Ninja ZX-6R
Ninja ZX-6R ABS

Motorcycle
Service Manual

Kawasaki

Quick Reference Guide

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

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

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Motorcycle Service Manual

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

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

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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)		

COUNTRY AND AREA CODES

AT	Austria	ID	Indonesia
AU	Australia	MY	Malaysia
BR	Brazil	SEA-B2	Southeast Asia B2
CA	Canada	SEA-B3	Southeast Asia B3
CAL	California (with Evaporative Emission Control System)	US	United States
CH	Switzerland	WVTA (FULL)	WVTA Model (Full Power)
DE	Germany	WVTA (78.2)	WVTA Model (78.2 kW Power)
EUR	Europe	GB WVTA (FULL)	GB WVTA Model (Full Power)
GB	United Kingdom	Euro 3	Euro 3 Model (2017 MY ~)

EMISSION CONTROL INFORMATION

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

1. Crankcase Emission Control System

This system eliminates the release of crankcase vapors into the atmosphere. Instead, the vapors are routed through an oil separator to the intake side of the engine. While the engine is operating, the vapors are drawn into combustion chamber, where they are burned along with the fuel and air supplied by the fuel injection system.

2. Exhaust Emission Control System

This system reduces the amount of pollutants discharged into the atmosphere by the exhaust of this motorcycle. The fuel, ignition, and exhaust systems of this motorcycle have been carefully designed and constructed to ensure an efficient engine with low exhaust pollutant levels.

The exhaust system of this model motorcycle manufactured primarily for sale in California includes a catalytic converter system.

3. Evaporative Emission Control System

Vapors caused by fuel evaporation in the fuel system are not vented into the atmosphere. Instead, fuel vapors are routed into the running engine to be burned, or stored in a canister when the engine is stopped.

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

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

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

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

NOTE

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

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

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

TAMPERING WITH NOISE CONTROL SYSTEM PROHIBITED

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

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

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

Foreword

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

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

For the duration of 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 Service 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 this manual, the product is divided into its major systems and these systems make up the manual's chapters. 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.

For example, if you want stick coil information, use the Quick Reference Guide to locate the Electrical System chapter. Then, use the Table of Contents on the first page of the chapter to find the Stick Coil section.

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

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

NOTICE

NOTICE is used to address practices not related to personal injury.

This manual contains four more symbols which will help you distinguish different types of information.

NOTE

○*NOTE indicates information that may help or guide you in the operation or service of the vehicle.*

- 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

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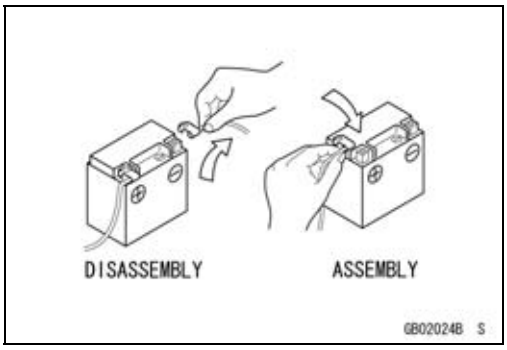
Before Servicing

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.

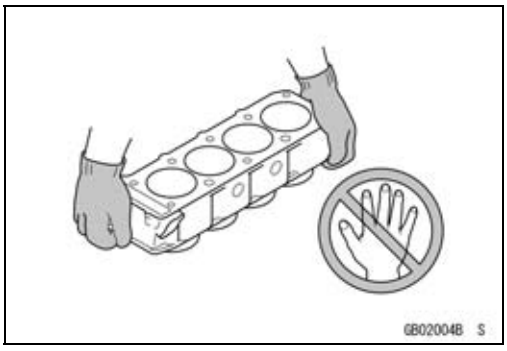
Battery Ground

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



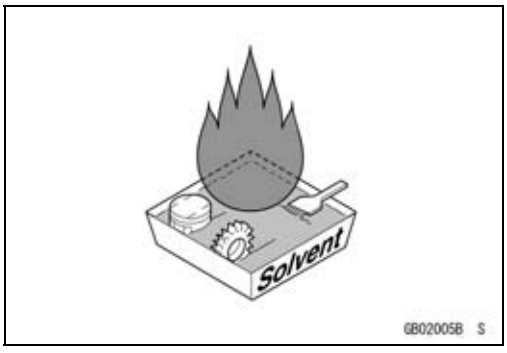
Edges of Parts

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



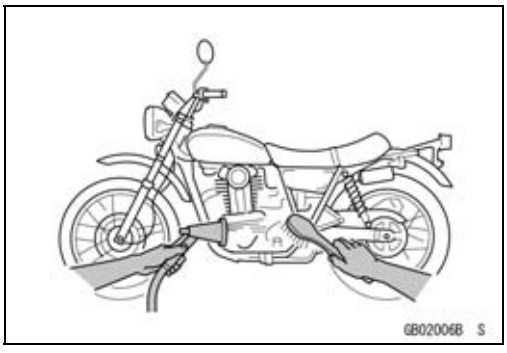
Solvent

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



Cleaning Vehicle before Disassembly

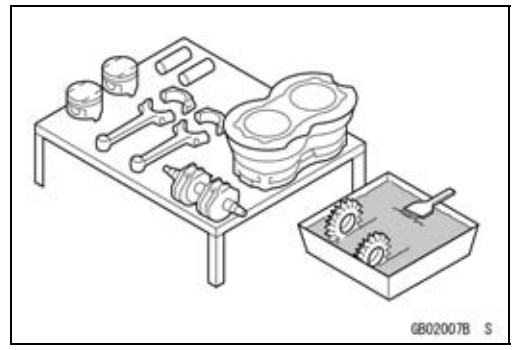
Clean the vehicle thoroughly before disassembly. Dirt or other foreign materials entering into sealed areas during vehicle disassembly can cause excessive wear and decrease performance of the vehicle.



Before Servicing

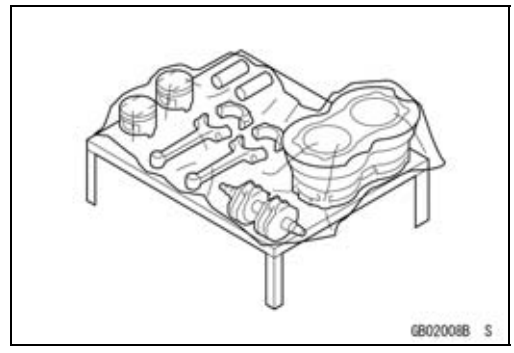
Arrangement and Cleaning of Removed Parts

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.



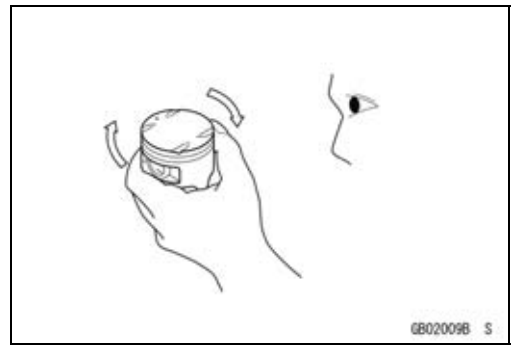
Storage of Removed Parts

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.



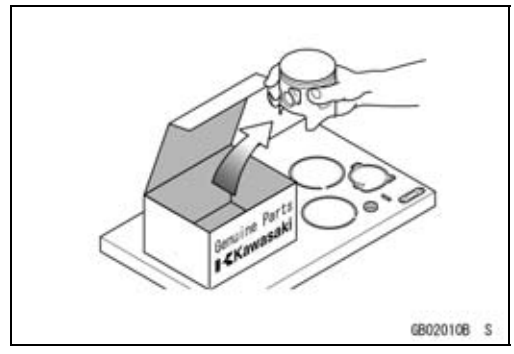
Inspection

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.



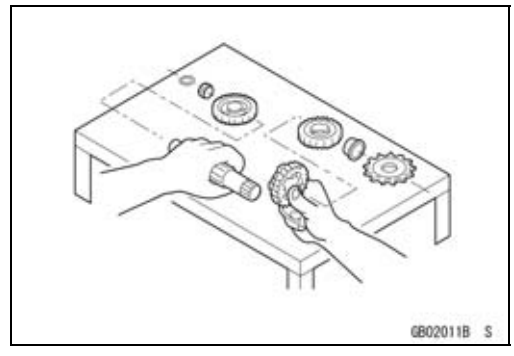
Replacement Parts

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



Assembly Order

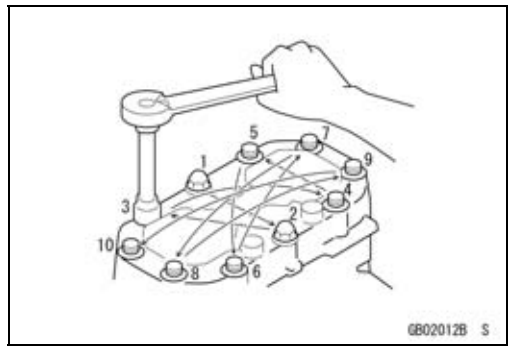
In most cases assembly order is the reverse of disassembly, however, if assembly order is provided in this Service Manual, follow the procedures given.



Before Servicing

Tightening Sequence

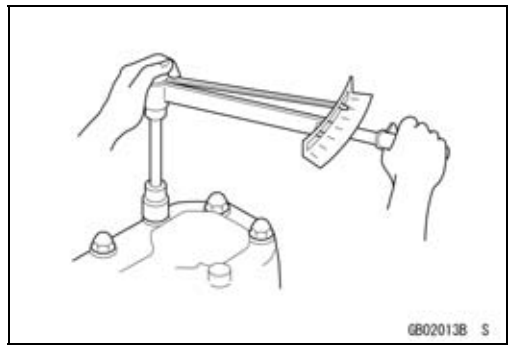
Generally, when installing a part with several bolts, nuts, or screws, start them all in their holes and tighten them to a snug fit. Then tighten them according to the specified sequence to prevent case warpage or deformation which can lead to malfunction. Conversely when loosening the bolts, nuts, or screws, first loosen all of them by about a quarter turn and then remove them. If the specified tightening sequence is not indicated, tighten the fasteners alternating diagonally.



Tightening Torque

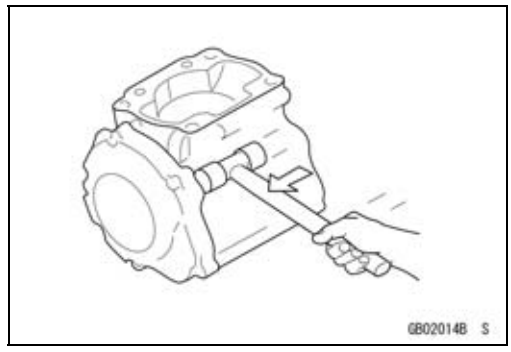
Incorrect torque applied to a bolt, nut, or screw may lead to serious damage. Tighten fasteners to the specified torque using a good quality torque wrench.

All of the tightening torque values are for use with dry, solvent - cleaned threads unless otherwise indicated. If a fastener which should have dry, clean threads gets contaminated with lubricant, etc., applying even the specified torque could damage it.



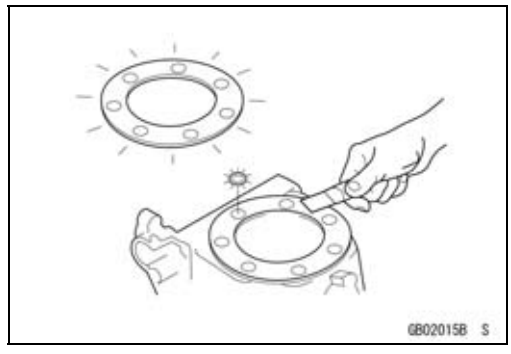
Force

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.



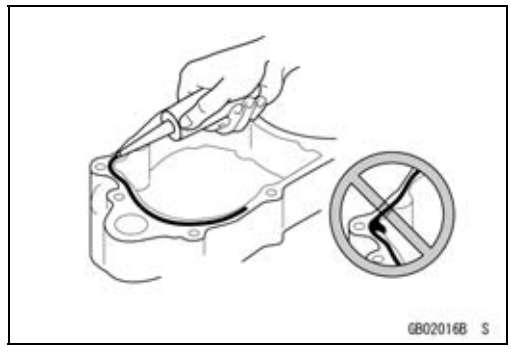
Gasket, O-ring

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 the new gaskets and replace the used O-rings when re-assembling.



Liquid Gasket, Non-permanent Locking Agent

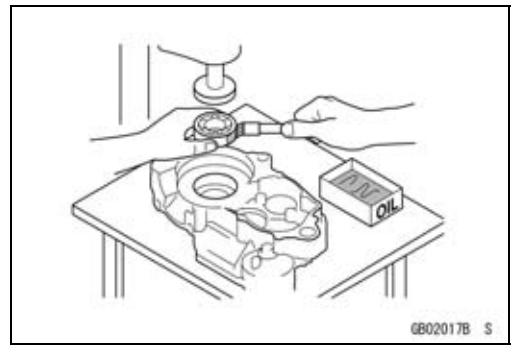
For applications that require Liquid Gasket or a Non-permanent Locking Agent, clean the surfaces so that no oil residue remains before applying liquid gasket or non-permanent locking agent. Do not apply them excessively. Excessive application can clog oil passages and cause serious damage.



Before Servicing

Press

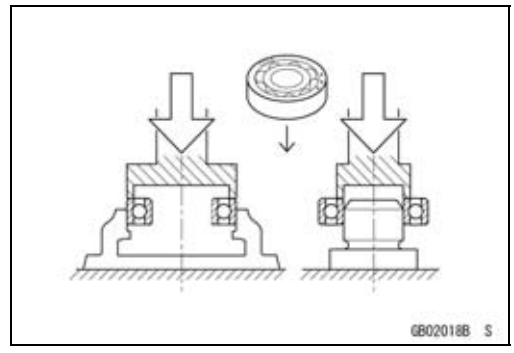
For items such as bearings or oil seals that must be pressed into place, apply small amount of oil to the contact area. Be sure to maintain proper alignment and use smooth movements when installing.



Ball Bearing and Needle Bearing

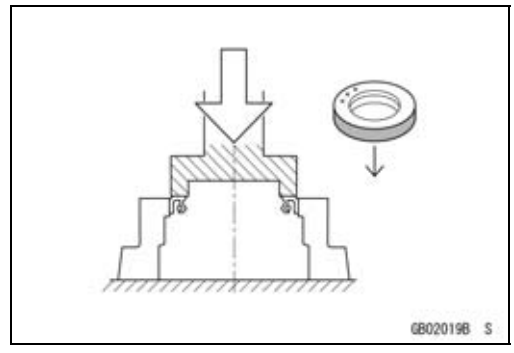
Do not remove pressed ball or needle unless removal is absolutely necessary. Replace with new ones whenever removed. Press bearings with the manufacturer and size marks facing out. Press the bearing into place by putting pressure on the correct bearing race as shown.

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

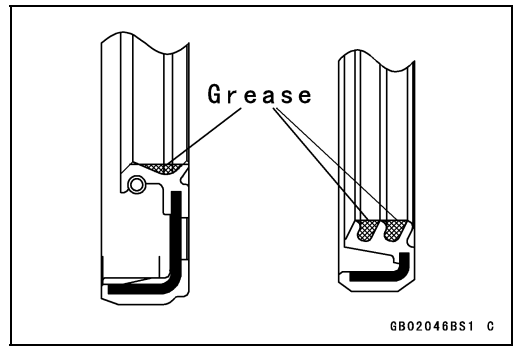


Oil Seal, Grease Seal

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.

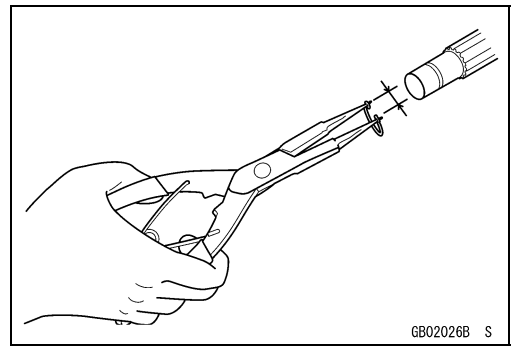


Apply specified grease to the lip of seal before installing the seal.



Circlips, Cotter Pins

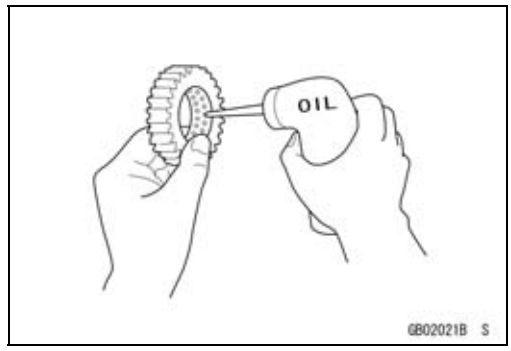
Replace the circlips or cotter pins that were removed with new ones. Take care not to open the clip excessively when installing to prevent deformation.



Before Servicing

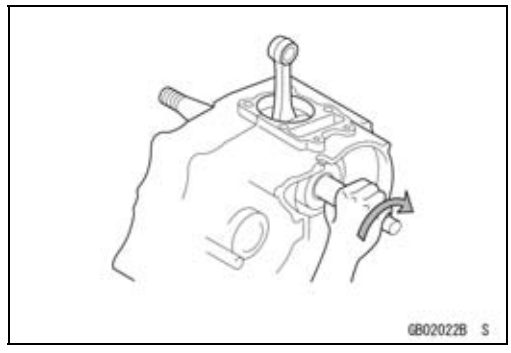
Lubrication

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.



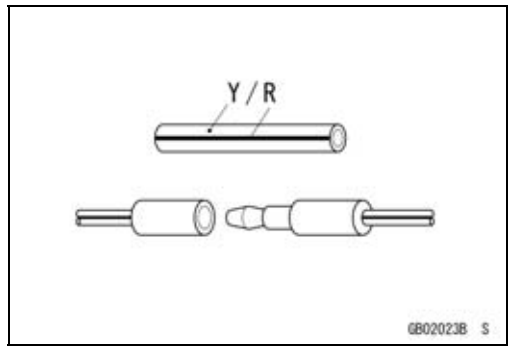
Direction of Engine Rotation

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).



