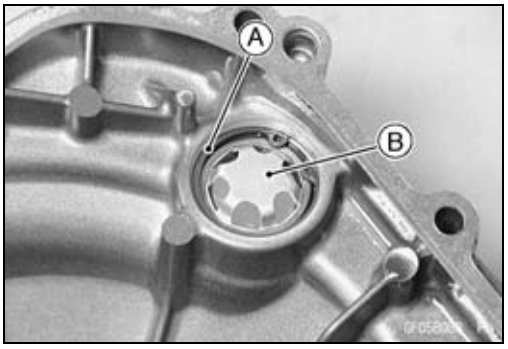


Clutch Cover Disassembly

● Remove:
Oil Seal [A]
Needle Bearings



● Remove:
Circlip [A]
Oil Level Gauge [B]



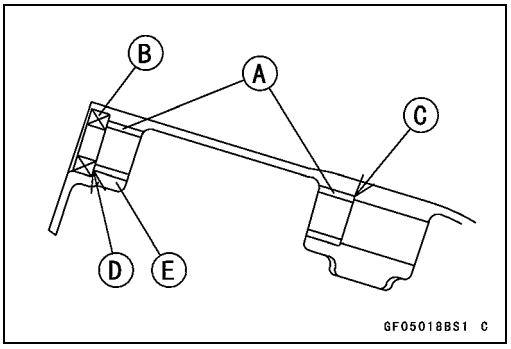
Clutch Cover Assembly

● Replace the needle bearings and oil seal with new ones.

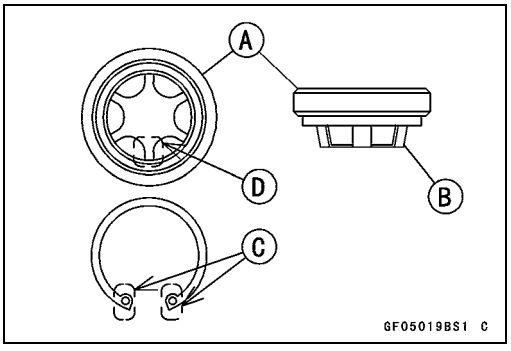
NOTE

○*Install the needle bearings so that the manufacture's mark face out.*

● Install the needle bearings [A] and oil seal [B] position as shown.
Press the bearing until the bottom [C].
Press the bearing so that the bearing surface [D] is flush with the housing end of clutch cover [E].



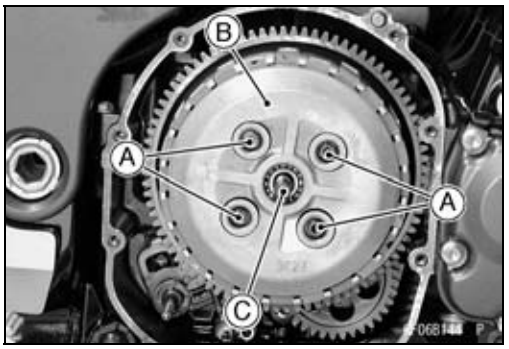
● Apply water to the rubber of the oil gauge [A] and press it so that the projections [B] face inside.
● Install a new circlip so that the circlip ends [C] do not warp over the projection [D].



Clutch

Clutch Removal

- Remove:
  Engine Oil (drain, see Engine Lubrication System in the Periodic Maintenance chapter)
  Clutch Cover (see Clutch Cover Removal)
  Clutch Spring Bolts [A]
  Clutch Springs
  Clutch Spring Plate [B] (with thrust bearing and pusher [C], spring and washer)



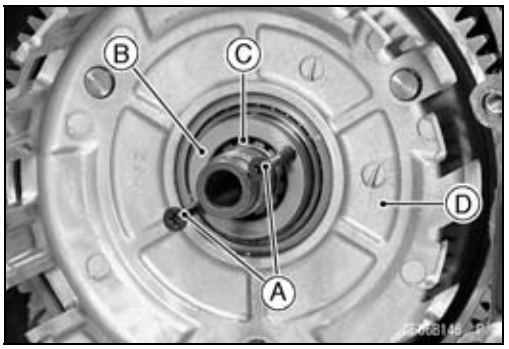
- Remove:
  Friction Plates, Steel Plates
  Spring, Spring Seat
  Clutch Hub Nut [A]

○Holding the clutch hub [B], remove the nut and washer.

Special Tool - Clutch Holder [C]: 57001–1243

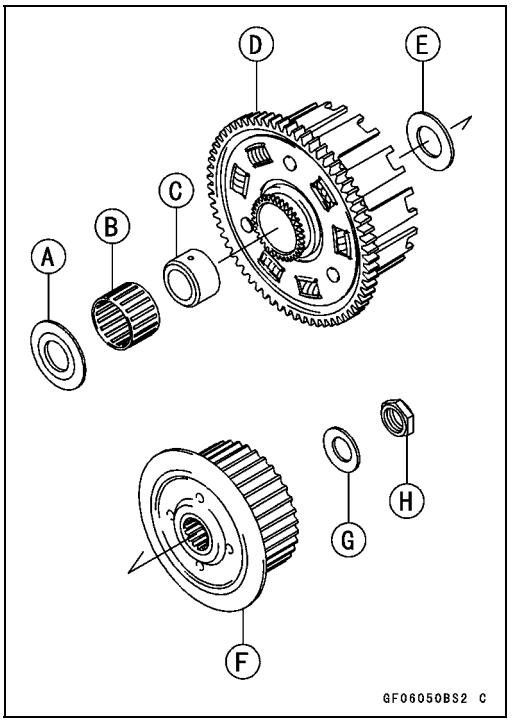
- Remove:
  Clutch Hub
  Spacer

- Using the two 4 mm (0.16 in.) screws [A], pull out the sleeve [B], needle bearing [C] and clutch housing [D].
- Remove the spacer.



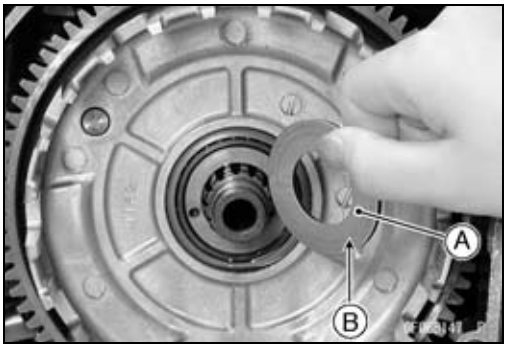
Clutch Installation

- Install the following parts on the drive shaft.
  Spacer [A]
  Needle Bearing [B]
  Sleeve [C]
  Clutch Housing [D]
  Spacer [E]
  Clutch Hub [F]
  Washer [G]
  Nut [H]



Clutch

○Install the spacer [A] so that the tapered side [B] faces inward.



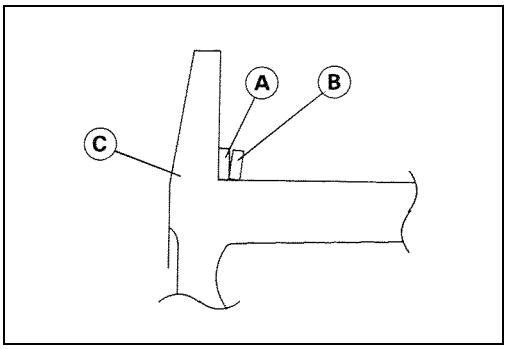
○Install the washer [A] so that the OUTSIDE mark faces outward.

○Replace the clutch hub nut with a new one.
○Holding the clutch hub, tighten the clutch hub nut.

Special Tool - Clutch Holder: 57001–1243

Torque - Clutch Hub Nut: 135 N·m (14 kgf·m, 100 ft·lb)

● Install the spring seat [A] and spring [B] as shown.
Clutch Hub [C]

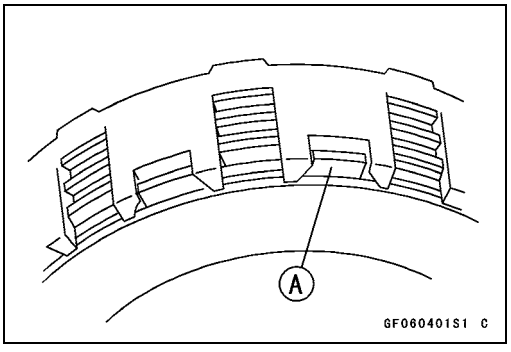


● Install the friction plates and steel plates, starting with a friction plate and alternating them.

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.

○Install the last friction plate [A] fitting the tangs in the grooves in the housing as shown.



Clutch

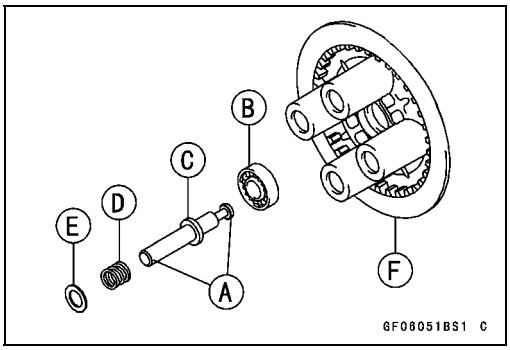
- Apply molybdenum disulfide grease to the pusher ends [A] and install the bearing [B], pusher [C], spring [D] and washer [E] in the clutch spring plate [F].

○Apply engine oil to the needle bearing.

- Install the clutch spring plate, springs and spring holders, and tighten the clutch spring bolts.

Torque - Clutch Spring Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

- Install the clutch cover (see Clutch Cover Installation).



Clutch Plate Assembly Inspection

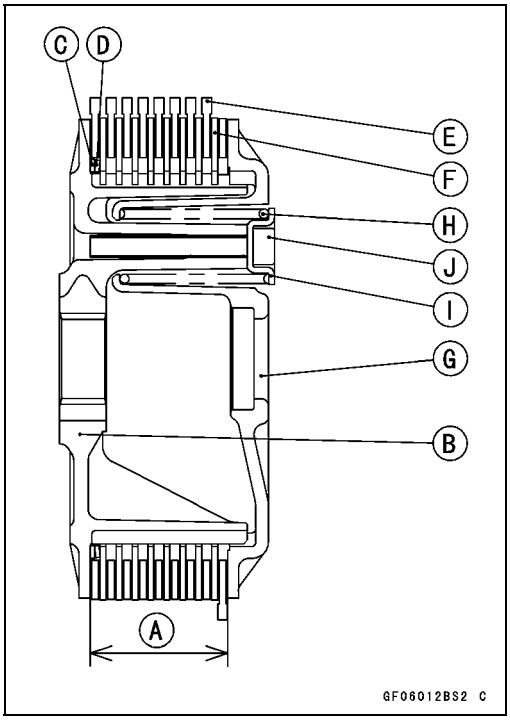
- Inspect the friction plate thickness (see Clutch Plate, Wear, Damage Inspection).
- Measure the length [A] of the clutch plate assembly as shown.

○Assemble:
Clutch Hub [B]
Spring Seat [C]
Spring [D]
Friction Plates [E]
Steel Plates [F]
Spring Plate [G]
Springs [H]
Spring Holders [I]
Spring Bolts [J]

Torque - Clutch Spring Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

Clutch Plate Assembly
Standard: 37.7 ~ 38.3 mm (1.48 ~ 1.51 in.)

★If the length is not within the specified range, adjust the length (see Clutch Plate Assembly Adjustment).



Clutch Plate Assembly Adjustment

- Inspect the clutch plate assembly length, and then replace the steel plate(s) which brings the length within the specified range.
- Remove:
Spring Bolts
Spring Holders
Springs
Spring Plate
- Replace the following steel plate(s).

Part No.	Thickness
13089–1126	1.4 mm (0.055 in.)
13089–013	1.6 mm (0.063 in.) (STD)
13089–1073	2.0 mm (0.079 in.)

NOTE

○*Do not use the steel plate of 1.4 mm (0.055 in.) and 2.0 mm (0.079 in.) thickness at the same time.*

- Install the removed parts, and inspect the clutch plate assembly length.

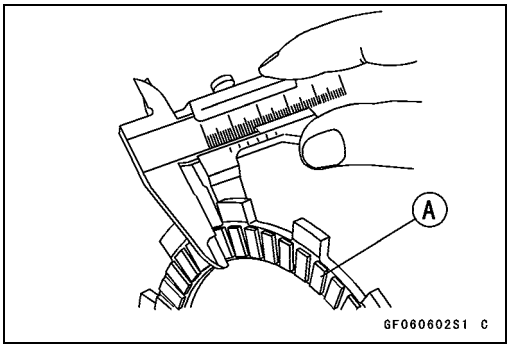
Torque - Clutch Spring Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

Clutch

Clutch Plate, Wear, Damage Inspection

- Visually inspect the friction and steel plates for signs of seizure, overheating (discoloration), or uneven wear.
- Measure the thickness of each friction plate [A] at several points.

★If any plates show signs of damage, or if they have worn past the service limit, replace them with new ones.



Friction Plate Thickness

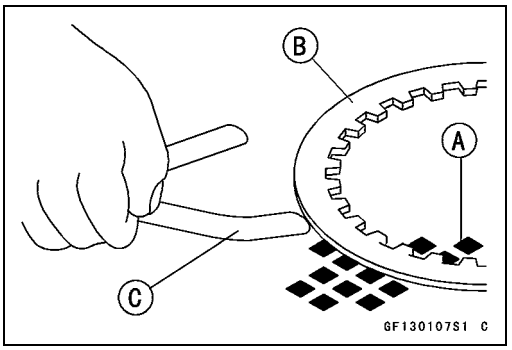
Standard: 2.72 ~ 2.88 mm (0.107 ~ 0.113 in.)

Service Limit: 2.4 mm (0.094 in.)

Clutch Plate Warp Inspection

- Place each friction plate or steel plate on a surface plate and measure the gap between the surface plate [A] and each friction plate or steel plate [B] with a thickness gauge [C]. The gap is the amount of friction or steel plate warp.

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



Friction and Steel Plate Warp

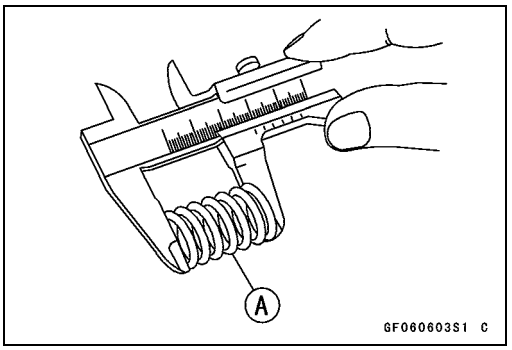
Standard: 0.2 mm (0.008 in.) or less

Service Limit: 0.3 mm (0.012 in.)

Clutch Spring Free Length Measurement

- Measure the free length of the clutch springs [A].

★If any spring is shorter than the service limit, it must be replaced.



Clutch Spring Free Length

Standard: 80.6 mm (3.17 in.)

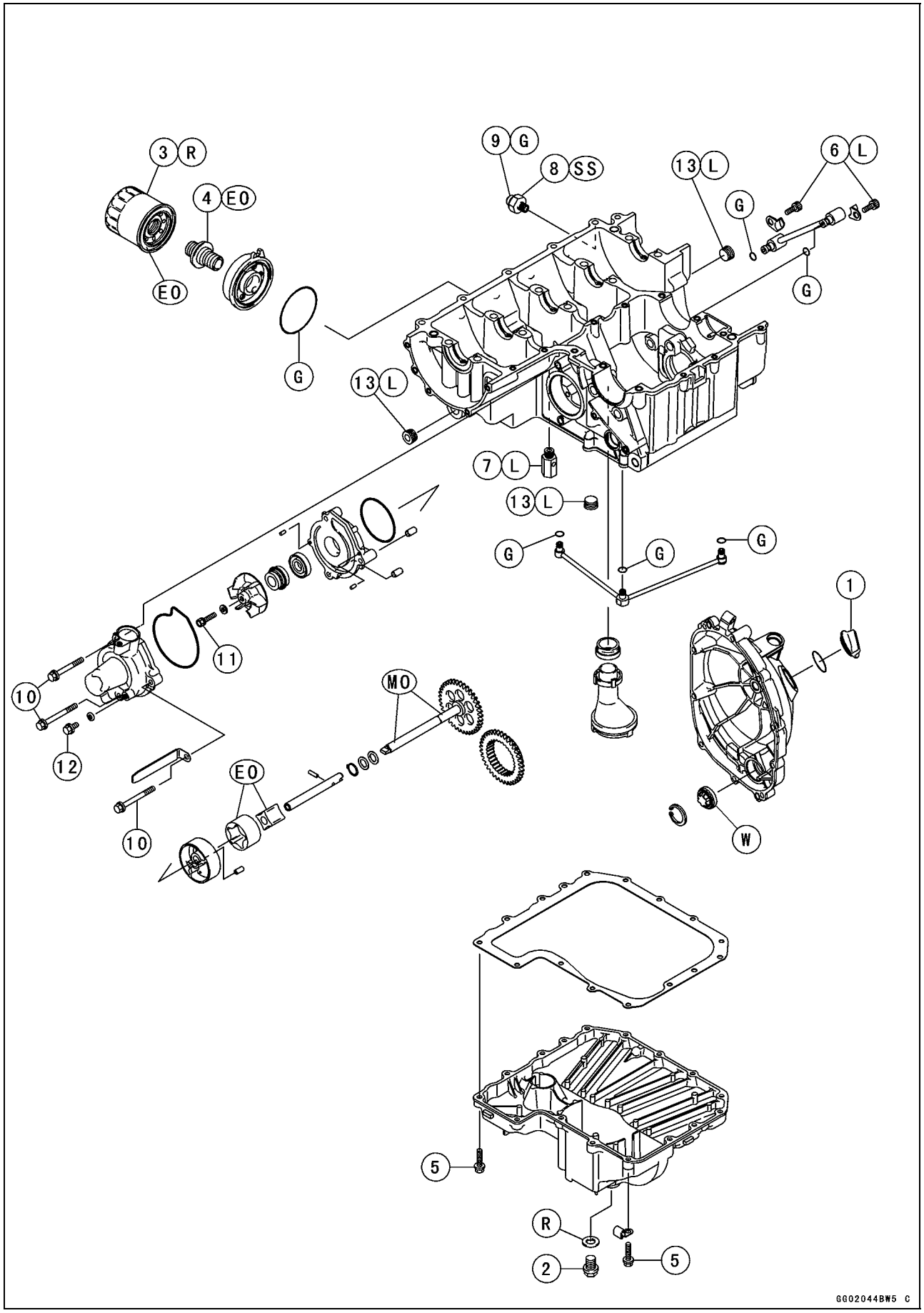
Service Limit: 76.6 mm (3.02 in.)

Engine Lubrication System

Table of Contents

Exploded View 7-2
Engine Oil Flow Chart 7-4
Specifications 7-6
Special Tools and Sealant 7-7
Engine Oil and Oil Filter 7-8
  Oil Level Inspection 7-8
  Engine Oil Change 7-8
  Oil Filter Replacement 7-8
Oil Pan 7-9
  Oil Pan Removal 7-9
  Oil Pan Installation 7-9
Oil Pressure Relief Valve 7-10
  Oil Pressure Relief Valve Removal 7-10
  Oil Pressure Relief Valve Installation 7-10
  Oil Pressure Relief Valve Inspection 7-10
Oil Pump 7-11
  Oil Pump Removal 7-11
  Oil Pump Installation 7-11
  Oil Pump Drive Gear Removal 7-12
  Oil Pump Drive Gear Installation 7-12
Oil Pressure Measurement 7-13
  Oil Pressure Measurement 7-13
Oil Pressure Switch 7-14
  Oil Pressure Switch Removal 7-14
  Oil Pressure Switch Installation 7-14

Exploded View

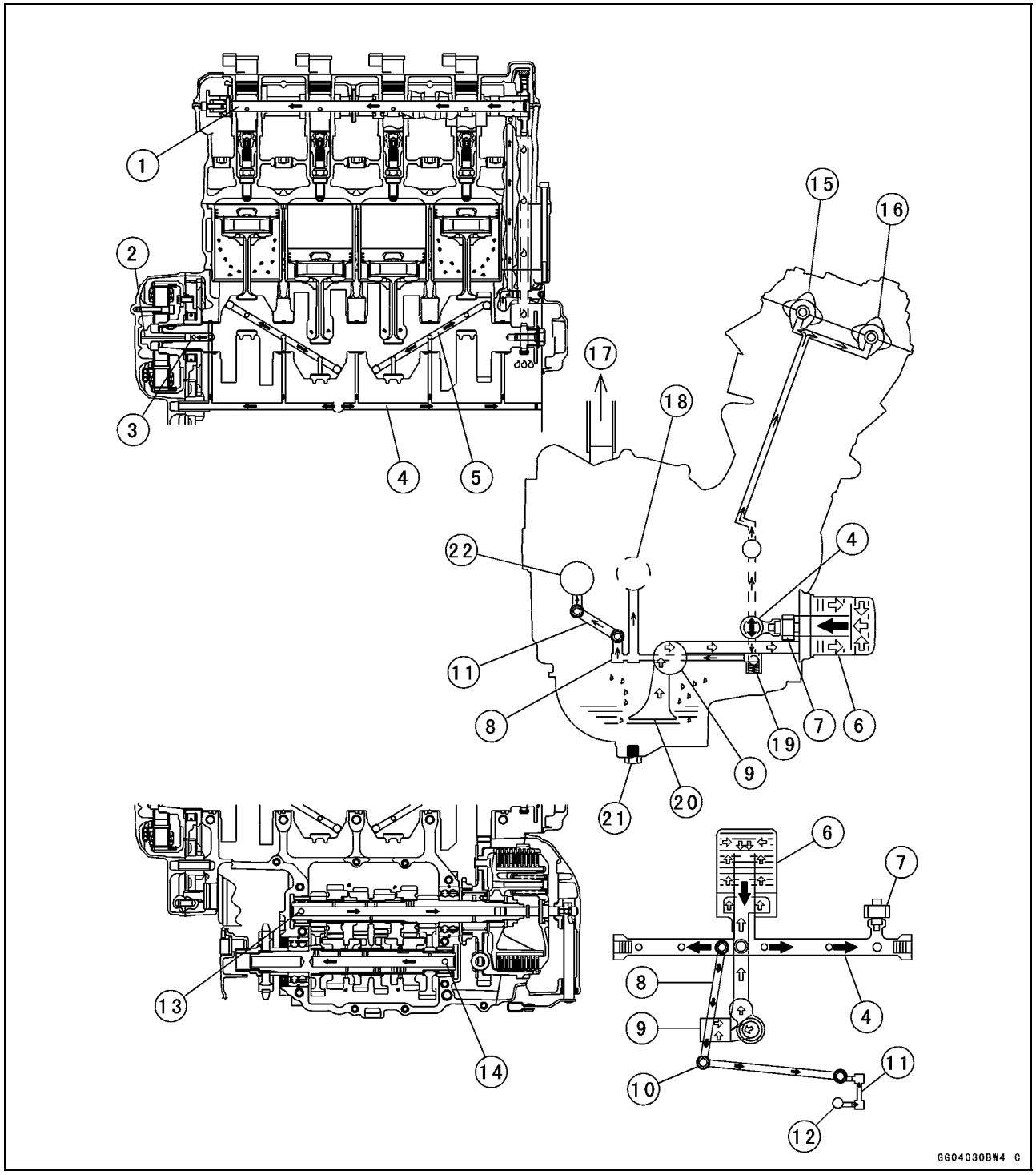


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Oil filler plug	1.5	0.15	13 in·lb	
2	Engine oil drain bolt	20	2.0	14	
3	Oil filter	31	3.2	23	EO, R
4	Holder mounting bolt	76	7.8	56	EO
5	Oil pan bolts	11	1.1	95 in·lb	
6	Oil pipe holder bolts	13	1.3	113 in·lb	L
7	Oil pressure relief valve	15	1.5	11	L
8	Oil pressure switch	15	1.5	11	SS
9	Oil pressure switch terminal bolt	1.5	0.15	13 in·lb	G
10	Water pump cover bolts	11	1.1	95 in·lb	
11	Water pump impeller bolt	9.8	1.0	87 in·lb	
12	Coolant drain plug (water pump)	11	1.1	95 in·lb	
13	Oil passage plugs	20	2.0	14	L

EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
MO: Apply molybdenum disulfide oil.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10 : 1)
R: Replacement Parts
SS: Apply silicone sealant (Kawasaki Bond: 56019–120).
W: Apply water.

Engine Oil Flow Chart



Engine Oil Flow Chart

1. Camshaft Oil Passage
2. Oil Passage Hole in Alternator Rotor Bolt
3. Starter Clutch Oil Passage Hole
4. Main Oil Passage
5. Crankshaft Oil Passage
6. Oil Filter
7. Oil Pressure Switch
8. Oil Pipe
9. Oil Pump
10. To Drive Shaft
11. Oil Pipe
12. To Output Shaft
13. Drive Shaft Oil Passage Hole
14. Output Shaft Oil Passage Hole
15. Inlet Camshaft
16. Exhaust Camshaft
17. To Air Cleaner
18. Drive Shaft
19. Relief Valve
20. Oil Screen
21. Engine Oil Drain Bolt
22. Output Shaft

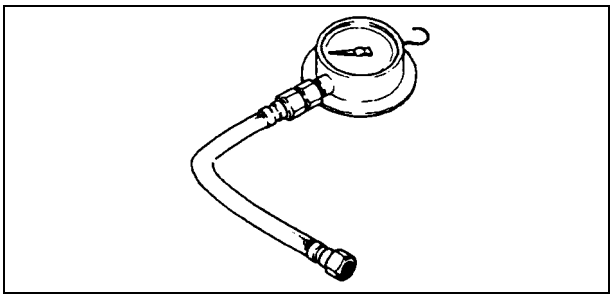
7-6 ENGINE LUBRICATION SYSTEM

Specifications

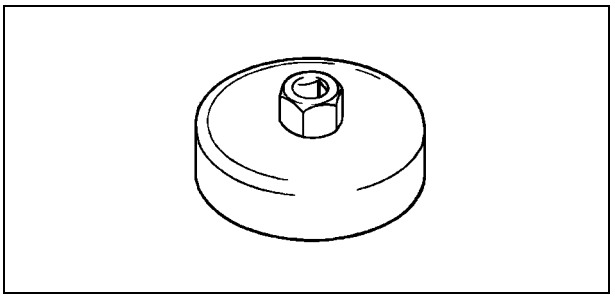
Item	Standard
Engine Oil:	
Type	API SE, SF or SG
	API SH or SJ with JASO MA
Viscosity	SAE 10W-40
Capacity:	3.1 L (3.3 US gt) (when filter is not removed)
	3.3 L (3.5 US gt) (when filter is removed)
	3.8 L (4.0 US gt) (when engine is completely dry)
Level	Between upper and lower level lines
Oil Pressure Measurement:	
Oil pressure @4 000 r/min (rpm),	
oil temp. 90°C (194°F)	255 ~ 314 kPa (2.6 ~ 3.2 kgf/cm², 37 ~ 46 psi)

Special Tools and Sealant

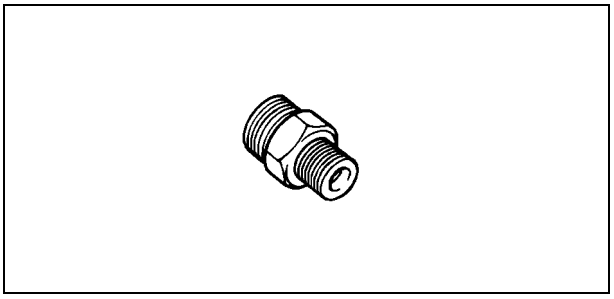
Oil Pressure Gauge, 10 kgf/cm²:
57001–164



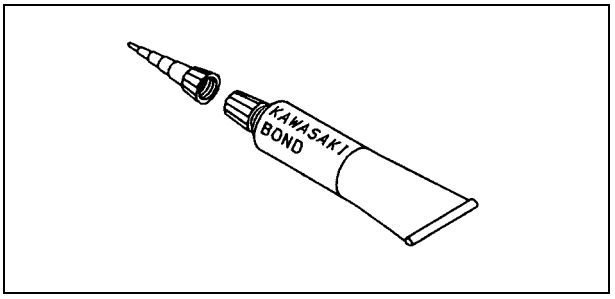
Oil Filter Wrench:
57001–1249



Oil Pressure Gauge Adapter, PT3/8:
57001–1233



Kawasaki Bond (Silicone Sealant):
56019–120



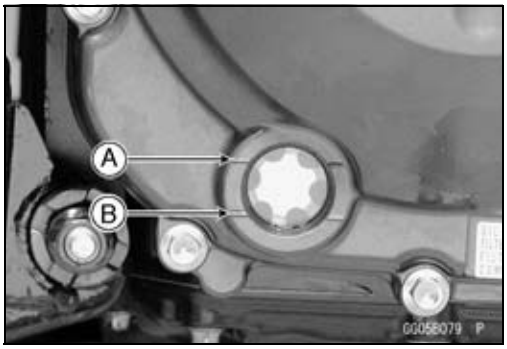
Engine Oil and Oil Filter

⚠ 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 that the engine oil level is between the upper [A] and lower [B] levels in the gauge.



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

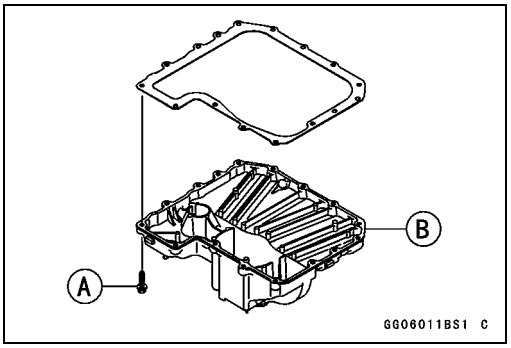
- Refer to the Engine Lubrication System in the Periodic Maintenance chapter.

Oil Filter Replacement

- Refer to the Engine Lubrication System in the Periodic Maintenance chapter.

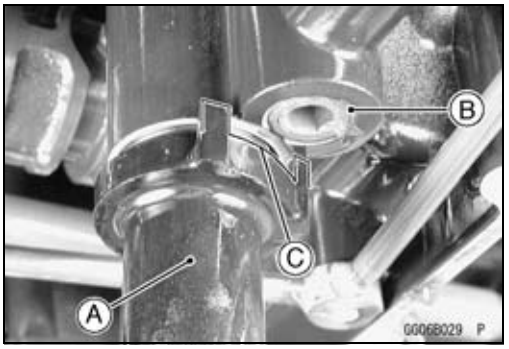
Oil Pan

Oil Pan Removal



- Remove:
  Engine Oil (drain, see Engine Lubrication System in the Periodic Maintenance chapter)
  Exhaust Pipe Assy and Muffler Body (see Engine Top End chapter)
  Oil Pan Bolts [A]
  Oil Pan [B]

Oil Pan Installation



- Clean the oil screen [A].
- Install the oil screen so that the crankcase rib [B] fits the slot [C] of the oil screen.
- Apply engine oil to the O-rings on the oil pipe.

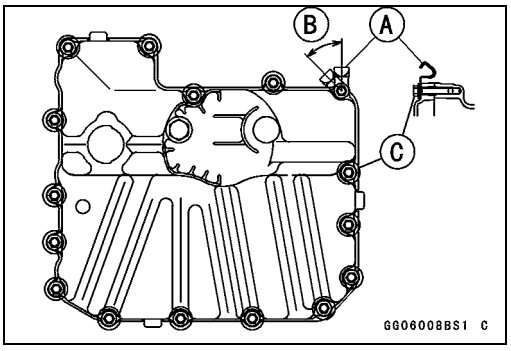
★If the oil pressure relief valve was removed, install it.

○Apply a non-permanent locking agent to the threads of the oil pressure relief valve, and tighten it.

CAUTION

Do not apply too much non-permanent locking agent to the threads. This may block the oil passage.

Torque - Oil Pressure Relief Valve: 15 N·m (1.5 kgf·m, 11 ft·lb)



- Install the clamp [A] at an angle of within 45° [B] as shown.
- Replace the oil pan gasket with a new one.
- Tighten:

Torque - Oil Pan Bolts [C]: 11 N·m (1.1 kgf·m, 95 in·lb)

Oil Pressure Relief Valve

Oil Pressure Relief Valve Removal

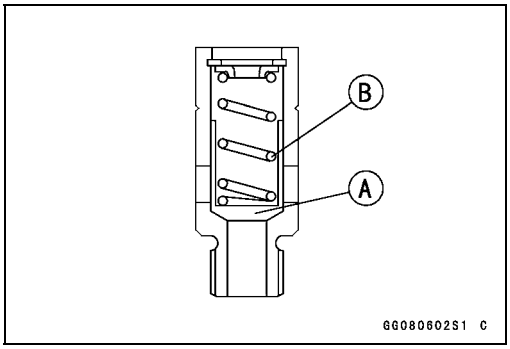
- See Oil Pan Removal.

Oil Pressure Relief Valve Installation

- See Oil Pan Installation.

Oil Pressure Relief Valve Inspection

- Check to see if the valve [A] slides smoothly when pushing it in with a wooden or other soft rod, and see if it comes back to its seat by spring [B] pressure.



NOTE

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

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

⚠ WARNING

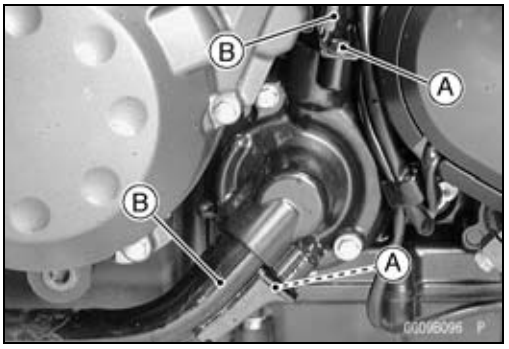
Clean the oil pressure relief valve in a well -ventilated area, and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low-flash point solvent.

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

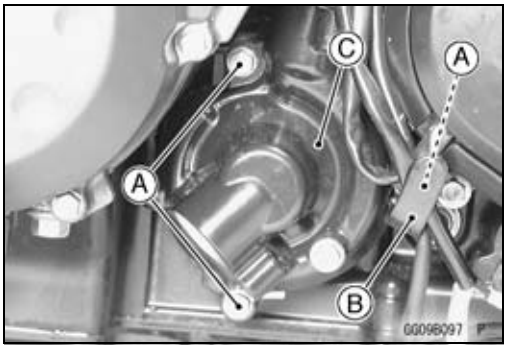
Oil Pump

Oil Pump Removal

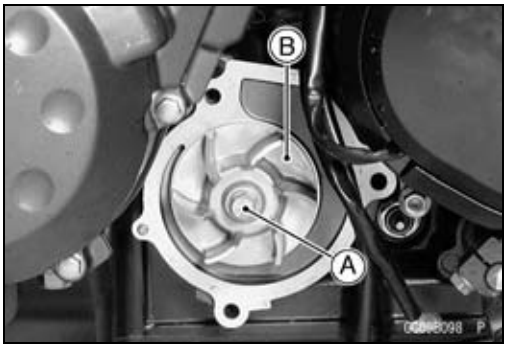
- Drain:
  Coolant (see Cooling System in the Periodic Maintenance chapter)
  Engine Oil (see Engine Lubrication System in the Periodic Maintenance chapter)
- Remove:
  Water Pipe Bolts [A]
  Water Pipes [B]



- Remove:
  Water Pump Cover Bolts [A]
  Clamp [B]
  Water Pump Cover [C]



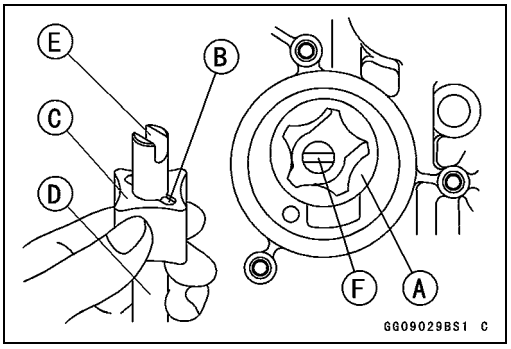
- Remove:
  Impeller Bolt [A]
  Washer
  Impeller [B]
  Water Pump Body
  Oil Pump Cover
  Oil (Water) Pump Shaft
  Outer Rotor and Inner Rotor



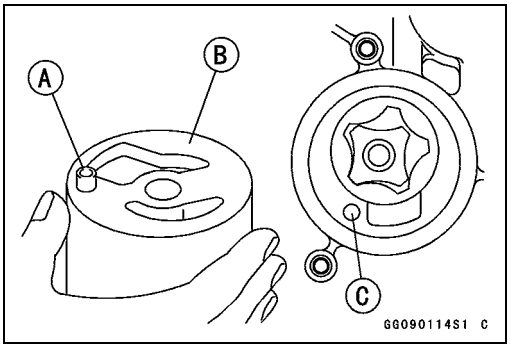
Oil Pump Installation

- Install the outer rotor [A] into the crankcase.
- Install the pin [B], inner rotor [C] and oil (water) pump shaft [D].

○Turn the pump shaft so that the slot [E] in its shaft fits onto the projection [F] of the pump drive gear shaft.

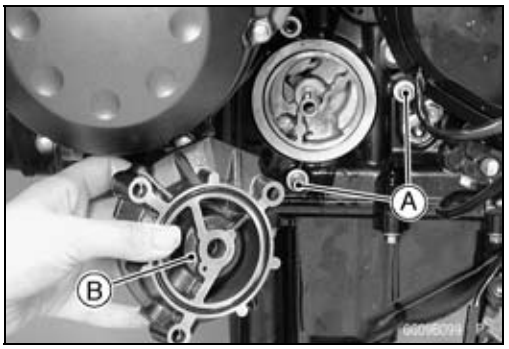


- Fit the pin [A] of the oil pump cover [B] into the hole [C] in the crankcase.



Oil Pump

- Install:
  Pins [A]
  Water Pump Body [B]

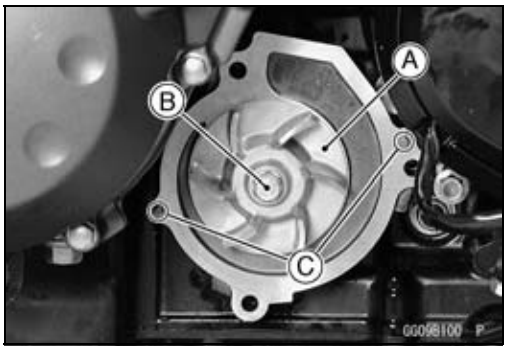


- Install:
  Impeller [A], Washer and Bolt [B]
- Tighten:

Torque - Water Pump Impeller Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

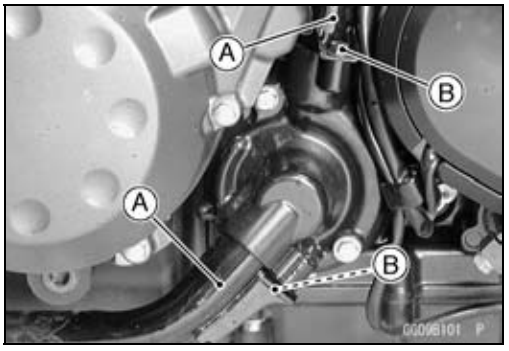
- Install:
  Pins [C]
  Water Pump Cover and Bolts

Torque - Water Pump Cover Bolts: 11 N·m (1.1 kgf·m, 95 in·lb)



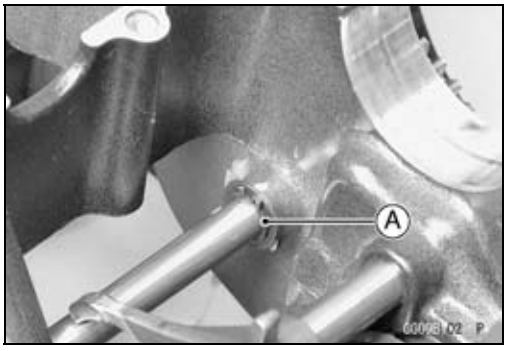
- Install:
  Water Pipes [A]
- Tighten:

Torque - Water Pipe Bolts [B]: 11 N·m (1.1 kgf·m, 95 in·lb)



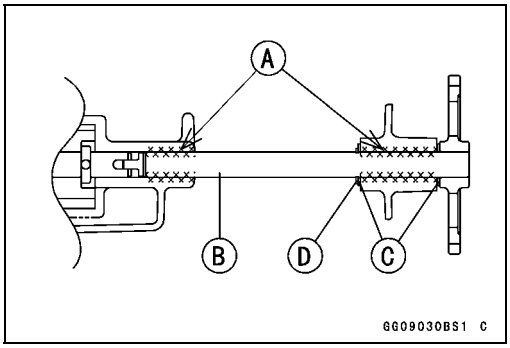
Oil Pump Drive Gear Removal

- Remove:
  Clutch (see Clutch chapter)
  Oil Pan (see Oil Pan Removal)
  Circlip [A] and Washer
  Oil Pump Drive Gear



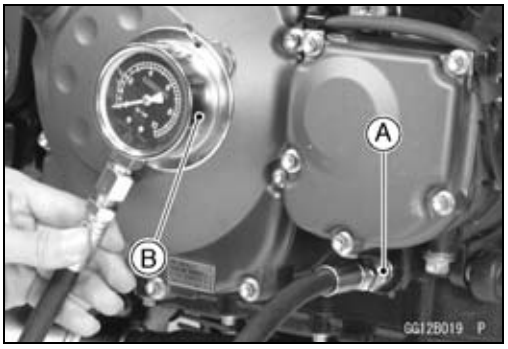
Oil Pump Drive Gear Installation

- Apply molybdenum disulfide oil solution to the journal portions [A] on the oil pump gear shaft [B].
- Install:
  Washers [C]
- Install the new circlip [D] into the groove of the oil pump drive gear shaft.



Oil Pressure Measurement

Oil Pressure Measurement



- Remove the oil passage plug, and attach the adapter [A] and gauge [B] to the plug hole.

Special Tools - Oil Pressure Gauge, 10 kgf/cm²: 57001–164
Oil Pressure Gauge Adapter, PT 3/8: 57001–1233

- Start the engine and warm up the engine.
- Run the engine at the specified speed, and read the oil pressure gauge.

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

★If the reading is much higher than the standard, check the oil passages for clogging.

Oil Pressure
Standard: 255 ~ 314 kPa (2.6 ~ 3.2 kgf/cm², 37 ~ 46 psi) @ 4 000 r/min (rpm), oil temp. 90°C (194°F)

- Stop the engine.
- Remove the oil pressure gauge and adapter.

⚠ WARNING

Take care against burns form hot engine oil that will drain through the oil passage when the gauge adapter is removed.

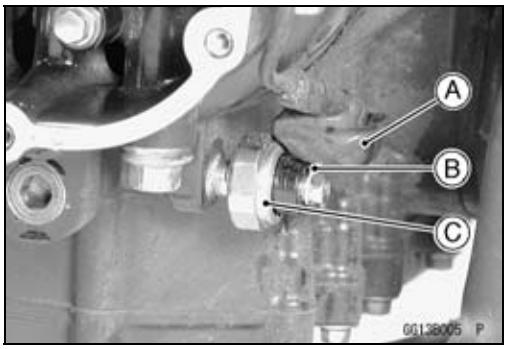
- Apply a non-permanent locking agent to the oil passage plug, and install it.

Torque - Oil Passage Plug (Right): 20 N·m (2.0 kgf·m, 14 ft·lb)

Oil Pressure Switch

Oil Pressure Switch Removal

- Remove:
  Engine Oil (drain, see Engine Lubrication System in the Periodic Maintenance chapter)
  Switch Cover [A]
  Switch Terminal [B]
  Oil Pressure Switch [C]



Oil Pressure Switch Installation

- Apply silicone sealant to the threads of the oil pressure switch and tighten it.

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

  Torque - Oil Pressure Switch: 15 N·m (1.5 kgf·m, 11 ft·lb)

- Install the switch lead direction upward.
- Tighten the terminal bolt.

  Torque - Oil Pressure Switch Terminal Bolt: 1.5 N·m (0.15 kgf·m, 13 in·lb)

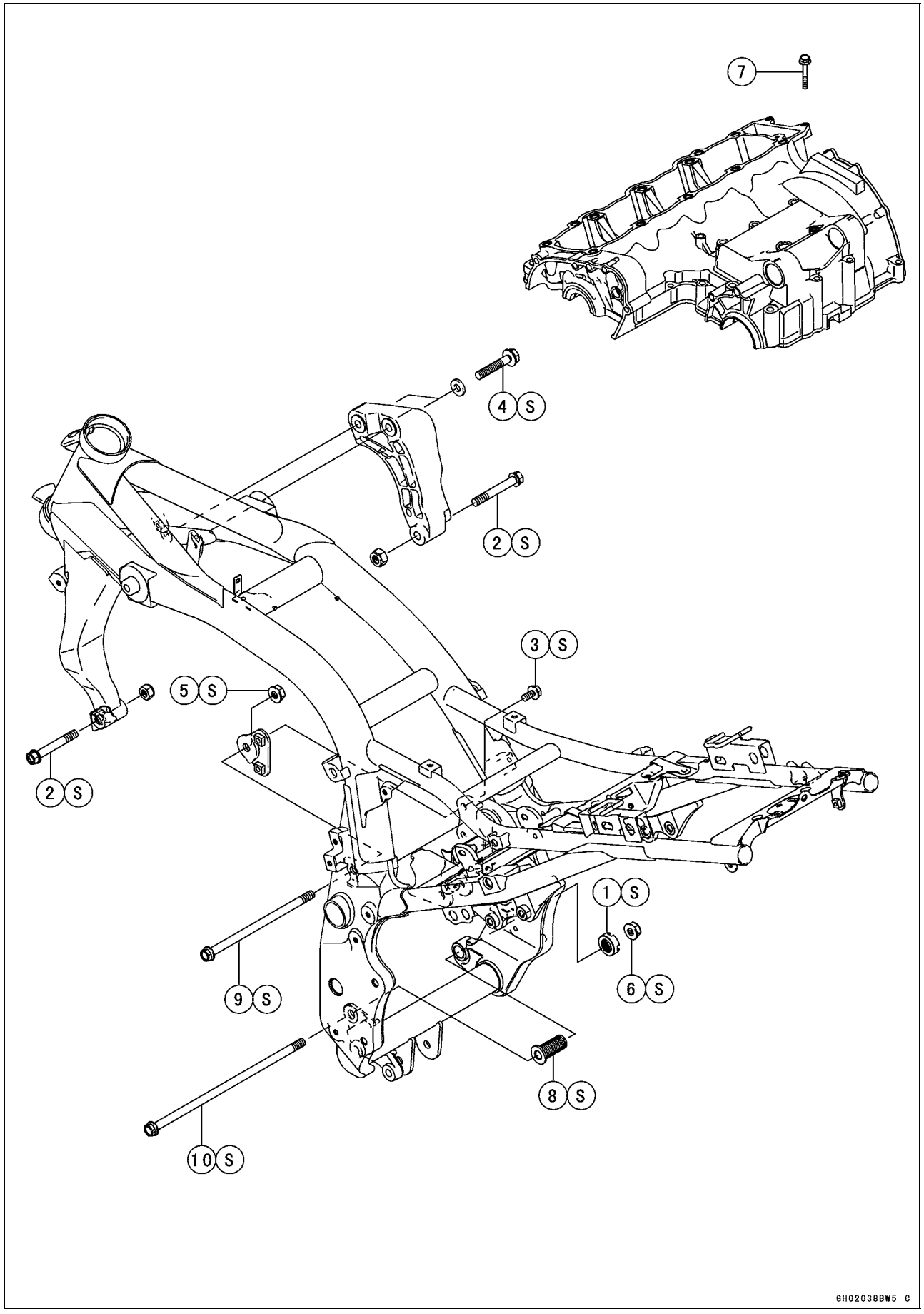
- Apply grease to the terminal.

Engine Removal/Installation

Table of Contents

Exploded View 8-2
Special Tool 8-4
Engine Removal/Installation 8-5
Engine Removal 8-5
Engine Installation 8-7

Exploded View



Exploded View

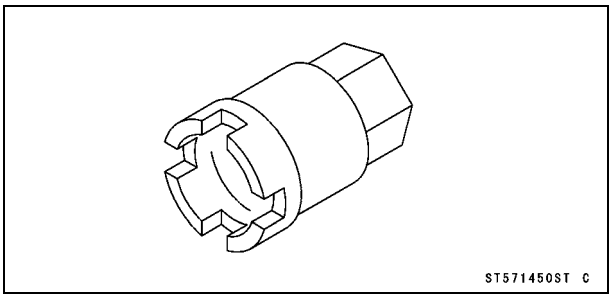
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Adjusting collar locknut	49	5.0	36	S
2	Upper engine mounting bolts	44	4.5	33	S
3	Rear engine bracket bolts	25	2.5	18	S
4	Front engine bracket bolts	44	4.5	33	S
5	Middle engine mounting nut	44	4.5	33	S
6	Lower engine mounting nut	44	4.5	33	S
7	Engine ground cable terminal bolt	9.8	1.0	87 in·lb	

8. Adjusting Collar
9. Middle Engine Mounting Bolt
10. Lower Engine Mounting Bolt

S: Follow the specific tightening sequence.

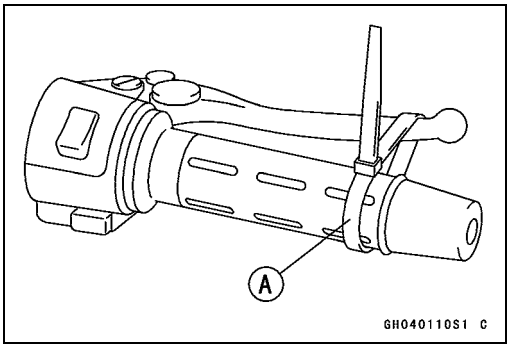
Special Tool

Engine Mount Nut Wrench:
57001–1450



Engine Removal/Installation

Engine Removal



- Support the rear part of the swingarm with a stand.
- Squeeze the brake lever slowly and hold it with a band [A].

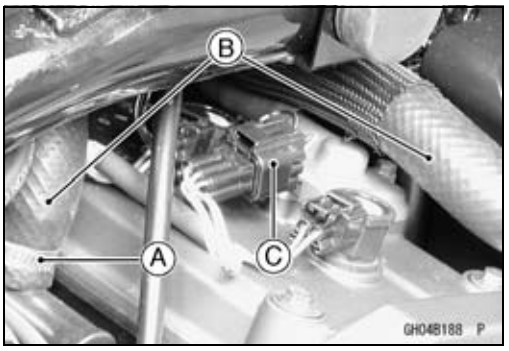
⚠ WARNING

Be sure to hold the front brake when removing the engine, or the motorcycle may fall over. It could cause an accident and injury.

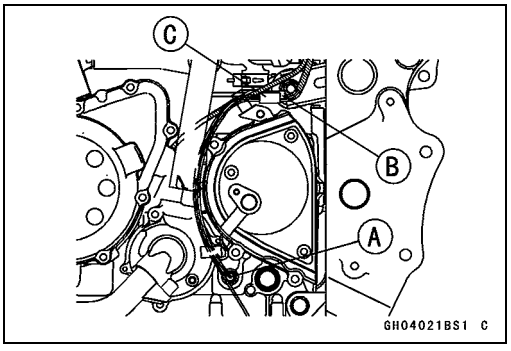
CAUTION

Be sure to hold the front brake when removing the engine, or the motorcycle may fall over. The engine or the motorcycle could be damaged.

- Drain:
  Engine Oil (see Engine Lubrication System in the Periodic Maintenance chapter)
  Coolant (see Cooling System in the Periodic Maintenance chapter)
- Remove:
  Seats (see Frame chapter)
  Fuel Tank (see Fuel System chapter)
  Side Covers (see Frame chapter)
  Frame Covers (see Frame chapter)
  Clutch Cable Lower End (see Clutch chapter)
  Exhaust Pipe Assy and Muffler Body (see Engine Top End chapter)
  Throttle Body Assembly (see Fuel System (DFI) chapter)
  Shift Lever (see Crankshaft/Transmission chapter)



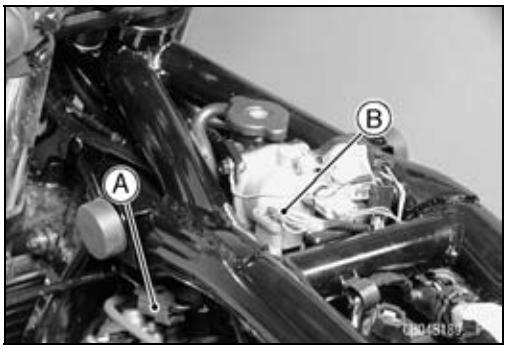
- Remove:
  Radiator Hose Clamps [A] (Loosen)
  Radiator Hoses [B]
- Disconnect:
  Crankshaft Sensor Lead Connector (see Electrical System chapter)
  Stick Coil Harness Connector [C]



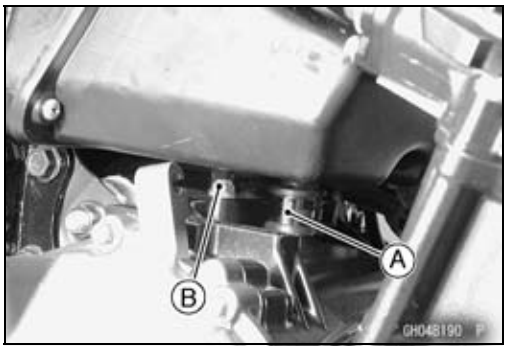
- Pull off the connectors from the engine and free the wiring from the clamps.
- Remove:
  Starter Motor Lead (see Electrical System chapter)
  Alternator Lead Connector (see Electrical System chapter)
  Neutral Switch Lead Connector [A]
  Side Stand Switch Lead Connector [B]
  Speed Sensor Connector [C]
- Remove:
  Left Radiator Hose (see Cooling System chapter)
  Engine Sprocket (see Final Drive chapter)

Engine Removal/Installation

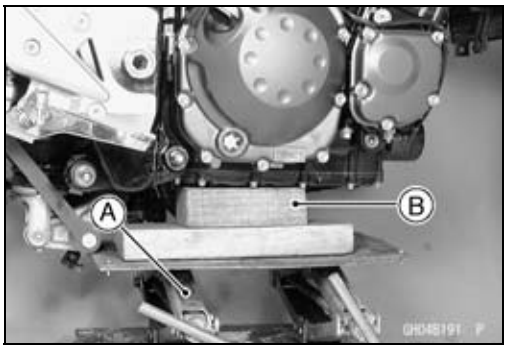
● Remove:
Camshaft Position Sensor Connector [A]
Injector Harness Connector [B]
● Remove the vacuum switch valve hose from the air cleaner housing.



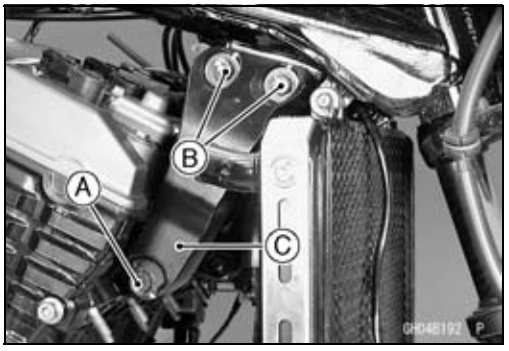
● Remove:
Breather Hose End [A]
Engine Ground Cable Terminal Bolt [B]

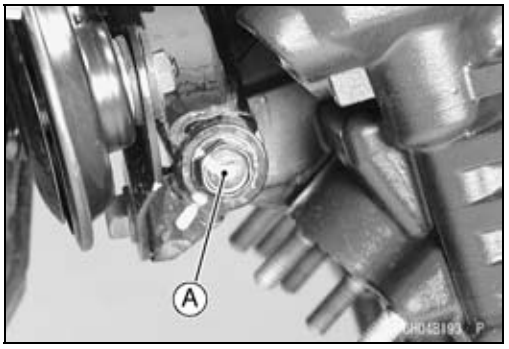


● Support the engine with a suitable stand [A].
○Put a plank [B] onto the suitable stand for engine balance.



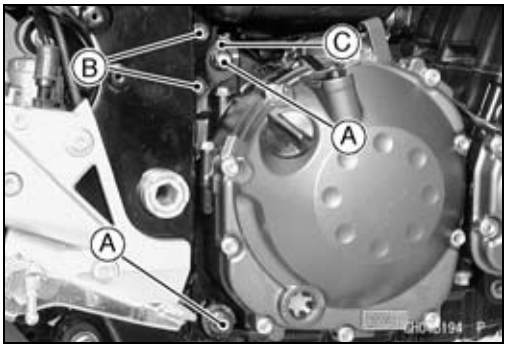
● Remove:
Right and Left Upper Engine Mounting Bolts [A]
Front Engine Bracket Bolts [B]
Front Engine Bracket [C]





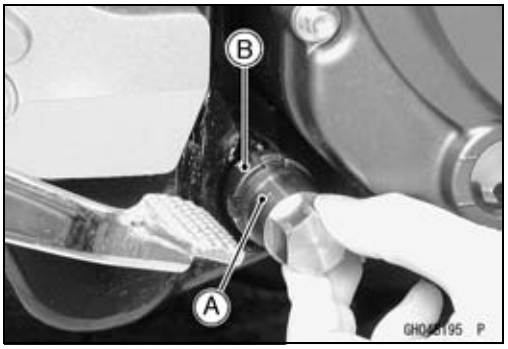
Engine Removal/Installation

- Remove the middle and lower engine mounting nuts [A] and bolts.
- Remove:
  Rear Engine Bracket Bolts [B]
  Rear Engine Bracket [C]

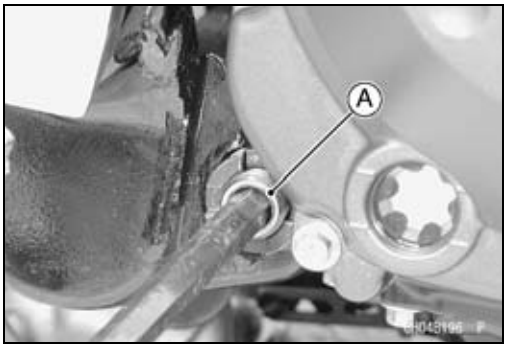


- Using the nut wrench [A], loosen the locknut [B].

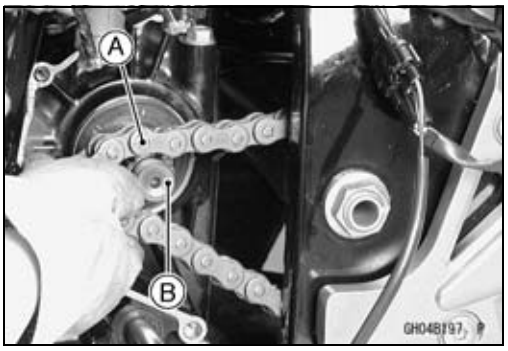
Special Tool - Engine Mount Nut Wrench: 57001–1450



- Using the Hexagon Wrench, turn the adjusting collar [A] counter clockwise to mark the gap between the engine and frame adjusting collar.



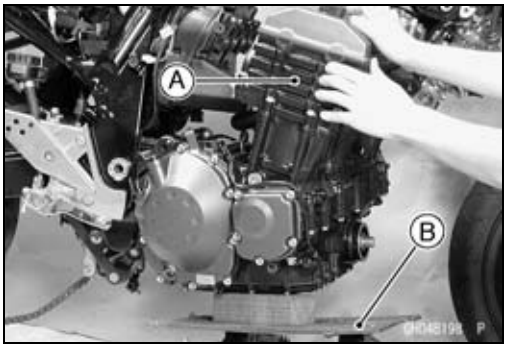
- Remove the drive chain [A] from the output shaft [B].
- Using the stand, take out the engine.



Engine Installation

- Support the engine [A] with a suitable stand [B].

○Put a plank onto the suitable stand for engine balance.

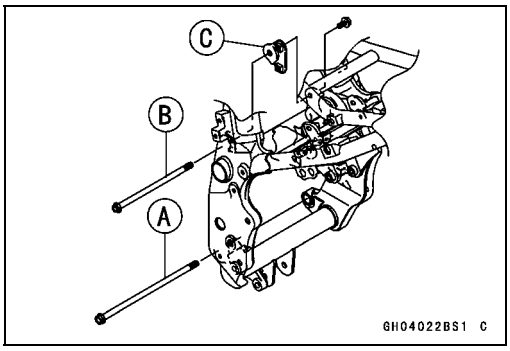


- Screw the adjusting collar fully by hand.
- Install the engine ground cable.

Torque - Engine Ground Cable Terminal Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

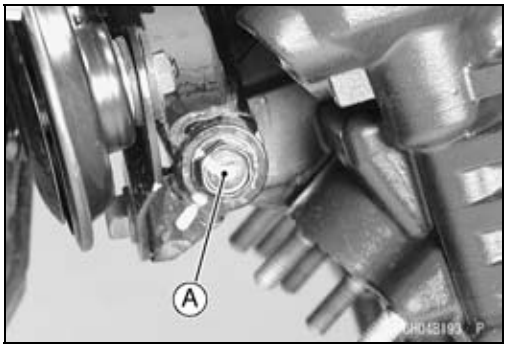
Engine Removal/Installation

● Install the engine mounting bolts and nuts, following the specified installing sequence.
○First, hang the drive chain over the output shaft just before moving the engine into its final position in the frame.
○Second, insert the lower engine mounting bolt [A].
○Third, insert the middle engine mounting bolt [B].
○Fourth, install the rear engine bracket [C] temporarily.



○Fifth, install the left upper engine mounting bolt [A] and tighten it.

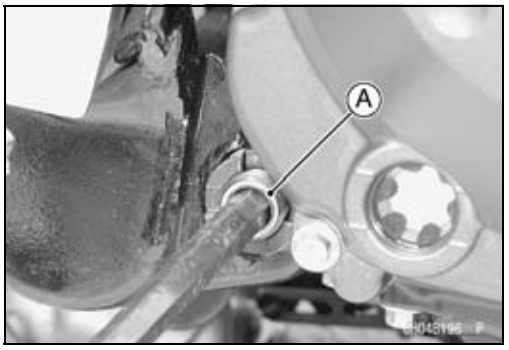
Torque - Left Upper Engine Mounting Bolt : 44 N·m (4.5 kgf·m, 33 ft·lb)

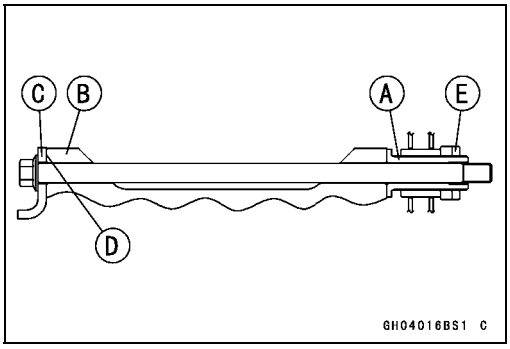


○Sixth, tighten the adjusting collar [A] until the clearance between the crankcase [B] and frame bracket [C] come to 0 mm [D].
○Seventh, tighten the collar locknut [E].

Torque - Adjusting Collar Locknut: 49 N·m (5.0 kgf·m, 36 ft·lb)

Special Tool - Engine Mount Nut Wrench : 57001–1450





○Eighth, tighten the rear bracket bolts.

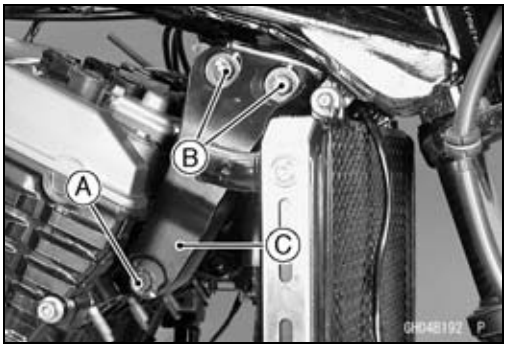
Torque - Rear Engine Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

○Ninth, tighten securely:
Middle Engine Mounting Nut
Lower Engine Mounting Nut

Torque - Engine Mounting Nuts: 44 N·m (4.5 kgf·m, 33 ft·lb)

Engine Removal/Installation

○Tenth, temporarily install:
Front Engine Bracket [C]
Right Upper Engine Mounting Bolt [A]
Front Engine Bracket Bolts [B]



○Eleventh, tighten the right upper engine mounting bolt.
○Lastly, tighten the front engine bracket bolts.

Torque - Right Upper Engine Mounting Bolt : 44 N·m (4.5 kgf·m, 33 ft·lb)
Front Engine Bracket Bolts: 44 N·m (4.5 kgf·m, 33 ft·lb)

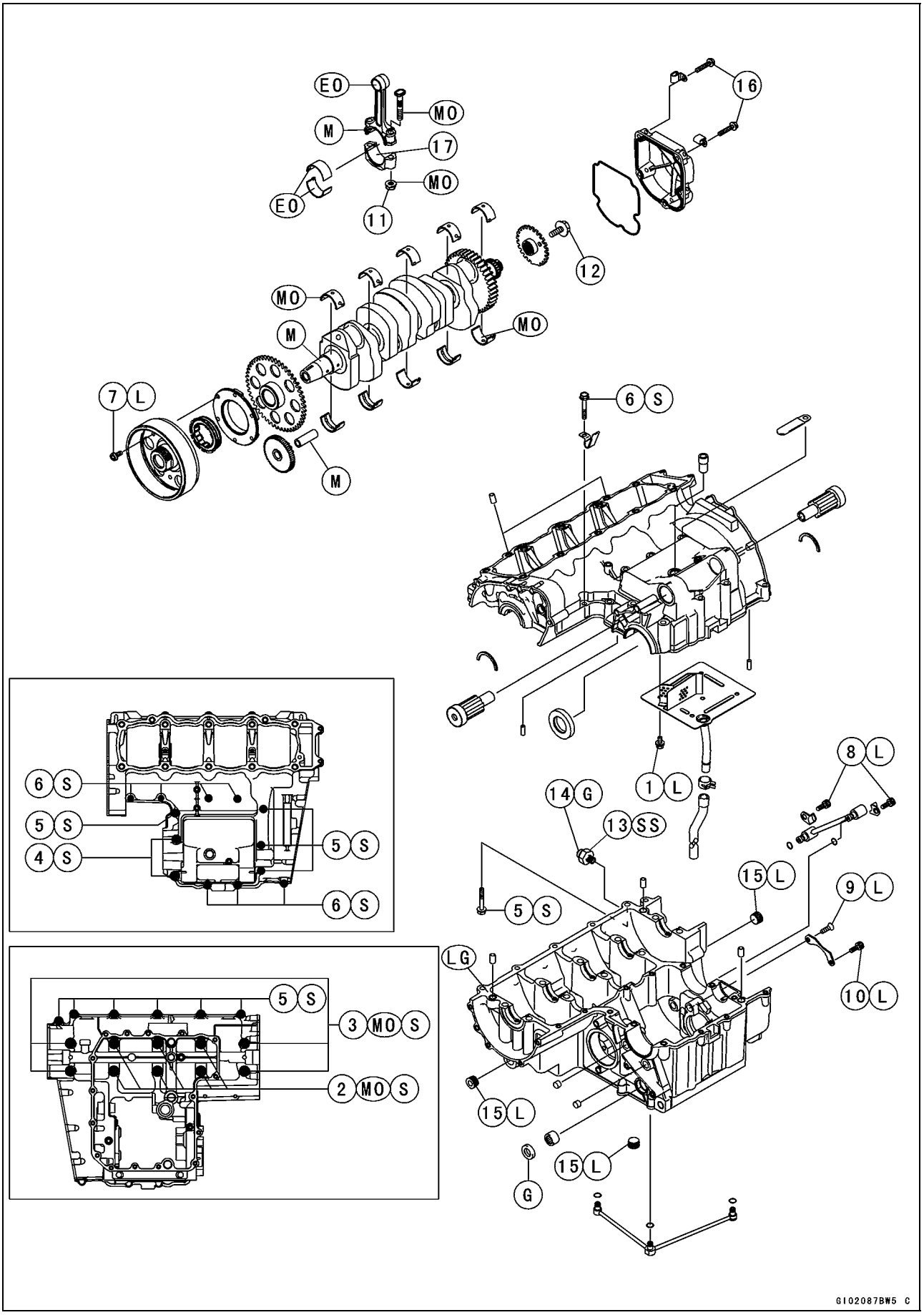
- Run the leads, cables and hoses correctly (see Cable, Wire and Hose Routing section in Appendix chapter).
- Install the removed parts (see appropriate chapters).
- Adjust:
  Throttle Cables (see Fuel System (DFI) chapter)
  Choke Cable (see Fuel System (DFI) chapter)
  Clutch Cable (see Clutch chapter)
  Drive Chain (see Final Drive chapter)
- Fill the engine with engine oil (see Engine Lubrication System in the Periodic Maintenance chapter).
- Fill the engine with coolant (see Cooling System in the Periodic Maintenance chapter).

Crankshaft/Transmission

Table of Contents

Exploded View 9-2
Specifications 9-6
Special Tools and Sealant 9-9
Crankcase Splitting 9-10
  Crankcase Splitting 9-10
  Crankcase Assembly 9-10
Crankshaft and Connecting Rods 9-13
  Crankshaft Removal 9-13
  Crankshaft Installation 9-13
  Connecting Rod Removal 9-13
  Connecting Rod Installation 9-13
  Crankshaft/Connecting Rod Cleaning 9-16
  Connecting Rod Bend 9-17
  Connecting Rod Twist 9-17
  Connecting Rod Big End Side Clearance 9-17
  Connecting Rod Big End Bearing Insert/Crankpin Wear 9-18
  Crankshaft Side Clearance 9-19
  Crankshaft Runout 9-20
  Crankshaft Main Bearing Insert/Journal Wear 9-20
Starter Motor Clutch 9-22
  Starter Motor Clutch Removal/Installation 9-22
  Starter Motor Clutch Inspection ... 9-22
  Starter Motor Clutch Disassembly 9-22
  Starter Motor Clutch Assembly 9-22
Transmission 9-23
  Shift Pedal Removal 9-23
  Shift Pedal Installation 9-23
  External Shift Mechanism Removal 9-24
  External Shift Mechanism Installation 9-25
  External Shift Mechanism Inspection 9-25
  Transmission Shaft Removal 9-26
  Transmission Shaft Installation 9-26
  Transmission Shaft Disassembly . 9-26
  Transmission Shaft Assembly 9-27
  Shift Drum and Fork Removal 9-30
  Shift Drum and Fork Installation... 9-30
  Shift Drum Disassembly 9-30
  Shift Drum Assembly 9-30
  Shift Fork Bending 9-31
  Shift Fork/Gear Groove Wear 9-31
  Shift Fork Guide Pin/Drum Groove Wear 9-31
  Gear Dog and Gear Dog Hole Damage 9-31

Exploded View

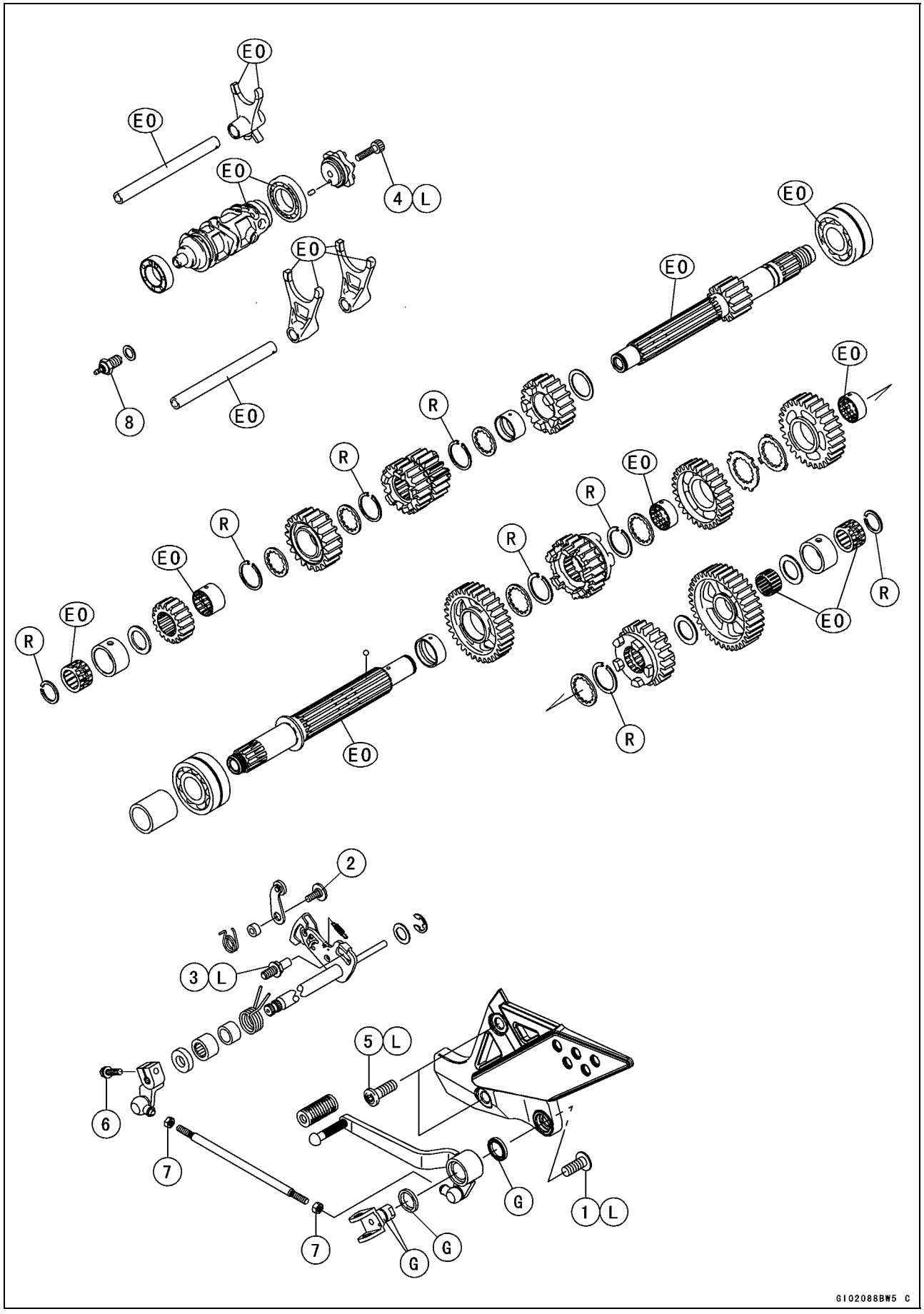


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Breather plate bolts	9.8	1.0	87 in·lb	L
2	Crankcase bolts (M9, L = 81 mm)	42	4.3	31	MO, S
3	Crankcase bolts (M9, L = 95 mm)	42	4.3	31	MO, S
4	Crankcase bolts (M8)	27	2.8	20	S
5	Crankcase bolts (M7)	20	2.0	14	S
6	Crankcase bolts (M6)	12	1.2	104 in·lb	S
7	Starter motor clutch bolts	12	1.2	104 in·lb	L
8	Oil pipe holder bolts	13	1.3	113 in·lb	L
9	Shift drum bearing holder screw	5.4	0.55	48 in·lb	L
10	Shift drum bearing holder bolt	13	1.3	113 in·lb	L
11	Connecting rod big end nuts	see the text	←	←	←
12	Crankshaft position rotor bolt	40	4.1	30	
13	Oil pressure switch	15	1.5	11	SS
14	Oil pressure switch terminal bolt	1.5	0.15	13 in·lb	
15	Oil passage plugs	20	2.0	14	L
16	Crankshaft sensor cover bolts	11	1.1	95 in·lb	

17. Do not apply any grease or oil.
EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
LG: Apply liquid gasket (Kawasaki Bond: 92104–1066).
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
S: Tightening the fasteners following the specified sequence.
SS: Apply silicone sealant (Kawasaki Bond: 56019–120).

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Shift pedal mounting bolt	34	3.5	25	L
2	Gear positioning lever bolt	12	1.2	104 in·lb	
3	Shift shaft return spring pin	29	3.0	22	L
4	Shift drum cam holder bolt	12	1.2	104 in·lb	L
5	Footpeg bracket bolts	34	3.5	25	L
6	Shift lever bolt	6.9	0.70	61 in·lb	
7	Tie-rod locknuts	6.9	0.70	61 in·lb	
8	Neutral switch	15	1.5	11	

EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts

Specifications

Item	Standard	Service Limit
Crankshaft, Connecting Rods:		
Connecting rod bend	– – –	TIR 0.2/100 mm (0.008/3.94 in.)
Connecting rod twist	– – –	TIR 0.2/100 mm (0.008/3.94 in.)
Connecting rod big end side clearance	0.13 ~ 0.38 mm (0.0051 ~ 0.0150 in.)	0.58 mm (0.023 in.)
Connecting rod big end bearing insert/crankpin clearance	0.041 ~ 0.071 mm (0.0016 ~ 0.0028 in.)	0.11 mm (0.0043 in.)
Crankpin diameter:	34.984 ~ 35.000 mm (1.3773 ~ 1.3780 in.)	34.97 mm (1.3768 in.)
Marking None	34.984 ~ 34.992 mm (1.3773 ~ 1.3776 in.)	– – –
○	34.993 ~ 35.000 mm (1.3777 ~ 1.3780 in.)	– – –
Connecting rod big end inside diameter:	38.000 ~ 38.016 mm (1.4961 ~ 1.4967 in.)	– – –
Marking None	38.000 ~ 38.008 mm (1.4961 ~ 1.4964 in.)	– – –
○	38.009 ~ 38.016 mm (1.4964 ~ 1.4967 in.)	– – –
Connecting rod big end bearing insert thickness:		
Brown	1.475 ~ 1.480 mm (0.05807 ~ 0.05827 in.)	– – –
Black	1.480 ~ 1.485 mm (0.05827 ~ 0.05846 in.)	– – –
Blue	1.485 ~ 1.490 mm (0.05846 ~ 0.05866 in.)	– – –

Connecting rod big end bearing insert selection:

Con-rod Big End Bore Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Size Color	Part Number
None	○	Brown	92139–1110
None	None	Black	92139–1109
○	○		
○	None	Blue	92139–1108

Connecting Rod Bolt Stretch: (Usable Range)		
New connecting rod	0.24 ~ 0.36 mm (0.0094 ~ 0.0142 in.)	– – –
Used connecting rod	0.20 ~ 0.32 mm (0.0079 ~ 0.0126 in.)	– – –

Specifications

Item		Standard	Service Limit
Crankshaft side clearance		0.05 ~ 0.20 mm (0.0020 ~ 0.0079 in.)	0.40 mm (0.0157 in.)
Crankshaft runout		TIR 0.02 mm (0.0008 in.) or less	TIR 0.05 mm (0.0020 in.)
Crankshaft main bearing insert/journal clearance		0.020 ~ 0.044 mm (0.0008 ~ 0.0017 in.)	0.07 mm (0.0028 in.)
Crankshaft main journal diameter:		32.984 ~ 33.000 mm (1.2986 ~ 1.2992 in.)	32.96 mm (1.2976 in.)
Marking	None	32.984 ~ 32.992 mm (1.2986 ~ 1.2989 in.)	– – –
	1	32.993 ~ 33.000 mm (1.2989 ~ 1.2992 in.)	– – –
Crankcase main bearing inside diameter:		36.000 ~ 36.016 mm (1.4173 ~ 1.4179 in.)	– – –
Marking	○	36.000 ~ 36.008 mm (1.4173 ~ 1.4176 in.)	– – –
	None	36.009 ~ 36.016 mm (1.4177 ~ 1.4179 in.)	– – –
Crankshaft main bearing insert thickness:			
	Brown	1.490 ~ 1.494 mm (0.0587 ~ 0.0588 in.)	– – –
	Black	1.494 ~ 1.498 mm (0.0588 ~ 0.0590 in.)	– – –
	Blue	1.498 ~ 1.502 mm (0.0590 ~ 0.0591 in.)	– – –

Crankshaft main bearing insert selection:

Crankcase Main Bearing Inside Diameter Marking	Crankshaft Main Journal Diameter Marking	Bearing Insert*		
		Size Color	Part Number	Journal Nos.
○	1	Brown	92028–1868	3, 5
			92028–1829	1, 2, 4
None	1	Black	92028–1867	3, 5
○	None		92028–1828	1, 2, 4
None	None	Blue	92028–1866	3, 5
			92028–1827	1, 2, 4

*The bearing inserts for Nos. 1, 2 and 4 journals have an oil groove, respectively.

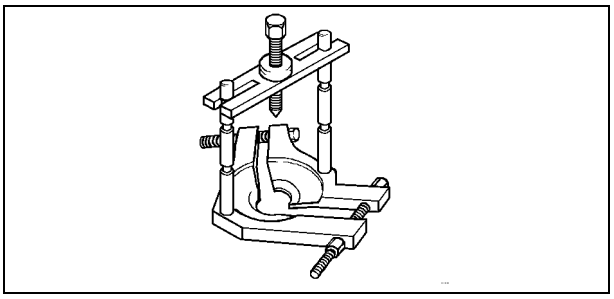
Transmission:		
Shift fork ear thickness	5.9 ~ 6.0 mm (0.232 ~ 0.236 in.)	5.8 mm (0.228 in.)
Gear groove width	6.05 ~ 6.15 mm (0.238 ~ 0.242 in.)	6.25 mm (0.246 in.)

Specifications

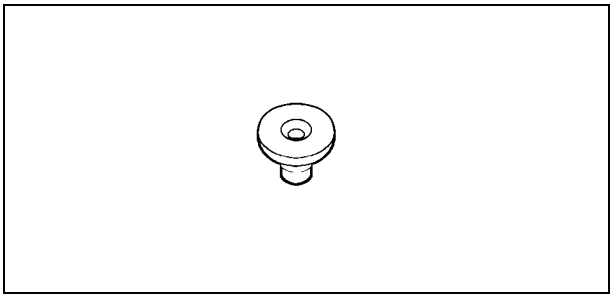
Item	Standard	Service Limit
Shift fork guide pin diameter	6.9 ~ 7.0 mm (0.272 ~ 0.276 in.)	6.8 mm (0.268 in.)
Shift drum groove width	7.05 ~ 7.20 mm (0.278 ~ 0.283 in.)	7.3 mm (0.287 in.)

Special Tools and Sealant

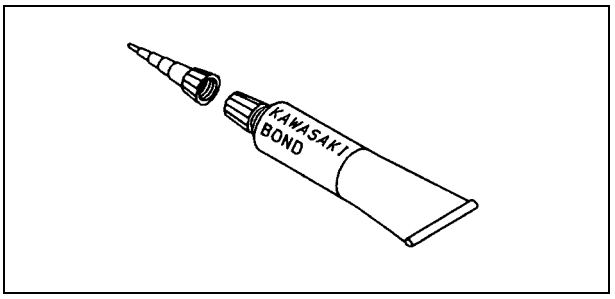
Bearing Puller:
57001–135



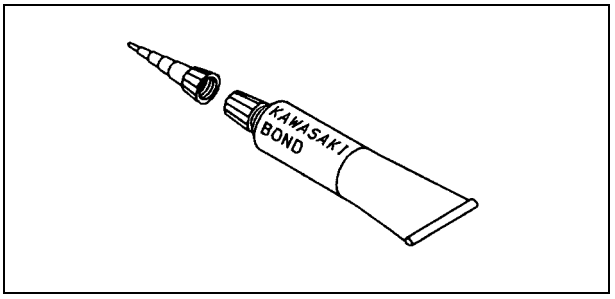
Bearing Puller Adapter:
57001–317



Kawasaki Bond (Silicone Sealant):
56019–120



Kawasaki Bond (Silicone Sealant):
92104–1066



Crankcase Splitting

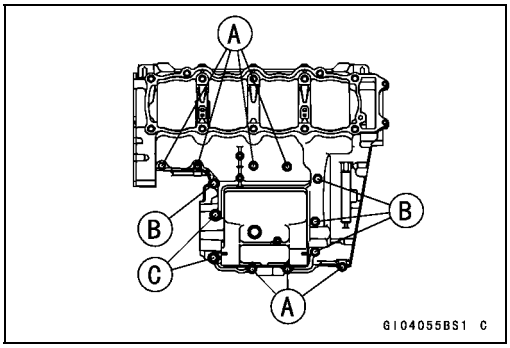
Crankcase Splitting

- 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:
  Crankshaft Sensor (see Electrical System chapter)
  Clutch (see Clutch chapter)
  External Shift Mechanism (see External Shift Mechanism Removal)
  Starter Motor (see Electrical System chapter)
  Oil Pump (see Engine Lubrication System chapter)
  Alternator Rotor (see Electrical System chapter)
  Oil Filter (see Engine Lubrication System chapter)

★If the crankshaft is to be removed, remove the pistons (see Engine Top End chapter).

- Remove the upper crankcase bolts.

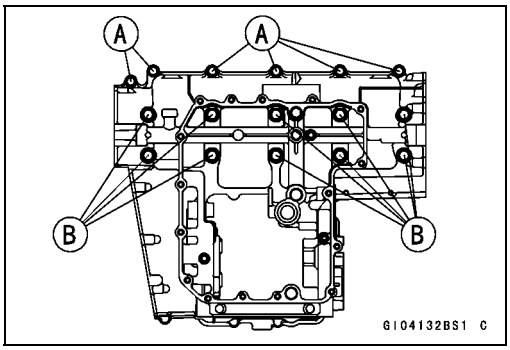
○First loosen the M6 bolts.
  M6 Bolts [A]
  M7 Bolts [B]
  M8 Bolts [C]



- Remove the oil pan, relief valve, oil screen and oil pipes (see Engine Lubrication System chapter).
- Remove the lower crankcase bolts.

○First loosen the M7 bolts.
  M7 Bolts [A]
  M9 Bolts [B]

- Tap lightly around the crankcase mating surface with a plastic mallet, and split the crankcase. Take care not to damage the crankcase.



Crankcase Assembly

CAUTION

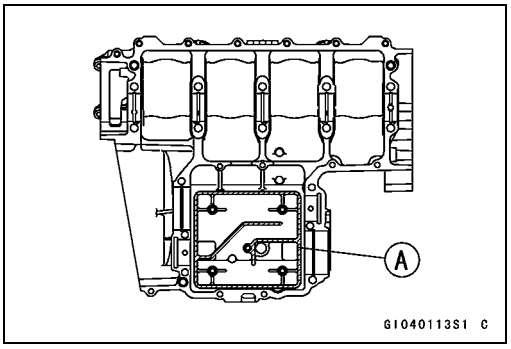
The upper and lower crankcase halves are machined at the factory in the assembled state, so the crankcase halves must be replaced as a set.

- With a high-flash point solvent, clean off the mating surfaces of the crankcases halves and wipe dry.
- Using compressed air, blow out the oil passages in the crankcase halves.

Crankcase Splitting

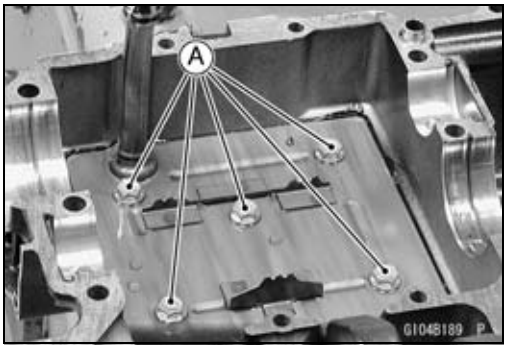
● Apply liquid gasket to the breather plate mating surface [A] 1 to 1.5 mm (0.04 to 0.06 in.) thick, and then install the breather plate.

Sealant - Three Bond: 1207B

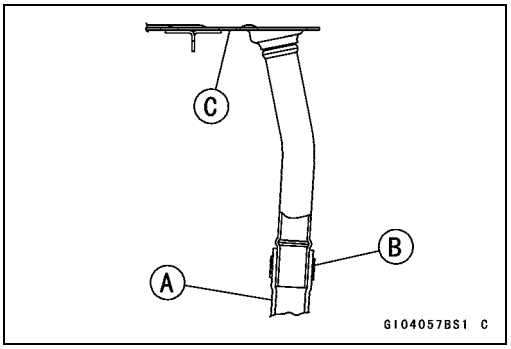


● Apply a non-permanent locking agent to the threads and tighten the bolts [A].

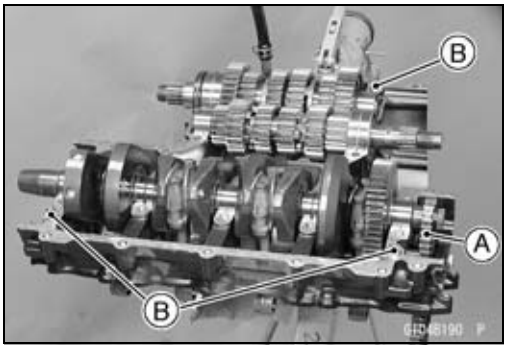
Torque - Breather Plate Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)



● Install the breather hose [A].
○Align the white mark on the hose with the white mark on the pipe.
○Install the clamp [B] so that its head faces to right side.
Breather Plate [C]



● Install:
Crankshaft and Connecting Rods
Camshaft Chain [A]
Transmission Shafts and Gears
Dowel Pins [B]
Shift Drum
Shift Forks and Shift Rods
● Before fitting the lower case on the upper case, check the following.
○Be sure to hang the camshaft chain on the crankshaft.
○Check to see that the shift drum and transmission gears are in the neutral position.



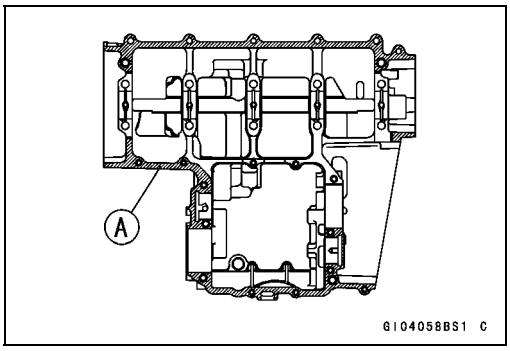
Crankcase Splitting

● Apply liquid gasket [A] to the mating surface of the lower crankcase half.

Sealant - Kawasaki Bond (Silicone Sealant): 92104–1066

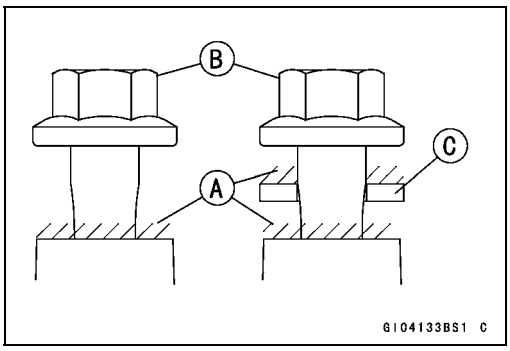
CAUTION

Do not apply liquid gasket around the crankshaft main bearing inserts, and oil passage holes.



● Fit the lower crankcase to the upper crankcase.

● Apply molybdenum disulfide oil to the seating surface [A] on the lower crankcase for the M9 bolts [B].
Washer [C]



● Tighten the lower crankcase bolts using the following steps.

○Following the sequence numbers on the lower crankcase half, tighten the M9 bolts [1 ~ 6] L= 81 mm (3.19 in.).

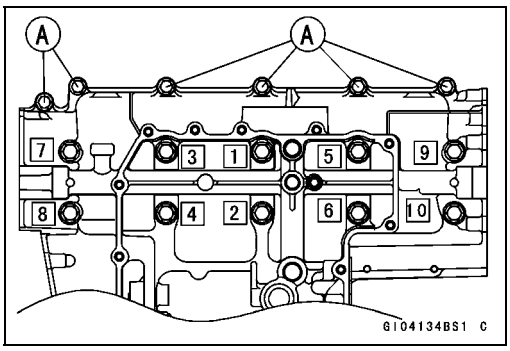
Torque - Crankcase Bolts (M9): 42 N·m (4.3 kgf·m, 31 ft·lb)

○Tighten the M9 bolts [7 ~ 10] L= 95 mm (3.74 in.) with washers.

Torque - Crankcase Bolts (M9): 42 N·m (4.3 kgf·m, 31 ft·lb)

○Tighten the M7 bolts [A].

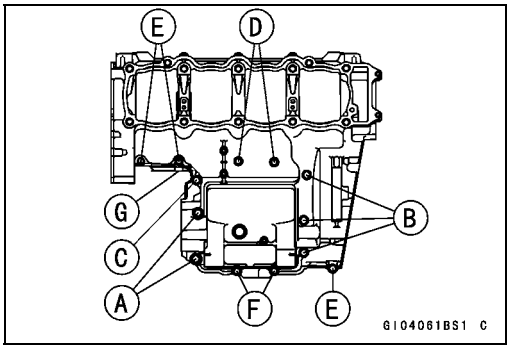
Torque - Crankcase Bolts (M7): 20 N·m (2.0 kgf·m, 14 ft·lb)



● Tighten the upper crankcase bolts in the order listed.

Torque - Crankcase Bolts (M8) [A]: 27 N·m (2.8 kgf·m, 20 ft·lb)
Crankcase Bolts (M7): 20 N·m (2.0 kgf·m, 14 ft·lb)
L= 85 mm (3.35 in.) [B]
L= 50 mm (1.97 in.) [C]
Crankcase Bolts (M6): 12 N·m (1.2 kgf·m, 104 in·lb)
L= 60 mm (2.36 in.) [D]
L= 40 mm (1.57 in.) [E]
L= 90 mm (3.54 in.) [F]

Clamp [G]



● After tightening all crankcase bolts, check the following items.

○Crankshaft and transmission shafts turn freely.

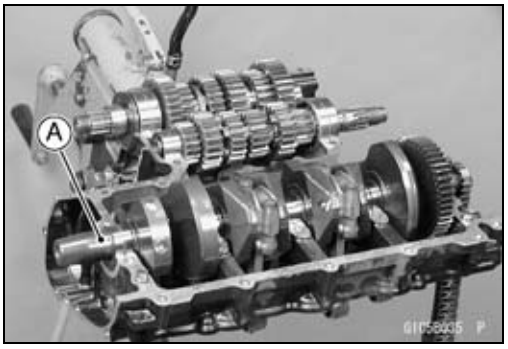
○While spinning the output shaft, gears shift smoothly from the 1st to 6th gear, and 6th to 1st.

○When the output shaft stays still, the gear can not be shifted to 2nd gear or other higher gear positions.

Crankshaft and Connecting Rods

Crankshaft Removal

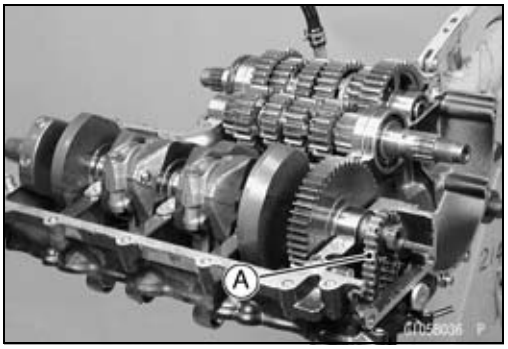
- Split the crankcase (see Crankcase Splitting).
- Remove the crankshaft [A].



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 (press gauge) before assembling engine to be sure the correct bearing inserts are installed.



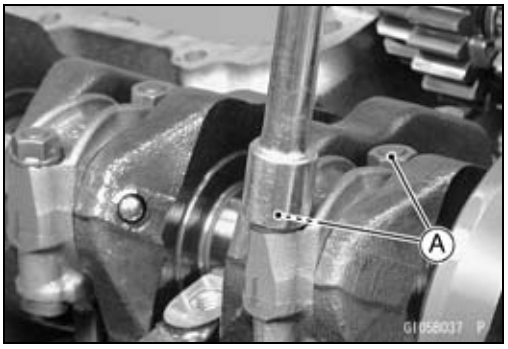
- Apply molybdenum disulfide oil solution to the crankshaft main bearing inserts.
- Install the crankshaft with the camshaft chain [A] hanging on it.

Connecting Rod Removal

- Split the crankcase (see Crankcase Splitting).
- Remove the connecting rod nuts [A].
- Remove the crankshaft.

NOTE

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



- Remove the connecting rods from the crankshaft.

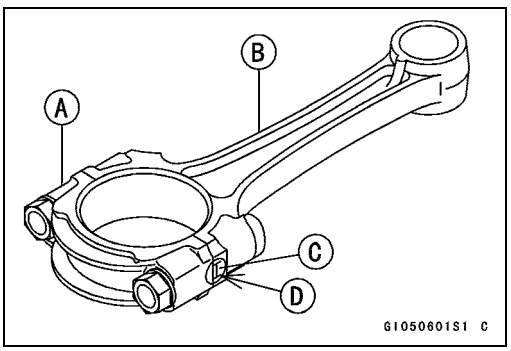
CAUTION

Discard the connecting rod bolts. To prevent damage to the crankpin surfaces, do not allow the connecting rod bolts to bump against the crankpins.

Connecting Rod Installation

CAUTION

To minimize vibration, the connecting rods should have the same weight mark.

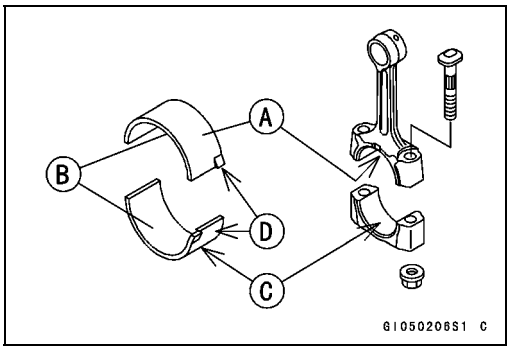


Big End Cap [A]
Connecting Rod [B]
Weight Mark, Alphabet [C]
Diameter Mark [D]: "◯" or no mark

CAUTION

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

Crankshaft and Connecting Rods



- Apply molybdenum disulfide grease [A] to the outer surface of the upper insert and the inner surface of the connecting rod big end.
- Apply molybdenum disulfide oil [B] to the inner surfaces of upper and lower bearing inserts.

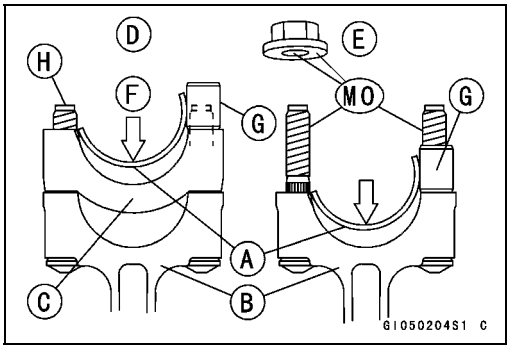
○The molybdenum disulfide oil is a mixture of engine oil and molybdenum disulfide grease with a weight ratio (10:1).

○Do not apply any grease or oil [C] to the cap inside and cap insert outside.

○Install the inserts so that their nails [D] are on the same side and fit them into the recess of the connecting rod and cap.

CAUTION

Wrong application of oil and grease could cause bearing damage.



○When installing the inserts [A], be careful not to damage the insert surface with the edge of the connecting rod [B] or the cap [C]. One way to install inserts is as follows:
Installation [D] to Cap
Installation [E] to Connecting Rod
Push [F]
Spare Dowel Pin [G]
Connecting Rod Bolts [H]

- Install the cap on the connecting rod, aligning the weight and diameter marks.
- Remove debris and clean the surface of inserts.
- Apply molybdenum disulfide oil [MO] to the threads and seating surfaces of the big end nuts and bolts.

- Install the crankshaft (see Crankshaft Installation).
- Install each connecting rod on its original crankpin.

○The connecting rod big end is bolted using the “plastic region fastening method”.

○This method precisely achieves the needed clamping force without exceeding it unnecessarily, allowing the use of thinner, lighter bolts further decreasing connecting rod weight.

○There are two types of the plastic region fastening. One is a bolt length measurement method and other is a rotation angle method. Observe one of the following two, but the bolt length measurement method is preferable because this is a more reliable way to tighten the big end nuts.

CAUTION

The connecting rod bolts are designed to stretch when tightened. Never reuse the connecting rod bolts. See the table below for correct bolt and nut usage.

CAUTION

Be careful not to overtighten the nuts.
The bolts must be positioned on the seating surface correctly to prevent the bolt heads from hitting the crankcase.

Crankshaft and Connecting Rods

(1) Bolt Length Measurement Method

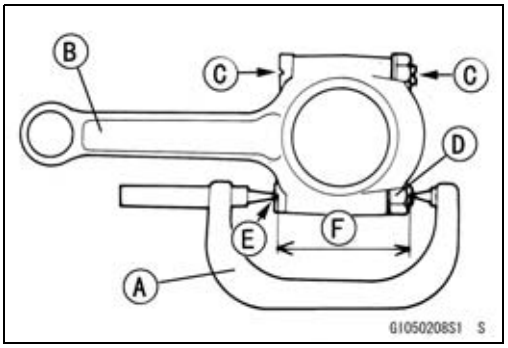
- Be sure to clean the bolts, nuts, and connecting rods thoroughly with a high-flash point solvent, because the new connecting rods, bolts, and nuts are treated with an anti-rust solution.

⚠ WARNING

Clean the bolts, nuts, and connecting rods 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 them.

CAUTION

Immediately dry the bolts and nuts with compressed air after cleaning.
Clean and dry the bolts and nuts completely.



- Install new bolts in reused connecting rods.
- Dent both bolt head and bolt tip with a punch as shown.
- Before tightening, use a point micrometer [A] to measure the length of new connecting rod bolts and record the values to find the bolt stretch.
  Connecting Rod [B]
  Mark here with a punch [C].
  Nuts [D]
  Fit micrometer pins into punch marks [E].
- Apply a small amount of molybdenum disulfide oil to the following:
  Threads of Nuts and Bolts
  Seating Surfaces of Nuts and Con-rods
- Tighten the big end nuts until the bolt elongation reaches the length specified in the table.
- Check the length [F] of the connecting rod bolts.

★If the stretch is more than the usable range, the bolt has stretched too much. An overelongated bolt may break in use.

Bolt Length after tightening – Bolt Length before tightening = Bolt Stretch

Connecting Rod Assy	Bolt	Nut	Usable Range of Connecting Rod Bolt Stretch
New	Use the bolts attached to new con-rod.	Attached to new con-rod	0.24 ~ 0.36 mm (0.0094 ~ 0.0142 in.)
		New	
Used	Replace the bolts with new ones.	Used	0.20 ~ 0.32 mm (0.0079 ~ 0.0126 in.)
		New	

Crankshaft and Connecting Rods

(2) Rotation Angle Method

★If you don't have a point micrometer, you may tighten the nuts using the "Rotation Angle Method".

● Be sure to clean the bolts and nuts thoroughly with a high -flash point solvent, because the new bolts and nuts are treated with an anti-rust solution.

⚠ WARNING

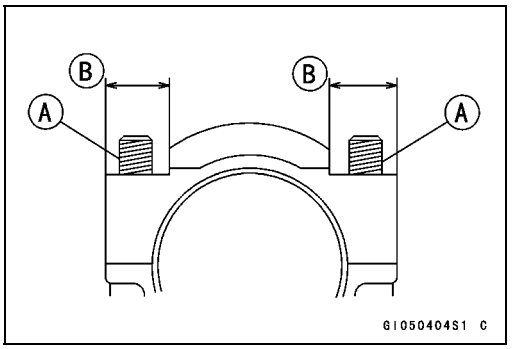
Clean the bolts and nuts in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. This includes any appliance with a pilot light. Because of the danger or highly flammable liquids, do not use gasoline or low-flash point solvents to clean them.

CAUTION

Immediately dry the bolts and nuts with compressed air after cleaning.
Clean and dry the bolts and nuts completely.

● Install new bolts in reused connecting rods.

● Apply a small amount of molybdenum disulfide oil to the following:
Threads [A] of Nuts and Bolts
Seating Surfaces [B] of Nuts and Con-rods

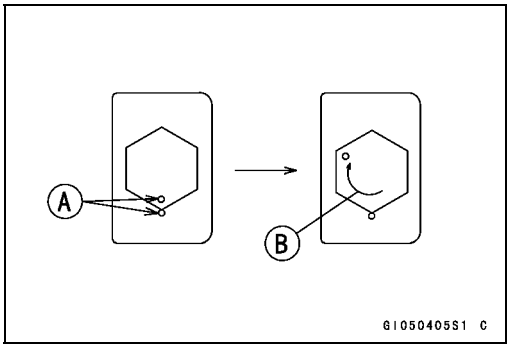


● First, tighten the nuts to the specified torque. See the table below.

● Next, tighten the nuts **120° ±5°** .

○Mark [A] the connecting rod big end caps and nuts so that nuts can be turned 120° [B] properly.

○Tighten the hexagon nut by 2 corners.



Connecting Rod Assy	Bolt	Nut	Torque + Angle N·m (kgf·m, ft·lb)
New	Use the bolts attached to new con-rod.	Attached to new con-rod	18 (1.8, 13.0) + 120°
		New	20 (2.0, 14.5) + 120°
Used	Replace the bolts with new ones	Used	24 (2.4, 17.4) + 120°
		New	25 (2.6, 18.8) + 120°

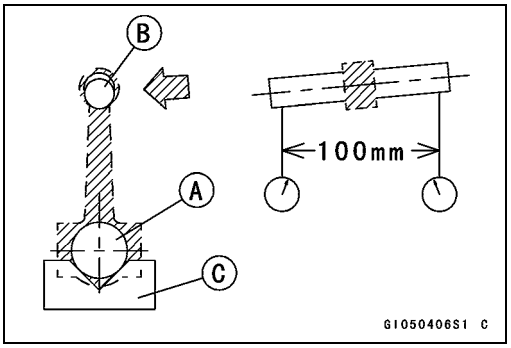
Crankshaft/Connecting Rod Cleaning

● After removing the connecting rods from the crankshaft, clean them with a high-flash point solvent.

● Blow the crankshaft oil passages with compressed air to remove any foreign particles or residue that may have accumulated in the passages.

Crankshaft and Connecting Rods

Connecting Rod Bend

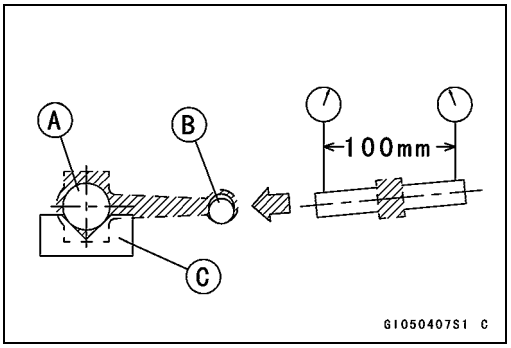


- Remove the connecting rod big end bearing inserts, and reinstall the connecting rod big end cap.
- Select an arbor [A] of the same diameter as the connecting rod big end, and insert the arbor through the connecting rod big end.
- Select an arbor of the same diameter as the piston pin and at least 100 mm (3.94 in.) long, and insert the arbor [B] through the connecting rod small end.
- On a surface plate, set the big-end arbor on V block [C].
- With the connecting rod held vertically, use a height gauge to measure the difference in the height of the arbor above the surface plate over a 100 mm (3.94 in.) length to determine the amount of connecting rod bend.

★If connecting rod bend exceeds the service limit, the connecting rod must be replaced.

Connecting Rod Bend
Service Limit: TIR 0.2/100 mm (0.008/3.94 in.)

Connecting Rod Twist

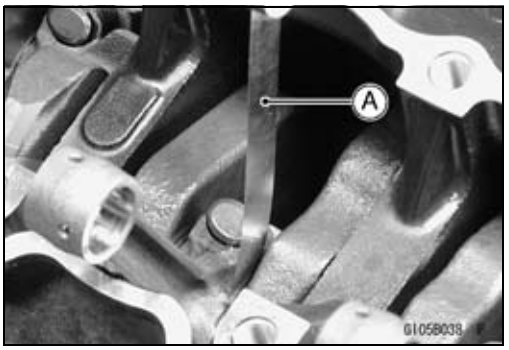


- With the big-end arbor [A] still on V block [C], hold the connecting rod horizontally and measure the amount that the arbor [B] varies from being paralleled with the surface plate over a 100 mm (3.94 in.) length of the arbor to determine the amount of connecting rod twist.

★If connecting rod twist exceeds the service limit, the connecting rod must be replaced.

Connecting Rod Twist
Service Limit: TIR 0.2/100 mm (0.008/3.94 in.)

Connecting Rod Big End Side Clearance



- Measure connecting rod big end side clearance.

○Insert a thickness gauge [A] between the big end and either crank web to determine clearance.

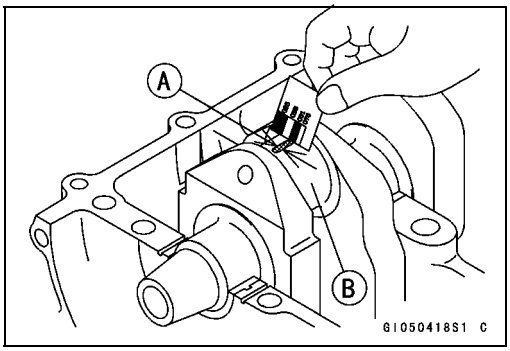
Connecting Rod Big End Side Clearance
Standard: 0.13 ~ 0.38 mm (0.0051 ~ 0.0150 in.)
Service Limit: 0.58 mm (0.023 in.)

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

Crankshaft and Connecting Rods

Connecting Rod Big End Bearing Insert/Crankpin Wear

- Measure the bearing insert/crankpin [B] clearance with plastigage [A].
- Tighten the big end nuts to the specified torque (see Connecting Rod Installation).



NOTE

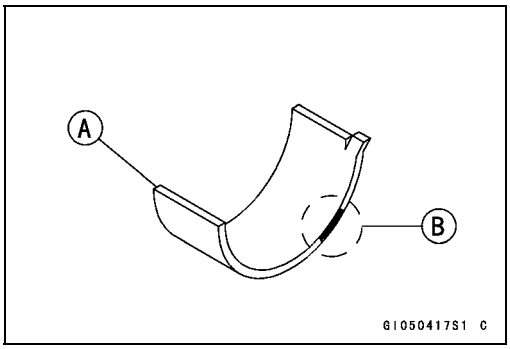
○*Do not move the connecting rod and crankshaft during clearance measurement.*

CAUTION

After measurement, replace the connecting rod bolts.

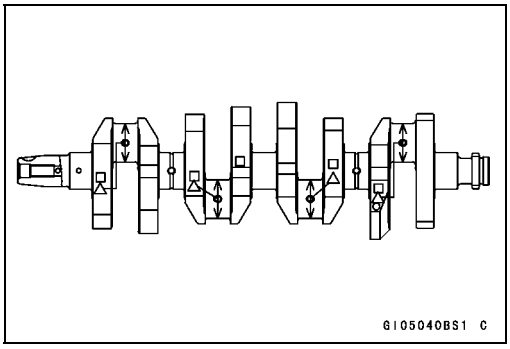
Connecting Rod Big End Bearing Insert/Crankpin Clearance
Standard: 0.041 ~ 0.071 mm (0.0016 ~ 0.0028 in.)
Service Limit: 0.11 mm (0.0043 in.)

★If the clearance is within the standard, no bearing replacement is required.
★If the clearance is between 0.072 mm (0.00284 in.) and the service limit (0.11 mm, 0.0043 in.), replace the bearing inserts [A] with inserts painted blue [B]. 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 the clearance exceeds the service limit, measure the diameter of the crankpins.



Crankpin Diameter
Standard: 34.984 ~ 35.000 mm (1.3773 ~ 1.3780 in.)
Service Limit: 34.97 mm (1.3768 in.)

★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 (1.3773 ~ 1.3776 in.)
◯ 34.993 ~ 35.000 mm (1.3777 ~ 1.3780 in.)

Δ: Crankpin Diameter Marks, "◯" or no mark.

Crankshaft and Connecting Rods

- Measure the connecting rod big end inside diameter, and mark each connecting rod big end in accordance with the inside diameter.
- Tighten the connecting rod big end nuts to the specified torque (see Connecting Rod Installation).

NOTE

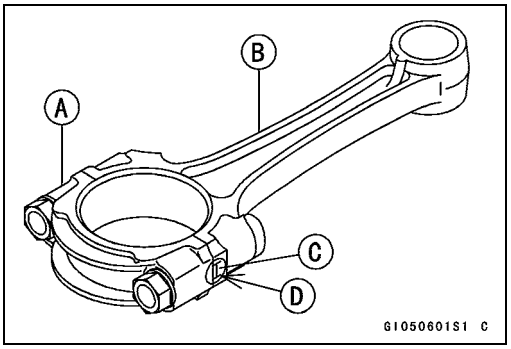
○*The mark already on the big end should almost coincide with the measurement.*

Connecting Rod Big End Inside Diameter Marks

None 38.000 ~ 38.008 mm (1.4961 ~ 1.4964 in.)

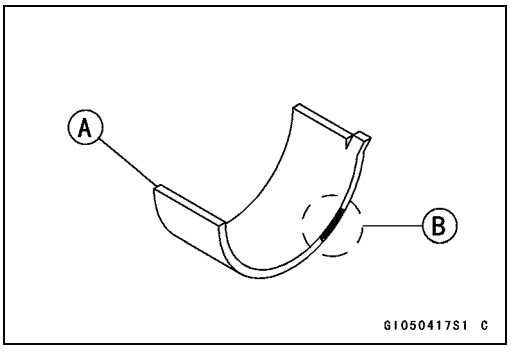
○ 38.009 ~ 38.016 mm (1.4964 ~ 1.4967 in.)

Big End Cap [A]
Connecting Rod [B]
Weight Mark, Alphabet [C]
Diameter Mark (Around Weight Mark) [D]: "○" or no mark



- Select the proper bearing insert [A] in accordance with the combination of the connecting rod and crankshaft coding.
  Size Color [B]

Con-rod Big End Inside Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Size Color	Part Number
None	○	Brown	92139–1110
None	None	Black	92139–1109
○	○		
○	None	Blue	92139–1108



- Install the new inserts in the connecting rod and check insert/crankpin clearance with the plastigage.

Crankshaft Side Clearance

- Insert a thickness gauge [A] between the crankcase main bearing and the crank web at the No. 2 journal [B] to determine clearance.

★If the clearance exceeds the service limit, replace the crankcase halves as a set.

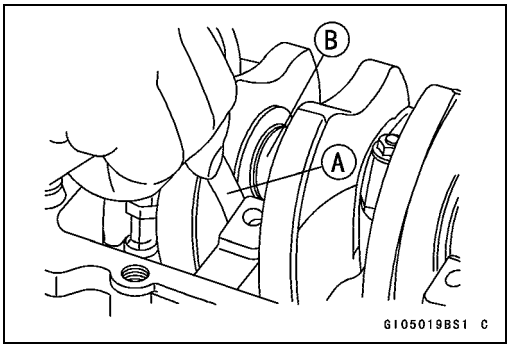
NOTE

○*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.*

Crankshaft Side Clearance

Standard: 0.05 ~ 0.20 mm (0.0020 ~ 0.0079 in.)

Service Limit: 0.40 mm (0.0157 in.)



Crankshaft and Connecting Rods

Crankshaft Runout

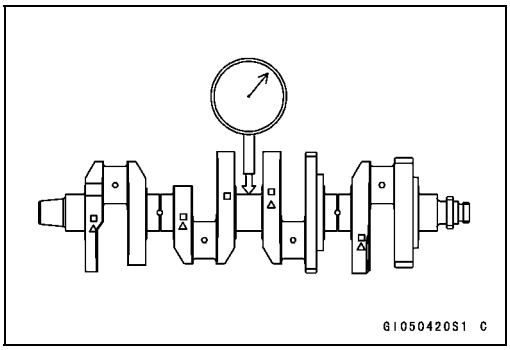
- Measure the crankshaft runout.

★If the measurement exceeds the service limit, replace the crankshaft.

Crankshaft Runout

Standard: TIR 0.02 mm (0.0008 in.) or less

Service Limit: TIR 0.05 mm (0.0020 in.)



Crankshaft Main Bearing Insert/Journal Wear

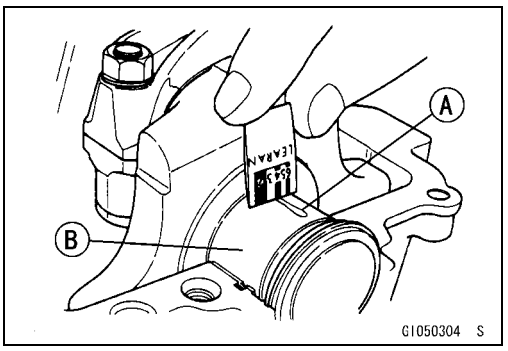
- Using a plastigage (press gauge) [A], measure the bearing insert/journal [B] clearance.

NOTE

○*Tighten the crankcase bolts to the specified torque (see Crankcase Assembly).*

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

○*Journal clearance less than 0.025 mm (0.00098 in.) can not be measured by plastigage, however, using genuine parts maintains the minimum standard clearance.*



Crankshaft Main Bearing Insert/Journal Clearance

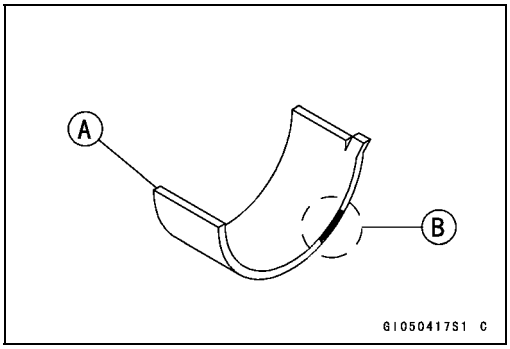
Standard: 0.020 ~ 0.044 mm (0.0008 ~ 0.0017 in.)

Service Limit: 0.07 mm (0.0028 in.)

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

★If the clearance is between 0.045 mm (0.0018 in.) and the service limit (0.07 mm, 0.0028 in.), replace the bearing inserts [A] with inserts painted blue [B]. 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 the clearance exceeds the service limit, measure the diameter of the crankshaft main journal.



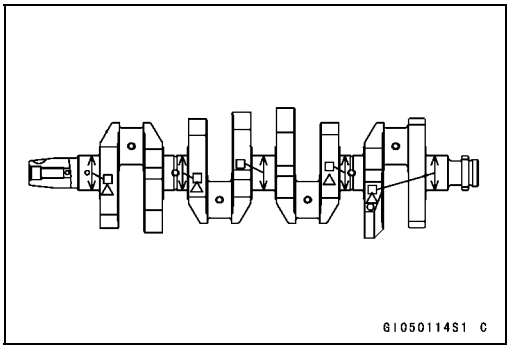
Crankshaft Main Journal Diameter

Standard: 32.984 ~ 33.000 mm (1.2986 ~ 1.2992 in.)

Service Limit: 32.96 mm (1.2976 in.)

★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 32.984 ~ 32.992 mm (1.2986 ~ 1.2989 in.)

1 32.993 ~ 33.000 mm (1.2989 ~ 1.2992 in.)

□: Crankshaft Main Journal Diameter Marks, "1" or no mark.

Crankshaft and Connecting Rods

- Measure the main bearing inside diameter, and mark the upper crankcase half in accordance with the inside diameter.
  Crankcase Main Bearing Inside Diameter Marks : "○" or no mark.
- Tighten the crankcase bolts to the specified torque (see Crankcase Assembly).

NOTE

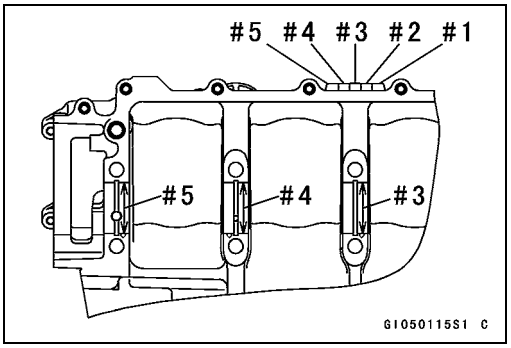
○*The mark already on the upper crankcase half should almost coincide with the measurement.*

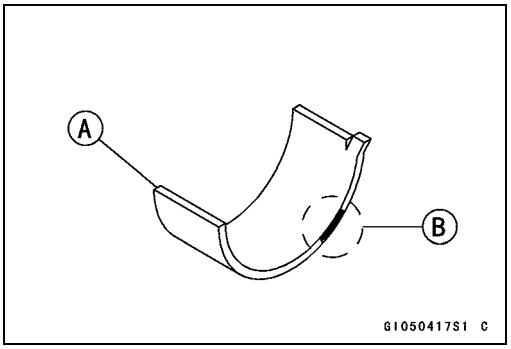
Crankcase Main Bearing Inside Diameter Marks

○ 36.000 ~ 36.008 mm (1.4173 ~ 1.4176 in.)

None 36.009 ~ 36.016 mm (1.4177 ~ 1.4179 in.)

- Select the proper bearing insert [A] in accordance with the combination of the crankcase and crankshaft coding.
  Size Color [B]





Crankcase Main Bearing Inside Diameter Marking	Crankshaft Main Journal Diameter Marking	Bearing Insert*		
		Size Color	Part Number	Journal Nos.
○	1	Brown	92028–1868	3, 5
			92028–1829	1, 2, 4
None	1	Black	92028–1867	3, 5
○	None		92028–1828	1, 2, 4
None	None	Blue	92028–1866	3, 5
			92028–1827	1, 2, 4

* The bearing inserts for Nos. 1, 2 and 4 journals have an oil groove, respectively.

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

Starter Motor Clutch

Starter Motor Clutch Removal/Installation

- Refer to the Alternator Rotor Removal and Installation in the Electrical System chapter.

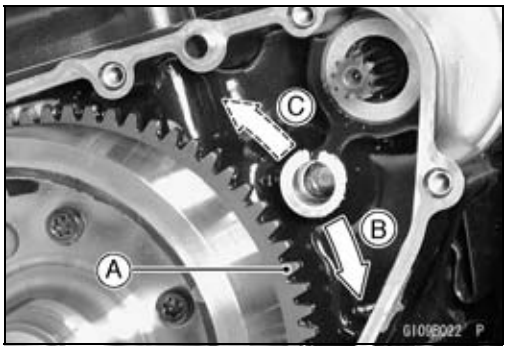
Starter Motor Clutch Inspection

- Remove:
  Alternator Cover (see Electrical System chapter)
  Starter Idle Gear
- Turn the starter motor clutch gear [A] by hand. The starter motor clutch gear should turn clockwise [B] freely, but should not turn counterclockwise [C].

★If the clutch does not operate as it should or if it makes noise, go to the next step.

- Remove and disassemble the starter motor clutch, and visually inspect the clutch parts.

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



NOTE

○*Examine the starter motor clutch gear as well. Replace it if it is worn or damaged.*

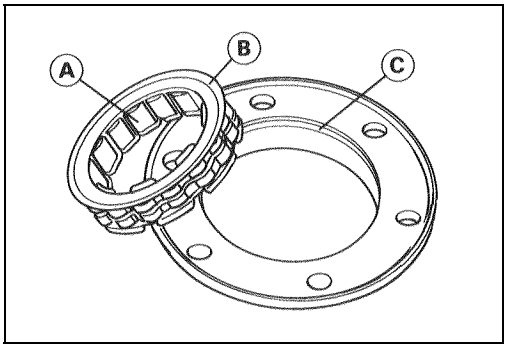
Starter Motor Clutch Disassembly

- Remove:
  Alternator Rotor (see Electrical System chapter)
  Starter Motor Clutch Bolts [A] and Starter Motor Clutch

Starter Motor Clutch Assembly

- Be sure to install the one-way clutch [A] so that its flange [B] fits in the holder recess [C].
- Apply a non-permanent locking agent to the threads of the starter motor clutch bolts, and tighten them.

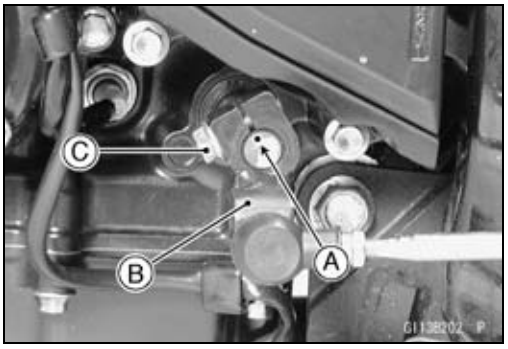
Torque - Starter Motor Clutch Bolts: 12 N·m (1.2 kgf·m, 104 in·lb)



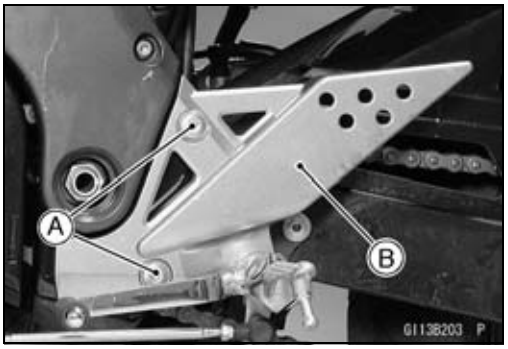
Transmission

Shift Pedal Removal

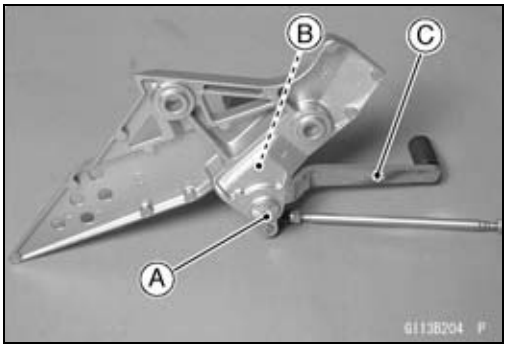
- Mark [A] the position of the shift lever [B] on the shift shaft so that it can be installed later in the same position.
- Remove:
  Shift Lever Bolt [C]
  Shift Lever



- Remove:
  Footpeg Bracket Bolts [A]
  Footpeg Bracket [B]

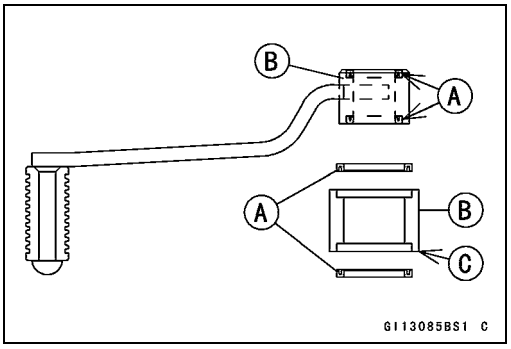


- Remove the bolt [A], footpeg [B] and shift pedal [C].



Shift Pedal Installation

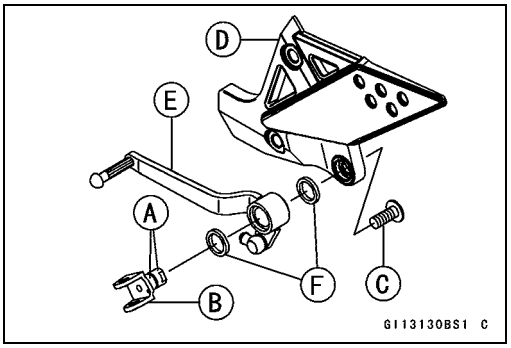
- Apply grease to the oil seal lip.
- Press the oil seals [A] in the shift pedal housing [B] so that the oil seal surfaces are flush with the housing end [C] as shown.



- Apply grease to the sliding surfaces [A] on the footpeg holder [B].
- Apply a non-permanent locking agent to the shift pedal mounting bolt [C].
- Tighten:

Torque - Shift Pedal Mounting Bolt: 34 N·m (3.5 kgf·m, 25 ft·lb)

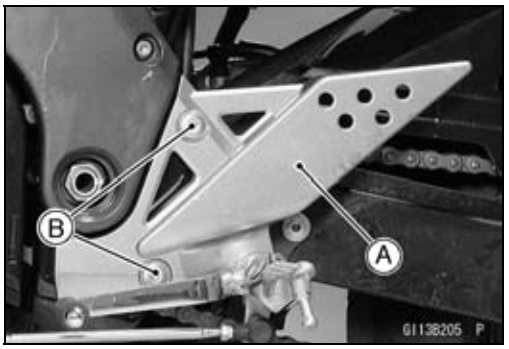
Footpeg Bracket [D]
Shift Pedal [E]
Oil Seals [F]



Transmission

- Install the footpeg bracket [A].
- Tighten:

Torque - Footpeg Bracket Bolts [B]: 34 N·m (3.5 kgf·m, 25 ft·lb)



- Install the shift lever [A], aligning the mark (previously marked).
- Tighten:

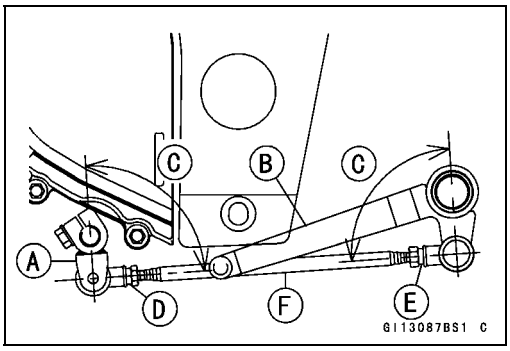
Torque - Shift Lever Bolt: 6.9 N·m (0.70 kgf·m, 61 in·lb)

- Install the shift pedal [B] as shown.
  About 90° [C]

○To adjust the pedal position, loosen the front locknut [D] (left-hand threads) and rear locknut [E] and then turn the tie-rod [F].

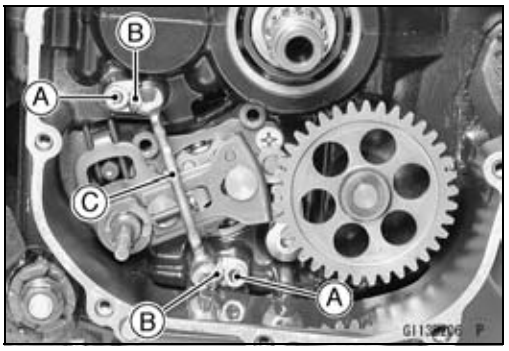
- Tighten:

Torque - Tie-rod Locknuts: 6.9 N·m (0.70 kgf·m, 61 in·lb)

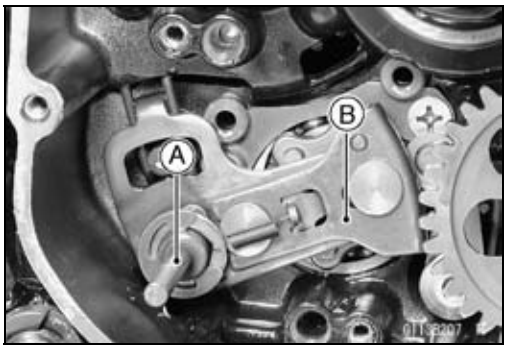


External Shift Mechanism Removal

- Remove:
  Engine Oil (drain, see Engine Lubrication System chapter)
  Shift Pedal (see Shift Pedal Removal)
  Clutch (see Clutch chapter)
  Oil Pipe Holder Bolts [A]
  Oil Pipe Holders [B], Oil Pipe [C] and O-rings

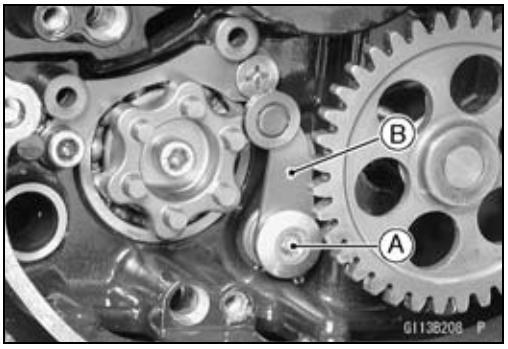


- Remove the shift shaft assembly [A] while pulling the shift mechanism arm [B] to the direction of the arrow.



Transmission

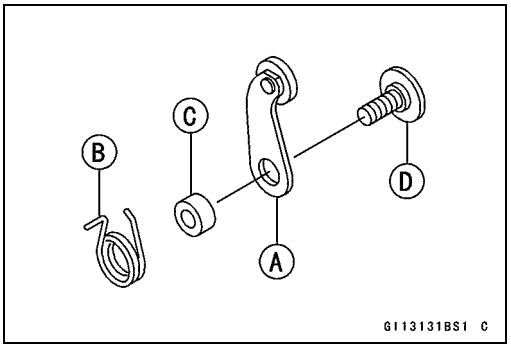
- Remove:
  Gear Positioning Lever Bolt [A]
  Gear Positioning Lever [B], Collar and Spring



External Shift Mechanism Installation

- Install the gear positioning lever [A] as shown.
  Spring [B]
  Collar [C]
  Bolt [D]
- Tighten:

Torque - Gear Positioning Lever Bolt: 12 N·m (1.2 kgf·m, 104 in·lb)

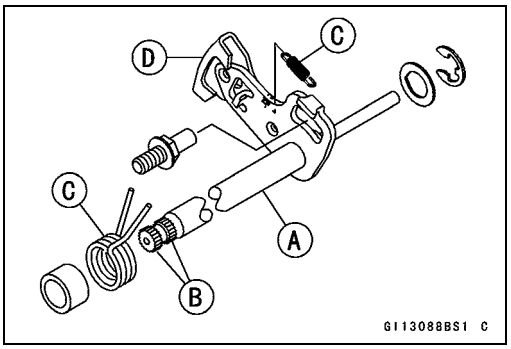


- Apply grease to the O-rings on the oil pipe ends.
- Apply a non-permanent locking agent to the oil pipe holder bolts and tighten them.

Torque - Oil Pipe Holder Bolts: 13 N·m (1.3 kgf·m, 113 in·lb)

External Shift Mechanism Inspection

- Examine the shift shaft [A] for any damage.
★If the shaft is bent, straighten or replace it.
★If the serration [B] are damaged, replace the shaft.
★If the springs [C] are damaged in any way, replace them.
★If the shift mechanism arm [D] is damaged in any way, replace the arm.



- Check the return spring pin [A] is not loose.
★If it is loose, unscrew it, apply a non-permanent locking agent to the threads, and tighten it.

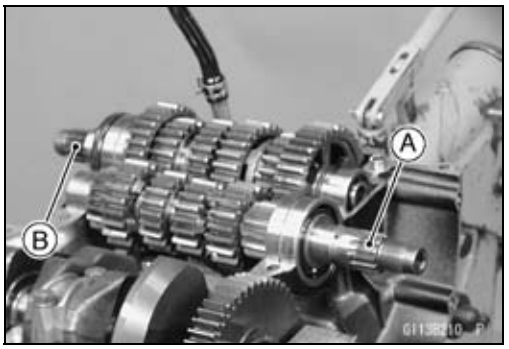
Torque - Shift Shaft Return Spring Pin: 29 N·m (3.0 kgf·m, 22 ft·lb)

- Check the gear positioning lever [B] and its spring for breaks or distortion.
★If the lever or spring are damaged in any way, replace them.
- Visually inspect the shift drum cam [C].
★If they are badly worn or if they show any damage, replace it.

Transmission

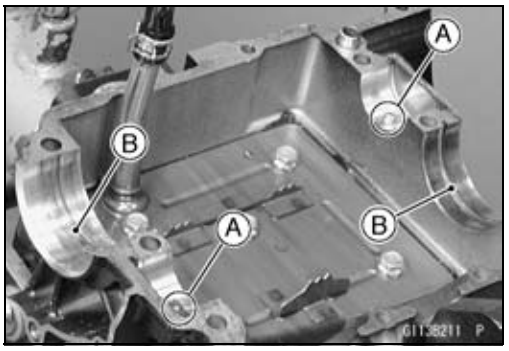
Transmission Shaft Removal

- Split the crankcase (see Crankcase Splitting).
- Remove the drive shaft [A] and output shaft [B].



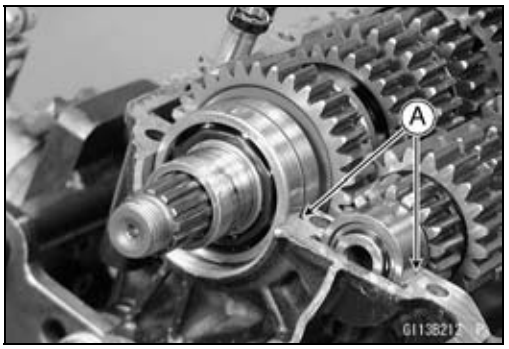
Transmission Shaft Installation

- Check to see that the set pins [A] and set rings [B] are in place.

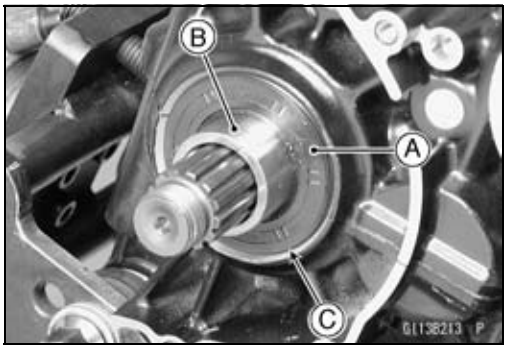


- Install the drive shaft and output shaft into the upper crankcase half.
- Apply engine oil to the bearings.

○The bearing set pins and rings must match properly with the holes or grooves in the bearing outer races. When they are properly matched, there is no clearance [A] between the crankcase and the bearing outer races.



- Assemble the crankcase.
- Press in the oil seal [A] onto collar [B] so that the surface of the oil seal is flush with the counterbore bottom surface [C] of the crankcase.

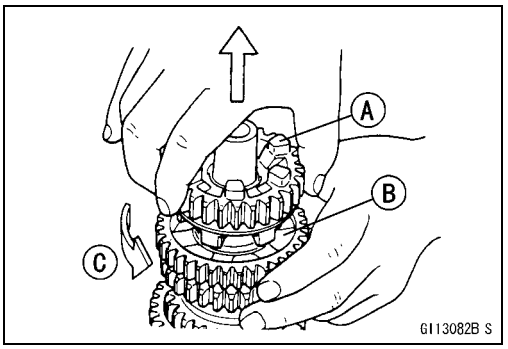


Transmission Shaft Disassembly

- Remove the transmission shafts (see Transmission Shaft Removal).
- Remove the circlips, disassemble the transmission shafts.
- The 5th gear [A] on the output shaft has three steel balls assembled into it for the positive neutral finder mechanism. Remove the 5th gear.

○Set the output shaft in a vertical position holding the 3rd gear [B].

○Spin the 5th gear quickly [C] and pull it off upward.

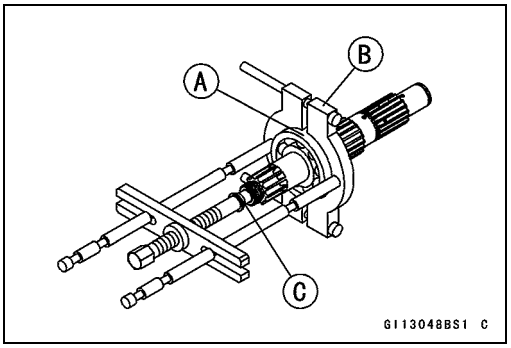


Transmission

- Remove the ball bearing [A] from each shafts.

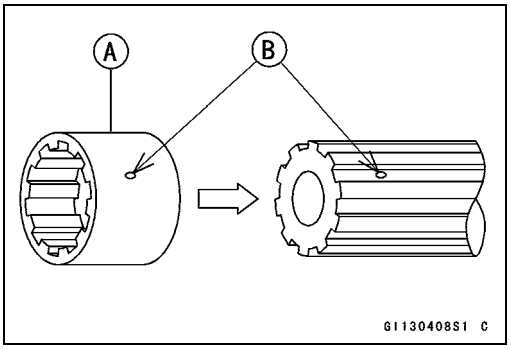
  Special Tools - Bearing Puller: 57001–135 [B]
  Bearing Puller Adapter: 57001–317 [C]

- Discard the bearing.

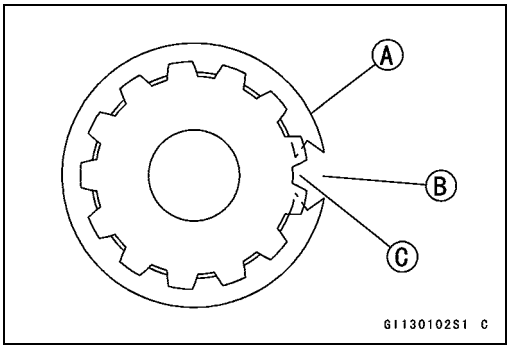


Transmission Shaft Assembly

- Apply engine oil to the bushings, ball bearings and shafts.
- Install the gear bushings [A] on the shaft with their holes [B] aligned.



- Replace any circlips removed with new ones.
- Install the circlips [A] so that the opening [B] is aligned with a spline groove [C].



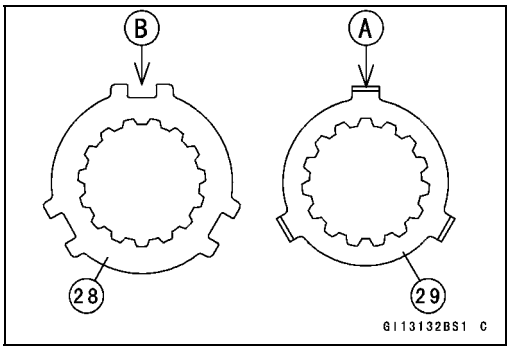
- The drive shaft gears can be recognized by size: the gear with the smallest diameter is 1st gear, and the largest one is 6th gear. Be sure that all parts are put back in the correct sequence and all circlips and washers are properly in place.
- Install the 3rd/4th gear onto the drive shaft with their oil holes aligned.
- Install the 6th gear bushing onto the drive shaft with their oil holes aligned.
- The output shaft gears can be recognized by size: the gear with the largest diameter is 1st gear, and the smallest one is 6th gear. Be sure that all parts are put back in the correct sequence and all circlips and washers are properly in place.
- Install the 5th and 6th gears onto the output shaft with their oil holes aligned.
- Install the 3rd/4th gear bushings onto the output shaft with their oil holes aligned.

Transmission

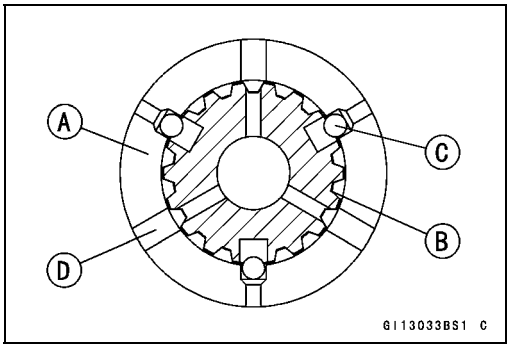
NOTE

○*When the toothed washers [28] [29] are assembled onto the output shaft, note the following.*

○*When the tangs [A] of the toothed washer [29] shall be assembled, they should be installed into the notch [B] of the toothed washer [28] (see Page 9–29).*



● Fit the steel balls into the 5th gear holes in the output shaft, aligning three oil holes [D].
5th Gear [A]
Output Shaft [B]
Steel Balls [C]



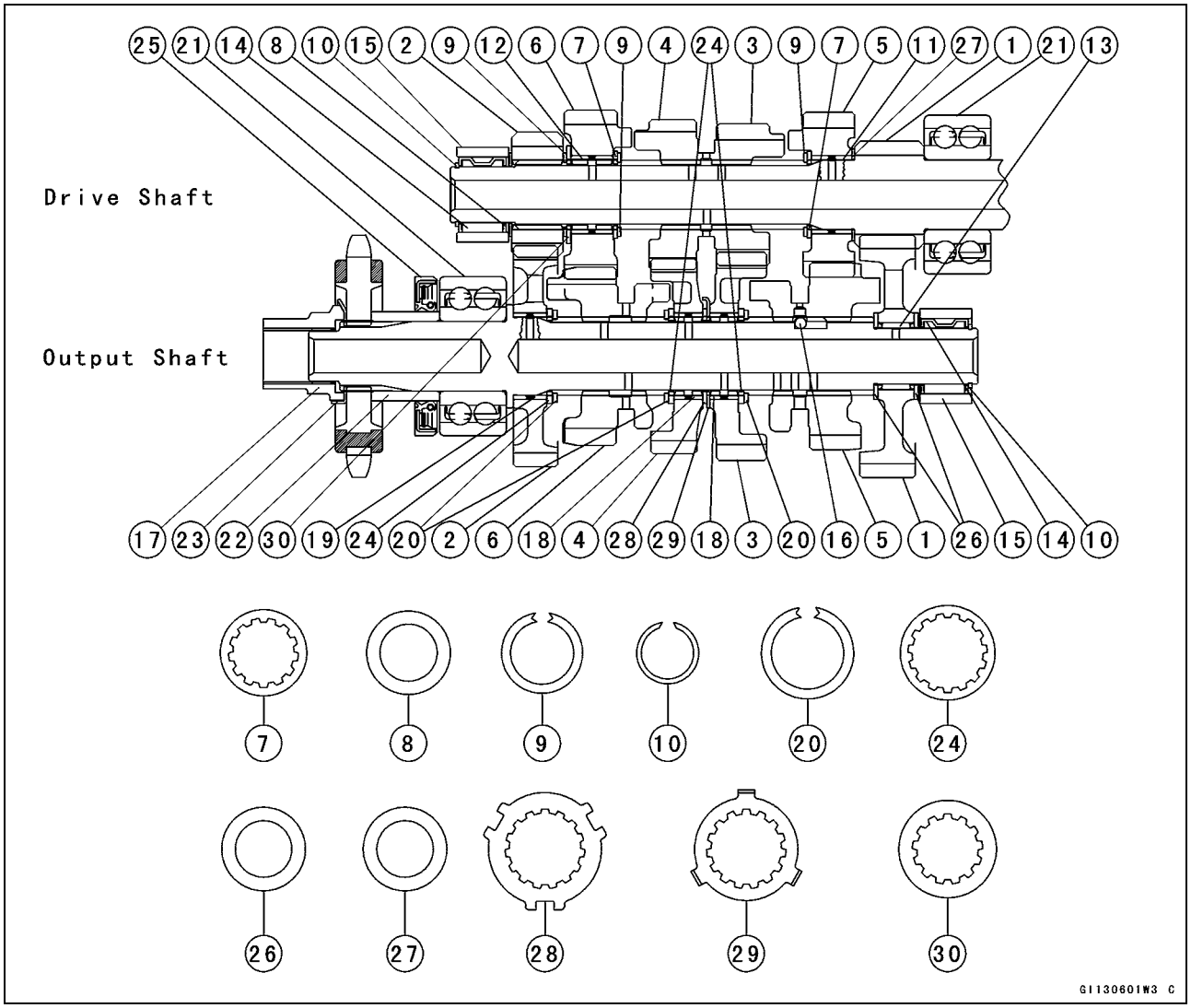
CAUTION

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

○After assembling the 5th gear with steel balls in place on the output shaft, check the ball-locking effect that the 5th gear doesn't come out of the output shaft when moving it up and down by hand.

● Check that each gear spins or slides freely on the transmission shafts without binding after assembly.

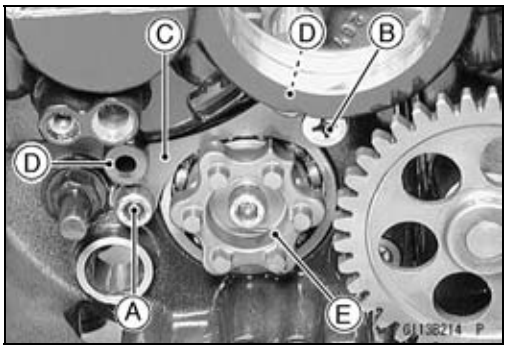
Transmission



1. 1st Gear
2. 2nd Gear
3. 3rd Gear
4. 4th Gear
5. 5th Gear
6. 6th (Top) Gear
7. Toothed Washer, ϕ31 mm (1.22 in.)
8. Thrust Washer, ϕ30 mm (1.18 in.)
9. Circlip
10. Circlip
11. Bushing
12. Bushing
13. Needle Bearing
14. Needle Bearing
15. Bearing Outer Race
16. Steel Ball
17. Nut
18. Bushing
19. Bushing
20. Circlip
21. Ball Bearing
22. Collar
23. Washer
24. Toothed Washer
25. Oil Seal
26. Thrust Washer, ϕ31 mm (1.22 in.)
27. Thrust Washer, ϕ33 mm (1.30 in.)
28. Toothed Washer
29. Toothed Washer
30. Toothed Washer, ϕ35 mm (1.38 in.)

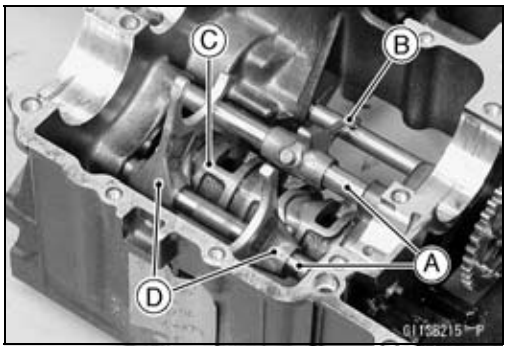
Transmission

Shift Drum and Fork Removal



- Remove:
  Lower Crankcase Half (see Crankcase Splitting)
  Transmission Shafts
  External Shift Mechanism (see External Shift Mechanism Removal)
  Bolt [A] and Screw [B]
  Shift Drum Bearing Holder [C]
- Pull out the shift rods [D], and take off the shift forks.
- Pull out the shift drum [E].

Shift Drum and Fork Installation



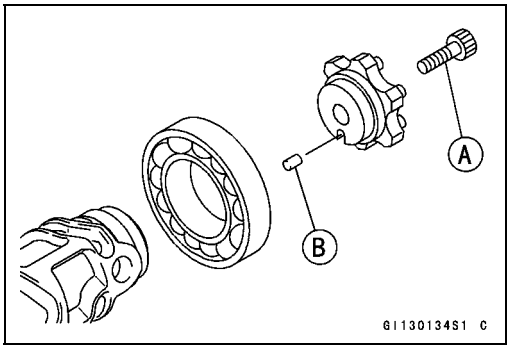
- Install the shift rods [A], noting the groove position. The rods are identical.
- Position the one with shortest ears [B] on the drive shaft and place the pin in the center groove in the shift drum [C].

○The two forks [D] on the output shaft are identical.

- Install the forks so that its “266” and “267” side faces clutch side.
- Apply a non-permanent locking agent to the threads of the shift drum bearing holder bolt and screw, and tighten them.

Torque - Shift Drum Bearing Holder Bolt: 13 N·m (1.3 kgf·m, 113 in·lb)
Shift Drum Bearing Holder Screw: 5.4 N·m (0.55 kgf·m, 48 in·lb)

Shift Drum Disassembly



- Remove the shift drum (see Shift Drum and Fork Removal).
- While holding the shift drum with a vise, remove the shift drum cam holder bolt.
  Shift Drum Cam Holder Bolt [A]
  Dowel Pin [B]

Shift Drum Assembly

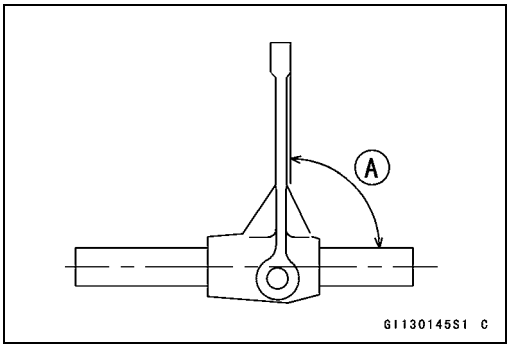
- Be sure to install the dowel pin.
- Apply a non-permanent locking agent to the threads of the shift drum cam holder bolt, and tighten it.

Torque - Shift Drum Cam Holder Bolt: 12 N·m (1.2 kgf·m, 104 in·lb)

Transmission

Shift Fork Bending

- Visually inspect the shift forks, and replace any fork that is bent. A bent fork could cause difficulty in shifting, or allow the transmission to jump out of gear when under power.
  90° [A]



Shift Fork/Gear Groove Wear

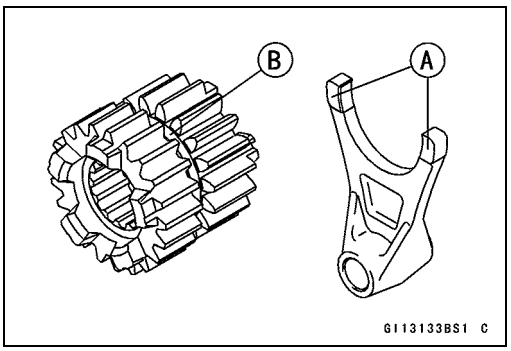
- Measure the thickness of the shift fork ears [A], and measure the width [B] of the gear grooves.

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

Shift Fork Ear Thickness
Standard: 5.9 ~ 6.0 mm (0.232 ~ 0.236 in.)
Service Limit: 5.8 mm (0.228 in.)

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

Gear Groove Width
Standard: 6.05 ~ 6.15 mm (0.238 ~ 0.242 in.)
Service Limit: 6.25 mm (0.246 in.)



Shift Fork Guide Pin/Drum Groove Wear

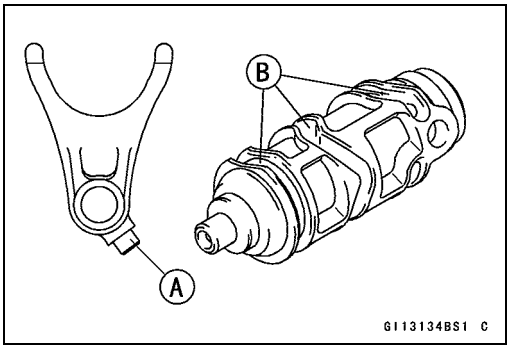
- Measure the diameter of each shift fork guide pin [A], and measure the width [B] of each shift drum groove.

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

Shift Fork Guide Pin Diameter
Standard: 6.9 ~ 7.0 mm (0.272 ~ 0.276 in.)
Service Limit: 6.8 mm (0.268 in.)

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

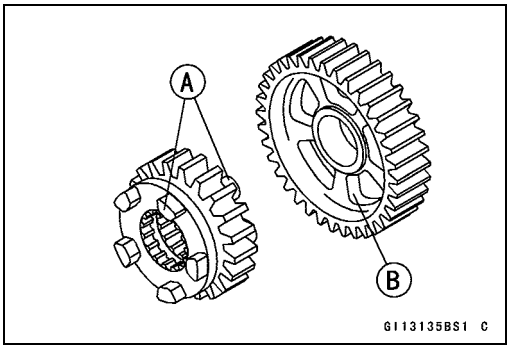
Shift Drum Groove Width
Standard: 7.05 ~ 7.20 mm (0.278 ~ 0.283 in.)
Service Limit: 7.3 mm (0.287 in.)



Gear Dog and Gear Dog Hole Damage

- Visually inspect the gear dogs [A] and gear dog holes [B].

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

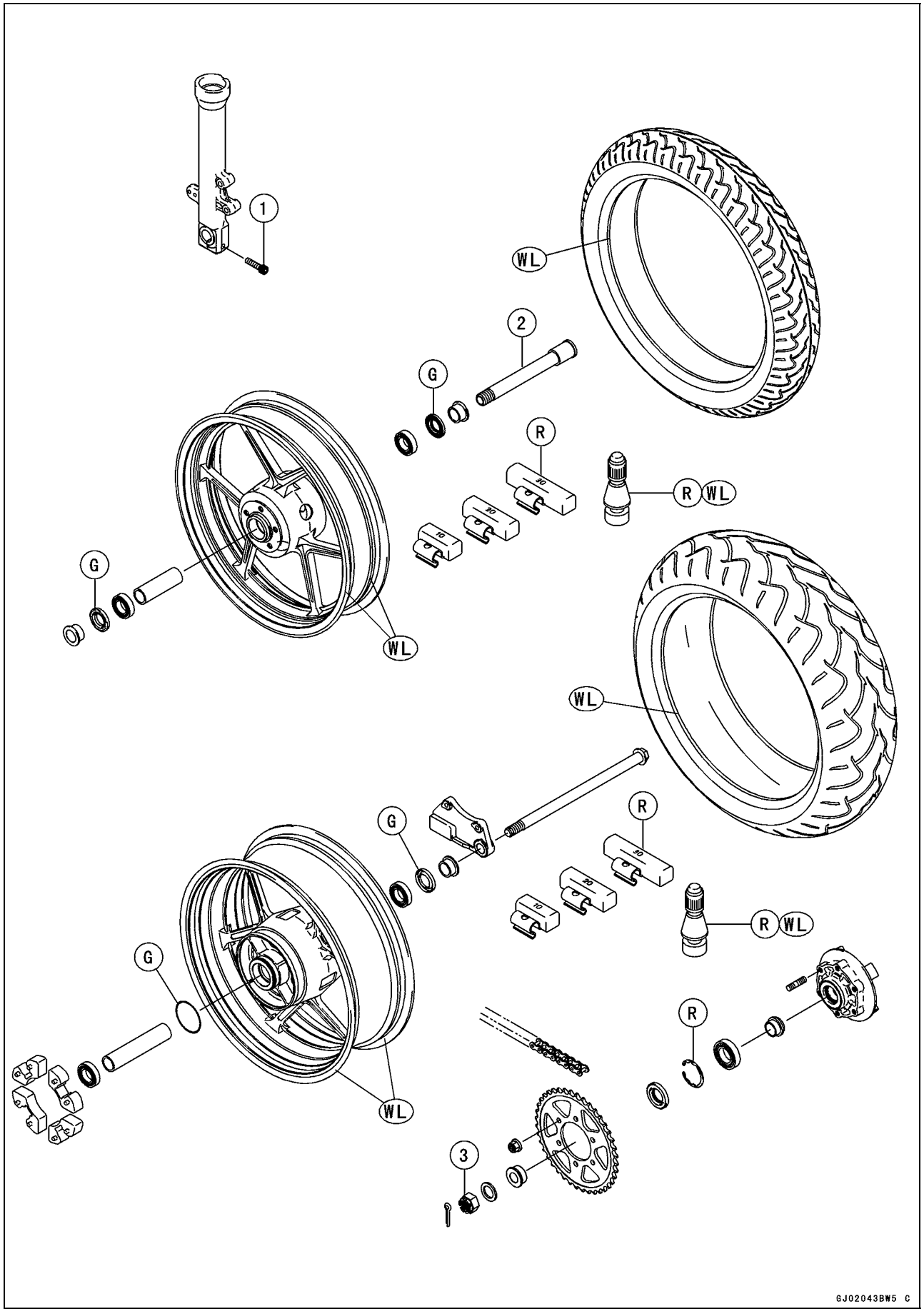


Wheels/Tires

Table of Contents

Exploded View 10-2
Specifications 10-4
Special Tools 10-5
Wheels (Rims) 10-6
Front Wheel Removal 10-6
Front Wheel Installation 10-6
Rear Wheel Removal 10-7
Rear Wheel Installation 10-8
Wheel Inspection 10-9
Axle Inspection 10-10
Balance Inspection 10-10
Balance Adjustment 10-10
Balance Weight Removal 10-10
Balance Weight Installation 10-11
Tires 10-12
Air Pressure Inspection 10-12
Tire Inspection 10-12
Tire Removal 10-12
Tire Installation 10-12
Tire Repair 10-14
Hub Bearing 10-15
Hub Bearing Removal 10-15
Hub Bearing Installation 10-15
Hub Bearing Inspection 10-15

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front axle clamp bolt	34	3.5	25	
2	Front axle	108	11	80	
3	Rear axle nut	108	11	80	

G: Apply grease.
R: Replacement Parts
WL: Apply soap and water solution or rubber lubricant.

Specifications

Item		Standard		Service Limit
Wheels (Rims):				
Rim runout:	Axial	– – –		TIR 0.5 mm (0.020 in.)
	Radial	– – –		TIR 0.8 mm (0.031 in.)
Axle runout/ 100 mm (3.94 in.)		TIR 0.05 mm (0.0020 in.) or less		TIR 0.2 mm (0.008 in.)
Wheel balance		10 g (0.35 oz.) or less		– – –
Balance weights		10 g (0.35 oz.), 20 g (0.71 oz.), 30 g (1.06 oz.)		– – –
Tires: Air pressure: (when cold)	Front	Up to 180 kg (397 lb) load:	250 kPa (2.5 kgf/cm², 36 psi)	– – –
	Rear		290 kPa (2.9 kgf/cm², 42 psi)	– – –
Tread depth:	Front	BRIDGESTONE	3.4 mm (0.13 in.)	1 mm (0.04 in.) 1.6 mm (0.06 in.) (AT, CH, DE)
	Rear	BRIDGESTONE	5.8 mm (0.23 in.)	Up to 130 km/h (80 mph): 2 mm (0.08 in.) Over 130 km/h (80 mph) : 3 mm (0.12 in.)
Standard tires:		Make, Type		Size
	Front	BRIDGESTONE, BATTLAX BT-019F RADIAL E		120/70 ZR17 M/C (58 W)
	Rear	BRIDGESTONE, BATTLAX BT-012R RADIAL E		180/55 ZR17 M/C (73 W)

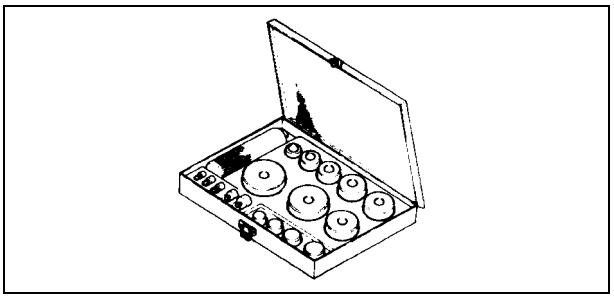
⚠ WARNING

Use the same manufacturer's tires on both front and rear wheels.

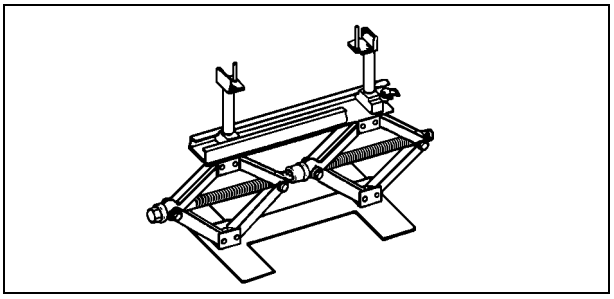
AT: Republic of Austria
CH: Swiss Confederation
DE: Federal Republic of Germany

Special Tools

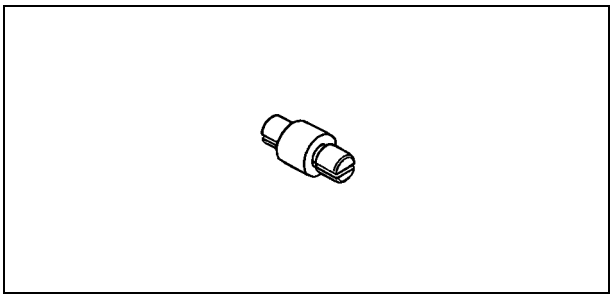
Bearing Driver Set:
57001–1129



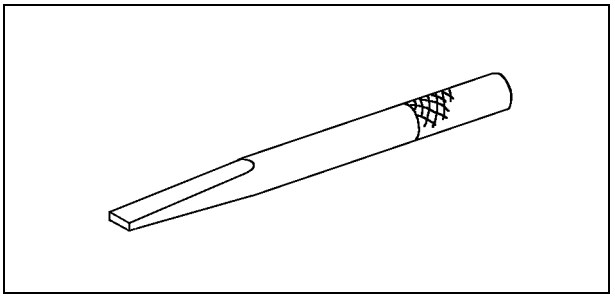
Jack:
57001–1238



Bearing Remover Head, ϕ20 × ϕ22:
57001–1293



Bearing Remover Shaft, ϕ13:
57001–1377

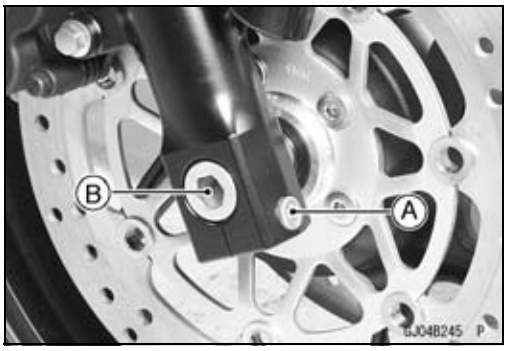


Wheels (Rims)

Front Wheel Removal

- Remove:
  Brake Caliper Mounting Bolts [A]

- Loosen the front axle clamp bolt [A].
- Remove the front axle [B].



- Raise the front wheel off the ground.
  Special Tool - Jack: 57001–1238
- Pull out the axle to the right and drop the front wheel out of the forks.

CAUTION

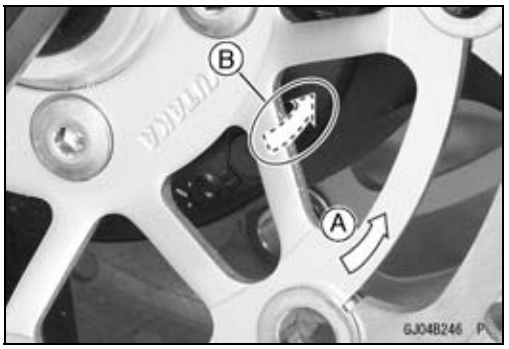
Do not lay the wheel down on one of the discs. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

Front Wheel Installation

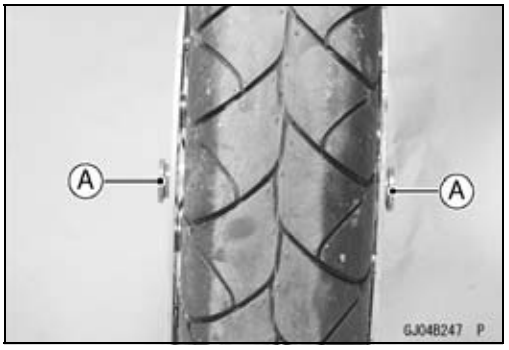
NOTE

○*The direction of the wheel rotation [A] is shown by an arrow [B] on the wheel spoke.*

- Check the wheel rotation mark on the front wheel and install it.



- Fit the collars [A] on the both sides of the hub.



Wheels (Rims)

- Tighten the front axle.

  Torque - Front Axle: 108 N·m (11 kgf·m, 80 ft·lb)

- Before tightening the clamp bolt on the right front fork leg, pump the front fork up and down 4 or 5 times to allow the right front fork leg to seat on the front axle.

NOTE

○*Put a block in front of the front wheel to stop moving.*

- Tighten the axle clamp bolt [A].

  Torque - Front Axle Clamp Bolt: 34 N·m (3.5 kgf·m, 25 ft·lb)

- Install the front brake calipers (see Brakes chapter).
- Check the front brake effectiveness (see Brakes chapter).

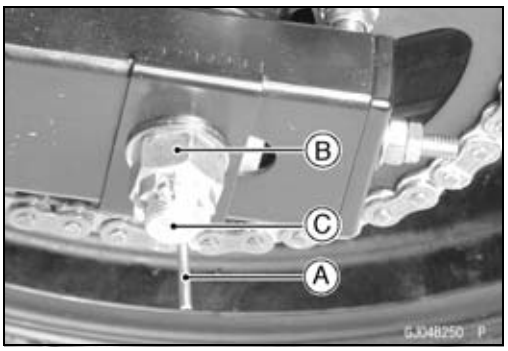
⚠ WARNING

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.

Rear Wheel Removal

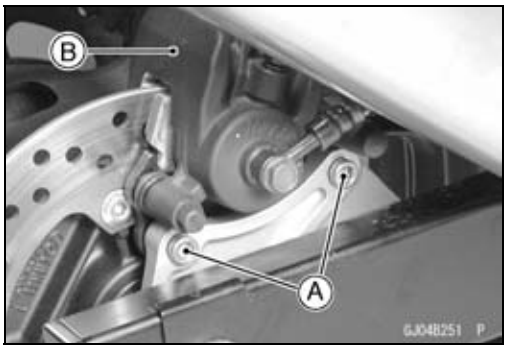
- Using the stand [A], raise the rear wheel off the ground.

- Remove:
  Cotter Pin [A]
  Axle Nut [B]
  Axle [C]



Wheels (Rims)

● Remove:
Caliper Mounting Bolts [A]
Caliper [B]



● Remove the drive chain [A] from the rear sprocket toward the left.
● Move the rear wheel back and remove the wheel from the rear caliper.
● Remove the rear wheel.

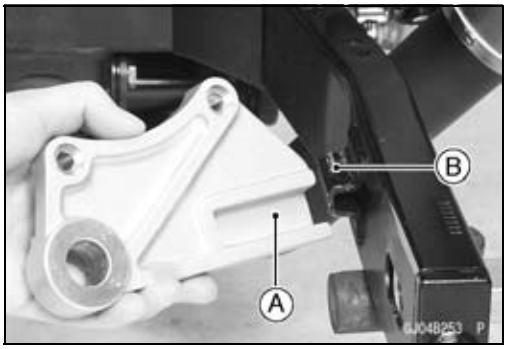
CAUTION

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 that the disc does not touch the ground.

Rear Wheel Installation

● Install the caliper bracket [A] onto the swingarm stop [B].
● Engage the drive chain with the rear sprocket.
● Insert the axle from the right side of the wheel, and tighten the axle nut.

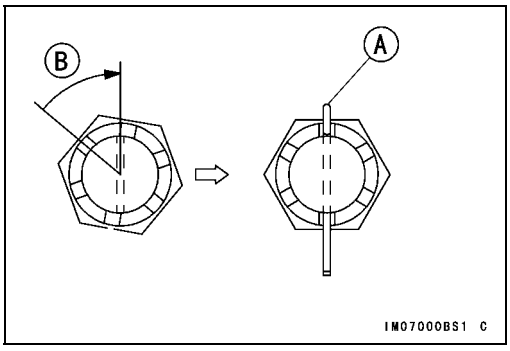
Torque - Rear Axle Nut: 108 N·m (11 kgf·m, 80 ft·lb)



● Insert a new cotter pin [A].

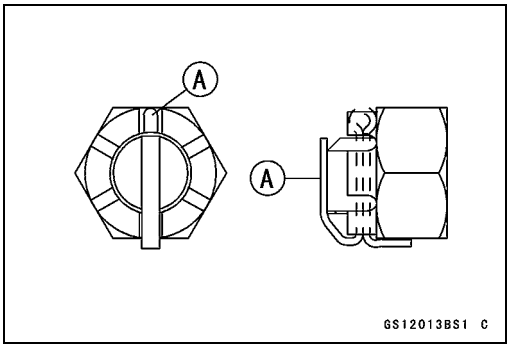
NOTE

○*When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axle, tighten the nut clockwise [B] up to next alignment.*
○*It should be within 30 degree.*
○*Loosen once and tighten again when the slot goes past the nearest hole.*



Wheels (Rims)

● Bend the cotter pin [A] over the nut.



⚠ WARNING

If the rear axle nut is not securely tightened or the cotter pin is not installed, an unsafe riding condition may result.

● Adjust the drive chain slack after installation (see Final Drive chapter).
● Check the rear brake effectiveness.

⚠ WARNING

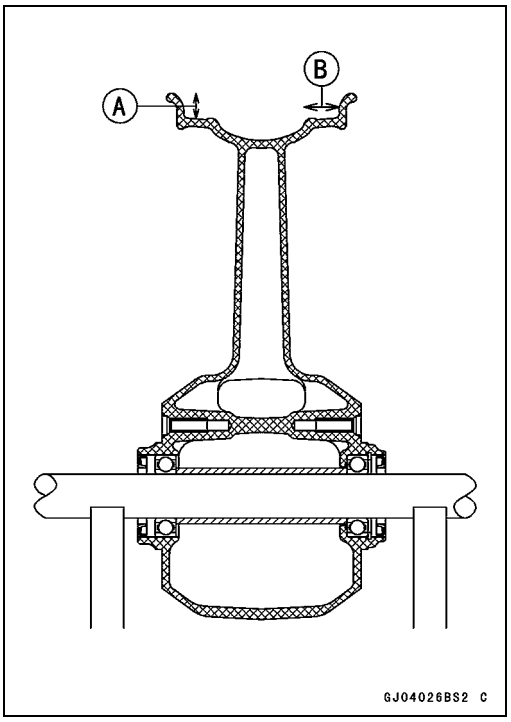
Do not attempt to drive the motorcycle until a full brake pedal is obtained by pumping the brake pedal until the pads are against the disc. The brake will not function on the first application of the pedal if this is not done.

Wheel Inspection

● Raise the front/rear wheel off the ground.

Special Tool - Jack: 57001–1238

● Spin the wheel lightly, and check for roughness or binding.
★If roughness or binding is found, replace the hub bearings.
● Inspect the wheel for small cracks, dents, bending, or warp.
★If there is any damage to the wheel, replace the wheel.
● Remove the wheel, and support it without the tire by the axle.
● Measure the rim runout, radial [A] and axial [B], with a dial gauge.
★If rim runout exceeds the service limit, check the hub bearings.
★If the problem is not due to the bearings, replace the wheel.