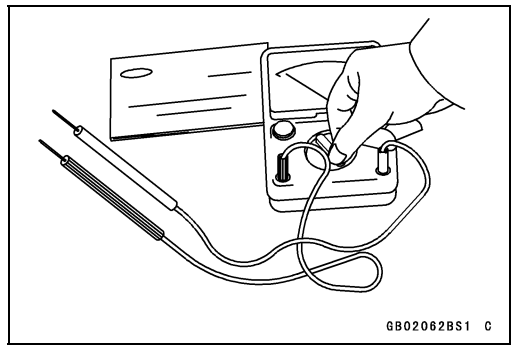
Electrical Wires

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.



Instrument

Use a meter that has enough accuracy for an accurate measurement. Read the manufacture's instructions thoroughly before using the meter. Incorrect values may lead to improper adjustments.



Handling Electronic Parts

Severe impacts to electronic parts such as the ECU, sensor, and relay can damage them. If dropped on a hard surface, replace such parts with new ones.

If a high voltage that is created by static electricity is applied to the electric parts, it could cause them to fail. To avoid this, touch a non-painted metal surface to discharge any static electricity that is accumulated on your body before inspecting or replacing electric parts.

Be careful not to touch the electrical terminals of the electronic parts. The static electricity discharged from your body could damage them or deform the electrical terminals.

Model Identification

ZX636ED (US and CA Models) Left Side View

ZX636ED (US and CA Models) Right Side View

Model Identification

ZX636ED (EUR Models) Left Side View

ZX636ED (EUR Models) Right Side View

Model Identification

ZX636FD (EUR Models) Left Side View

ZX636FD (EUR Models) Right Side View

Frame Number

Engine Number

General Specifications

Items	ZX636ED ~ EJ/FD ~ FJ
Dimensions	
Overall Length	2 085 mm (82.09 in.)
Overall Width	705 mm (27.8 in.)
Overall Height	1 115 mm (43.90 in.)
Wheelbase	1 395 mm (54.92 in.)
Road Clearance	130 mm (5.12 in.)
Seat Height	830 mm (32.7 in.)
Curb Mass:	
ZX636E	192 kg (423 lb)
ZX636F	194 kg (428 lb)
Front:	
ZX636E	98 kg (216 lb)
ZX636F	99 kg (218 lb)
Rear:	
ZX636E	94 kg (207 lb)
ZX636F	95 kg (209 lb)
Fuel Tank Capacity	17 L (4.5 US gal)
Performance	
Minimum Turning Radius	3.4 m (11.2 ft)
Engine	
Type	4-stroke, DOHC, 4-cylinder
Cooling System	Liquid-cooled
Bore and Stroke	67.0 × 45.1 mm (2.64 × 1.78 in.)
Displacement	636 cm³ (38.8 cu in.)
Compression Ratio	12.9:1
Maximum Horsepower	96.4 kW (131 PS) @13 500 r/min (rpm), (WVTA (78.2)) 78.2 kW (106 PS) @13 500 r/min (rpm), (SEA-B2) 95.0 kW (129 PS) @13 000 r/min (rpm), (CA), (CAL), (US) – – –
Maximum Torque	71 N·m (7.2 kgf·m, 52 ft·lb) @11 500 r/min (rpm), (WVTA (78.2)) 61 N·m (6.2 kgf·m, 45 ft·lb) @10 800 r/min (rpm), (CA), (CAL), (US) – – –
Carburetion System	FI (Fuel Injection), KEIHIN TTK38 × 4
Fuel Type:	
Minimum Octane Rating:	
Research Octane Number (RON)	95
Antiknock Index (RON + MON)/2	90
Starting System	Electric starter
Ignition System	Battery and coil (transistorized)
Timing Advance	Electronically advanced (IC igniter in ECU)
Ignition Timing	From 12.5° BTDC @1 300 r/min (rpm) to 36.4° BTDC @4 800 r/min (rpm)
Spark Plug	NGK CR9E
Cylinder Numbering Method	Left to right, 1-2-3-4

General Specifications

Items	ZX636ED ~ EJ/FD ~ FJ
Firing Order	1-2-4-3
Valve Timing:	
Intake:	
Open	44° (BTDC)
Close	67° (ABDC)
Duration	291°
Exhaust:	
Open	58° (BBDC)
Close	20° (ATDC)
Duration	258°
Lubrication System	Forced lubrication (wet sump with oil cooler)
Engine Oil:	
Type	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2
Viscosity	SAE 10W-40
Capacity	3.6 L (3.8 US qt)
Drive Train	
Primary Reduction System:	
Type	Gear
Reduction Ratio	1.900 (76/40)
Clutch Type	Wet multi disc
Transmission:	
Type	6-speed, constant mesh, return shift
Gear Ratios:	
1st	2.846 (37/13)
2nd	2.200 (33/15)
3rd	1.850 (37/20)
4th	1.600 (32/20)
5th	1.421 (27/19)
6th	1.300 (26/20)
Final Drive System:	
Type	Chain drive
Reduction Ratio	2.688 (43/16)
Overall Drive Ratio	6.638 at Top gear
Frame	
Type	Tubular, diamond
Caster (Rake Angle)	23.5°
Trail	101 mm (3.98 in.)
Front Tire:	
Type	Tubeless
Size	120/70ZR17 M/C (58 W)
Rim Size	17M/C × MT3.50
Rear Tire:	
Type	Tubeless
Size	180/55ZR17 M/C (73 W)

General Specifications

Items	ZX636ED ~ EJ/FD ~ FJ
Rim Size	17M/C × MT5.50
Front Suspension:	
Type	Telescopic fork (upside-down)
Wheel Travel	120 mm (4.72 in.)
Rear Suspension:	
Type	Swingarm (uni-trak)
Wheel Travel	134 mm (5.28 in.)
Brake Type:	
Front	Dual discs
Rear	Single disc
Electrical Equipment	
Battery	12 V 8 Ah (10 HR)
Headlight:	
Type	Semi-sealed beam
Bulb:	
High	12 V 55 W (quartz-halogen)
Low	12 V 55 W (quartz-halogen)
Tail/Brake Light	LED
Alternator:	
Type	Three-phase AC
Maximum Output	14 V-26 A @5 000 r/min (rpm)

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

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

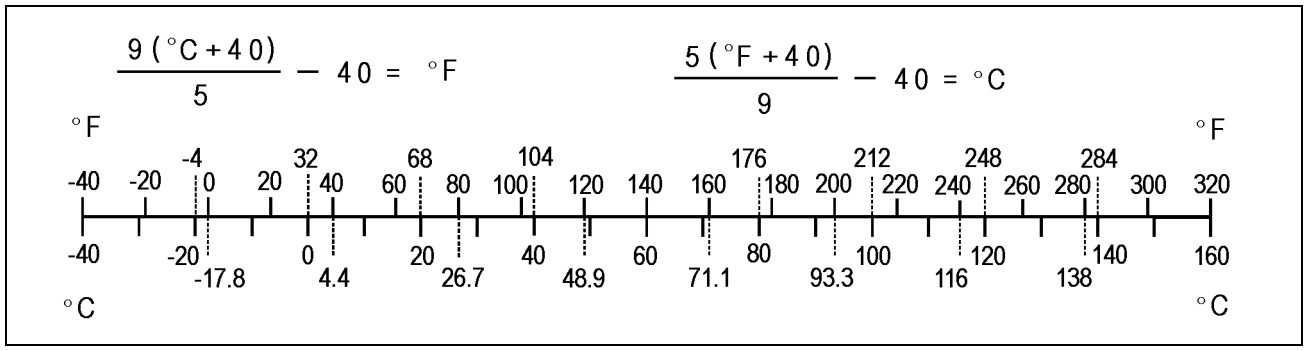
Units of Speed:

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:



Periodic Maintenance

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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

*A: Service at number of years shown or indicated odometer reading intervals, whichever comes first.
*B: For higher odometer readings, repeat at the frequency interval established here.
*C: Service more frequently when operating in severe conditions: dusty, wet, muddy, high speed, or frequent starting/stopping.
○: Emission Related Item

Q: Inspection
: Change or Replace
: Lubrication

	Items	year (*A)	Odometer Reading (*B) × 1 000 km (× 1 000 mile) 1 (0.6)	6 (3.8)	12 (7.6)	18 (11.4)	24 (15.2)	See Page
Fuel System								
○	Air cleaner element (*C)							2-14
○	Idle speed		Q		Q		Q	2-15
○	Throttle control system (play, smooth return, no drag)	Q:1	Q		Q		Q	2-15
○	Engine vacuum synchronization				Q		Q	2-16
	Fuel system	Q:1	Q		Q		Q	2-19
	Fuel hose	:5						2-20
○	Evaporative emission control system (CAL Model)		Q	Q	Q	Q	Q	2-22
Cooling System								
	Coolant level		Q		Q		Q	2-23
	Cooling system	Q:1	Q		Q		Q	2-23
	Coolant, water hoses and O-rings	:3	: every 36 000 km (22 500 mile)					2-23, 2-26
Engine Top End								
○	Valve clearance (US and CA Models)						Q	2-27
	Valve clearance (Other than US and CA Models)		Q: every 42 000 km (26 250 mile)					2-27
○	Air suction system				Q		Q	2-30
Clutch								
	Clutch operation (play, engagement, disengagement)		Q		Q		Q	2-31
Engine Lubrication System								
	Engine oil and oil filter (*C)	:1						2-32, 2-33
Wheels and Tires								
	Tire air pressure	Q:1			Q		Q	2-34
	Wheels and tires	Q:1			Q		Q	2-34

Periodic Maintenance Chart

	Items	year (*A)	Odometer Reading (*B) × 1 000 km (× 1 000 mile) 1 (0.6)	6 (3.8)	12 (7.6)	18 (11.4)	24 (15.2)	See Page
	Wheel bearing damage	Q:1			Q		Q	2-35
Final Drive								
	Drive chain lubrication condition (*C)		Q: every 600 km (400 mile)					2-36
	Drive chain slack (*C)		Q: every 1 000 km (600 mile)					2-36
	Drive chain wear (*C)				Q		Q	2-38
	Drive chain guide wear				Q		Q	2-39
Brakes								
	Brake system	Q:1	Q		Q		Q	2-39
	Brake fluid level	Q:1	Q		Q		Q	2-40
	Brake fluid (front and rear)	:2						2-41
	Brake hose/rubber parts of brake master cylinder and caliper	:4						2-43, 2-46, 2-47
	Brake pad wear (*C)			Q	Q	Q	Q	2-51
	Brake light switch operation		Q	Q	Q	Q	Q	2-51
Suspension								
	Suspension system	Q:1			Q		Q	2-52
Steering								
	Steering play	Q:1	Q		Q		Q	2-53
	Steering stem bearings	:2						2-55
Electrical System								
	Electrical system	Q:1			Q		Q	2-56
○	Spark plugs							2-61
Others								
	Chassis parts	:1						2-61
	Condition of bolts, nuts and fasteners		Q		Q		Q	2-62

Torque and Locking Agent

The following tables list the tightening torque for the major fasteners requiring use of a non-permanent locking agent or silicone sealant etc. All of the values are for use with dry solvent - cleaned threads unless otherwise indicated.

Letters used in the “Remarks” column mean:
AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque.
G: Apply grease.
L: Apply a non-permanent locking agent.
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
S: Follow the specified tightening sequence.
Si: Apply silicone grease.
SS: Apply silicone sealant.

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Fuel System (DFI)				
Air Cleaner Housing Assembly Screws	1.2	0.12	11 in·lb	
Air Cleaner Housing Clamp Bolts	2.0	0.20	18 in·lb	
Air Intake Duct Mounting Bolts	9.8	1.0	87 in·lb	L
Air Intake Duct Assembly Screws	1.5	0.15	13 in·lb	
Crankshaft Sensor Bolts	5.9	0.60	52 in·lb	
Delivery Pipe Assy Mounting Screws	3.43	0.35	30 in·lb	
Exhaust Butterfly Valve Actuator Mounting Screws	4.3	0.44	38 in·lb	
Exhaust Butterfly Valve Actuator Pulley Bolt	4.9	0.50	43 in·lb	
Fuel Pump Assembly Screws	0.98	0.10	8.7 in·lb	R
Fuel Pump Bolts	9.8	1.0	87 in·lb	L, S
Gear Position Switch Screws	2.9	0.30	26 in·lb	L
Intake Air Temperature Sensor Screw	1.2	0.12	11 in·lb	
Oxygen Sensor (Equipped Models)	25	2.5	18	
Vehicle-down Sensor Bolts	5.9	0.60	52 in·lb	
Throttle Body Assy Holder Bolts	12	1.2	106 in·lb	L
Throttle Body Assy Holder Clamp Bolts	2.9	0.30	26 in·lb	
Throttle Cable Holder Plate Bolt	3.9	0.40	35 in·lb	L
Throttle Case Screws	3.5	0.36	31 in·lb	
Water Temperature Sensor	12	1.2	106 in·lb	
Cooling System				
Coolant By-pass Fitting Bolt	8.8	0.90	78 in·lb	L
Coolant Drain Bolt (Cylinder)	9.8	1.0	87 in·lb	
Coolant Drain Bolt (Water Pump)	8.8	0.90	78 in·lb	
Heat Insulation Plate Bolt	3.9	0.40	35 in·lb	L
Impeller Bolt	9.8	1.0	87 in·lb	
Oil Cooler Mounting Bolts	20	2.0	15	
Radiator Upper Bolts	9.8	1.0	87 in·lb	
Thermostat Housing Cover Bolts	5.9	0.60	52 in·lb	
Water Hose Clamp Screws	3.0	0.31	27 in·lb	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Water Hose Fitting Bolts	9.8	1.0	87 in·lb	
Water Pump Cover Bolts	12	1.2	106 in·lb	L
Water Temperature Sensor	12	1.2	106 in·lb	
Engine Top End				
Air Suction Valve Cover Bolts	9.8	1.0	87 in·lb	L
Breather Hose Fitting	15	1.5	11	L
Camshaft Cap Bolts	12	1.2	106 in·lb	S
Camshaft Chain Tensioner Cap Bolt	20	2.0	15	
Camshaft Chain Tensioner Mounting Bolts	11	1.1	97 in·lb	
Camshaft Sprocket Bolts	15	1.5	11	L
Coolant Drain Bolt (Cylinder)	9.8	1.0	87 in·lb	
Cylinder Head Bolts (M9)	see the text	←	←	MO, S
Cylinder Head Bolts (M6)	12	1.2	106 in·lb	S
Cylinder Head Cover Bolts	9.8	1.0	87 in·lb	S
Exhaust Butterfly Valve Actuator Mounting Screws	4.3	0.44	38 in·lb	
Exhaust Butterfly Valve Actuator Pulley Bolt	4.9	0.50	43 in·lb	
Exhaust Butterfly Valve Cable Locknuts	5.0	0.51	44 in·lb	
Front Camshaft Chain Guide Bolt (Lower)	12	1.2	106 in·lb	
Front Camshaft Chain Guide Bolt (Upper)	25	2.5	18	
Muffler Body Mounting Bolt	25	2.5	18	
Premuffler Chamber Bracket Bolt	40	4.1	30	
Premuffler Chamber Mounting Bolt	40	4.1	30	
Muffler Body End Cover Bolts	7.0	0.71	62 in·lb	L
Spark Plugs	13	1.3	115 in·lb	
Starter Clutch Bolt Cap	2.9	0.30	26 in·lb	
Throttle Body Assy Holder Bolts	12	1.2	106 in·lb	L
Throttle Body Assy Holder Clamp Bolts	2.9	0.30	26 in·lb	
Timing Inspection Cap	2.9	0.30	26 in·lb	
Upper Camshaft Chain Guide Bolts	12	1.2	106 in·lb	S
Water Passage Plugs	19.6	2.00	14.5	L
Clutch				
Clutch Cover Bolts (M6, L = 40 mm)	9.8	1.0	87 in·lb	
Clutch Cover Bolts (M6, L = 25 mm)	9.8	1.0	87 in·lb	
Clutch Hub Nut	135	13.8	100	R
Clutch Lever Holder Clamp Bolts	7.8	0.80	69 in·lb	S
Clutch Stopper Bolts	8.8	0.90	78 in·lb	
Oil Filler Plug	–	–	–	Hand-tighten
Engine Lubrication System				
Air Bleed Bolt	9.8	1.0	87 in·lb	
Engine Oil Drain Bolt	29	3.0	21	
Impeller Bolt	9.8	1.0	87 in·lb	
Oil Cooler Mounting Bolts	20	2.0	15	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Oil Cooler/Oil Filter Case Mounting Bolts	20	2.0	15	L
Oil Filter	17	1.7	13	G, R
Oil Filter Guard Bolts	4.0	0.41	35 in·lb	L
Oil Filter Holder Bolt	25	2.5	18	L
Oil Jet Nozzles	2.9	0.30	26 in·lb	
Oil Pan Bolts	9.8	1.0	87 in·lb	S
Oil Passage Plug	17	1.7	13	
Oil Passage Plugs (Taper)	20	2.0	15	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	G
Oil Pump Drive Gear Bolt	9.8	1.0	87 in·lb	L
Water Pump Cover Bolts	12	1.2	106 in·lb	L
Engine Removal/Installation				
Adjusting Collar Locknuts	49	5.0	36	S
Adjusting Collars	9.8	1.0	87 in·lb	S, (M)
Left Front Engine Mounting Bolt	44	4.5	32	S
Lower Engine Mounting Nut	44	4.5	32	R, S
Middle Engine Mounting Nut	44	4.5	32	R, S
Right Front Engine Mounting Bolt	44	4.5	32	S
Crankshaft/Transmission				
Bearing Holder Screws	4.9	0.50	43 in·lb	L
Breather Hose Fitting	15	1.5	11	L
Breather Plate Bolts	9.8	1.0	87 in·lb	L
Connecting Rod Big End Nuts	see the text	←	←	MO
Crankcase Bolt (M8, L = 90 mm)	27	2.8	20	S
Crankcase Bolts (M8, L = 95 mm)	31	3.2	23	MO, S
Crankcase Bolts (M8, L = 75 mm)	27	2.8	20	S
Crankcase Bolts (M6, L = 68 mm)	12	1.2	106 in·lb	S
Crankcase Bolts (M6, L = 50 mm)	12	1.2	106 in·lb	
Gear Position Switch Screws	2.9	0.30	26 in·lb	L
Gear Positioning Lever Bolt	12	1.2	106 in·lb	
Idle Gear Cover Bolts	9.8	1.0	87 in·lb	
Oil Jet Nozzles	2.9	0.30	26 in·lb	
Oil Passage Nozzle	4.9	0.50	43 in·lb	
Oil Passage Plug	17	1.7	13	
Oil Passage Plugs (Taper)	20	2.0	15	L
Race Holder Screws	4.9	0.50	43 in·lb	L
Shift Drum Cam Holder Bolt	12	1.2	106 in·lb	L
Shift Pedal Mounting Bolt	25	2.5	18	L
Shift Shaft Return Spring Pin	28	2.9	21	L
Starter Clutch Bolt	49	5.0	36	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Starter Clutch Cover Bolt (L = 20 mm)	9.8	1.0	87 in·lb	
Starter Clutch Cover Bolts (L = 30 mm)	9.8	1.0	87 in·lb	
Transmission Case Bolt (M6)	9.8	1.0	87 in·lb	
Transmission Case Bolts (M8)	20	2.0	15	
Wheels/Tires				
Front Axle Clamp Bolts	20	2.0	15	AL
Front Axle	127	13.0	93.7	
Rear Axle Nut	127	13.0	93.7	
Final Drive				
Chain Guide Bolts	12	1.2	106 in·lb	L
Engine Sprocket Cover Bolts (L = 45 mm)	9.8	1.0	87 in·lb	
Engine Sprocket Cover Bolts (L = 55 mm)	9.8	1.0	87 in·lb	
Engine Sprocket Cover Damper Screws	3.0	0.31	27 in·lb	
Engine Sprocket Nut	147	15.0	108	MO
Rear Axle Nut	127	13.0	93.7	
Rear Sprocket Nuts	59	6.0	44	R
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	8.9 in·lb	Si
Brake Lever Pivot Bolt Locknut	5.9	0.60	52 in·lb	
Brake Pedal Mounting Bolt	34	3.5	25	L
Front Brake Disc Mounting Bolts	27	2.8	20	L
Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
Front Brake Pad Pins	17	1.7	13	
Front Brake Reservoir Cap Stopper Screw	1.2	0.12	11 in·lb	
Front Caliper Mounting Bolts	34	3.5	25	
Brake Pipe Banjo Bolts (L = 20.8 mm) (ABS Equipped Models)	23	2.3	17	
Brake Pipe Banjo Bolt (L = 32.3 mm) (ABS Equipped Models)	23	2.3	17	
Brake Pipe Joint Nuts (ABS Equipped Models)	18	1.8	13	
Front Master Cylinder Bleed Valve	5.4	0.55	48 in·lb	
Front Master Cylinder Clamp Bolts	11	1.1	97 in·lb	S
Front Master Cylinder Bracket Bolt	8.8	0.90	78 in·lb	
Rear Brake Disc Mounting Bolts	27	2.8	20	L
Rear Master Cylinder Mounting Bolts	25	2.5	18	
Rear Master Cylinder Push Rod Locknut	17	1.7	13	
Rear Brake Pad Pin	17	1.7	13	
Rear Brake Pad Pin Plug	2.45	0.25	22 in·lb	
Rear Caliper Pin Bolt	27	2.8	20	Si