Rim Runout

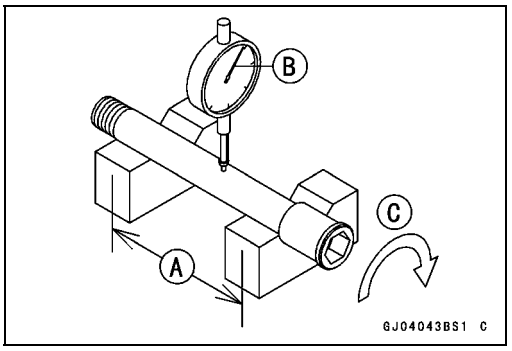
Service Limit:	**Axial**	**TIR 0.5 mm (0.020 in.)**
	Radial	**TIR 0.8 mm (0.031 in.)**

⚠ 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.

Wheels (Rims)

Axle Inspection



- Remove the front and rear axles.
- Visually inspect the front and rear axle for damages.

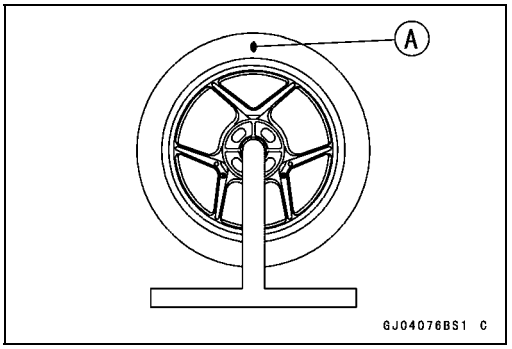
★If the axle is damaged or bent, replace it.

- Place the axle in V blocks that are 100 mm (3.94 in.) [A] apart, and set a dial gauge [B] on the axle at a point halfway between the blocks. Turn [C] the axle to measure the runout. The difference between the highest and lowest dial readings is the amount of runout.

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

Axle Runout/100 mm (3.94 in.)
Standard: TIR 0.05 mm (0.0020 in.) or less
Service Limit: TIR 0.2 mm (0.008 in.)

Balance Inspection

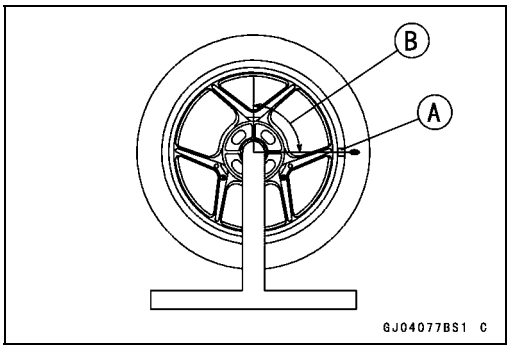


- Remove the wheel.
- Support the wheel so that it can be spun freely.
- Spin the wheel lightly, and mark [A] the wheel at the top when the wheel stops.

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

★If the wheel always stops in one position, adjust the wheel balance.

Balance Adjustment

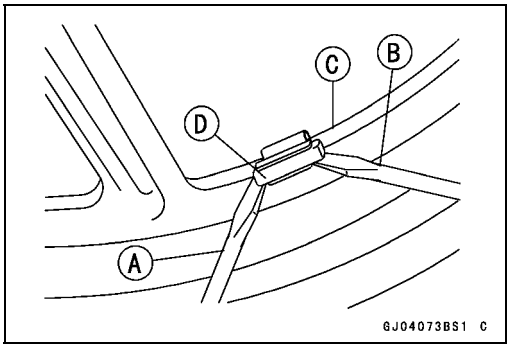


- If the wheel always stops in one position, provisionally attach a balance weight [A] on the rim at the marking using adhesive tape.
- Rotate the wheel 1/4 turn [B], and see whether or not the wheel stops in this position. If it does, the correct balance weight is being used.

★If the wheel rotates and the weight goes up, replace the weight with the next heavier size. If the wheel rotates and the weight goes down, replace the weight with the next lighter size. Repeat these steps until the wheel remains at rest after being rotated 1/4 turn.

- Rotate the wheel another 1/4 turn and then another 1/4 turn to see if the wheel is correctly balanced.
- Repeat the entire procedure as many times as necessary to achieve correct wheel balance.
- Permanently install the balance weight.

Balance Weight Removal



- Insert a standard screwdrivers [A] [B] between the rib [C] and the weight [D] as shown.
- Pry the weight with two screwdrivers and remove the balance weight.

Wheels (Rims)

CAUTION

When removing the balance weight, do not touch the brake disc. The disc could be damaged.
Do not tap the screwdrivers. The rim could be damaged.

Balance Weight Installation

● Check if the weight portion has any play on the clip.
★If it does, discard it.

⚠ WARNING

If the balance weight has any play on the rim, the clip of the weight have been stretched. Replace the loose balance weight.
Do not reuse used balance weight.
Unbalanced wheels can create an unsafe riding condition.

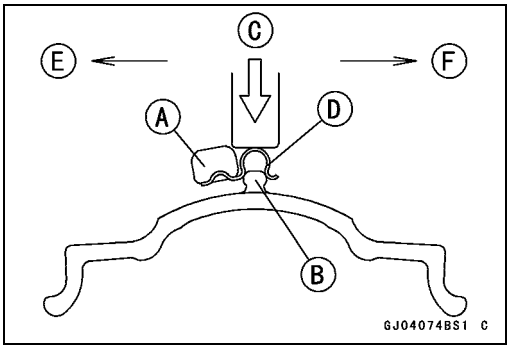
Balance Weight

Part Number	Weight
41075–0007	10 g (0.35 oz.)
41075–0008	20 g (0.71 oz.)
41075–0009	30 g (1.06 oz.)

NOTE

○*Balance weights are available from Kawasaki dealers in 10, 20, and 30 grams (0.35, 0.71, and 1.06 oz.) sizes. An imbalance of less than 10 grams (0.35 oz.) will not usually affect running stability.*
○*Do not use four or more balance weight (more than 90 gram, 3.17 oz.). If the wheel requires an excess balance weight, disassemble the wheel to find the cause.*

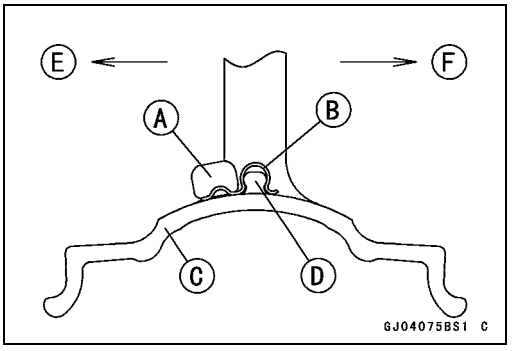
● Slip the balance weight [A] onto the rib [B] by pushing or lightly hammering [C] the clip [D].
Left Side [E]
Right Side [F]



CAUTION

When installing the balance weight, do not touch the brake disc. The disc could be damaged.

● Check that the weight [A] and clip [B] are fully seated on the rim [C] and that the clip is hooked over the rib [D].
Left Side [E]
Right Side [F]



⚠ WARNING

If the balance weight has any play on the rim, the clip of the weight has been stretched. Replace the loose balance weight.
Do not reuse balance weight.
Unbalanced wheels can create an unsafe riding condition.

Tires

Air Pressure Inspection

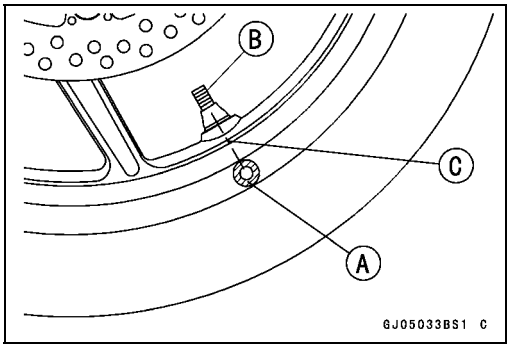
- Refer to the Air Pressure Inspection in the Periodic Maintenance chapter.

Tire Inspection

- Refer to the Tire Wear Inspection in the Periodic Maintenance chapter.

Tire Removal

- Remove:
  Wheel (see Front Wheel Removal, Rear Wheel Removal)
  Disc(s)
  Valve Core (let out the air)
- To maintain wheel balance, mark the valve stem position on the tire with chalk so that the tire can be reinstalled in the same position.
  Chalk Mark or Yellow Mark [A]
  Air Valve [B]
  Align [C]



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

CAUTION

Never lubricate with engine oil or petroleum distillates because they will deteriorate the tire.

- Remove the tire from the rim using a suitable commercially available tire changer.

NOTE

○*The tires cannot be removed with hand tools because they fit the rims too tightly.*

Tire Installation

⚠ WARNING

Use the same manufacturer's tires on both front and rear wheels.

- Inspect the rim and tire, and replace them if necessary.
- Clean the sealing surfaces of the rim and tire, and smooth the sealing surfaces of the rim with a fine emery cloth if necessary.
- Remove the air valve and discard it.

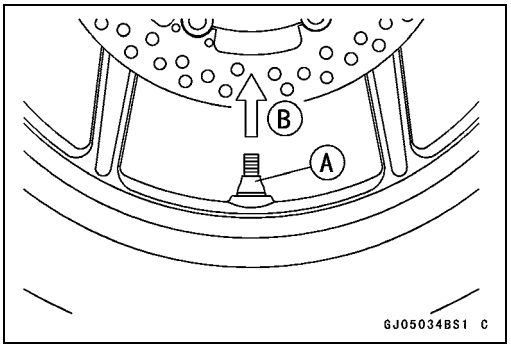
CAUTION

Replace the air valve whenever the tire is replaced. Do not reuse the air valve.

Tires

● Install a new valve in the rim.

○Remove the valve cap, lubricate the stem seal with a soap and water solution or rubber lubricant, and pull [B] the valve stem [A] through the rim from the inside out until it snaps into place.



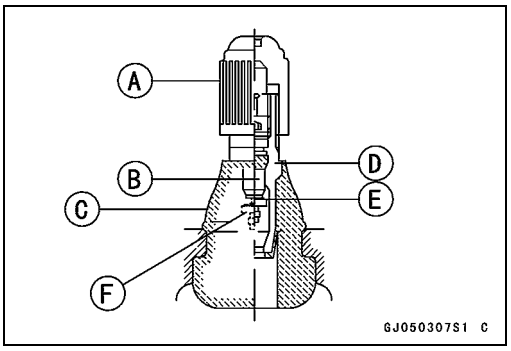
CAUTION

Do not use engine oil or petroleum distillates to lubricate the stem because they will deteriorate the rubber.

● Apply a soap and water solution, or rubber lubricant to the rim flange and tire beads.

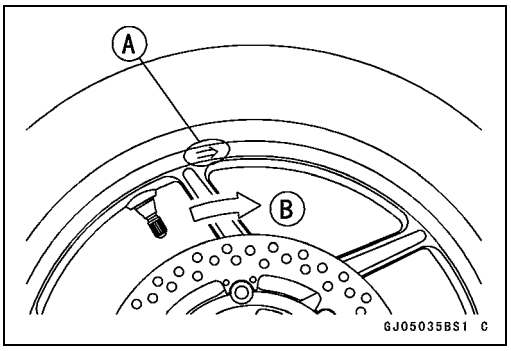
○The air valve is shown in the figure.

Valve Cap [A]
Valve Core [B]
Stem Seal [C]
Valve Stem [D]
Valve Seat [E]
Valve Opened [F]



● Check the tire rotation mark on the front and rear tires and install them on the rim accordingly.

Tire Rotation Mark [A]
Rotation Direction [B]

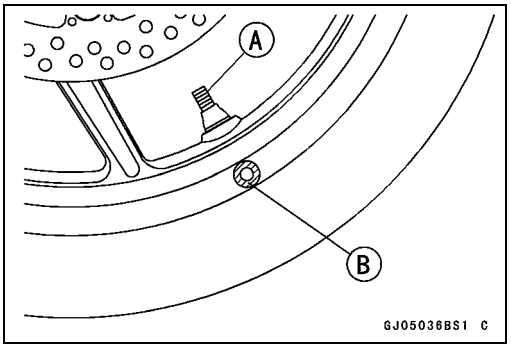


● Position the tire on the rim so that the valve [A] align with the tire balance mark [B] (the chalk mark made during removal, or the yellow paint mark on a new tire).

● Install the tire bead over the rim using a suitable commercially available tire changer.

● Lubricate the tire beads and rim flanges with a soap and water solution or rubber lubricant to help seat the tire beads in the sealing surfaces of the rim while inflating the tire.

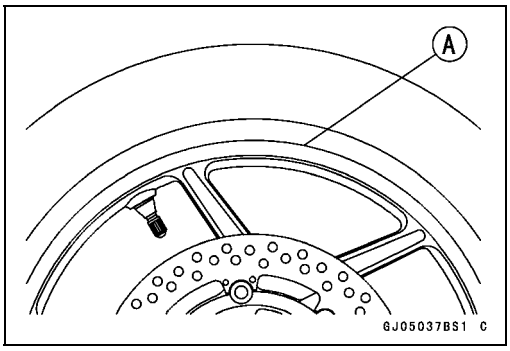
● Center the rim in the tire beads, and inflate the tire with compressed air until the tire beads seat in the sealing surfaces.



⚠ WARNING

Be sure to install the valve core whenever inflating the tire, and do not inflate the tire to more than 400 kPa (4.0 kgf/cm², 57 psi). Overinflation can explode the tire with possibility of injury and loss of life.

Tires



- Check to see that the rim lines [A] on both sides of the tire sidewalls are parallel with the rim flanges.

★If the rim flanges and tire sidewall rim lines are not parallel, remove the valve core.

- Lubricate the rim flanges and tire beads.
- Install the valve core and inflate the tire again.
- After the tire beads seat in the rim flanges, check for air leakage.

○Inflate the tire slightly above standard inflation.

○Use a soap and water solution or submerge the tire, and check for bubbles that would indicate leakage.

- Adjust the air pressure to the specified pressure (see Tire Inspection).
- Install the brake disc(s) so that the marked side faces out (see Brakes chapter).
- Adjust the wheel balance (see Balance Adjustment).
- Install the air valve cap.

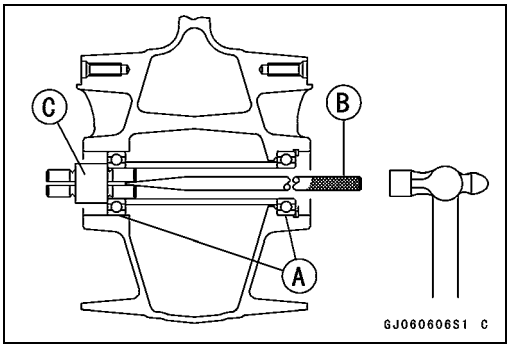
Tire Repair

Currently two types of repair for tubeless tires have come into wide use. One type is called a temporary (external) repair which can be carried out without removing the tire from the rim, and the other type is called permanent (internal) repair which requires tire removal. It is generally understood that higher running durability is obtained by permanent (internal) repairs than by temporary (external) ones. Also, permanent (internal) repairs have the advantage of permitting a thorough examination for secondary damage not visible from external inspection of the tire. For these reasons, Kawasaki does not recommend temporary (external) repair. Only appropriate permanent (internal) repairs are recommended. Repair methods may vary slightly from make to make. Follow the repair methods indicated by the manufacturer of the repair tools and materials so that safe results can be obtained.

Hub Bearing

Hub Bearing Removal

- Remove the wheel, and take out the following.
  Collars
  Coupling (out of rear hub)
  Grease Seals
  Circlip
- Use the bearing remover to remove the hub bearings [A].



CAUTION

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

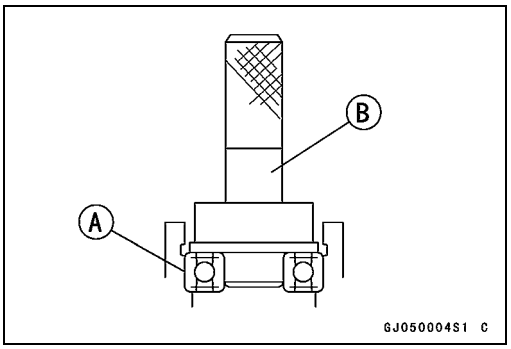
Special Tools - Bearing Remover Head, ϕ20 × ϕ22: 57001–1293 [C]
Bearing Remover Shaft, ϕ13: 57001–1377 [B]

Hub Bearing Installation

- Before installing the wheel bearings, blow any dirt or foreign particles out of the hub with compressed air to prevent contamination of the bearings.
- Replace the bearings with new ones.

NOTE

○*Install the bearings so that the marked side faces out.*



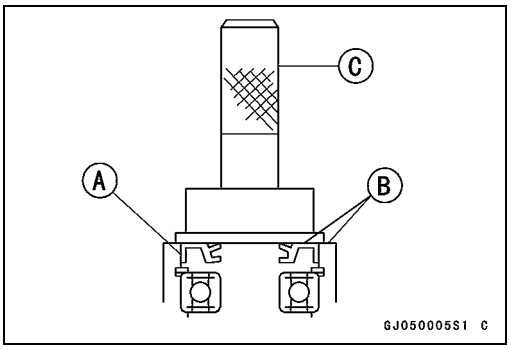
- Install the bearings by using the bearing driver set which does not contact the bearing inner race.
- Press in each bearing [A] right until they are bottomed.

Special Tool - Bearing Driver Set: 57001–1129 [B]

- Replace the circlip with a new one.
- Replace the grease seals with new ones.
- Press in the grease seals [A] so that the seal surface flush [B] with the end of the hole.

○Apply high temperature grease to the grease seal lips.

Special Tool - Bearing Driver Set: 57001–1129 [C]

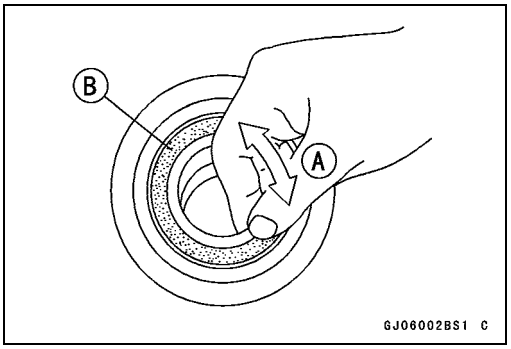


Hub Bearing Inspection

Since the hub bearings are made to extremely close tolerances, the clearance can not normally be measured.

NOTE

○*Do not remove any bearings for inspection. If any bearings are removed, they will need to be replaced with new ones.*



- Turn each bearing in the hub back and forth [A] while checking for plays, roughness, or binding.

★If bearing play, roughness, or binding is found, replace the bearing.

- Examine the bearing seal [B] for tears or leakage.

★If the seal is torn or is leaking, replace the bearing.

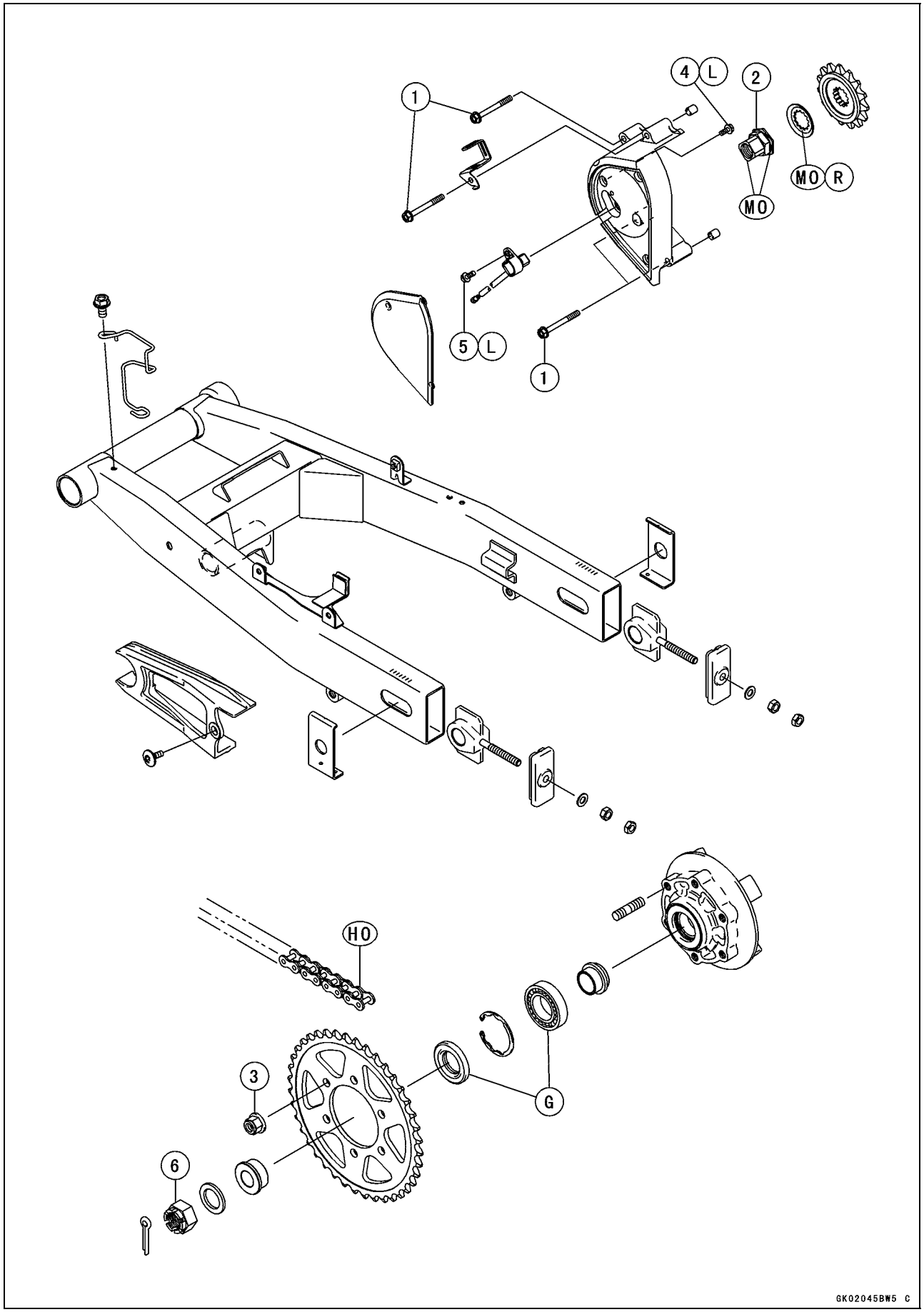
Final Drive

Table of Contents

Exploded View 11-2
Specifications 11-4
Special Tools 11-5
Drive Chain 11-6
- Drive Chain Slack Inspection 11-6
- Drive Chain Slack Adjustment 11-6
- Drive Chain Wear Inspection 11-6
- Drive Chain Lubrication 11-6
- Drive Chain Removal 11-6
- Drive Chain Installation 11-6
- Drive Chain Replacement 11-7

Sprocket, Coupling 11-10
- Engine Sprocket Removal 11-10
- Engine Sprocket Installation 11-10
- Rear Sprocket Removal 11-11
- Rear Sprocket Installation 11-11
- Coupling Bearing Removal 11-11
- Coupling Bearing Installation 11-11
- Coupling Installation 11-12
- Coupling Bearing Inspection 11-12
- Coupling Bearing Lubrication 11-12
- Coupling Damper Inspection 11-12
- Sprocket Wear Inspection 11-13
- Rear Sprocket Warp Inspection 11-13

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Engine sprocket cover bolts	9.8	1.0	87 in·lb	
2	Engine sprocket nut	125	13	92	MO
3	Rear sprocket nuts	59	6.0	43	
4	Speed sensor cover bolts	6.9	0.70	61 in·lb	L
5	Speed sensor bolt	6.9	0.70	61 in·lb	L
6	Rear axle nut	108	11	80	

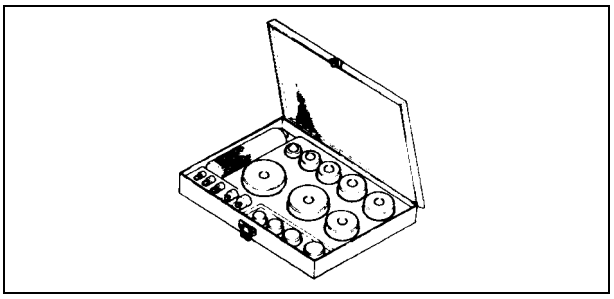
G: Apply grease.
HO: Apply heavy oil.
L: Apply a non-permanent locking agent.
MO: Apply molybdenum disulfide oil.
R: Replacement Parts

Specifications

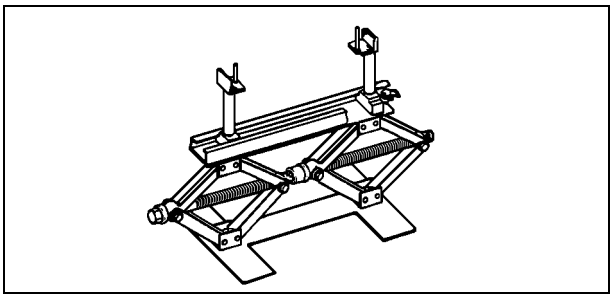
Item	Standard	Service Limit
Drive Chain:		
Chain slack	25 ~ 35 mm (1.0 ~ 1.4 in.)	– – –
20-link length	317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)	323 mm (12.7 in.)
Standard chain		
Make	ENUMA	– – –
Type	EK520MVXL	– – –
Link	112 links	– – –
Sprockets:		
Rear sprocket warp	0.4 mm (0.016 in.) or less	0.5 mm (0.020 in.)

Special Tools

Bearing Driver Set:
57001–1129



Jack:
57001–1238



Drive Chain

Drive Chain Slack Inspection

- Refer to the Drive Chain Slack Inspection in the Periodic Maintenance chapter.

Drive Chain Slack Adjustment

- Refer to the Drive Chain Slack Adjustment in the Periodic Maintenance chapter.

Drive Chain Wear Inspection

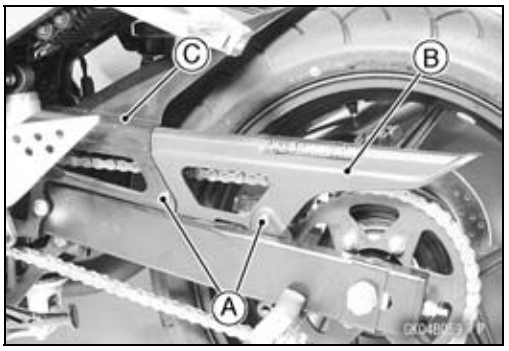
- Refer to the Drive Chain Wear Inspection in the Periodic Maintenance chapter.

Drive Chain Lubrication

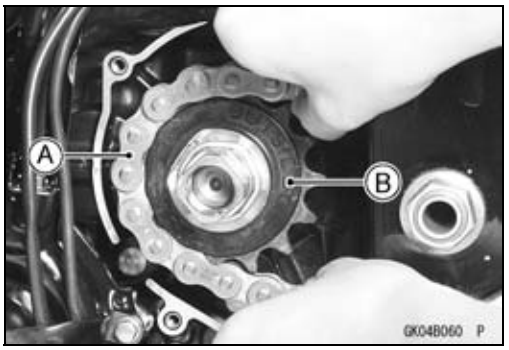
- Refer to the Drive Chain Lubrication in the Periodic Maintenance chapter.

Drive Chain Removal

- Remove:
  Rear Wheel (see Wheels/Tires chapter)
  Chain Cover Screws [A]
  Chain Cover [B]
  Mud Guard [C] (see Frame chapter)
  Swingarm (see Suspension chapter)
  Engine Sprocket Cover (see this chapter)



- Disengage the drive chain [A] from the engine sprocket [B], and take it off the chassis.



Drive Chain Installation

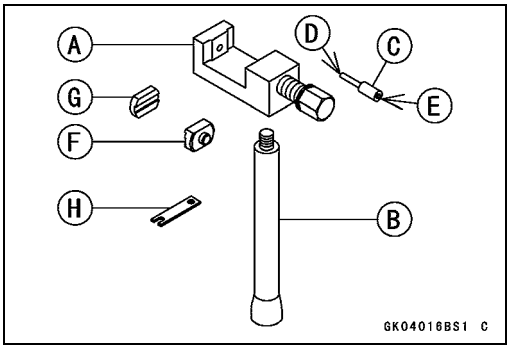
- Engage the drive chain to the engine sprocket.
- Install:
  Swingarm (see Suspension chapter)
  Rear Wheel (see Wheels/Tires chapter)
  Engine Sprocket Cover (see this chapter)
  Mud Guard (see Frame chapter)
  Chain Cover
- Adjust the chain slack after installing the chain (see Drive Chain Slack Adjustment).

Drive Chain

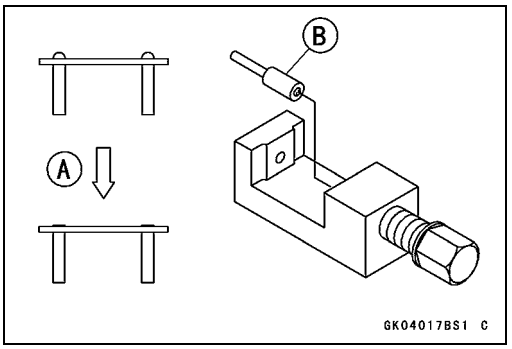
Drive Chain Replacement

● Remove:
Chain Cover (see Drive Chain Removal)
Engine Sprocket Cover (see Engine Sprocket Removal)

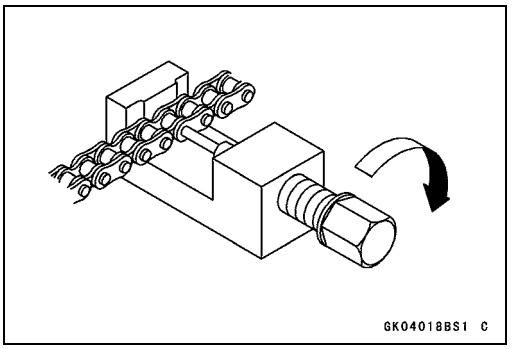
EK JOINT TOOL #50
Body [A]
Handlebar [B]
Cutting & Riveting Pin [C]
For Cutting [D]
For Riveting [E]
Plate Holder (A) [F]
Plate Holder (B) [G]
Gauge [H]



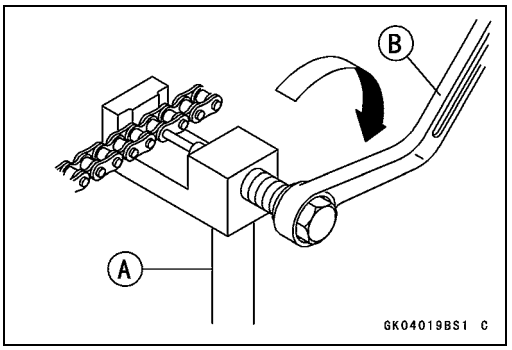
● Grind [A] pin head to make it flat.
● Set cutting & riveting pin [B] as shown.



● Screw pin holder until it touches chain pin.
● Be sure that cutting pin hits center of chain pin.

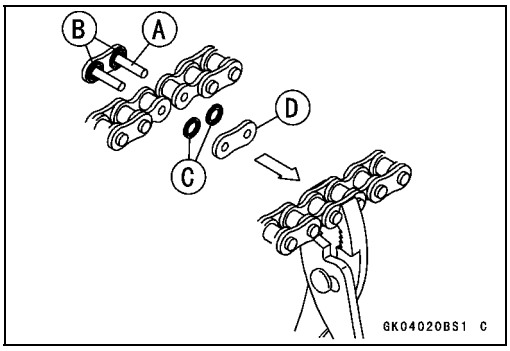


● Screw handlebar [A] into body.
● Turn pin holder with wrench [B] clockwise to extract chain pin.

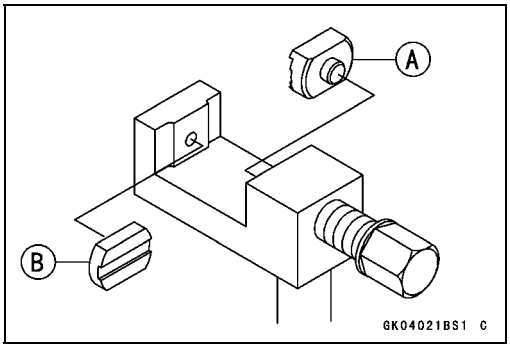


Drive Chain

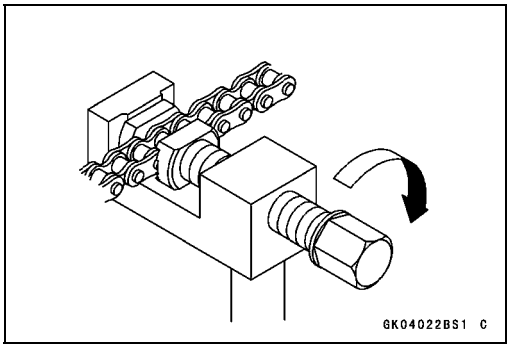
- Replace the link pin, link plate and grease seals.
- Apply grease to the link pins [A] and grease seals [B] [C].
- Engage the drive chain on the engine and rear sprockets.
- Insert the link pins in the drive chain ends.
- Install the grease seals [C].
- Install the link plate so that the mark [D] faces out.
- Push link plate by hand or plier to fix it.
- In case of O-ring chain, be sure to set O-rings correctly.



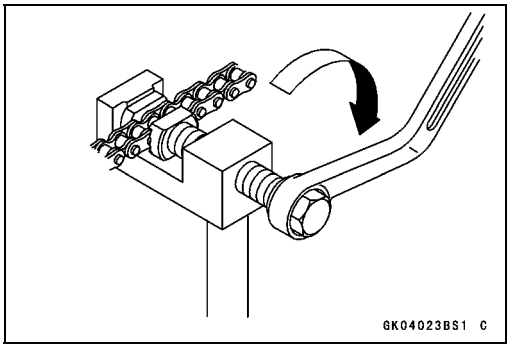
- Set plate holder (A) [A] and plate holder (B) [B] on the body.



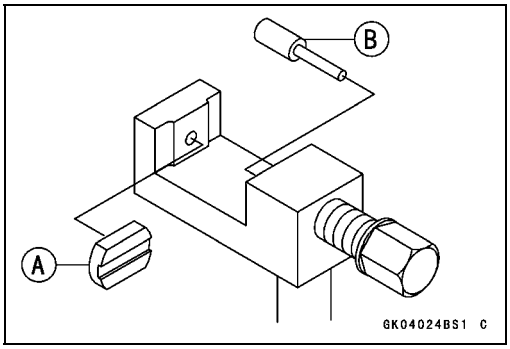
- Fit plate holder (A) to link plate.
- Turn pin holder by hand until plate holder (B) touches the other link plate.



- Turn pin holder by wrench clockwise until two pins of link come into groove of plate holder (A).
- Take off plate holder.

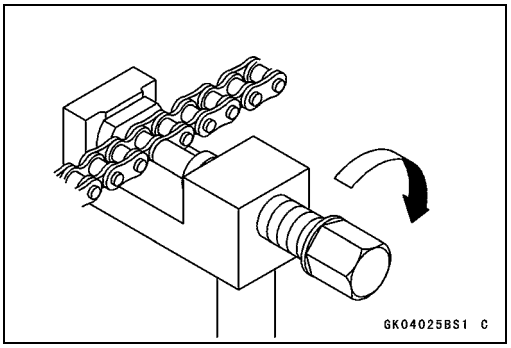


- Set plate holder (B) [A] and cutting & riveting pin [B] as shown.

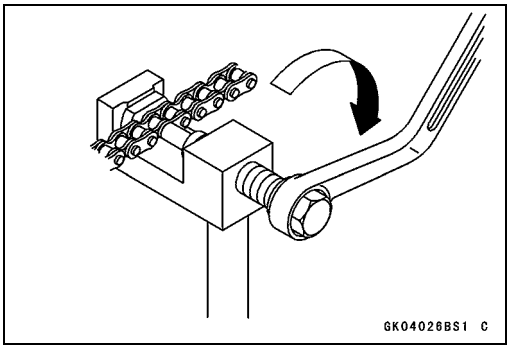


Drive Chain

- Turn pin holder until riveting pin touches link pin.



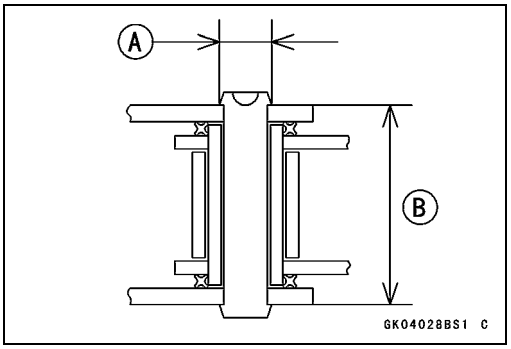
- Turn wrench clockwise until tip of riveting pin hits of link pin.
- Rivet it.
- Some work for the other link pin.



- After staking, check the staked area of the link pin for cracks.
- Measure the outside diameter [A] of the link pin and link plates width [B].

Link Pin Outside Diameter
Standard: 5.6 ~ 6.0 mm (0.22 ~ 0.24 in.)

Link Plates Outside Width
Standard: 17.45 ~ 17.60 mm (0.687 ~ 0.693 in.)



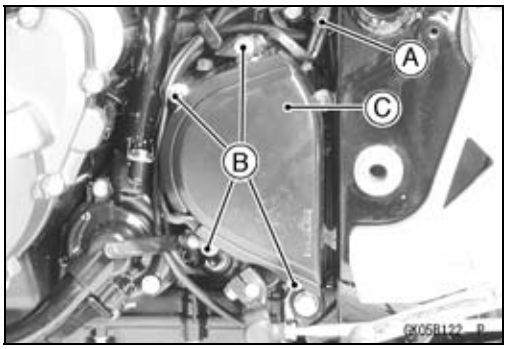
★If the reading exceeds the specified length, cut and rejoin the chain again.

- Check:
  Movement of the Rollers
  Chain Slack

Sprocket, Coupling

Engine Sprocket Removal

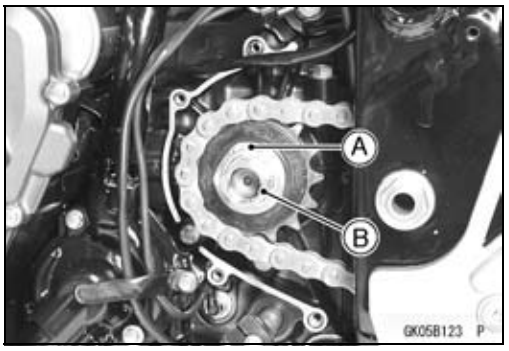
- Remove:
  Speed Sensor Connector [A]
  Engine Sprocket Cover Bolts [B]
  Engine Sprocket Cover [C] with Speed Sensor



- Flatten out the bended washer [A].
- Remove the engine sprocket nut [B] and washer.

NOTE

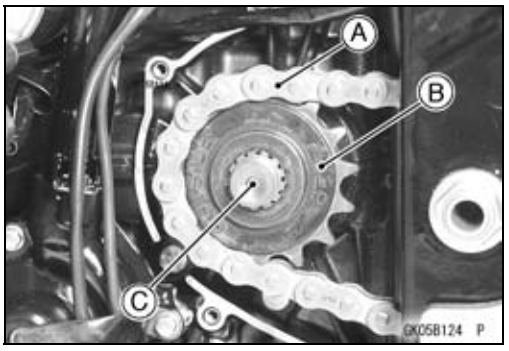
○*When loosening the engine sprocket nut, hold the rear brake on.*



- Using the jack, raise the rear wheel off the ground.

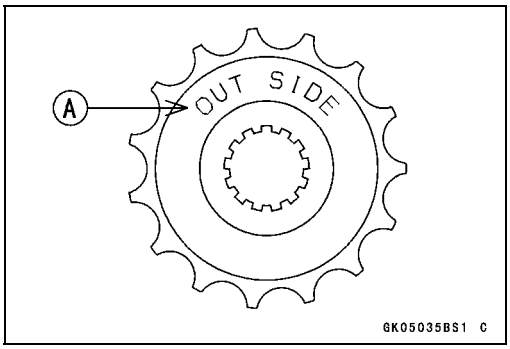
Special Tool - Jack : 57001–1238

- Loosen the drive chain (see Slack Adjustment).
- Remove the drive chain from the rear sprocket toward the right.
- Disengage the drive chain [A] from the engine sprocket [B].
- Pull the engine sprocket off the output shaft [C].



Engine Sprocket Installation

- Replace the sprocket washer and axle cotter pin.
- Install the engine sprocket so that “OUTSIDE” letters [A] face outward.
- Apply molybdenum disulfide oil to the threads of the output shaft and the seating surface of the engine sprocket nut.
- After torquing the engine sprocket nut, bend the one side of the washer over the nut.



NOTE

○*Tighten the nut while applying the rear brake.*

- Tighten:

Torque - Engine Sprocket Nut: 125 N·m (13 kgf·m, 92 ft·lb)
Engine Sprocket Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Adjust the drive chain slack after installing the sprocket (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).

Sprocket, Coupling

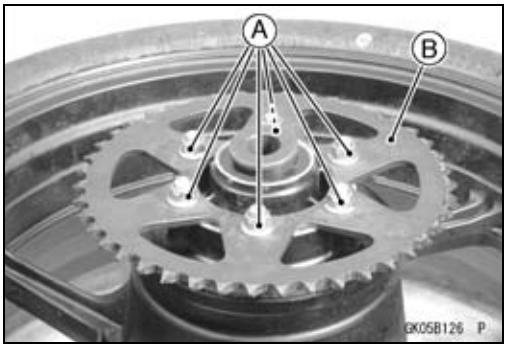
Rear Sprocket Removal

● 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 that the disc does not touch the ground.

● Remove the rear sprocket nuts [A].
● Remove the rear sprocket [B].

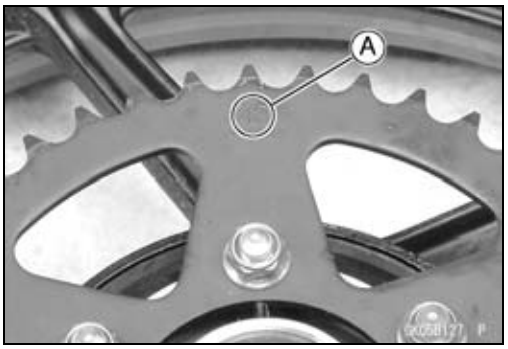


Rear Sprocket Installation

● Install the sprocket facing the tooth number marking [A] outward.
● Tighten the rear sprocket nuts.

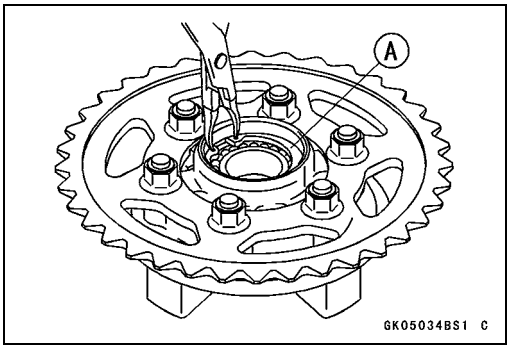
Torque - Rear Sprocket Nuts: 59 N·m (6.0 kgf·m, 43 ft·lb)

● Install the rear wheel (see Wheels/Tires chapter).



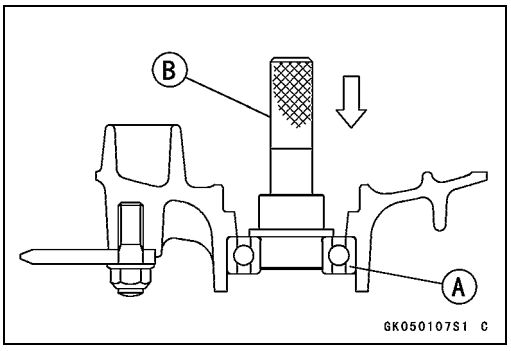
Coupling Bearing Removal

● Remove:
Coupling
Grease Seal
Circlip [A]



● Remove the bearing [A] by tapping from the wheel side.

Special Tool - Bearing Driver Set: 57001–1129 [B]

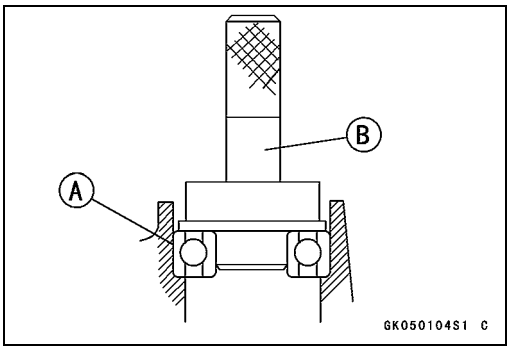


Coupling Bearing Installation

● Replace the bearing with a new one.
● Press in the bearing [A] until it is bottomed.

Special Tool - Bearing Driver Set: 57001–1129 [B]

● Pack the bearing with high temperature grease.
● Replace the circlip with a new one.



Sprocket, Coupling

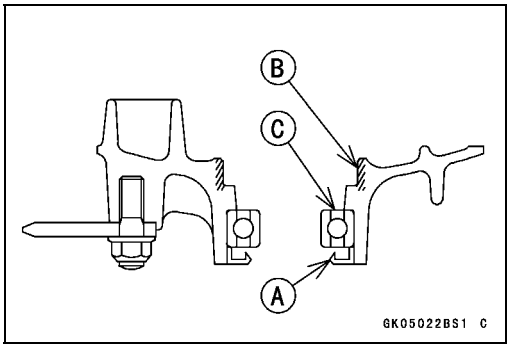
- Replace the grease seal with a new one.
- Press in the grease seal so that the seal surface is flush with the end of the hole.

○Apply high temperature grease to the grease seal lips.

Special Tool - Bearing Driver Set: 57001–1129

Coupling Installation

- Grease the following and install the coupling.
  Coupling Grease Seal [A]
  Coupling Internal Surface [B]
  Ball Bearing [C]

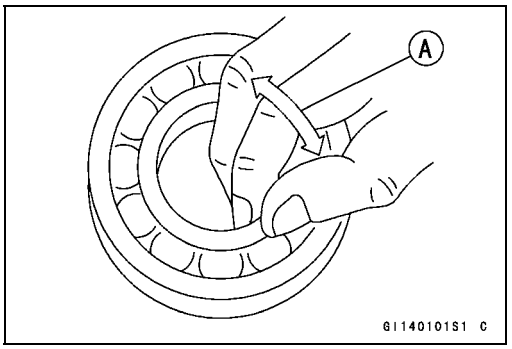


Coupling Bearing Inspection

Since the coupling bearing is made to extremely close tolerances, the clearance can not normally be measured.

NOTE

○*It is not necessary to remove the coupling bearing for inspection. If the bearing is removed, it will need to be replaced with a new one.*



- Spin [A] it by hand to check its condition.

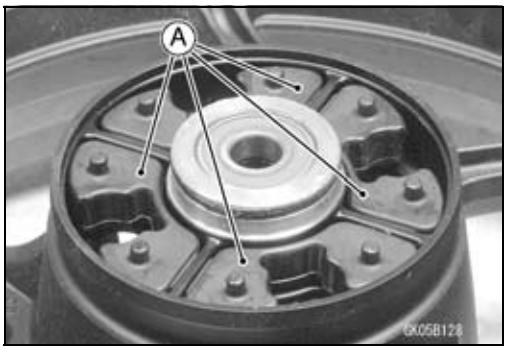
★If it is noisy, does not spin smoothly, or has any rough spots, it must be replaced.

Coupling Bearing Lubrication

- Pack the bearing with good quality bearing grease. Turn the bearing around by hand a few times to make sure the grease is distributed uniformly inside the bearing.

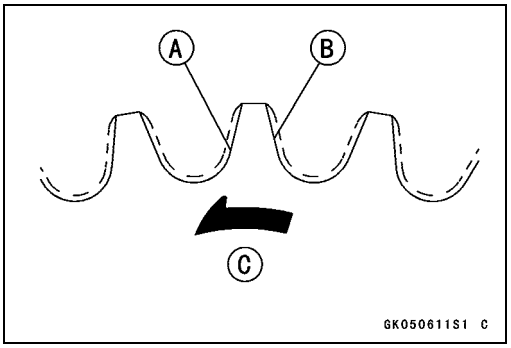
Coupling Damper Inspection

- Remove the rear wheel coupling, and inspect the rubber dampers [A].
- Replace the damper if it appears damaged or deteriorated.



Sprocket, Coupling

Sprocket Wear Inspection



- Visually inspect the engine and rear sprocket teeth for wear and damage.

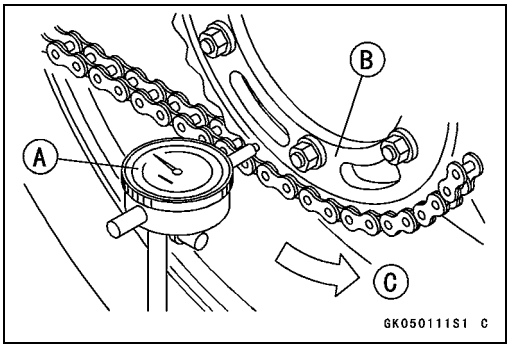
★If the teeth are worn as illustrated, replace the sprocket, and inspect the drive chain wear (see Drive Chain Wear Inspection).

Worn Tooth (Engine Sprocket) [A]
Worn Tooth (Rear Sprocket) [B]
Direction of Rotation [C]

NOTE

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

Rear Sprocket Warp Inspection



- Raise the rear wheel off the ground (see Wheels/Tires chapter) so that it will turn freely.
- Set a dial gauge [A] against the rear sprocket [B] near the teeth as shown, and rotate [C] the rear wheel to measure the sprocket runout (warp). 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.

Rear Sprocket Warp

Standard: 0.4 mm (0.016 in.) or less

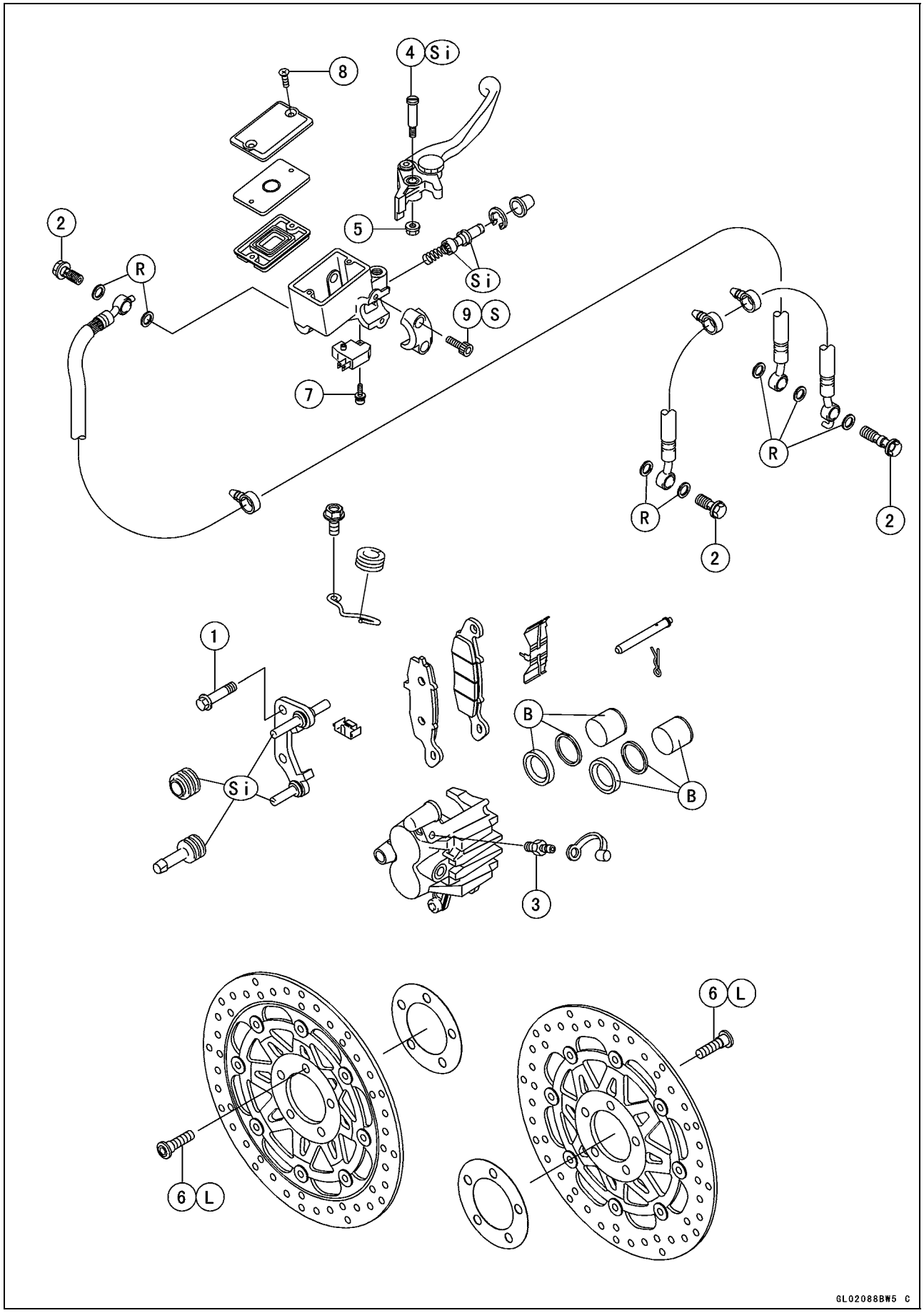
Service Limit: 0.5 mm (0.020 in.)

Brakes

Table of Contents

Exploded View 12-2
Specifications 12-6
Special Tool 12-7
Brake Lever, Brake Pedal 12-8
  Brake Lever Position Adjustment. 12-8
  Brake Pedal Position Inspection .. 12-8
  Brake Pedal Position Adjustment. 12-8
Calipers 12-9
  Front Caliper Removal 12-9
  Rear Caliper Removal 12-9
  Caliper Installation 12-9
  Front Caliper Disassembly 12-10
  Front Caliper Assembly 12-10
  Rear Caliper Disassembly 12-11
  Rear Caliper Assembly 12-12
  Caliper Fluid Seal Damage 12-12
  Caliper Dust Seal/Friction Boot Damage 12-12
  Caliper Piston and Cylinder Damage 12-13
  Caliper Holder Shaft Wear 12-13
Brake Pads 12-14
  Front Brake Pad Removal 12-14
  Front Brake Pad Installation 12-14
  Rear Brake Pad Removal 12-14
  Rear Brake Pad Installation 12-14
  Brake Pad Wear Inspection 12-14
Master Cylinder 12-15
  Front Master Cylinder Removal ... 12-15
  Front Master Cylinder Installation 12-15
  Rear Master Cylinder Removal 12-16
  Rear Master Cylinder Installation. 12-16
  Front Master Cylinder Disassembly 12-16
  Rear Master Cylinder Disassembly 12-17
  Master Cylinder Assembly 12-17
  Master Cylinder Inspection (Visual Inspection) 12-17
Brake Disc 12-18
  Brake Disc Removal 12-18
  Brake Disc Installation 12-18
  Brake Disc Wear 12-18
  Brake Disc Warp 12-18
Brake Fluid 12-19
  Brake Fluid Level Inspection 12-19
  Brake Fluid Change 12-19
  Brake Line Bleeding 12-19
Brake Hose 12-20
  Brake Hose Removal/Installation. 12-20
  Brake Hose Inspection 12-20

Exploded View

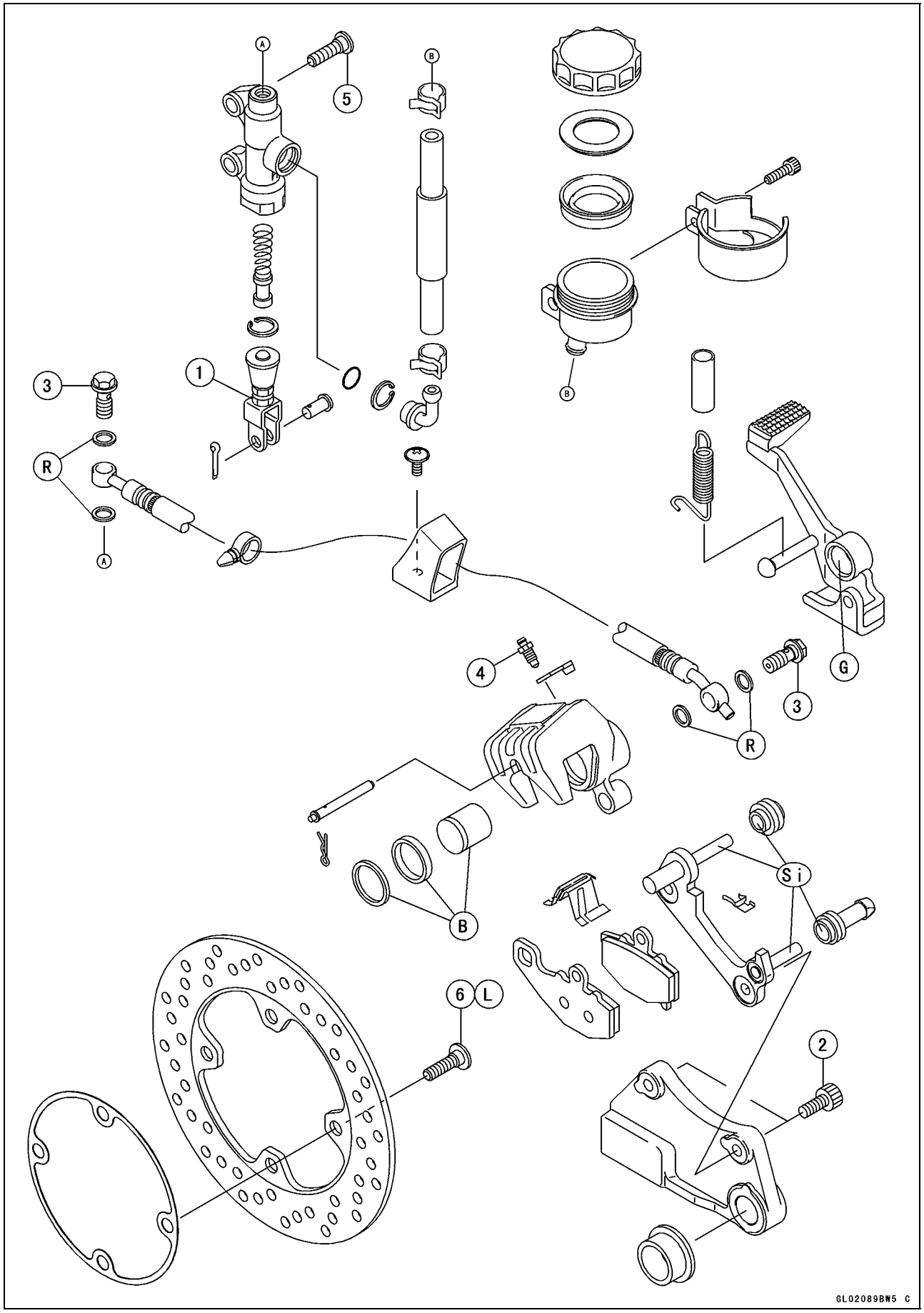


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front caliper mounting bolts	34	3.5	25	
2	Brake hose banjo bolts	25	2.5	18	
3	Bleed valve	7.8	0.80	69 in·lb	
4	Brake lever pivot bolt	1.0	0.10	9 in·lb	Si
5	Brake lever pivot bolt locknut	5.9	0.60	52 in·lb	
6	Front brake disc mounting bolts	27	2.8	20	L
7	Front brake light switch screws	1.0	0.10	9 in·lb	
8	Front brake reservoir cap screws	1.0	0.10	9 in·lb	
9	Front master cylinder clamp bolts	8.8	0.90	78 in·lb	S

B: Apply brake fluid.
L: Apply a non-permanent locking agent.
R: Replacement Parts
S: Follow the specific tightening sequence.
Si: Apply silicone grease (ex. PBC grease).

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Rear master cylinder push rod locknut	18	1.8	13	
2	Rear caliper mounting bolts	25	2.5	18	
3	Brake hose banjo bolts	25	2.5	18	
4	Bleed valve	7.8	0.80	69 in·lb	
5	Rear master cylinder mounting bolts	25	2.5	18	
6	Rear brake disc mounting bolts	27	2.8	20	L

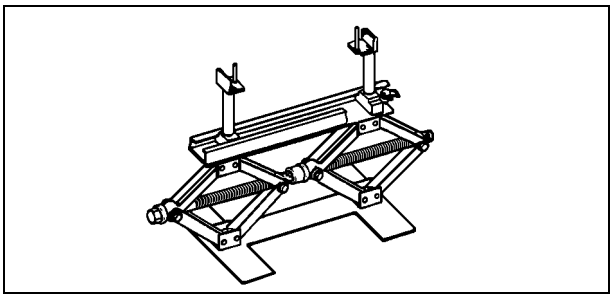
B: Apply brake fluid.
G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts
Si: Apply silicone grease (ex. PBC grease).

Specifications

Item	Standard	Service Limit
Brake Lever, Brake Pedal:		
Brake lever position	5-way adjustable (to suit rider)	– – –
Brake lever free play	Non-adjustable	– – –
Pedal free play	Non-adjustable	– – –
Pedal position	About 47 mm (1.85 in.) below footpeg top	– – –
Brake Fluid:		
Grade	DOT4	– – –
Brake Pads:		
Lining thickness:		
Front	4.5 mm (0.18 in.)	1 mm (0.04 in.)
Rear	5 mm (0.20 in.)	1 mm (0.04 in.)
Brake Discs:		
Thickness:		
Front	4.3 ~ 4.5 mm (0.17 ~ 0.18 in.)	4.0 mm (0.16 in.)
Rear	4.8 ~ 5.2 mm (0.19 ~ 0.20 in.)	4.5 mm (0.18 in.)
Runout	Not more than 0.2 mm (0.008 in.)	0.3 mm (0.012 in.)

Special Tool

Jack:
57001–1238



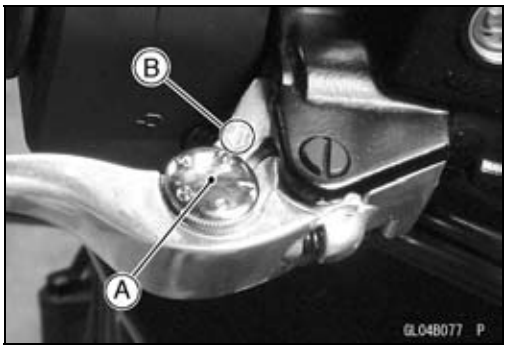
Brake Lever, Brake Pedal

Brake Lever Position Adjustment

The brake lever adjuster has 5 positions so that the brake lever position can be adjusted to suit the operator's hand.

- Push the lever forward and turn the adjuster [A] to align the number with the arrow mark [B] on the lever holder.

○The distance from the grip to the lever is minimum at number 5 and maximum at number 1.



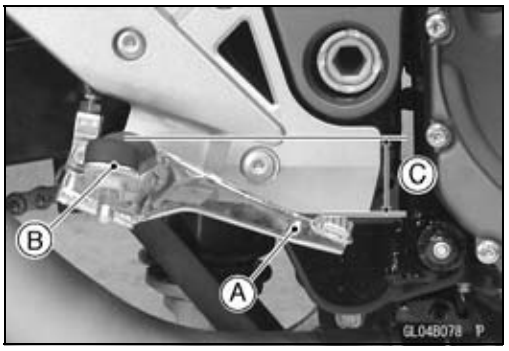
Brake Pedal Position Inspection

- Check that the brake pedal [A] is in the correct position.
  Footpeg [B]

Pedal Position

Standard: About 47 mm (1.85 in.) [C] below top of footpeg

★If it is incorrect, adjust the brake pedal position.

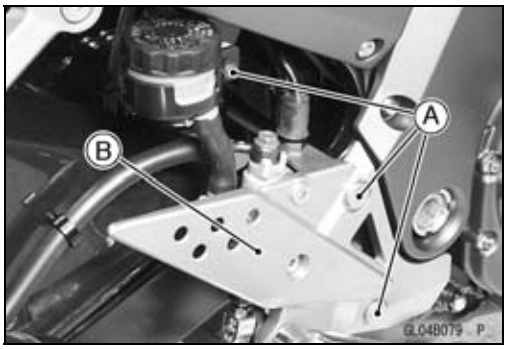


Brake Pedal Position Adjustment

NOTE

○*Usually it is not necessary to adjust the pedal position, but always adjust it when the push rod locknut has been loosened.*

- Remove the bolts [A] and remove the guard bracket [B].



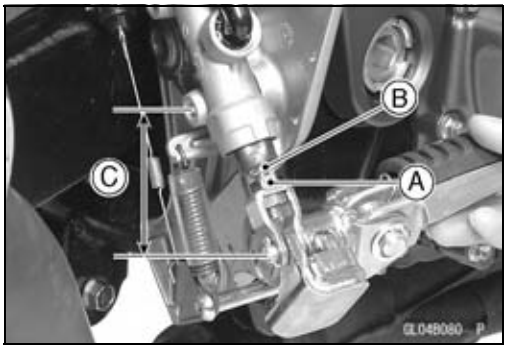
- Loosen the locknut [A] and turn the push rod with the hex head [B] to achieve the correct pedal position.

★If the length [C] shown is **70 ±1 mm (2.76 ±0.04 in.)**, the pedal position will be within the standard range.

- Tighten:

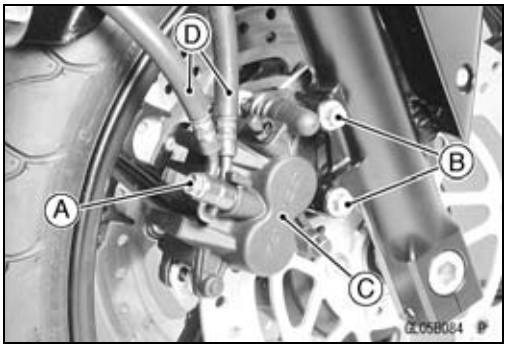
Torque - Rear Master Cylinder Push Rod Locknut: 18 N·m (1.8 kgf·m, 13 ft·lb)

- Check the brake light switch operation (see Brakes in the Periodic Maintenance chapter).



Calipers

Front Caliper Removal



- Loosen the banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Unscrew the caliper mounting bolts [B], and detach the caliper [C] from the disc.
- Unscrew the banjo bolt and remove the brake hoses [D] from the caliper (see Brake Hose Removal/Installation).

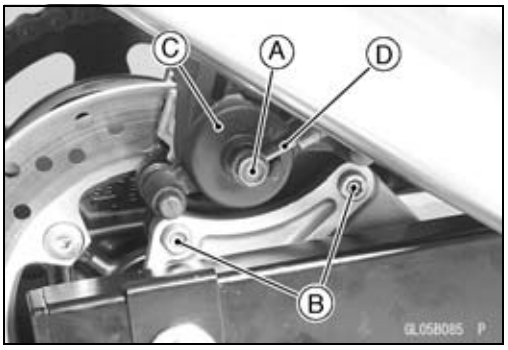
CAUTION

Immediately wash away any brake fluid that spills.

NOTE

○*After the caliper removal, if compressed air will not be available for disassembling the caliper, remove the piston before detaching the brake hose (see Front Caliper Disassembly).*

Rear Caliper Removal



- Loosen the banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Unscrew the caliper mounting bolts [B], and detach the caliper [C] from the disc.
- Unscrew the banjo bolt and remove the brake hose [D] from the caliper (see Brake Hose Removal/Installation).

CAUTION

Immediately wash away any brake fluid that spills.

NOTE

○*After the caliper removal, if compressed air will not be available for disassembling the caliper, remove the piston before detaching the brake hose (see Rear Caliper Disassembly).*

Caliper Installation

- Install the caliper and brake hose lower end.

○Replace the washers on each side of hose fitting with new ones.

- Tighten:

Torque - Caliper Mounting Bolts (Front): 34 N·m (3.5 kgf·m, 25 ft·lb)
Caliper Mounting Bolts (Rear): 25 N·m (2.5 kgf·m, 18 ft·lb)
Brake Hose Banjo Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Check the fluid level in the brake reservoirs.
- Bleed the brake line (see Bleeding the Brake Line).
- Check the brake for good braking power, no brake drag, and no 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.

Calipers

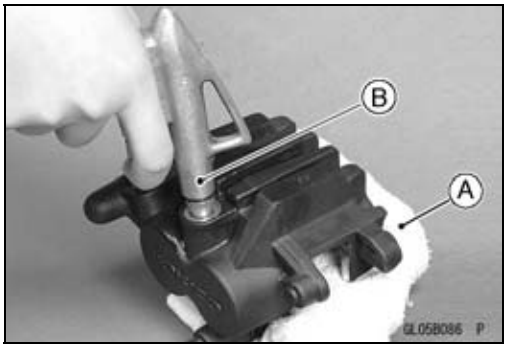
Front Caliper Disassembly

- Remove:
  Front Caliper (see Caliper Removal)
  Brake Pads and Springs (see Brake Pad Removal)

- Using compressed air, remove the pistons.

○Cover the piston area with a clean, thick cloth [A].

○Blow compressed air [B] into the hole for the banjo bolt to remove the piston.

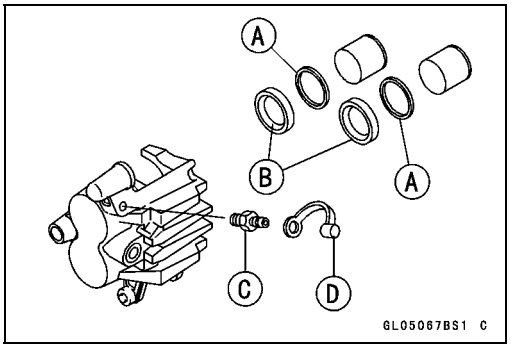


⚠ WARNING

To avoid serious injury, never place your fingers or palm in front of the piston. If you apply compressed air into the caliper, the piston may crush your hand or fingers.

○Pull out the pistons by hand.

- Remove the dust seals [A] and fluid seals [B].
- Remove the bleed valve [C] and rubber cap [D].



NOTE

○*If compressed air is not available, with the brake hose still attached, apply the brake lever to remove the piston. The remaining process is as described above.*

Front Caliper Assembly

- Clean the caliper parts except for the pads.

CAUTION

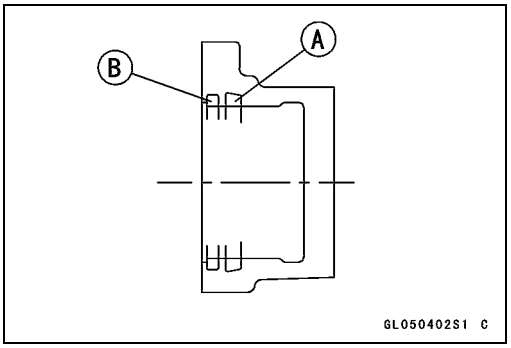
For cleaning the parts, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol.

- Install the bleed valve and rubber cap.

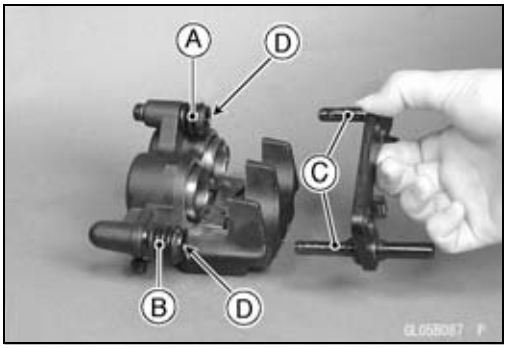
Torque - Bleed Valve: 7.8 N·m (0.80 kgf·m, 69 in·lb)

Calipers

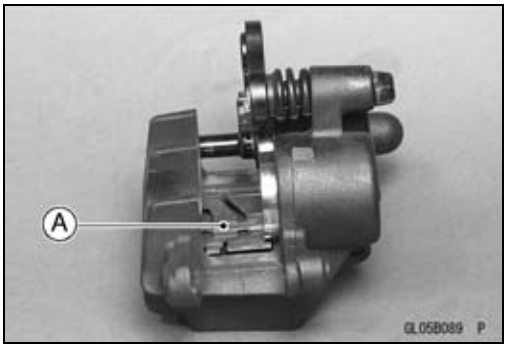
- Replace the fluid seals [A] with new ones.
○Apply brake fluid to the fluid seals, and install them into the cylinders by hand.
- Replace the dust seals [B] with new ones if they are damaged.
○Apply brake fluid to the dust seals, and install them into the cylinders by hand.



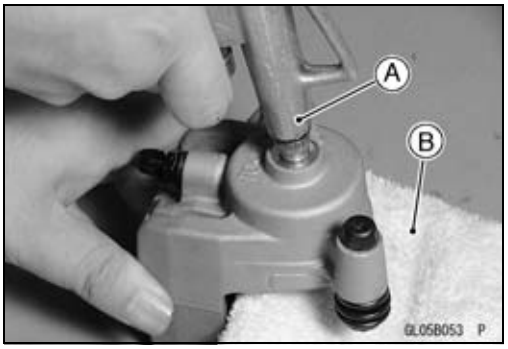
- Apply brake fluid to the outside of the pistons, and push them into each cylinder by hand.
- Check the shaft rubber friction boot [A] and the dust cover [B] replace them with new ones if they are damaged.
- Apply a thin coat of PBC (Poly Butyl Cuprysil) grease to the caliper holder shafts [C] and holder holes [D] (PBC is a special high temperature, water-resistance grease).



- Install the anti-rattle spring [A].
- Install the pads (see Front Brake Pad Installation).
- Wipe up any spilled brake fluid on the caliper with wet cloth.



Rear Caliper Disassembly
- Remove the rear caliper.
- Remove the pads and anti-rattle spring (see Rear Brake Pad Removal).
- Using compressed air, remove the piston.
○Cover the piston area with a clean, thick cloth [B].
○Blow compressed air [A] into the hole for the banjo bolt to remove the piston.



⚠ 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.

- Remove the dust seal and fluid seal.
- Remove the bleed valve and rubber cap.

NOTE

○*If compressed air is not available, with the brake hose still attached, apply the brake pedal to remove the piston. The remaining process is as described above.*

Calipers

Rear Caliper Assembly

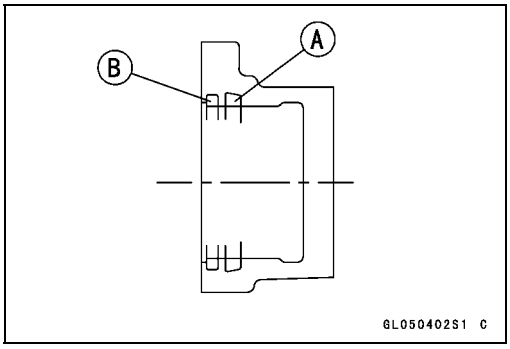
- Clean the caliper parts except for the pads.

CAUTION
For cleaning the parts, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol.

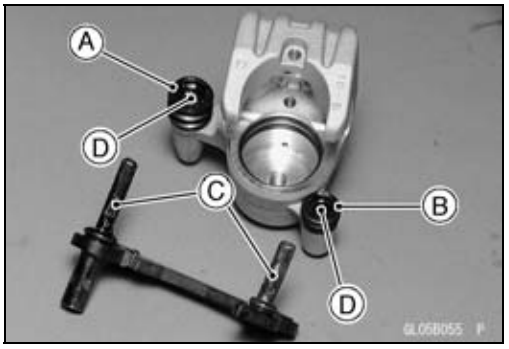
- Install the bleed valve and rubber cap.

Torque - Bleed Valve: 7.8 N·m (0.80 kgf·m, 69 in·lb)

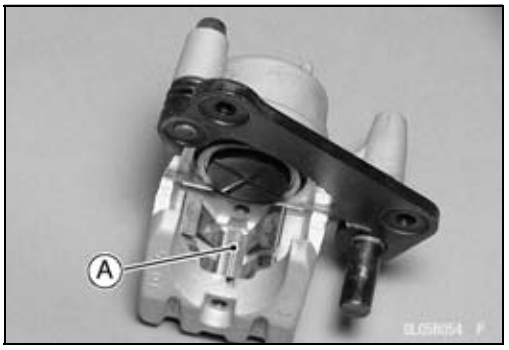
- Replace the fluid seal [A] with a new one.
- ○Apply brake fluid to the fluid seal, and install it into the cylinder by hand.
- Replace the dust seal [B] with a new one if it is damaged.
- ○Apply brake fluid to the dust seal, and install it into the cylinder by hand.



- Apply brake fluid to the outside of the piston, and push it into the cylinder by hand.
- Replace the shaft rubber friction boot [A] and dust cover [B] if they are damaged.
- Apply a thin coat of PBC (Poly Butyl Cuprysil) grease to the caliper holder shafts [C] and holder holes [D] (PBC is a special high temperature, water-resistance grease).



- Install the anti-rattle spring [A] in the caliper as shown.
- Install the pads (see Rear Brake Pad Installation).
- Wipe up any spilled brake fluid on the caliper with wet cloth.



Caliper Fluid Seal Damage

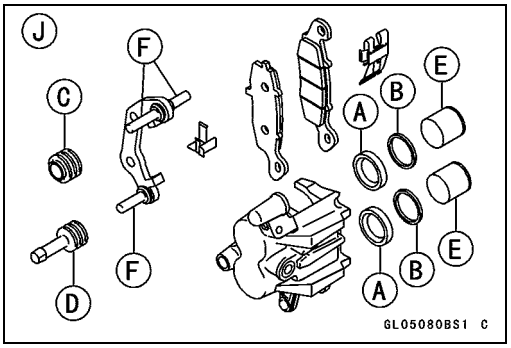
- Refer to the Brakes in the Periodic Maintenance chapter.

Caliper Dust Seal/Friction Boot Damage

- Refer to the Brakes in the Periodic Maintenance chapter.

Calipers

Caliper Piston and Cylinder Damage

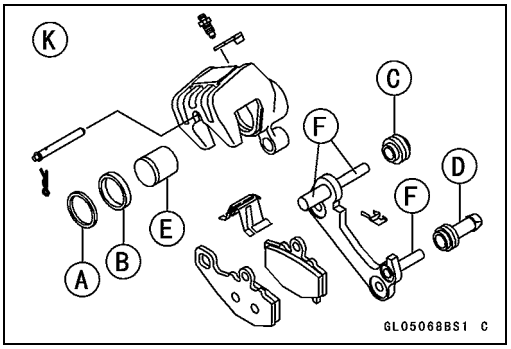


- Visually inspect the piston [E] and cylinder surfaces.

★Replace the caliper if the cylinder and piston are badly scores or rusty.

Fluid Seal [A]
Dust Seal [B]
Rubber Boot [C]
Front Caliper [J]
Rear Caliper [K]

Caliper Holder Shaft Wear



The caliper body must slide smoothly on the caliper holder shaft [F]. If the body does not slide smoothly, one pad will wear more than the other, pad wear will increase, and constant drag on the disc will raise brake and brake fluid temperature.

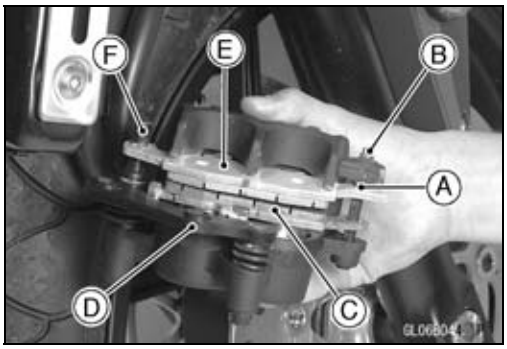
- Check to see that the caliper holder shaft are not badly worn or stepped, and that the rubber friction boots [D] are not damaged.

★If the rubber friction boot is damaged, replace the rubber friction boot. To replace the friction boot, remove the pads and the caliper bracket.

★If the caliper holder shaft is damage, replace the caliper bracket.

Brake Pads

Front Brake Pad Removal



- Remove the caliper from the disc.
- Draw out the holder shaft pin [A], and take off the holder shaft [B].
- Remove the pad [C] on the piston side.
- Push the holder [D] towards the piston, and remove the pad of the other side [E] from the holder shaft [F].

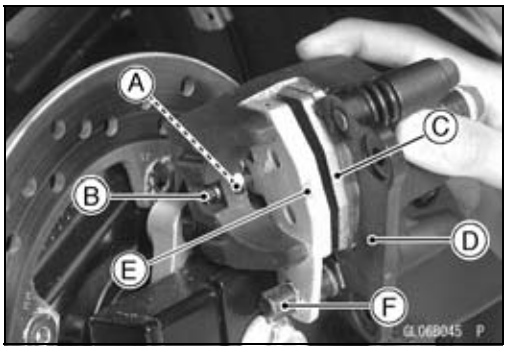
Front Brake Pad Installation

- Push the caliper pistons in by hand as far as they will go.
- Install the anti-rattle spring in its correct position.
- Install the pad on the piston side first, then install the other pad on the holder.
- Install the caliper (see Caliper 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.

Rear Brake Pad Removal



- Remove the caliper with the hose installed.
- Draw out the holder shaft pin [A], and take off the holder shaft [B].
- Remove the pad [C] on the piston side.
- Push the holder [D] towards the piston, and remove the pad of the other side [E] from the holder shaft [F].

Rear Brake Pad Installation

- Push the caliper piston in by hand as far as it will go.
- Install the anti-rattle spring in its correct position.
- Install the pad on the piston side first, then install the other pad on the holder.
- Install the caliper (see Caliper Installation).

⚠ 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 brake will not function on the first application of the pedal if this is not done.

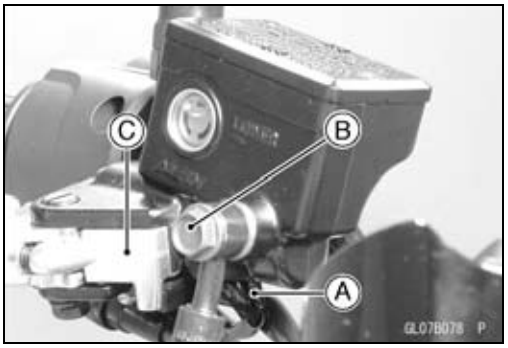
Brake Pad Wear Inspection

- Refer to the Brakes in the Periodic Maintenance chapter.

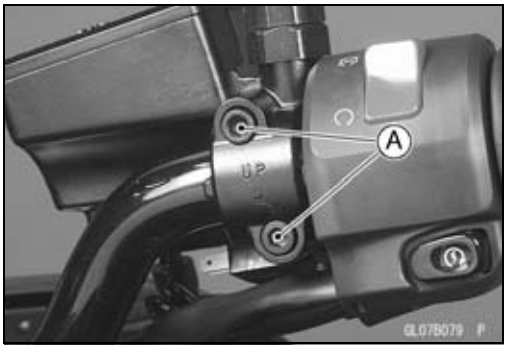
Master Cylinder

Front Master Cylinder Removal

- Disconnect the front brake light switch connectors [A].
- Remove the banjo bolt [B] to disconnect the brake hose from the master cylinder [C] (see Brake Hose Removal/Installation).

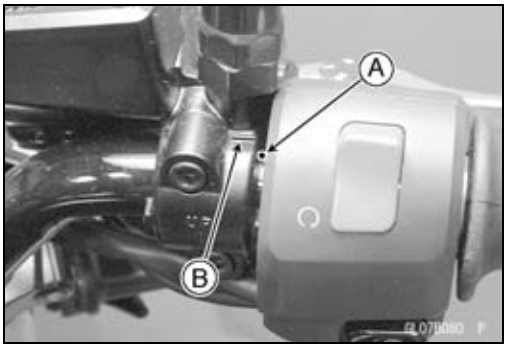


- Unscrew the clamp bolts [A], and take off the master cylinder as an assembly with the reservoir, brake lever, and brake switch installed.



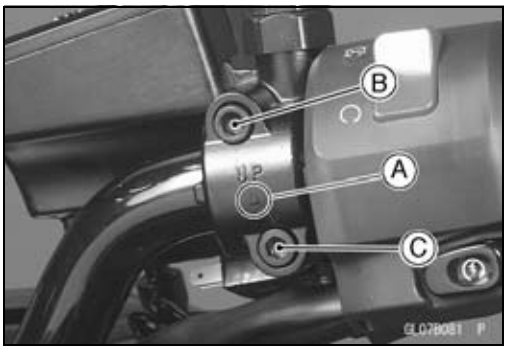
Front Master Cylinder Installation

- Install the front master cylinder so that the punch mark [A] of the handlebar is aligned with the mating surface [B] of the master cylinder clamp to level the reservoir.



- The master cylinder clamp must be installed with the arrow mark [A] upward.
- Tighten the upper clamp bolt [B] first, and then the lower clamp bolt [C]. There will be a gap at the lower part of the clamp after tightening.

  Torque - Front Master Cylinder Clamp Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)



- Replace the washers on each side of the hose fitting with new ones.
- Tighten the brake hose banjo bolt.

  Torque - Brake Hose Banjo Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Bleed the brake line (see Brake Line Bleeding in the Periodic Maintenance chapter).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

Master Cylinder

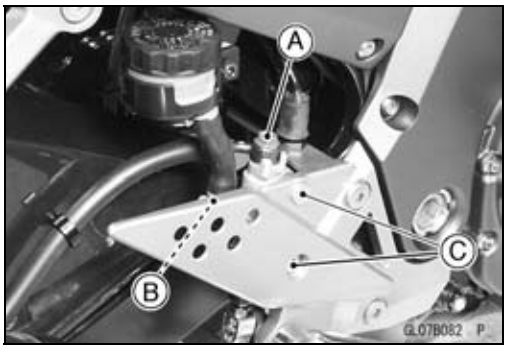
Rear Master Cylinder Removal

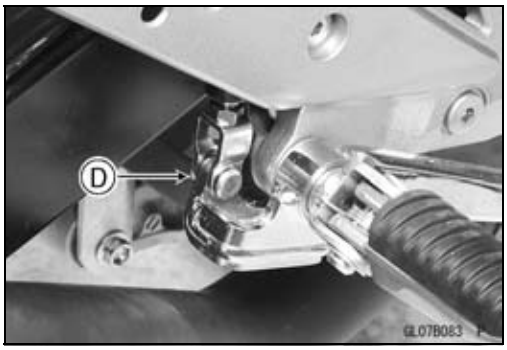
- Unscrew the brake hose banjo bolt [A] on the master cylinder (see Brake Hose Removal/Installation).
- Pull off the reservoir hose lower end [B], and drain the brake fluid into a container.
- Loosen the master cylinder mounting bolts [C] lightly.
- Remove the cotter pin [D].

NOTE

○*Pull off the joint pin while pressing down the brake pedal.*

- Unscrew the master cylinder mounting bolts, and remove the master cylinder.



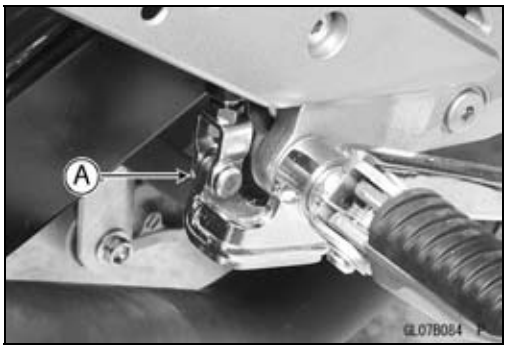


Rear Master Cylinder Installation

- Replace the cotter pin [A] with a new one.
- Replace the washers on each side of hose fitting with new ones.
- Tighten the following bolts.

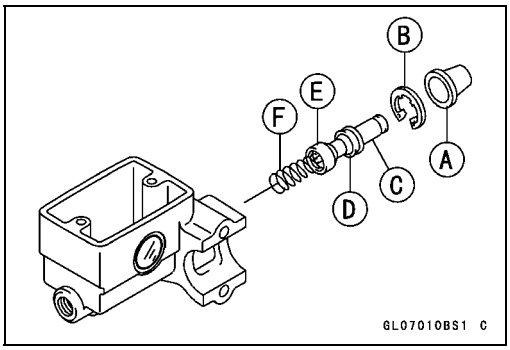
Torque - Rear Master Cylinder Mounting Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)
Brake Hose Banjo Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Bleed the brake line (see Brakes in the Periodic Maintenance chapter).
- Check the brake for good braking power, no brake drag, and no fluid leakage.



Front Master Cylinder Disassembly

- Remove the front master cylinder (see Front Master Cylinder Removal).
- Remove the reservoir cap and diaphragm, and pour the brake fluid into a container.
- Unscrew the locknut and pivot bolt, and remove the brake lever.
- Pull the dust cover [A] out of place, and remove the circlip [B].
- Pull out the piston [C], secondary cup [D], primary cup [E], and return spring [F].



CAUTION

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

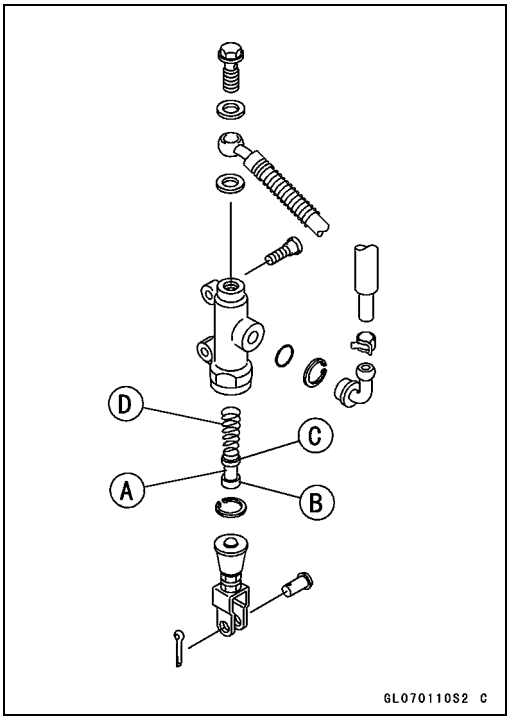
Master Cylinder

Rear Master Cylinder Disassembly

NOTE

○*Do not remove the push rod clevis for master cylinder disassembly since removal requires brake position adjustment.*

- Remove the rear master cylinder (see Rear Master Cylinder Removal).
- Slide the dust cover on the push rod out of place, and remove the circlip.
- Pull out the push rod with the piston stop.
- Take off the piston [A], secondary cup [B], primary cup [C], and return spring [D].



CAUTION

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

Master Cylinder Assembly

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

CAUTION

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

- Apply brake fluid to the removed parts and to the inner wall of the cylinder.
- Take care not to scratch the piston or the inner wall of the cylinder.
- Apply silicone grease (ex. PBC grease).
  Brake Lever Pivot Bolt
  Brake Lever Pivot Contact
  Push Rod Contact
  Dust Covers
- Tighten:

Torque - Brake Lever Pivot Bolt: 1.0 N·m (0.10 kgf·m, 9 in·lb)
Brake Lever Pivot Bolt Locknut: 5.9 N·m (0.60 kgf·m, 52 in·lb)

Master Cylinder Inspection (Visual Inspection)

- Refer to the Brakes in the Periodic Maintenance chapter.

Brake Disc

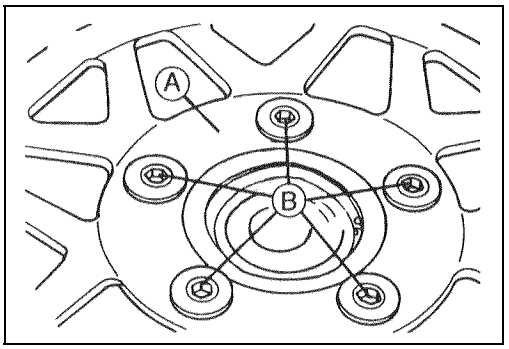
Brake Disc Removal

- Remove the wheel (see Wheels/Tires chapter).
- Unscrew the mounting bolts, and take off the disc.

Brake Disc Installation

- Install the brake disc on the wheel so that the marked side [A] faces out.
- Apply a non-permanent locking agent to the threads of the front and rear brake disc mounting bolts [B].
- Tighten:

Torque - Brake Disc Mounting Bolts: 27 N·m (2.8 kgf·m, 20 ft·lb)



Brake Disc Wear

- Measure the thickness of each disc [A] at the point where it has worn the most.

★If the disk has worn past the service limit, replace it.

Measuring Area [B]

Front Disc Thickness

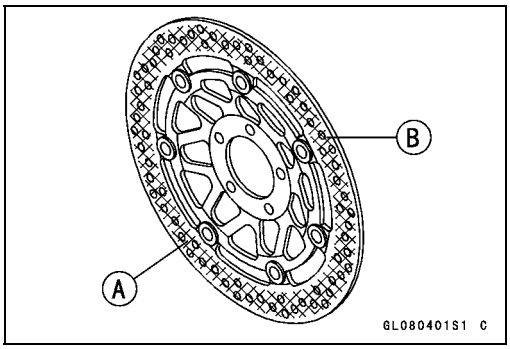
Standard: 4.3 ~ 4.5 mm (0.17 ~ 0.18 in.)

Service Limit: 4.0 mm (0.16 in.)

Rear Disc Thickness

Standard: 4.8 ~ 5.2 mm (0.19 ~ 0.20 in.)

Service Limit: 4.5 mm (0.18 in.)



Brake Disc Warp

- Jack up the motorcycle so that the wheel is off the ground (see Wheels/Tires chapter).

Special Tool - Jack: 57001–1238

○For front disc inspection, turn the handlebar fully to one side.

- Set up a dial gauge against the disc [A] as shown and measure disc runout, while turning [B] the wheel by hand.

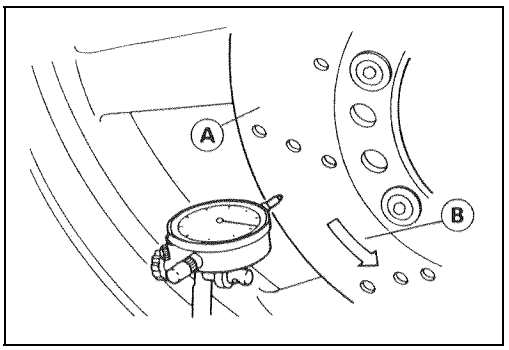
★If runout exceeds the service limit, replace the disc.

Disc Runout

Standard: Not more than 0.2 mm (0.008 in.)

Service Limit: 0.3 mm (0.012 in.)

Special Tool - Jack: 57001–1238



Brake Fluid

Brake Fluid Level Inspection
- Refer to the Brakes in the Periodic Maintenance chapter.

Brake Fluid Change
- Refer to the Brakes in the Periodic Maintenance chapter.

Brake Line Bleeding
- Refer to the Brakes in the Periodic Maintenance chapter.

Brake Hose

Brake Hose Removal/Installation

CAUTION
Brake fluid quickly ruins painted or plastic surfaces; any spilled fluid should be completely wiped up immediately with wet cloth.

- When removing the brake hose, take care not to spill the brake fluid on the painted or plastic parts.
- When removing the brake hose, temporarily secure the end of the brake hose to some high place to keep fluid loss to a minimum.
- There are washers on each side of the brake hose fitting. Replace them with new ones when installing.
- When installing the hoses, avoid sharp bending, kinking, flattening or twisting, and route the hoses according to Cable, Wire and Hose Routing section in General Information chapter.
- Tighten:

Torque - Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Bleed the brake line after installing the brake hose (see Brakes in the Periodic Maintenance chapter).

Brake Hose Inspection

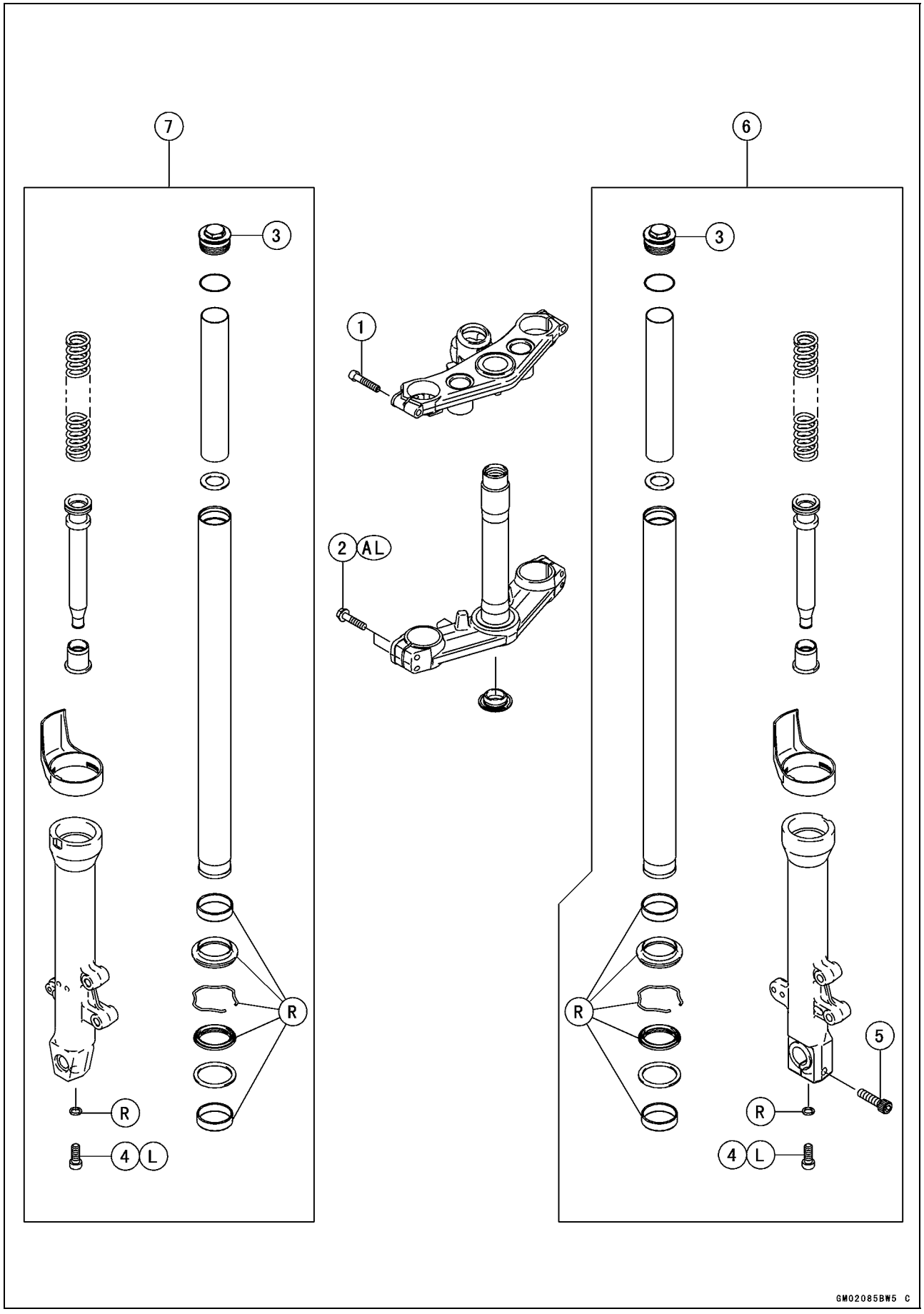
- Refer to the Brakes in the Periodic Maintenance chapter.

Suspension

Table of Contents

Exploded View 13-2
Specifications 13-6
Special Tools 13-7
Front Fork 13-8
  Front Fork Removal 13-8
  Front Fork Installation 13-8
  Front Fork Oil Change 13-8
  Front Fork Disassembly 13-9
  Front Fork Assembly 13-11
  Inner Tube/Outer Tube Inspection 13-12
  Dust Seal Inspection 13-12
  Fork Spring Inspection 13-12
Rear Shock Absorber 13-13
  Rebound Damping Force Adjustment 13-13
  Spring Preload Adjustment 13-13
  Rear Shock Absorber Removal 13-13
  Rear Shock Absorber Installation 13-14
  Rear Shock Absorber Inspection 13-14
Swingarm 13-15
  Swingarm Removal 13-15
  Swingarm Installation 13-16
  Swingarm Bearing Removal 13-16
  Swingarm Bearing Installation 13-17
  Swingarm Bearing, Sleeve Inspection 13-17
  Chain Guide Inspection 13-17
Tie-rod, Rocker Arm 13-18
  Tie-rod Removal 13-18
  Tie-rod Installation 13-18
  Rocker Arm Removal 13-18
  Rocker Arm Installation 13-18
  Rocker Arm/Tie-rod Bearing, Sleeve Inspection 13-19

Exploded View



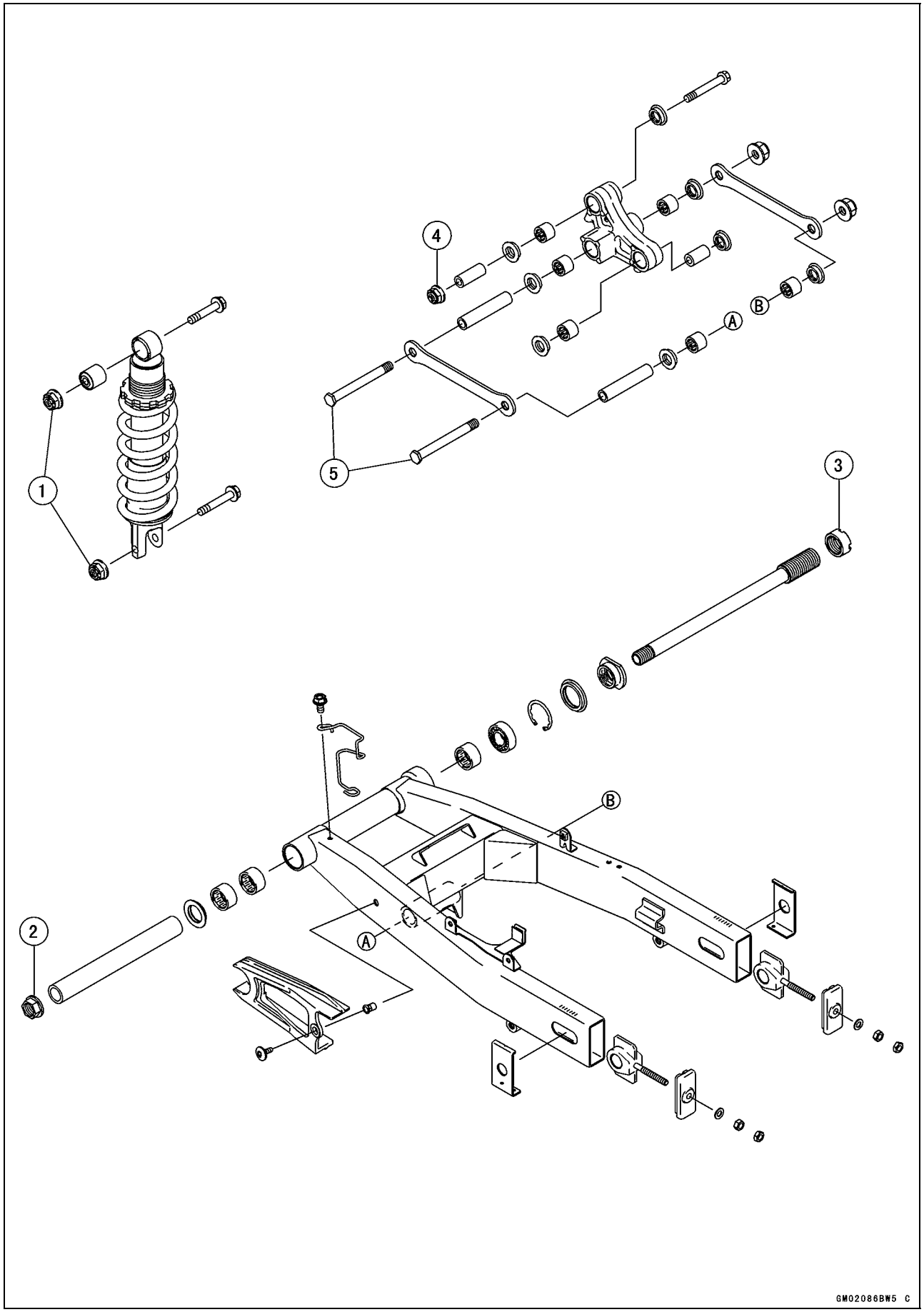
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front fork clamp bolts (Upper)	20	2.0	14	
2	Front fork clamp bolts (Lower)	20	2.0	14	AL
3	Front fork top plugs	25	2.5	18	
4	Front fork bottom Allen bolts	30	3.1	22	L
5	Front axle clamp bolt	34	3.5	25	

6. Right fork leg
7. Left fork leg

AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque.
L: Apply a non-permanent locking agent.
R: Replacement Parts

Exploded View



Exploded View

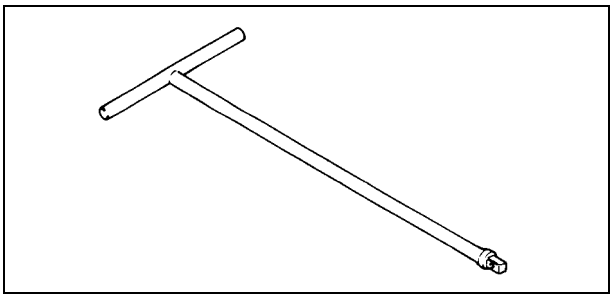
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Rear shock absorber nuts (upper and lower)	34	3.5	25	
2	Swingarm pivot shaft nut	108	11	80	
3	Swingarm pivot shaft locknut	98	10	72	
4	Rocker arm nut	34	3.5	25	
5	Tie-rod bolts	59	6.0	43	

Specifications

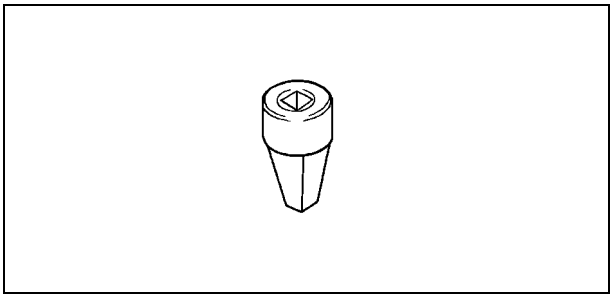
Item	Standard
Front Fork (per one unit):	
Fork inner tube outside diameter	41 mm (1.61 in.)
Air Pressure	Atmospheric pressure (Non-adjustable)
Fork spring setting	Non-adjustable
Damper setting	Non-adjustable
Fork oil viscosity	KAYABA KHL34-G10
Fork oil capacity	452 ±4 mL (15.28 ±0.135 US oz.) (completely dry)
	approx. 385 mL (13.01 US oz.) (when changing oil)
Fork oil level	115 ±2 mm (4.53 ±0.08 in.) below from inner tube top with fully compressed, without fork spring
Fork spring free length	277.2 mm (10.91 in.) (Service limit 272 mm (10.71 in.))
Rear Shock Absorber:	
Rebound damping force	Number 2 (Adjustable Range: Number 1 ~ 4)
Spring preload	4th position (Adjustable Range: 1st ~ 7th position)
Gas pressure	980 kPa (10 kgf/cm², 142 psi, Non-adjustable)

Special Tools

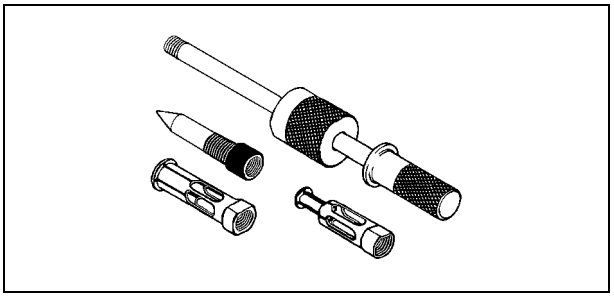
Fork Cylinder Holder Handle:
57001–183



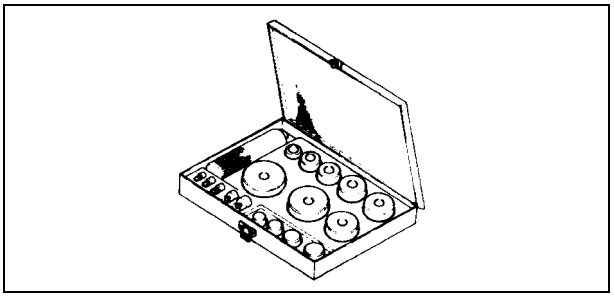
Fork Cylinder Holder Adapter:
57001–1057



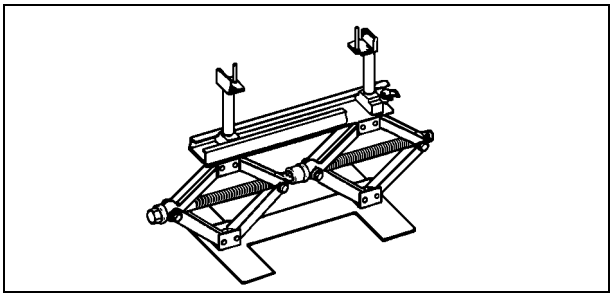
Oil Seal & Bearing Remover:
57001–1058



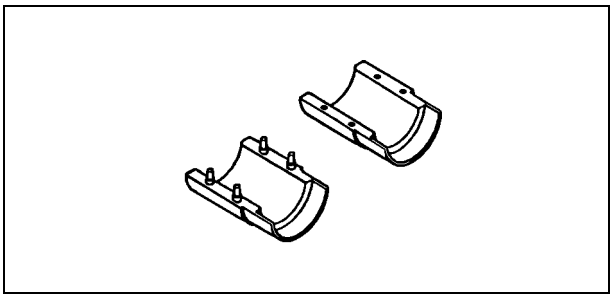
Bearing Driver Set:
57001–1129



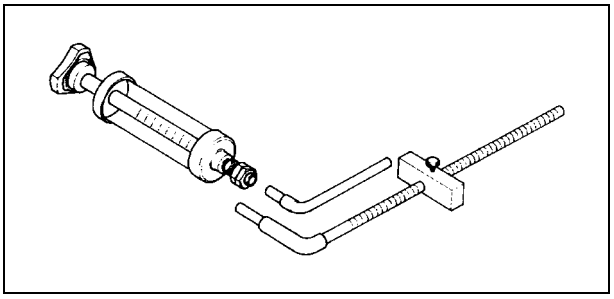
Jack:
57001–1238



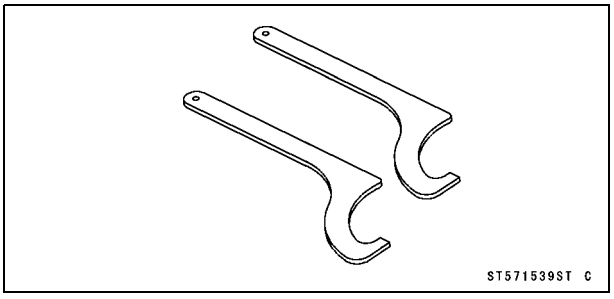
Fork Oil Seal Driver:
57001–1288



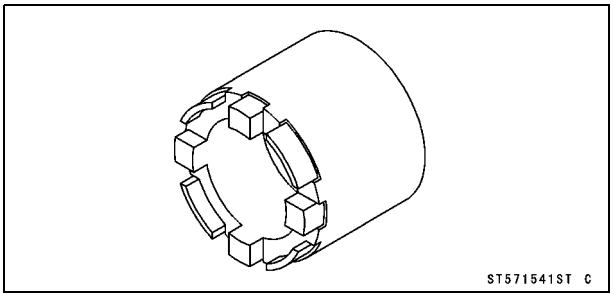
Fork Oil Level Gauge:
57001–1290



Hook Wrench:
57001–1539

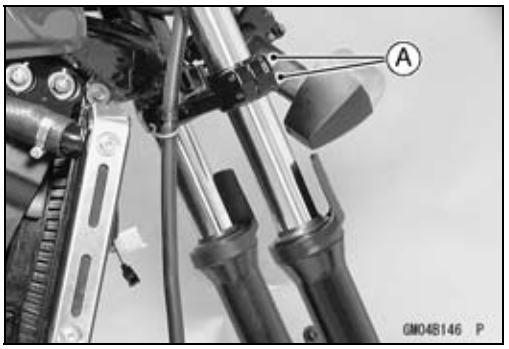


Swingarm pivot Nut Wrench:
57001–1541



Front Fork

Front Fork Removal



- Remove:
  Front Wheel (see Tires/Wheels chapter)
  Front Fender (see Frame chapter)
  Fairing (see Frame chapter)

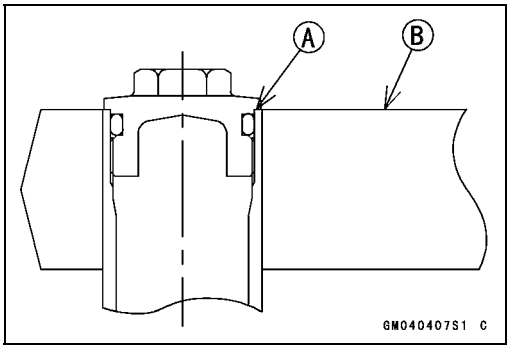
★Loosen the handlebar bolt, upper fork clamp bolt and fork top plug before-hand if the fork leg is to be disassembled.

NOTE

○*Loosen the top plug after loosening the upper fork clamp bolt.*

- Loosen the upper fork clamp bolt and lower fork clamp bolts [A].
- With a twisting motion, work the fork leg down and out.

Front Fork Installation



- Install the fork with the upper end of the inner tube flush [A] against the top surface of the stem head [B].
- Tighten:

Torque - Front Fork Clamp Bolts (Lower): 20 N·m (2.0 kgf·m, 14 ft·lb)
Front Fork Top Plug: 25 N·m (2.5 kgf·m, 18 ft·lb)

NOTE

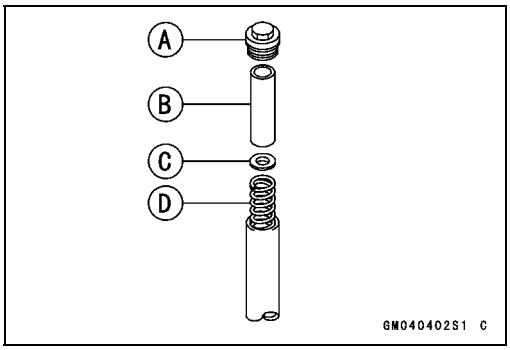
○*Tighten the top plug before tightening the upper fork clamp bolt.*
○*Tighten the two clamp bolts alternately two times to ensure even tightening torque.*

- Tighten:

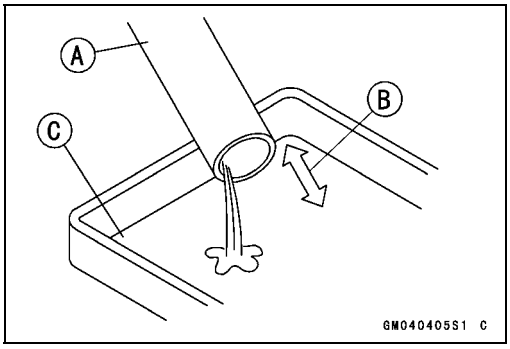
Torque - Front Fork Clamp Bolt (Upper): 20 N·m (2.0 kgf·m, 14 ft·lb)

- Install the removed parts (see appropriate chapters).

Front Fork Oil Change



- Remove the front fork (see Front Fork Removal).
- Remove:
  Top Plug [A]
  Collar [B]
  Fork Spring Seat [C]
  Fork Spring [D]



- Compress [B] the fork [A] upside down to draw out the oil into the suitable container [C].
- Pour in the specified amount of oil.

Fork Oil Viscosity:	**KAYABA KHL34–G10**
Capacity (when changing oil):	**385 mL (13.01 US oz.)**

NOTE

○*Move the outer tube up and down a few times to remove the air that is trapped in the fork oil in order to stabilize the oil level.*

Front Fork

- Hold the outer tube vertically in a vise and compress the fork completely.
- Wait until the oil level stabilizes.
- Use the fork oil level gauge [A] to measure the distance between the top of the inner tube to the oil level.

Special Tool - Fork Oil Level Gauge: 57001–1290

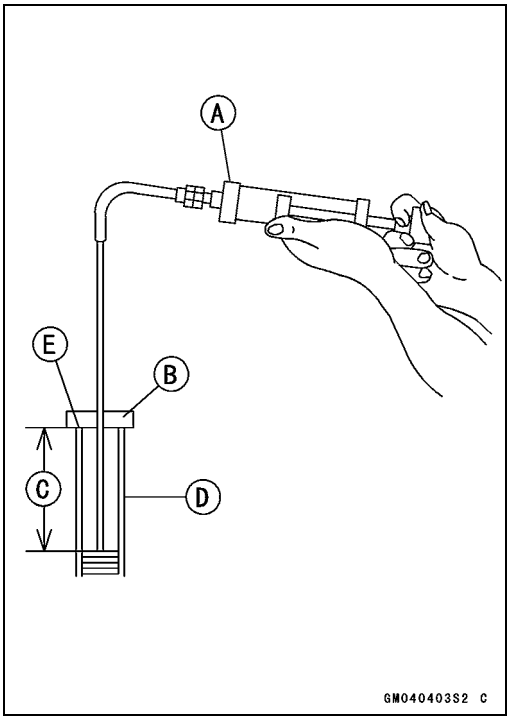
○Set the oil level gauge stopper [B] so that the distance [C] from the bottom of the stopper to the lower end of the pipe is the standard oil level distance.

○A correct measurement can not be obtained unless the level gauge pipe is placed in the center of the inner tube.

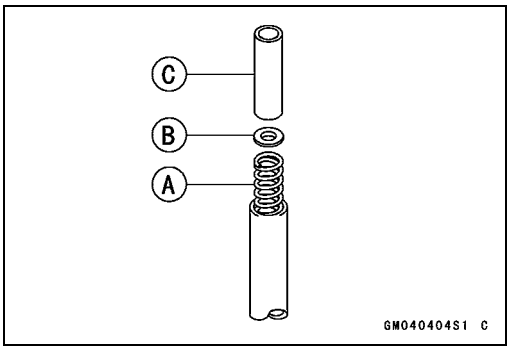
Oil Level (fully compressed, without spring)
Standard: 115 ±2 mm (4.53 ±0.08 in.)

○Place the stopper of the level gauge at the top [E] of the inner tube [D] and pull the handle slowly to draw out the excess oil from fork into the gauge, thus attaining the standard level.

○If not oil is drawn out, there is not enough oil in the fork. Pour in some more oil and measure again.

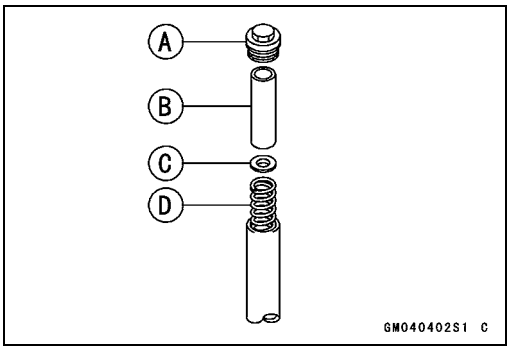


- Repeat the same procedure for adjusting the other fork.
- Install the fork spring [A], fork spring seat [B] and collar [C].
- Inspect the top plug O-ring and replace it with a new one.
- Install the front fork (see Front Fork Installation).



Front Fork Disassembly

- Remove the front fork (see Front Fork Removal).
- Remove the top plug [A] with O-ring, take out the collar [B], spring seat [C], and spring [D].
- Drain the fork oil (see Fork Oil Change).

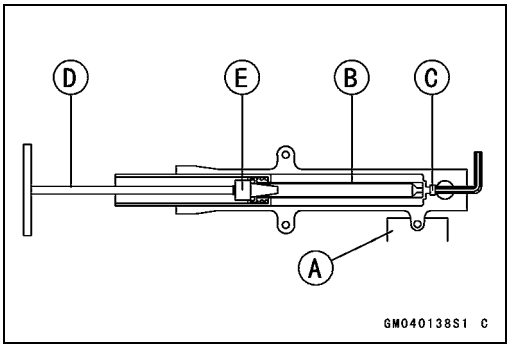


- Remove the Allen bolt [C] from the bottom of the fork.

Special Tools - Fork Cylinder Holder Handle: 57001-183 [D]
Fork Cylinder Holder Adapter: 57001-1057 [E]

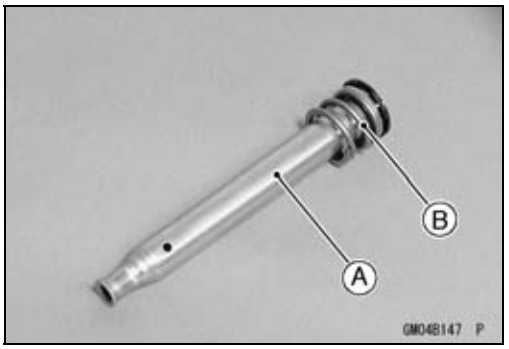
NOTE

○*Hold the outer tube in a vise [A], stop the cylinder unit [B] from turning by using the special tools, and unscrew the Allen bolt.*

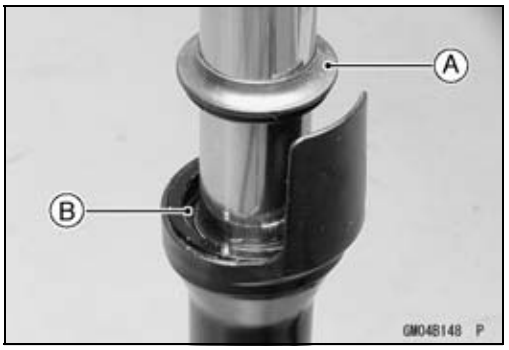


Front Fork

- Remove the cylinder unit [A], washer, and the spring [B] from the inner tube.



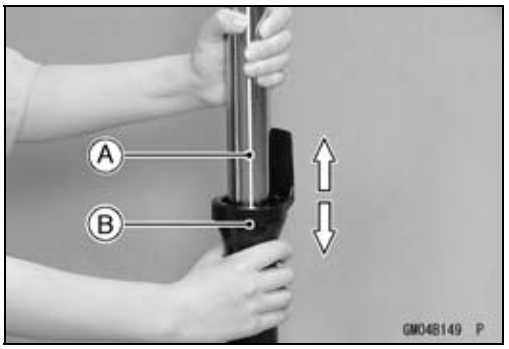
- Remove the following from the top of the outer tube:
  Dust Seal [A]
  Retaining Ring [B]



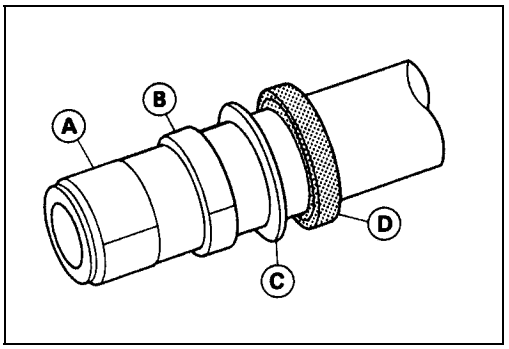
- Separate the inner tube [A] from the outer tube [B].

NOTE

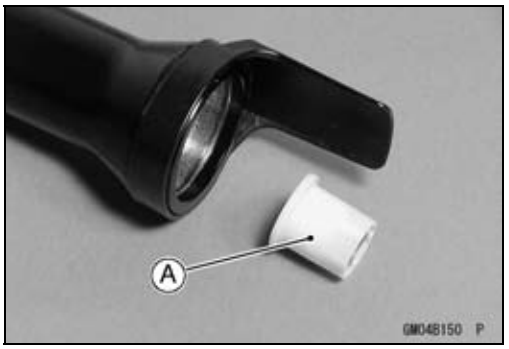
○*From the compressed state, firmly pull down the outer tube a few times towards the direction of elongation.*



- Remove the following from the inner tube:
  Guide Bushing (inner) [A]
  Guide Bushing (outer) [B]
  Washer [C]
  Oil Seal [D]



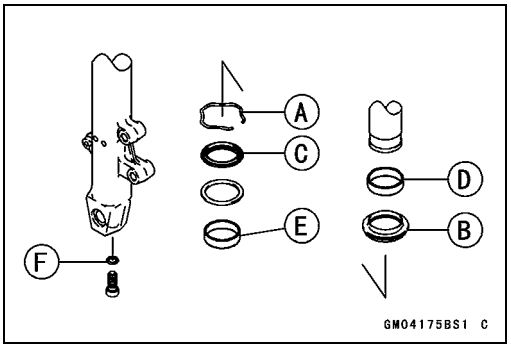
- Remove the cylinder base [A] from the bottom of the outer tube.



Front Fork

Front Fork Assembly

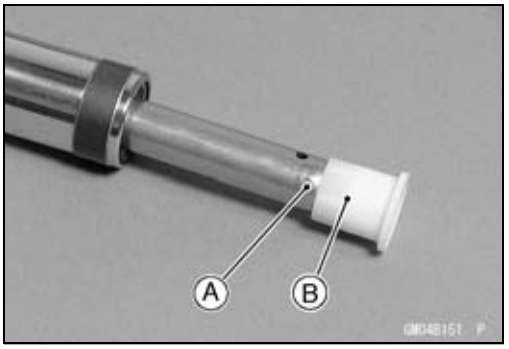
- Check the top plug O-ring and replace it with a new one.
- Replace the following parts with new ones:
  Retaining Ring [A]
  Dust Seal [B]
  Oil Seal [C]
  Inner Guide Bushing [D]
  Outer Guide Bushing [E]
  Fork Bottom Allen Bolt Gasket [F]



- Install the guide bushing on the end of the inner tube.
- Insert the cylinder unit and the spring into the inner tube, and install the cylinder base [B] onto the cylinder end [A] that protrudes from the bottom.

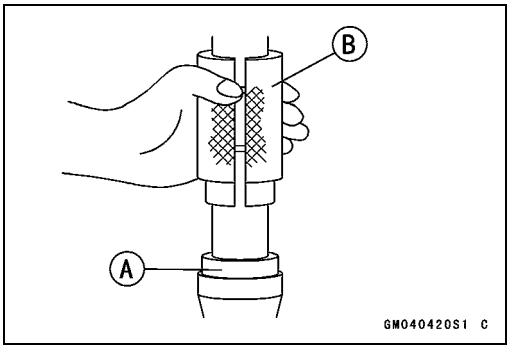
○Install the cylinder base starting with its stepped end.

- Insert the inner tube, cylinder unit, washer, spring, and cylinder base as a set into the outer tube.



- Install the guide bushing into the outer tube.
- After installing the washer, install the oil seal [A] by using the fork oil seal driver [B].

Special Tool - Fork Oil Seal Driver: 57001-1288



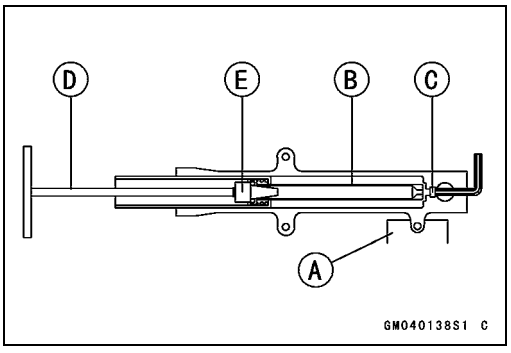
○Apply high-temperature grease to the oil seal lips.

- Install the retaining ring into the outer tube.
- Install the dust seal by hand.

- Apply non-permanent locking agent to the threads of the bottom Allen bolt [C].
- Hold the front fork horizontally in a vise [A].
- Hold the cylinder unit [B] with the special tools and tighten the bottom Allen bolt to secure the cylinder in place.

Torque - Front Fork Bottom Allen Bolt: 30 N·m (3.1 kgf·m, 22 ft·lb)

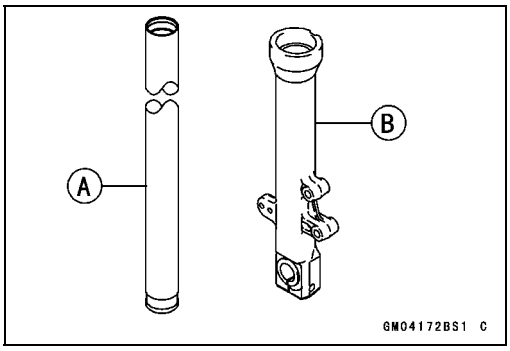
Special Tools - Fork Cylinder Holder Handle: 57001-183 [D]
Fork Cylinder Holder Adapter: 57001-1057 [E]



- Pour in the specified type of oil (see Front Fork Oil Change).

Front Fork

Inner Tube/Outer Tube Inspection



- Visually inspect the inner tube [A] and repair any nicks or rust by using an oil stone.

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

CAUTION

If the inner tube is badly nicked or bent, replace it. Excessive bending, followed by subsequent straightening, can weaken the inner tube.

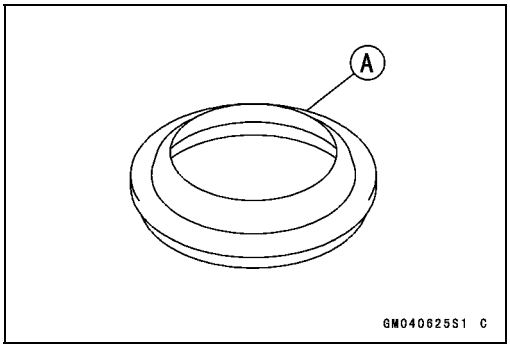
- Place the inner tube in the outer tube [B] and pump them back and forth manually to check for smooth operation.

★If the movement is not smooth, replace both the inner tube and the outer tube.

⚠ WARNING

Replace the inner and outer tubes with new ones if they are bent because it is dangerous to use them by repairing them.
Make sure to inspect the inner and outer tubes of the other side.

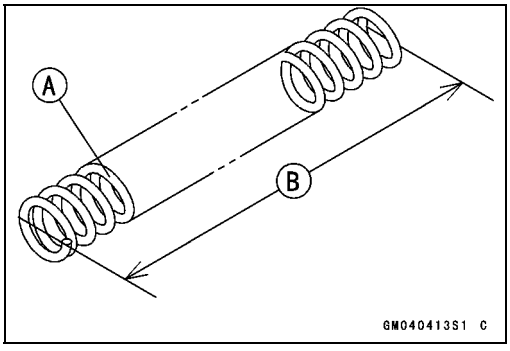
Dust Seal Inspection



- Inspect the dust seal [A] for any signs of deterioration or damage.

★Replace it if necessary.

Fork Spring Inspection



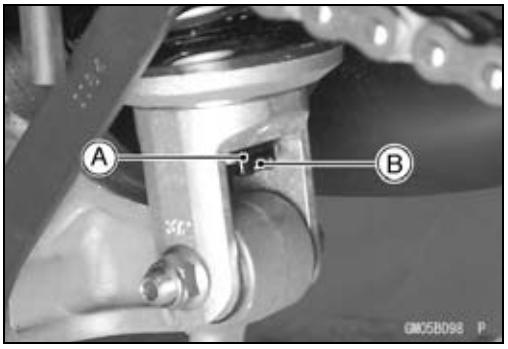
- Measure the free length [B] of the fork spring [A].

★If the measured length is shorter than the service limit, the spring must be replaced. If the free length of the 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 to ensure stability.

Fork Spring Free Length
Standard: 277.2 mm (10.91 in.)
Service Limit: 272 mm (10.71 in.)

Rear Shock Absorber

Rebound Damping Force Adjustment



- Turn the damper adjuster [A] to adjust the rebound damping.

○Align the numbered mark [B] of the adjuster.

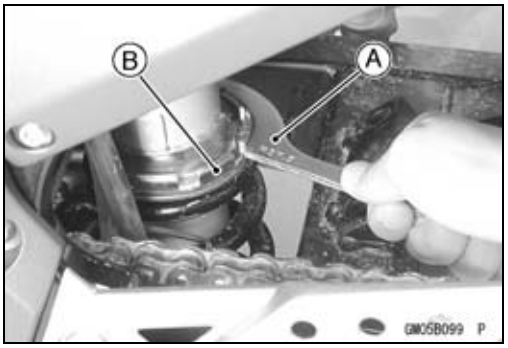
○The standard adjuster setting for average-build rider of 68 kg (150 lb) with no passenger and no accessories is position "2".

★If the damper's effectiveness is not suited to the operating conditions, adjust it to an appropriate position by referring to the table below.

Rebound Damping Adjustment

Adjuster Position	Damping Force	Shock Absorber Hardness	Load	Road Conditions	Driving Speed
1	Weak	Soft	Light	Good	Street
2	↑	↑	↑	↑	↑
3	↓	↓	↓	↓	↓
4	Strong	Hard	Heavy	Bad	Highway

Spring Preload Adjustment



- Remove the mud guard (see Frame chapter).
- Using the hook wrench [A], turn the adjusting nut [B] to adjust the spring preload.

○The standard adjuster setting for average-build rider of 68 kg (150 lb) with no passenger and no accessories is 4th position.

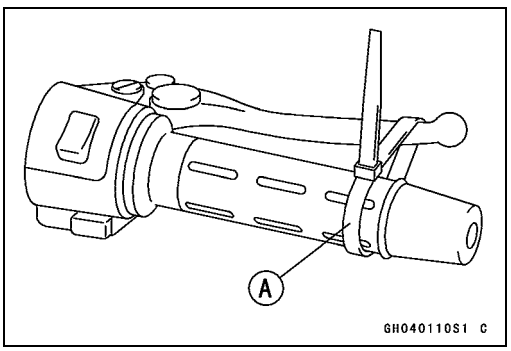
Spring Preload Setting
Standard Position: 4th position
Adjustable Range: 1st to 7th position

- If the compression of the spring is not suited to the operating conditions, adjust it to an appropriate position by referring to the table below.

Spring Preload Adjustment

Adjuster Position	Damping Force	Shock Absorber Hardness	Load	Road Conditions	Driving Speed
1st	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
7th	Strong	Hard	Heavy	Bad	Highway

Rear Shock Absorber Removal



- Using the jack, raise the rear wheel off the ground.

Special Tool - Jack: 57001–1238

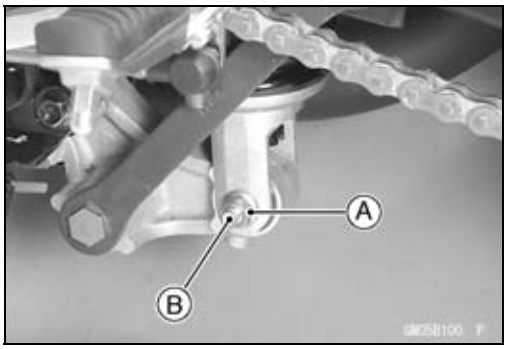
- Squeeze the brake lever slowly and hold it with a band [A].

⚠ WARNING

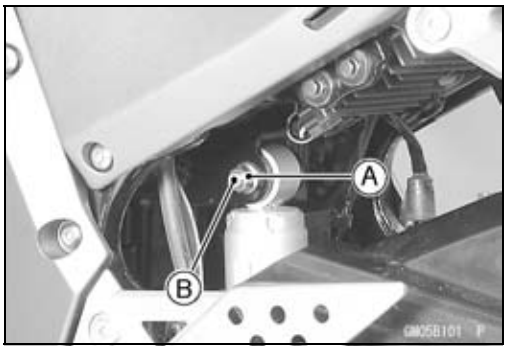
Be sure to hold the front brake when removing the shock absorber, or the motorcycle may tall over. It could cause an accident and injury.

Rear Shock Absorber

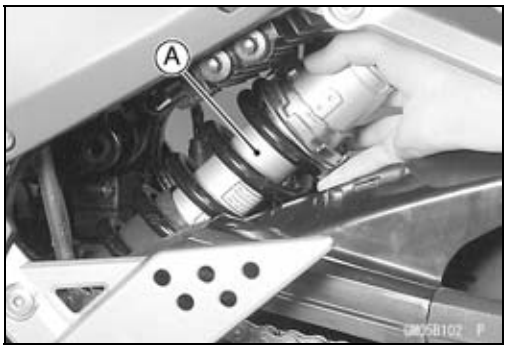
- Remove:
  Lower Shock Absorber Nut [A]
  Lower Shock Absorber Bolt [B]



- Remove:
  Upper Shock Absorber Nut [A]
  Upper Shock Absorber Bolt [B]



- Remove the shock absorber [A] from upside.



Rear Shock Absorber Installation

- Tighten:

Torque - Rear Shock Absorber Nuts: 34 N·m (3.5 kgf·m, 25 ft·lb)

Rear Shock Absorber Inspection

- Remove the rear shock absorber.
- Visually inspect the following items.
  Smooth Stroke
  Oil Leakage
  Crack or Dent

★If there is any damage to the rear shock absorber, replace it.

- Visually inspect the rubber bushing.

★If it show any signs of damage, replace it.

Swingarm

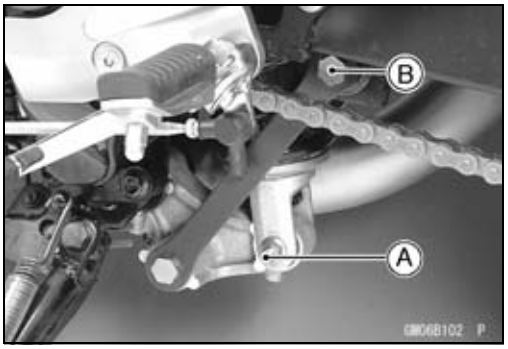
Swingarm Removal

- Raise the rear wheel off the ground with jack.

  Special Tool - Jack: 57001–1238

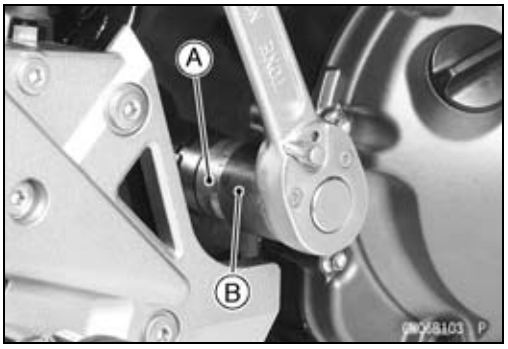
- Remove:
  Chain Cover (see Final Drive chapter)
  Mud Guard (see Frame chapter)
  Brake Hose Clamp [A]
  Rear Wheel (see Wheels/Tires chapter)

Lower Shock Absorber Nut and Bolt [A]
Upper Tie-rod Nut and Bolt [B]

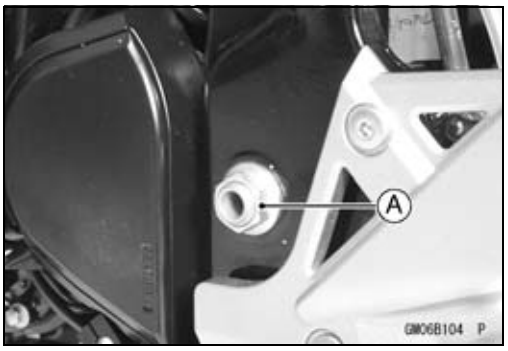


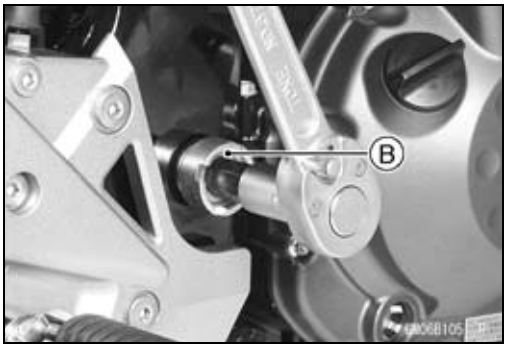
- Remove the both frame cover (see Frame chapter).
- Unscrew the swingarm pivot locknut [A], using the nut wrench [B].

  Special Tool - Swingarm Pivot Nut Wrench: 57001–1541



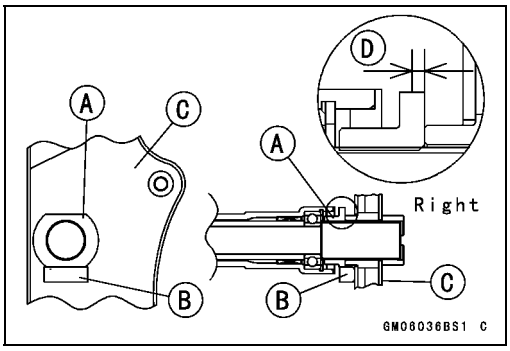
- Unscrew the swingarm pivot nut [A] and loosen the swingarm pivot shaft [B].
- Pull off the pivot shaft and remove the swingarm.





Swingarm

Swingarm Installation



○Place the collar [A] on the stopper [B] inside the frame [C].
- Insert the pivot shaft into the frame from the right side.
- Tighten the pivot shaft so that the clearance [D] between the collar and the frame come to zero mm.
- Tighten:

Torque - Swingarm Pivot Shaft Nut: 108 N·m (11 kgf·m, 80 ft·lb)

- Tighten the pivot locknut, using the socket wrench.

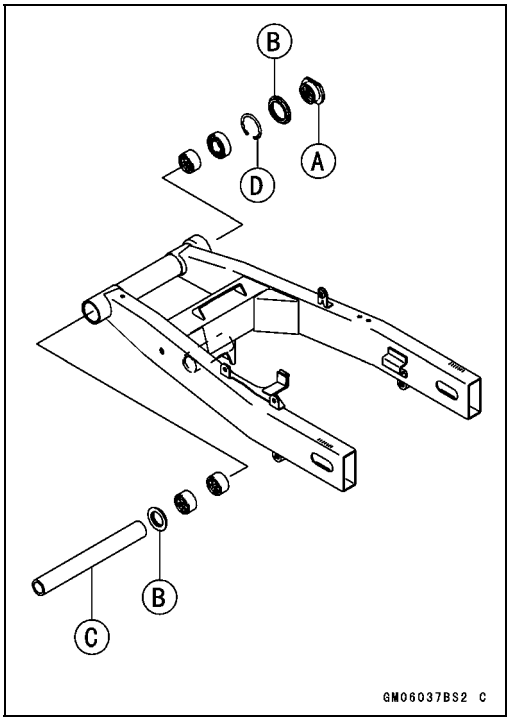
Special Tool - Swingarm Pivot Nut Wrench: 57001–1541

Torque - Swingarm Pivot Shaft Locknut: 98 N·m (10 kgf·m, 72 ft·lb)

- Install the removed parts (see appropriate chapters).

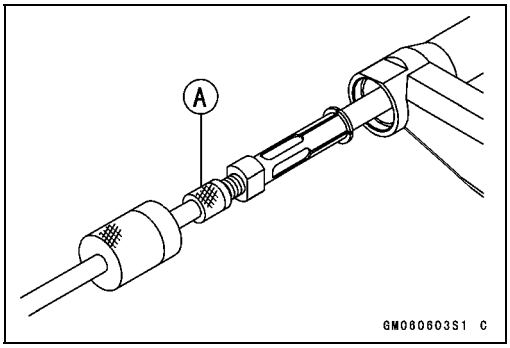
Swingarm Bearing Removal

- Remove:
  Swingarm
  Collar [A]
  Grease Seals [B]
  Sleeve [C]
  Circlip (right side) [D]



- Remove the ball bearing and needle bearings.

Special Tool - Oil Seal & Bearing Remover: 57001–1058 [A]

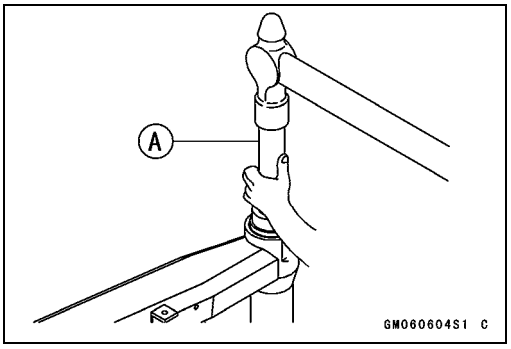


Swingarm

Swingarm Bearing Installation

- Install the needle bearings so that the manufacturer's marks face in.
- Install the ball bearing so that the manufacturer's marks faces out.

Special Tool - Bearing Driver Set: 57001–1129 [A]



Swingarm Bearing, Sleeve Inspection

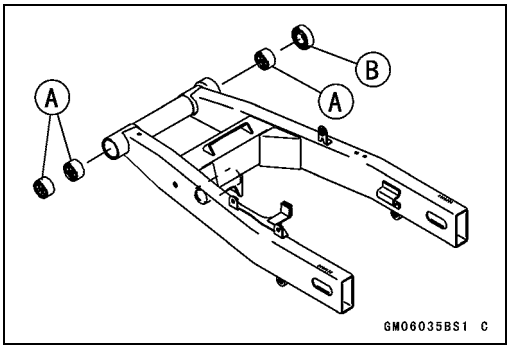
CAUTION

Do not remove the bearings for inspection. Remove may damage them.

- Inspect the needle bearings [A] and ball bearing [B] installed in the swingarm.

○The rollers and ball in bearing normally wear very little, and wear is difficult to measure. Instead of measuring, visually inspect the bearing for abrasion, discoloration, or other damage.

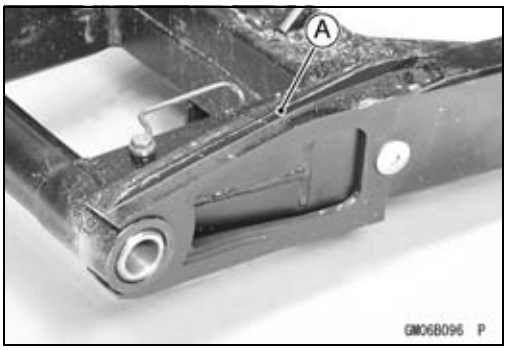
★If the needle bearings, ball bearing, and sleeve show any sings of abnormal wear, discoloration, or damage. replace them as a set.



Chain Guide Inspection

- Visually inspect the chain guide [A].

★Replace the chain guide if it shows any signs of abnormal wear or damage.



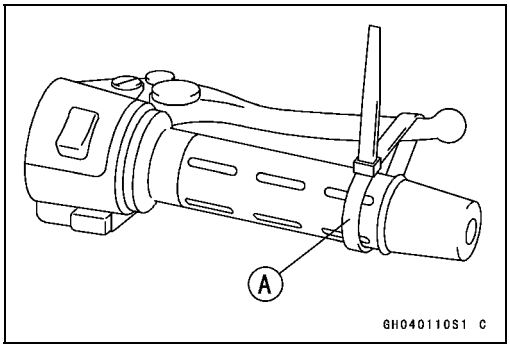
Tie-rod, Rocker Arm

Tie-rod Removal

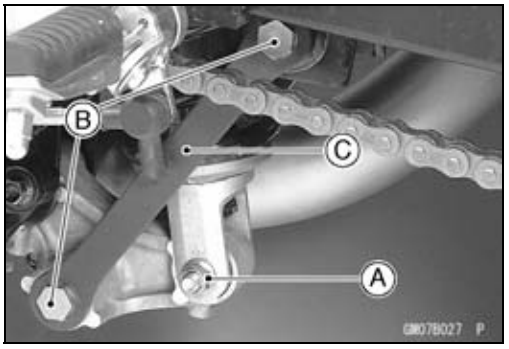
- Remove the side stand (see Frame chapter).
- Using the jack, raise the rear wheel off the ground.

Special Tool - Jack: 57001–1238

- Squeeze the brake lever slowly and hold it with a band [A].



- Remove:
  Lower Rear Shock Absorber Bolt and Nut [A]
  Upper and Lower Tie-rod Nuts and Bolts [B]
  Tie-rods [C]



Tie-rod Installation

- Install the tie-rods so that the marked side faces the bolts and nuts.
- Tighten:

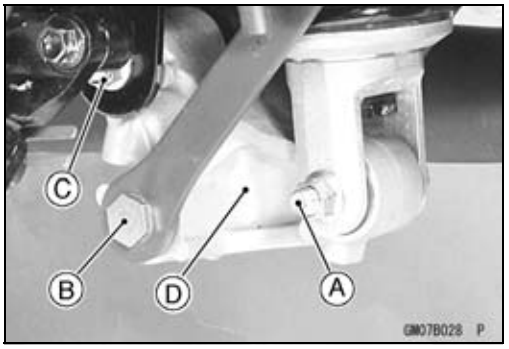
Torque - Tie-rod Nuts: 59 N·m (6.0 kgf·m, 43 ft·lb)
Rear Shock Absorber Nut: 34 N·m (3.5 kgf·m, 25 ft·lb)

Rocker Arm Removal

- Using the jack, raise the rear wheel off the ground.

Special Tool - Jack: 57001–1238

- Squeeze the brake lever slowly and hold it with a band.
- Remove:
  Lower Rear Shock Absorber Nut and Bolt [A]
  Lower Tie-rod Nut and Bolt [B]
  Rocker Arm Nut [C] and Bolt
  Rocker Arm [D]



Rocker Arm Installation

- Tighten:

Torque - Rocker Arm Nut: 34 N·m (3.5 kgf·m, 25 ft·lb)
Tie-rod Nut: 59 N·m (6.0 kgf·m, 43 ft·lb)
Rear Shock Absorber Nut: 34 N·m (3.5 kgf·m, 25 ft·lb)

Tie-rod, Rocker Arm

Rocker Arm/Tie-rod Bearing, Sleeve Inspection

- Visually inspect the rocker arm/tie-rod sleeves and needle bearings.
- The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.

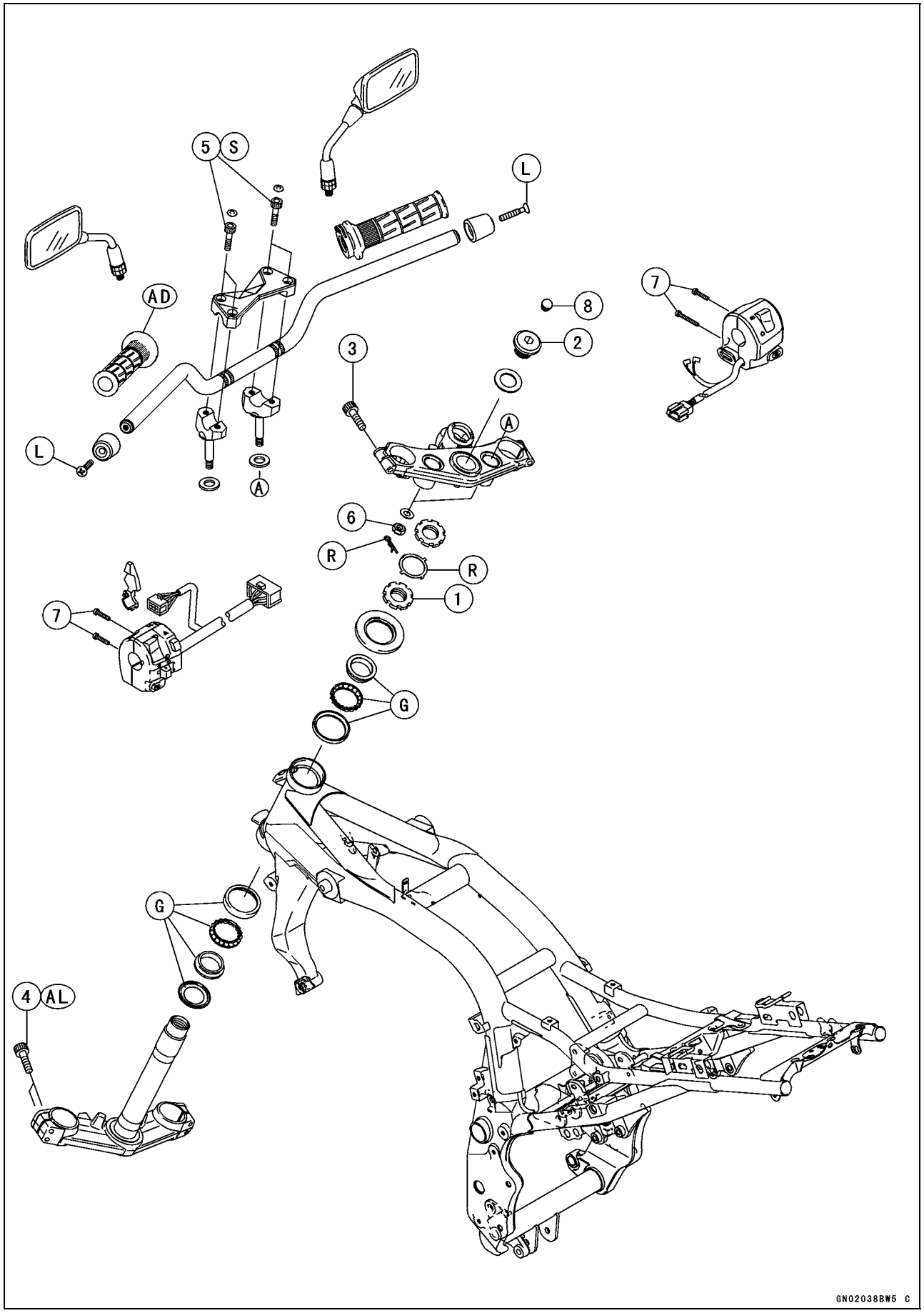
★If there is any doubt as to the condition of any of the needle bearings or sleeve, replace the sleeve, and needle bearings as a set.

Steering

Table of Contents

Exploded View 14-2
Special Tools 14-4
Steering 14-5
  Steering Inspection 14-5
  Steering Adjustment 14-5
Steering Stem 14-6
  Stem, Stem Bearing Removal 14-6
  Stem, Stem Bearing Installation 14-7
  Stem Bearing Lubrication 14-8
  Steering Stem Warp 14-8
Handlebar 14-9
  Handlebar Removal 14-9
  Handlebar Installation 14-9

Exploded View



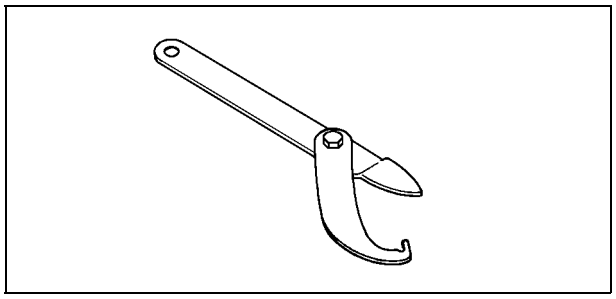
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Steering stem nut	27	2.8	20	
2	Steering stem head bolt	108	11	80	
3	Front fork clamp bolts (Upper)	20	2.0	14	
4	Front fork clamp bolts (Lower)	20	2.0	14	AL
5	Handlebar clamp bolts	25	2.5	18	S
6	Handlebar lower clamp nuts	34	3.5	25	
7	Switch housing screws	3.5	0.36	31 in·lb	

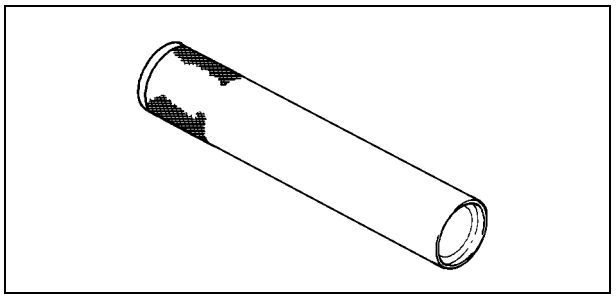
8. Steering stem head bolt plug
AD: Apply adhesive.
AL: Tighten the two clamp bolts alternately two times to ensure even tighten torque.
G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts
S: Follow the specific tightening sequence.

Special Tools

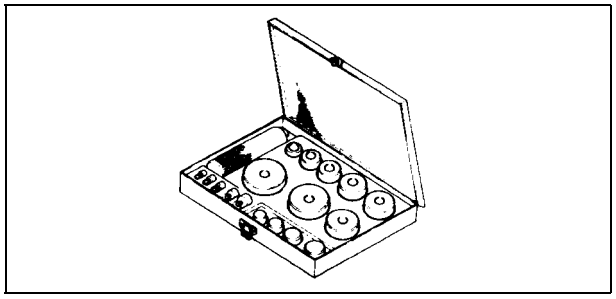
Steering Stem Nut Wrench:
57001–1100



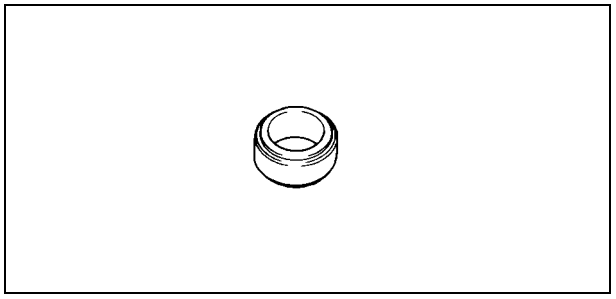
Steering Stem Bearing Driver:
57001–1344



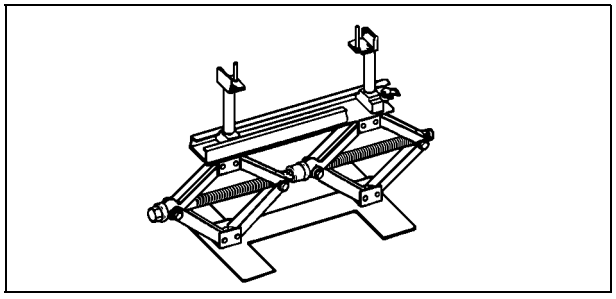
Bearing Driver Set:
57001–1129



Steering Stem Bearing Driver Adapter:
57001–1345



Jack:
57001–1238



Steering

Steering Inspection

● Refer to the Steering in the Periodic Maintenance chapter.

Steering Adjustment

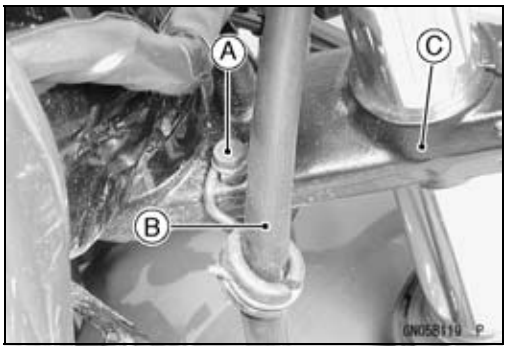
● Refer to the Steering in the Periodic Maintenance chapter.

Steering Stem

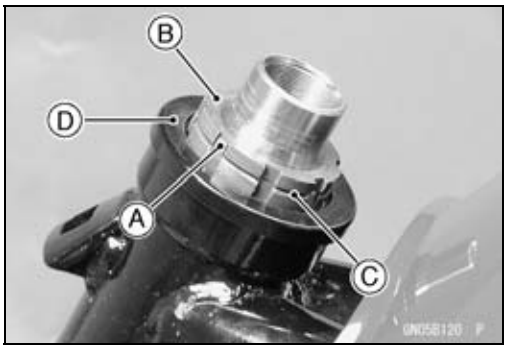
Stem, Stem Bearing Removal

- Remove:
  Inner Cover (see Frame chapter)
  Fairing and Bracket (see Frame chapter)
  Front Wheel (see Wheels/Tires chapter)
  Handlebar (see Handlebar Removal)
  Steering Stem Head Bolt Plug
  Steering Stem Head Bolt [A] and Washer
  Front Fork Clamp Bolts (Lower) (Loosen)
  Steering Stem Head

- Remove the brake hose clamp bolt [A] and take the hose [B] off the steering stem [C].
- Remove the front fork (see Suspension chapter).



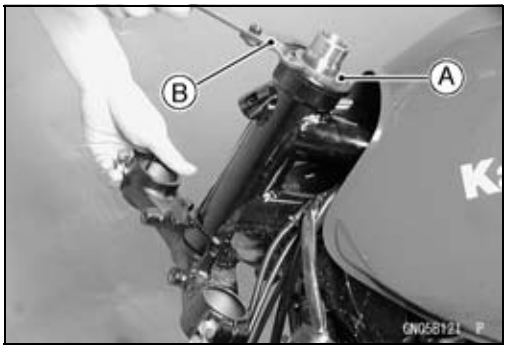
- Bend the claw washer tabs [A].
- Pushing up the stem base, and remove the steering stem locknut [B] and claw washer [C].
  Stem Cap [D]



- Remove the steering stem nut [A].

Special Tool - Steering Stem Nut Wrench: 57001–1100 [B]

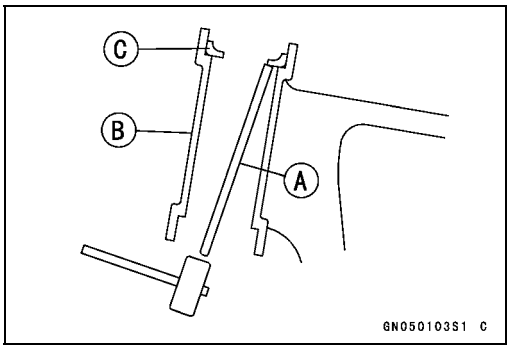
- Remove the stem cap.
- Remove the upper stem bearing inner race.



- To remove the bearing outer races [C] pressed into the head pipe [B], insert a bar [A] into the recesses of head pipe, and applying it to both recess alternately hammer it to drive the race 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.*



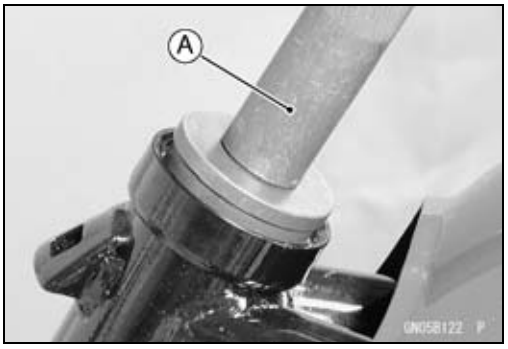
- Remove the lower bearing inner race which is pressed onto the steering stem with a suitable commercially available chisel.

Steering Stem

Stem, Stem Bearing Installation

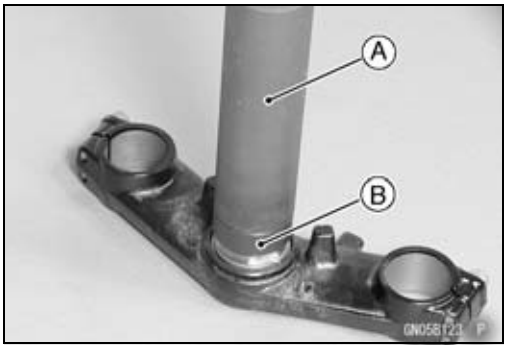
- Replace the bearing outer races with new ones.
- Apply grease to the outer races, and drive them into the head pipe at the same time.

Special Tool - Bearing Driver Set: 57001–1129 [A]

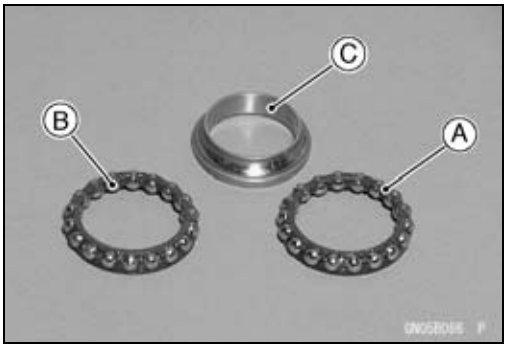


- Replace the bearing inner races and oil seal with new ones.
- Apply grease to the oil seal.
- Drive the lower ball bearing inner race applied the grease onto the stem.

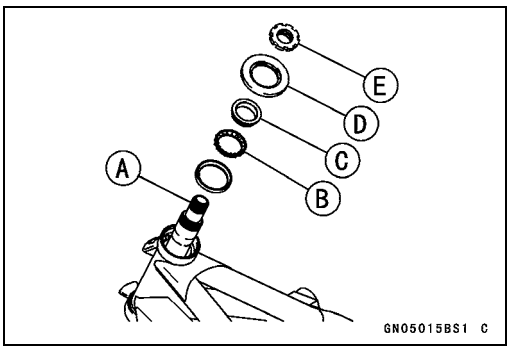
Special Tools - Steering Stem Bearing Driver: 57001–1344 [A]
Steering Stem Bearing Driver Adapter: 57001–1345 [B]



- Apply grease the lower ball bearing [A] and install it onto the stem.
- Apply grease to the upper ball bearing [B] and inner race [C].



- Install the stem [A] through the head pipe and install the ball bearing [B] and inner race [C] on it.
- Install the stem cap [D] and steering stem nut [E].



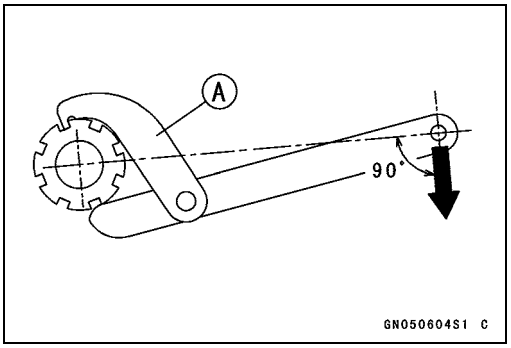
- Settle the inner races in place as follows:

○Tighten the steering stem nut with 39 N·m (4.0 kgf·m, 29 ft·lb) of torque first, and loosen it a fraction of a turn until it turns lightly. Afterward tighten it again with specified torque using a stem nut wrench [A] in the direction shown.

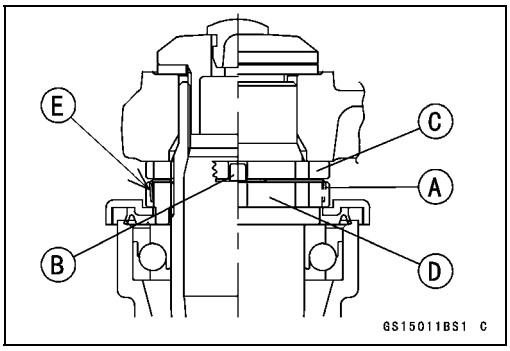
○Check that there is no play and the steering stem turns smoothly without rattles. If not, the steering stem bearings may be damaged.

Special Tool - Steering Stem Nut Wrench: 57001–1100

Torque - Steering Stem Nut: 27 N·m (2.8 kgf·m, 20 ft·lb)



Steering Stem



- Install the claw washer [A] so that its bent side [B] faces upward, and engage the bent claws with the grooves of stem locknut [C].
- Hand tighten the stem locknut until it touches the claw washer.
- Tighten the stem locknut clockwise until the claws are aligned with the grooves (ranging from 2nd to 4th) of stem nut [D], and bend the 2 claws downward [E].
- Install the stem head.
- Install the washer, and tighten the stem head bolt with specified torque.
- Install the steering stem head bolt plug.
- Install the front fork (see Suspension chapter).

NOTE

○*Tighten the fork upper clamp bolts first, next the stem head nut, last the fork lower clamp bolts.*

○*Tighten the two clamp bolts alternately two times to ensure even tightening torque.*

Torque - Steering Stem Head Bolt : 108 N·m (11 kgf·m, 80 ft·lb)
Front Fork Clamp Bolts (Upper) : 20 N·m (2.0 kgf·m, 14 ft·lb)
Front Fork Clamp Bolts (Lower) : 20 N·m (2.0 kgf·m, 14 ft·lb)

⚠ WARNING

Do not impede the handlebar turning by routing the cables, harnesses and hoses improperly (see Appendix chapter).

- Install the removed parts (see appropriate chapters).

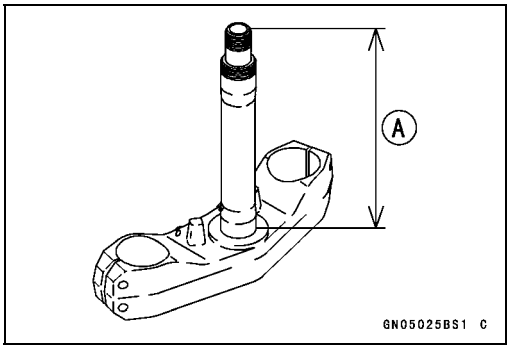
Stem Bearing Lubrication

- Refer to the Steering in the Periodic Maintenance chapter.

Steering Stem Warp

- Whenever the steering stem is removed, or if the steering cannot be adjusted for smooth action, check the steering stem for straightness.

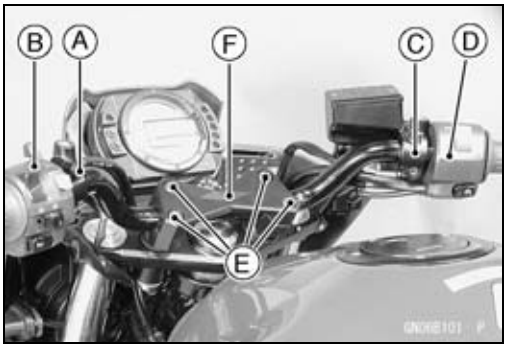
★If the steering stem [A] is bent, replace the steering stem.



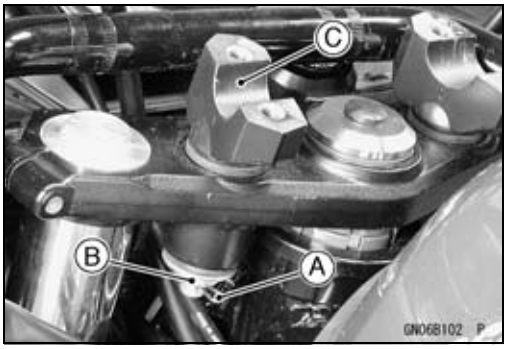
Handlebar

Handlebar Removal

- Remove:
  Handlebar Holder Plugs
  Clutch Lever Assembly [A]
  Left Handlebar Switch Housing [B]
  Front Brake Master Cylinder [C]
  Right Handlebar Switch Housing [D]
  Handlebar Holder Bolts [E]
- Remove the handlebar holder [F] and then pull out the handlebar.



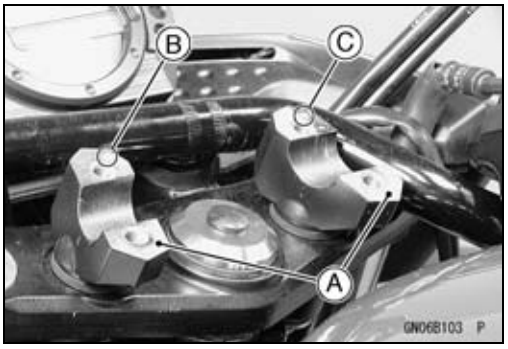
- Remove the cotter pins [A].
- Remove the mounting nuts [B], washers and handlebar lower clamps [C].



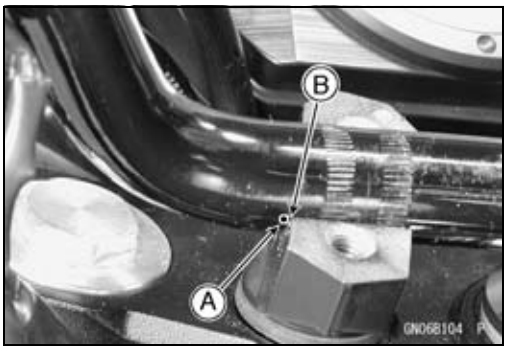
Handlebar Installation

- Install the handlebar lower clamps [A], noting the letters "L" [B] and "R" [C].
- Tighten:

Torque - Handlebar Lower Clamp Nuts: 34 N·m (3.5 kgf·m, 25 ft·lb)



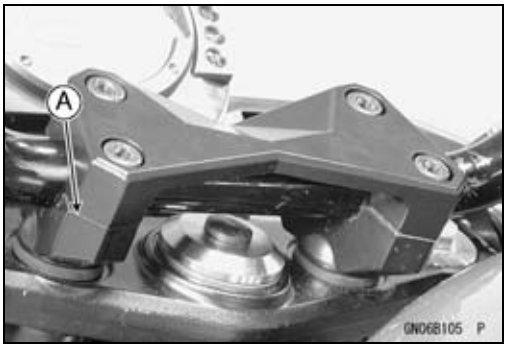
- Align the punch mark [A] on the handlebar and the corner edge [B] on the lower clamp.



- Tighten the front clamp bolts first, and then the rear clamp bolts. There will be a gap [A] at the rear part of the clamp after tightening.

Torque - Handlebar Clamp Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Install the removed parts (see appropriate chapters).