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Suspension				
Front Axle Clamp Bolts	20	2.0	15	AL
Front Fork Top Plugs	35	3.6	26	
Lower Front Fork Clamp Bolts	23	2.3	17	AL
Lower Rear Shock Absorber Nut	34	3.5	25	R
Piston Rod Guide Case	90	9.2	66	
Rear Shock Absorber Bracket Nut	59	6.0	44	
Swingarm Pivot Adjusting Collar Locknut	98	10.0	72	
Swingarm Pivot Shaft	20	2.0	15	
Swingarm Pivot Shaft Nut	108	11.0	79.7	
Tie-Rod Nuts	59	6.0	44	R
Rocker Arm Bolt	34	3.5	25	
Upper Front Fork Clamp Bolts	20	2.0	15	
Upper Rear Shock Absorber Nut	34	3.5	25	R
Steering				
Handlebar Clamp Bolts	25	2.5	18	
Handlebar Positioning Bolts	9.8	1.0	87 in·lb	L
Left Switch Housing Screws	3.5	0.36	31 in·lb	
Lower Front Fork Clamp Bolts	23	2.3	17	AL
Right Switch Housing Screws	3.5	0.36	31 in·lb	
Steering Stem Head Bolt	78	8.0	58	L
Steering Stem Nut	27	2.8	20	
Throttle Case Screws	3.5	0.36	31 in·lb	
Upper Front Fork Clamp Bolts	20	2.0	15	
Frame				
Front Fender Mounting Bolts	3.9	0.40	35 in·lb	
Front Footpeg Bracket Bolts	25	2.5	18	L
Rear Footpeg Bracket Bolts	25	2.5	18	
Rear Frame Bolts (M10)	44	4.5	32	L
Rear Frame Bolts (M8)	25	2.5	18	L
Sidestand Bolt	29	3.0	21	S
Sidestand Bracket Bolts	49	5.0	36	L
Sidestand Switch Bolt	8.8	0.90	78 in·lb	L
Sidestand Nut	44	4.5	32	R, S
Windshield Mounting Bolts	0.42	0.043	3.7 in·lb	
Electrical System				
Alternator Cover Bolts	9.8	1.0	87 in·lb	
Alternator Lead Holding Plate Bolt	9.8	1.0	87 in·lb	L
Alternator Rotor Bolt	155	15.8	114	
Crankshaft Sensor Bolts	5.9	0.60	52 in·lb	
Engine Ground Cable Terminal Bolt	9.8	1.0	87 in·lb	
Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
Front Turn Signal Light Mounting Screw	1.2	0.12	11 in·lb	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Fuel Pump Bolts	9.8	1.0	87 in·lb	L, S
Gear Position Switch Screws	2.9	0.30	26 in·lb	L
Left Switch Housing Screws	3.5	0.36	31 in·lb	
License Plate Light Cover Screws	1.0	0.10	8.9 in·lb	
License Plate Light Mounting Nuts	3.5	0.36	31 in·lb	
Meter Unit Mounting Screws	1.2	0.12	11 in·lb	
Oil Pressure Switch	15	1.5	11	SS
Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	G
Oxygen Sensor (Equipped Models)	25	2.5	18	
Regulator/Rectifier Bracket Screws	1.2	0.12	11 in·lb	
Right Switch Housing Screws	3.5	0.36	31 in·lb	
Sidestand Switch Bolt	8.8	0.90	78 in·lb	L
Spark Plugs	13	1.3	115 in·lb	
Starter Clutch Bolt Cap	2.9	0.30	26 in·lb	
Starter Clutch Cover Bolt (L = 20 mm)	9.8	1.0	87 in·lb	
Starter Clutch Cover Bolts (L = 30 mm)	9.8	1.0	87 in·lb	
Starter Motor Cable Terminal Bolt	2.9	0.30	26 in·lb	
Starter Motor Mounting Bolts	9.8	1.0	87 in·lb	
Stator Coil Bolts	12	1.2	106 in·lb	L
Water Temperature Sensor	12	1.2	106 in·lb	

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 Diameter (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 ~ 13.5
10	25 ~ 34	2.6 ~ 3.5	19 ~ 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	23.0 ~ 33.0	165 ~ 240

Specifications

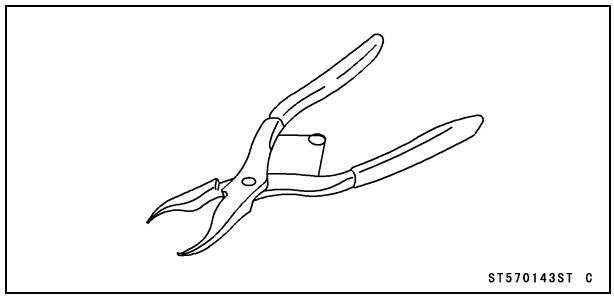
Item	Standard	Service Limit
Fuel System (DFI)		
Throttle Grip Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	– – –
Idle Speed	1 300 ±50 r/min (rpm)	– – –
Throttle Body Vacuum	33.4 ±1.33 kPa (251 ±10 mmHg) at idle speed	– – –
Bypass Screws (Turn Out)	0 ~ 2 1/2 (for reference)	– – –
Air Cleaner Element	Viscous paper element	– – –
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	2.5 L (2.6 US qt)	– – –
Engine Top End		
Valve Clearance:		
Exhaust	0.24 ~ 0.31 mm (0.0094 ~ 0.0122 in.)	– – –
Intake	0.13 ~ 0.19 mm (0.0051 ~ 0.0075 in.)	– – –
Clutch		
Clutch Lever Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	– – –
Engine Lubrication System		
Engine Oil:		
Type	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2	– – –
Viscosity	SAE 10W-40	– – –
Capacity	2.8 L (3.0 US qt) (when filter is not removed)	– – –
	3.1 L (3.3 US qt) (when filter is removed)	– – –
	3.6 L (3.8 US qt) (when engine is completely dry)	– – –
Level	Between upper and lower level lines (Wait 2 ~ 3 minutes after idling or running)	– – –
Wheels/Tires		
Tread Depth:		
Front	3.6 mm (0.14 in.)	1 mm (0.04 in.) (AT, CH, DE) 1.6 mm (0.06 in.)
Rear	5.1 mm (0.20 in.)	Up to 130 km/h (80 mph): 2 mm (0.08 in.) Over 130 km/h (80 mph): 3 mm (0.12 in.)
Air Pressure (when Cold):		
Front	Up to 180 kg (397 lb) load: 250 kPa (2.50 kgf/cm², 36 psi)	– – –
Rear	Up to 180 kg (397 lb) load: 290 kPa (2.90 kgf/cm², 42 psi)	– – –

Specifications

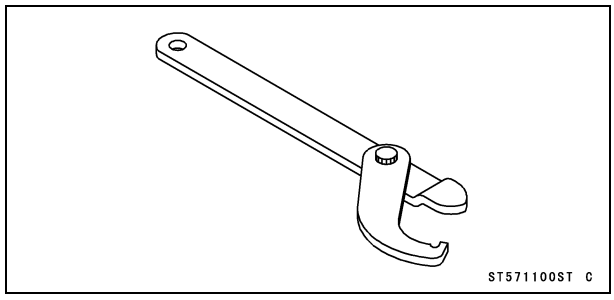
Item	Standard	Service Limit
Final Drive		
Drive Chain Slack	30 ~ 40 mm (1.2 ~ 1.6 in.)	– – –
Drive Chain Wear (20-link Length)	317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)	319 mm (12.6 in.)
Standard Chain:		
Make	ENUMA	– – –
Type	EK520RMX/3D	– – –
Link	112 links	– – –
Brakes		
Brake Fluid:		
Grade	DOT4	– – –
Brake Pad Lining Thickness:		
Front	4.0 mm (0.16 in.)	1 mm (0.04 in.)
Rear	5.0 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:		
Type	NGK CR9E	– – –
Gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)	– – –

Special Tools

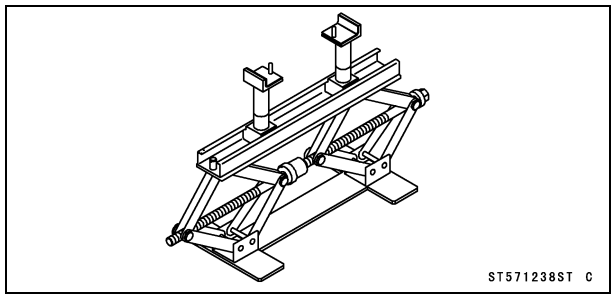
Inside Circlip Pliers:
57001-143



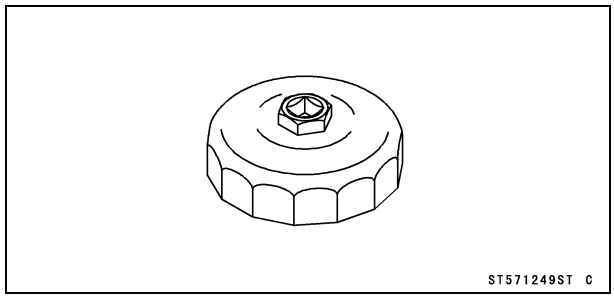
Steering Stem Nut Wrench:
57001-1100



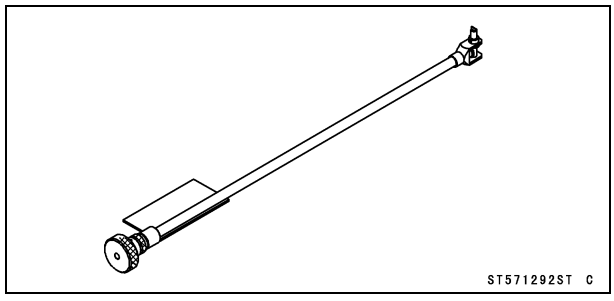
Jack:
57001-1238



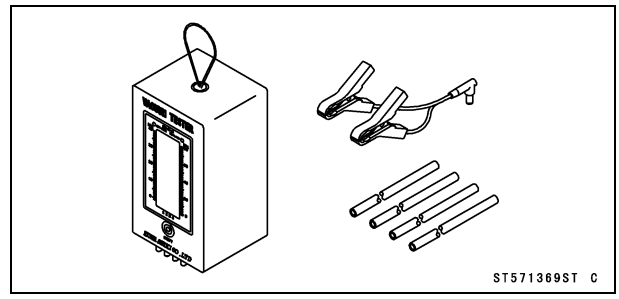
Oil Filter Wrench:
57001-1249



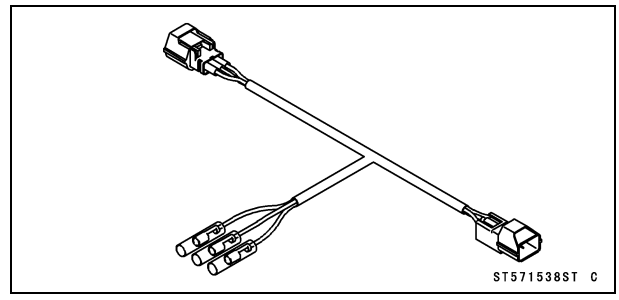
Pilot Screw Adjuster, C:
57001-1292



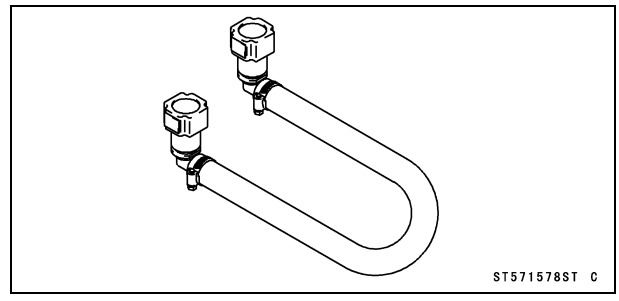
Vacuum Gauge:
57001-1369



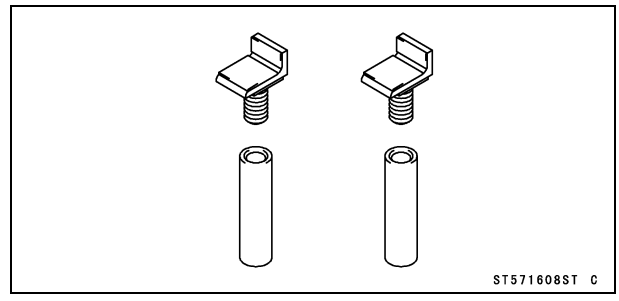
Throttle Sensor Setting Adapter:
57001-1538



Extension Tube:
57001-1578



Jack Attachment:
57001-1608



Periodic Maintenance Procedures

Fuel System (DFI)

Air Cleaner Element Replacement

NOTE

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

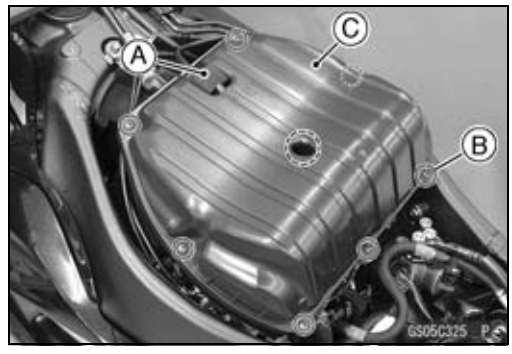
⚠ WARNING

If dirt or dust is allowed to pass through into the throttle body assy, the throttle may become stuck, possibly causing accident. Replace the air cleaner element according to the maintenance chart.

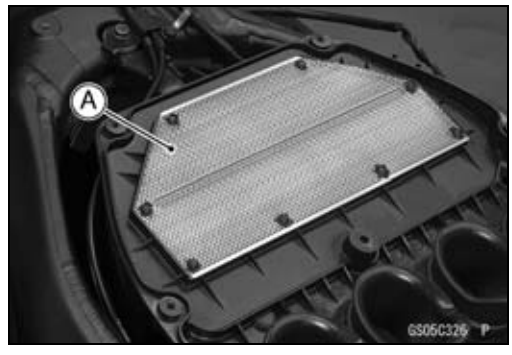
NOTICE

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

- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Disconnect the intake air temperature sensor lead connector [A].
- Remove:
  Screws [B]
  Upper Air Cleaner Housing [C]



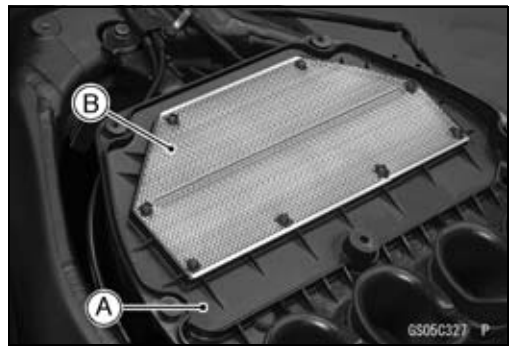
- Discard the air cleaner element [A].



- Install a new element [A] so that the screen side [B] faces upward.