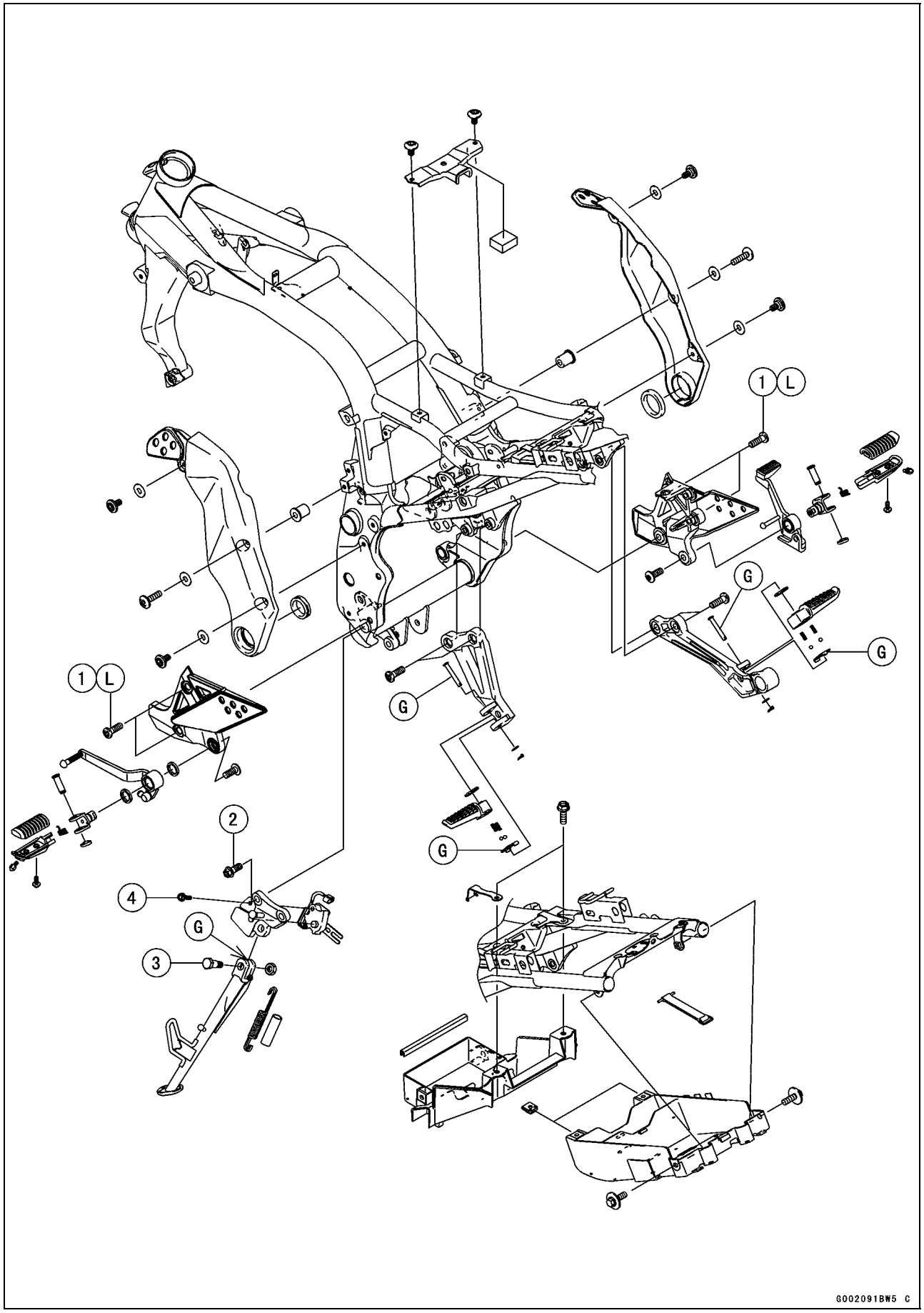


Frame

Table of Contents

Exploded View 15-2
Seats 15-7
Rear Seat Removal 15-7
Rear Seat Installation 15-7
Front Seat Removal 15-7
Front Seat Installation 15-7
Side Covers 15-8
Side Cover Removal 15-8
Side Cover Installation 15-8
Fairings 15-9
Inner Cover Removal 15-9
Inner Cover Installation 15-9
Fairing Removal 15-9
Fairing Installation 15-9
Fairing Bracket Removal 15-9
Seat Covers 15-10
Seat Cover Removal 15-10
Seat Cover Installation 15-10
Mud Guard 15-11
Mud Guard Removal 15-11
Mud Guard Installation 15-11
Fenders 15-12
Front Fender Removal 15-12
Front Fender Installation 15-12
Rear Fender Rear Removal 15-12
Rear Fender Rear Installation 15-13
Frame Cover 15-14
Frame Cover Removal 15-14
Battery Case 15-15
Battery Case Removal 15-15
Battery Case Installation 15-15
Side Stand 15-16
Side Stand Removal 15-16
Side Stand Installation 15-16
Rear View Mirrors 15-17
Rear View Mirrors Removal 15-17
Rear View Mirrors Installation 15-17
Frame 15-18
Frame Inspection 15-18

Exploded View

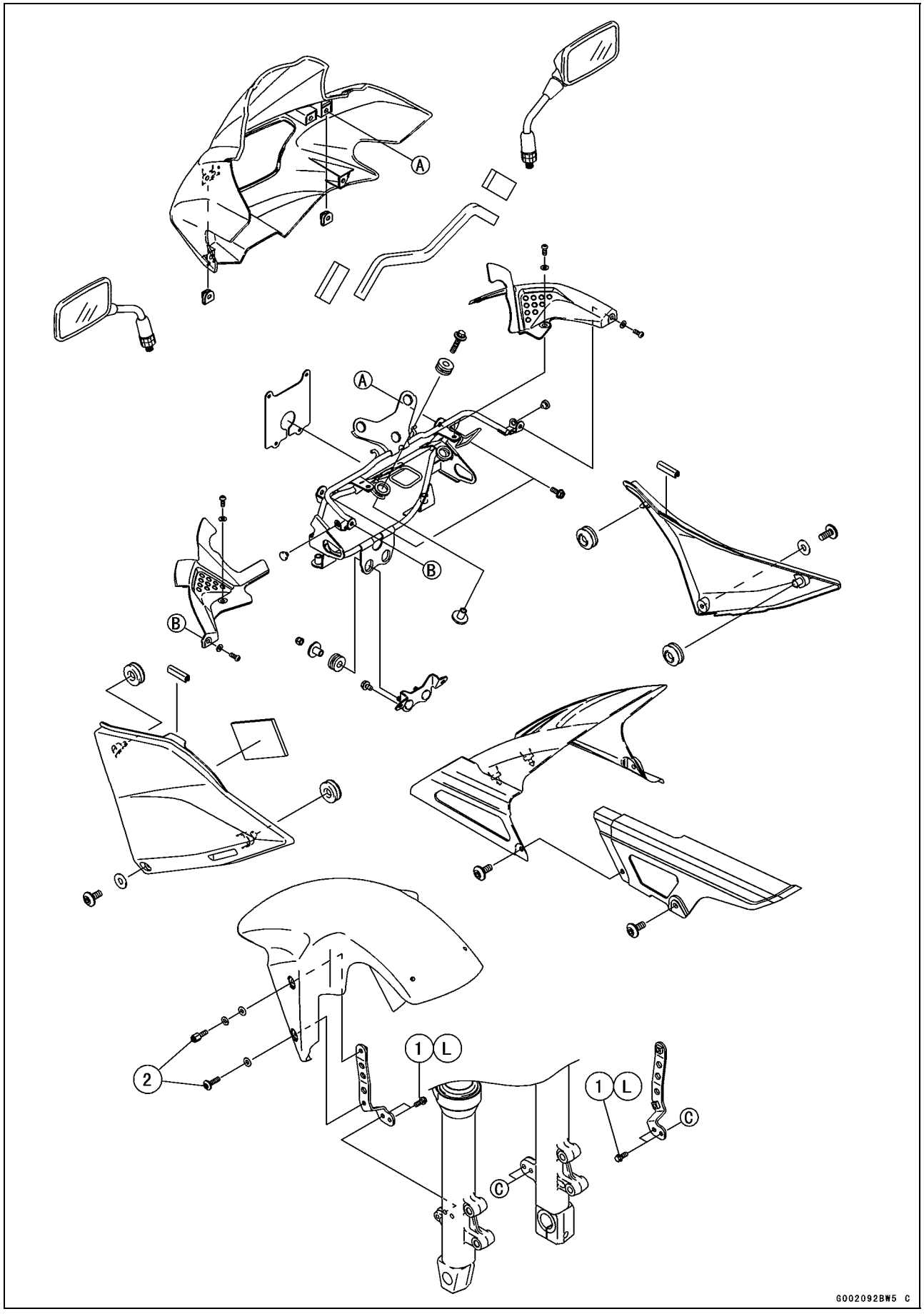


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Footpeg bracket bolts	34	3.5	25	L
2	Side stand bracket bolts	49	5.0	36	
3	Side stand bolt	44	4.5	33	
4	Side stand switch bolt	8.8	0.90	78 in·lb	

G: Apply grease.
L: Apply a non-permanent locking agent.

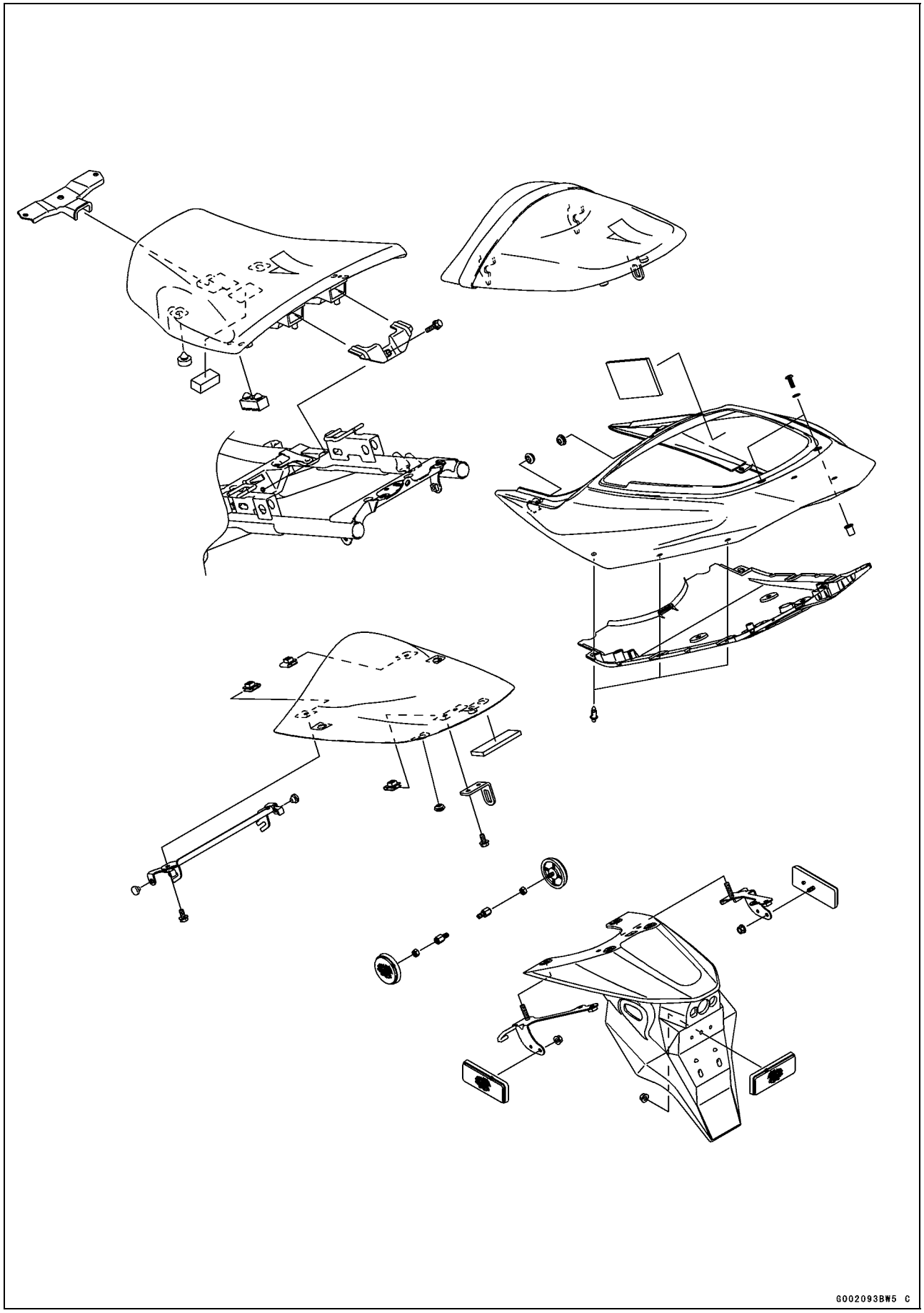
Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front fender bracket bolts	8.8	0.90	78 in·lb	L
2	Front fender bolts	3.9	0.40	35 in·lb	

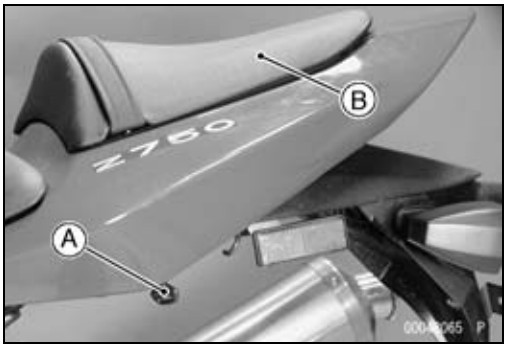
Exploded View



Seats

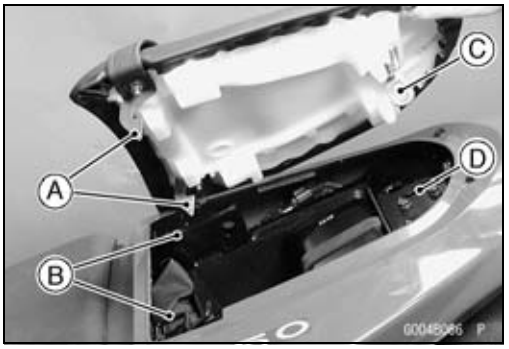
Rear Seat Removal

- Insert the ignition switch key into the seat lock [A], turning the key clockwise, pulling up on the rear of the seat [B], and pulling the seat backward.



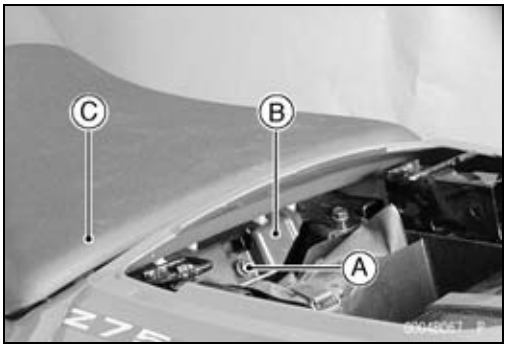
Rear Seat Installation

- Slip the rear seat hooks [A] into the hollow-cubic bracket [B] on the frame.
- Insert the seat latch [C] into the latch hole [D].
- Push down the rear part of the seat until the lock clicks.



Front Seat Removal

- Remove:
  Rear Seat (see Rear Seat Removal)
  Mounting Bolt [A]
  Seat Bracket [B]
- Remove the front seat [C] by pulling the rear of it up and backward.



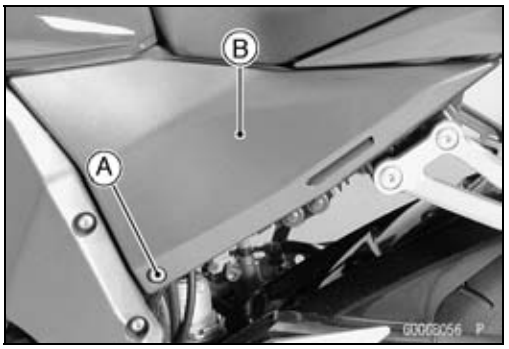
Front Seat Installation

- Slip the front seat hook [A] under the brace [B] on the fuel tank bracket.

Side Covers

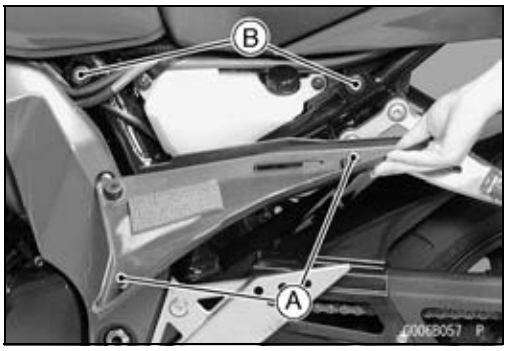
Side Cover Removal

- Remove the bolt [A].
- Pull the side cover [B] evenly outward to clear the stoppers.



Side Cover Installation

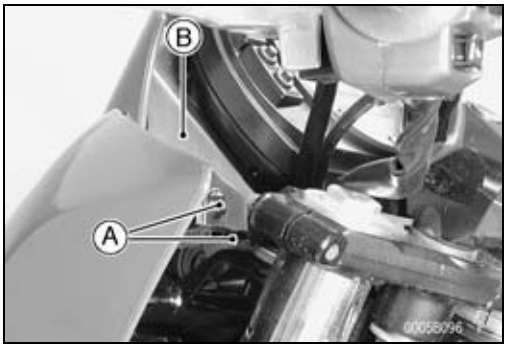
- Insert the tabs [A] into the holes [B].
- Install the bolt.



Fairings

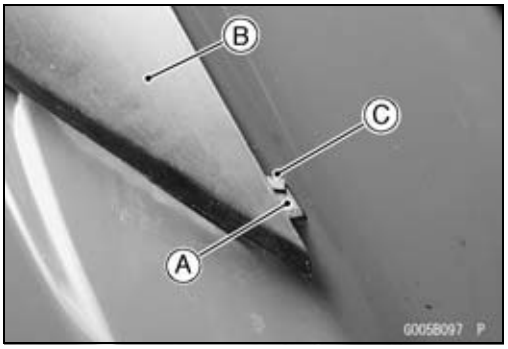
Inner Cover Removal

- Remove:
  Inner Cover Screws [A] and Washers
  Inner Cover [B]



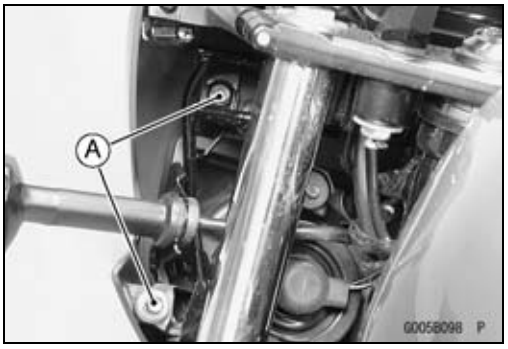
Inner Cover Installation

- Fit the projection [A] on the inner cover [B] into the hole [C] in the fairing.
- Install the washers and inner cover screws.



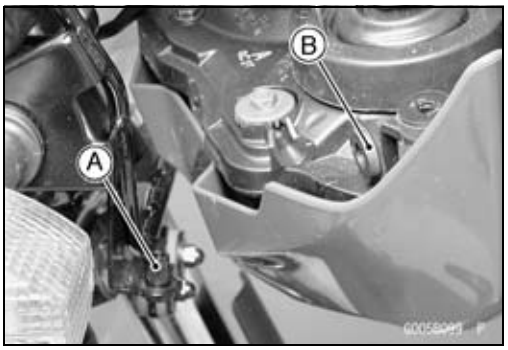
Fairing Removal

- Remove:
  Fairing Mounting Bolts [A] (both side)
  Headlight Connectors



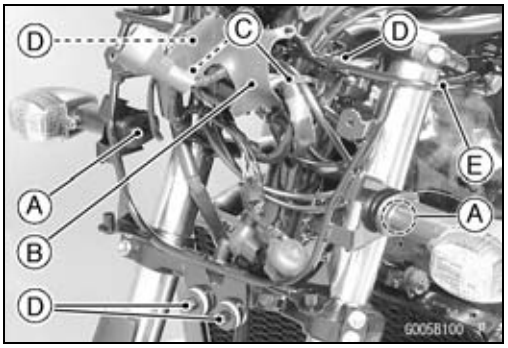
Fairing Installation

- Install the headlight connectors.
- Fit the projections [A] on the fairing bracket into the holes [B] in the fairing.
- Tighten the fairing mounting bolts.



Fairing Bracket Removal

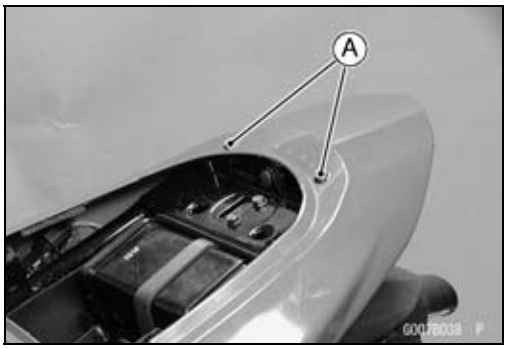
- Remove:
  Fairing (see Fairing Removal)
  Meter Unit (see Electrical System chapter)
  Turn Signal Light Nuts [A] and Lights
  Rubber Cover [B]
  Clamps [C]
  Bolts [D]
  Fairing Bracket [E]



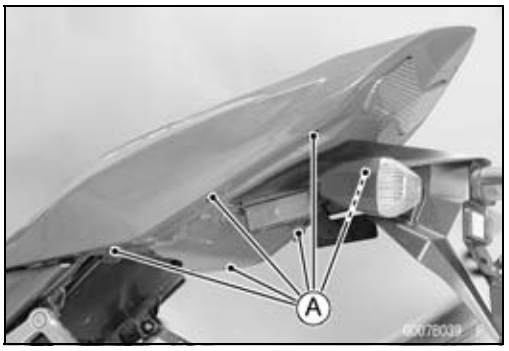
Seat Covers

Seat Cover Removal

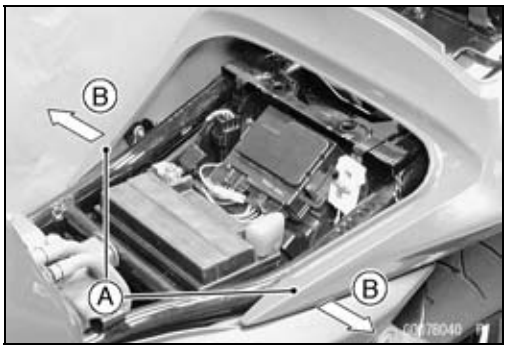
- Remove:
  Seats
  Screws [A]



- Push the central pin, and then remove the quick rivets [A].

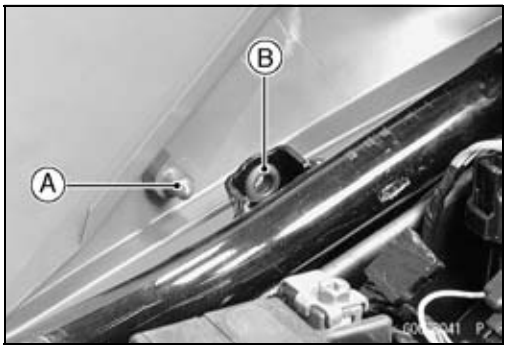


- Pull the front portions [A] of the seat cover outside [B], and then remove the seat cover backward.



Seat Cover Installation

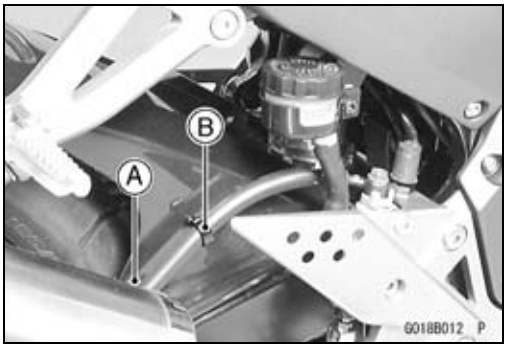
- Installation is reverse of removal.
- Put the projections [A] into the grommets [B] on the frame.



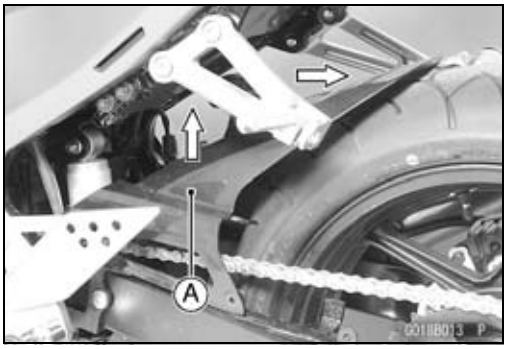
Mud Guard

Mud Guard Removal

- Remove:
  Chain Cover (see Final Drive chapter)
  Bolt [A]
  Clamp [B]

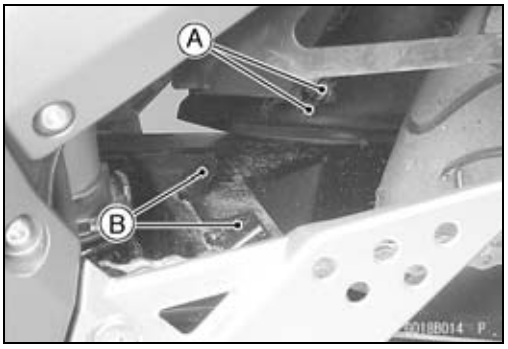


- Lift up the mud guard [A], and then pull it out backward.



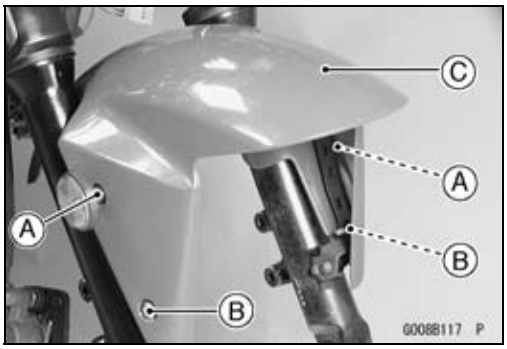
Mud Guard Installation

- Put the projections [A] into the grommets [B].



Fenders

Front Fender Removal



- Remove:
  Front Wheel (see Wheels/Tires chapter)
  Brake Hose Clamps
  Front Reflector Bolts [A]
  Bolts [B] (both side)
- Remove the front fender [C].

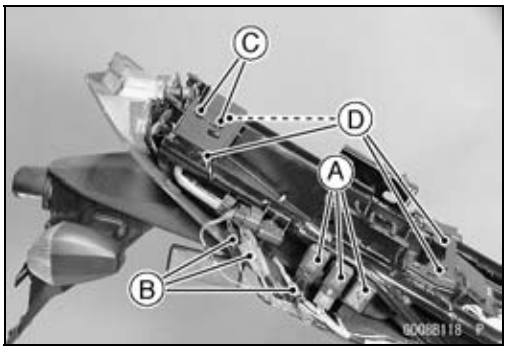
Front Fender Installation

- Apply a non-permanent locking agent to the threads of the bracket bolts.
- Tighten:

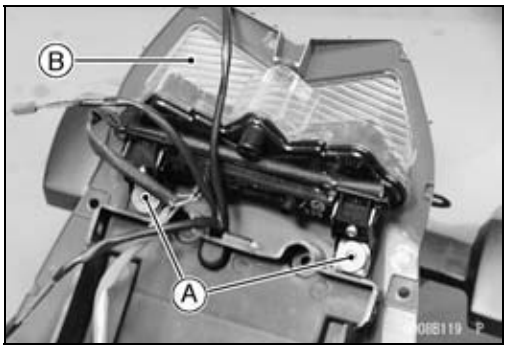
Torque - Front Fender Bracket Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)
Front Fender Bolts: 3.9 N·m (0.40 kgf·m, 35 in·lb)

- Install the brake hose clamps to the front fender holes.
- Install the front wheel (see Wheels/Tires chapter).

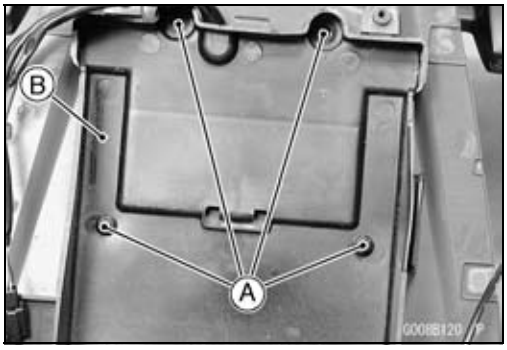
Rear Fender Rear Removal



- Remove:
  Seats
  Seat Cover
  Diodes [A] (pull out)
  Stop and Turn Signal Light Lead Connectors [B]
  Seat Lock Mounting Bolts [C]
  Rear Fender Assy Bolts [D]



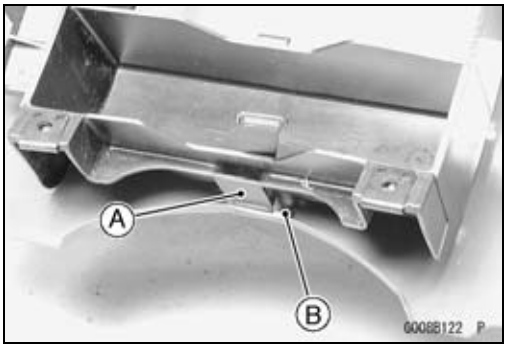
- Remove:
  Screws [A] and Washers
  Tail-Lamp Assembly [B]



- Remove:
  Bolts [A]
  Storage Compartment [B]

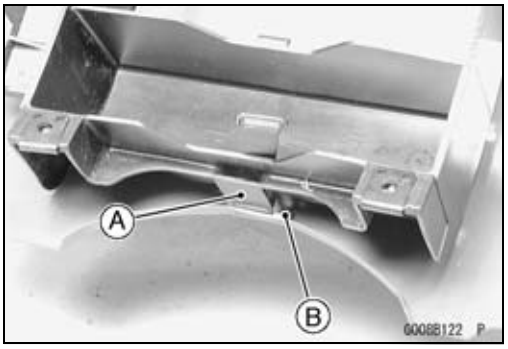
Fenders

- Remove:
  Quick Rivets [A]
  Rear Fender Rear [B]

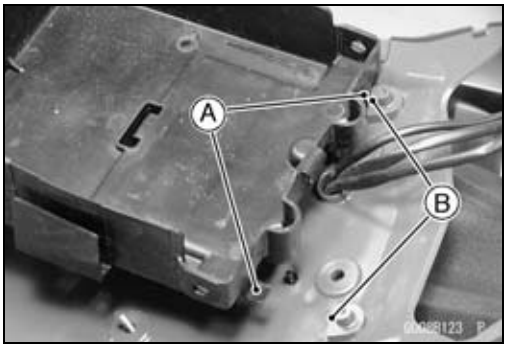


Rear Fender Rear Installation

- Put the projection [A] into the hole [B].

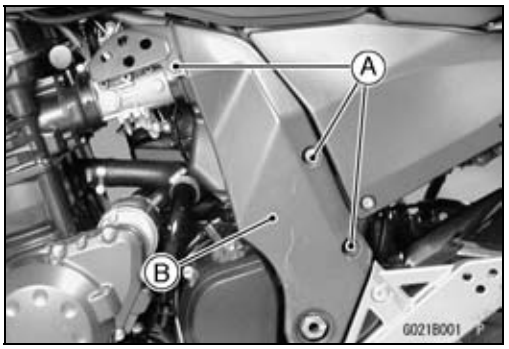


- Put the projections [A] into the holes [B].
- Installation is reverse of removal.



Frame Cover

Frame Cover Removal



- Remove:
  Bolts [A]
  Frame Cover [B] (both side)

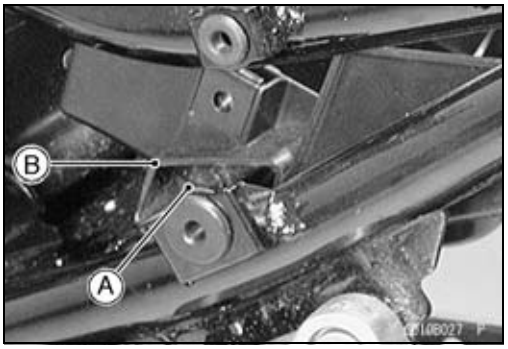
Battery Case

Battery Case Removal

- Remove:
  Seats
  Seat Cover
  Rear Fender Assy
  Side Covers
  Battery
  Reserver Tank Screws
- Pull out the battery case [A] backward.

Battery Case Installation

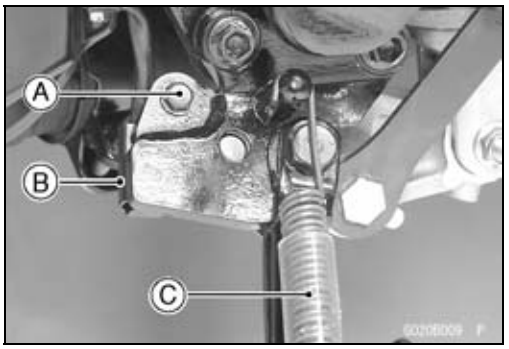
- Put the battery case attachments [A] at the projections [B] on the frame.



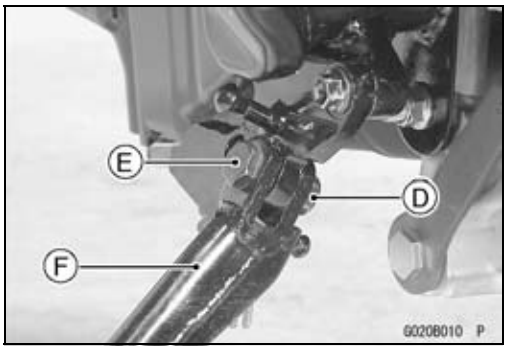
Side Stand

Side Stand Removal

- Raise the rear wheel off the ground with the stand.
- Remove:
  Side Stand Switch Bolt [A]
  Side Stand Switch [B]
  Spring [C]



Side Stand Nut [D]
Side Stand Bolt [E]
Side Stand [F]



Side Stand Installation

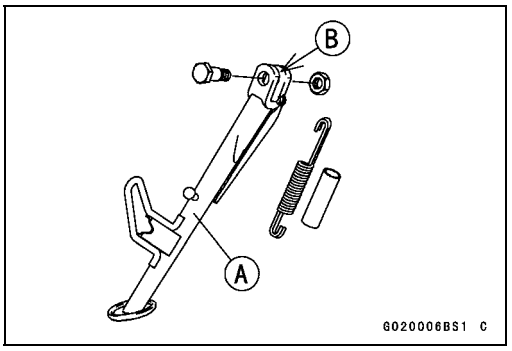
- Apply grease to the sliding area [B] of the side stand [A].
- Tighten the bolt and lock them with the nut.

Torque - Side Stand Bolt: 44 N·m (4.5 kgf·m, 33 ft·lb)

- Hook the spring
- Install the side stand switch.

○Apply a non-permanent locking agent to the thread of the switch bolt.

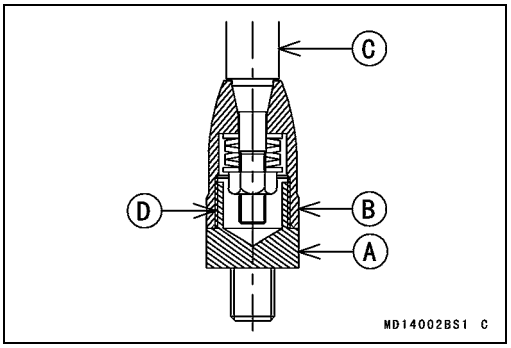
Torque - Side Stand Switch Bolt: 8.8 N·m (0.90 kgf·m, 78 in·lb)



Rear View Mirrors

Rear View Mirrors Removal

● Loosen the lower hexagonal area [A] for tightening to remove the rear view mirror from the holder.



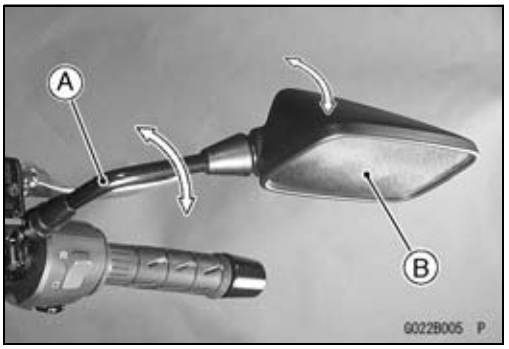
CAUTION

Do not force to tighten and/or loosen the upper hexagonal area (Adapter) [B] with a pair of spanners. Disassembly of this area is Not Available. Non-permanent locking agent [D] is already applied to the threads of this inner area. Forcible loosening may damage the adapter and/or the turning mechanism of the stay [C].

Rear View Mirrors Installation

● Screw the mounting area of the right rear view mirror into the holder all the way, and tighten the lower hexagonal area for tightening securely.
  Lower Hexagonal Area for Tightening [A]
  Upper Hexagonal Area (Adapter) [B]
  Rear View Mirror (Right) [C]

● Turn the stay [A] to assure the safe conditions of the rear with the operator sat on the motorcycle.
● Adjust the rear view mirror slightly with its mirror [B].
○Installation and adjustment of the left side are common with those of the right side. Follow the procedure specified at the right side.



Frame

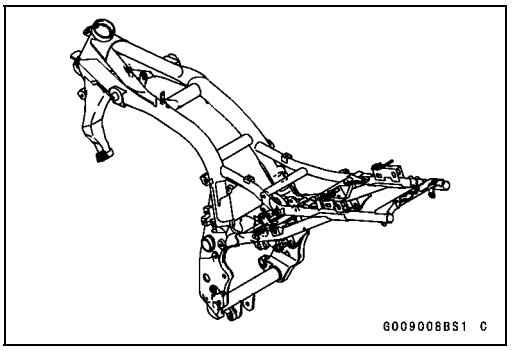
Frame Inspection

- Visually inspect the frame for cracks, dents, bending, or warp.

○If there is any damage to the frame, replace it.

⚠ WARNING

A repaired frame may fail in use, possibly causing an accident. If the frame is bent, dented, cracked, or warped, replace it.



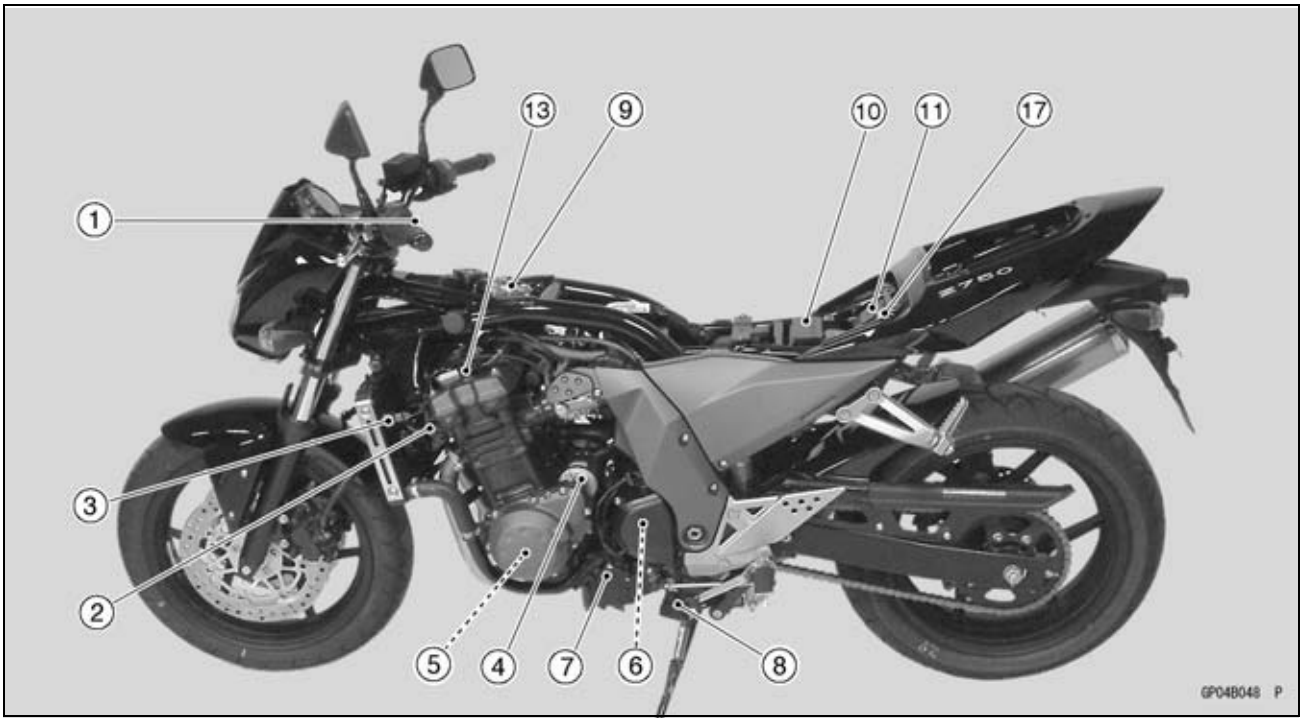
Electrical System

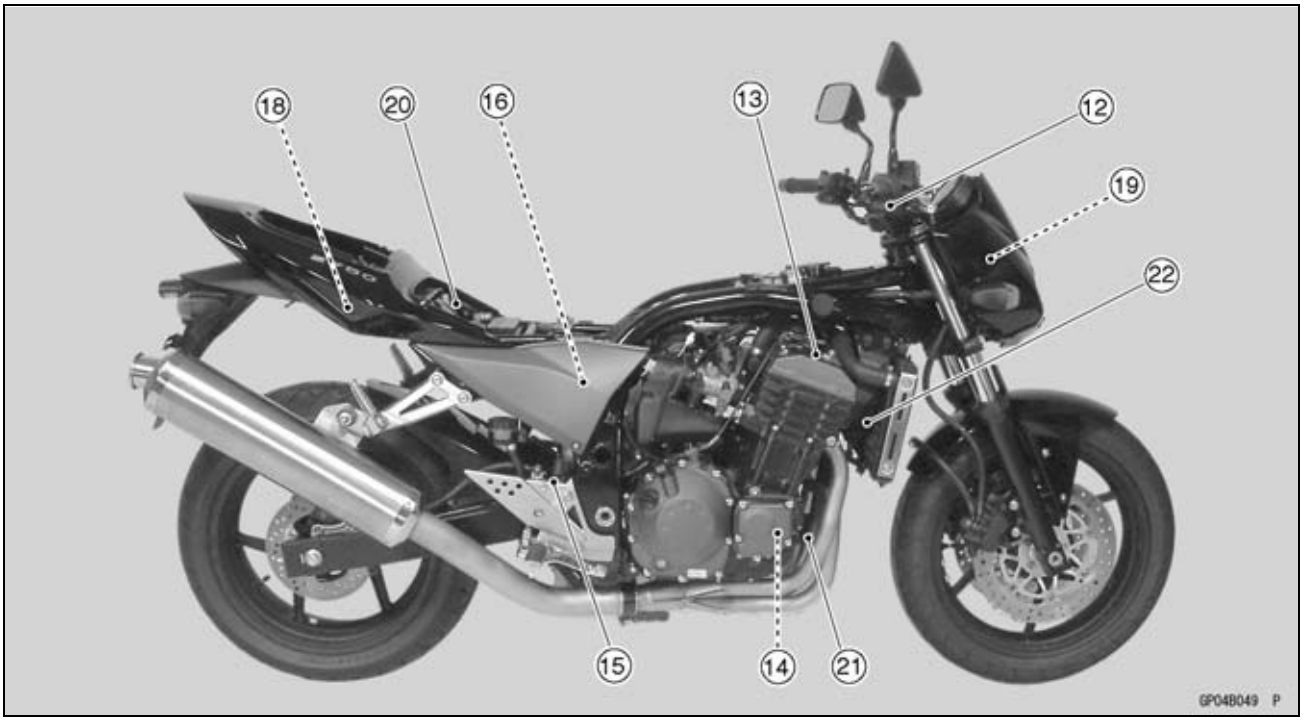
Table of Contents

Parts Location 16-3
Exploded View 16-4
Specifications 16-10
Special Tools and Sealant 16-11
Wiring Diagram (Canada) 16-12
Wiring Diagram (Australia) 16-14
Wiring Diagram (Other than Canada, Australia and Malaysia) 16-16
Wiring Diagram (Malaysia) 16-18
Precautions 16-20
Electrical Wiring 16-22
  Wiring Inspection 16-22
Battery 16-23
  Battery Removal 16-23
  Battery Installation 16-23
  Electrolyte Filling 16-23
  Initial Charge 16-25
  Precautions 16-26
  Interchange 16-27
  Charging Condition Inspection 16-27
  Refreshing Charge 16-27
Charging System 16-29
  Alternator Cover Removal 16-29
  Alternator Cover Installation 16-29
  Stator Coil Removal 16-29
  Stator Coil Installation 16-30
  Alternator Rotor Removal 16-30
  Alternator Rotor Installation 16-30
  Alternator Inspection 16-32
  Regulator/Rectifier Inspection 16-33
  Charging Voltage Inspection 16-35
Ignition System 16-37
  Crankshaft Sensor Removal 16-37
  Crankshaft Sensor Installation 16-38
  Crankshaft Sensor Inspection 16-39
  Crankshaft Sensor Peak Voltage Inspection 16-39
  Timing Rotor Removal 16-40
  Timing Rotor Installation 16-40
  Camshaft Position Sensor Removal 16-40
  Camshaft Position Sensor Installation 16-40
  Camshaft Position Sensor Inspection 16-41
  Camshaft Position Sensor Peak Voltage Inspection 16-41
  Stick Coil (Ignition Coil together with Spark Plug Cap) Removal 16-42
  Stick Coil (Ignition Coil together with Spark Plug Cap) Installation 16-42
  Stick Coil (Ignition Coil together with Spark Plug Cap) Inspection 16-43
  Stick Coil Primary Peak Voltage 16-43
  Spark Plug Removal 16-44

Spark Plug Installation 16-44
Spark Plug Inspection 16-44
Spark Plug Gap Inspection 16-44
Interlock Operation Inspection 16-45
IC Igniter Inspection 16-46
Electric Starter System 16-49
Starter Motor Removal 16-49
Starter Motor Installation 16-49
Starter Motor Disassembly 16-49
Starter Motor Assembly 16-50
Brush Inspection 16-51
Commutator Cleaning and Inspection 16-51
Armature Inspection 16-51
Brush Lead Inspection 16-52
Brush Plate and Terminal Bolt Inspection 16-52
Starter Relay Inspection 16-52
Lighting System 16-54
Headlight Beam Horizontal Adjustment 16-54
Headlight Beam Vertical Adjustment 16-54
Headlight Bulb Replacement 16-54
Headlight Removal/Installation 16-55
City Light Bulb Replacement (European Model) 16-56
Turn Signal Light Bulb Replacement 16-58
Turn Signal Relay Inspection 16-60
Tail/Brake Light (LED) Removal 16-60
Tail/Brake Light (LED) Installation 16-61
Radiator Fan System 16-62
Fan System Circuit Inspection 16-62
Fan Motor Inspection 16-62
Meter, Gauge, Indicator Unit 16-64
Meter Unit Removal 16-64
Meter, Gauge Disassembly 16-64
Electronic Combination Meter Unit Inspection 16-65
Switches and Sensors 16-74
Brake Light Timing Inspection 16-74
Brake Light Timing Adjustment 16-74
Switch Inspection 16-74
Radiator Fan Switch Inspection 16-74
Water Temperature Sensor Inspection 16-75
Speed Sensor Inspection 16-76
Fuel Level Sensor Inspection 16-78
Fuel Reserve Switch Inspection 16-78
Diode (Rectifier) Inspection 16-79
Junction Box 16-80
Junction Box Fuse Circuit Inspection 16-80
Starter Circuit/Headlight Relay Inspection 16-81
Diode Circuit Inspection 16-82
Fuse 16-83
30 A Main Fuse Removal 16-83
Junction Box Fuse Removal 16-83
Fuse Installation 16-83
15 A ECU Fuse Removal 16-83
Fuse Inspection 16-84

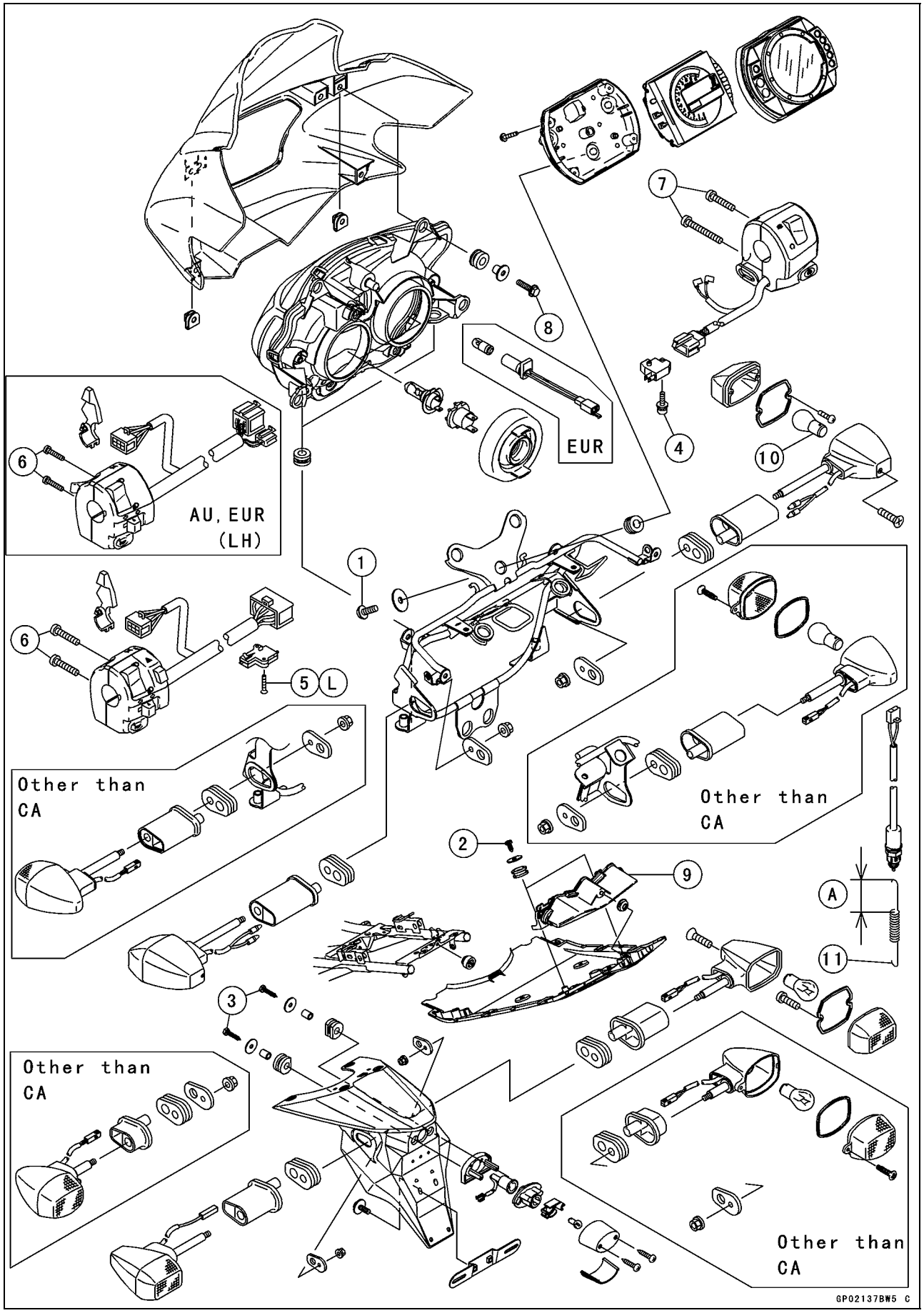
Parts Location





1. Starter Lockout Switch
2. Camshaft Position Sensor
3. Radiator Fan Switch
4. Starter Motor
5. Alternator
6. Speed Sensor
7. Neutral Switch
8. Side Stand Switch
9. Water Temperature Sensor
10. Battery
11. Junction Box
12. Front Brake Light Switch
13. Stick Coils
14. Crankshaft Sensor
15. Rear Brake Light Switch
16. Starter Relay and Main Fuse
17. ECU Fuse
18. Turn Signal Relay
19. Diode (Rectifier)
20. ECU (Electronic Control Unit)
21. Oil Pressure Switch
22. Radiator Fan

Exploded View



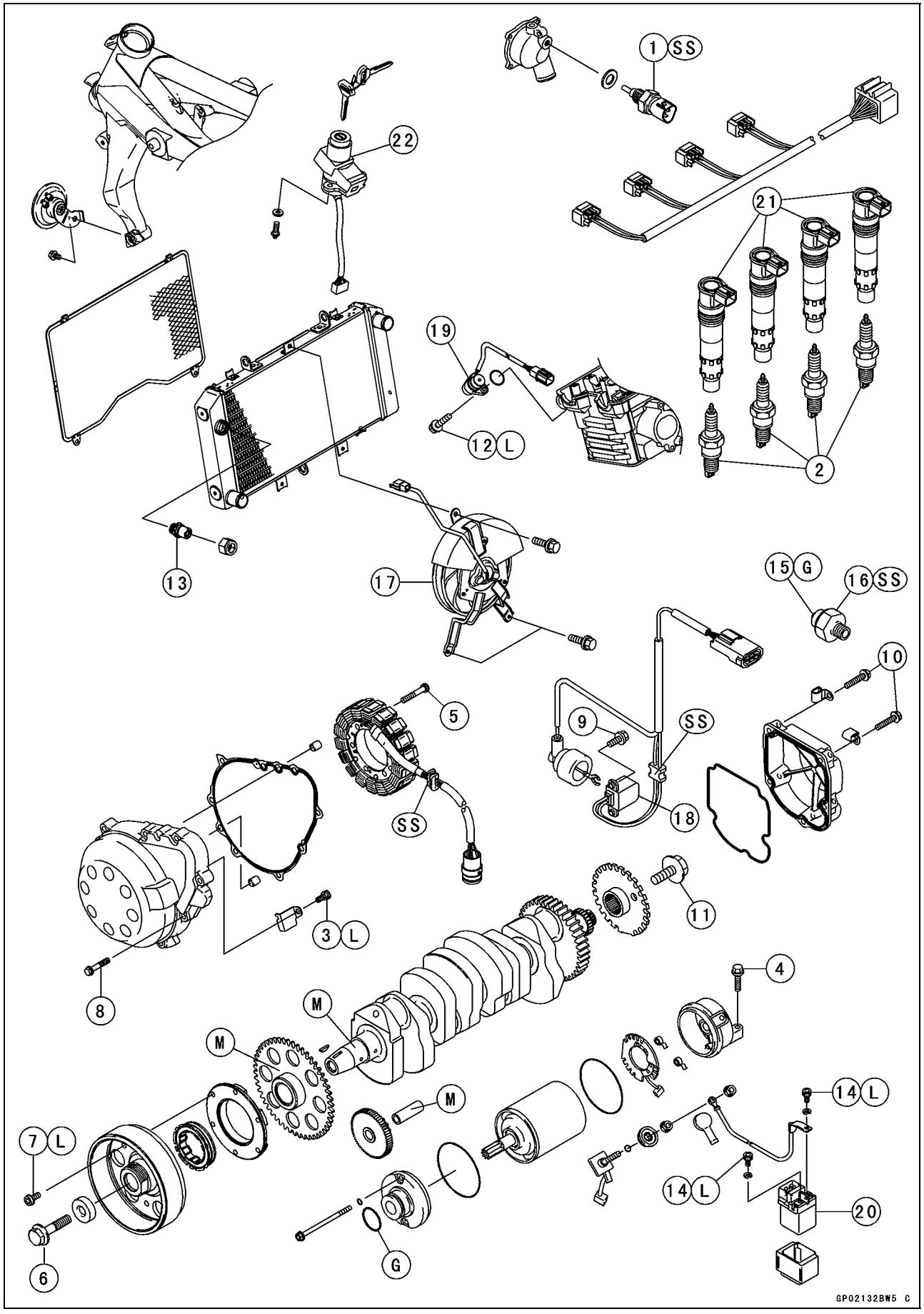
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Meter mounting screws	1.2	0.12	10 in·lb	
2	Tail/brake light mounting screws	1.2	0.12	10 in·lb	
3	License plate light mounting screws	1.2	0.12	10 in·lb	
4	Front brake light switch screw	1.0	0.10	9 in·lb	
5	Starter locknut switch screws	–	–	–	L
6	Left switch housing screws	3.5	0.36	31 in·lb	
7	Right switch housing screws	3.5	0.36	31 in·lb	
8	Headlight mounting bolts	5.9	0.60	52 in·lb	

9. Tail/brake lights (LED)
10. Vibration Resistance Bulb
11. Install the rear brake spring as shown.
    Longer Side [A]

L: Apply a non–permanent locking agent.
AU: Australia
CA: Canada
EUR: European Community

Exploded View



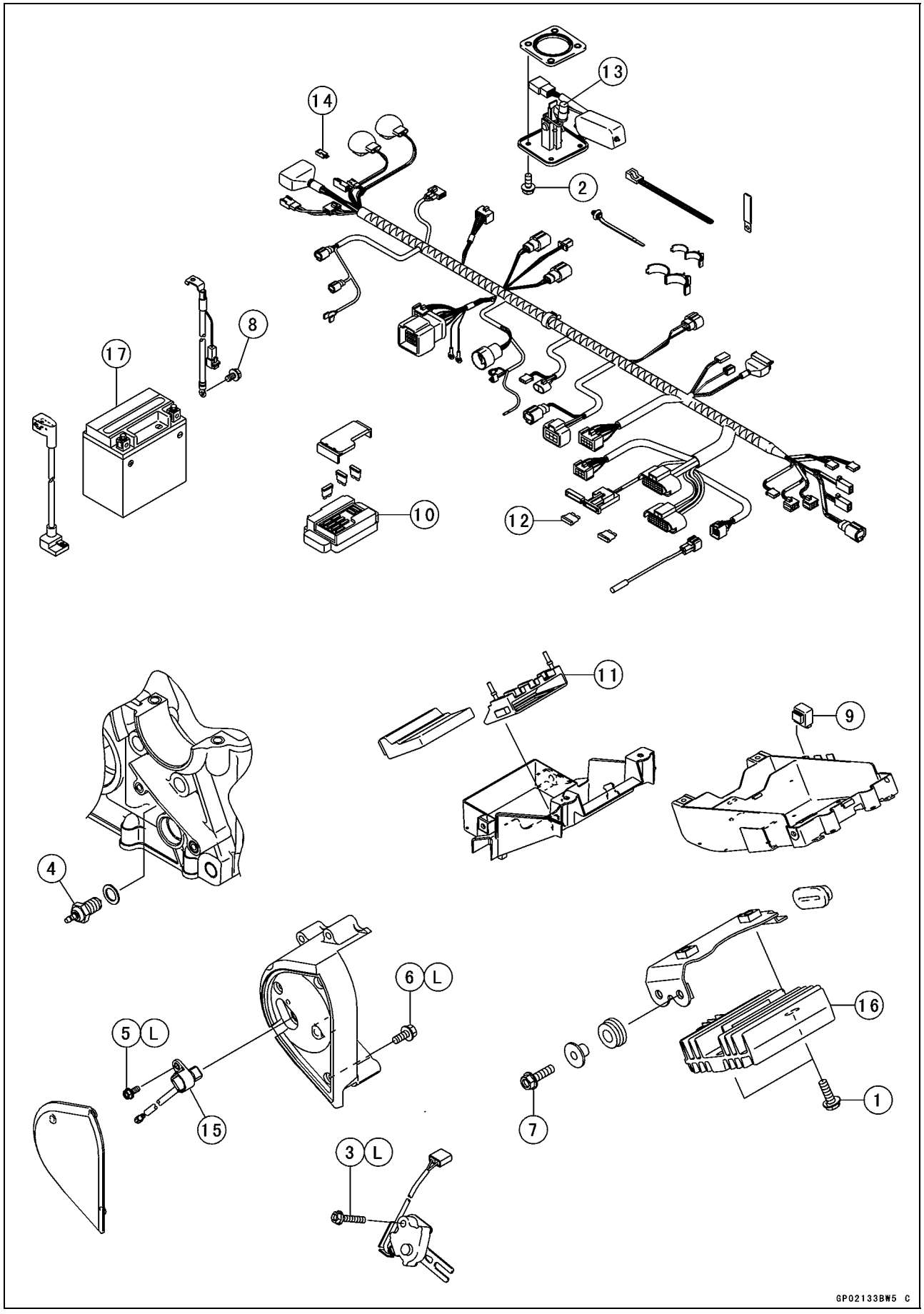
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Water temperature sensor	25	2.5	18	SS
2	Spark plugs	13	1.3	113 in·lb	
3	Alternator lead holding plate bolt	11	1.1	95 in·lb	L
4	Starter motor mounting bolts	11	1.1	95 in·lb	
5	Stator coil bolts	11	1.1	95 in·lb	
6	Alternator rotor bolt	110	11	81	
7	Starter motor clutch bolts	12	1.2	104 in·lb	L
8	Alternator cover bolts	11	1.1	95 in·lb	
9	Crankshaft sensor bolts	5.9	0.60	52 in·lb	
10	Crankshaft sensor cover bolts	11	1.1	95 in·lb	
11	Timing rotor bolt	39	4.0	29	
12	Camshaft position sensor bolt	12	1.2	104 in·lb	L
13	Radiator fan switch	18	1.8	13	
14	Starter relay cable terminal bolts	3.9	0.40	35 in·lb	L
15	Oil pressure switch terminal bolt	1.5	0.15	13 in·lb	G
16	Oil pressure switch	15	1.5	11	SS

17. Radiator fan
18. Crankshaft sensor
19. Camshaft position sensor
20. Starter relay/main fuse
21. Stick coils
22. Ignition switch

G: Apply grease.
L: Apply a non-permanent locking agent.
M: Apply molybdenum disulfide grease.
SS: Apply silicone sealant.

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Regulator/rectifier bolts	6.9	0.70	61 in·lb	
2	Fuel level sensor bolts	6.9	0.70	61 in·lb	
3	Side stand switch bolt	8.8	0.90	78 in·lb	L
4	Neutral switch	15	1.5	11	
5	Speed sensor bolt	6.9	0.70	61 in·lb	L
6	Speed sensor cover bolts	6.9	0.70	61 in·lb	L
7	Regulator/rectifier bracket bolts	6.9	0.70	61 in·lb	
8	Engine ground cable terminal bolt	9.8	1.0	87 in·lb	

9. Turn signal relay
10. Junction box
11. ECU (Electrical Unit Control)
12. 15 A ECU fuse
13. Fuel reserve switch
14. Diode (Rectifier)
15. Speed sensor
16. Regulator/rectifier
17. Battery 12 V 8 Ah

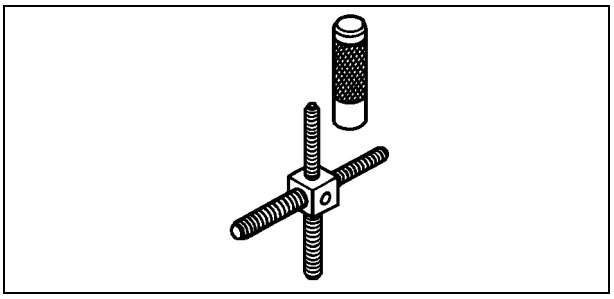
L: Apply a non-permanent locking agent.

Specifications

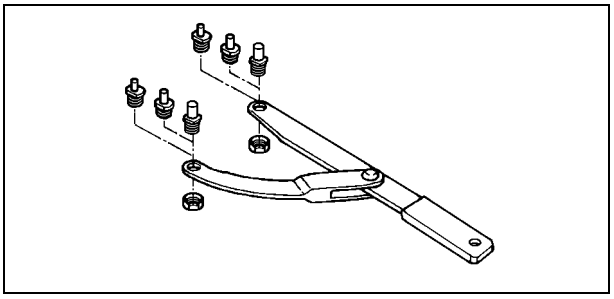
Item	Standard
Battery:	
Type	Sealed Battery
Capacity	12 V 8 Ah
Voltage	12.6 V or more
Charging System:	
Type	Three-phase AC
Alternator output voltage	42 V or more
Stator coil resistance	0.3 ~ 0.4 Ω
Charging voltage (regulator/rectifier output voltage)	14.7 ±0.5 V
Ignition System:	
Crankshaft sensor resistance	376 ~ 564 Ω
Crankshaft sensor peak voltage	1.9 V or more
Camshaft Position Sensor resistance	400 ~ 460 Ω
Camshaft Position Sensor peak voltage	0.2 V or more
Interlock Operation Voltage	4 V or more
Stick coil:	
Primary winding resistance	1.04 ~ 1.56 Ω
Secondary winding resistance	10.8 ~ 16.2 kΩ
Primary peak voltage	88 V or more
Spark plug:	
Spark plug gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)
Electric Starter System:	
Starter motor:	
Brush length	12 mm (0.47 in.) (Service limit: 8.5 mm, 0.33 in.)
Commutator diameter	28 mm (1.10 in.) (Service limit: 27 mm, 1.06 in.)
Switch and Sensor:	
Rear brake light switch timing	ON after about 10 mm pedal travel
Engine oil pressure switch connections	When engine is stopped: ON When engine is running: OFF
Fan switch connections	
Rising temperature	From OFF to ON @ 93 ~ 103°C (199 ~ 217°F)
Falling temperature	Fan stops with the temperature 3 ~ 8°C (38 ~ 46°F) lower than the operation temperature range. ON: Less than 0.5 Ω OFF: More than 10 MΩ
Water temperature sensor resistance	in the text
Fuel level sensor resistance:	
Fuel position	4 ~ 10 Ω
Empty position	90 ~ 100 Ω

Special Tools and Sealant

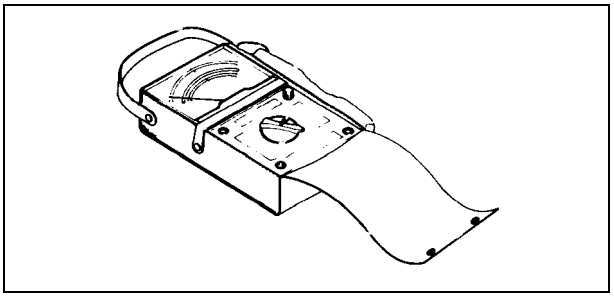
Rotor Puller, M16/M18/M20/M22 × 1.5 :
57001–1216



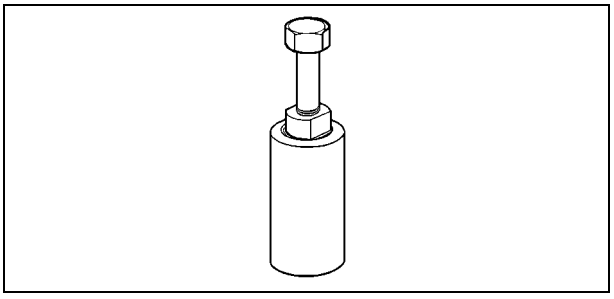
Flywheel & Pulley Holder :
57001–1343



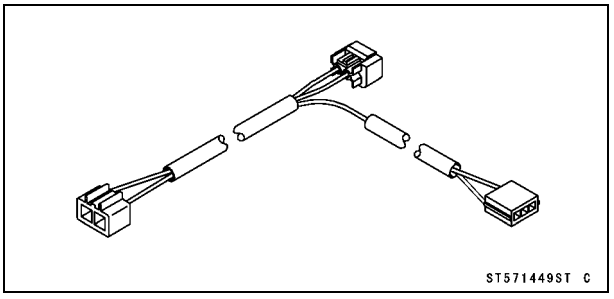
Hand Tester :
57001–1394



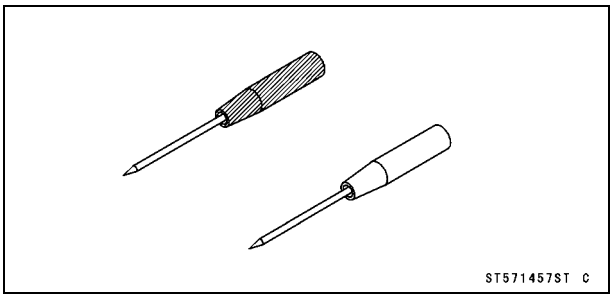
Flywheel Puller, M38 × 1.5 :
57001–1405



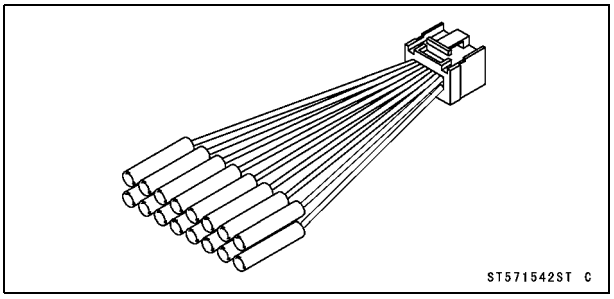
Lead Wire-Peak Voltage Adapter :
57001–1449



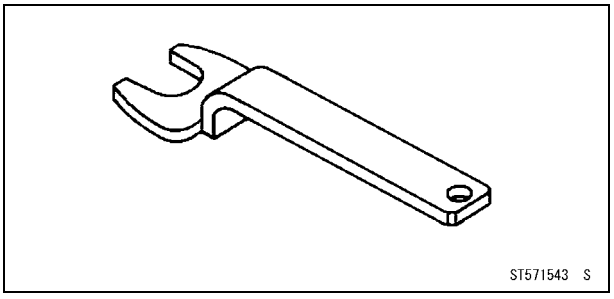
Needle Adapter :
57001–1457



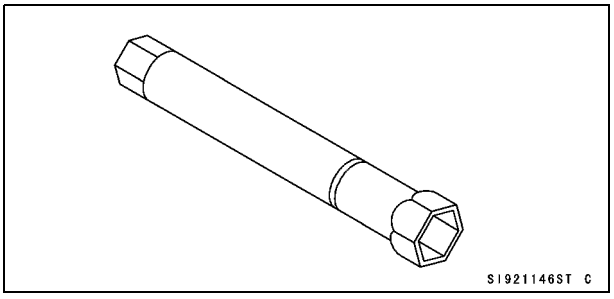
Harness Adapter :
57001–1542



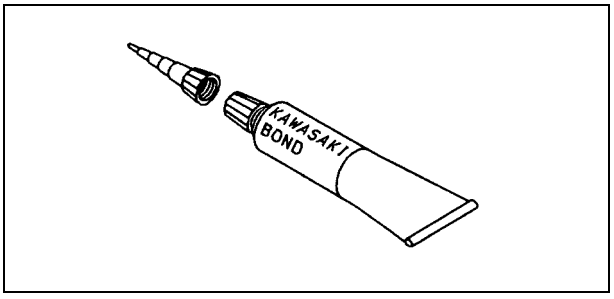
Rotor Holder :
57001–1543



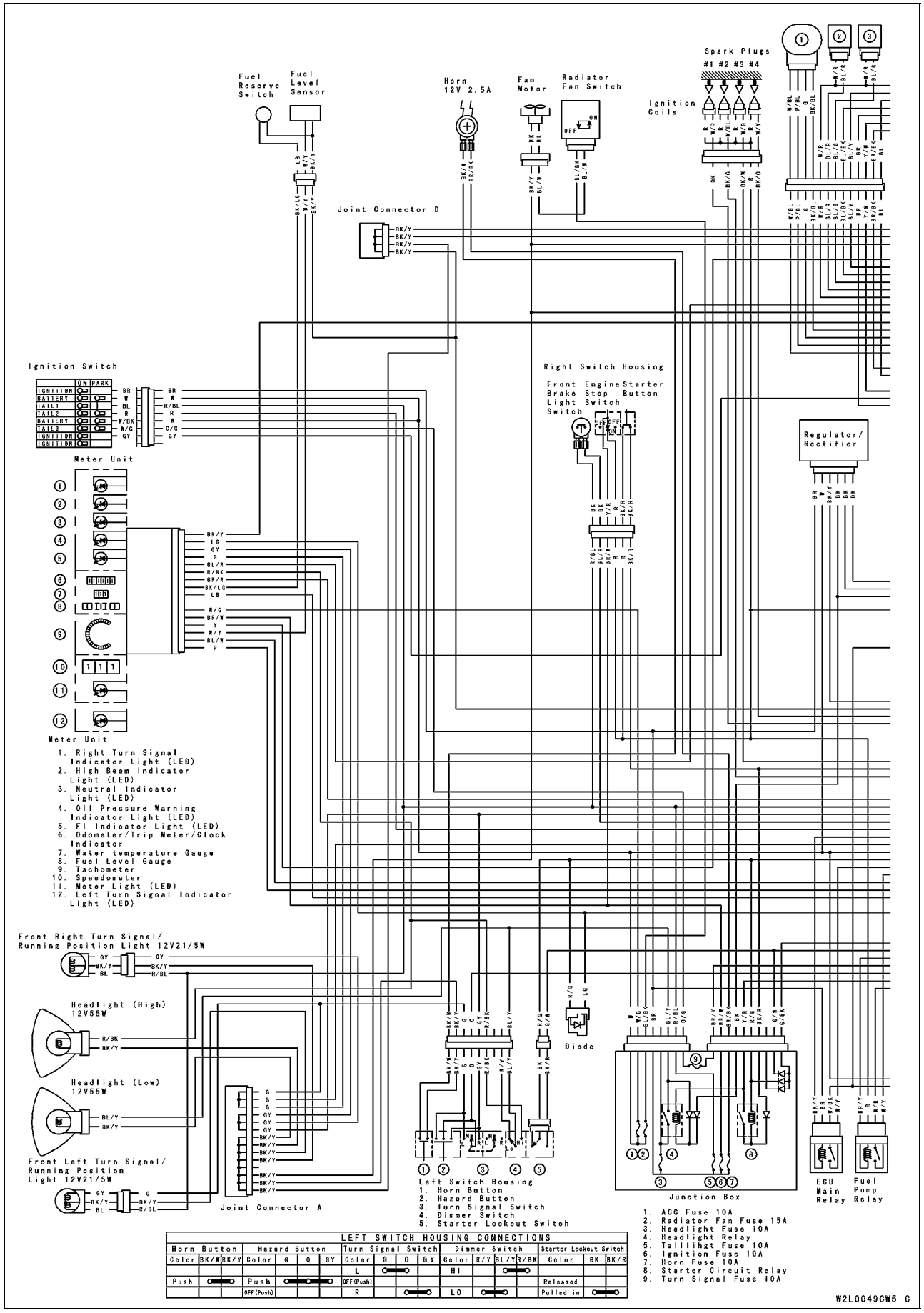
Spark Plug Wrench (Owner's Tool) :
92110–1146



Kawasaki Bond (Silicone Sealant) :
56019–120



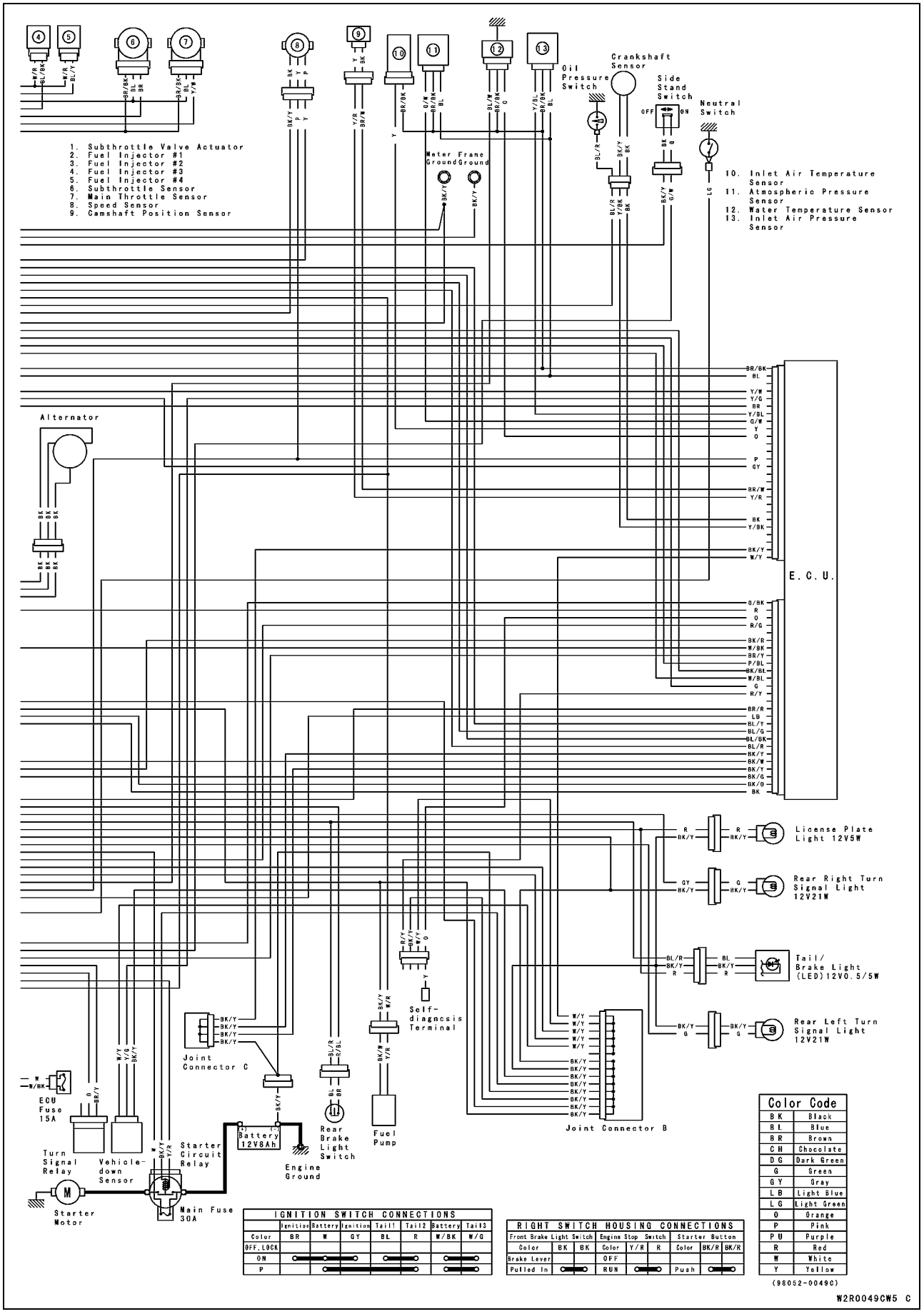
Wiring Diagram (Canada)



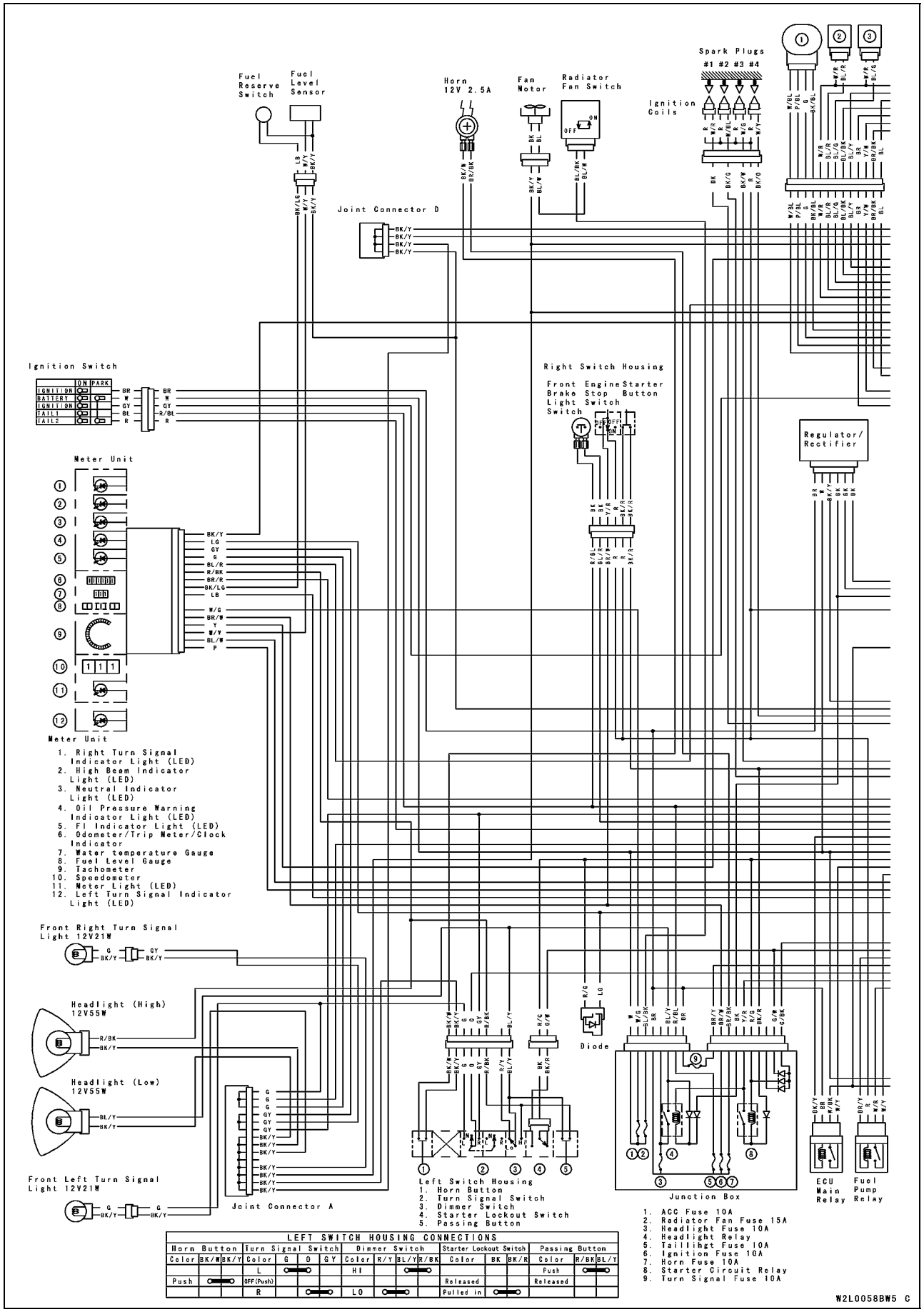
LEFT SWITCH HOUSING CONNECTIONS

Horn Button			Hazard Button				Turn Signal Switch				Dimmer Switch				Starter Lockout Switch		
Color	BK/W	BK/Y	Color	G	O	GY	Color	G	O	GY	Color	R/Y	BL/Y	R/BK	Color	BK	BK/R
							L				HI						
Push			Push				OFF (Push)								Released		
			OFF (Push)				R				LO				Pulled in		

Wiring Diagram (Canada)



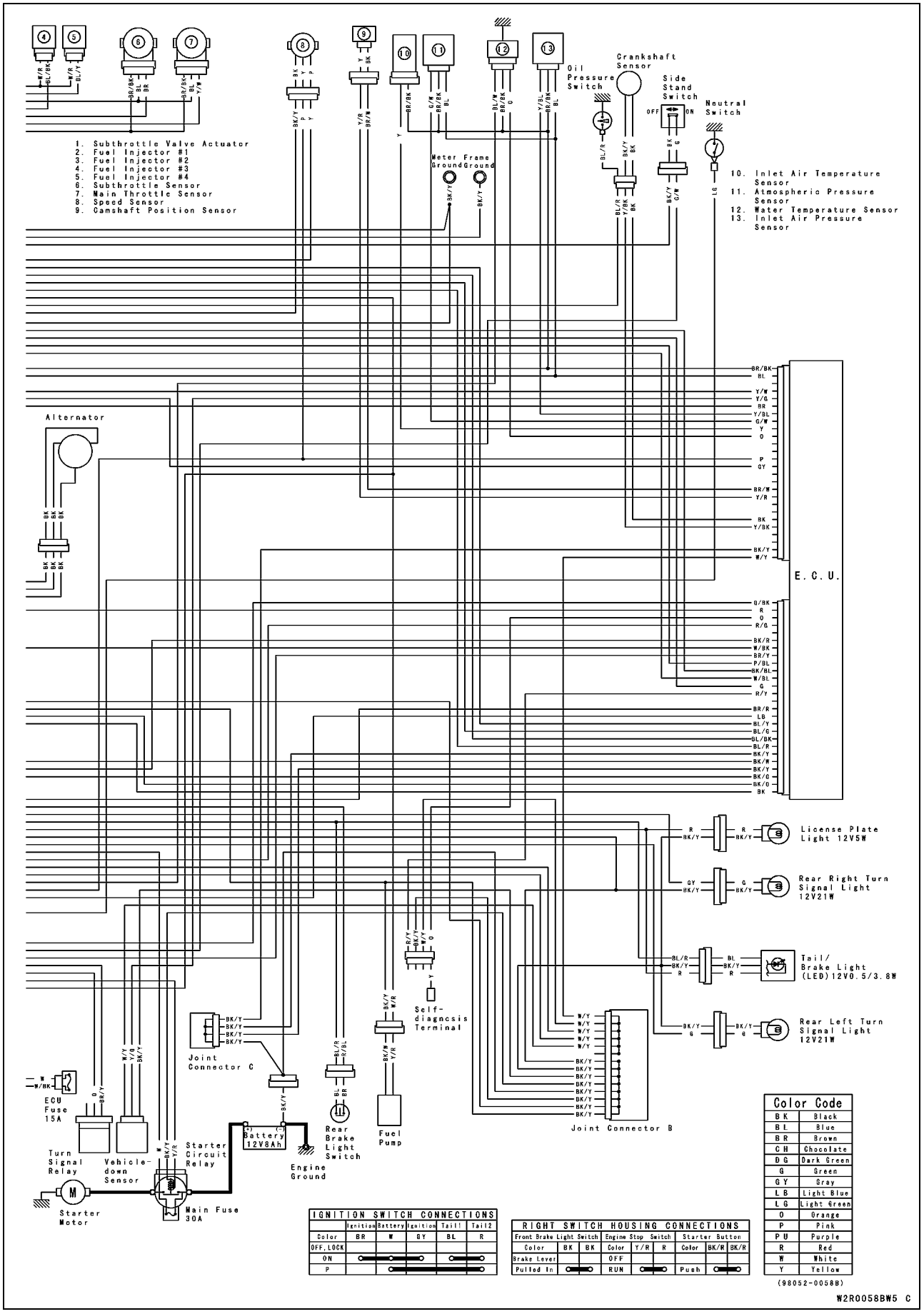
Wiring Diagram (Australia)



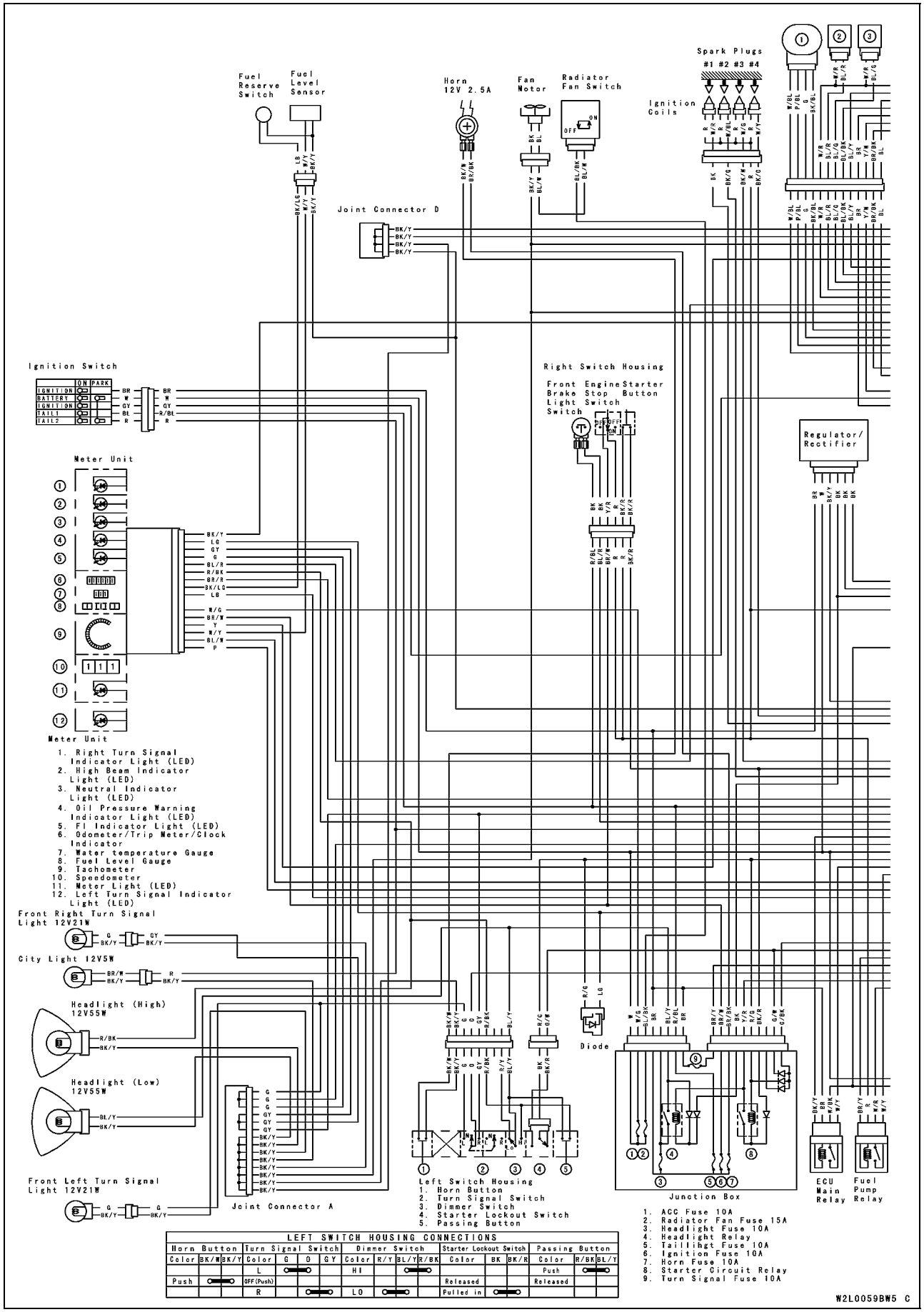
LEFT SWITCH HOUSING CONNECTIONS

Horn Button			Turn Signal Switch				Dimmer Switch				Starter Lockout Switch			Passing Button		
Color	BK/W	BK/Y	Color	G	O	GY	Color	R/Y	BL/Y	R/BK	Color	BK	BK/R	Color	R/BK	BL/Y
			L				HI							Push		
Push			OFF(Push)								Released			Released		
			R				LO				Pulled in					

Wiring Diagram (Australia)



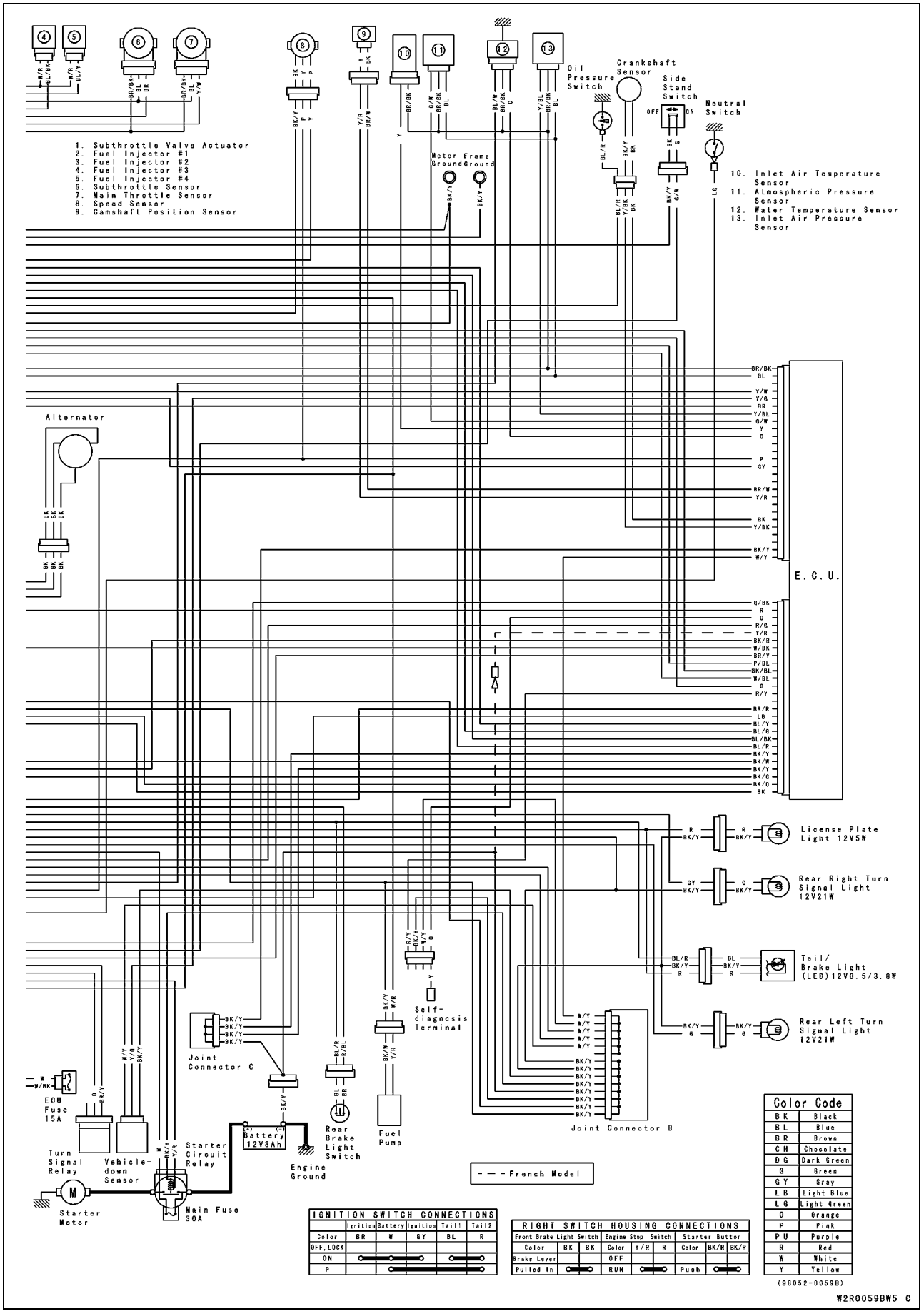
Wiring Diagram (Other than Canada, Australia and Malaysia)



LEFT SWITCH HOUSING CONNECTIONS

Horn Button			Turn Signal Switch				Dimmer Switch				Starter Lockout Switch			Passing Button		
Color	BK/W	BK/Y	Color	G	O	GY	Color	R/Y	BL/Y	R/BK	Color	BK	BK/R	Color	R/BK	BL/Y
			L				HI							Push		
Push			OFF(Push)								Released			Released		
			R				LO				Pulled in					

Wiring Diagram (Other than Canada, Australia and Malaysia)



Color Code	
BK	Black
BL	Blue
BR	Brown
CH	Chocolate
DG	Dark Green
G	Green
GY	Gray
LB	Light Blue
LG	Light Green
O	Orange
P	Pink
PU	Purple
R	Red
W	White
Y	Yellow

(98052-0059B)

W2R0059BW5 C

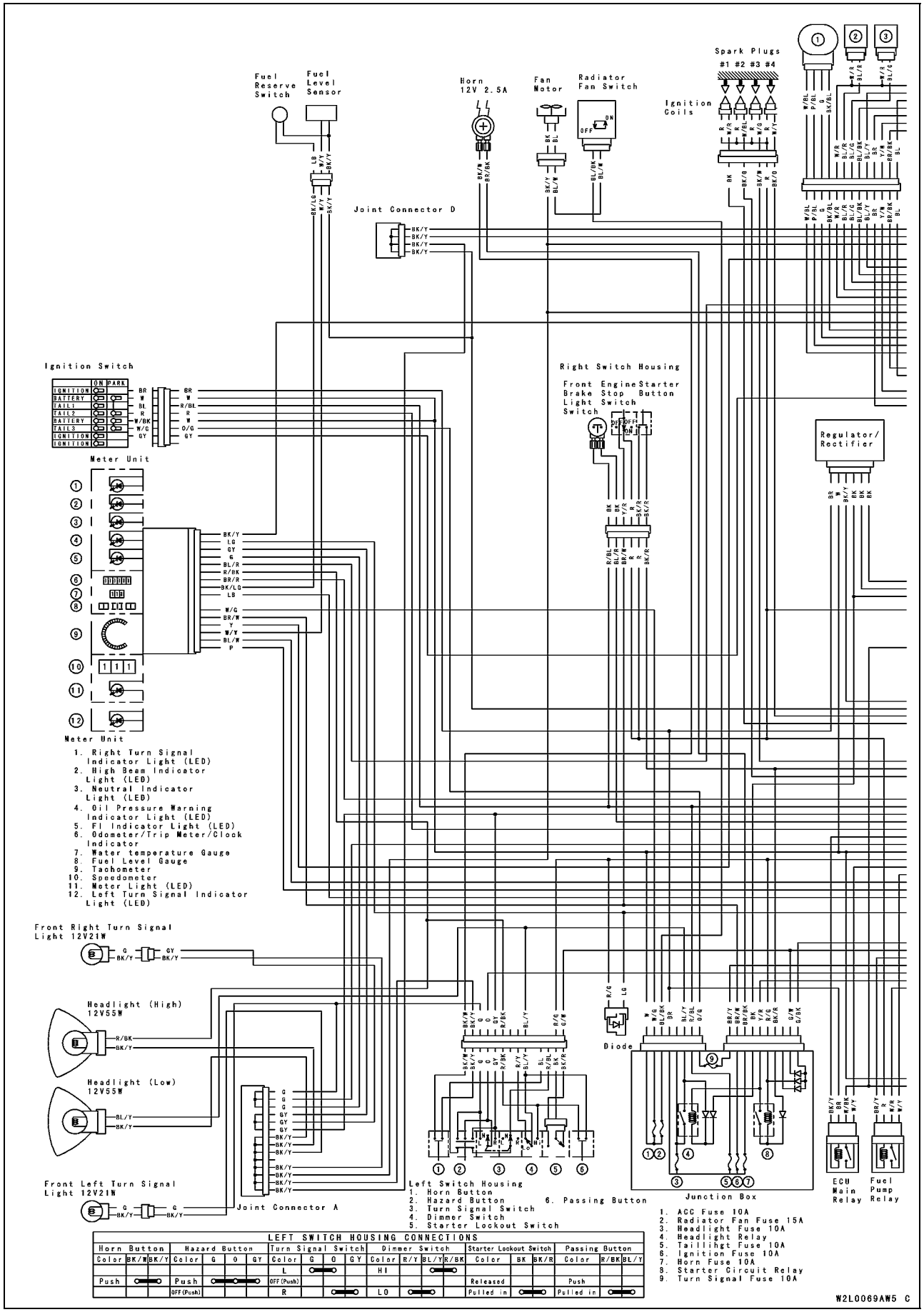
IGNITION SWITCH CONNECTIONS

	Ignition	Battery	Ignition	Tail	Tail
Color	BR	W	GY	BL	R
OFF, LOCK					
ON					
P					

RIGHT SWITCH HOUSING CONNECTIONS

Front Brake Light Switch			Engine Stop Switch			Starter Button		
Color	BK	BK	Color	Y/R	R	Color	BK/R	BK/R
Brake Lever			OFF					
Pulled In			RUN			Push		

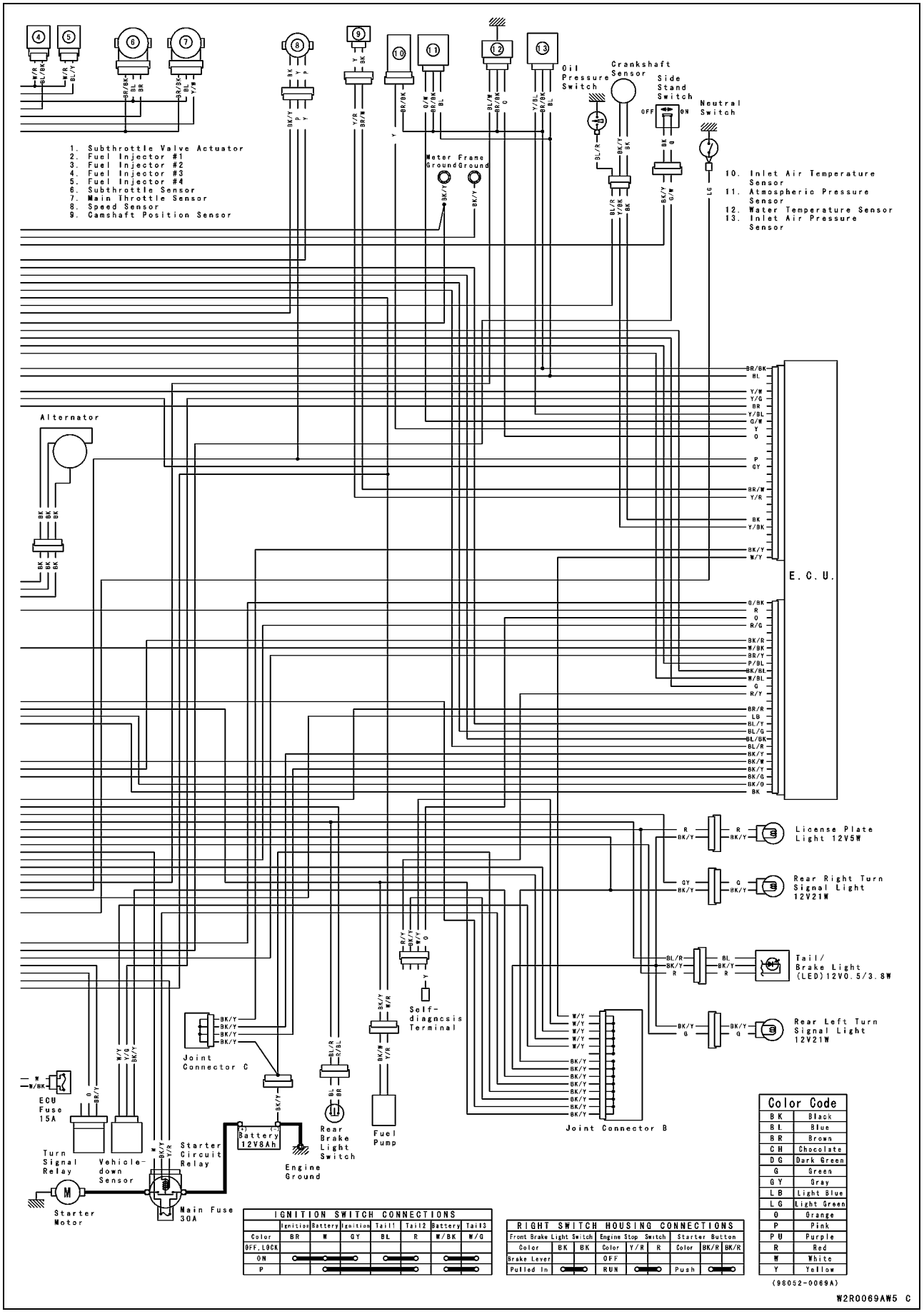
Wiring Diagram (Malaysia)



LEFT SWITCH HOUSING CONNECTIONS

Horn Button			Hazard Button				Turn Signal Switch				Dimmer Switch				Starter Lockout Switch			Passing Button		
Color	BK/W	BK/Y	Color	G	O	GY	Color	G	O	GY	Color	R/Y	BL/Y	R/BK	Color	BK	BK/R	Color	R/BK	BL/Y
							L				HI									
Push			Push				OFF (Push)								Released			Push		
			OFF (Push)				R				LO				Pulled in			Pulled in		

Wiring Diagram (Malaysia)



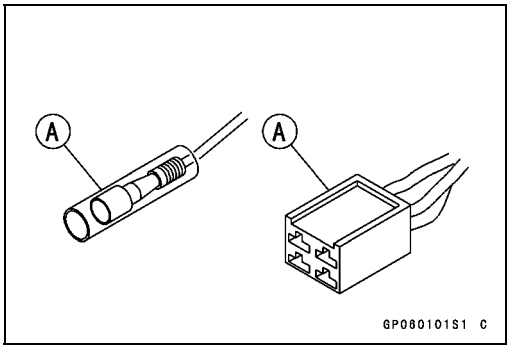
Precautions

There are a number of important precautions that are musts when servicing electrical systems. Learn and observe all the rules below.

- ○Do not reverse the battery lead connections. This will burn out the diodes on 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 button pushed when the starter motor will not turn over, or the current may burn out the starter motor windings.
- ○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 caused by some other item or items, they 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.
- ○Measure coil and winding resistance when the part is cold (at room temperature).
- ○Color Codes:

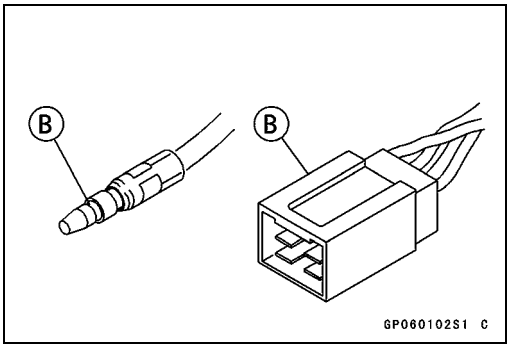
BK	Black	G	Green	P	Pink
BL	Blue	GY	Gray	PU	Purple
BR	Brown	LB	Light blue	R	Red
CH	Chocolate	LG	Light green	W	White
DG	Dark green	O	Orange	Y	Yellow

- ○Electrical Connectors
  Female Connectors [A]



Precautions

Male Connectors [B]



Electrical Wiring

Wiring Inspection

- Visually inspect the wiring for signs of burning, fraying, etc.

★If any wiring is poor, replace the damaged wiring.

- Pull each connector [A] apart and inspect it for corrosion, dirt, and damage.

★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.

- Check the wiring for continuity.

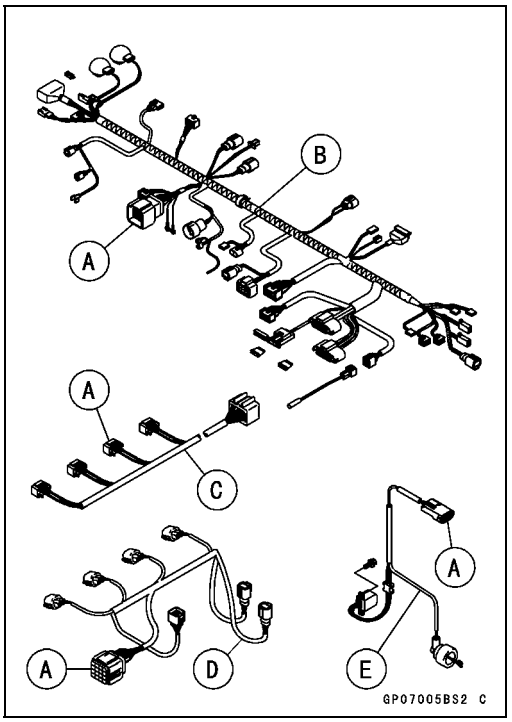
○Use the wiring diagram to find the ends of the lead which is suspected of being a problem.

○Connect the hand tester between the ends of the leads.

Special Tool - Hand Tester: 57001–1394

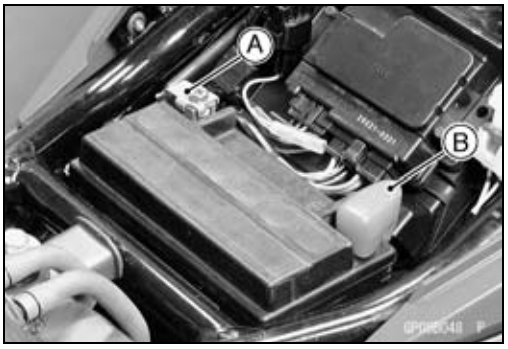
○Set the tester to the × 1 Ω range, and read the tester.

★If the tester does not read 0 Ω, the lead is defective. Replace the lead or the wiring harness [B], [C], [D], [E] if necessary.



Battery

Battery Removal



CAUTION

Do not disconnect the battery cables or any other electrical connections when the ignition switch is ON, as this could damage the ECU (Electronic Control Unit).
Never reverse the connections of the battery, this could damage the ECU.

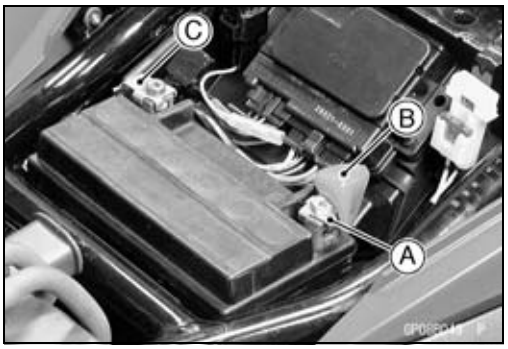
- Remove:
  Seats (see Frame Chapter)
- Disconnect the negative (–) cable [A].
- Slide out the positive (+) terminal cap [B] and then disconnect the positive (+) cable.

CAUTION

Be sure to disconnect the negative (–) cable first.

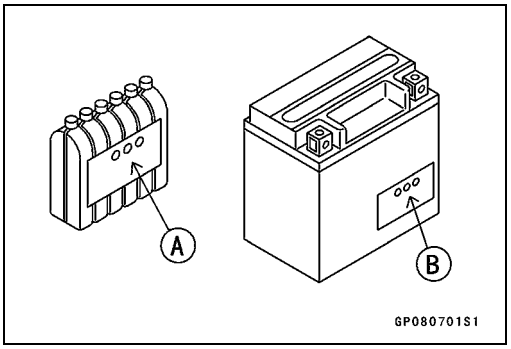
- Remove the battery.

Battery Installation



- Apply a light coat of grease on the terminals to prevent corrosion.
- Install the positive (+) cable [A] first.
- Cover the (+) terminal with the cap [B].
- Install the negative (–) cable [C].

Electrolyte Filling



- Make sure that the model name [A] of the electrolyte container matches the model name [B] of the battery. These names must be the same.

Battery Model Name for ZR750–J1 : YTX9–BS

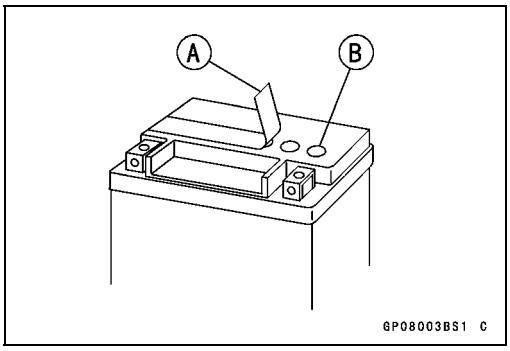
CAUTION

Be sure to use the electrolyte container with the same model name as the battery since the electrolyte volume and specific gravity vary with the battery type. This is to prevent overfilling of the electrolyte, shorting the battery life, and deterioration of the battery performance.

Battery

CAUTION

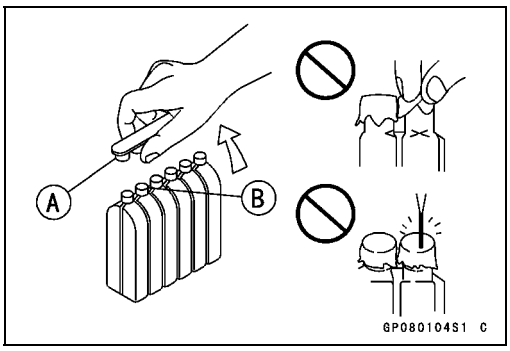
Do not remove the aluminum seal sheet [A] sealing the filler ports [B] until just before use.



- Check to see that there is no peeling, tears or holes in the seal sheet on the top of the battery.
- Place the battery on a level surface.
- Remove the seal sheet.

NOTE

○*A battery whose seal sheet has any peeling, tears or holes, requires a refreshing charge (initial charge).*

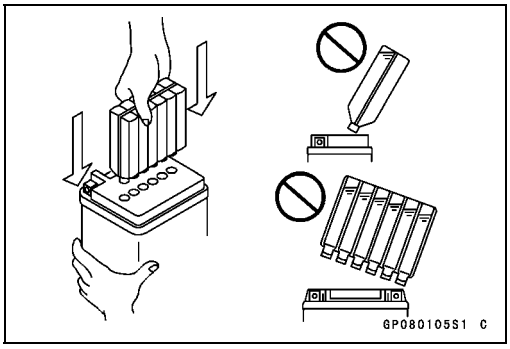


- Take the electrolyte container out of the vinyl bag.
- Detach the seal cap [A] from the container.

NOTE

○*Do not discard the seal cap because it is used as the battery plugs later.*

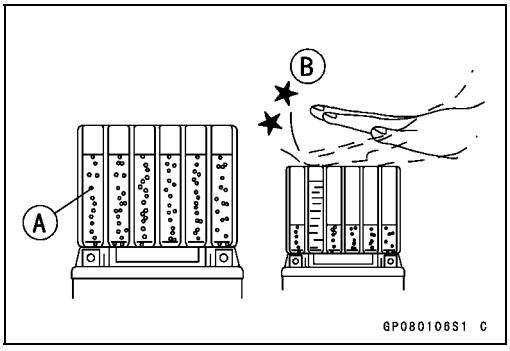
○*Do not peel back or pierce the seals [B] on the container.*



- Place the electrolyte container upside down aligning the six seals with the six battery filler ports.
- Push the container down strongly enough to break the seals. Now the electrolyte should start to flow into the battery.

NOTE

○*Do not tilt the container as the electrolyte flow may be interrupted.*



- Make sure air bubbles [A] are coming up from all six filler ports.

○Leave the container this way for 5 minutes or longer.

NOTE

○*If no air bubbles are coming up from a filler port, tap [B] the bottom of the bottle two or three times. Never remove the container from the battery.*

CAUTION

Fill the electrolyte into the battery until the container is completely emptied.

- Be certain that all the electrolyte has flowed out.
- Tap the bottom the same way as above if there is any electrolyte left in the container.
- Now pull the container gently out of the battery.
- Let the battery sit for **20** minutes. During this time, the electrolyte permeates the special separators and the gas generated by chemical reaction is released.

Battery

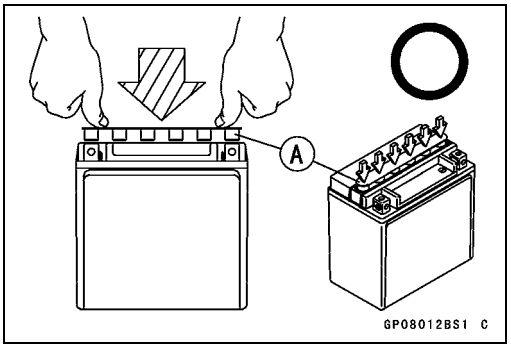
● Fit the seal cap [A] tightly into the filler ports until the seal caps are at the same level as the top of the battery.

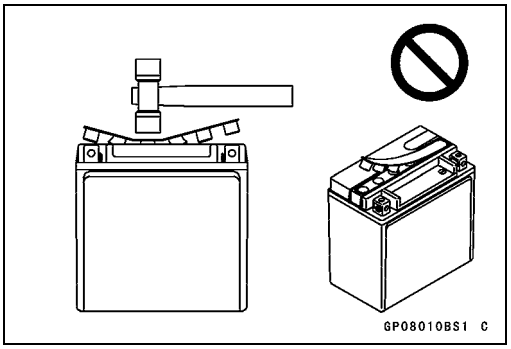
NOTE

○*Do not hammer. Press down evenly with both hands.*

CAUTION

Once you installed the seal caps after filling the battery, never remove it, nor add any water or electrolyte.





Initial Charge

While a sealed battery can be used after only filling with electrolyte, a battery may not be able to sufficiently move a starter motor to start an engine in the cases shown in the table below, where an initial charge is required before use. However, if a battery shows a terminal voltage of 12.6 V or more, using a digital voltmeter, after 10 minutes of filling, no initial charge is necessary.

Kawasaki-recommended chargers:

OptiMate III
Yuasa 1.5 Amp Automatic Charger
Battery Mate 150-9

If the above chargers are not available, use equivalent one.

NOTE

○*To measure battery terminal voltage, use a digital voltmeter which can be read one decimal place voltage.*

Condition requiring initial charge	Charging method
At low temperatures (lower than 0°C)	0.9 A × 2 ~ 3 hours
Battery has been stored in high temperature and humidity.	0.9 A × 15 ~ 20 hours
Seal has been removed, or broken – peeling, tear or hole.	
Battery two years or more years old from date of manufacture. Battery manufacturing date is printed on battery top. Example) 12 (Day) 10 (Month) 01 (Year) T1 (Mfg. location)	

Battery

Precautions

1) No need of topping–up
   No topping–up is necessary in this battery until it ends its life under normal use. Forcibly prying off the seat cap to add water is very dangerous. Never do that.
2) Refreshing charge
   If an engine will not start, a horn sounds weak, or lamps are dim, it indicates the battery has been discharged. Give refresh charge for 5 to 10 hours with charge current shown in the specification (see the this chapter).
   When a fast charge is inevitably required, do it following precisely the maximum charge current and time conditions indicated on the battery.

CAUTION

This battery is designed to sustain no unusual deterioration if refresh-charged according to the method specified above. However, the battery's performance may be reduced noticeably if charged under conditions other than given above.
Never remove the seal caps during refresh charge.
If by chance an excessive amount of gas is generated due to overcharging, the relief valve releases the gas to keep the battery normal.

3) When you do not use the motorcycle for months:
   Give a refresh charge before you store the motorcycle and store it with the negative cable removed. Give a refresh charge **once a month** during storage.
4) Battery life:
   If the battery will not start the engine even after several refresh charges, the battery has exceeded its useful life. Replace it. (Provided, however, the vehicle's starting system has no problem.)

⚠ 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.
No fire should be drawn near the battery, or no terminals should have the tightening loosened.
The electrolyte contains sulfuric acid. Be careful not to have it touch your skin or eyes. If touched, wash it off with liberal amount of water. Get medical attention if severe.

Battery

Interchange

The sealed battery can fully display its performance only when combined with the proper vehicle electric system. Therefore, replace a sealed battery only on a motorcycle which was originally equipped with a sealed battery.

Be careful, if a sealed battery is installed on a motorcycle which had an ordinary battery as original equipment, the sealed battery's life will be shortened.

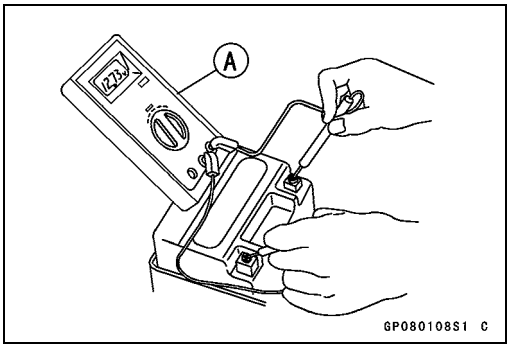
Charging Condition Inspection

Battery charging condition can be checked by measuring battery terminal voltage with the digital voltmeter [A].

- Remove the seats (see Frame chapter).
- Disconnect the battery (–) cables.

CAUTION

Be sure to disconnect the negative (–) cable first.



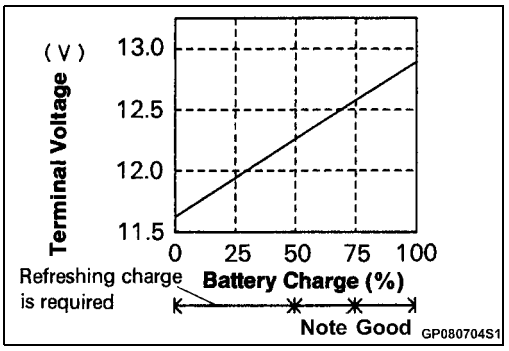
- Measure the battery terminal voltage.

NOTE

○*Measure with a digital voltmeter which can be read to one decimal place voltage.*

★If the reading is below the specified, refreshing charge is required.

Battery Terminal Voltage
Standard: 12.6 V or more

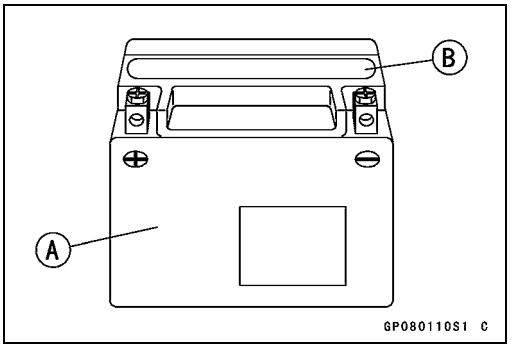


Refreshing Charge

- Remove the battery [A] (see Battery Removal).
- Do refresh charge by following method according to the battery terminal voltage.

⚠ WARNING

This battery is sealed type. Never remove seal cap [B] even at charging. Never add water. Charge with current and time as stated below.



Battery

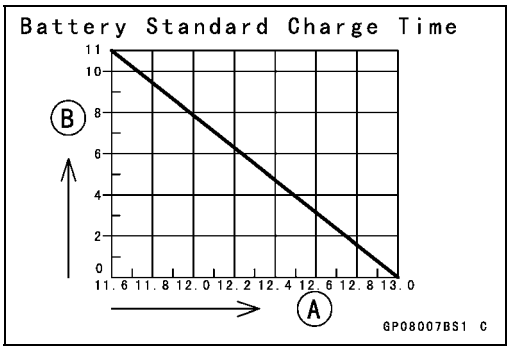
Terminal Voltage: 11.5 ~ less than 12.6 V

Standard Charge

0.9 A × 5 ~ 10 h

Quick Charge

4.0 A × 1.0 h



Battery Terminal Voltage (V) [A]
Charge Time (h) [B]

CAUTION

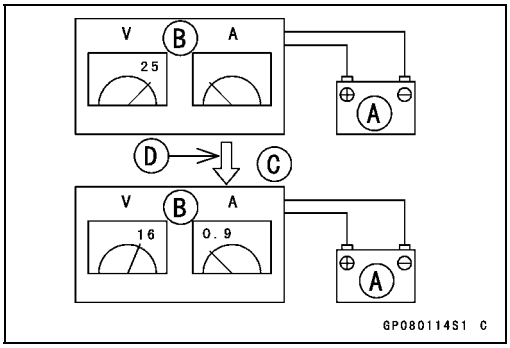
If possible, do not quick charge. If the quick charge is done due to unavoidable circumstances, do standard charge later on.

Terminal Voltage : less than 11.5 V

Charging Method : 0.9 A × 20 h

NOTE

○*Increase the charging voltage to a maximum voltage of 25 V if the battery will not accept current initially. Charge for no more than 5 minutes at the increased voltage then check if the battery is drawing current. If the battery will accept current decrease the voltage and charge by the standard charging method described on the battery case. If the battery will not accept current after 5 minutes, replace the battery.*



Battery [A]
Battery Charger [B]
Standard Value [C]
Current starts to flow [D]

● Determine battery condition after refreshing charge.

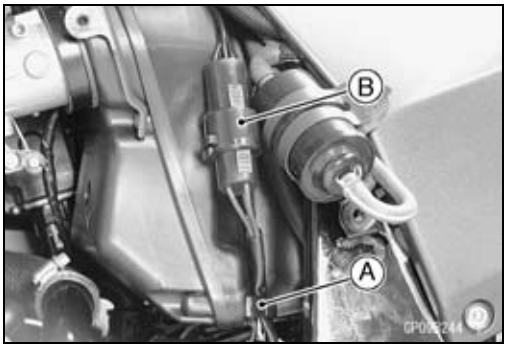
○Determine the condition of the battery 30 minutes after completion of the charge by measuring the terminal voltage according to the table below.

Criteria	Judgement
12.6 V or higher	Good
12.0 ~ lower than 12.6 V	Charge insufficient → Recharge
lower than 12.0 V	Unserviceable → Replace

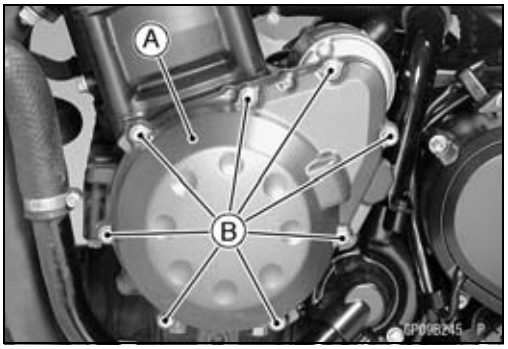
Charging System

Alternator Cover Removal

- Remove:
  Left Frame Cover (see Frame chapter)
  Clamp (open) [A]
  Alternator Lead Connector [B]



- Place a suitable container under the alternator cover [A], and remove the cover bolts [B].
- Pull the alternator cover outside.



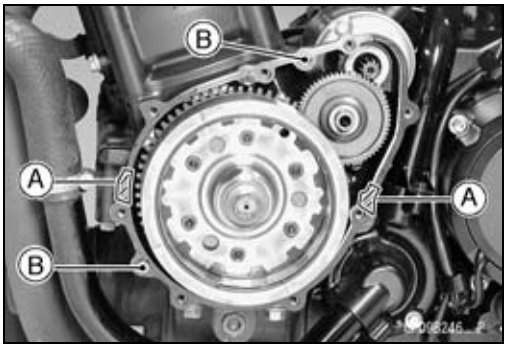
Alternator Cover Installation

- Apply silicone sealant to the alternator lead grommet and crankcase halves mating surface [A] on the front and rear sides of the cover mount.

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

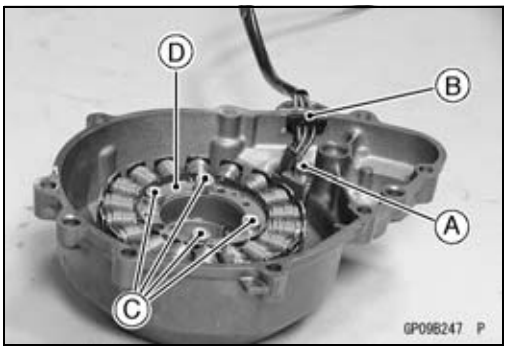
- Check that knock pins [B] are in place on the crankcase.
- Install a new gasket and the alternator cover.
- Tighten:

  Torque - Alternator Cover Bolts: 11 N·m (1.1 kgf·m, 95 in·lb)



Stator Coil Removal

- Remove:
  Alternator Cover (see Alternator Cover Removal)
  Holding Plate Bolt [A] and Plate
  Alternator Lead Grommet [B]
  Stator Coil Bolts [C]
- Remove the stator coil [D] from the alternator cover.



Charging System

Stator Coil Installation

- Apply a non-permanent locking agent to the threads of the stator coil bolts and tighten them.

Torque - Stator Coil Bolts: 11 N·m (1.1 kgf·m, 95 in·lb)

- Secure the alternator lead with a holding plate, and tighten the bolt.

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

Torque - Alternator Lead Holding Plate Bolt: 11 N·m (1.1 kgf·m, 95 in·lb)

- Apply silicone sealant to the circumference of the alternator lead grommet, and fit the grommet into the notch of the cover securely.

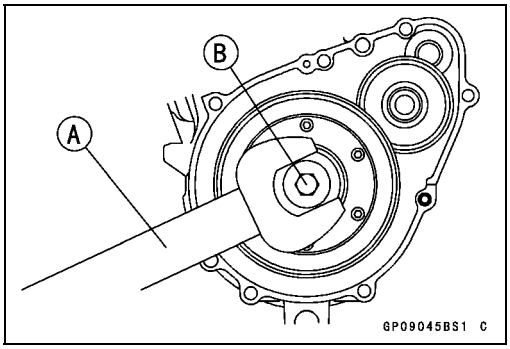
Sealant - Kawasaki Bond (Silicone Sealant): 56019–120

- Install the alternator cover (see Alternator Cover Installation).

Alternator Rotor Removal

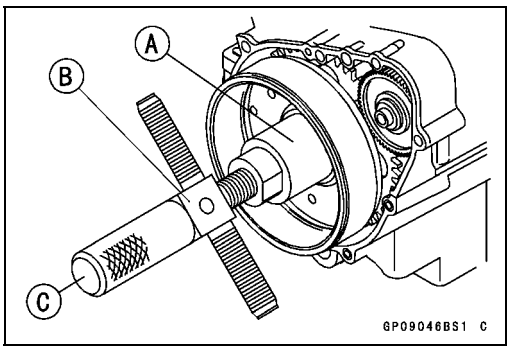
- Remove:
  Alternator Cover (see Alternator Cover Removal)
- Wipe oil off the outer circumference of the rotor.
- Hold the alternator rotor steady with the rotor holder [A], and remove the rotor bolt [B] and washer.

Special Tool - Rotor Holder: 57001–1543



- Using the flywheel puller [A] and rotor puller [B], remove the alternator rotor from the crankshaft.

Special Tools - Rotor Puller, M16/M18/M20/M22 × 1.5: 57001–1216
Flywheel Puller, M38 × 1.5: 57001–1405



NOTE

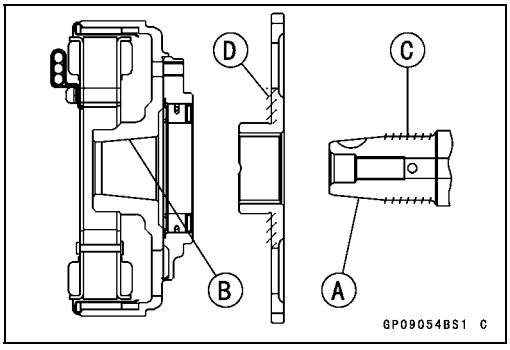
○*Screw in the puller while tapping the head [C] of the puller with a hammer.*

CAUTION

Do not attempt to strike the alternator rotor itself. Striking the rotor can cause the magnets to lose their magnetism.

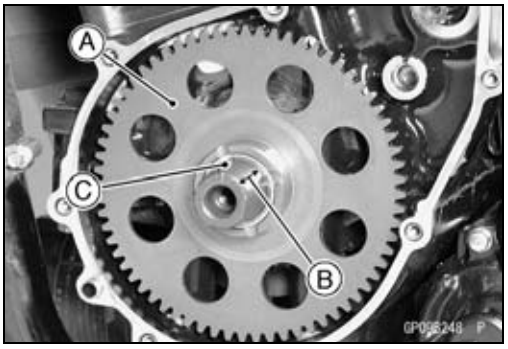
Alternator Rotor Installation

- Using a cleaning fluid, clean off any oil or dirt on the following portions and dry them with a clean cloth.
  Crankshaft Tapered Portion [A]
  Alternator Rotor Tapered Portion [B]
- Apply a thin coat of molybdenum disulfide grease to the crankshaft [C] and the face [D] of the starter clutch gear.

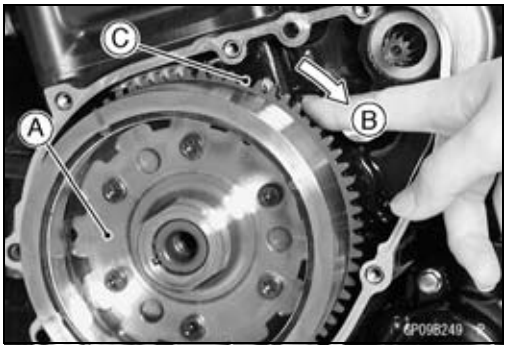


Charging System

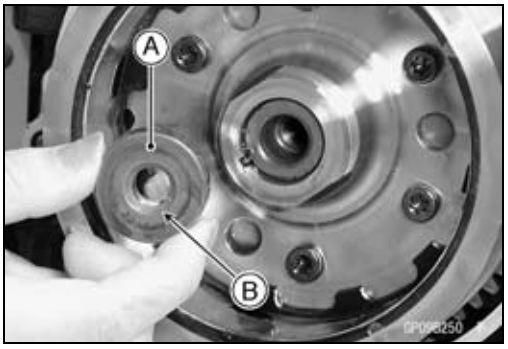
- Install the starter gear [A].
- Again, clean the crankshaft tapered portion [B] and dry there.
- Fit the woodruff key [C] securely in the slot in the crankshaft before installing the alternator rotor.



- Install the alternator rotor [A] while turning [B] the starter clutch gear [C].



- Install the washer [A] so that the chamfer side [B] faces outward.



NOTE

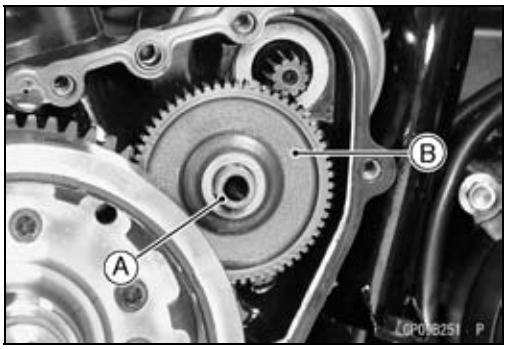
○*Confirm the alternator rotor fit or not to the crankshaft before tightening it with specified torque.*

○Install the rotor and tighten it with 70 N·m (7.0 kgf·m, 52 ft·lb) of torque.
○Remove the washer and rotor bolt.
○Check the tightening torque with rotor puller.
★If the rotor is not pulled out with 20 N·m (2.0 kgf·m, 15 ft·lb) of drawing torque, it is installed correctly.
★If the rotor is pulled out with under 20 N·m (2.0 kgf·m, 15 ft·lb) of drawing torque, clean off any oil dirt or flaw of the crankshaft and rotor tapered portion, and dry them with a clean cloth. Then, confirm that it is not pulled out with above torque.

- Tighten the alternator rotor bolt while holding the alternator rotor steady with the rotor holder.

Special Tool - Rotor Holder: 57001–1543

Torque - Alternator Rotor Bolt: 110 N·m (11 kgf·m, 81 ft·lb)



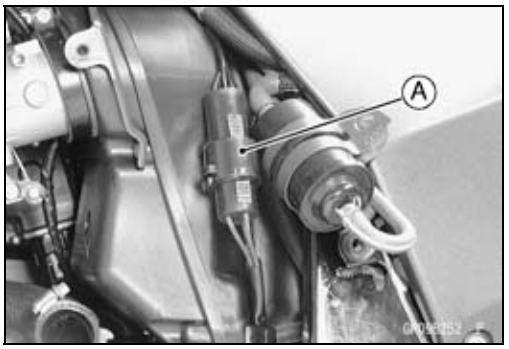
- Apply a thin coat of molybdenum disulfide grease to the shaft [A], and install it and starter idle gear [B].
- Install the alternator cover (see Alternator Cover Installation).

Alternator Inspection

There are three types of alternator failures: short, open (wire burned out), or loss in rotor magnetism. A short or open in one of the coil wires will result in either a low output, or no output at all. A loss in rotor magnetism, which may be caused by dropping or hitting the alternator, by leaving it near an electromagnetic field, or just by aging, will result in low output.

- To check the alternator output voltage, do the following procedures.

○Turn off the ignition switch.
○Remove the left frame cover (see Alternator Cover Removal).



○Disconnect the alternator lead connector [A].
○Connect the hand tester as shown in the table 1.
○Start the engine.
○Run it at the rpm given in the table 1.
○Note the voltage readings (total 3 measurements).

Table 1 Alternator Output Voltage

Tester Range	Connections		Reading @ 4,000 rpm
	Tester (+) to	Tester (–) to	
250 V AC	One Black lead	Another Black lead	42 V or more

★If the output voltage shows the value in the table, the alternator operates properly.
★If the output voltage shows a much higher than the value in the table, the regulator/rectifier is damaged. A much lower reading than that given in the table indicates that the alternator is defective.

- Check the stator coil resistance as follows.

○Stop the engine.
○Connect the hand tester as shown in the table 2.
○Note the readings (total 3 measurement).

Table 2 Stator Coil Resistance

Tester Range	Connections		Reading
	Tester (+) to	Tester (–) to	
× 1 Ω	One Black lead	Another Black lead	0.3 ~ 0.4 Ω

Charging System

★If there is more resistance than shown in the table, or no hand tester reading (infinity) for any two leads, the stator has an open lead and must be replaced. Much less than this resistance means the stator is shorted, and must be replaced.

● Using the highest resistance range of the hand tester, measure the resistance between each of the black leads and chassis ground.

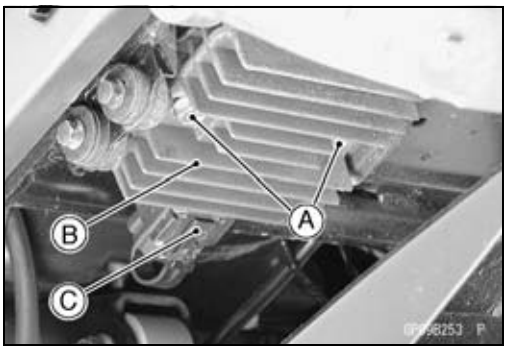
★Any hand tester reading less than infinity (∞) indicates a short, necessitating stator replacement.

★If the stator coils have normal resistance, but the voltage check showed the alternator to be defective; then the rotor magnets have probably weakened, and the rotor must be replaced.

Special Tool - Hand Tester: 57001–1394

Regulator/Rectifier Inspection

● Remove:
Bolts [A]
Regulator/Rectifier [B]
Connector [C] (disconnect)



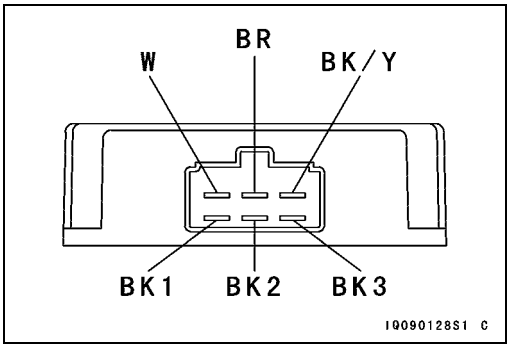
Rectifier Circuit Check:

● Check conductivity of the following pair of terminals.

Rectifier Circuit Inspection

Tester connection	W-BK1,	W–BK2,	W–BK3
	BK/Y-BK1,	BK/Y-BK2,	BK/Y-BK3

★The resistance should be low in one direction and more than ten times as much in the other direction. If any two leads are low or high in both directions, the rectifier is defective and must be replaced.



NOTE

○*The actual meter reading varies with the meter used and the individual rectifier, but, generally speaking the lower reading should be from zero to one half the scale.*

Regulator Circuit Check:

To test the regulator out of circuit, use three 12 V batteries and a test light (12 V 3 ~ 6 W bulb in a socket with leads).

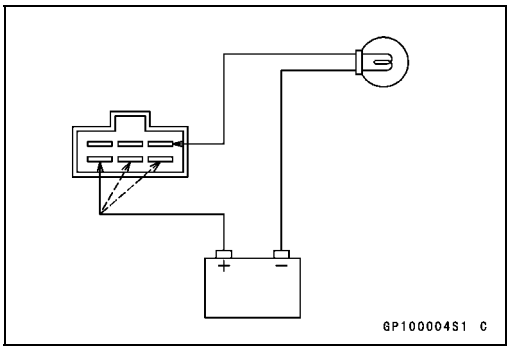
CAUTION

The test light works as an indicator and also a current limiter to protect the regulator/rectifier from excessive current. Do not use an ammeter instead of a test light.

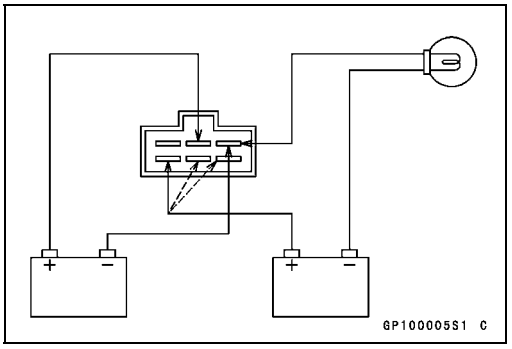
● Check to be sure the rectifier circuit is normal before continuing.

Charging System

● Do the 1st step regulator circuit test:
○Connect the test light and the 12 V battery to the regulator/rectifier as shown.
○Check BK1, BK2, and BK3 terminal respectively.
★If the test light turns on, the regulator/rectifier is defective. Replace it.
★If the test light does not turn on, continue the test.



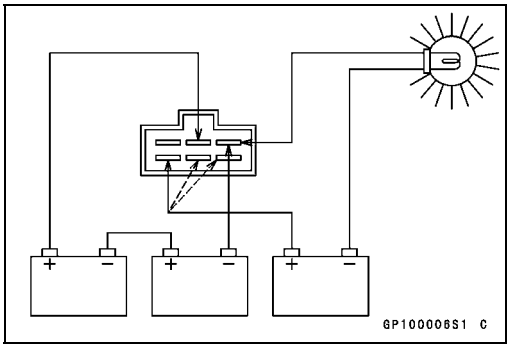
● Do the 2nd step regulator circuit test:
○Connect the test light and the 12 V battery in the same manner as specified in the "Regulator Circuit Test–1st Step".
○Apply 12 V to the voltage BR terminal.
○Check BK1, BK2, and BK3 terminal respectively.
★If the test light turns on, the regulator/rectifier is defective. Replace it.
★If the test light does not turn on, continue the test.



● Do the 3rd step regulator circuit test:
○Connect the test light and the 12 V battery in the same manner as specified in the "Regulator Circuit Test–1st Step".
○Momentarily apply 24 V to the voltage BR terminal by adding a 12 V battery.
○Check BK1, BK2, and BK3 terminals respectively.

CAUTION

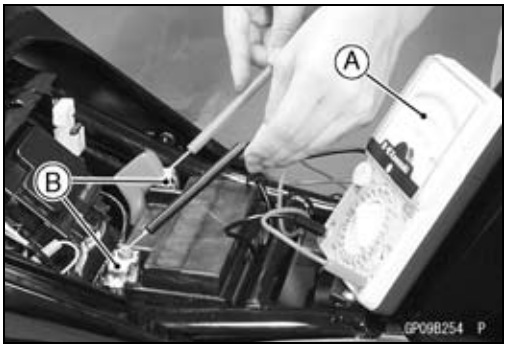
Do not apply more than 24 volts. If more than 24 volts is applied, the regulator/rectifier may be damaged. Do not apply 24 V more than a few seconds. If 24 volts is applied for more than a few seconds, the regulator/rectifier may be damaged.



★If the test light did not light when the 24 V was applied momentarily to the voltage monitoring terminal, the regulator/rectifier is defective. Replace it.
★If the regulator/rectifier passes all of the tests described, it may still be defective. If the charging system still does not work properly after checking all of the components and the battery, test the regulator/rectifier by replacing it with a known good unit.

Charging System

Charging Voltage Inspection



- Check the battery condition (see Battery section).
- Warm up the engine to obtain actual alternator operating conditions.
- Remove the seats (see Frame chapter).
- Check that the ignition switch is turned off, and connect the hand tester [A] to the battery terminals [B].

Special Tool - Hand Tester: 57001–1394 [A]

- Start the engine, and note the voltage readings at various engine speeds with the headlight turned on and then turned off. (To turn off the headlight, disconnect the headlight connector on the headlight unit.) The readings should show nearly battery voltage when the engine speed is low, and, as the engine speed rises, the readings should also rise. But they must be kept under the specified voltage.

Charging Voltage

Tester Range	Connections		Reading
	Tester (+) to	Tester (–) to	
25 V DC	Battery (+)	Battery (–)	14.2 ~ 15.2 V

- Turn off the ignition switch to stop the engine, and disconnect the hand tester.

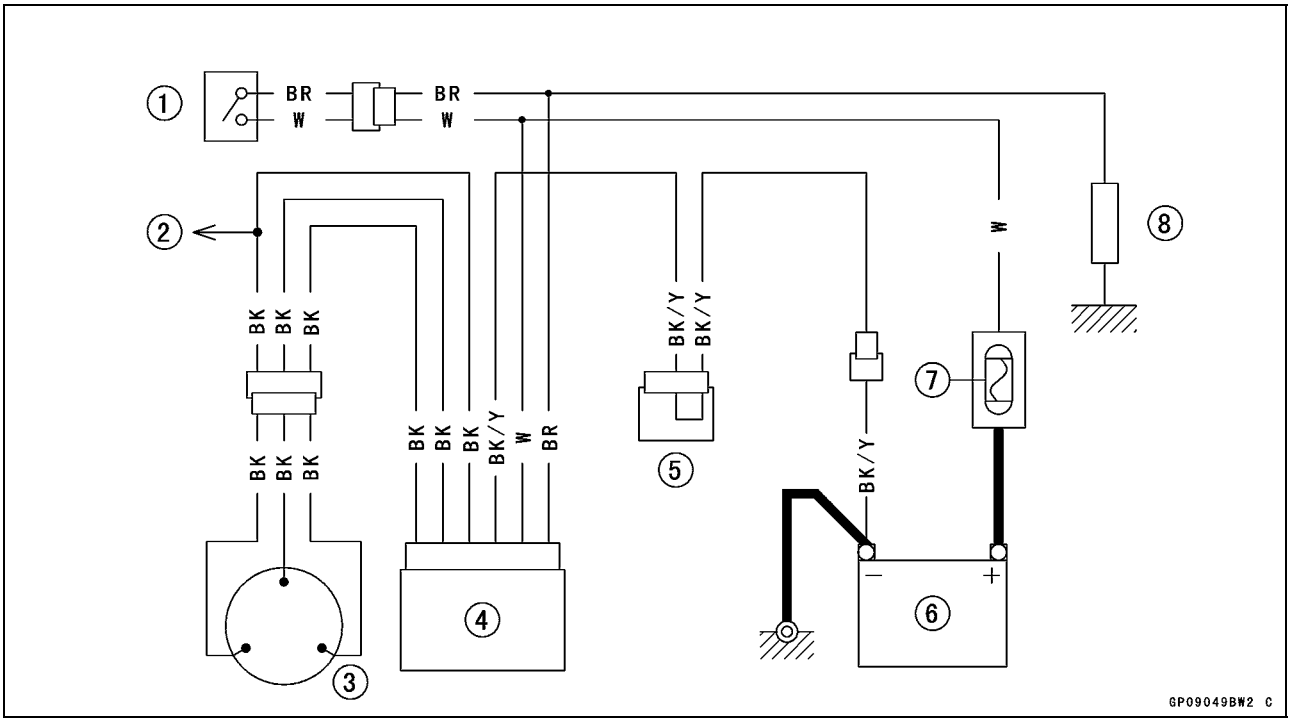
★If the charging voltage is kept between the values given in the table, the charging system is considered to be working normally.

★If the charging voltage is much higher than the values specified in the table, the regulator/rectifier is defective or the regulator/rectifier leads are loose or open.

★If the charging voltage does not rise as the engine speed increases, then the regulator/rectifier is defective or the alternator output is insufficient for the loads. Check the alternator and regulator/rectifier to determine which part is defective.

Charging System

Charging System Circuit



1. Ignition Switch
2. To Starter Circuit Relay
3. Alternator
4. Regulator/Rectifier
5. Joint Connector C
6. Battery 12 V 8 Ah
7. Main Fuse 30 A
8. Load

Ignition System

⚠ WARNING

The ignition system produces extremely high voltage. Do not touch the spark plugs or stick coils while the engine is running, or you could receive a severe electrical shock.

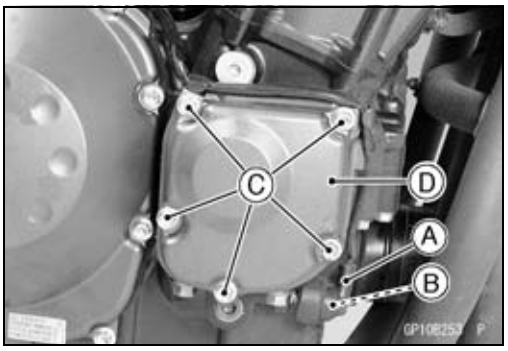
CAUTION

Do not disconnect the battery cables or any other electrical connections when the ignition switch is on, or while the engine is running. This is to prevent ECU (Electrical Control Unit) damage.
Do not install the battery backwards. The negative side is grounded. This is to prevent damage to the diodes and ECU.

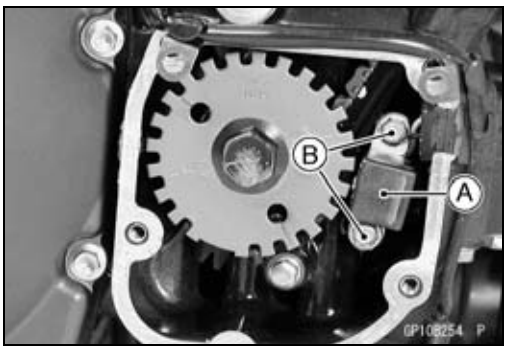
Crankshaft Sensor Removal

- Remove:
  Right Frame Cover (see Frame chapter)
  Crankshaft Sensor Lead Connector [A]

- Remove:
  Rubber Boot (slide out) [A]
  Oil Pressure Switch Lead Terminal [B]
  Crankshaft Sensor Cover Bolts [C] with Clamps
  Crankshaft Sensor Cover [D]



- Remove the crankshaft sensor [A] by taking off the crankshaft sensor bolts [B].



Ignition System

Crankshaft Sensor Installation

- Route the crankshaft sensor lead correctly (see Cable, Wire, and Hose Routing in Appendix chapter).
- Tighten:

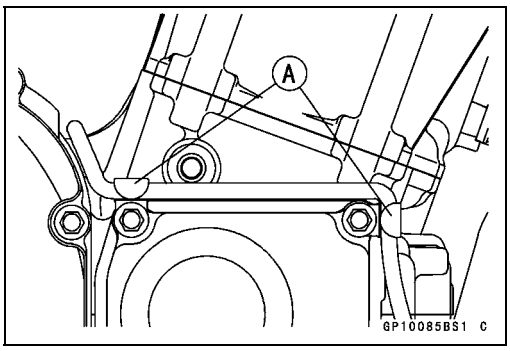
Torque - Crankshaft Sensor Bolts: 5.9 N·m (0.60 kgf·m, 52 in·lb)

- Apply silicone sealant [A] to the crankshaft sensor lead grommet and crankcase halves mating surface on the front and rear sides of the crankshaft sensor cover mount.

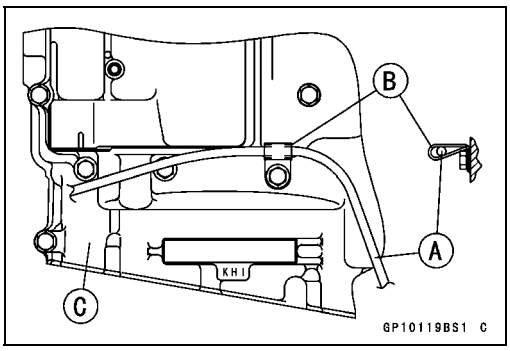
Sealant - Kawasaki Bond (Silicone Sealant): 56019–120

- Install the clamps [A] direction as shown.
- Tighten:

Torque - Crankshaft Sensor Cover Bolts: 11 N·m (1.1 kgf·m, 95 in·lb)



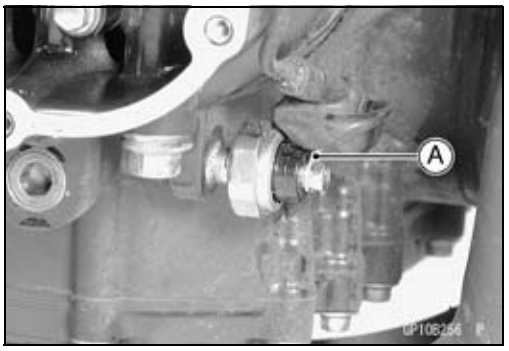
- Hold the sensor lead [A] with the clamp [B].
  Upper Crankcase [C]



- Install oil pressure switch lead terminal [A] securely.
- ○Install the lead terminal direction upward.

Torque - Oil Pressure Switch Terminal Bolt: 1.5 N·m (0.15 kgf·m, 13 in·lb)

- Install the removed parts (see appropriate chapters).



Ignition System

Crankshaft Sensor Inspection

- Remove:
  Right Frame Cover (see Frame chapter)
  Crankshaft Sensor Lead Connector [A]
- Set the hand tester to the × 100 Ω range and connect (+) lead to the yellow/black lead and (–) lead to the black lead in the connector.

Special Tool - Hand Tester: 57001– 1394

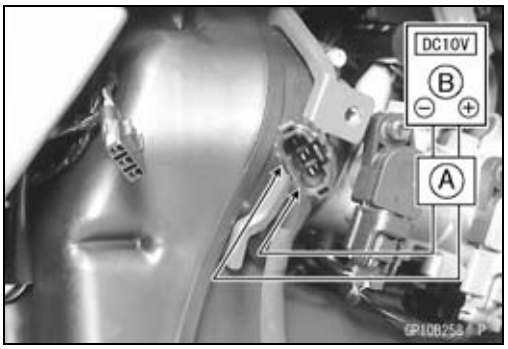
★If there is more resistance than the specified value, the coil has an open lead and must be replaced. Much less than this resistance means the coil is shorted, and must be replaced.

Crankshaft Sensor Resistance: 376 ~ 564 Ω

- Using the highest resistance range of the tester, measure the resistance between the crankshaft sensor leads and chassis ground.

★Any tester reading less than infinity (∞) indicates a short, necessitating replacement of the crankshaft sensor assembly.

Crankshaft Sensor Peak Voltage Inspection



NOTE

○*Be sure the battery is fully charged.*
○*Using the peak voltage adapter is a more reliable way to determine the condition of the crankshaft sensor than crankshaft sensor internal resistance measurements.*

- Remove:
  Right Frame Cover (see Frame chapter)
  Crankshaft Sensor Lead Connector (see Crankshaft Sensor Removal)
- Set the hand tester [B] to the × 10 V DC range, and connect it a commercially available peak voltage adapter [A] as shown in the diagram.
- Connect the black lead of the adapter to black lead and red lead to yellow lead in the crankshaft sensor connector.
- Turn the ignition switch and engine stop switch on.
- Pushing the starter button, turn the engine 4 ~ 5 seconds with the transmission gear in neutral to measure the crankshaft sensor peak voltage.
- Repeat the measurement 5 or more times.

Crankshaft Sensor Peak Voltage
Standard: 1.9 V or more

Special Tool - Hand Tester: 57001–1394

Recommended Tool- Peak Voltage Adapter
Type: KEK-54-9-B
Brand: KOWA SEIKI

★If the tester reading is not specified one, check the crankshaft sensor.

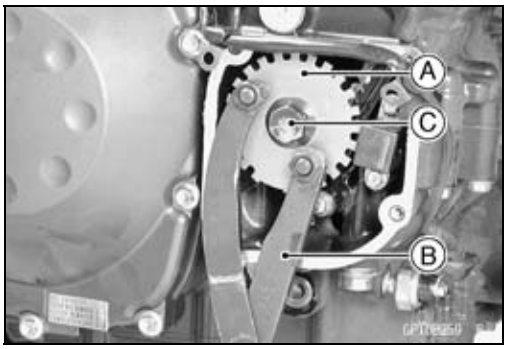
Ignition System

Timing Rotor Removal

- Remove the crankshaft sensor cover (see Crankshaft Sensor Removal)
- Remove the timing rotor [A].

○Holding the timing rotor with the flywheel & pulley holder [B] and remove the bolt [C].

Special Tool - Flywheel & Pulley Holder : 57001–1343



Timing Rotor Installation

- Fit the rotor to the crankshaft.
- Tighten the rotor bolt.

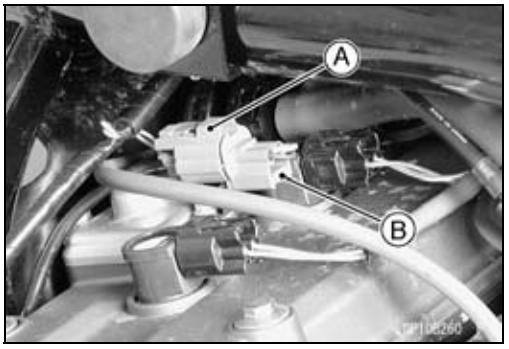
Torque - Timing Rotor Bolt : 39 N·m (4.0 kgf·m, 29 ft·lb)

- Install the crankshaft sensor cover (see Crankshaft Sensor Installation).

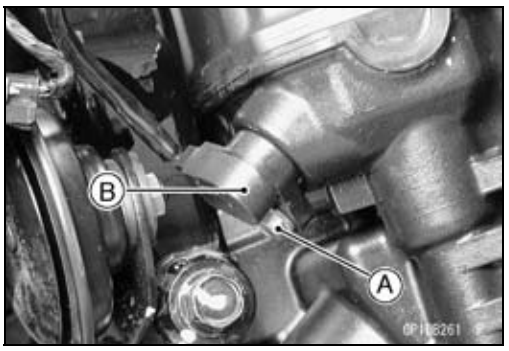
Camshaft Position Sensor Removal

- Remove:
  Fuel Tank (see Fuel System (DFI) chapter)
  Camshaft Position Sensor Lead Connector [A] (disconnect)

○Push the tongue [B] upside and take out the connector from the bracket.



- Remove:
  Camshaft Position Sensor Bolt [A]
  Camshaft Position Sensor [B]



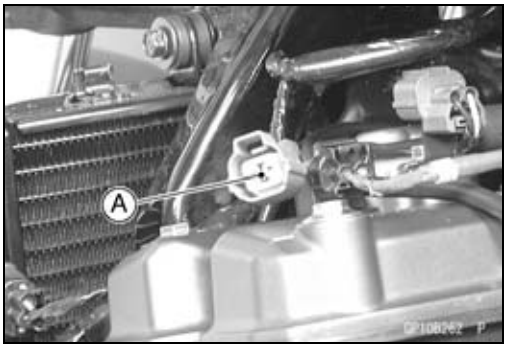
Camshaft Position Sensor Installation

- Apply grease or engine oil to the O-ring on the camshaft position sensor.
- Apply a non-permanent locking agent to the sensor bolt.
- Tighten:

Torque - Camshaft Position Sensor Bolt: 12 N·m (1.2 kgf·m, 104 in·lb)

Ignition System

Camshaft Position Sensor Inspection



- Remove:
  Fuel Tank (see Fuel System (DFI) chapter)
  Camshaft Position Sensor Lead Connector [A] (disconnect)
- Set the hand tester to the × 10 Ω range and connect it to the yellow and black leads in the connector.

Special Tool - Hand Tester: 57001–1394

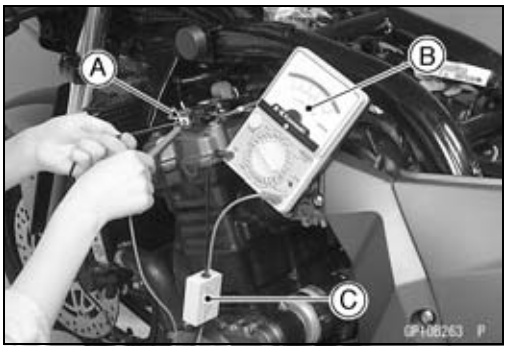
★If there is more resistance than the specified value, the sensor coil has an open lead and must be replaced. Much less than this resistance means the sensor coil is shorted, and must be replaced.

Camshaft Position Sensor Resistance: 400 ~ 460 Ω

- Using the highest resistance range of the tester, measure the resistance between the camshaft position sensor leads and chassis ground.

★Any tester reading less than infinity (∞) indicates a short, necessitating replacement of the camshaft position sensor.

Camshaft Position Sensor Peak Voltage Inspection



- Remove:
  Fuel Tank (see Fuel System (DFI) chapter)
  Camshaft Position Sensor Lead Connector [A] (disconnect)
- Set the hand tester [B] to the 10 V DC range.
- Connect the peak voltage adapter [C] to the hand tester and camshaft position sensor leads in the connector.

Special Tool - Hand Tester: 57001–1394

Recommended Tool- Peak Voltage Adapter
Type: KEK-54-9-B
Brand: KOWA SEIKI

Connections:

Camshaft Position Sensor Lead		Adapter		Hand Tester
Black	←	Red	→	(+)
Yellow	←	Black	→	(–)

- Turn the ignition switch and engine stop switch on.
- Pushing the starter button, turn the engine 4 ~ 5 seconds with the transmission gear in neutral to measure the camshaft position sensor peak voltage.
- Repeat the measurement 5 or more times.

Camshaft Position Sensor Peak Voltage
Standard: 0.2 V or more

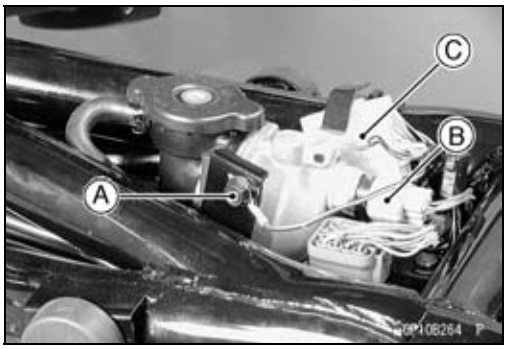
★If the peak voltage is lower than the standard, inspect the camshaft position sensor.

Ignition System

Stick Coil (Ignition Coil together with Spark Plug Cap) Removal

- Remove the fuel tank (see Fuel System (DFI) chapter).
- Remove the thermostat bracket bolt [A].
- Disconnect:
  Water Temperature Sensor Connector [B]
  Left Switch Housing Connector [C]

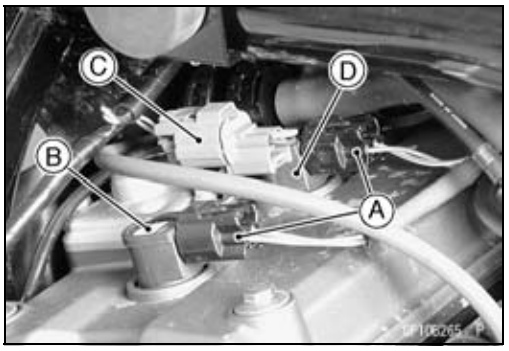
○If removing the stick coil #2 or #3.



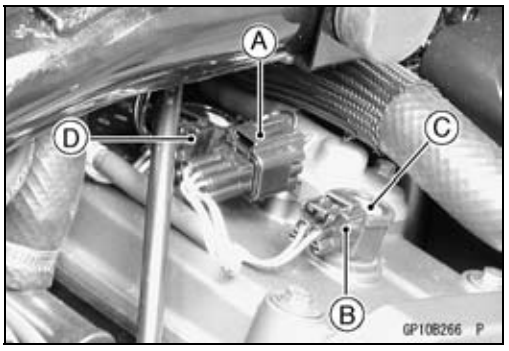
- Disconnect the stick coil connectors [A].
- Pull the stick coil #1 [B] off the spark plug.
- Take out the camshaft position sensor connector [C] from the bracket (see Camshaft Position Sensor Removal).
- Pull the stick coil #2 [D] off the spark plug.

CAUTION

Do not pry the connector part of the coil while removing the coil.



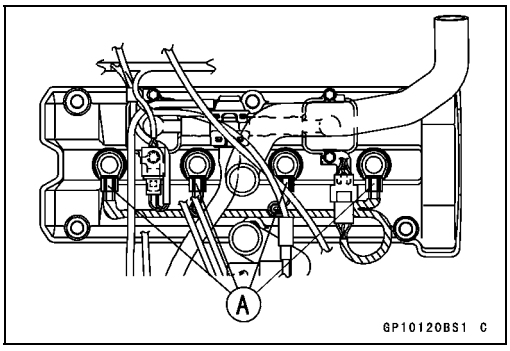
- Remove the stick coil harness [A] from the bracket.
- Remove:
  Stick Coil Connector #4 [B] (disconnect)
  Stick Coil #4 [C]
  Stick Coil Connector #3 [D] (disconnect)
- Pull the main harness upward and remove the stick coil #3.



Stick Coil (Ignition Coil together with Spark Plug Cap) Installation

- Install the coil using the following steps.

○Insert the coil as shown being careful of the coil heads [A] direction.



○Be sure the stick coils are installed by pulling up [A] it lightly.

○Connect the connectors.

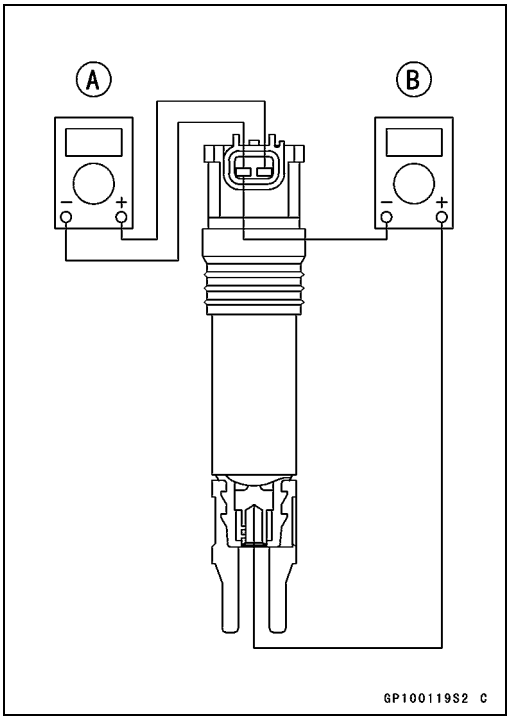
CAUTION

Do not tap the coil head while installing the coil.

- Install the removed parts (see appropriate chapters).

Ignition System

Stick Coil (Ignition Coil together with Spark Plug Cap) Inspection



- Remove the stick coils (see this chapter).
- Measure the primary winding resistance [A] as follows.

○Connect the hand tester between the coil terminals.
○Set the tester to the × 1 Ω range, and read the tester.

- Measure the secondary winding resistance [B] as follows.

○Connect the tester between the plug terminal and (–) coil terminal.
○Set the tester to the × 1 kΩ range and read the tester.

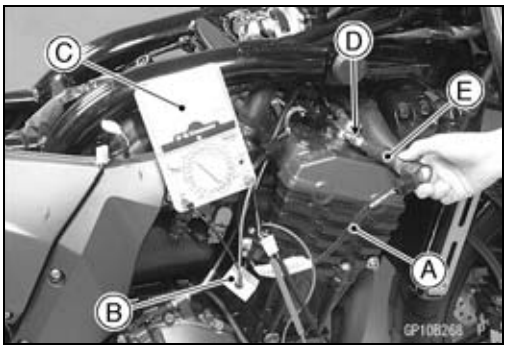
Ignition Coil Winding Resistance
Primary Windings: 1.04 ~ 1.56 Ω
Secondary Windings: 10.8 ~ 16.2 kΩ

★If the tester does not read as specified, replace the coil.

Stick Coil Primary Peak Voltage

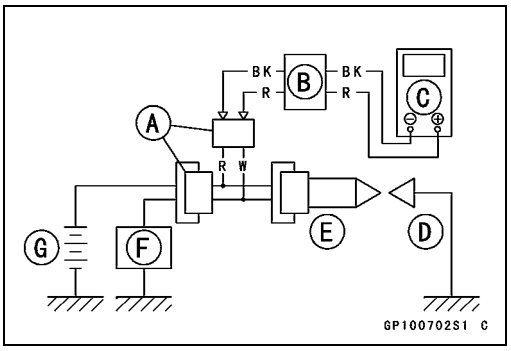
NOTE

○*Be sure the battery is fully charged.*



- Remove the stick coils (see this chapter), but do not remove the spark plugs.
- Measure the primary peak voltage as follows.

○Connect a commercially peak voltage adapter [B] into the hand tester [C] which is set to the x 250 V DC range.
○Connect the adapter to the lead wire-peak voltage adapter [A] which is connected between the stick coil connector and stick coil.
○Install the new spark plug [D] into each stick coil [E], and ground them onto the engine.
ECU [F]
Battery [G]



Recommended Tool- Peak Voltage Adapter
Type: KEK-54-9-B
Brand: KOWA SEIKI

Special Tools - Hand Tester: 57001–1394
Lead Wire-Peak Voltage Adapter: 57001–1449

Primary Lead Connection
Adapter (R, +) to lead wire-peak voltage adapter (W)
Adapter (BK, –) to lead wire-peak voltage adapter (R)

Ignition System

⚠ WARNING

To avoid extremely high voltage shocks, do not touch the spark plugs or tester connections.

- Turn the ignition switch and the engine stop switch ON.
- Pushing the starter button, turn the engine 4 ~ 5 seconds with the transmission in neutral to measure the primary peak voltage.
- Repeat the measurements 5 times for one stick coil.

Stick Coil Primary Peak Voltage
Standard: 88 V or more

- Repeat the test for the other stick coil.

★If the reading is less than the specified value, check the following.
Stick Coils (see Stick Coil Inspection)
Crankshaft Sensor (see Crankshaft Sensor Inspection)

★If the stick coils, and crankshaft sensor are normal, check the ECU (see Fuel System (DFI) chapter).

Spark Plug Removal

- Refer to the Electrical System in the Periodic Maintenance chapter.

Spark Plug Installation

- Refer to the Electrical System in the Periodic Maintenance chapter.

Spark Plug Inspection

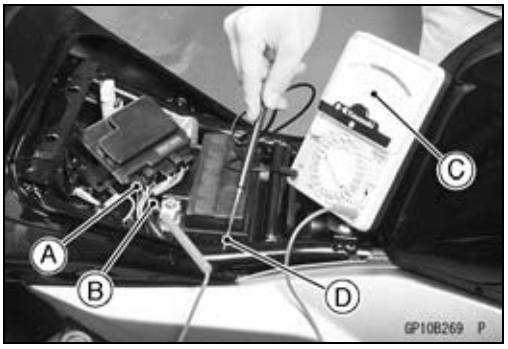
- Refer to the Electrical System in the Periodic Maintenance chapter.

Spark Plug Gap Inspection

- Refer to the Electrical System in the Periodic Maintenance chapter.

Ignition System

Interlock Operation Inspection



● Remove:
Seats (see Frame chapter)
Junction Box (see this chapter)

○Do not disconnect the connectors.

1st Check

● Measure the terminal voltage of the G/BK lead in the junction box connector [A] in accordance with the following procedure.

○Insert the needle adapter [B] in the Green/Black lead terminal.

○Set the tester [C] to the 25 V DC range, connect it to the needle adapter and frame ground [D].

Connection:
Tester (+) Terminal → G/BK Lead Terminal
Tester (–) Terminal → Frame Ground

Condition:
Transmission Gear → 1st Position
Clutch Lever → Release or Pulled In
Side Stand → Down

Special Tool - Needle Adapter Set: 57001–1457

○Turn the ignition switch on.

○Read the voltage.

Interlock Operation Voltage
Standard: 4 V or more

★If the voltage is lower than the standard, inspect the side stand switch, starter lockout switch, and junction box. And their parts are normality, replace the ECU.

★If the voltage is standard, push the starter button to check as follows.

○If the starter motor does not turn, the ECU is good, and check the starter system circuit.

○If the starter motor turned, ECU is defective. Replace the ECU.

2nd Check

Raise the rear wheel off the ground with a stand.

● Inspect the engine for its secure stop after the following operations are completed.

● Run the engine to the following conditions.

Condition:
Transmission Gear → 1st Position
Clutch Lever → Release
Side Stand → Up

● Set the side stand on the ground, then the engine will stop.

★If whichever may not be stopped, inspect the starter lockout switch, side stand switch and junction box.

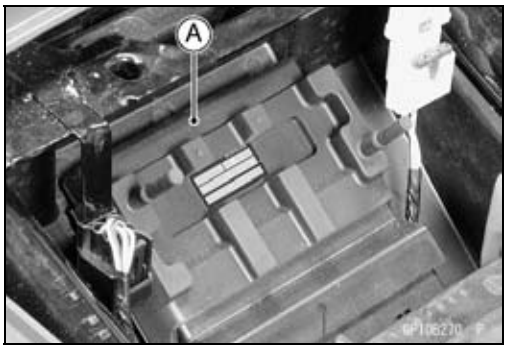
★If their parts are normality, replace the ECU.

Ignition System

IC Igniter Inspection

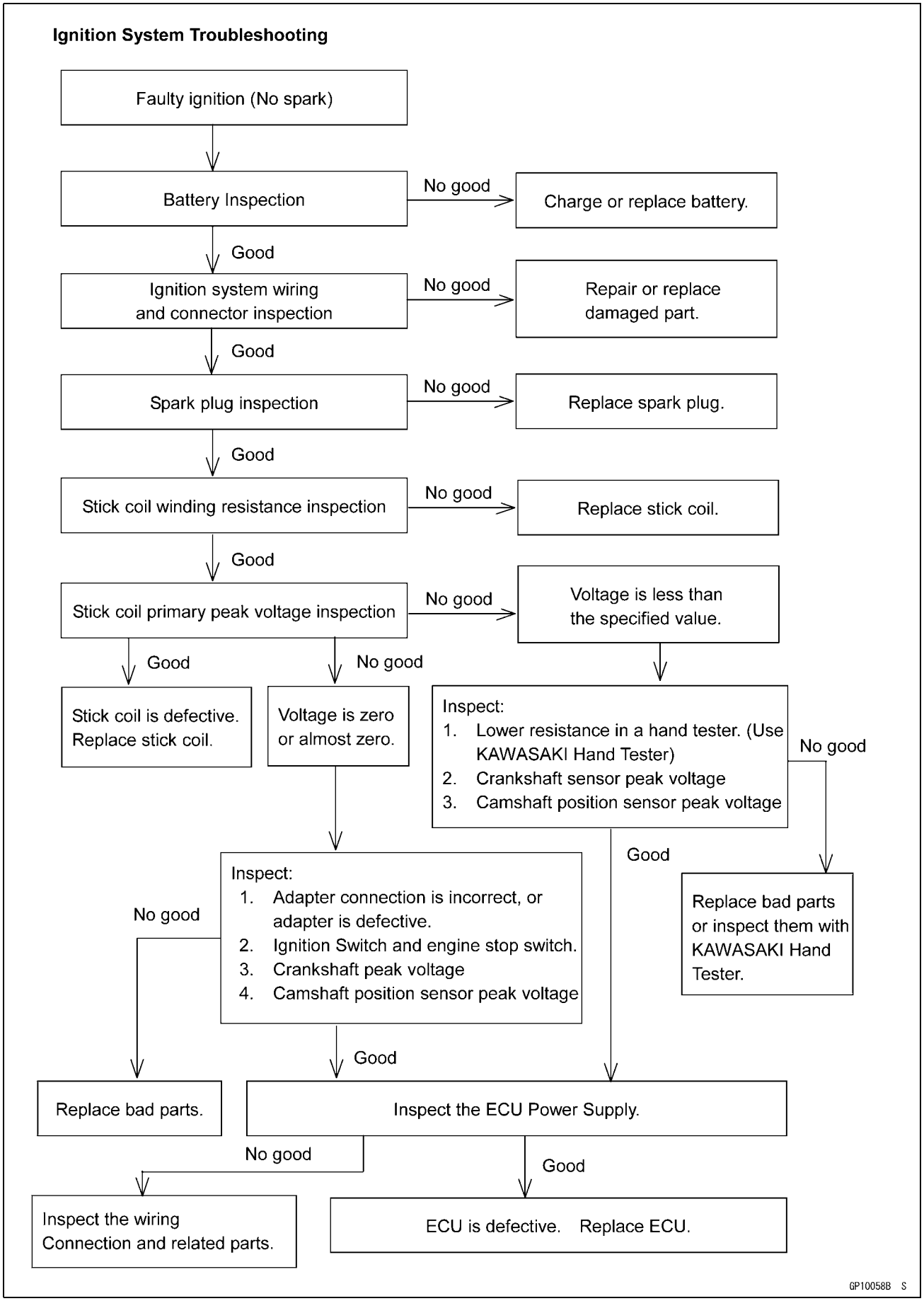
○The IC Igniter is built in the ECU [A].