NOTICE

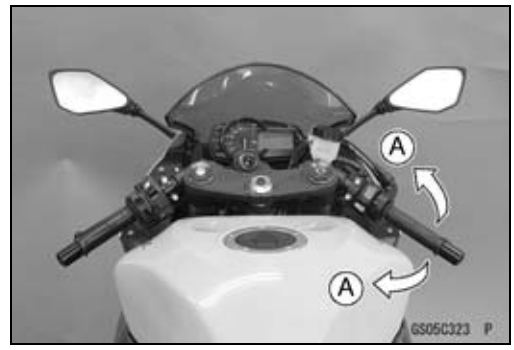
Use only the recommended air cleaner element (Kawasaki part number 11013-0036). Using another air cleaner element will wear the engine prematurely or lower the engine performance.



- Install the upper air cleaner housing (see Air Cleaner Housing Assembly in the Fuel System (DFI) chapter).

Periodic Maintenance Procedures

Idle Speed Inspection



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

★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 Throttle Control System Inspection and Cable, Wire, and Hose Routing section in the Appendix chapter).

⚠ WARNING

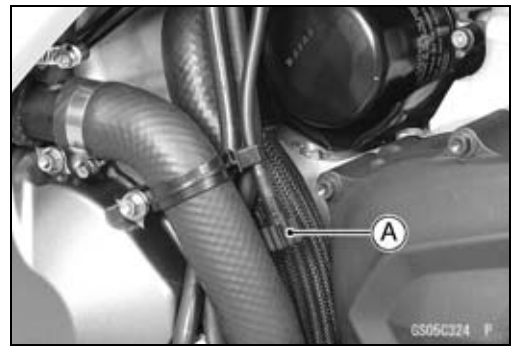
Operation with improperly adjusted, incorrectly routed or damaged cable could result in an unsafe riding condition. Follow the service manual to make sure to correct any of these conditions.

- Check the idle speed.

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

Idle Speed
Standard: 1 300 ±50 r/min (rpm)

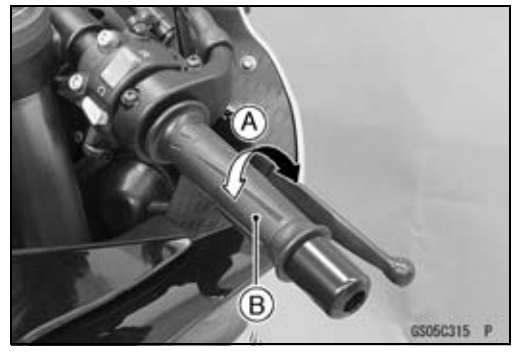
Idle Speed Adjustment



- Start the engine and warm it up thoroughly.
- Turn the adjusting screw [A] until the idle speed is correct.

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

Throttle Control System Inspection



- Check the throttle grip free play [A].

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

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

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

★If the throttle grip does not return properly, check the throttle cables routing, grip free play, and cable damage. Then lubricate the throttle cable.

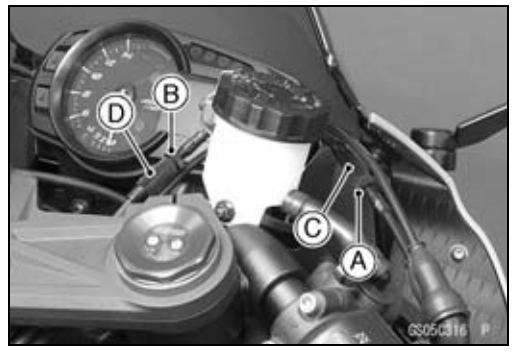
- Run the engine at the idle speed, and turn the handlebar all the way to the right and left to ensure that the idle speed does not change.

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

Periodic Maintenance Procedures

★If necessary, adjust the throttle cable as follows.
- Loosen the locknuts [A] [B].
- Screw both throttle cable adjusters [C] [D] to give the throttle grip plenty of play.
- Turn the decelerator cable adjuster [C] until it has no play when the throttle grip is completely closed.
- Tighten the locknut [A].
- Turn the accelerator cable adjuster [D] until 2 ~ 3 mm (0.08 ~ 0.12 in.) of throttle grip play is obtained.
- Tighten the locknut [B].

★If the free play can not be adjusted with the adjusters, replace the cable.



Engine Vacuum Synchronization Inspection

NOTE

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

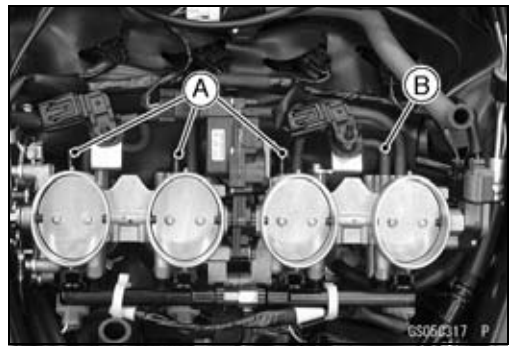
- Situate the motorcycle so that it is vertical.
- Remove:

  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)

  Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter)

  Fuel Hose (see Fuel Hose Replacement)

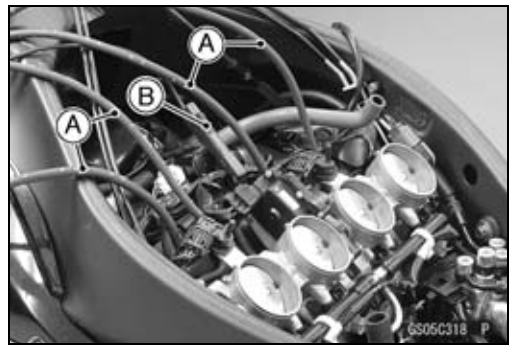
- Pull off the rubber caps [A] and vacuum hose [B] from the fittings of each throttle body.
- For the CAL Model, pull off the vacuum hoses.



- Connect a vacuum gauge and hoses [A] (Special Tool: 57001-1369) to the fittings on the throttle body.

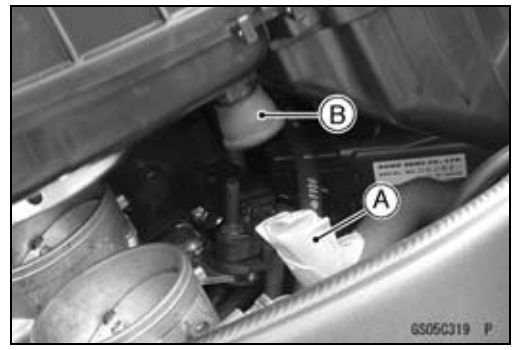
  Special Tool - Vacuum Gauge: 57001-1369

- Connect a highly accurate tachometer lead [B] to one of the stick coil primary leads.



Periodic Maintenance Procedures

- Plug the air switching valve hose end [A] and air cleaner housing fitting [B].



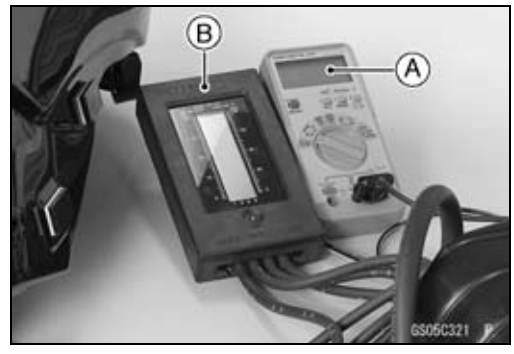
- Install the air cleaner housing (see Air Cleaner Housing Installation in the Fuel System (DFI) chapter).
- Connect the following parts temporarily.
  Fuel Pump Lead Connector [A]
  Extension Tube [B]

Special Tool - Extension Tube: 57001-1578

- Start the engine and warm it up thoroughly.
- Check the idle speed, using a highly accurate tachometer [A].

Idle Speed
Standard: 1 300 ±50 r/min (rpm)

★If the idle speed is out of the specified range, adjust it with the adjusting screw (see Idle Speed Adjustment).



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

- While idling the engine, inspect the throttle body vacuum, using the vacuum gauge [B].

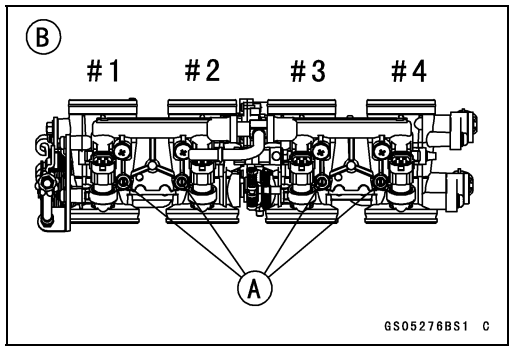
Throttle Body Vacuum
Standard: 33.4 ±1.33 kPa (251 ±10 mmHg) at idle speed

Periodic Maintenance Procedures

★If any vacuum is not within specifications, adjust the bypass screws [A].
View from Rear [B]

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

- Adjust the each vacuum (#1 ~ #4) to the standard value.
- Open and close the throttle valves after each measurement.



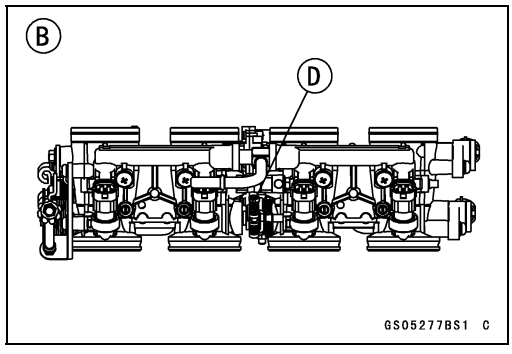
NOTE

○*Do not turn the center adjusting screw [D].*

- Check the vacuums as before.

★If all vacuums are within the specification range, finish the engine vacuum synchronization.

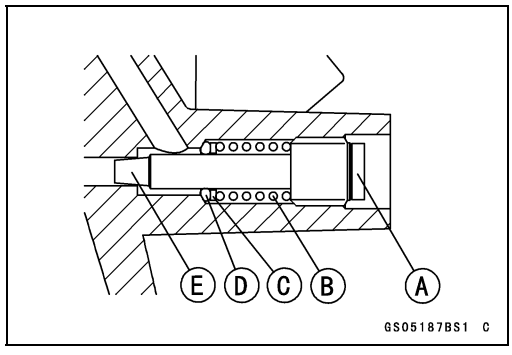
★If any vacuum can not be adjusted within the specification, replace the bypass screws #1 ~ #4 with new ones, refer to the following procedure.



- Remove the throttle body assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter).
- Turn in the bypass screw [A] with counting the number of turns until it seats fully but not tightly. Record the number of turns.
- Remove:
  Bypass Screw
  Spring [B]
  Washer [C]
  O-ring [D]
- Check the bypass screw hole in the throttle body for carbon deposits.

★If any carbons accumulate, wipe the carbons off from the hole, using a cotton pad penetrated with a high flash-point solvent.

- Replace the bypass screw, spring, washer and O-ring as a set.
- Turn in the bypass screw until it seats fully but not tightly.



NOTICE
Do not over-tighten the bypass screw. The tapered portion [E] of the bypass screw could be damaged.

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. On setting the bypass screw, use the "turns out" determined during disassembly.*

● 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 Main Throttle Sensor Output Voltage Inspection in the Self-Diagnosis System chapter).

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538

Main Throttle Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → R (sensor Y/W) lead
Digital Meter (–) → BK (sensor G) lead

Standard: DC 1.02 ~ 1.06 V at idle throttle opening

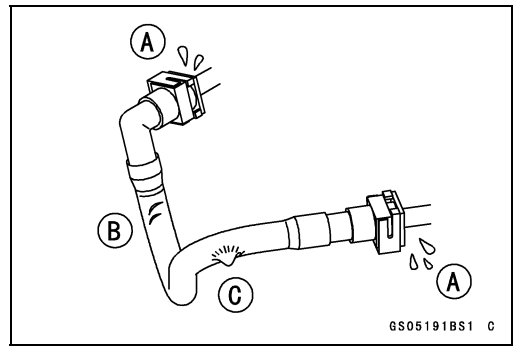
★If the output voltage is out of the standard, check the input voltage of the main throttle sensor (see Main Throttle Sensor Input Voltage Inspection in the Self-Diagnosis System chapter).

● Remove the vacuum gauge hoses and install the rubber caps and vacuum hose on the original position.
● For CAL Model, install the vacuum hoses.
○Run the vacuum hose according to Cable, Wire, and Hose Routing section in the Appendix chapter.
● Install the removed parts (see appropriate chapters).

Fuel System

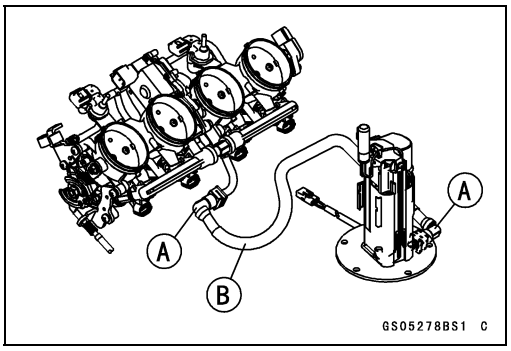
Fuel Hose Inspection (fuel leak, damage, installation condition)

○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 Tank Removal in the Fuel System (DFI) chapter) and check the fuel hoses.
★Replace the fuel hose if any fraying, cracks [B] or bulges [C] are noticed.



Periodic Maintenance Procedures

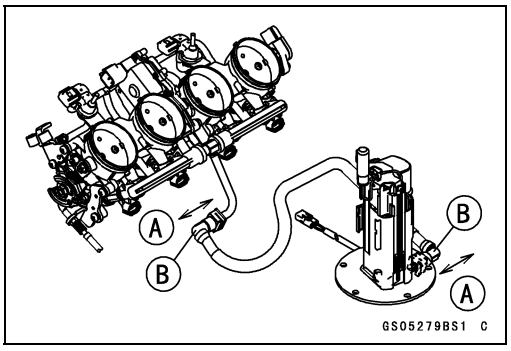
● Check that the fuel hose is routed according to Cable, Wire, and Hose Routing section in the Appendix chapter.
★Replace the hose if it has been sharply bent or kinked.
Hose Joints [A]
Fuel Hose [B]



● Check that the fuel hose joints are securely connected.
○Push and pull [A] the fuel hose joint [B] back and forth more than two times, and make sure it is locked.

⚠ WARNING

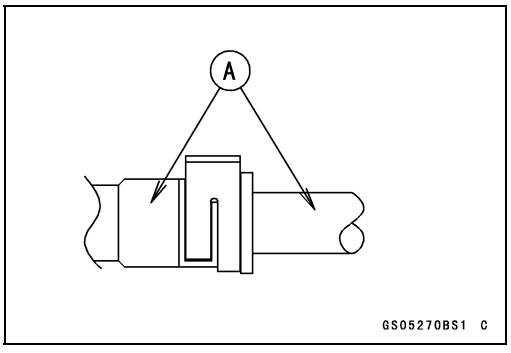
Leaking fuel can cause a fire or explosion resulting in serious burns. Make sure the hose joint is installed correctly on the delivery pipe by sliding the joint.



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

Fuel Hose Replacement

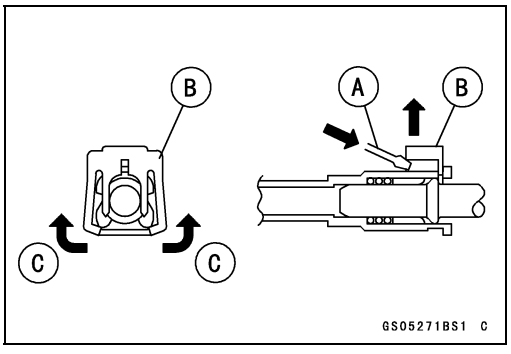
● Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
● Be sure to place a piece of cloth around the fuel hose joint.
● Wipe off the dirt of the surface [A] around the connection using a cloth or a soft brush.



When removing with standard tip screwdriver
● Insert the standard tip screwdriver [A] into slit on the joint lock [B].
● Turn the driver to disconnect the joint lock.
When removing with fingers
● Open and push up [C] the joint lock with your fingers.

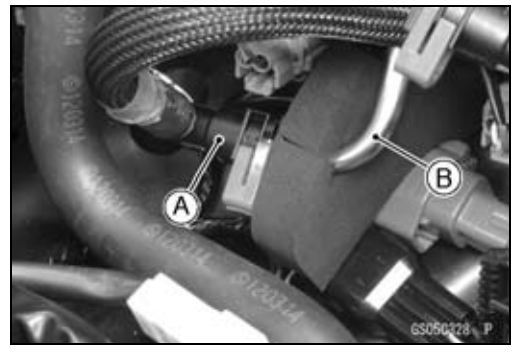
NOTICE

Prying or excessively widening the joint lock ends for fuel hose removal will permanently deform the joint lock, resulting in a loose or incomplete lock that may allow fuel to leak and create the potential for a fire explosion. To prevent fire or explosion from a damaged joint lock, do not pry or excessively widen the joint lock ends when removing the fuel hose. The joint lock has a retaining edge that locks around the housing.



Periodic Maintenance Procedures

● Pull the fuel hose joint [A] out of the delivery pipe [B].

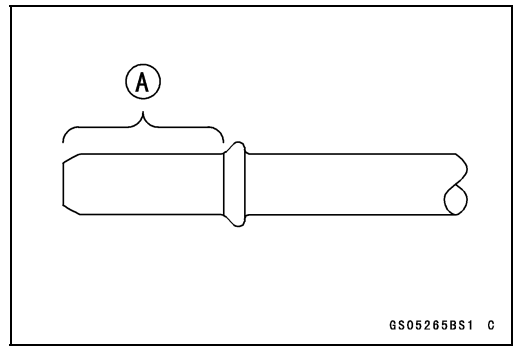


⚠ WARNING

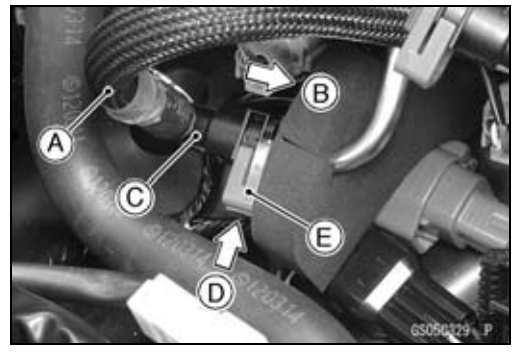
Fuel is flammable and explosive under certain conditions and can cause severe burns. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately. When the fuel hose is disconnected, fuel spills out from the hose and the pipe. Cover the hose connection with a clean shop towel to prevent fuel spillage.