● Refer to the Interlock Operation Inspection, Ignition System Troubleshooting chapter and Fuel System (DFI) chapter for ECU Inspection.



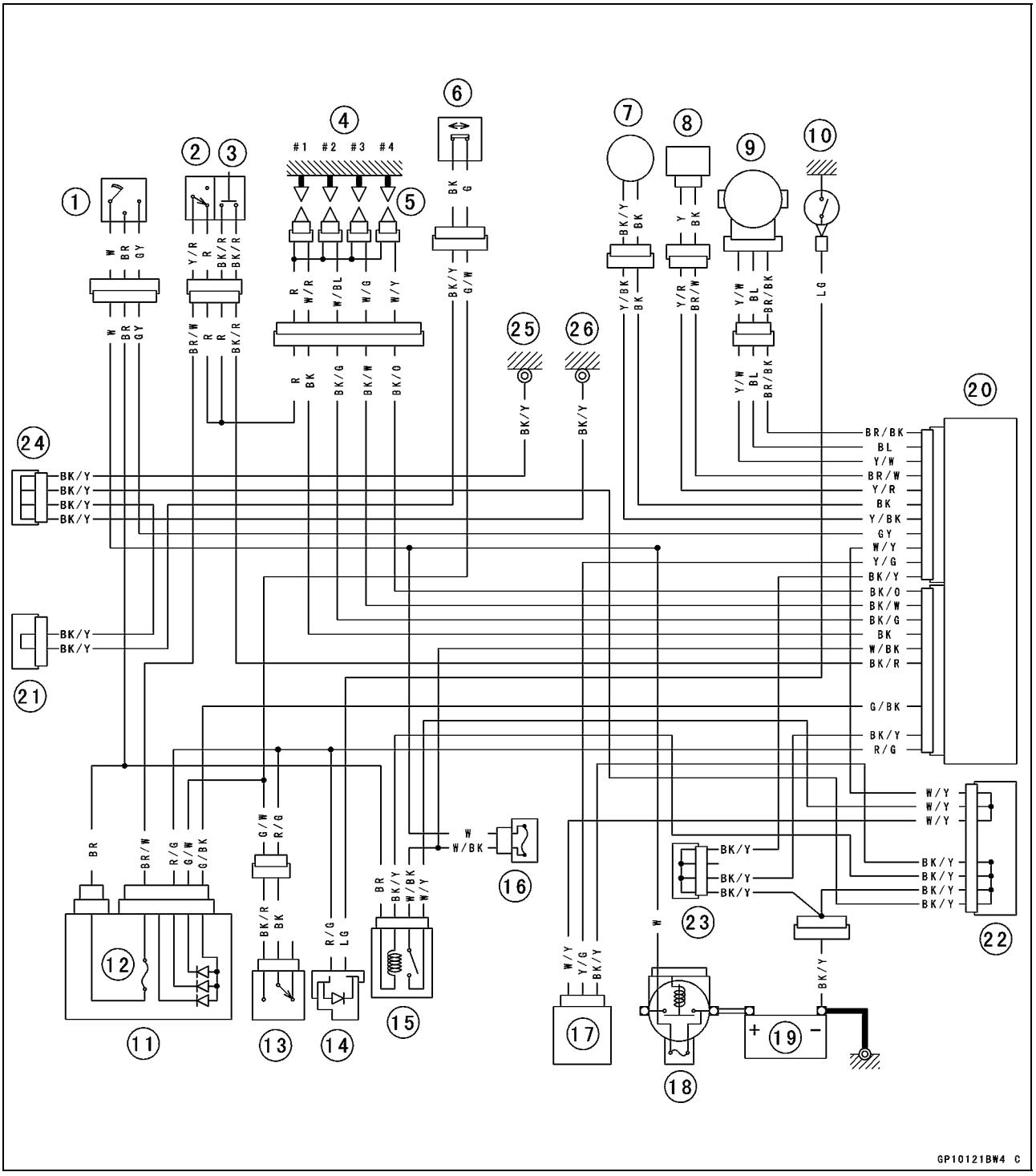
Ignition System

Ignition System Troubleshooting



Ignition System

Ignition System Circuit



1. Ignition Switch
2. Engine Stop Switch
3. Starter Button
4. Spark Plugs
5. Stick Coils
6. Side Stand Switch
7. Crankshaft Sensor
8. Camshaft Position Sensor
9. Throttle Sensor
10. Neutral Switch
11. Junction Box
12. Ignition Fuse 10 A
13. Starter Lockout Switch
14. Diode
15. ECU Main Relay
16. ECU Fuse 15 A
17. Vehicle-down Sensor
18. Main Fuse 30 A
19. Battery 12 V 8 Ah
20. ECU (Electrical Control Unit)
21. Joint Connector A
22. Joint Connector B
23. Joint Connector C
24. Joint Connector D

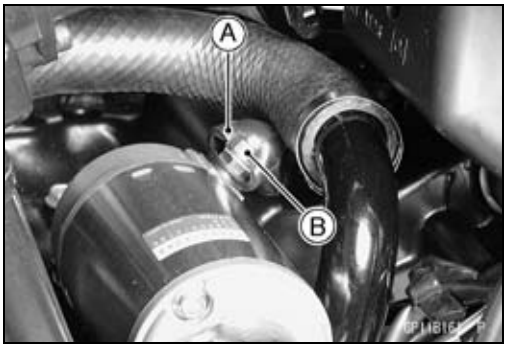
Electric Starter System

Starter Motor Removal

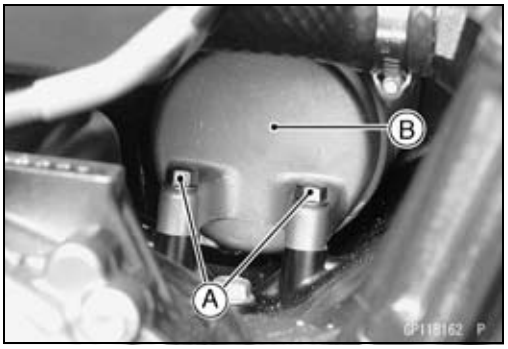
CAUTION

Do not tap the starter motor shaft or body. Tapping the shaft or body could damage the motor.

- Slide back the rubber cap [A].
- Remove the starter motor terminal nut [B].



- Remove the mounting bolts [A].
- Pull out the starter motor [B].

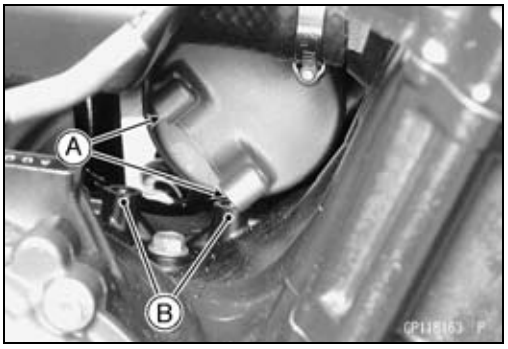


Starter Motor Installation

CAUTION

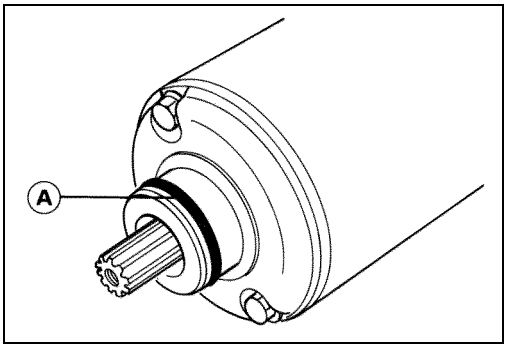
Do not tap the starter motor shaft or body. Tapping the shaft or body could damage the motor.

- When installing the starter motor, clean the starter motor legs [A] and crankcase [B] where the starter motor is grounded.



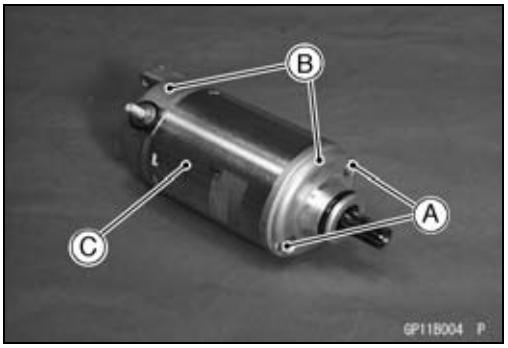
- Replace the O-ring [A] with a new one.
- Apply grease to the O-ring.
- Tighten:

Torque - Starter Motor Mounting Bolts: 11 N·m (1.1 kgf·m, 95 in·lb)



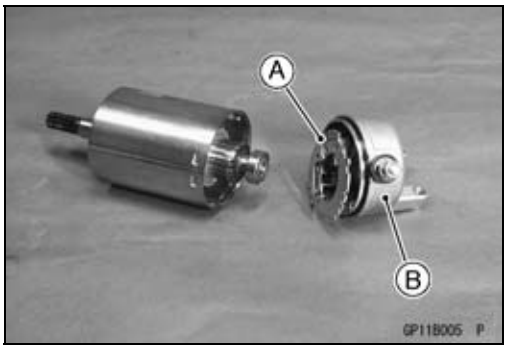
Starter Motor Disassembly

- Take off the starter motor through bolts [A] and remove both end covers [B] and pull the armature out of the yoke [C].

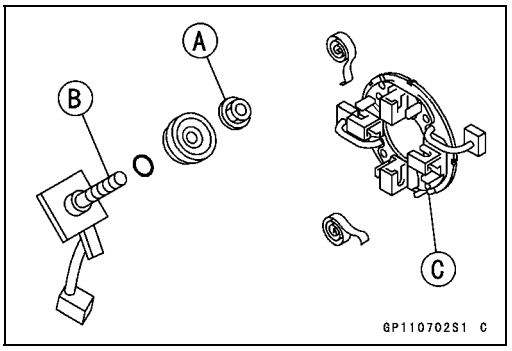


Electric Starter System

○The brush plate [A] and brushes come off with the right -hand end cover [B].

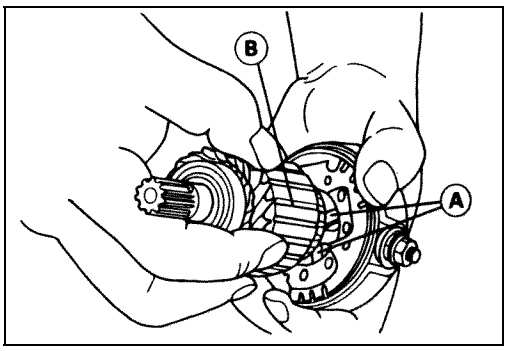


● Remove the terminal locknut [A] and terminal bolt [B], and then remove the brush with the brush plate [C] from the right-hand end cover.

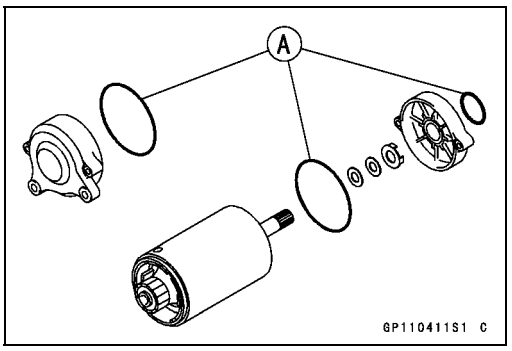


Starter Motor Assembly

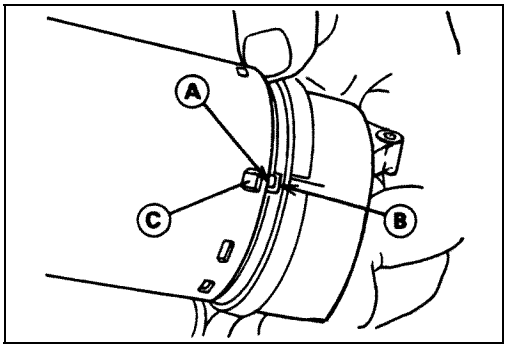
● Install the brush plate and brushes [A], and then put the armature [B] among the brushes.



● Install the O-rings [A] as shown.

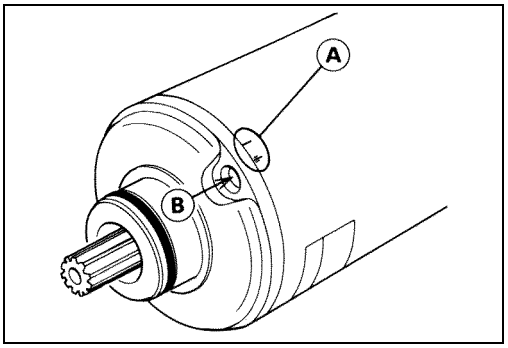


● Align the notch [A] in the brush plate with the end cover notch [B] and the mark [C] on the yoke.



Electric Starter System

● Align the line [A] marked on the yoke with the through bolt hole [B].



Brush Inspection

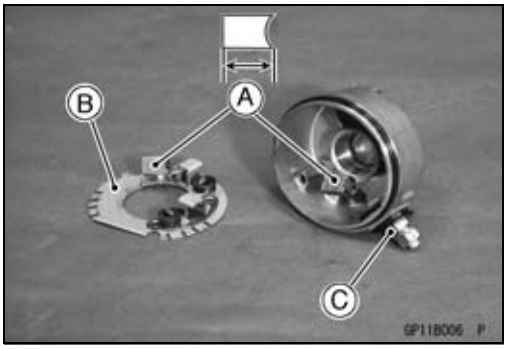
● Measure the length [A] of each brush.

★If any is worn down to the service limit, replace the carbon brush holder assembly [B] and the terminal bolt assembly [C].

Starter Motor Brush Length

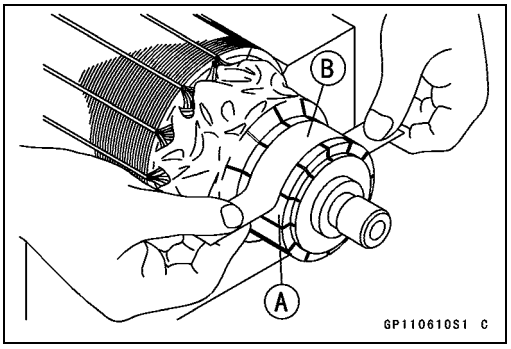
Standard: 12 mm (0.47 in.)

Service Limit: 8.5 mm (0.33 in.)



Commutator Cleaning and Inspection

● Smooth the commutator surface [A] if necessary with fine emery cloth [B], and clean out the grooves.



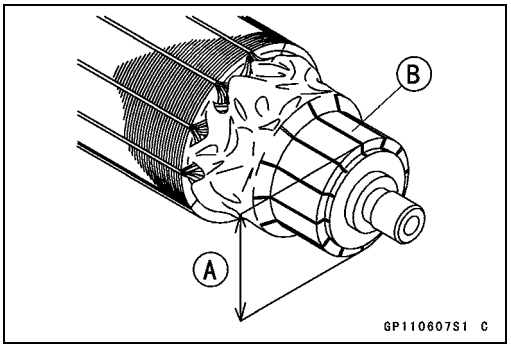
● Measure the diameter [A] of the commutator [B].

★If the commutator diameter is less than the service limit, replace the starter motor with a new one .

Commutator Diameter

Standard: 28 mm (1.10 in.)

Service Limit: 27 mm (1.06 in.)



Armature Inspection

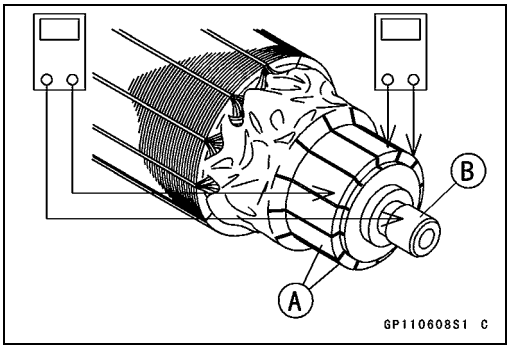
● Using the × 1 Ω hand tester range, measure the resistance between any two commutator segments [A].

Special Tool - Hand Tester: 57001–1394

★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 hand tester range, measure the resistance between the segments and the shaft [B].

★If there is any reading at all, the armature has a short and the starter motor must be replaced.

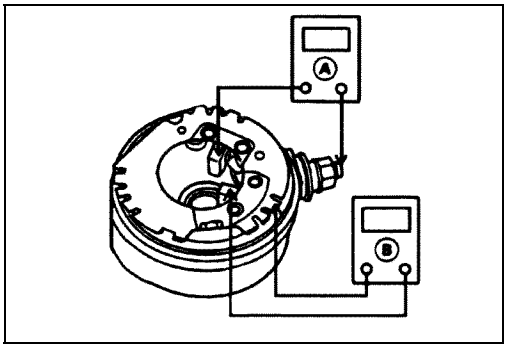


Electric Starter System

NOTE

○*Even if the foregoing checks show the armature to be good, it may be defective in some manner not readily detectable with the hand tester. 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 Lead Inspection

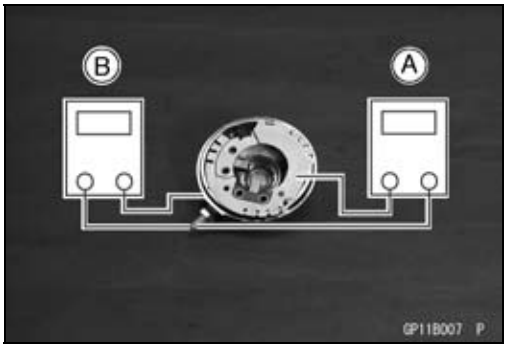


- Using the × 1 Ω hand tester range, measure the resistance as shown.
  Terminal Bolt and Positive Brush [A]
  Brush Plate and Negative Brush [B]

Special Tool - Hand Tester: 57001–1394

★If there is not close to zero ohms, the brush lead has an open. Replace the terminal bolt assembly and/or the brush holder assembly.

Brush Plate and Terminal Bolt Inspection



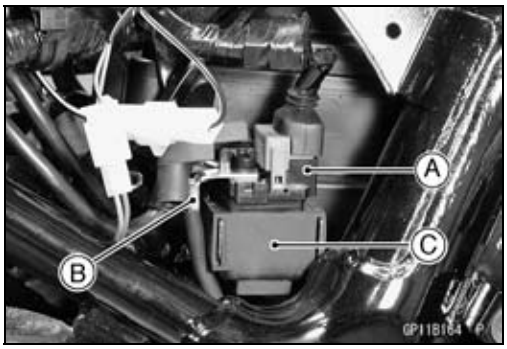
- Using the highest hand tester range, measure the resistance as shown.
  Terminal Bolt and Brush Plate [A]
  Terminal Bolt and Right-hand End Cover [B]

Special Tool - Hand Tester: 57001–1394

★If there is any reading, the brush holder assembly and/or terminal bolt assembly have a short. Replace the brush holder assembly and the terminal bolt assembly.

Starter Relay Inspection

- Remove the battery negative (–) cable from the battery negative (–) terminal (see Battery Removal).
- Remove the right side cover.
- Pull out the starter relay.



- Disconnect the connector [A].
- Disconnect the starter motor cable [B] and battery positive (+) cable from the starter relay [C].

CAUTION

The battery positive (+) cable with the rubber cap is connected directly to the battery positive (+) terminal even when the ignition switch off, so take care not to short the removed cable to chassis ground.

Electric Starter System

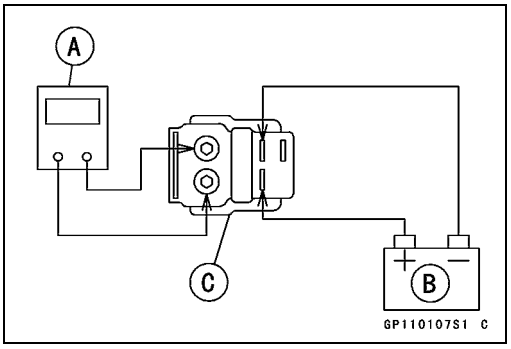
- Connect the hand tester [A] and 12 V battery [B] to the starter relay [C] as shown.

Special Tool - Hand Tester: 57001–1394

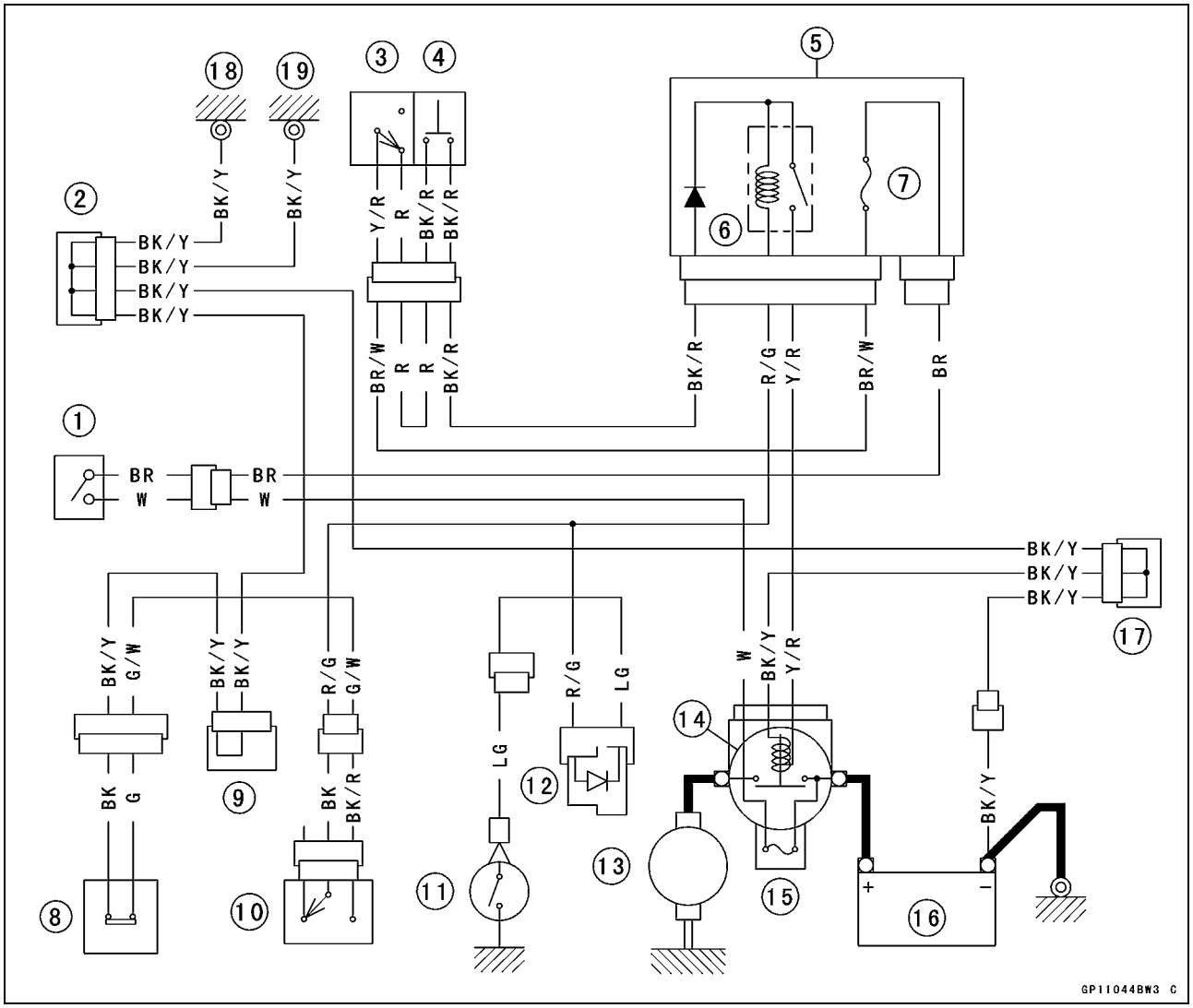
★If the relay does not work as specified, the relay is defective. Replace the relay.

Testing Relay

Tester Range:	**× 1 Ω range**
Criteria:	**When battery is connected → 0 Ω**
	When battery is disconnected → ∞ Ω



Electric Starter Circuit



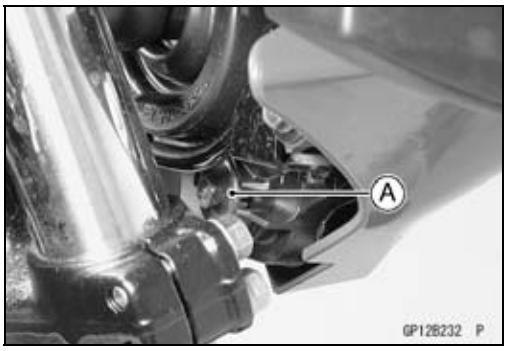
1. Ignition Switch
2. Joint Connector D
3. Engine Stop Switch
4. Starter Button
5. Junction Box
6. Starter Circuit Relay
7. Ignition Fuse 10 A
8. Side Stand Switch
9. Joint Connector A
10. Starter Lockout Switch
11. Neutral Switch
12. Diode
13. Starter Motor
14. Starter Relay
15. Main Fuse 30 A
16. Battery 12 V 8 Ah
17. Joint Connector B
18. Meter Ground
19. Frame Ground

Lighting System

This models adopt the daylight system and have a headlight relay in the junction box. In these models, the headlight does not go on when the ignition switch and the engine stop switch are first turned on. The headlight comes on after the starter button is released and stays on until the ignition switch is turned off. The headlight will go out momentarily whenever the starter button is pressed and come back on when the button is released.

Headlight Beam Horizontal Adjustment

- Turn the horizontal adjuster [A] on the headlight with the screwdriver in or out until the beam points straight ahead.

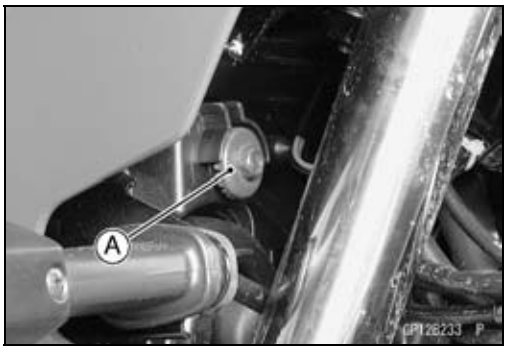


Headlight Beam Vertical Adjustment

- Turn the vertical adjusters [A] on the headlight with the screwdriver in or out to adjust the headlight vertically.

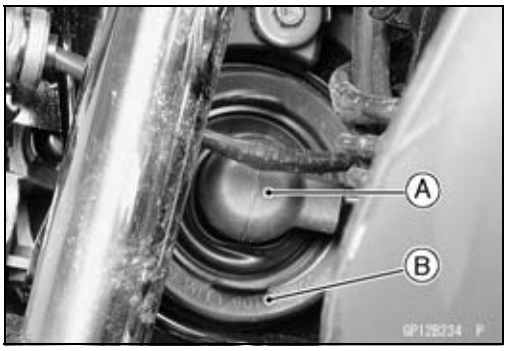
NOTE

○*On high beam, the brightest points should be slightly below horizontal with the motorcycle on its wheels and the rider seated. Adjust the headlight(s) to the proper angle according to local regulations.*



Headlight Bulb Replacement

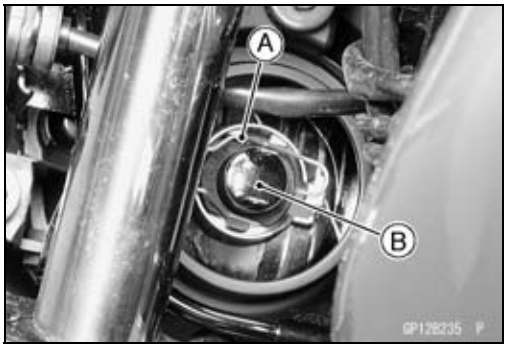
- Remove:
  Headlight Connector [A]
  Headlight Bulb Dust Cover [B]



- Remove:
  Hook [A]
  Headlight Bulb [B]

CAUTION

When handling the quartz-halogen bulb, 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.



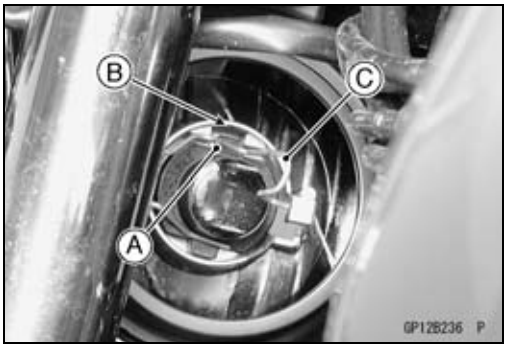
NOTE

○*Clean off any contamination that inadvertently gets on the bulb with alcohol or soap and water solution.*

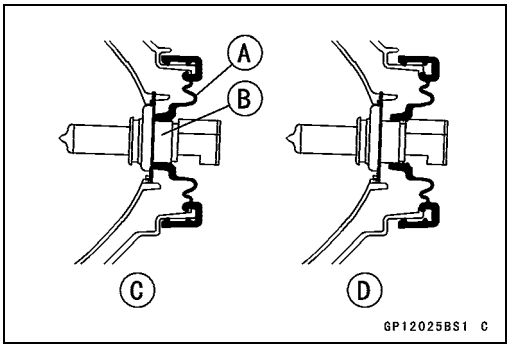
- Replace the headlight bulb.

Lighting System

- Fit the projection [A] of the bulb in the hollow [B] of the headlight.
- Install the hook [C].



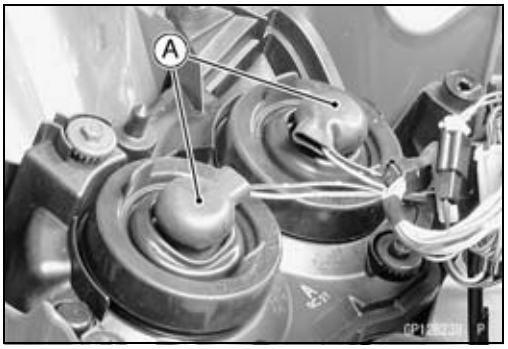
- Fit the dust cover [A] with the arrow mark upward onto the bulb [B] firmly as shown.
  Good [C]
  Bad [D]
  Arrow Mark [E]
- After installation, adjust the headlight aim (see this chapter).



Headlight Removal/Installation

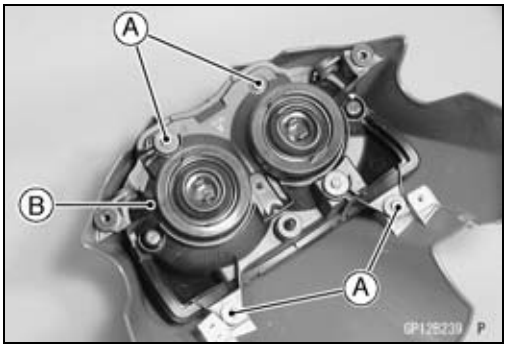
- Remove:
  Fairing (see Frame chapter)
- Disconnect the headlight connectors [A].

○For the european model disconnect the city light connector.



- Remove:
  Bolts [A]
  Headlight Assy [B]
- Headlight installation is revers of removal.

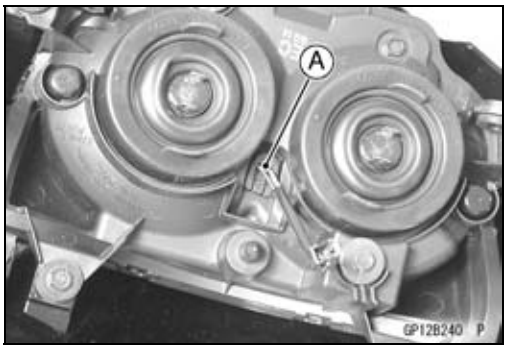
Torque - Headlight Mounting Bolts : 5.9 N·m (0.60 kgf·m, 52 in·lb)



Lighting System

City Light Bulb Replacement (European Model)

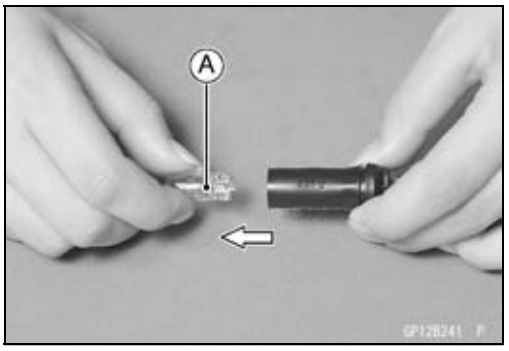
- Remove the fairing (see Frame chapter).
- Pull out the socket [A] together with the bulb.



- Pull the bulb [A] out of the socket.

CAUTION

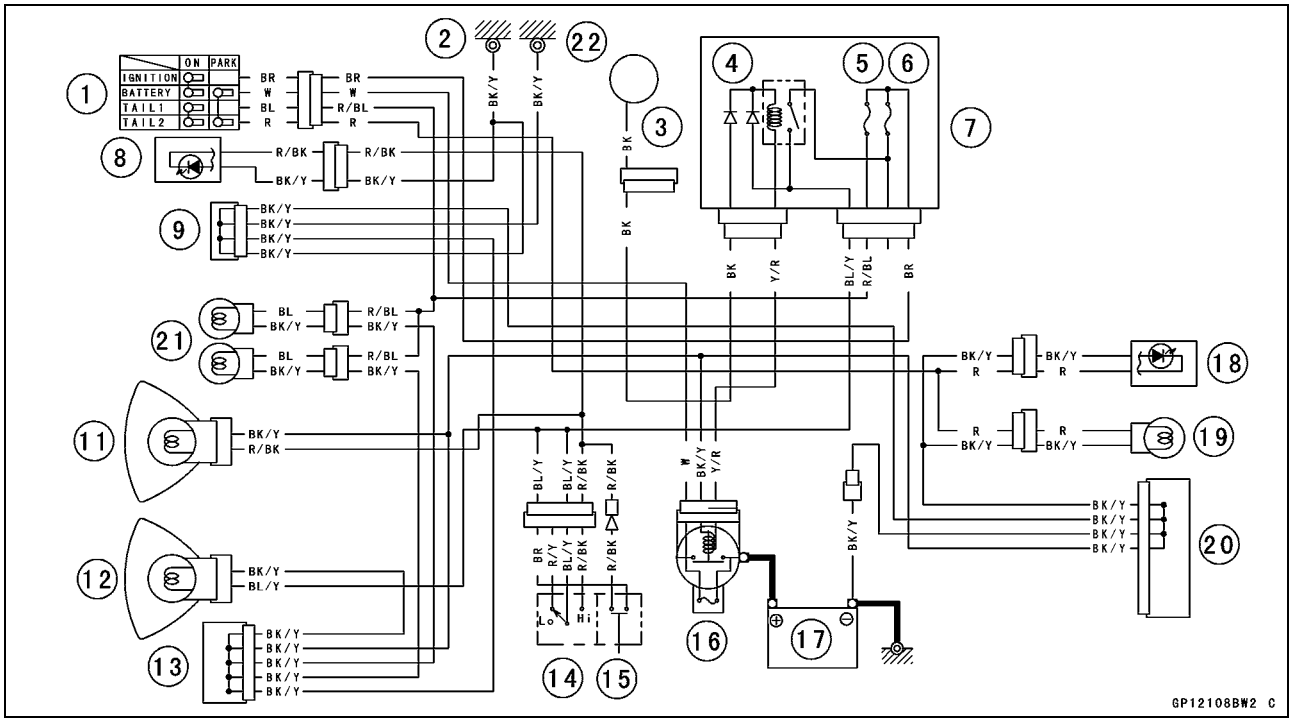
Do not turn the bulb. Pull the bulb out to prevent damage to the bulb. Do not use bulb rated for greater wattage then the specified valve.



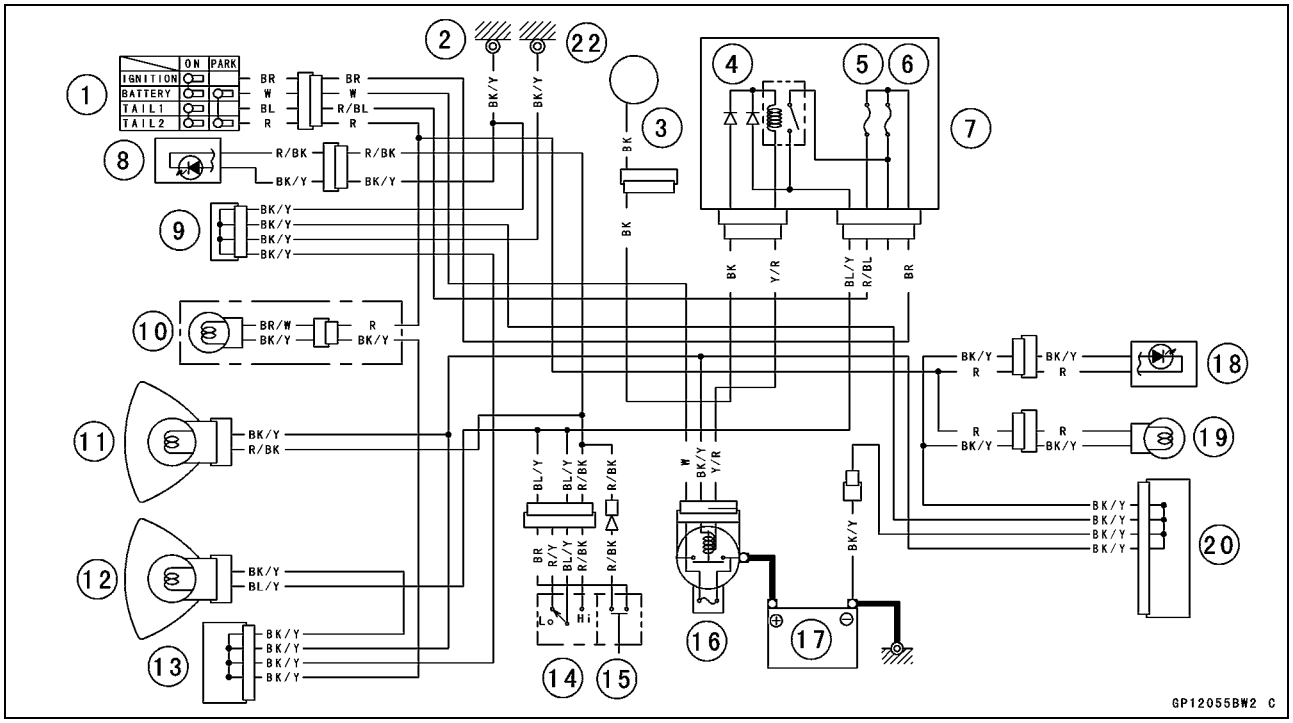
- Replace the bulb with a new one.

Lighting System

Headlight/Tail Light Circuit (CA, AS)



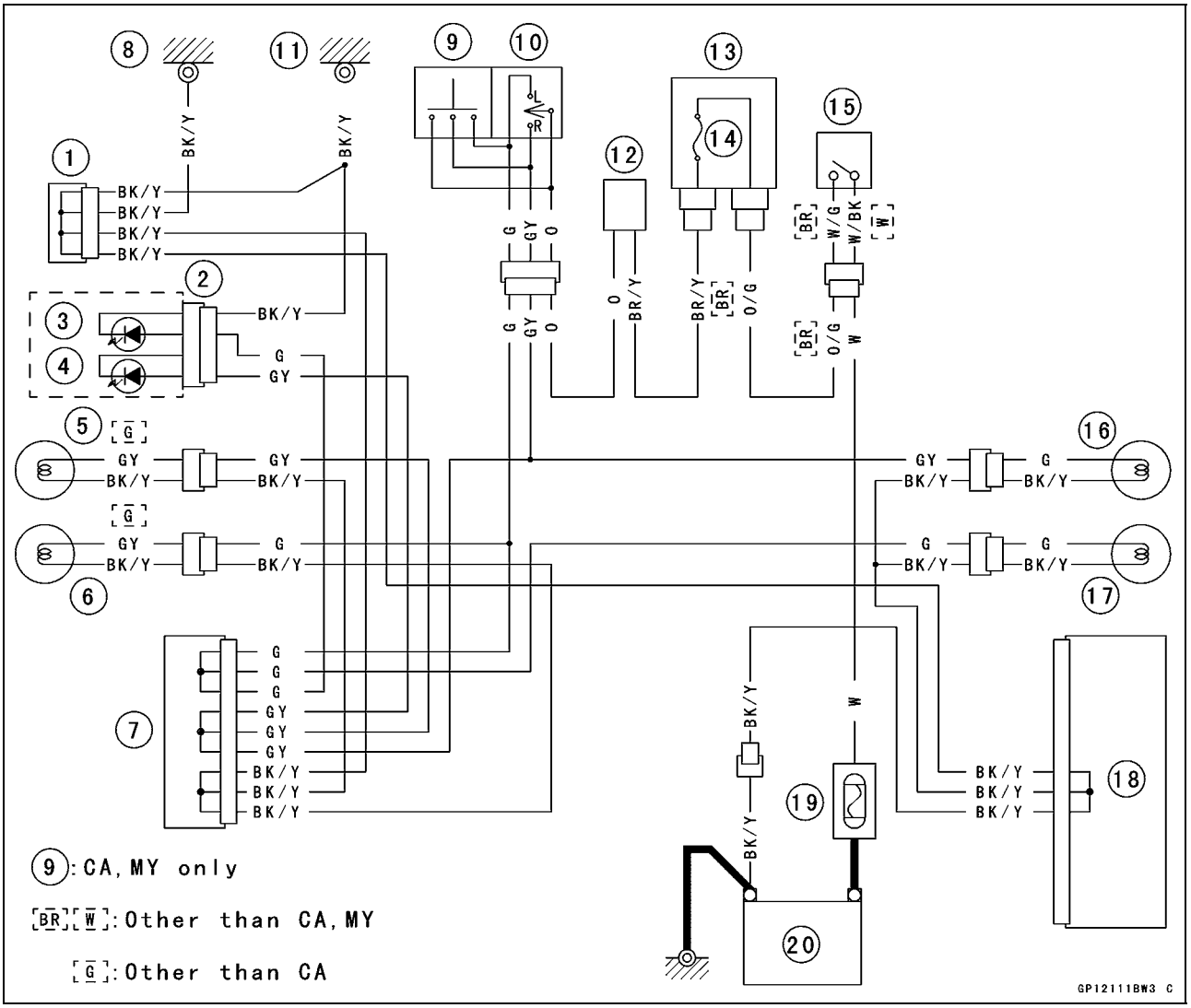
Headlight/Tail Light Circuit (Other than CA, AS)



AS: Australia
CA: Canada
1. Ignition Switch
2. Meter Ground
3. Alternator
4. Headlight Diodes
5. Taillight Fuse 10 A
6. Headlight Fuse 10 A
7. Junction Box
8. High Beam Indicator Light (LED)
9. Joint Connector D
10. City Light (European Model)
11. Headlight (High)
12. Headlight (Low)
13. Joint Connector A
14. Dimmer Switch
15. Passing Button
16. Main Fuse 30 A
17. Battery 12 V 8 Ah
18. Taillight (LED)
19. License Plate Light
20. Joint Connector B
21. Running Position Light
22. Frame Ground

Lighting System

Turn Signal Light Circuit



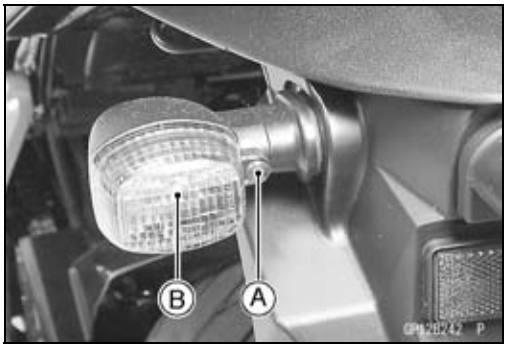
CA: Canada model
MY: Malaysia model

1. Joint Connector D
2. Meter Unit
3. Right Turn Signal Indicator Light (LED)
4. Left Turn Signal Indicator Light (LED)
5. Front Right Turn Signal Light
6. Front Left Turn Signal Light
7. Joint Connector A
8. Frame Ground
9. Hazard Button
10. Turn Signal Switch
11. Meter Ground
12. Turn Signal Relay
13. Junction Box
14. Turn Signal Fuse 10 A
15. Ignition Switch
16. Rear Right Turn Signal Light
17. Rear Left Turn Signal Light
18. Joint Connector B
19. Main Fuse 30 A
20. Battery 12 V 8 Ah

Turn Signal Light Bulb Replacement

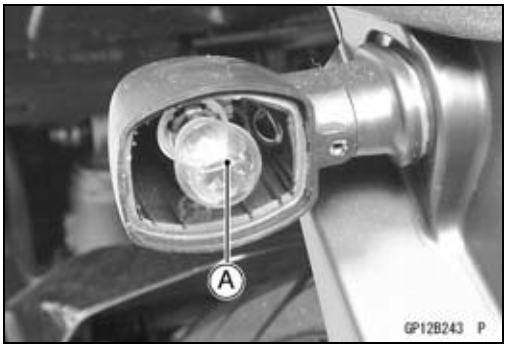
For the European, Malaysian and Australian Models:

● Unscrew the screw [A] and remove the lens [B].



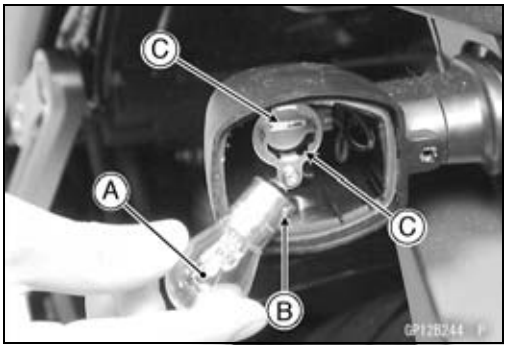
Lighting System

● Push and turn the bulb [A] counterclockwise and remove it.



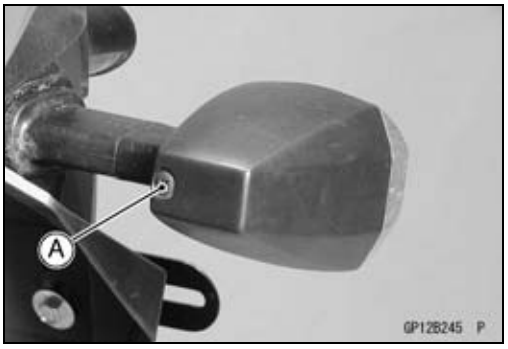
● Insert the new bulb [A] by aligning its upper and lower pins [B] with the upper and lower grooves [C] in the socket, and turn the bulb clockwise.

○Turn the bulb about 15°.



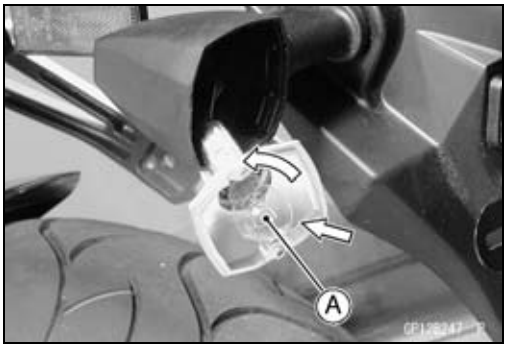
For the Canadian Model:

● Unscrew the screw [A].

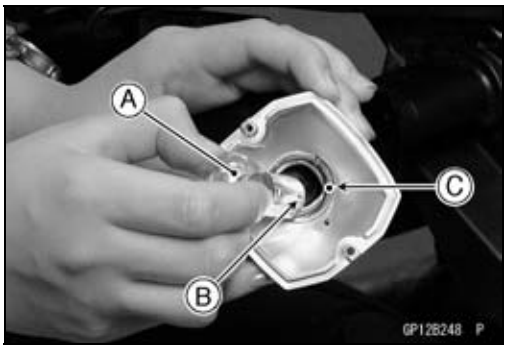


● Unscrew the screws [A].

● Push and turn the bulb [A] counterclockwise and remove it.

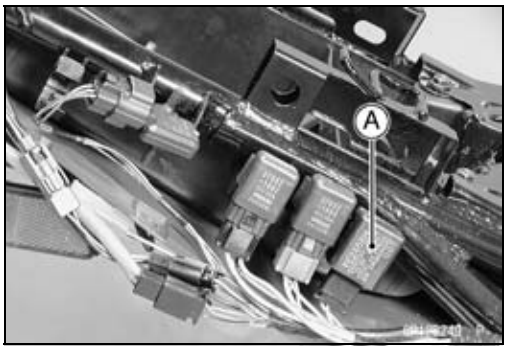


● Insert the new bulb [A] by aligning its upper and lower pins [B] with the upper and lower grooves [C] in the socket, and turn the bulb clockwise.



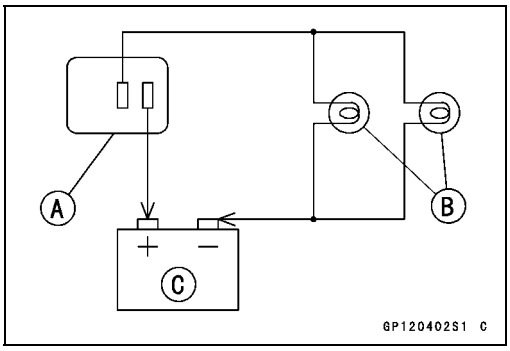
Turn Signal Relay Inspection

● Remove:
Seats (see Frame chapter)
Upper Seat Cover (see Frame chapter)
Turn Signal Relay [A]



● Connect one 12 V battery and turn signal lights as indicated in the figure, and count how may times the lights flash for one minute.
Turn Signal Relay [A]
Turn Signal Lights [B]
12 V Battery [C]

★If the lights do not flash as specified, replace the turn signal relay.



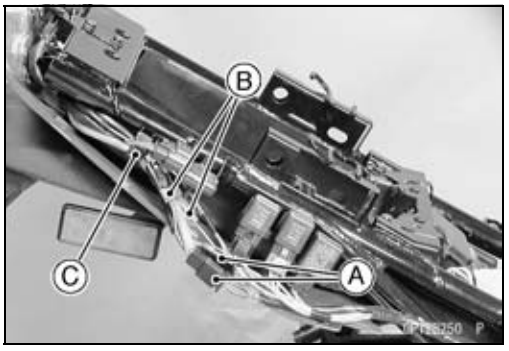
Testing Turn Signal Relay

Load		Flashing times (c/m*)
The Number of Turn Signal Lights	Wattage (W)	
1**	21 or 23	140 – 250
2	42 or 46	75 – 95

(*): Cycle(s) per minute
(**): Corrected to “one light burned out”.

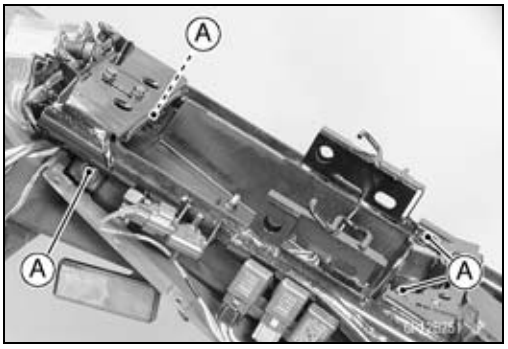
Tail/Brake Light (LED) Removal

● Remove:
Seats (see Frame chapter)
Upper Seat Cover (see Frame chapter)
● Disconnect the tail/brake light (LED) connectors [A] and rear turn signal connectors [B].
● Open the clamp [C].

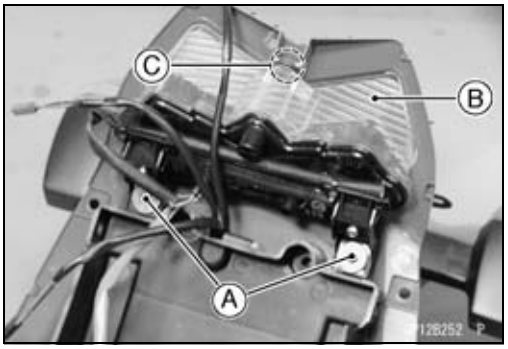


Lighting System

● Unscrew the bolts [A].



● Unscrew the mounting screws [A].
● Remove the tail/brake light (LED) [B].
○Pull out the mount portion [C].



Tail/Brake Light (LED) Installation

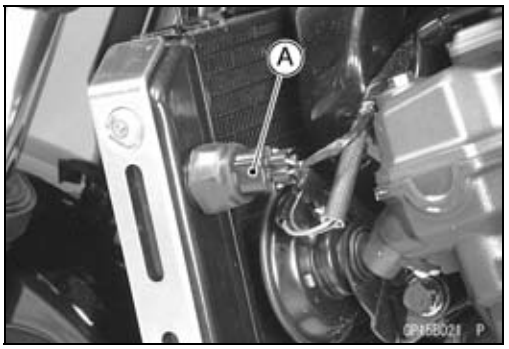
● Tighten the tail/brake light mounting screws.

Torque - Tail/Brake Light Mounting Screws: 1.2 N·m (0.12 kgf·m, 10 in·lb)

Radiator Fan System

Fan System Circuit Inspection

● Disconnect the lead connector [A] from the radiator fan switch.

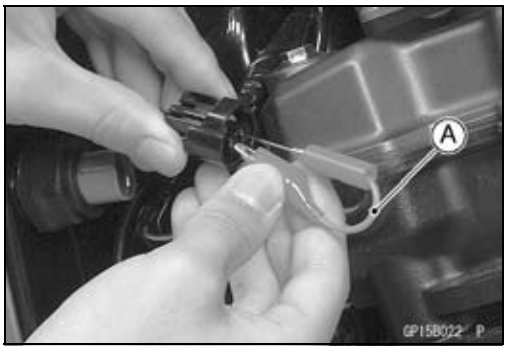


● Using an auxiliary wire [A], connect the radiator fan switch leads.

★If the fan rotates, inspect the fan switch.

★If the fan does not rotate, inspect the following.

Leads and Connectors
Main Fuse and Fan Fuse
Fan Motor

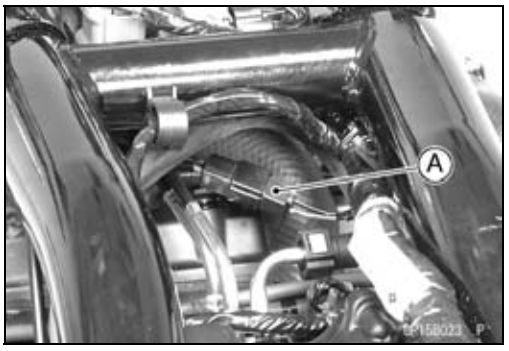


Fan Motor Inspection

● Remove the fuel tank (see Fuel System (DFI) chapter).

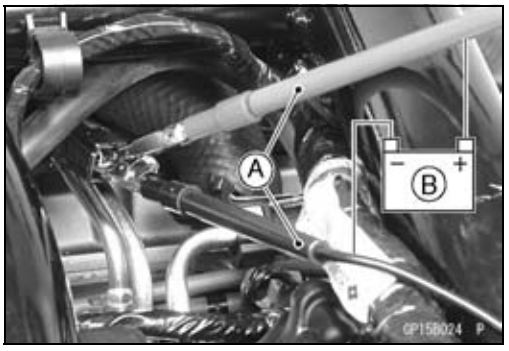
● Disconnect the 2-pin connector [A] in the fan motor leads.

○Pull the lead until come out the connector.



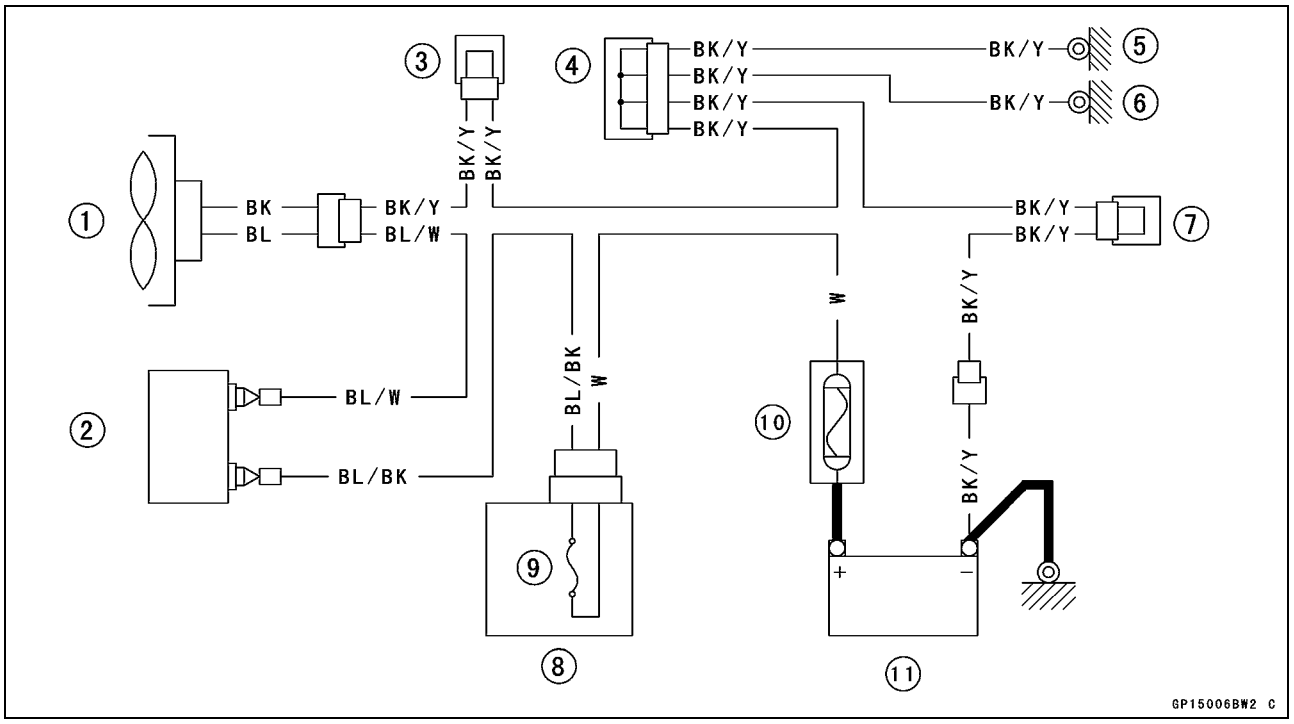
● Using two auxiliary wires [A], supply battery [B] power to the fan motor.

★If the fan does not rotate, the fan motor is defective and must be replaced.



Radiator Fan System

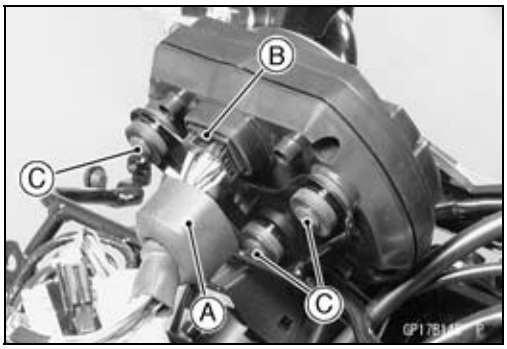
Radiator Fan Circuit



1. Radiator Fan
2. Radiator Fan Switch
3. Joint Connector A
4. Joint Connector D
5. Meter Ground
6. Frame Ground
7. Joint Connector B
8. Junction Box
9. Fan Fuse 15 A
10. Main Fuse 30 A
11. Battery 12 V 8 Ah

Meter, Gauge, Indicator Unit

Meter Unit Removal

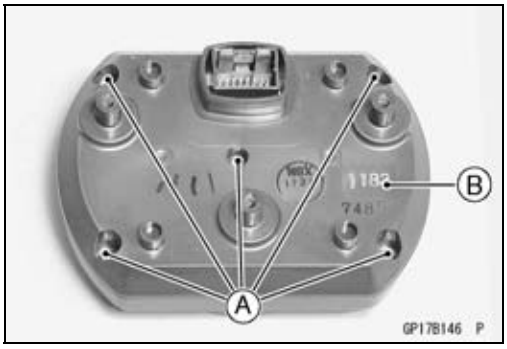


- Remove:
  Fairing (see Frame chapter)
- Slide the dust cover [A] and remove the wiring connector [B].
- Remove the meter unit by taking off the mounting screws [C] with the washers.

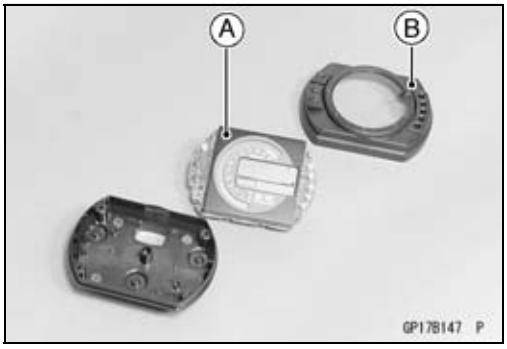
CAUTION

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.

Meter, Gauge Disassembly



- Remove:
  Meter Unit (see Meter Unit Removal)
  Screws [A]
  Lower Meter Cover [B]



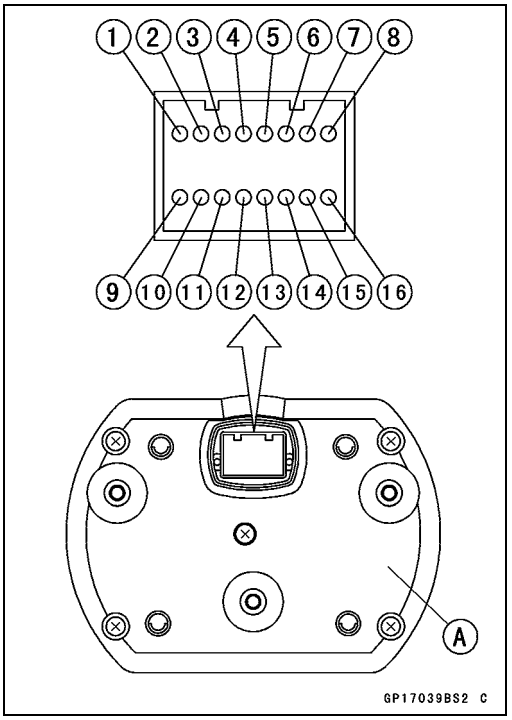
- Separate the meter assembly [A] and upper meter cover [B].

Meter, Gauge, Indicator Unit

Electronic Combination Meter Unit Inspection

● Remove the meter unit [A].

[1] Ignition
[2] Fuel Reserve Switch
[3] Unused
[4] Fuel Level Sensor
[5] Neutral Indicator Light (LED) Ground (–)
[6] FI Indicator Light (LED) Ground (–)
[7] Tachometer Pulse
[8] Water Temperature Sensor
[9] Ground (–)
[10] Battery (+)
[11] Oil Pressure Warning Indicator Light (LED) Ground (–)
[12] Speed Sensor Supply Voltage
[13] Right Turn Signal Light (LED) (+)
[14] Left Turn Signal Indicator Light (LED) (+)
[15] High Beam Indicator Light (LED)
[16] Speed Sensor Pulse



CAUTION

Do not drop the meter unit. Place the meter unit so that it faces upward. If the meter unit is left upside down or sideways for a long time or dropped, it will malfunction. Do not short each terminals.

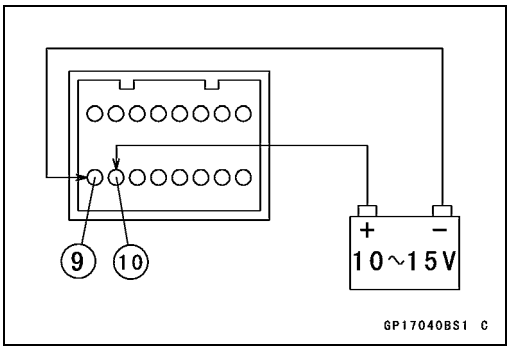
Liquid Crystal Display (LCD) Segments Check:

● Use the harness adapter for meter inspection.

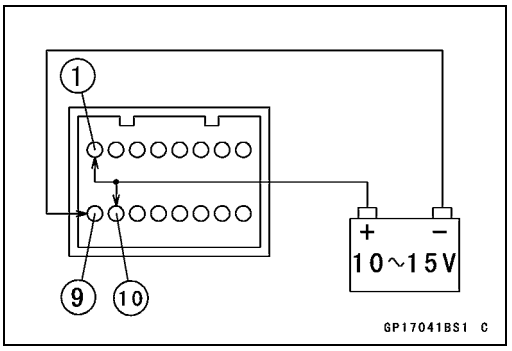
Special Tool - Harness Adapter : 57001–1542

● Using the auxiliary wires, connect the 12 V battery to the meter unit connector as follows.

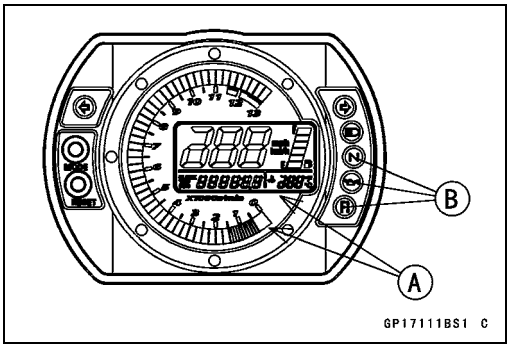
○Connect the battery positive terminal to the terminal [10].
○Connect the battery negative terminal to the terminal [9].



● Connect the terminal [1] to the terminal [10].



○The tachometer LCD segments momentarily to it last readings two times and segment movement is reversal.
○When the terminals are connected, all the LCD segments [A] and LED warning lights [B] appear for three seconds.
★If the LCD segments and LED warning light will not appear, replace the meter assembly.
● Disconnect the terminal [1].
○All the LCD segments and LED warning light disappear.
★If the segments do not disappear, replace the meter assembly.



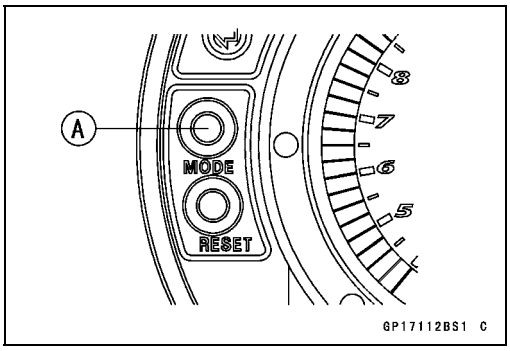
Meter, Gauge, Indicator Unit

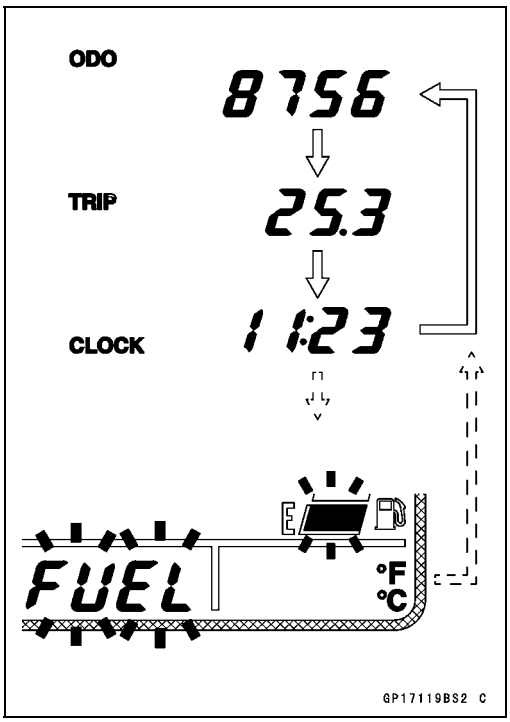
MODE AND RESET BUTTON Operation Check:

- Connect the 12 V battery and terminals in the same manner as specified in the "Liquid Crystal Display (LCD) Segments Check".
- Check that the display change to the ODO, TRIP, and CLOCK displays each time the MODE button [A] is pressed.

○If the fuel level gauge flashed, display change to ODO, TRIP, CLOCK and FUEL.

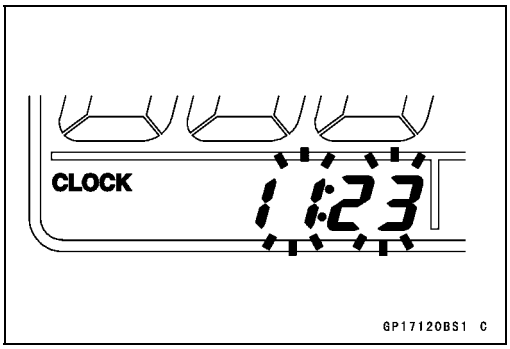
★If the display function does not work, replace the meter assembly.





- Indicate the clock mode.
- Check that when the RESET button in CLOCK mode is pushed for more than two seconds, the meter display turns to the clock set mode.

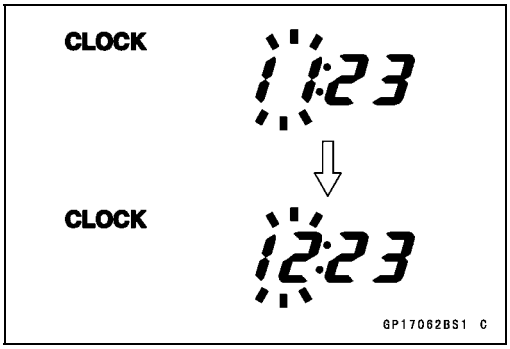
○Both the hour and minute display start flashing.



- In the HOUR/MINUTE setting mode, press the RESET button again to effect the HOUR setting mode.

○The hour display flashes on the display.

- Press the MODE button to set the hour.

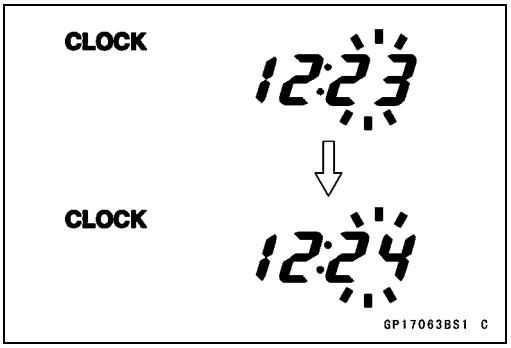


Meter, Gauge, Indicator Unit

- In the HOUR setting mode, press the RESET button to effect the MINUTE setting mode.

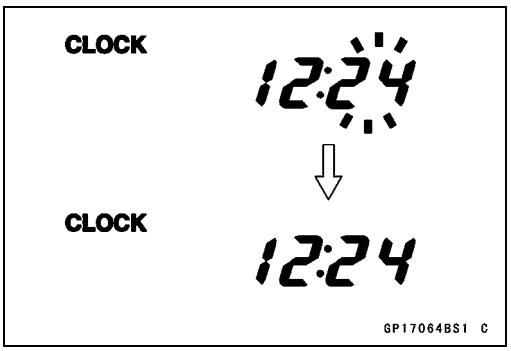
○The minute display flashes on the display.

- Press the MODE button to set the minute.



- In the MINUTE setting mode, press the RESET button to return to the HOUR/MINUTE setting mode.
- Press the MODE button to complete the time setting process.

○The clock starts counting the seconds as soon as the MODE button is pressed.

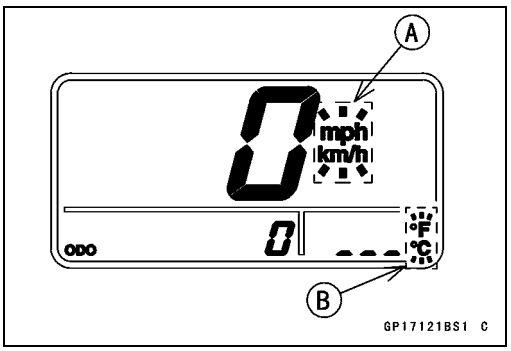


- Indicate the ODO mode.
- Check that the display [A] [B] change to the mile and °F, Mile and °C, km and °F, km and °C display each time by pushing the RESET bottom while MODE bottom pushed in.

NOTE

○*Mile/Km Display can alternate between English and metric modes (mile and km) in the digital meter. Make sure that km or mile according to local regulations is correctly displayed before riding.*

★If the display function does not work and adjust, replace the meter assembly.

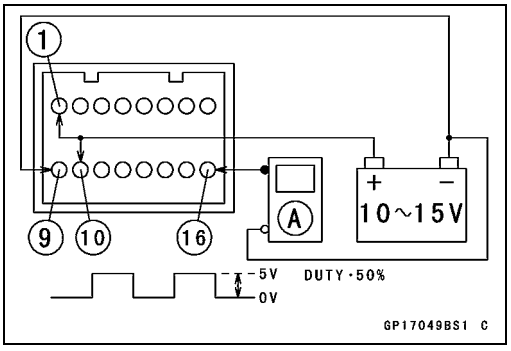


Speedometer Check:

- Connect the 12 V battery and terminals in the same manner as specified in the "Liquid Crystal Display (LCD) Segments Check".
- The speed equivalent to the input frequency is indicated in the oscillator [A], if the square wave (illustrated as shown) would be input into the terminal [16].

○Indicates approximately 60 mph in case the input frequency would be approximately 160 Hz.

○Indicates approximately 60 km/h in case the input frequency would be approximately 100 Hz.



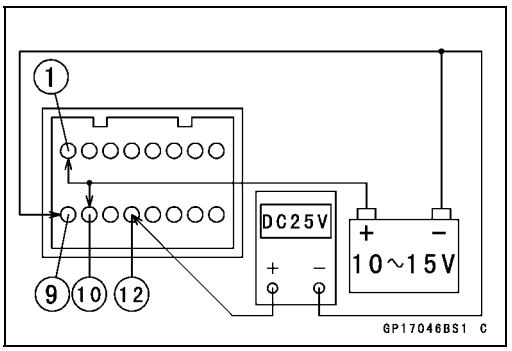
- If the oscillator is not available, the speedometer can be checked as follows.

○Install the meter unit.
○Raise the rear wheel off the ground, using the jack.
○Turn on the ignition switch.
○Rotate the rear wheel by hand.
○Check that the speedometer shows the speed.
★If the speedometer does not work, check the speed sensor electric source voltage and speed sensor.
★The electric source voltage and speed sensor are normal, replace the meter assembly.

Speed Sensor Electric Source Check:

- Connect the 12 V battery and terminals in the same manner as specified in the "Liquid Crystal Display (LCD) Segments Check".
- Set the hand tester to the DC 25 V range and connect it to the terminals [12] and [9].

★If the voltage is less than 8 V, replace the meter assembly.



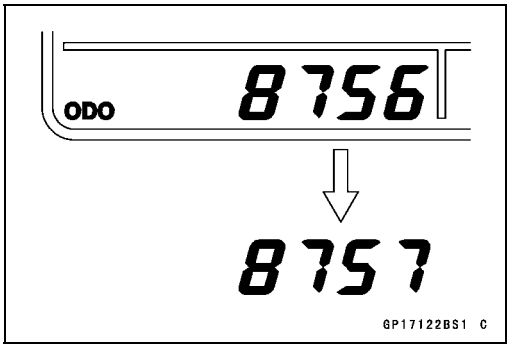
Odometer Check:

- Check the odometer with the speedometer in the same way.

★If value indicated in the odometer is not added, replace the meter assembly.

NOTE

○*The data is maintained even if the battery is disconnected.*
○*When the figures come to 999999, they are stopped and locked.*



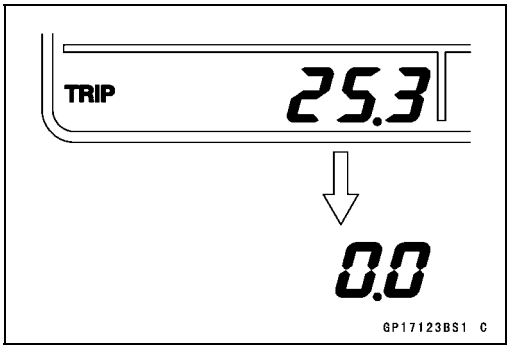
Trip Meter Check:

- Check the trip meter with the speedometer in the same way.

★If value indicated in the trip meter is not added, replace the meter assembly.

- Check that when the RESET button is pushed for more than two seconds, the figure display turns to 0.0.

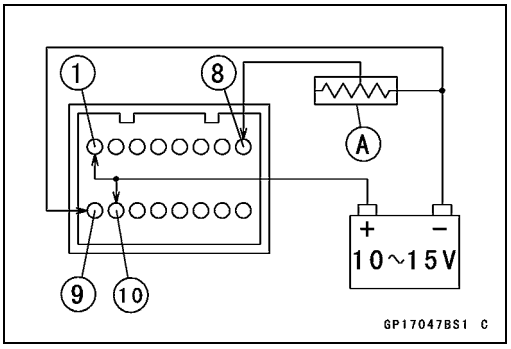
★If the figure display does not indicate 0.0, replace the meter assembly.



Meter, Gauge, Indicator Unit

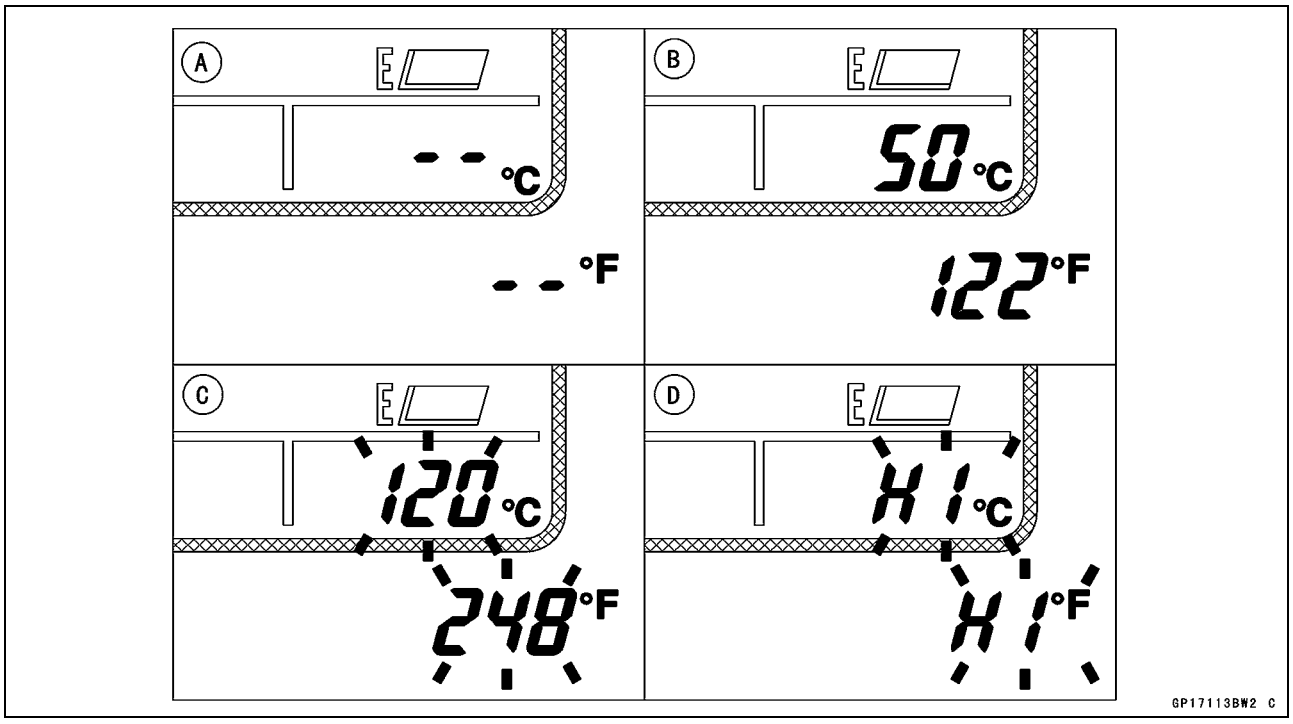
Water Temperature Meter Check:

- Connect the 12 V battery and terminals in the same manner as specified in the "Liquid Crystal Display (LCD) Segments Check".
- Connect the variable rheostat [A] to the terminal [8] as shown.
- Check that the number of segments matches the resistance value of the variable rheostat.



Resistance Value (Ω)	Temperature Meter	Warning Indicate
	–	[A] –
209.8	50°C (122°F)	[B] –
69.1	80°C (176°F)	[B] –
21.2	120°C (248°F)	[C] Flash
17	HI	[D] Flash

- If any display function does not work, replace the meter assembly.



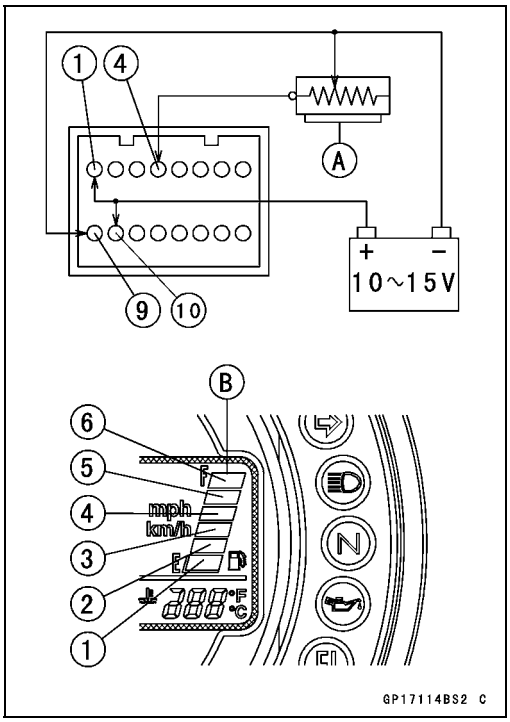
Meter, Gauge, Indicator Unit

Fuel Level Gauge Inspection:

- Connect the 12 V battery and terminals in the same manner as specified in the “Liquid Crystal Display (LCD) Segments Check”.
- Connect a variable rheostat [A] to terminal [4] and [9] as shown.
- Check that the number of segment [B] matches the resistance value of the variable rheostat.

Resistance (Ω)	Number of Segments
0 ~ 16.5	F 6
11.5 ~ 34.5	5
26.5 ~ 52.5	4
41.5 ~ 70.5	3
56.5 ~ 88.5	2
71.5 ~ above	E 1

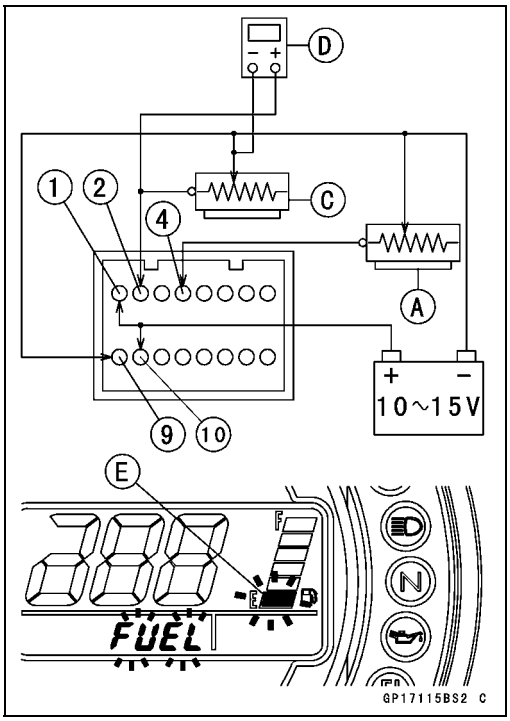
★If this display function does not work, replace the meter assembly.



- Connect an other variable rheostat [C] to terminal [2] and [9] as shown.
- Set the hand tester [D] to the DC 10 V range and connect it to terminals of the variable rheostat as shown.
- When the 1 segment [E] appears, adjust the variable rheostat [C] so that the terminal voltage is less than 5.7 V.

○Then the 1 and FUEL segments should flush.

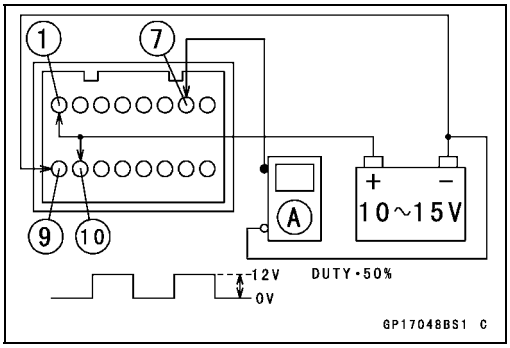
★If this display function does not flush, replace the meter assembly.



Tachometer Check:

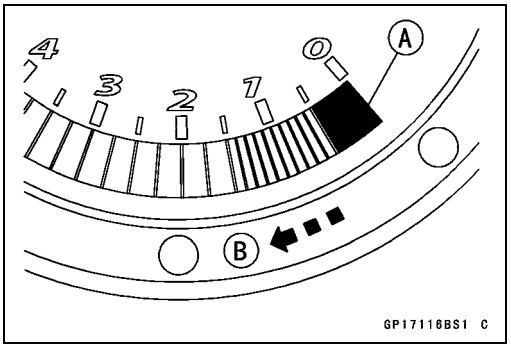
- Connect the 12 V battery and terminals in the same manner as specified in the "Liquid Crystal Display (LCD) Segments Check".
- The revolutions per minute (rpm) equivalent to the input frequency is indicated in the oscillator [A] if the square wave (illustrated as shown) would be input into the terminal [7].

○Indicates approximately 6000 rpm in case the input frequency would be approximately 200 Hz.