● Clean the delivery pipe.
● Cover the delivery pipe with the vinyl bag to keep it clean.

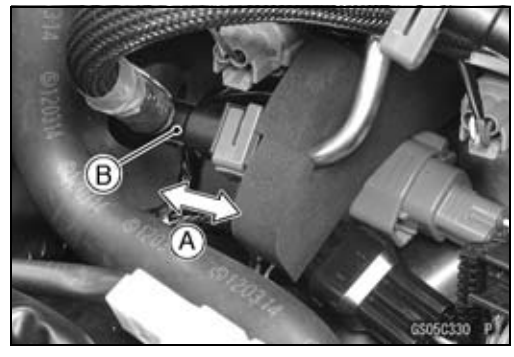
● Remove the vinyl bag on the pipe.
● Check that there are no flaws, burrs, and adhesion of foreign materials on the delivery pipe [A].



● Replace the fuel hose [A] with a new one.
● Run the fuel hose correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
● Insert [B] the fuel hose joint [C] straight onto the delivery pipe until the hose joint clicks.
● Push [D] the joint lock [E].



● Push and pull [A] the fuel hose joint [B] back and forth more than two times and make sure it is locked and does not come off.



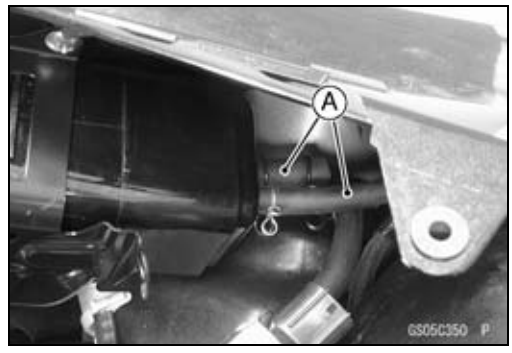
⚠ WARNING

Leaking fuel can cause a fire or explosion resulting in severe burns. Make sure the fuel hose joint is installed correctly on the delivery pipe and that it doesn't leak.

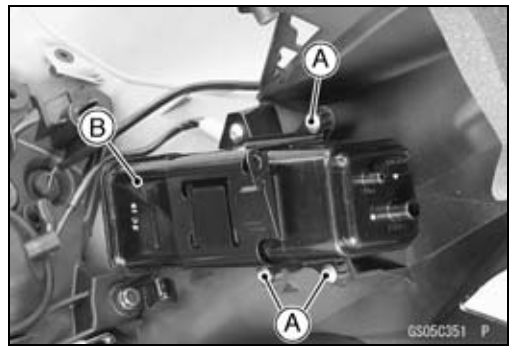
★If it comes off, reinstall the hose joint.
● Install the fuel tank (see Fuel Tank Installation in the Fuel System (DFI) chapter).
● Start the engine and check the fuel hose for leaks.

Periodic Maintenance Procedures

Evaporative Emission Control System Inspection (CAL Model)



● Inspect the canister as follows.
○Remove the purge valve from the canister bracket (see Purge Valve Removal/Installation in the Self-Diagnosis System chapter).
○Disconnect the hoses [A].



○Remove:
Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
Screws [A]
○Visually inspect the canister [B] for cracks or other damage.
★If the canister has any cracks or bad damage, replace it with a new one.

NOTE

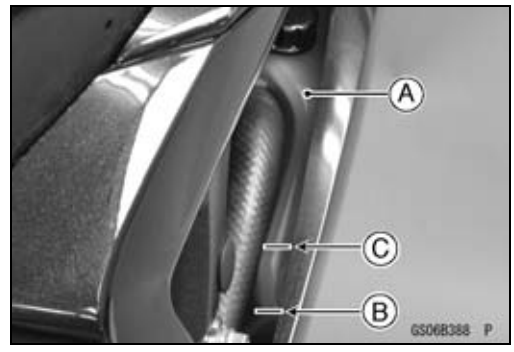
○*The canister is designed to work well through the motorcycle's life without any maintenance if it is used under normal conditions.*

● Inspect the purge valve (see Purge Valve Inspection in the Self-Diagnosis System chapter).
○Check that the hoses are securely connected and clips are in position.
○Replace any kinked, deteriorated or damaged hoses.
○Run the hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.
○When installing the hoses, avoid sharp bending, kinking, flattening or twisting, and run the hoses with a minimum of bending so that the emission flow will not be obstructed.

Periodic Maintenance Procedures

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], remove the upper fairing assembly (see Upper Fairing Assembly Removal in the Frame chapter), and then unscrew the reserve tank cap and add coolant to the "F" level line [C].

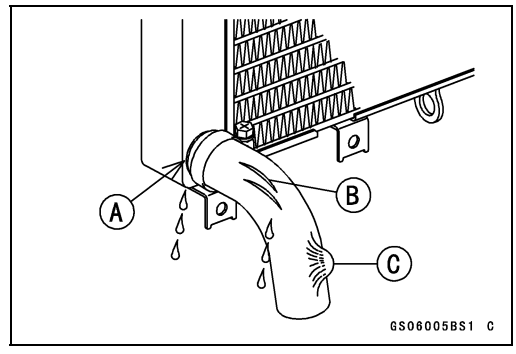
"L": Low
"F": Full

NOTICE

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.

Cooling System

Water Hose and Pipe Inspection (coolant leak, damage, installation condition)



○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 - Water Hose Clamp Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)

Coolant Change

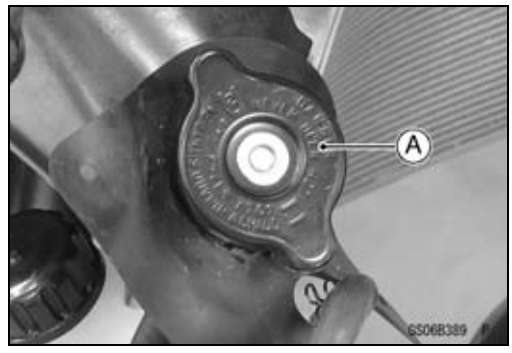
⚠ WARNING

Coolant can be extremely hot and cause severe burns, is toxic and very slippery. Do not remove the radiator cap or attempt to change the coolant when the engine is hot; allow it cool completely. Immediately wipe any spilled coolant from tires, frame, engine or other painted parts. Do not ingest coolant.

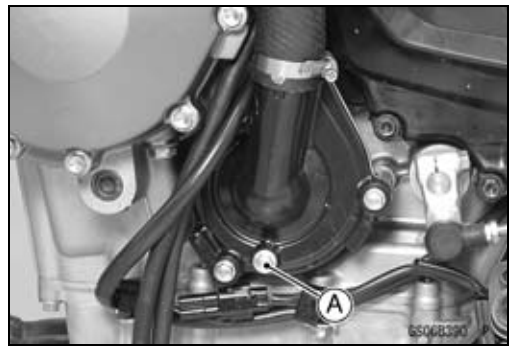
Periodic Maintenance Procedures

● Remove:
Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
Radiator Cap [A]

○Remove the radiator cap 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.

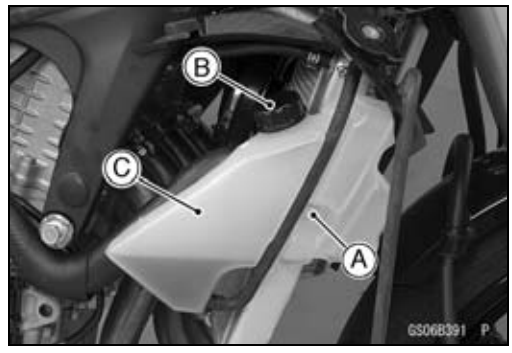


● Place a container under the drain bolt [A] of the water pump cover.
● Drain the coolant from the radiator by removing the drain bolt.



● Remove:
Bolt [A]
Cap [B]
● Pour the coolant into a container.
● Install the coolant reserve tank [C] and tighten the bolt.
● Tighten the drain bolt with new gasket.

Torque - Coolant Drain Bolt (Water Pump): 8.8 N·m (0.90 kgf·m, 78 in·lb)

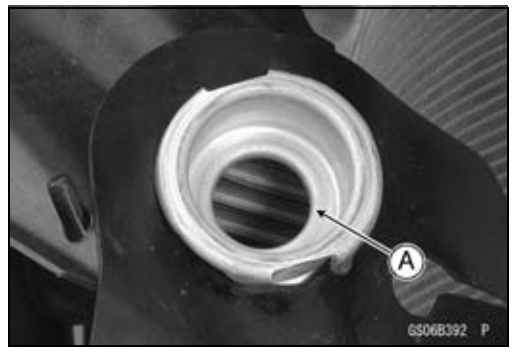


● Fill the radiator up to the radiator filler neck [A] with coolant, and install the radiator cap.

NOTE

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

● Fill the reserve tank up to the "F" level line with coolant, and install the cap (see Coolant Level Inspection).



NOTICE

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

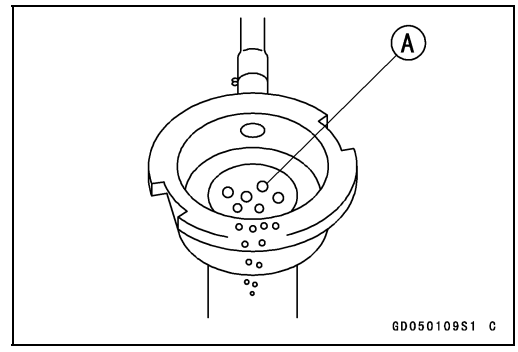
Periodic Maintenance Procedures

Water and Coolant Mixture Ratio (Recommended)

Soft Water:	**50%**
Coolant:	**50%**
Freezing Point:	**–35°C (–31°F)**
Total Amount:	**2.5 L (2.6 US qt)**

NOTE

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



● Bleed the air from the cooling system as follows.
○Start the engine with the radiator cap removed and run it until no more air bubbles [A] can be seen in the coolant.
○Tap the radiator hoses to force any air bubbles caught inside.
○Stop the engine and add coolant up to the radiator filler neck.
● Install the radiator cap.
● Start the engine, warm it up thoroughly until the radiator fan turns on and then stop the engine.
● Check the coolant level in the reserve tank after the engine cools down.
★If the coolant level is lower than the "L" level line, add coolant to the "F" level line (see Coolant Level Inspection).

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

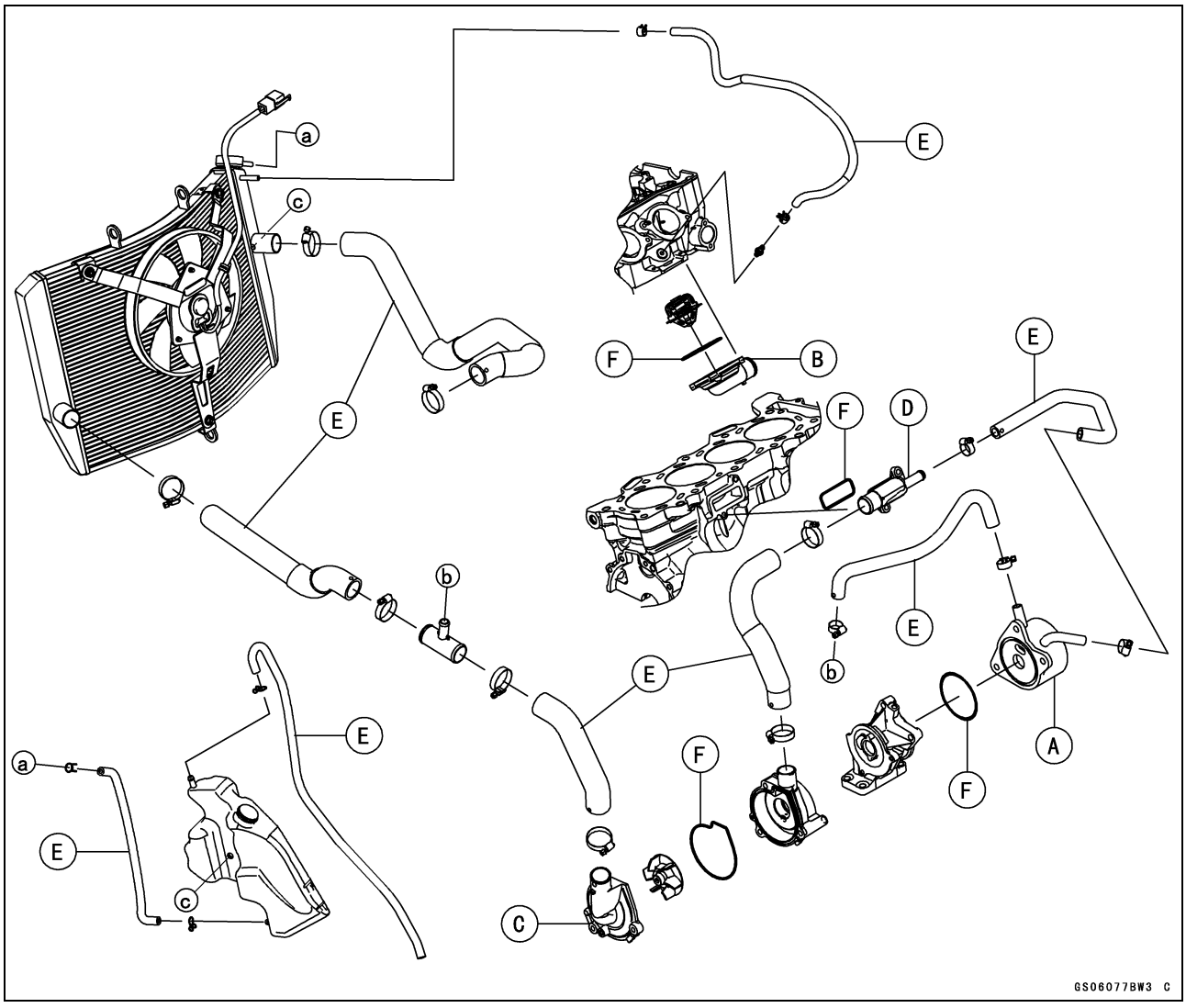
Periodic Maintenance Procedures

Water Hose and O-ring Replacement

- Drain the coolant (see Coolant Change).
- Remove:
  Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
  Oil Cooler [A] (see Oil Cooler Removal in the Engine Lubrication System chapter)
  Thermostat Housing Cover [B] (see Thermostat Housing Removal in the Cooling System chapter)
  Water Pump Cover [C] (see Water Pump Removal in the Cooling System chapter)
  Fitting [D]
- Replace the hoses [E] and O-rings [F] with new ones.
- Apply grease to the new O-rings.
- Run the new hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.
- Tighten:

Torque - Water Hose Clamp Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)

- Install the removed parts (see appropriate chapters).
- Fill the coolant (see Coolant Change).
- Check the cooling system for leaks.



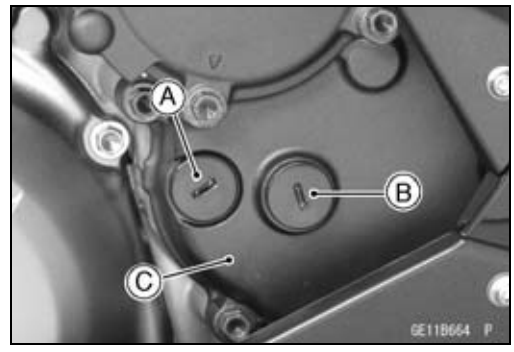
Periodic Maintenance Procedures

Engine Top End

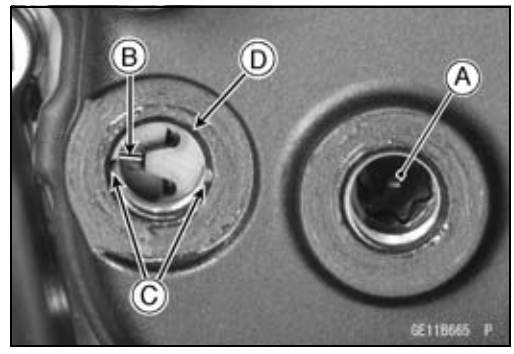
Valve Clearance Inspection

NOTE

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



- Remove the cylinder head cover (see Cylinder Head Cover Removal in the Engine Top End chapter).
- Remove the timing inspection cap [A] and starter clutch bolt cap [B] on the starter clutch cover [C].



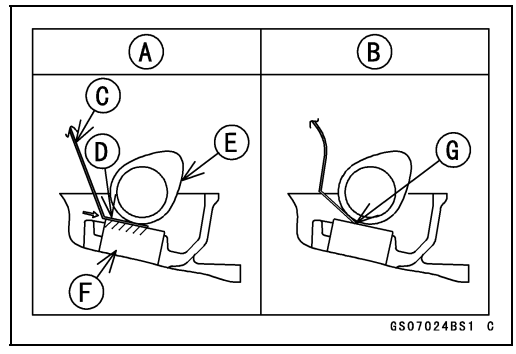
- Using a wrench on the starter clutch bolt [A], turn the crankshaft clockwise until the line [B] (TDC mark for #1,4 pistons) on the starter clutch is aligned with the notches [C] in the edge of the timing inspection hole [D] in the starter clutch cover.

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

Valve Clearance
Standard:
Exhaust 0.24 ~ 0.31 mm (0.0094 ~ 0.0122 in.)
Intake 0.13 ~ 0.19 mm (0.0051 ~ 0.0075 in.)

NOTE

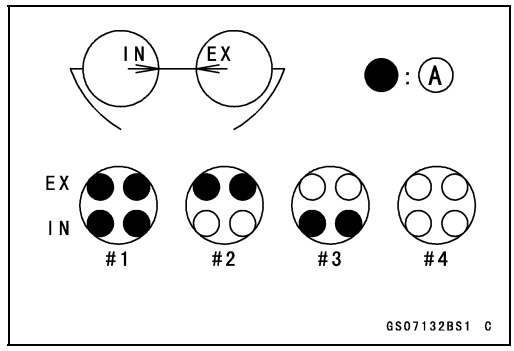
○*Thickness gauge is horizontally inserted on the valve lifter.*



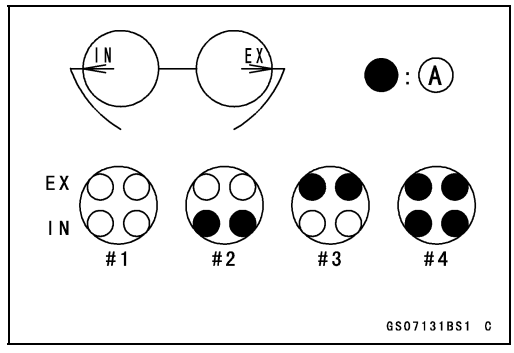
Appropriateness [A]
Inadequacy [B]
Thickness Gauge [C]
Horizontally Inserts [D]
Cam [E]
Valve Lifter [F]
Hits the Valve Lifter Ahead [G]

Periodic Maintenance Procedures

○**When positioning #1 piston TDC at the end of the compression stroke:**
Intake Valve Clearance of #1 and #3 Cylinders
Exhaust Valve Clearance of #1 and #2 Cylinders
Measuring Valve [A]



○**When positioning #4 piston TDC at the end of the compression stroke:**
Intake Valve Clearance of #2 and #4 Cylinders
Exhaust Valve Clearance of #3 and #4 Cylinders
Measuring Valve [A]



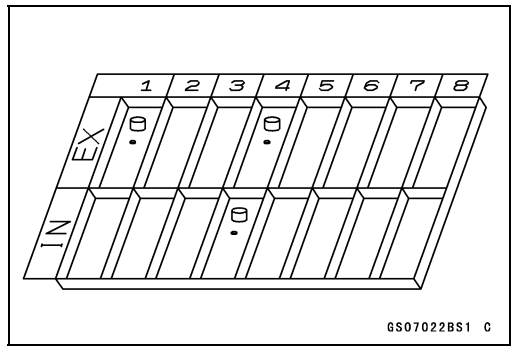
★If the valve clearance is not within the specified range, first record the clearance, and then adjust it.

Valve Clearance Adjustment

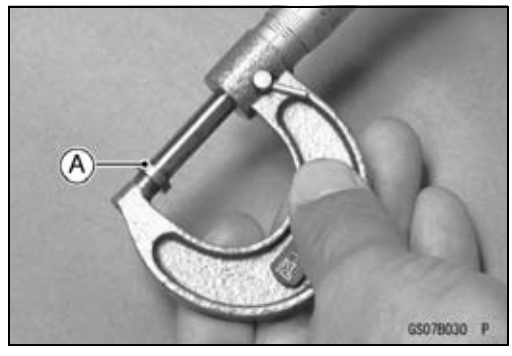
- To change the valve clearance, remove the camshafts (see Camshaft Removal in the Engine Top End chapter) and valve lifters.
- Replace the shim with one of a different thickness.

NOTE

○*Mark and record the locations of the valve lifters and shims so that they can be reinstalled in their original positions.*



- Clean the shim to remove any dust or oil.
- Measure the thickness of the removed shim [A].
- Select a new shim thickness calculation as follows.



a + b – c = d

[a] Present Shim Thickness

[b] Measured Valve Clearance

[c] Specified Valve Clearance [Mean Value = 0.275 mm (Exhaust), 0.160 mm (Intake)]

[d] Replace Shim Thickness

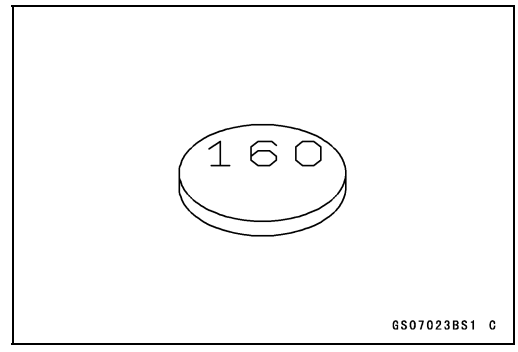
Example (Exhaust):
1.600 + 0.33 – 0.275 = 1.655 mm

○Exchange the shim for the 1.675 size shim.

Periodic Maintenance Procedures

Adjustment Shims

Thickness	Part Number	Mark
1.300	92180-0108	130
1.325	92180-0109	132
1.350	92180-0110	135
1.375	92180-0111	138
1.400	92180-0112	140
1.425	92180-0113	142
1.450	92180-0114	145
1.475	92180-0115	148
1.500	92180-0116	150
1.525	92180-0117	152
1.550	92180-0118	155
1.575	92180-0119	158
1.600	92180-0120	160
1.625	92180-0121	162
1.650	92180-0122	165
1.675	92180-0123	168
1.700	92180-0124	170
1.725	92180-0125	172
1.750	92180-0126	175
1.775	92180-0127	178
1.800	92180-0128	180
1.825	92180-0129	182
1.850	92180-0130	185
1.875	92180-0131	188
1.900	92180-0132	190
1.925	92180-0133	192
1.950	92180-0134	195
1.975	92180-0135	198
2.000	92180-0136	200
2.025	92180-0137	202
2.050	92180-0138	205
2.075	92180-0139	208
2.100	92180-0140	210
2.125	92180-0141	212
2.150	92180-0142	215
2.175	92180-0143	218
2.200	92180-0144	220
2.225	92180-0145	222
2.250	92180-0146	225
2.275	92180-0147	228
2.300	92180-0148	230



Periodic Maintenance Procedures

NOTICE
Be sure to remeasure the clearance after selecting a shim. The clearance can be out of the specified range because of the shim tolerance.

○If there is no valve clearance, use a shim that is a few sizes smaller, and remeasure the valve clearance.

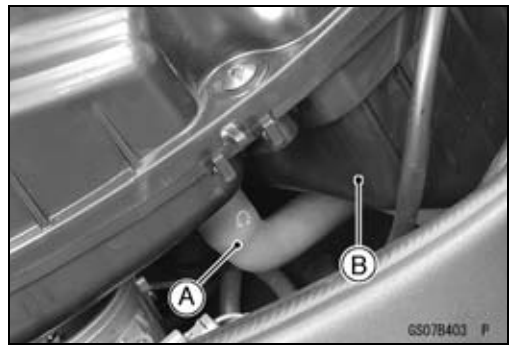
- When installing the shim, face the marked side toward the valve lifter. At this time, apply engine oil to the shim or the valve lifter to keep the shim in place during camshaft installation.

NOTICE
Do not put shim stock under the shim. This may cause the shim to pop out at high rpm, causing extensive engine damage. **Do not grind the shim. This may cause it to fracture, causing extensive engine damage.**

- Apply molybdenum disulfide oil solution to the valve lifter surface and install the lifter.
- Install the camshafts (see Camshaft Installation in the Engine Top End chapter).
- Recheck the valve clearance and readjust if necessary.
- Install the removed parts (see appropriate chapters).

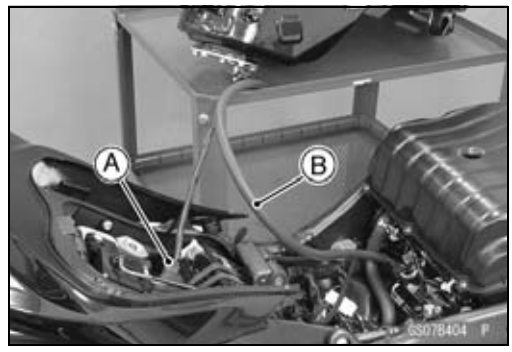
Air Suction System Damage Inspection

- Disconnect the air switching valve hose [A] from the lower air cleaner housing [B] (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter).



- Connect the following parts temporarily.
  Fuel Pump Lead Connector [A]
  Extension Tube [B]
  Air Cleaner Housing (see Air Cleaner Housing Installation in the Fuel System (DFI) chapter)

  Special Tool - Extension Tube: 57001-1578



Periodic Maintenance Procedures

- Start the engine and run it at idle speed.
- Plug the air switching valve hose end [A] with your finger and feel vacuum pulsing in the hose.

★If there is no vacuum pulsation, check the hose line for leak. If there is no leak, check the air switching valve (see Air Switching Valve Unit Test in the Electrical System chapter) or air suction valve (see Air Suction Valve Inspection in the Engine Top End chapter).

Clutch

Clutch Operation Inspection

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

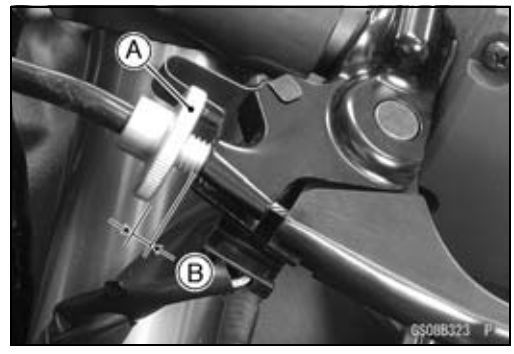
★If the gap is too wide, the clutch may not release fully. If the gap is too narrow, the clutch may not engage fully. In either case, adjust it.

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

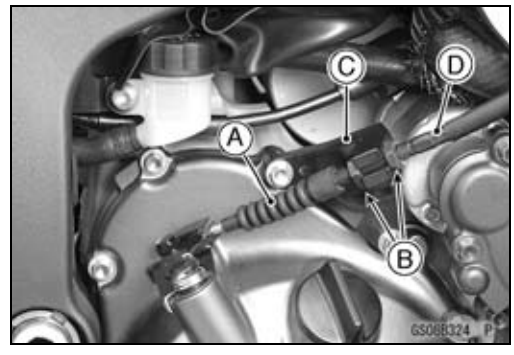
⚠ WARNING

The engine and exhaust system get extremely hot during normal operation and can cause serious burns. Never touch the engine or exhaust pipe during clutch adjustment.

- Turn the adjuster [A] so that 4 ~ 6 mm (0.16 ~ 0.24 in.) [B] of threads is visible.



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

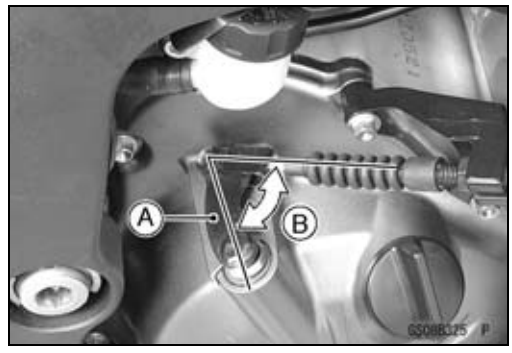


Periodic Maintenance Procedures

- 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

Too much cable play can prevent clutch disengagement and cause an accident resulting in serious injury or death. When adjusting the clutch or replacing the cable, be sure the upper end of the clutch outer cable is fully seated in its fitting, 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

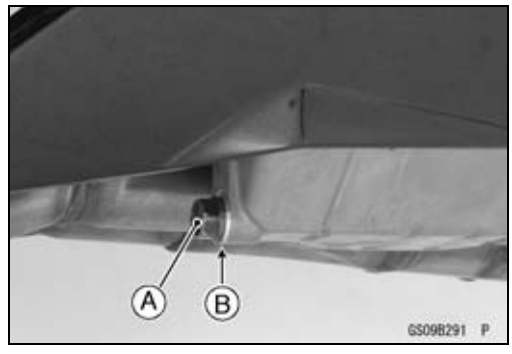
Engine Oil Change

- 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 Replacement).

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

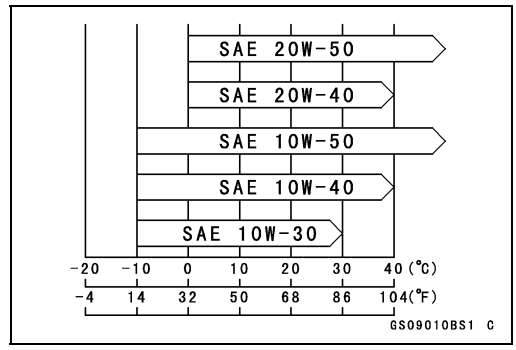
Torque - Engine Oil Drain Bolt: 29 N·m (3.0 kgf·m, 21 ft·lb)



- Remove the oil filler plug [A].

Periodic Maintenance Procedures

● Pour in the specified type and amount of oil.



Recommended Engine Oil

Type: **API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2**

Viscosity: **SAE 10W-40**

Capacity: **2.8 L (3.0 US qt) (when filter is not removed)**

3.1 L (3.3 US qt) (when filter is removed)

3.6 L (3.8 US qt) (when engine is completely dry)

NOTE

○*Do not add any chemical additive to the oil. Oils fulfilling the above requirements are fully formulated and provide adequate lubrication for both the engine and the clutch.*

○*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.*

● Replace the O-ring of the oil filler plug with a new one.
● Apply engine oil to the new O-ring.
● Install the oil filler plug.

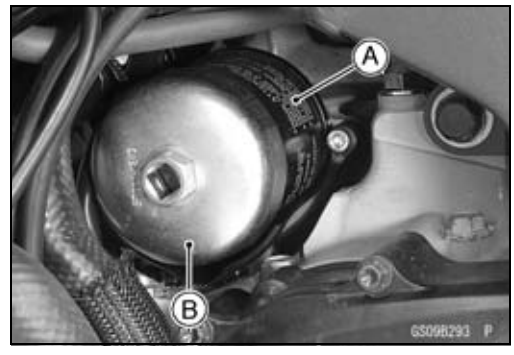
Torque - Oil Filler Plug: Hand-tighten

● Check the oil level (see Oil Level Inspection in the Engine Lubrication System chapter).

Oil Filter Replacement

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

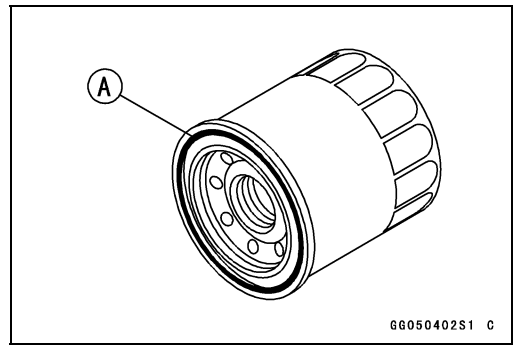
Special Tool - Oil Filter Wrench: 57001-1249



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

Special Tool - Oil Filter Wrench: 57001-1249

Torque - Oil Filter: 17 N·m (1.7 kgf·m, 13 ft·lb)



NOTE

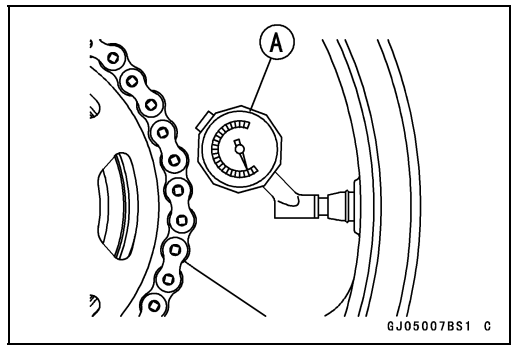
○*Hand tightening of the oil filter can not be allowed since it does not reach to this tightening torque.*

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

Periodic Maintenance Procedures

Wheels/Tires

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).
- Install the air valve cap.

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

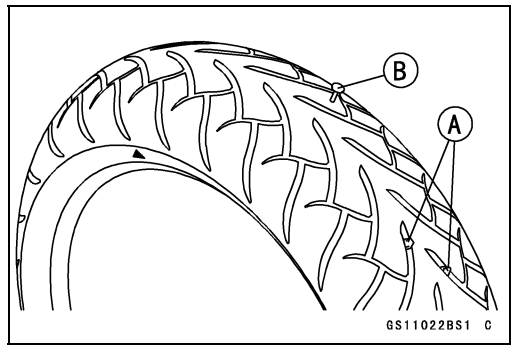
Air Pressure (when Cold)

Front: Up to 180 kg (397 lb) load:
250 kPa (2.50 kgf/cm², 36 psi)

Rear: Up to 180 kg (397 lb) load:
290 kPa (2.90 kgf/cm², 42 psi)

Wheels and Tires

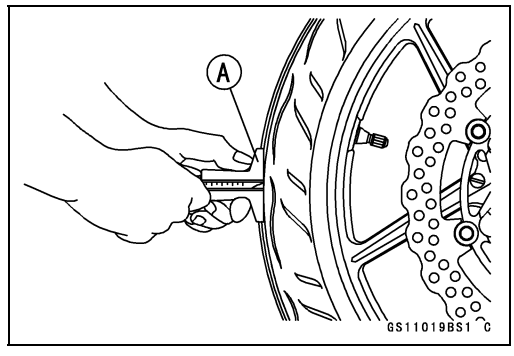
Wheel/Tire Damage Inspection



- Remove any imbedded stones [A] or other foreign particles [B] from tread.
- Visually inspect the tire for cracks and cuts, and replace the tire if necessary. Swelling or high spots indicate internal damage, requiring tire replacement.
- Visually inspect the wheel for cracks, cuts and dents damage.

★If any damage is found, replace the wheel if necessary.

Tire Tread 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.

- 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 (see Tire Removal/Installation in the Wheels/Tires chapter).

Tread Depth

Standard:	
Front	**3.6 mm (0.14 in.)**
Rear	**5.1 mm (0.20 in.)**
Service Limit:	
Front	**1 mm (0.04 in.)**
	(AT, CH, DE) 1.6 mm (0.06 in.)
Rear	**2 mm (0.08 in.) (Up to 130 km/h (80 mph))**
	3 mm (0.12 in.) (Over 130 km/h (80 mph))

Periodic Maintenance Procedures

⚠ WARNING

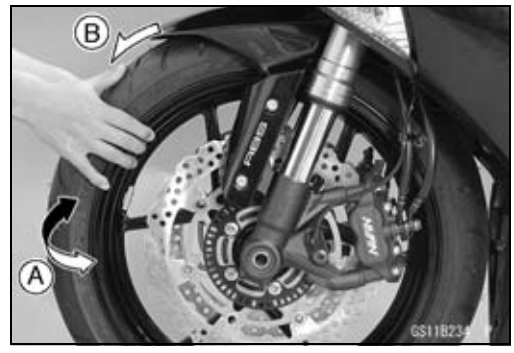
Some replacement tires may adversely affect handling and cause an accident resulting in serious injury or death. To ensure proper handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.