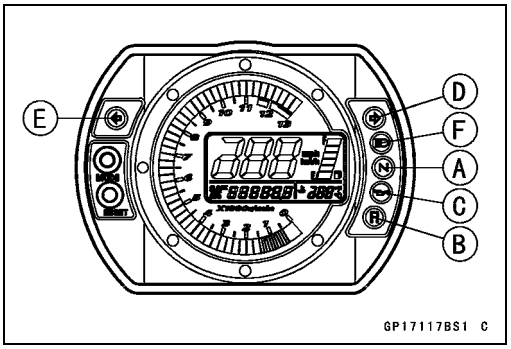


Meter, Gauge, Indicator Unit

● If the oscillator is not available, the tachometer can be checked as follows.
○Connect the 12 V battery and terminals in the same manner as specified in the "Liquid Crystal Display (LCD) Segments Check".
○Using an auxiliary wire, quick open and connect the terminal [1] to the terminal [7] repeatedly.
○Then the tachometer segment [A] should flick [B].
★If the segment does not flick, replace the meter assembly.

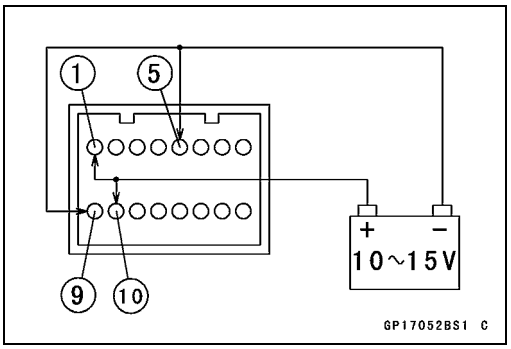


LED Lights Inspection:
● Connect the 12 V battery and terminals in the same manner as specified in the “Liquid Crystal Display (LCD) Segments check.”
Neutral Indicator Light (LED) [A]
FI Indicator Light (LED) [B]
Oil Pressure Warning Indicator Light (LED) [C]
Right Turn Signal Indicator Light (LED) [D]
Left Turn Signal Indicator Light (LED) [E]
High Beam Indicator Light (LED) [F]

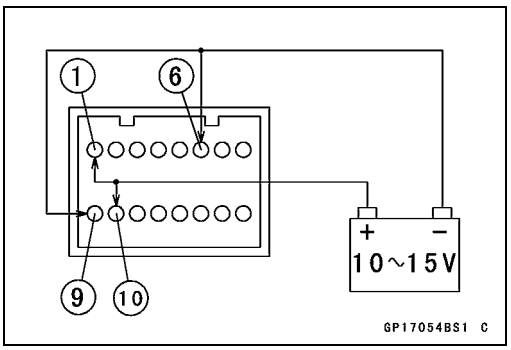


● Using the auxiliary leads, connect a 12 V battery to the meter unit connector as follows.

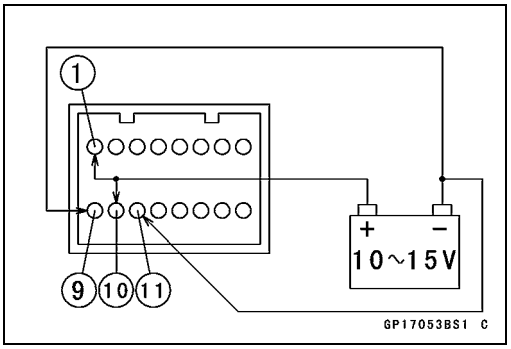
Neutral Indicator Light (LED):
Battery Negative (–) Terminal To Terminal [5]



FI Indicator Light (LED):
Battery Negative (–) Terminal To Terminal [6]



Oil Pressure Warning Indicator Light (LED):
Battery Negative (–) Terminal To Terminal [11]

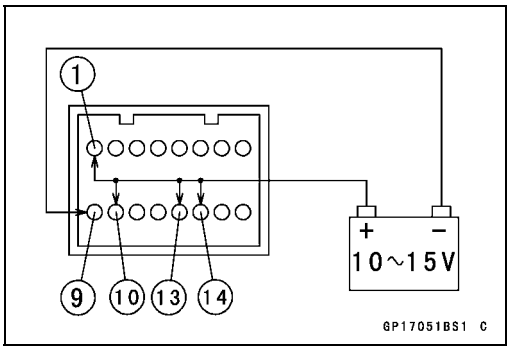


Meter, Gauge, Indicator Unit

Right and Left Turn Signal Indicator Light (LED):

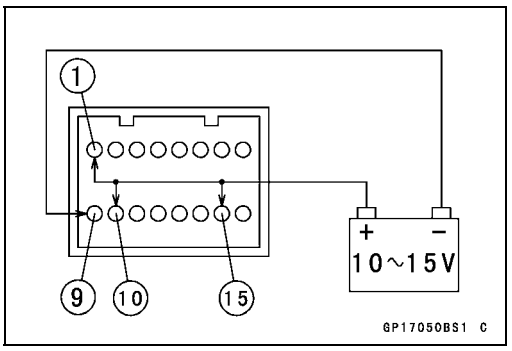
For Right Turn Signal Indicator Light (LED)
Battery Positive (+) Terminal to Terminal [13]

For Left Turn Signal Indicator Light (LED)
Battery Positive (+) Terminal to Terminal [14]



High Beam Indicator Light:

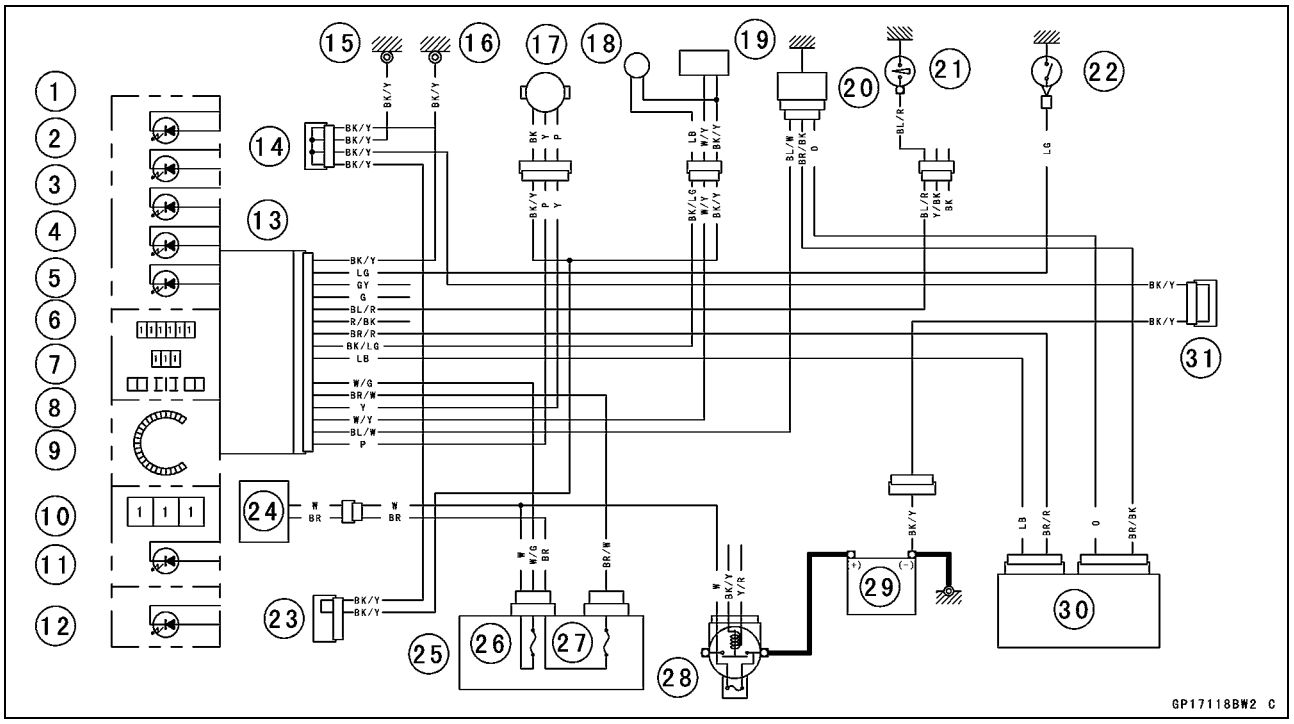
Battery Positive (+) Terminal to Terminal [15]



- If each LED lights does not go on, replace the meter assembly.

Meter, Gauge, Indicator Unit

Meter Circuit



1. Right Turn Signal Indicator Light (LED)
2. High Beam Indicator Light (LED)
3. Neutral Indicator Light (LED)
4. Oil Pressure Warning Indicator Light (LED)
5. FI Indicator Light (LED)
6. Odometer/Trip Meter/ Clock/Fuel Indicator
7. Water Temperature Gauge
8. Fuel Level Gauge
9. Tachometer
10. Speedometer
11. Meter Light (LED)
12. Left Turn Signal Indicator Light (LED)
13. Meter Unit
14. Joint Connector D
15. Frame Ground
16. Meter Ground
17. Speed Sensor
18. Fuel Reserve Switch
19. Fuel Level Sensor
20. Water Temperature Sensor
21. Oil Pressure Switch
22. Neutral Switch
23. Joint Connector A
24. Ignition Switch
25. Junction Box
26. ACC Fuse 10 A
27. Ignition Fuse 10 A
28. Main Fuse 30 A
29. Battery 12 V 8 Ah
30. E.C.U.
31. Joint Connector B

Switches and Sensors

Brake Light Timing Inspection

● Refer to the Brakes in the Periodic Maintenance chapter.

Brake Light Timing Adjustment

● Refer to the Brakes in the Periodic Maintenance chapter.

Switch Inspection

● Using a hand tester, check to see that only the connections shown in the table have continuity (about zero ohms).

○For the handlebar switches and the ignition switch, refer to the tables in the Wiring Diagram.

★If the switch has an open or short, repair it or replace it with a new one.

Special Tool - Hand Tester: 57001–1394

Rear Brake Light Switch Connections

	BR	BL
When brake pedal is pushed down	○——	——○
When brake pedal is released		

Side Stand Switch Connections

	G/W	BK/Y
When side stand is up	○——	——○
When side stand is down		

Neutral Switch Connections

	SW. Terminal	
When transmission is in neutral	○——	——○
When transmission is not in neutral		

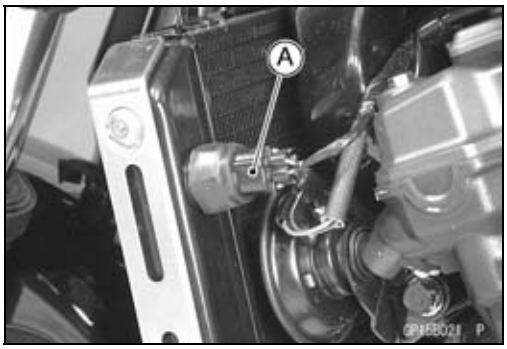
Oil Pressure Switch Connections*

	SW. Terminal	
When engine is stopped	○——	——○
When engine is running		

*: Engine lubrication system is in good condition

Radiator Fan Switch Inspection

● Disconnect the connector [A].



Switches and Sensors

- Remove the fan switch [A].

- Suspend the switch [A] in a container of coolant so that the temperature–sensing projection and threaded portion are submerged.
- Suspend an accurate thermometer [B] in the coolant so that the sensitive portions are located in almost the same depth.

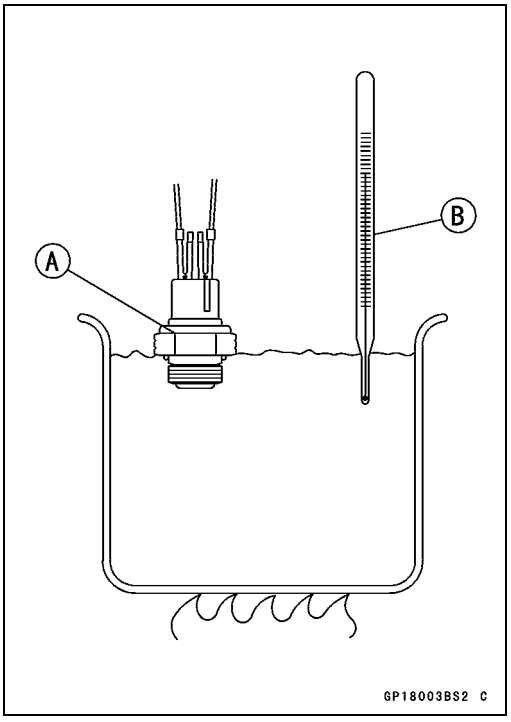
NOTE

○*The switch and thermometer must not touch the container sides or bottom.*

- Place the container over a source of heat and gradually raise the temperature of the coolant while stirring the coolant gently.
- Using the hand tester, measure the internal resistance of the switch across the terminals at the temperatures shown in the table.

Special Tool - Hand Tester: 57001–1394

★If the hand tester does not show the specified values, replace the switch.



Fan Switch Resistance

Rising temperature:

From OFF to ON at 93 ~ 103°C (199 ~ 217°F)

Falling temperature:

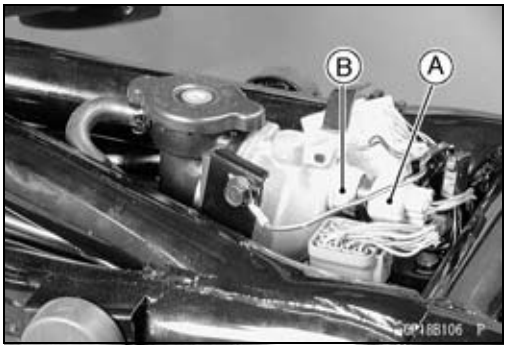
Fan stops with the temperature 3 ~ 8°C (38 ~ 46°F) lower than the operation temperature range.

ON: Less than 0.5 Ω

OFF: More than 10 MΩ

Water Temperature Sensor Inspection

- Remove the fuel tank (see Fuel System (DFI) chapter).
- Disconnect the water temperature sensor connector [A].
- Remove the water temperature sensor [B] (see Fuel System (DFI) chapter).



Switches and Sensors

- Suspend the sensor [A] in a container of coolant so that the temperature-sensing projection [E] and threaded portion [E] are submerged.
- Suspend an accurate thermometer [B] in the coolant.

NOTE

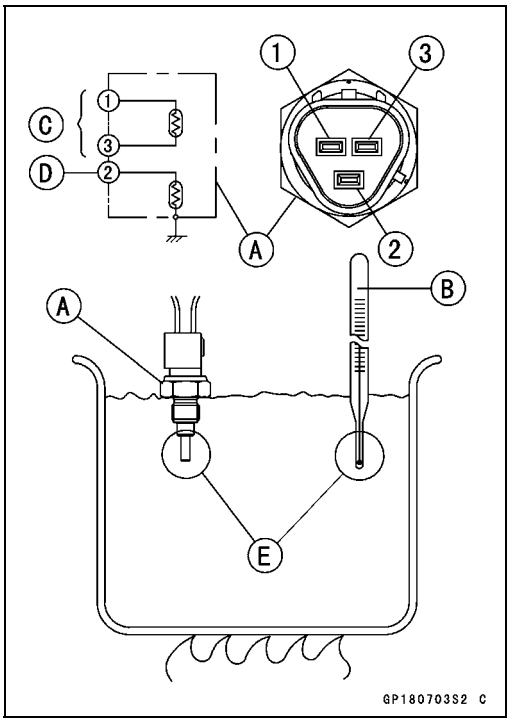
○*The sensor and thermometer must not touch the container side or bottom.*

- Place the container over a source of heat and gradually raise the temperature of the coolant while stirring the coolant gently.
- Using the hand tester, measure the internal resistance of the sensor.

○The sensor sends electric signals to the ECU (Electronic Control Unit) and coolant temperature gauge in the meter unit.

○Measure the resistance across the terminals and the body (for the gauge) at the temperatures shown in the table.

★If the hand tester does not show the specified values, replace the sensor.



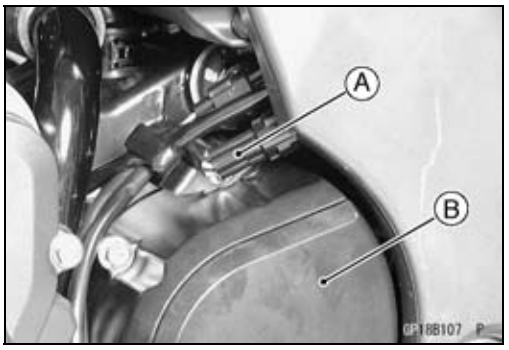
Water Temperature Sensor

Resistance for ECU [C]	
Temperature	Resistance (kΩ) (Terminal [1] - [3])
20°C (68°F)	2.46 $^{+\ 0.155}_{-\ 0.143}$
80°C (176°F)	0.32 ±0.011
110°C (230°F)	0.1426 ±0.0041

Resistance for Water Temperature Gauge [D]	
Temperature	Resistance (Ω) (Terminal [2] - Body)
50°C (122°F)	210 ±40
120°C (248°F)	21.2 ±1.5

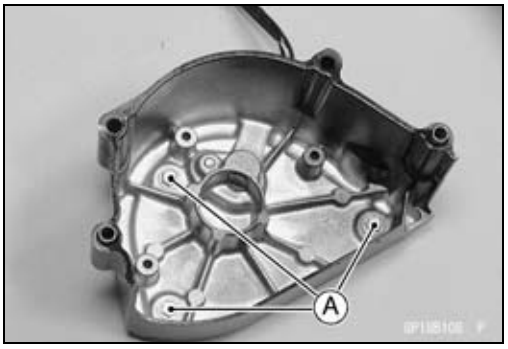
Speed Sensor Inspection

- Disconnect:
  Speed Sensor Connector [A]
- Remove:
  Engine Sprocket Cover [B] (see Final Drive chapter)

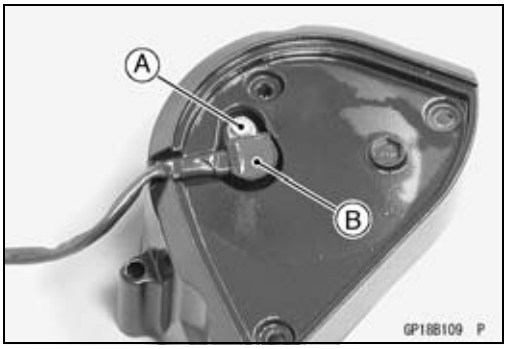


Switches and Sensors

- Remove:
  Bolts [A]
  Speed Sensor Cover

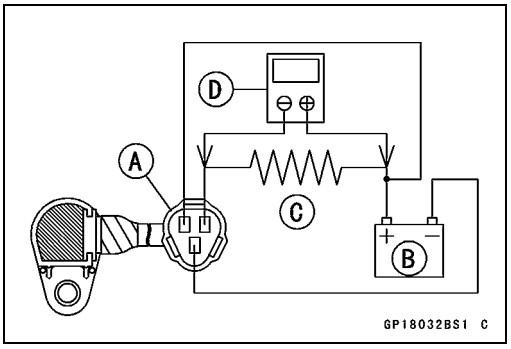


- Remove:
  Bolt [A]
- Take out the speed sensor [B].



- Connect the speed sensor connector [A] with the battery [B], 10 kΩ resistor [C] and hand tester [D] as shown.
- Set the tester to the DC 25 V range.

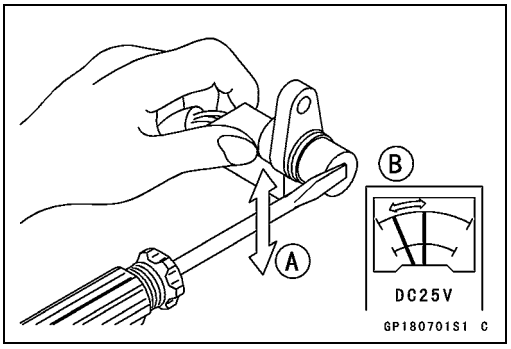
Special Tool - Hand Tester: 57001–1394



- Trace [A] each side of the speed sensor surface with the screw driver.

○Then the tester indicator should flick [B].

★If the tester indicator does not flick, replace the speed sensor.



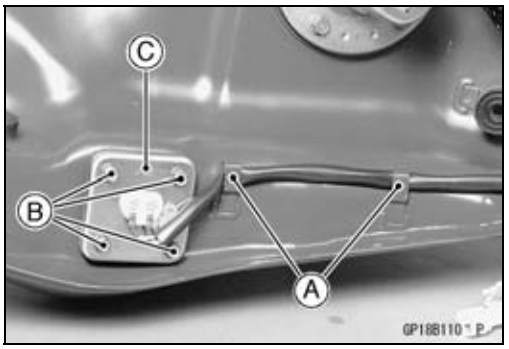
- Apply a non-permanent locking agent to the sensor bolt and sensor cover bolts.

Torque - Speed Sensor Bolt: 6.9 N·m (0.70 kgf·m, 61 in·lb)
Speed Sensor Cover Bolts: 6.9 N·m (0.70 kgf·m, 61 in·lb)

Switches and Sensors

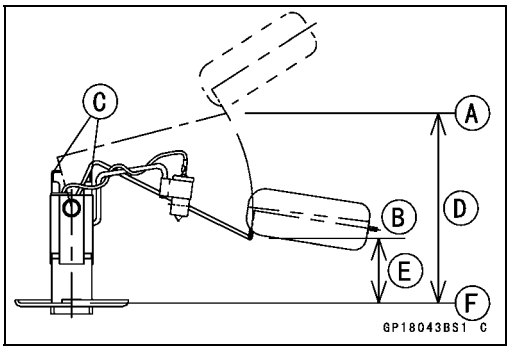
Fuel Level Sensor Inspection

- Remove:
  Fuel Tank (see Fuel System (DFI) chapter)
- Open the clamps [A].
- Remove:
  Bolts [B]
  Fuel Level Sensor [C]



- 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.
Float in Full Position [A]
Float in Empty Position [B]
Float Arm Stoppers [C]
105.2 ~ 112.2 mm (4.142 ~ 4.417 in.) from the Sensor Base Line [D]
33.6 ~ 40.6 mm (1.32 ~ 1.60 in.) from the Sensor Base Line [E]
Sensor Base Line [F]

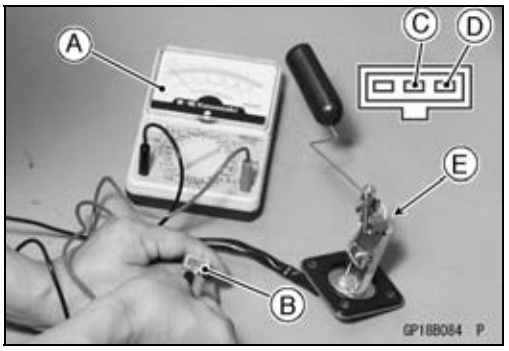


- Using the hand tester [A], measure the resistance across the terminals in the fuel level sensor lead connector [B].
  Black/Yellow [C]
  White/Yellow [D]

Special Tool - Hand Tester: 57001–1394

★If the tester readings are not as specified, or do not change smoothly according as the float moves up and down, replace the sensor.

Fuel Level Sensor Resistance
Standard: Full position: 4 ~ 10 Ω
Empty position [E]: 90 ~ 100 Ω



- Apply a non-permanent locking agent to the threads of the level sensor mounting bolts and tighten it.

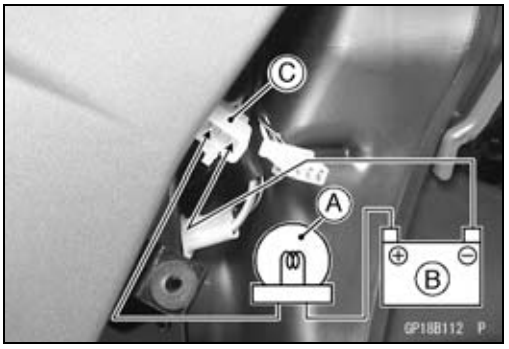
Torque - Fuel Level Sensor Bolts: 6.9 N·m (0.70 kgf·m, 61 in·lb)

Fuel Reserve Switch Inspection

- Fill the fuel tank with fuel.
- Close the fuel tank cap surely.
- Remove:
  Right Frame Cover (see Frame chapter)
- Disconnect the fuel level sensor connector [A].

Switches and Sensors

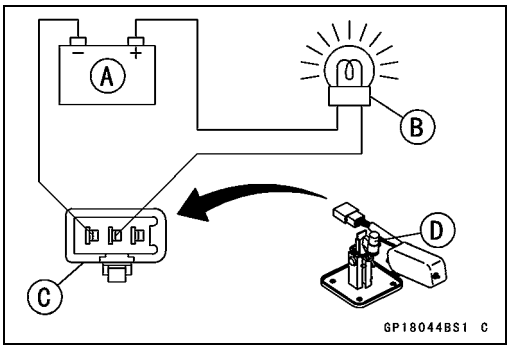
● Connect the test light [A] (12 V 3.4 W bulb a socket with leads) and the 12 V battery [B] to the fuel level sensor connector [C].



Connections:
Battery (+) → 12 V 3.4 W Bulb (one side)
12 V 3.4 W Bulb (other side) → Blue Lead Terminal
Battery (–) → BK/Y Lead Terminal

★If the test light turn on, the reverse switch is defective. Replace the fuel level sensor.

● Remove:
Fuel Level Sensor (see Fuel Level Sensor Inspection)
● Connect the test light (12 V 3.4 W bulb in a socket with leads) and the 12 V battery to the fuel pump connector as shown.
12 V Battery [A]
Test Light [B]
Fuel Pump Connector [C]
Fuel Reserve Switch [D]

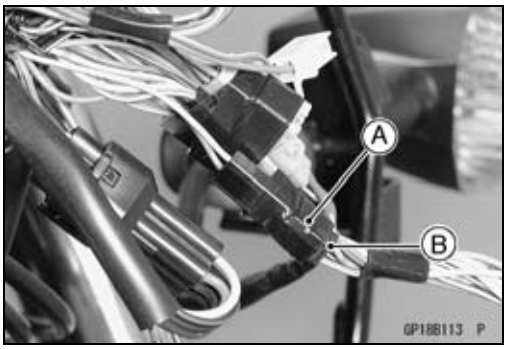


★If the test light doesn't light, replace the fuel level sensor.

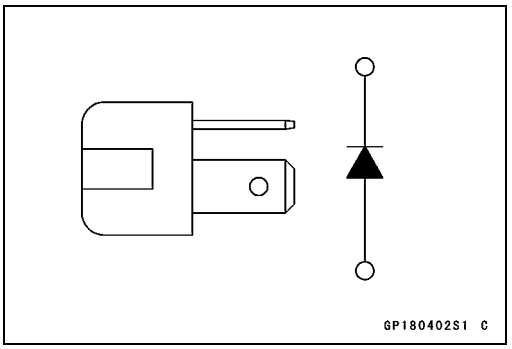
NOTE

○*It may take a long time to turn on the test light in case that the fuel reserve switch is inspected just after the fuel level sensor is removed. Leave the fuel reserve switch with leads for inspection connected for ten (10) minute.*

Diode (Rectifier) Inspection
● Remove the fairing (see Frame chapter)
● Cut the vinyl tape [A].
● Disconnect the diode [B].



● Set the hand tester to the × 100 Ω range.
Special Tool - Hand Tester: 57001–1394
● Check the continuity between the diode terminals in both directions.
★If there is continuity in one direction (forward direction) but no continuity (infinity) in the reverse direction, the diode is normal.
★The diode is defective if there is continuity after changing the direction, or it if remains with no continuity.

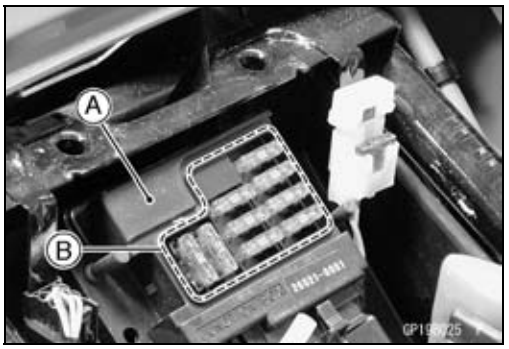


NOTE

○*The actual resistance measurement in the forward direction varies with the tester used and the individual diodes. Generally speaking, it is acceptable if the tester's indicator swings approximately halfway.*

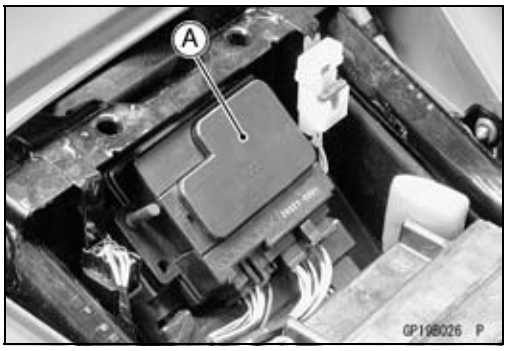
Junction Box

The junction box [A] has fuses [B], relays, and diodes. The relays and diodes can not be removed.



Junction Box Fuse Circuit Inspection

- Remove the seats (see Frame chapter).
- Remove the junction box [A].



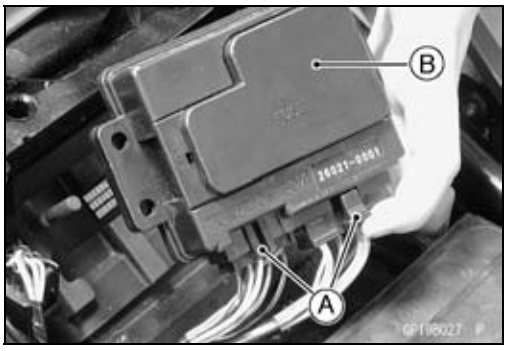
- Pull off the connectors [A] from the junction box [B].
- Make sure all connector terminals are clean and tight, and none of them have been bent.

★Clean the dirty terminals, and straighten slightly–bent terminals.

- Check conductivity of the numbered terminals with the hand tester.

○Refer to the Junction Box Internal Circuit.

★If the tester does not read as specified, replace the junction box.



Special Tool - Hand Tester: 57001–1394

Fuse Circuit Inspection

Tester Connection	Tester Reading (Ω)	Tester Connection	Tester Reading (Ω)
1 - 1A	0	1A - 8	∞
1 - 2	0	2 - 8	∞
3A - 4	0	3A - 8	∞
6 - 5	0	6 - 2	∞
6 - 10	0	6 - 3A	∞
6 - 7	0	17 - 3A	∞
6 - 17	0		

Junction Box

Starter Circuit/Headlight Relay Inspection

- Remove the junction box (see Junction Box Fuse Circuit Inspection).
- Check conductivity of the following numbered terminals by connecting the hand tester and one 12 V battery to the junction box as shown.

○Refer to the Junction Box Internal Circuit.

★If the tester does not read as specified, replace the junction box.

Special Tool - Hand Tester: 57001–1394

Relay Circuit Inspection (with the battery disconnected)

	Tester Connection	Tester Reading (Ω)
Headlight Relay	7 - 8	∞
	7 - 13	∞
	(+) (–) 13 - 9	Not ∞ *
Starter Circuit Relay	9 - 11	∞
	12 -13	∞
	(+) (–) 13 - 11	∞
	(+) (–) 12 - 11	Not ∞ *

(*): The actual reading varies with the hand tester used.
(+): Apply tester positive lead.
(–): Apply tester negative lead.

Relay Circuit Inspection (with the battery connected)

	Battery Connection (+) (–)	Tester Connection	Tester Reading (Ω)
Headlight Relay	9 - 13	7 - 8	0
Starter Circuit Relay	11 - 12	(+) (–) 13 - 11	Not ∞ *

(*): The actual reading varies with the hand tester used.
(+): Apply tester positive lead.
(–): Apply tester negative lead.

Junction Box

Diode Circuit Inspection

- Remove the junction box.
- Check conductivity of the following pairs of terminals.

Diode Circuit Inspection

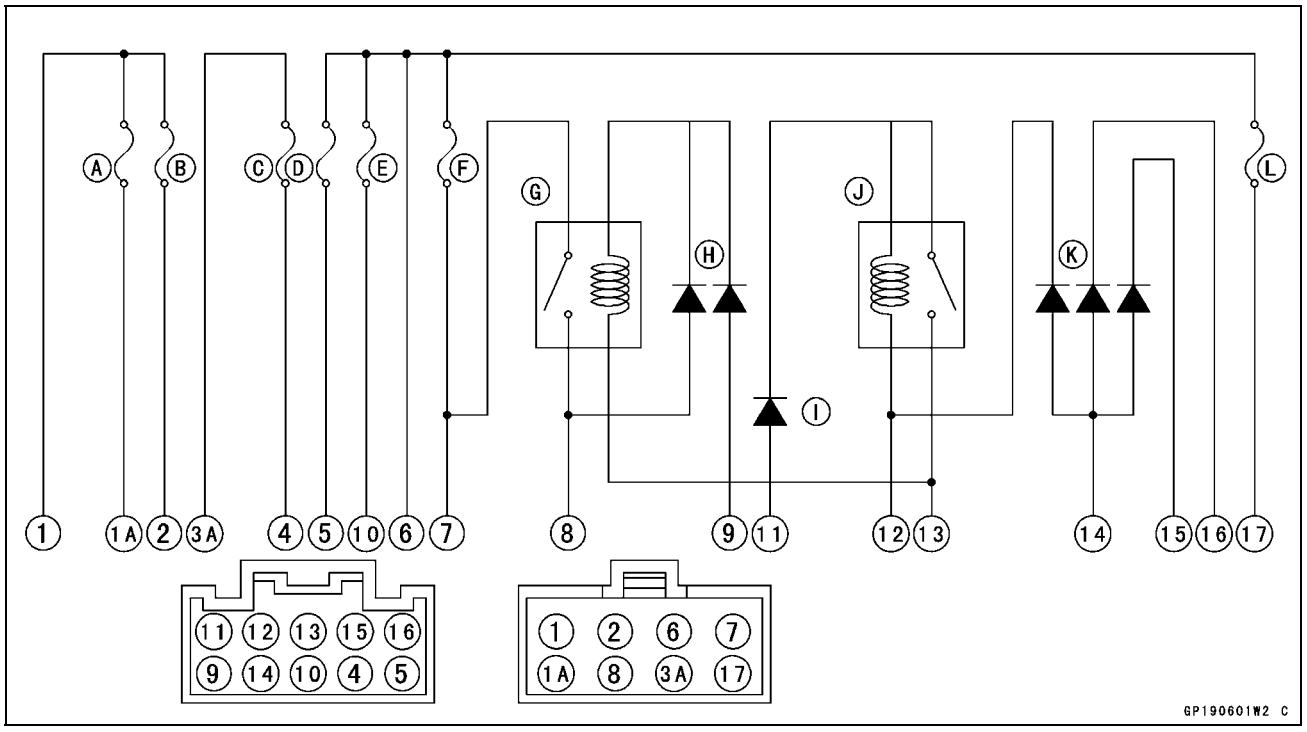
Tester Connection	13-8, 13-9, 12-11, 12-14, 15-14, 16-14

★The resistance should be low in one direction and more than ten times as much in the other direction. If any diode shows low or high in both directions, the diode is defective and the junction box must be replaced.

NOTE

○*The actual meter reading varies with the meter used and the individual diodes, but, generally speaking, the lower reading should be from zero to one half the scale.*

Junction Box Internal Circuit

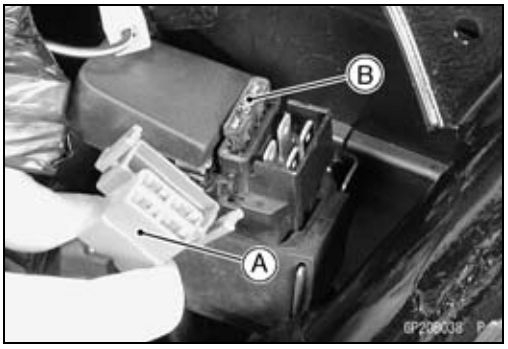


A. Accessory Fuse 10 A
B. Fan Fuse 15 A
C. Turn Signal Relay Fuse 10 A
D. Horn Fuse 10 A
E. Ignition Fuse 10 A
F. Headlight Fuse 10 A
G. Headlight Relay
H. Headlight Diodes
I. Starter Diode
J. Starter Circuit Relay
K. Interlock Diodes
L. Taillight Fuse 10 A

Fuse

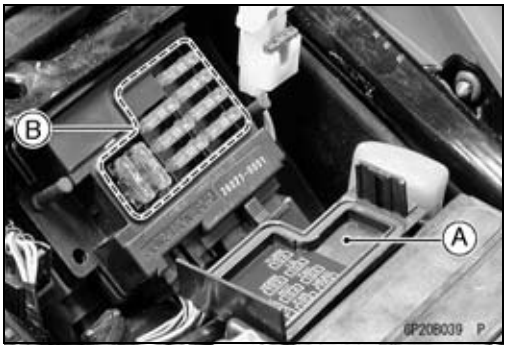
30 A Main Fuse Removal

- Remove:
  Right Side Cover (see Frame chapter)
  30 A Main Fuse Connector [A]
- Pull out the main fuse [B] from the starter relay with needle nose pliers.



Junction Box Fuse Removal

- Remove the seats (see Frame chapter).
- Unlock the hook to lift up the lid [A].
- Pull the fuses [B] straight out of the junction box with needle nose pliers.

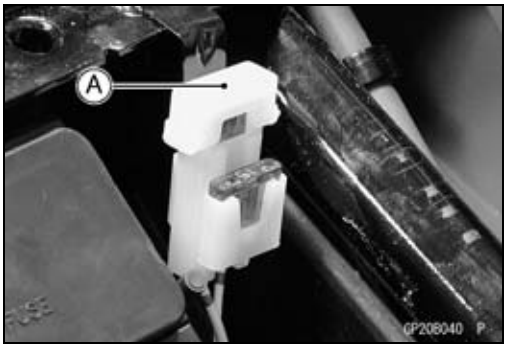


Fuse Installation

- 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.
- Install the junction box fuses on the original position as specified on the lid.

15 A ECU Fuse Removal

- Remove:
  Seats (see Frame chapter)
- Unlock the hook to pull the lid [A].
- Pull out the ECU Fuse from the fuse box.



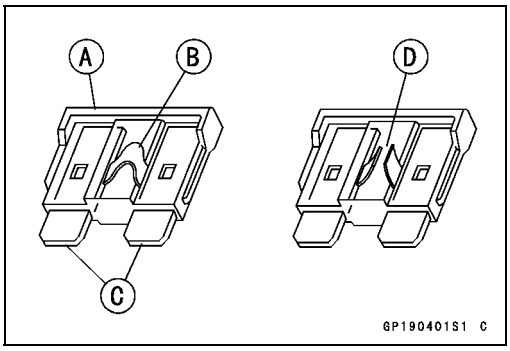
Fuse

Fuse Inspection

- Remove the fuse (see Fuse Removal).
- 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.

Housing [A]
Fuse Element [B]
Terminals [C]
Blown Element [D]



NOTE

○*A mass current flows to the battery according to the state of the battery which needs refreshing charge when the engine is turned causing main fuse blown out.*

CAUTION

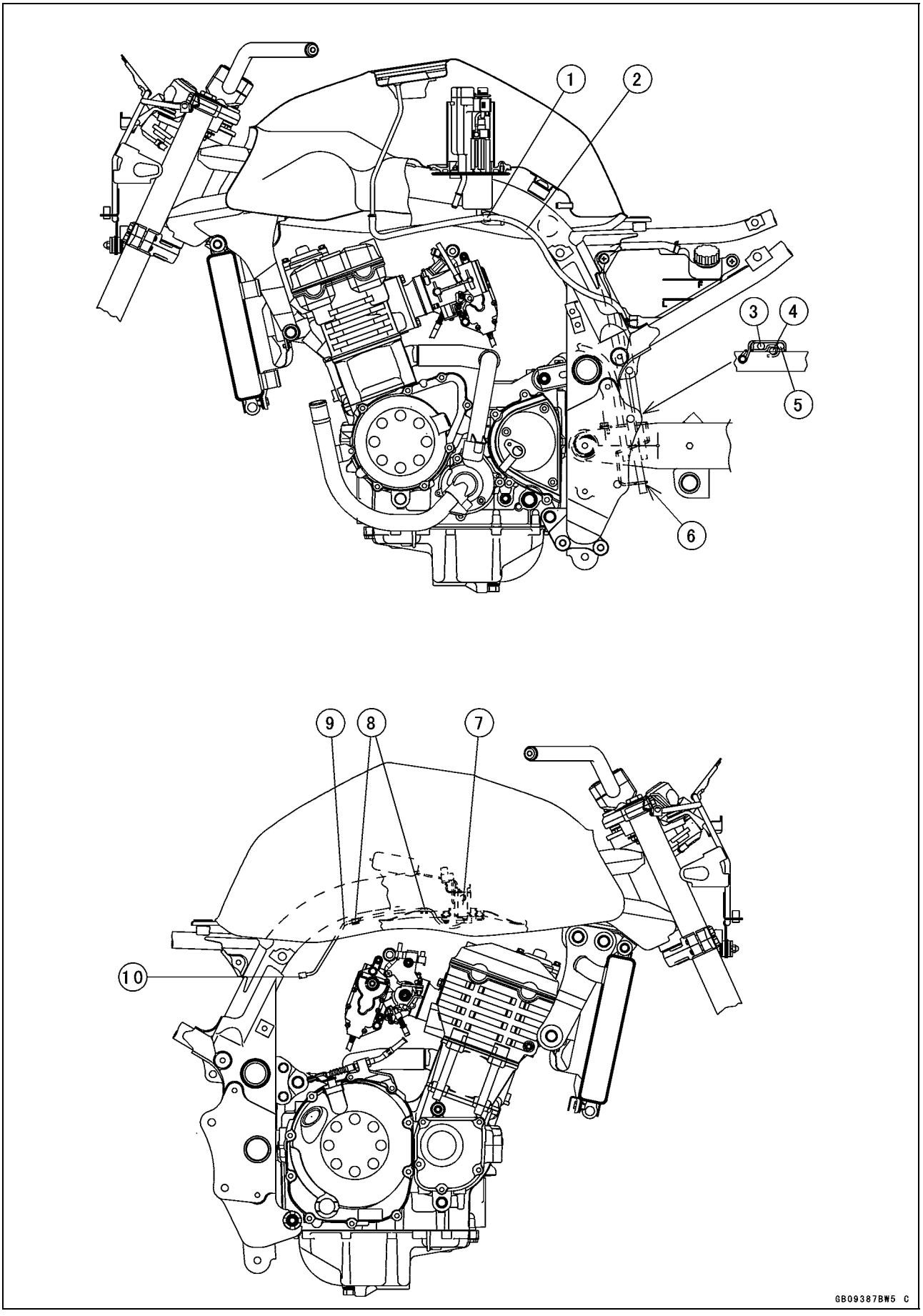
When replacing a fuse, be sure the new fuse matches the specified fuse rating for that circuit. Installation of a fuse with a higher rating may cause damage to wiring and components.

Appendix

Table of Contents

Cable, Wire, and Hose Routing 17-2
Troubleshooting Guide 17-18

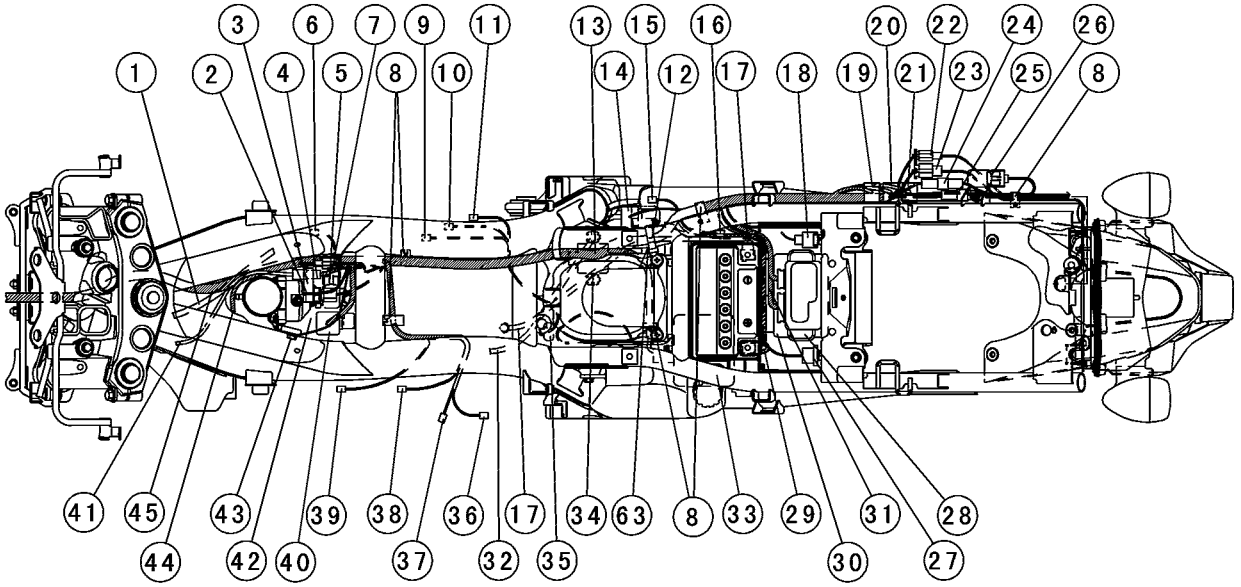
Cable, Wire, and Hose Routing

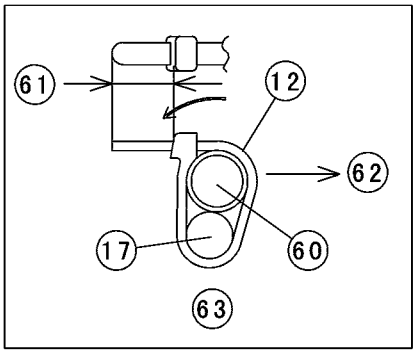


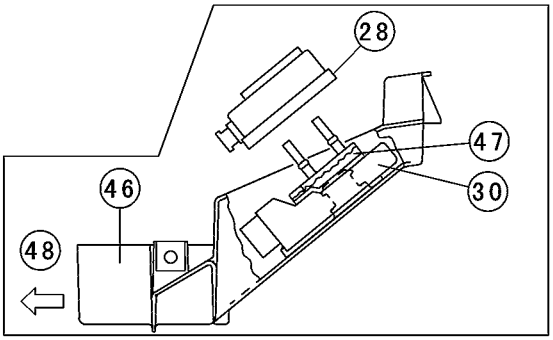
Cable, Wire, and Hose Routing

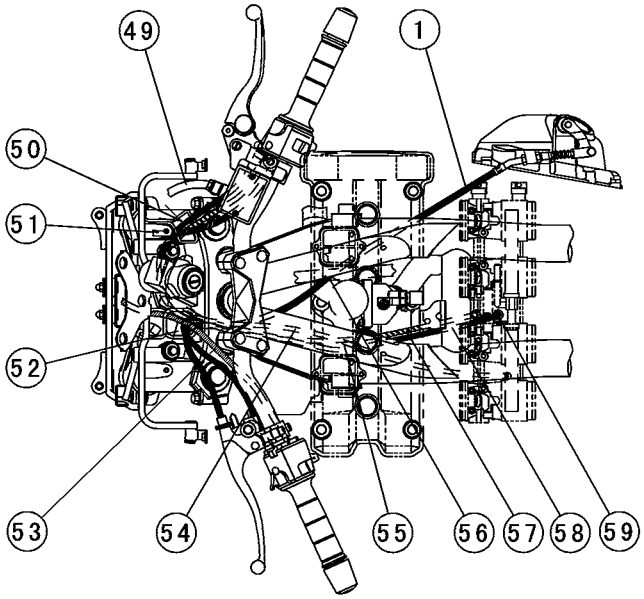
1. Fixes by the left side clamp of the tank.
2. Run the tank drain hose under the bracket for the side cover.
3. Air cleaner drain hose
4. Cooling reserve tank hose (Run the hose inside the under ring.)
5. Fuel tank drain hose
6. Fixes by the swingarm clamp
7. Fuel level sensor
8. Fixes by the right side clamps two places of the tank.
9. Run the lead outside the frame.
10. Fuel level sensor lead

Cable, Wire, and Hose Routing









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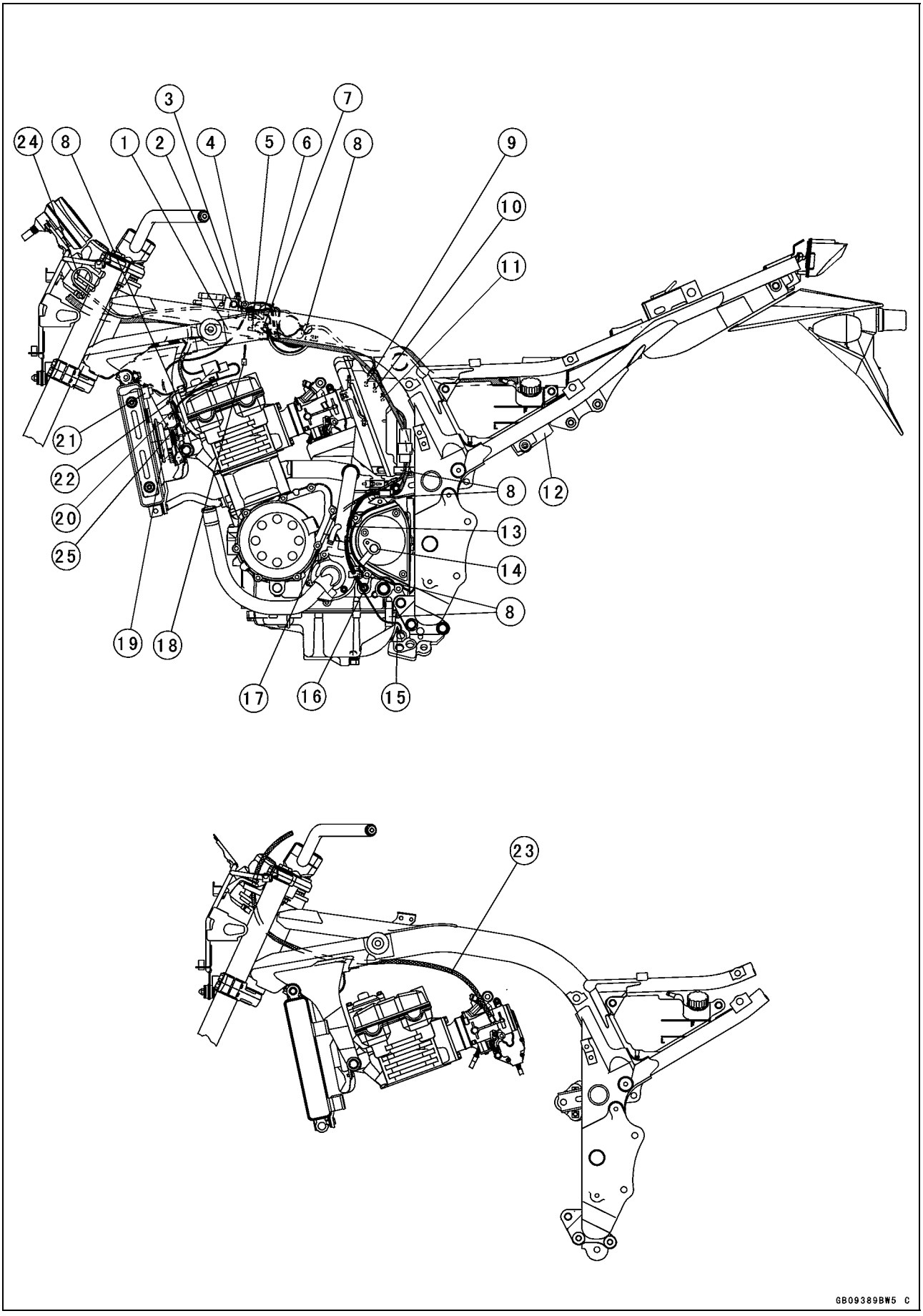
Cable, Wire, and Hose Routing

1. Clutch cable
2. Meter ground
3. Clamp (Ignition switch connector)
4. Ignition switch connector
5. Inlet air pressure sensor
6. To ignition coil
7. Fan motor connector (Connect the connector on the inlet air pressure sensor.)
8. Clamp
9. To fuel pump
10. To fuel level gauge and fuel reserve switch
11. To pickup coil and oil pressure switch
12. Band
13. Main harness
14. Starter relay
15. To rear brake switch
16. Connect the battery negative cable and battery.
17. Battery negative cable
18. Self-diagnosis indicator terminal
19. Turn signal relay
20. Fuel pump relay
21. ECU main relay
22. License light connector
23. Tail light connector
24. Rear right turn signal light connector
25. Rear left turn signal light connector
26. Atmospheric pressure sensor
27. ECU fuse
28. Junction box
29. Battery positive cable
30. ECU
31. Run the lead of ECU under the end surface of battery case.
32. Starter lead
33. Regulator/rectifier
34. Vehicle-down sensor
35. Inlet air temperature sensor
36. To side stand switch
37. To neutral Switch
38. To speed sensor
39. Alternator
40. Engine harness
41. Water temperature sensor
42. Ignition switch lead
43. Frame ground
44. To cam sensor, fan switch, horn
45. The harness passes on the clutch cable.
46. Battery case
47. Damper
48. Front
49. Brake hose
50. Run the Throttle Cable together with the Right Grip Switch wire through the of Cowl Bracket clamp.
    Run the wire thought the center of the frame, which has to be located nearer to the center than the cable.
51. Right switch housing lead
52. Run the Clutch Cable, the Starter Cable and the Left Grip Switch wire through of the Cowl Bracket clamp.
    Run the wire through the center of the frame, which has to be located nearer to the center than the cable.
53. Left switch housing lead
54. Starter cable
55. Run the starter cable through under the throttle cable.
56. Run the clutch cable between the water hose and the main harness.
57. Throttle cable (decelerator)
58. Throttle cable (accelerator)
59. No slip of cable
60. Frame
61. 10 ~ 15 mm (0.39 ~ 0.59 in.)
62. Frame outside
63. Back view

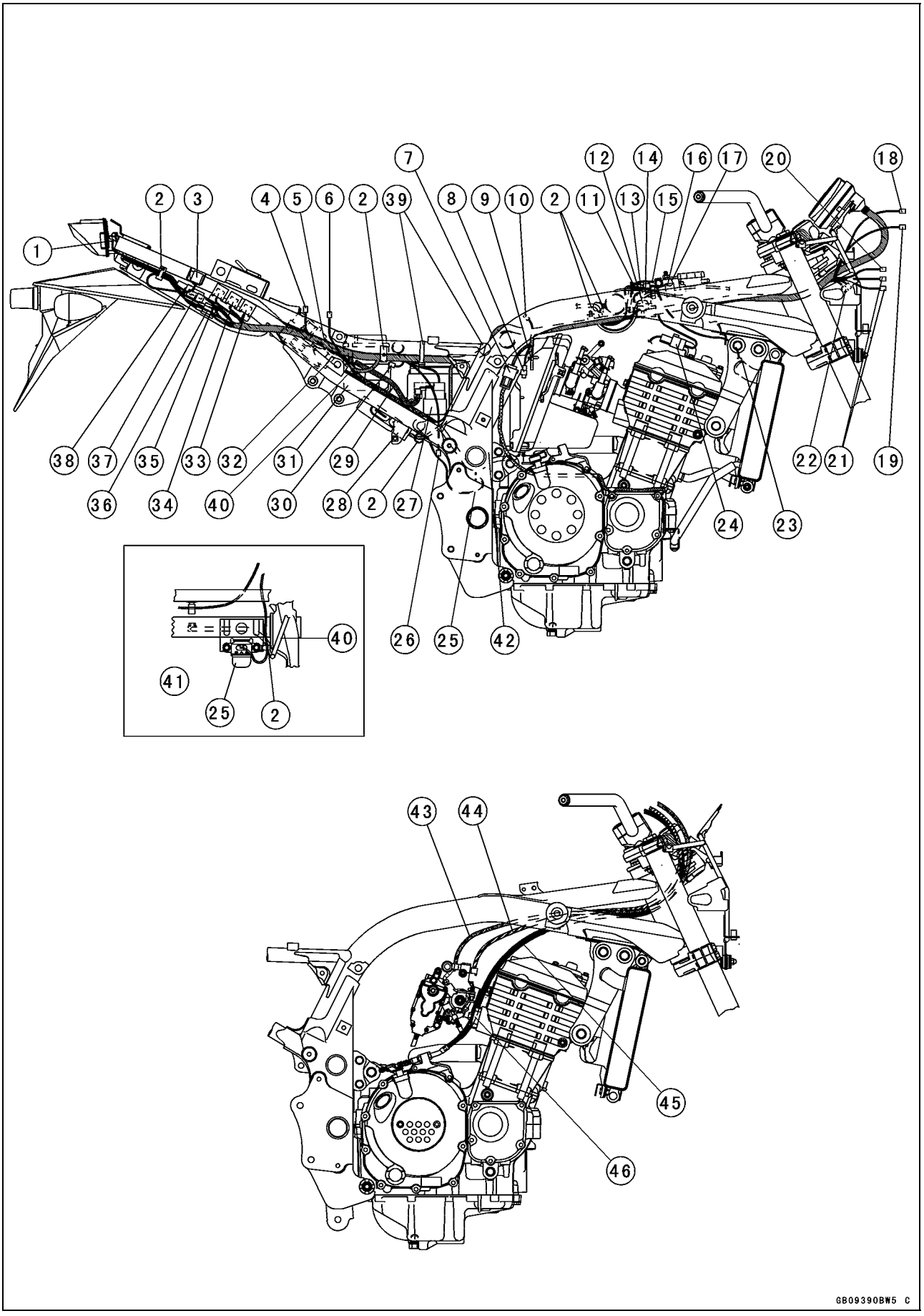
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Run the main harness through lower and right side of the thermostat.
2. Frame ground (with thermostat bracket)
3. Ignition switch connector
4. Meter ground
5. Engine harness
6. Water temperature sensor
7. Inlet air pressure sensor
8. Clamp
9. To pickup coil and oil pressure switch
10. To fuel level gauge and fuel reserve switch
11. To fuel pump
12. Regulator/rectifier
13. Run the lead through the inside of the pipe.
14. Speed sensor
15. To side stand switch
16. Neutral switch
17. To alternator
18. To ignition coil
19. Horn
20. Cam sensor
21. Fan switch
22. Run the harness between the engine bracket and the left side space of the heat cover.
23. Starter cable
24. Band
25. Run the cam sensor lead through the inside of the horn lead.

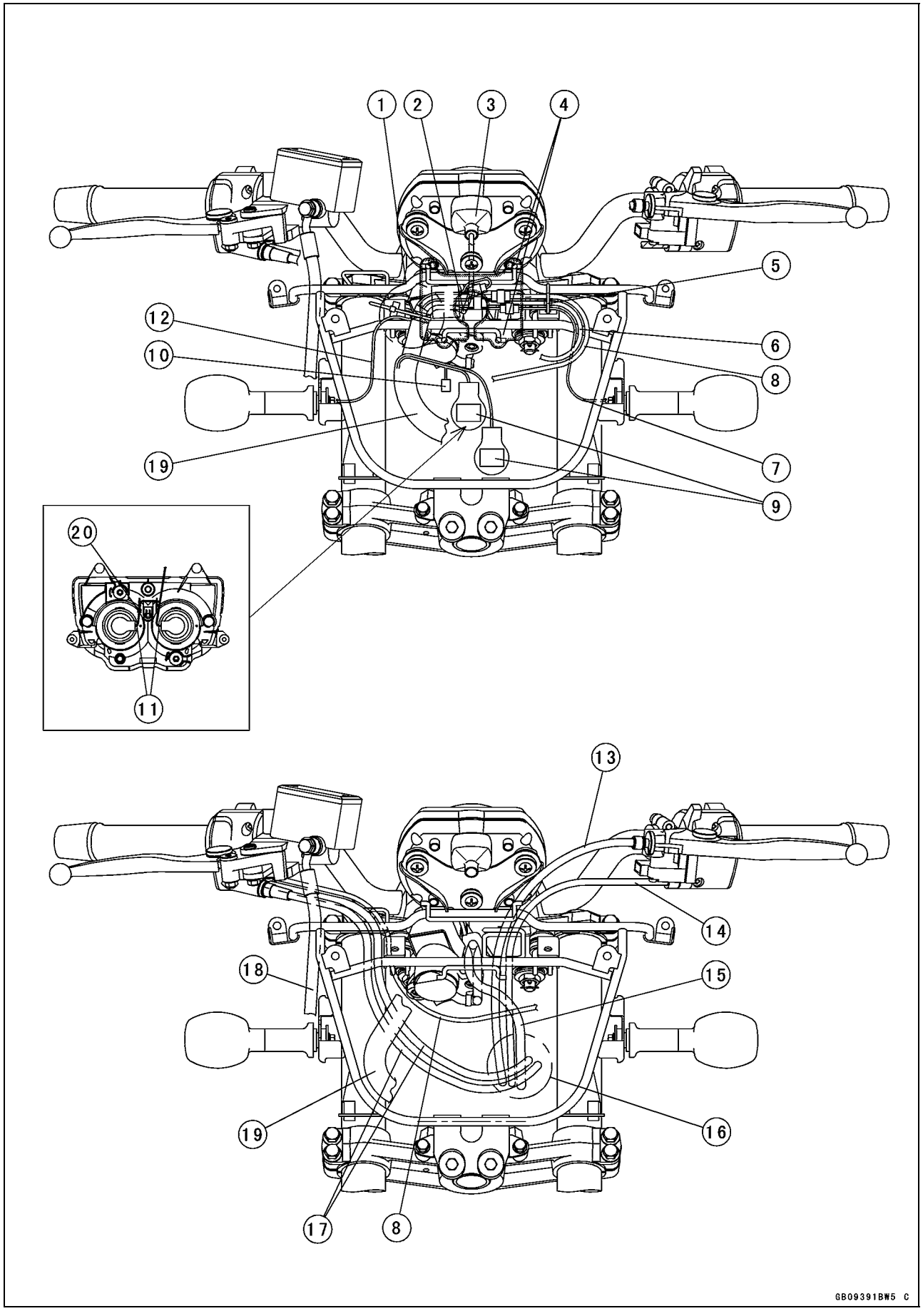
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Tail light
2. Clamp
3. Atmospheric pressure sensor
4. To ECU fuse
5. Junction Box
6. To self-diagnosis indicator terminal
7. Pickup coil and oil pressure switch
8. Fuel pump
9. Fuel level gauge and fuel reserve switch
10. To inlet air temperature sensor
11. Fan motor connector
12. Inlet air pressure sensor
13. Water temperature sensor
14. Engine harness
15. Meter ground
16. Ignition switch lead
17. Frame ground (with thermostat)
18. Right switch housing lead
19. Left switch housing lead
20. Running position light
21. Headlights
22. Turn signal lights
23. To fun motor
24. Ignition coil
25. Vehicle-down sensor
26. To rear brake switch
27. Starter relay
28. Regulator/rectifier
29. To battery positive cable
30. Connect the battery negative cable and battery.
31. Battery
32. ECU
33. Turn signal light relay
34. Fuel pump relay
35. ECU main relay
36. License light
37. Rear right turn signal light
38. Rear left turn signal light
39. Band
40. Battery negative cable
41. Back view
42. Battery negative cable (Run the cable through under the cross pipe.)
43. Throttle cable (accelerator)
44. Throttle cable (decelerator)
45. Clutch cable
46. Run the clutch cable inside the chain tensioner.

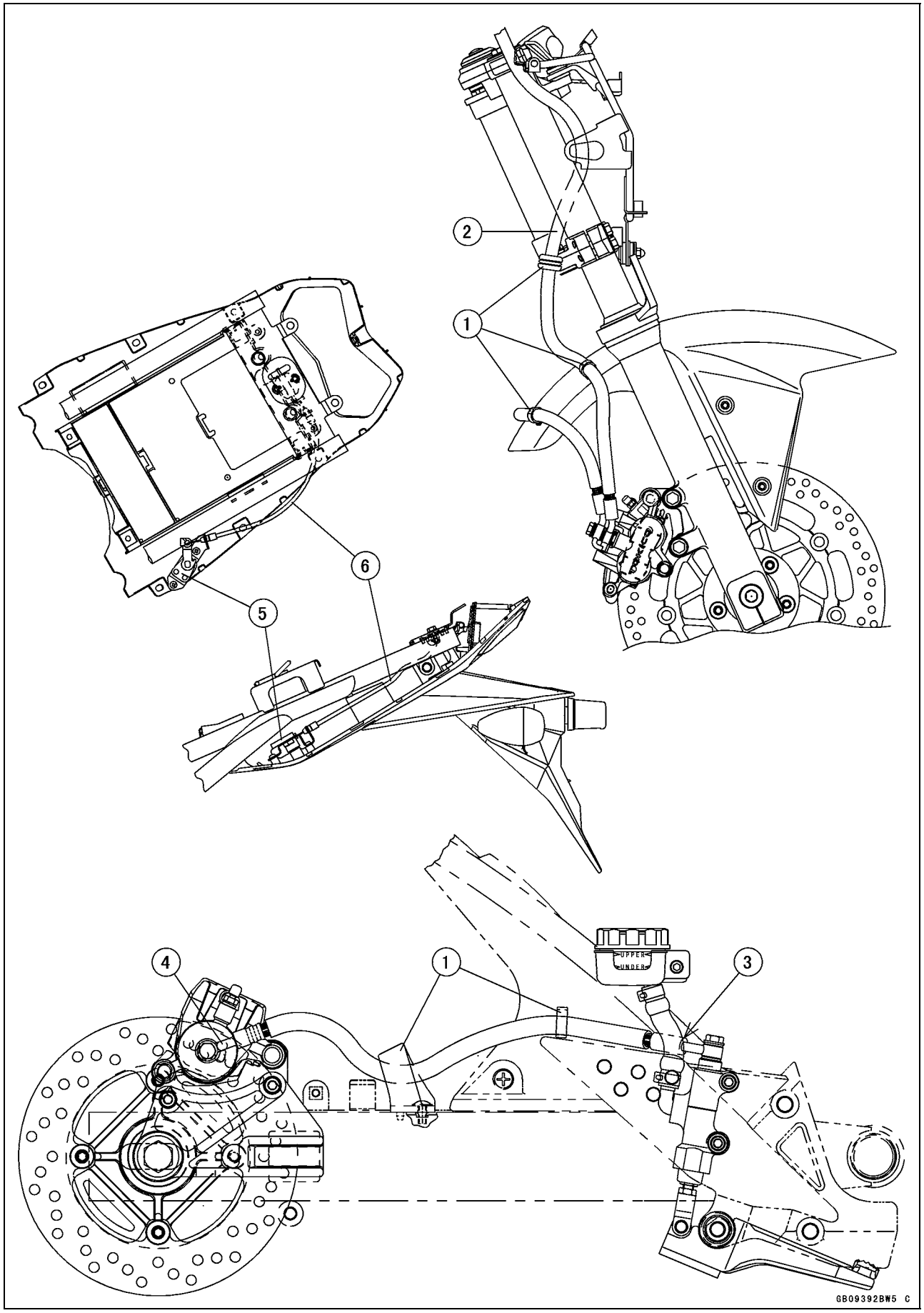
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Clamp the position of branch harness and front right turn signal light lead.
2. Run the meter harness into the hole of cover.
3. Meter
4. Set the cover to cover all of the connector.
5. Clamp the right and left switch housing lead and front left turn signal light lead.
6. To left switch housing
7. To front left turn signal light
8. To right switch housing
9. Headlight high and low
10. Running position light
11. Install the lead with its inner side facing inward.
12. To front right turn signal light
13. Clutch cable
14. Starter cable
15. Run the ignition switch lead in front of clutch and starter cable.
16. Run the leads for the clutch, starter and the ignition switch in order from the head pipe and in front of these, run the both throttle cables as decelerating one is outer.
17. Throttle cable (Run the cable in rear of the main harness.)
18. Brake hose
19. Main harness
20. Connect green tape side to left head lamp.

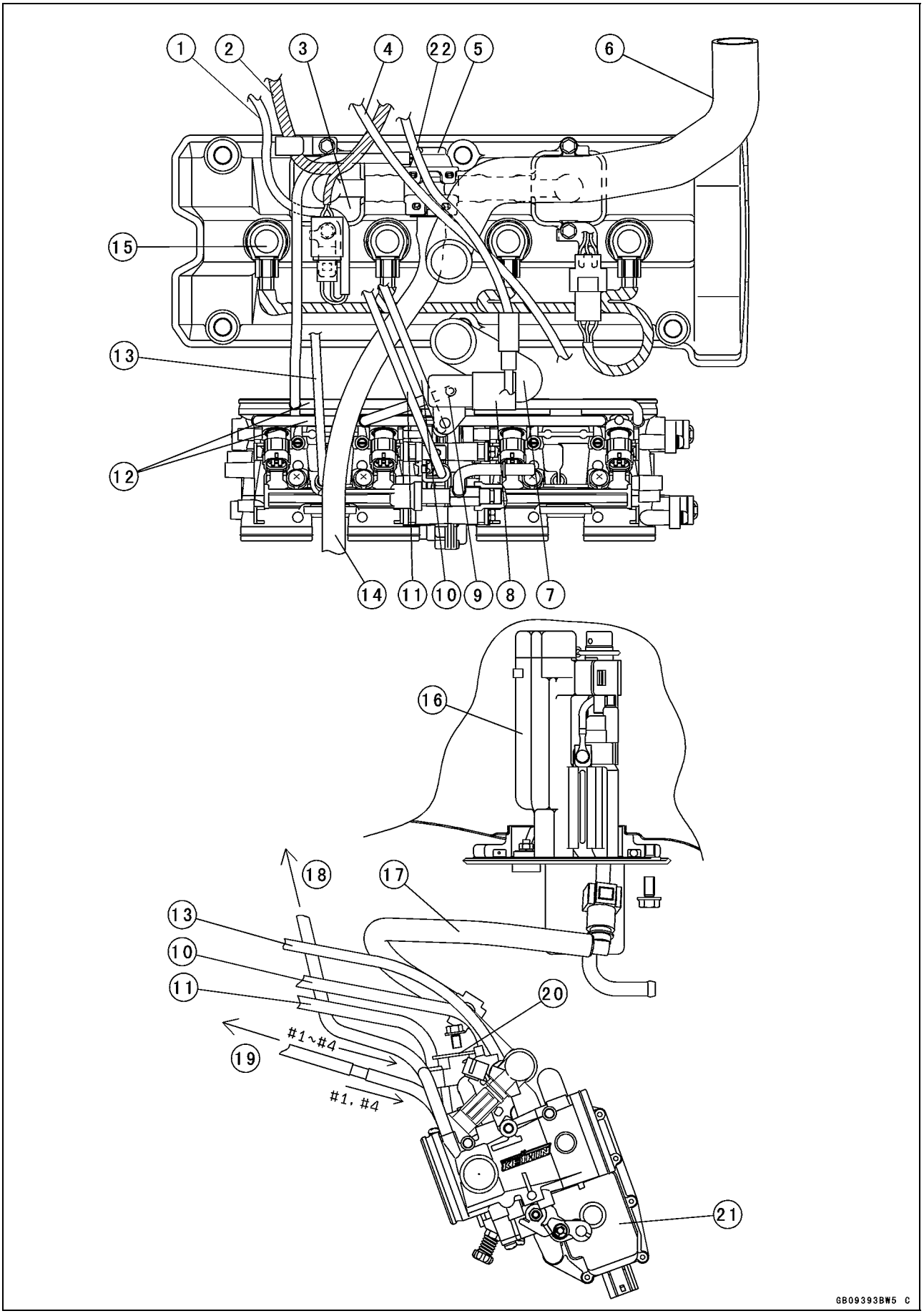
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Clamp
2. Brake hose
3. Run the brake hose through the inside of the reservoir hose.
4. Tight the bolt to the specified torque with the stopper (for turning prevention) applied.
5. Seat lock
6. Seat lock cable

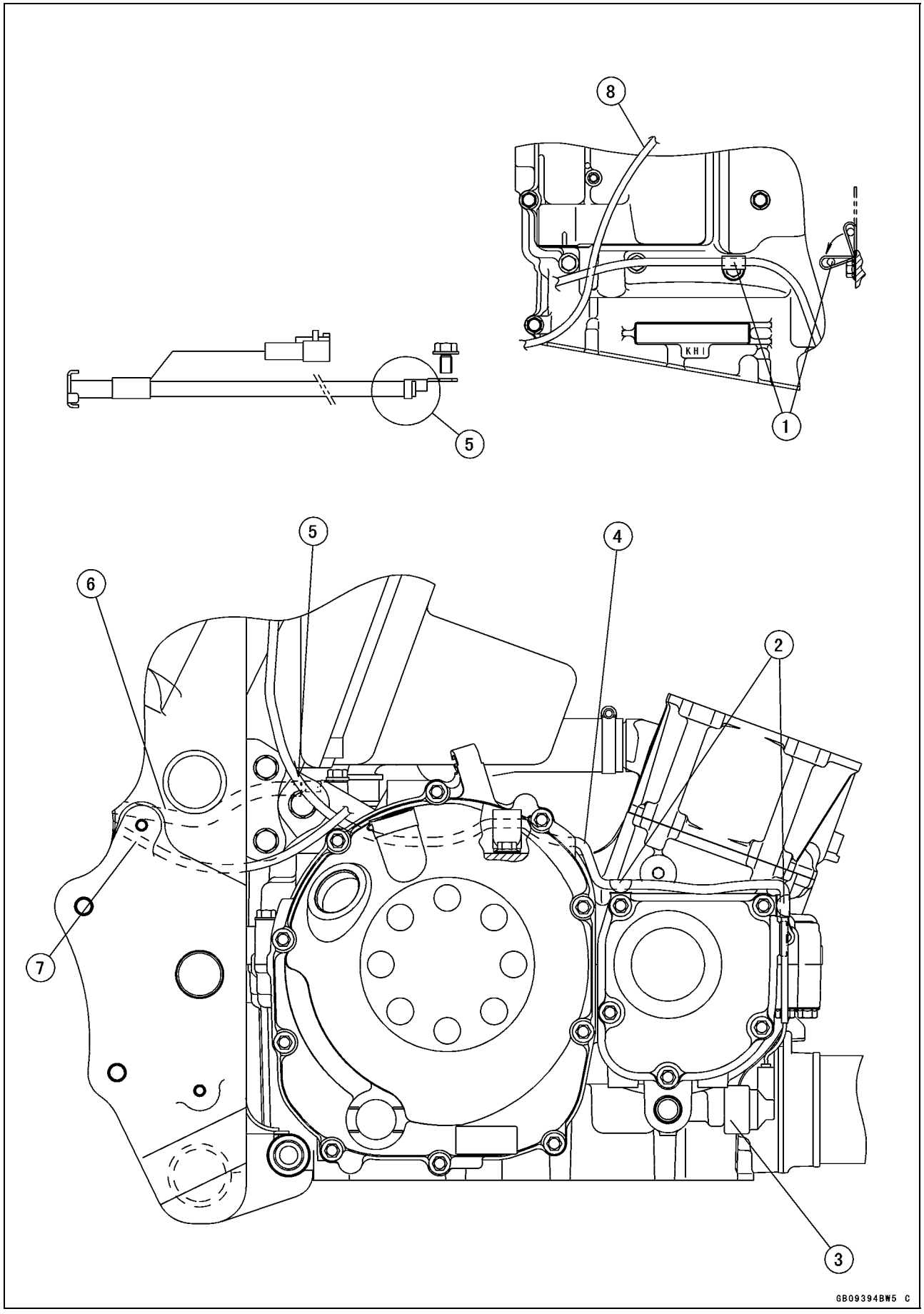
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Cam sensor lead (Run the lead between the convex area of cap center and bolt head to secure the coupler.)
2. Fan switch horn lead
3. Cap
4. Clutch cable (Run the cable through forward the water hose.)
5. Air suction valve
6. Water hose (Thermostat – Radiator)
7. Water hose (Head – Thermostat)
8. Inlet air pressure sensor
9. Vacuum hose (Run the vacuum hose under the throttle cable to connect with the inlet air pressure sensor.)
10. Throttle cable (accelerator)
11. Throttle cable (decelerator)
12. Vacuum balance tube
13. Choke Cable (Run the cable through left side of hose.)
14. Hose (air suction valve – air cleaner)
15. Stick coil
16. Fuel pump
17. Fuel hose
18. To inlet air pressure sensor
19. To air suction valve
20. Plate
21. Throttle body
22. Radiator fan lead (Run the lead through forward the water hose.)

Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Bend the bracket as shown to secure the lead.
2. Bend the bracket.
3. Install the lead upward.
4. Pickup coil and oil pressure switch (Run the cable through inner side from the starter lead.)
5. Install the exterior of the lead with staking area facing downward.
6. Battery negative cable (Run the cable through under the cross pipe.)
7. Starter lead (Run the lead through outside of engine bracket and under the cross pipe.)
8. Starter lead (Run the lead through on the alternator lead.)

Troubleshooting Guide

NOTE

○*Refer to the Fuel System chapter for most of DFI trouble shooting guide.*

○*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 switch or neutral switch trouble
- Starter motor trouble
- Battery voltage low
- Starter relay 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 clutch trouble
- Vehicle-down sensor (DFI) coming off

Engine won't turn over:
- Valve seizure
- Valve lifter seizure
- Cylinder, piston seizure
- Crankshaft seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Transmission gear or bearing seizure
- Camshaft seizure
- Starter idle gear seizure

No fuel flow:
- No fuel in tank
- Fuel pump trouble
- Fuel tank air vent obstructed
- Fuel filter clogged
- Fuel line clogged

Engine flooded:
- Clean spark plug and adjust plug gap
- Starting technique faulty
- (When flooded, do not crank the engine with the throttle fully opened. This promotes engine flood because more fuel is supplied automatically by DFI.)

No spark; spark weak:
- Vehicle-down sensor (DFI) coming off
- Ignition switch not ON
- Engine stop switch turned OFF
- Clutch lever not pulled in or gear not in neutral
- Battery voltage low
- Spark plug dirty, broken, or gap maladjusted
- Stick coil shorted or not in good contact
- Stick coil trouble
- Spark plug incorrect
- IC igniter in ECU trouble
- Camshaft position sensor trouble
- Neutral, starter lockout, or side stand switch trouble
- Crankshaft sensor trouble
- Ignition switch or engine stop switch shorted
- Wiring shorted or open
- Fuse blown

Fuel/air mixture incorrect:
- Bypass screw and/or idle adjusting screw maladjusted
- Air passage clogged
- Air cleaner clogged, poorly sealed, or missing

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/groove clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

Poor Running at Low Speed:

Spark weak:
- Battery voltage low
- Spark plug dirty, broken, or maladjusted
- Stick coil wiring trouble
- Stick coil not in good contact
- Spark plug incorrect
- IC igniter in ECU trouble
- Camshaft position sensor trouble
- Crankshaft sensor trouble
- Stick coil trouble

Fuel/air mixture incorrect:
- Bypass screw maladjusted
- Air passage clogged
- Air bleed pipe bleed holes clogged
- Pilot passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Fuel tank air vent obstructed
- Fuel pump trouble
- Throttle body assy 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/groove clearance excessive
Cylinder head warped
Cylinder head gasket damaged
Valve spring broken or weak
Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

Other:
IC igniter in ECU trouble
Throttle body assy not synchronizing
Engine oil viscosity too high
Drive train trouble
Brake dragging
Air suction valve trouble
Vacuum switch valve trouble
Engine overheating
Clutch slipping

Poor Running or No Power at High Speed:

Firing incorrect:
Spark plug dirty, broken, or maladjusted
Stick coil wiring trouble
Stick coil not in good contact
Spark plug incorrect
Camshaft position trouble
IC igniter in ECU trouble
Crankshaft sensor trouble
Stick coil trouble

Fuel/air mixture incorrect:
Air cleaner clogged, poorly sealed, or missing
Air cleaner O-ring damaged
Air cleaner duct loose
Water or foreign matter in fuel
Throttle body assy holder loose
Fuel to injector insufficient (DFI)
Fuel tank air vent obstructed
Fuel line clogged
Fuel pump trouble (DFI)

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/groove 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 in ECU trouble
Camshaft position sensor trouble
Crankshaft sensor trouble

Miscellaneous:
Throttle valve won't fully open
Brake dragging
Clutch slipping
Engine overheating
Engine oil level too high
Engine oil viscosity too high
Drive train trouble
Air suction valve trouble
Vacuum switch valve trouble
Catalytic converter melt down due to muffler overheating (KLEEN)

Overheating:

Firing incorrect:
Spark plug dirty, broken, or maladjusted
Spark plug incorrect
IC igniter in ECU trouble

Muffler overheating:
For KLEEN, do not run the engine even if with only one cylinder misfiring or poor running (Request the nearest service facility to correct it)
For KLEEN, do not push-start with a dead battery (Connect another full-charged battery with jumper cables, and start the engine using the electric starter)
For KLEEN, do not start the engine under misfire due to spark plug fouling or poor connection of the stick coil
For KLEEN, do not coast the motorcycle with the ignition switch off (Turn the ignition switch ON and run the engine)
IC igniter in ECU trouble

Fuel/air mixture incorrect:
Throttle body assy holder loose
Air cleaner duct loose
Air cleaner poorly sealed, or missing
Air cleaner O-ring damaged
Air cleaner clogged

Compression high:
Carbon built up in combustion chamber

Troubleshooting Guide

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
- Wrong coolant mixed ratio

Cooling system component incorrect:
- Radiator fin damaged
- Radiator clogged
- Thermostat trouble
- Radiator cap trouble
- Radiator fan switch trouble
- Radiator 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:
- Radiator 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 hub or housing unevenly worn
- No clutch lever play
- Clutch inner cable trouble
- Clutch release mechanism trouble

Clutch not disengaging properly:
- Clutch plate warped or too rough
- Clutch spring compression uneven
- Engine oil deteriorated
- Engine oil viscosity too high
- Engine oil level too high
- Clutch housing frozen on drive shaft
- Clutch hub nut loose
- Clutch hub spline damaged
- Clutch friction plate installed wrong
- Clutch lever play excessive
- Clutch release mechanism trouble

Gear Shifting Faulty:

Doesn't go into gear; shift pedal doesn't return:
- Clutch not disengaging
- Shift fork bent or seized
- Gear stuck on the shaft
- Gear positioning lever binding
- Shift return spring weak or broken
- Shift return spring pin loose
- Shift mechanism arm spring broken
- Shift mechanism arm broken
- Shift pawl broken

Jumps out of gear:
- Shift fork ear worn, bent
- Gear groove worn
- Gear dogs and/or dog holes worn
- Shift drum groove worn
- Gear positioning lever spring weak or broken
- Shift fork guide pin worn
- Drive shaft, output shaft, and/or gear splines worn

Overshifts:
- Gear positioning lever spring weak or broken
- Shift mechanism arm spring broken

Abnormal Engine Noise:

Knocking:
- IC igniter in ECU 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 pin hole worn

Valve noise:
- Valve clearance incorrect
- Valve spring broken or weak
- Camshaft bearing worn
- Valve lifter worn

Other noise:
- Connecting rod small end clearance excessive
- Connecting rod big end clearance excessive
- Piston ring/groove clearance excessive
- Piston ring worn, broken, or stuck
- Piston ring groove worn
- Piston seizure, damage
- Cylinder head gasket leaking
- Exhaust pipe leaking at cylinder head connection
- Crankshaft runout excessive

Troubleshooting Guide

Engine mount loose
Crankshaft bearing worn
Primary gear worn or chipped
Camshaft chain tensioner trouble
Camshaft chain, sprocket, guide worn
Air suction valve damaged
Vacuum switch valve damaged
Alternator rotor loose
Catalytic converter melt down due to muffler overheating (KLEEN)

Abnormal Drive Train Noise:

Clutch noise:
Clutch damper weak or damaged
Clutch housing/friction plate clearance excessive
Clutch housing gear worn
Wrong installation of outside friction plate

Transmission noise:
Bearings worn
Transmission gear worn or chipped
Metal chips jammed in gear teeth
Engine oil insufficient

Drive line noise:
Drive chain adjusted improperly
Drive 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 filter clogged
Engine oil level too low
Engine oil viscosity too low
Camshaft bearing worn
Crankshaft bearing worn
Oil pressure switch damaged
Wiring faulty
Relief valve stuck open
O-ring at the oil passage in the crankcase damaged

Exhaust Smokes Excessively:

White smoke:
Piston oil ring worn
Cylinder worn
Valve oil seal damaged
Valve guide worn
Engine oil level too high

Black smoke:
Air cleaner clogged

Brown smoke:
Air cleaner duct loose
Air cleaner O-ring damaged
Air cleaner poorly sealed or missing

Handling and/or Stability Unsatisfactory:

Handlebar hard to turn:
Cable routing incorrect
Hose routing incorrect
Wiring routing incorrect
Steering stem nut too tight
Steering stem bearing damaged
Steering stem bearing lubrication inadequate
Steering stem bent
Tire air pressure too low

Handlebar shakes or excessively vibrates:
Tire worn
Swingarm pivot bearing worn
Rim warped, or not balanced
Wheel bearing worn
Handlebar clamp bolt loose
Steering stem nut loose
Front, rear axle runout excessive
Engine mounting bolt loose

Handlebar pulls to one side:
Frame bent
Wheel misalignment
Swingarm bent or twisted
Swingarm pivot shaft runout excessive
Steering maladjusted
Front fork bent
Right and left front fork oil level uneven

Shock absorption unsatisfactory:
(Too hard)
Front fork oil excessive
Front fork oil viscosity too high
Rear shock absorber adjustment too hard
Tire air pressure too high
Front fork bent
(Too soft)
Tire air pressure too low
Front fork oil insufficient and/or leaking
Front fork oil viscosity too low

Rear shock adjustment too soft
Front fork, rear shock absorber spring weak
Rear shock absorber oil leaking

Brake Doesn't Hold:

Air in the brake line
Pad or disc worn
Brake fluid leakage
Disc warped
Contaminated pad
Brake fluid deteriorated
Primary or secondary cup damaged in master cylinder
Master cylinder scratched inside

Battery Trouble:

Battery discharged:
Charge insufficient
Battery faulty (too low terminal voltage)
Battery lead making poor contact
Load excessive (e.g., bulb of excessive wattage)
Ignition switch trouble
Alternator trouble
Wiring faulty
Regulator/rectifier trouble

Battery overcharged:
Alternator trouble
Regulator/rectifier trouble
Battery faulty

MODEL APPLICATION

Year	Model	Beginning Frame No.
2004	ZR750–J1	JKAZRDJ1□4A000001 ZR750J–000001 JKAZR750JJA000001

□:This digit in the frame number changes from one machine to another.

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