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.*

Wheel Bearing Damage Inspection

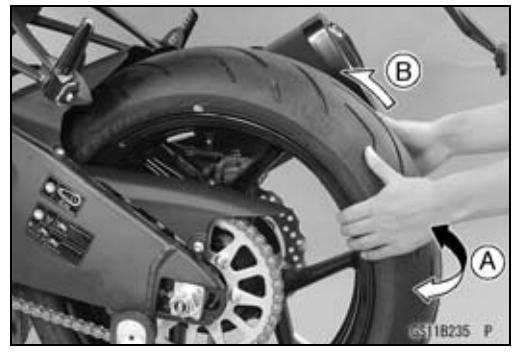


- Raise the front wheel off the ground with the jack (see Front Wheel Removal in the Wheels/Tires chapter).

Special Tools - Jack: 57001-1238
Jack Attachment: 57001-1608

- Turn the handlebar all the way to the right or left.
- Inspect the roughness of the front wheel bearing by pushing and pulling [A] the wheel.
- Spin [B] the front wheel lightly, and check for smoothly turn, roughness, binding or noise.

★If roughness, binding or noise is found, remove the front wheel and inspect the wheel bearing (see Front Wheel Removal, Hub Bearing Inspection in the Wheels/Tires chapter).



- Raise the rear wheel off the ground with the stand (see Rear Wheel Removal in the Wheels/Tires chapter).
- Inspect the roughness of the rear wheel bearing by pushing and pulling [A] the wheel.
- Spin [B] the rear wheel lightly, and check for smoothly turn, roughness, binding or noise.

★If roughness, binding or noise is found, remove the rear wheel and inspect the wheel bearing (see Rear Wheel Removal, Hub Bearing Inspection in the Wheels/Tires chapter) and coupling (see Coupling Bearing Inspection in the Final Drive chapter).

Periodic Maintenance Procedures

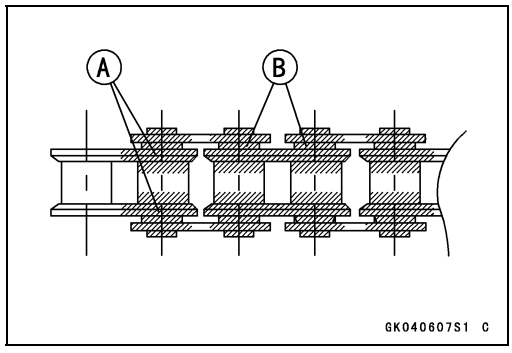
Final Drive

Drive Chain Lubrication Condition Inspection

- 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.

NOTICE
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 of the O-ring of the drive chain. Any other cleaning solution such as gasoline 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]



Drive Chain Slack Inspection

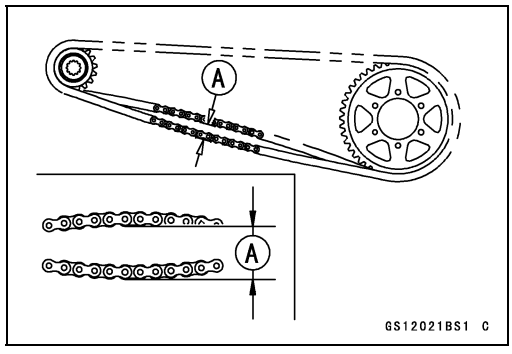
NOTE

○*Check the slack with the motorcycle setting on its sidestand.*
○*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.

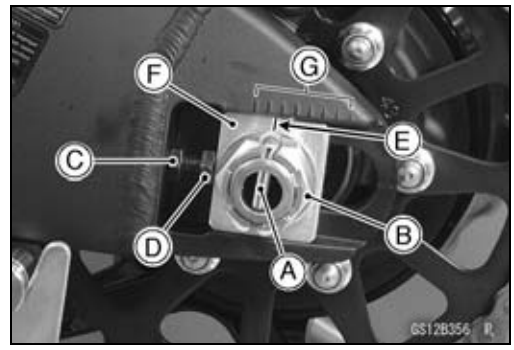
★If the chain slack exceeds the standard, adjust it.

Chain Slack
Standard: 30 ~ 40 mm (1.2 ~ 1.6 in.)



Periodic Maintenance Procedures

Drive Chain Slack Adjustment



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

★If the chain is too loose, turn out the left and right chain adjusters [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.

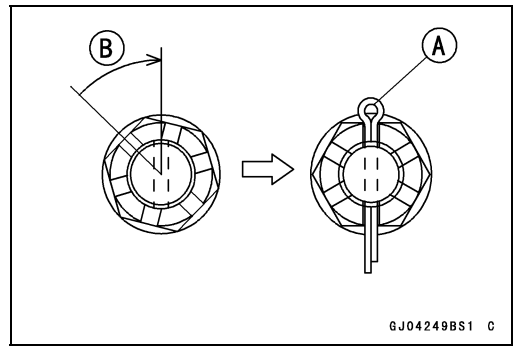
⚠ WARNING

Misalignment of the wheel will result in abnormal wear and may result in an unsafe riding condition. Be sure the wheel is properly aligned.

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

Torque - Rear Axle Nut: 127 N·m (13.0 kgf·m, 93.7 ft·lb)

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



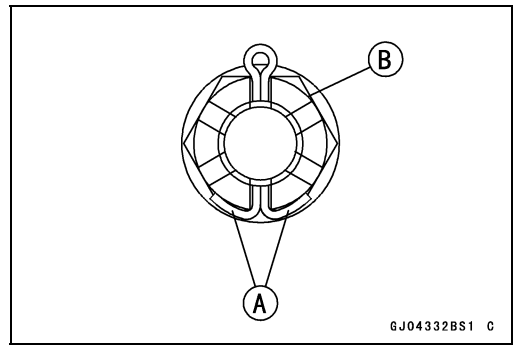
- Insert a new cotter pin [A].

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 degrees.*

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



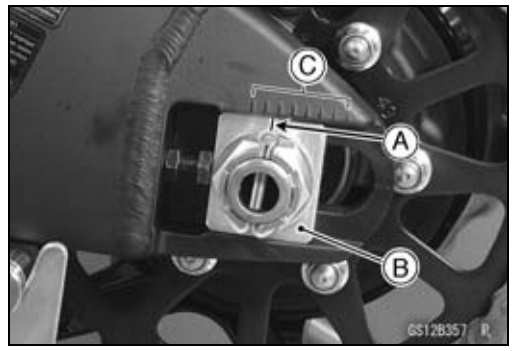
- Bend the cotter pin [A] over the nut [B].

⚠ WARNING

A loose axle nut can lead to an accident resulting in serious injury or death. Tighten the axle nut to the proper torque and install a new cotter pin.

Periodic Maintenance Procedures

Wheel Alignment Inspection



- Check that the notch [A] on the left alignment indicator [B] aligns with the same swingarm mark or position [C] that the right alignment indicator notch aligns with.

★If they do not, adjust the chain slack and align the wheel alignment (see Drive Chain Slack Adjustment).

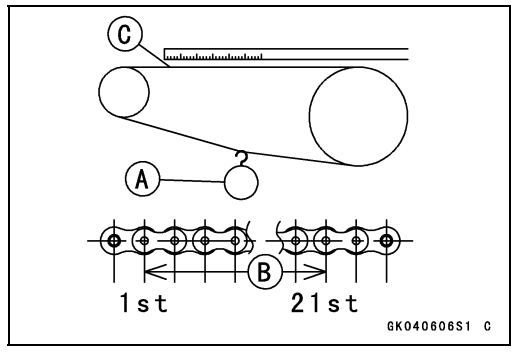
NOTE

○*Wheel alignment can be also checked using the straightedge or string method.*

⚠ WARNING

Misalignment of the wheel will result in abnormal wear and may result in an unsafe riding condition. Be sure the wheel is properly aligned.

Drive Chain Wear Inspection



- Remove the chain cover (see Drive Chain Removal in the Final Drive 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 10 kg (22 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: 319 mm (12.6 in.)

⚠ WARNING

A chain that breaks or jumps off the sprockets could snag on the engine sprocket or lock the rear wheel, severely damaging the motorcycle and causing it to go out of control. Inspect the chain for damage and proper adjustment before each ride. If chain wear exceeds the service limit, replace it with the standard chain. It is an endless type and should not be cut for installation.

Standard Chain

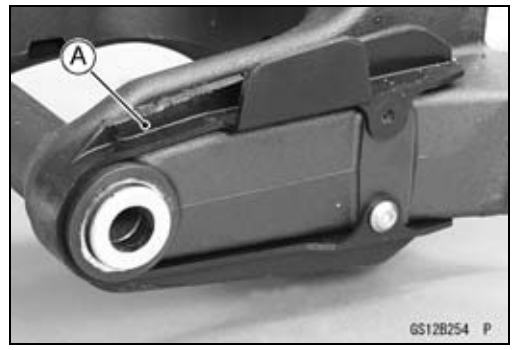
Make: ENUMA

Type: EK520RMX/3D

Link: 112 links

Periodic Maintenance Procedures

Chain Guide Wear Inspection



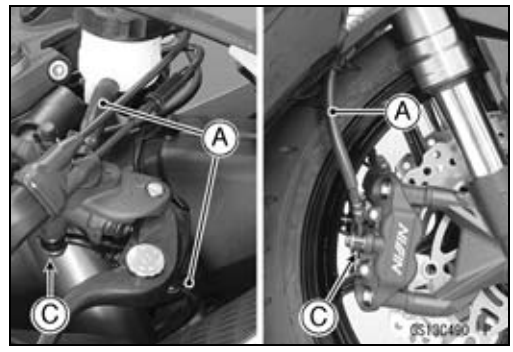
- Remove the swingarm (see Swingarm Removal in the Suspension chapter).
- Visually inspect the chain guide [A].

★Replace the chain guide if it shows any signs of abnormal wear or damage.

Brakes

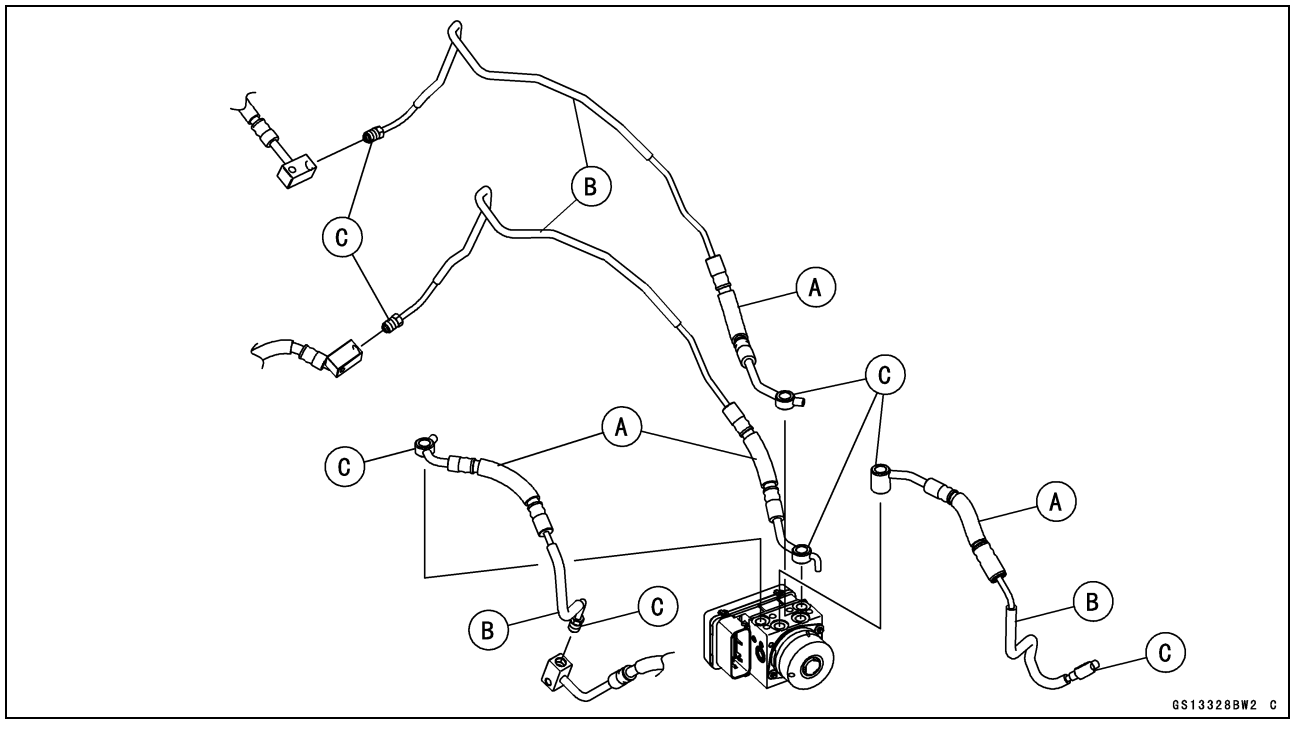
Brake System

Brake Fluid Leak (Brake Hose and Pipe) Inspection



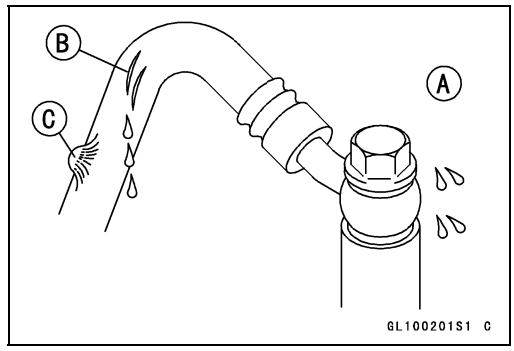
- For ABS equipped models, remove the air cleaner housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter).
- Apply the brake lever or pedal and inspect the brake fluid leak from the brake hoses [A], pipe [B] (ABS equipped models) and fittings [C].

★If the brake fluid leaked from any position, inspect or replace the problem part.



Periodic Maintenance Procedures

Brake Hose and Pipe Damage and Installation Condition Inspection



- For ABS equipped models, remove the air cleaner housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter).
- Inspect the brake hoses, pipe 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, pipe (ABS equipped models) to burst if the line is not properly maintained. Bend and twist the rubber hose while examining it.

★Replace the hose and pipe (ABS equipped models) if any crack [B], bulge [C] or leakage is noticed.

★Tighten any brake hose banjo bolts and brake pipe banjo bolts.

Torque - Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)
Brake Pipe Banjo Bolts (ABS Equipped Models): 23 N·m (2.3 kgf·m, 17 ft·lb)
Brake Pipe Joint Nuts (ABS Equipped Models): 18 N·m (1.8 kgf·m, 13 ft·lb)

- Inspect the brake hose and pipe routing.

★If any brake hose and pipe routing is incorrect, run the brake hose and pipe according to Cable, Wire, and Hose Routing section in the Appendix chapter.

Brake Operation Inspection

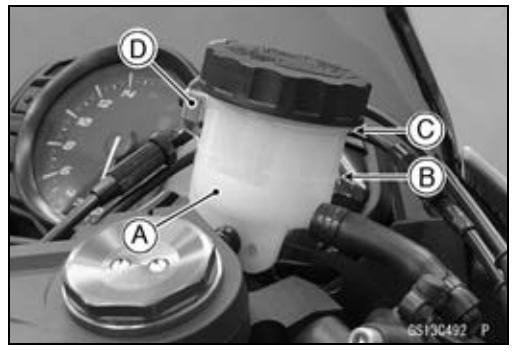
- Inspect the operation of the front and rear brake by running the vehicle on the dry road.

★If the brake operation is insufficiency, inspect the brake system.

⚠ WARNING

When test riding the vehicle, be aware of surrounding traffic for your safety.

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.*

NOTICE

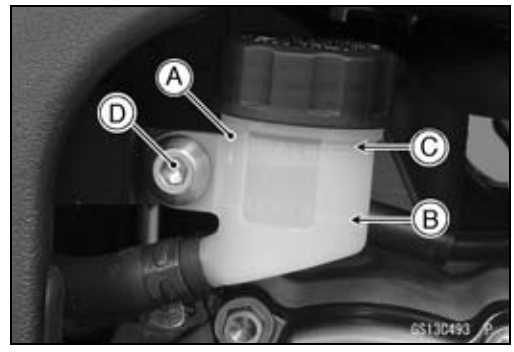
Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.

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

○Remove the stopper [D].

Periodic Maintenance Procedures

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



NOTICE
Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.

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

○Remove the bolt [D].

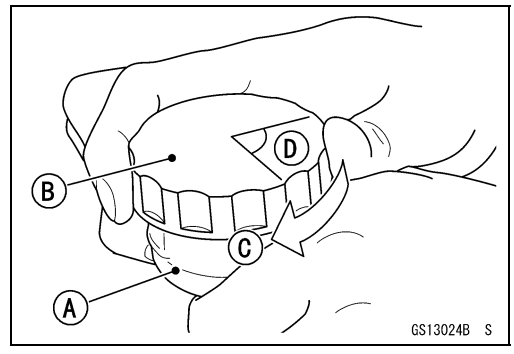
⚠ WARNING
Mixing brands and types of brake fluid can reduce the brake system's effectiveness and cause an accident resulting in injury or death. Do not mix two brands of brake fluid. Change the brake fluid in the brake line completely if the brake fluid must be refilled but the type and brand of the brake fluid that is already in the reservoir are unidentified.

Recommended Disc Brake Fluid
Grade: DOT4

● Follow the procedure below to install the front/rear brake fluid reservoir cap correctly.

○First, tighten the 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].

● Install the stopper (see Brake Line Bleeding in the Brakes chapter).



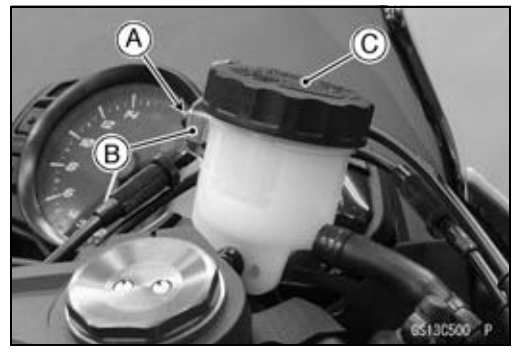
Brake Fluid Change

NOTE

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

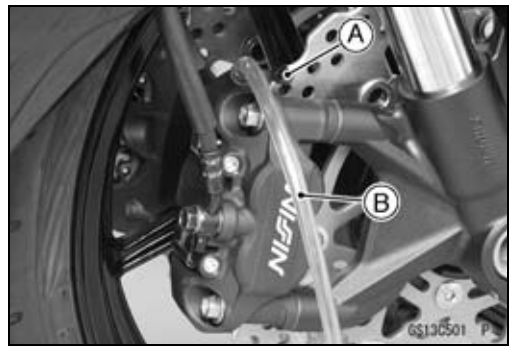
● Level the brake fluid reservoir.

● Remove:
Screw [A]
Stopper [B]
Front Brake Reservoir Cap [C]
Diaphragm Plate
Diaphragm



Periodic Maintenance Procedures

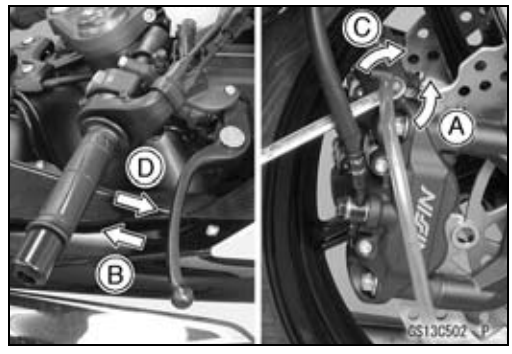
- Remove the rubber cap [A] from the bleed valve on the caliper.
- Attach a clear plastic hose [B] to the bleed valve, and run the other end of the hose into a container.
- Fill the reservoir with fresh specified brake fluid.



- 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.*

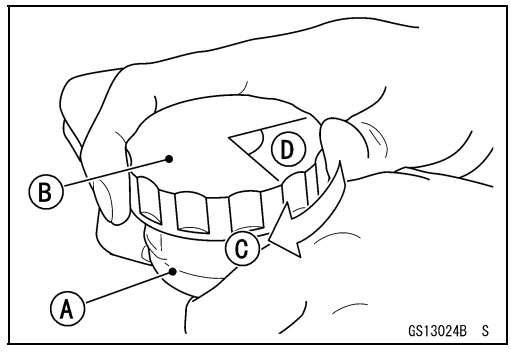
NOTICE

Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.

- Remove the clear plastic hose.
- Install the diaphragm and reservoir cap.

- Follow the procedure below to install the front/rear brake fluid reservoir cap correctly.

○First, tighten the front/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].



- Install the stopper on the reservoir.
- Tighten:

Torque - Front Brake Reservoir Cap Stopper Screw: 1.2 N·m (0.12 kgf·m, 11 in·lb)

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

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

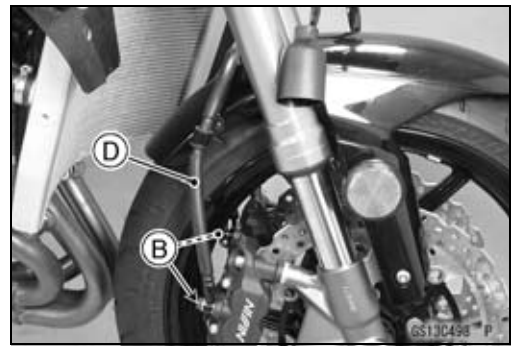
- After changing the fluid, check the brake for good braking power, no brake drag, and no fluid leakage.

★If necessary, bleed the air from the lines.

Periodic Maintenance Procedures

Brake Hose and Pipe Replacement

NOTICE
Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.



- Remove:
  Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
  Brake Hose Fitting Bolt [A]
  Brake Hose Banjo Bolts [B]
  Bolt [C]
- When removing the brake hoses [D], note the following.
  - Take care not to spill the brake fluid on the painted or plastic parts.
  - Temporarily secure the end of the brake hose to some high place to keep fluid loss to a minimum.
  - Immediately wash away any brake fluid that spills.
- When installing the brake hoses, note the following.
  - Avoid sharp bending, kinking, flatting or twisting, and run the hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.
  - There are washers on each side of the brake hose fitting. Replace them with new ones.
  - Tighten:

Torque - Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Fill the brake line after installing the brake hose (see Brake Fluid Change).

Periodic Maintenance Procedures

● For ABS equipped models; note the following.

NOTE

○*When removing the brake pipes and hoses on the hydraulic unit, remove them according to each assembly of the exploded view in the Brakes chapter.*

● Remove:
Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter)
Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
Swingarm (see Swingarm Removal in the Suspension chapter)
Brake Pipe Banjo Bolts [A]
Brake Pipe Joint Nuts [B]
Brake Hose Banjo Bolts [C]
Bolts [D]
Clamps

● There are washers on each side of the brake hose and pipe fitting. Replace them with new ones when installing.

● Before installing the brake pipe, check to see that there is no damage on the threads of the brake pipe joint nut.

★If there is any damage, replace the damaged parts with new ones.

NOTE

○*Tighten the brake pipe joint nut and banjo bolt at both ends of the brake pipe temporarily and then tighten them to the specified torque.*

● Install the brake pipes and brake hoses to the specified angle (see Cable, Wire, and Hose Routing section in the Appendix chapter).

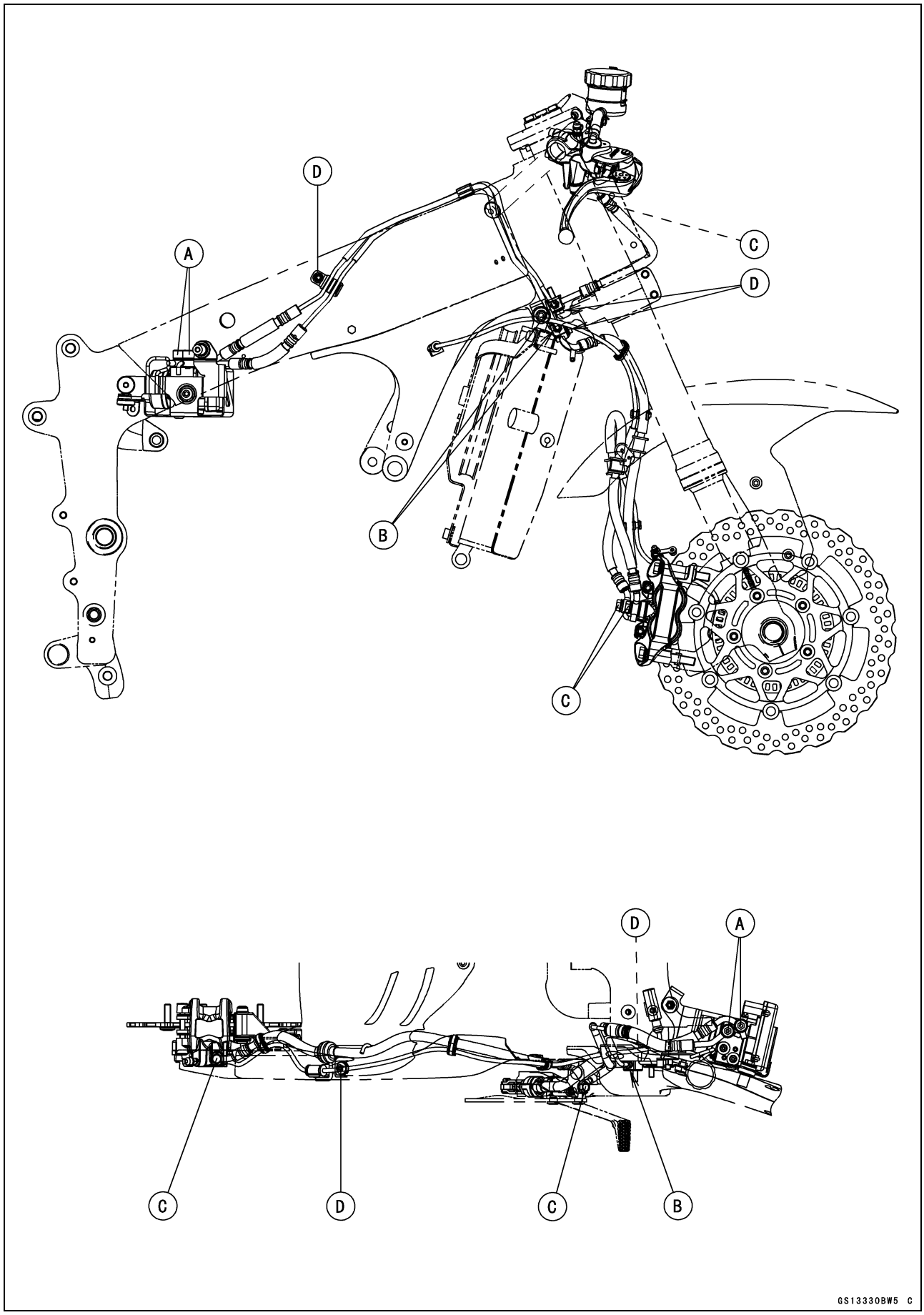
● Tighten the brake pipe joint nuts with the flare nut wrench.

● Tighten:

Torque - Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)
Brake Pipe Joint Nuts: 18 N·m (1.8 kgf·m, 13 ft·lb)
Brake Pipe Banjo Bolts: 23 N·m (2.3 kgf·m, 17 ft·lb)

● Fill the brake line after installing the brake hose and pipe (see Brake Fluid Change).

Periodic Maintenance Procedures



Periodic Maintenance Procedures

Master Cylinder Rubber Parts Replacement

Front Master Cylinder Disassembly

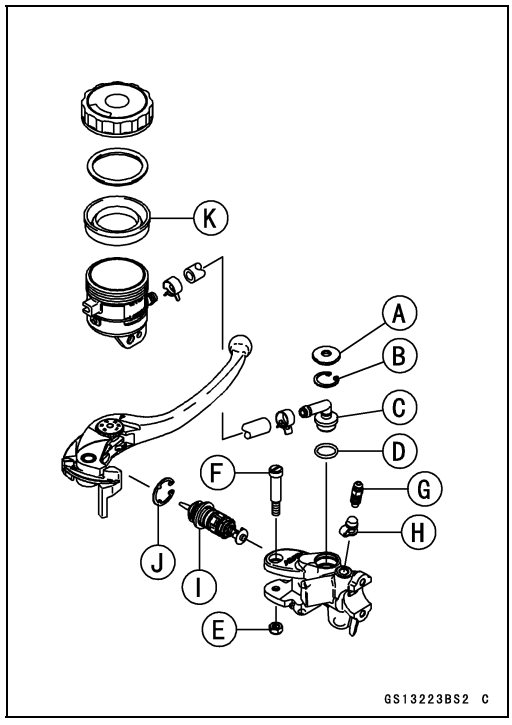
- Remove the front master cylinder (see Front Master Cylinder Removal in the Brakes chapter).
- Remove the seal cover [A], circlip [B], connector [C] and O-ring [D].

Special Tool - Inside Circlip Pliers: 57001-143

- Unscrew the locknut [E] and pivot bolt [F], and remove the brake lever.
- Remove the bleed valve [G] and rubber cap [H].
- Remove the piston assembly [I] as follows.

○Remove the dust cover and push rod.
○Remove the circlip [J].
○Pull out the piston (with primary cup and secondary cup).
○Remove the return spring and spring guide.

- Replace:
  Seal Cover [A]
  Circlip [B]
  O-ring [D]
  Rubber Cap [H]
  Piston Assembly [I]
  Circlip [J]
  Diaphragm [K]



Rear Master Cylinder Disassembly

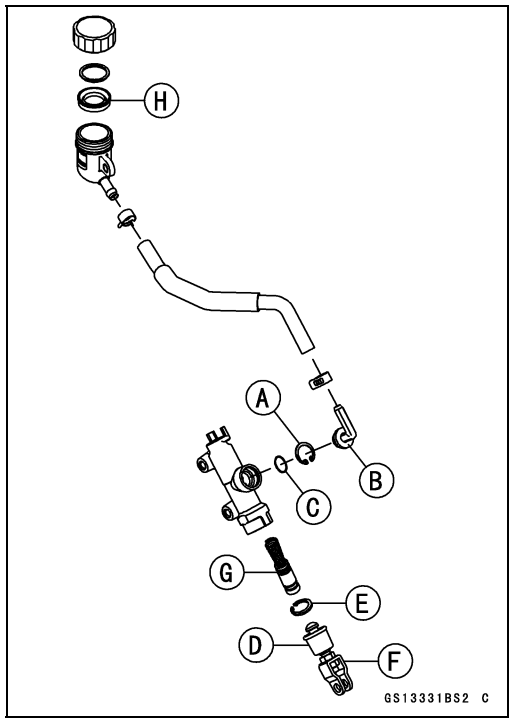
- Remove the rear master cylinder (see Rear Master Cylinder Removal in the Brakes chapter).
- Remove the circlip [A], connector [B] and O-ring [C].

Special Tool - Inside Circlip Pliers: 57001-143

- Slide the dust cover [D] out of place, and remove the circlip [E].
- Pull out the push rod assembly [F].
- Remove the piston assembly [G] and return spring.

NOTICE
Do not remove the secondary cup from the piston since removal will damage it.

- Replace:
  Circlip [A]
  O-ring [C]
  Circlip [E]
  Push Rod Assembly [F]
  Piston Assembly [G]
  Diaphragm [H]



Periodic Maintenance Procedures

Master Cylinder Assembly

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

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

- Apply brake fluid to the new 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 to the followings.

  Front: Brake Lever Pivot Bolt

  Rear: Dust Cover of Push Rod Assembly

- For the front master cylinder, tighten the brake lever pivot bolt and the locknut.

Torque - Brake Lever Pivot Bolt: 1.0 N·m (0.10 kgf·m, 8.9 in·lb)
Brake Lever Pivot Bolt Locknut: 5.9 N·m (0.60 kgf·m, 52 in·lb)

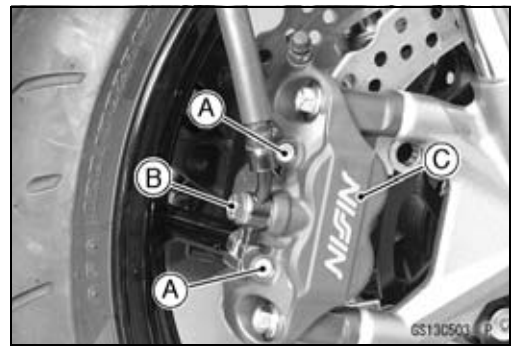
- For the front master cylinder, install the bleed valve and rubber cap.

Torque - Front Master Cylinder Bleed Valve: 5.4 N·m (0.55 kgf·m, 48 in·lb)

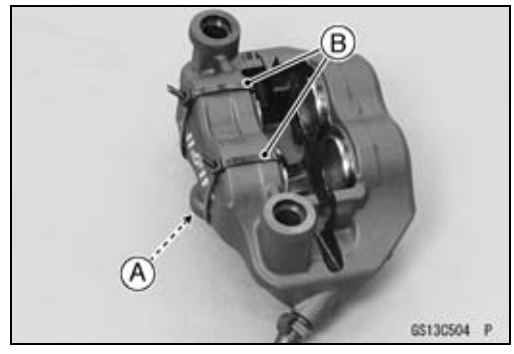
Caliper Rubber Parts Replacement

Front Caliper Disassembly

- Loosen the front caliper pad pins [A] and banjo bolt [B] and tighten them loosely.
- Remove:
  Front Caliper [C] (see Front Caliper Removal in the Brakes chapter)
  Brake Pads (see Front Brake Pad Removal in the Brakes chapter)

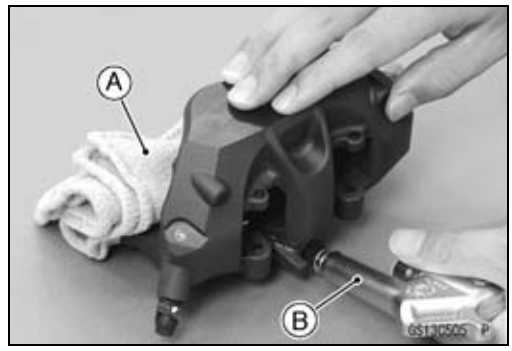


- Hold the pistons nearest the oil passage [A] with the bands [B].



Periodic Maintenance Procedures

● Using compressed air, remove the pistons.
○Cover the caliper opening with a clean heavy cloth [A].
○Lightly apply compressed air [B] to the oil passage.

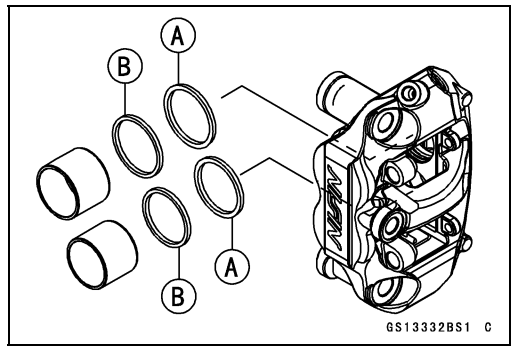


⚠ WARNING

The piston in the brake caliper can crush hands and fingers. Never place your hand or fingers in front of the piston.

○Pull out the pistons by hand.

● Remove the dust seals [A] and fluid seals [B].
● Cut the band.
● Repeat the previous step to remove the pistons from the other side of the caliper body.
● Remove the bleed valve and rubber cap.



Front Caliper Assembly

● Clean the caliper parts except for the pads.

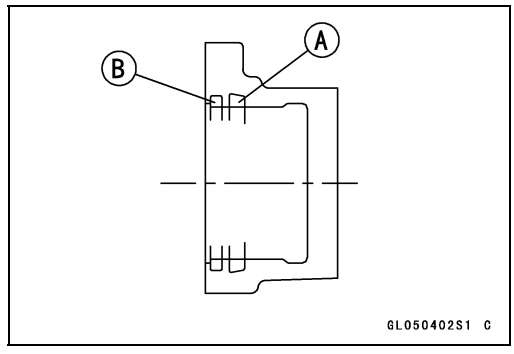
NOTICE

For cleaning the parts, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol.

● Install the bleed valve and rubber cap.

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

● Replace the fluid seals [A] with new ones.
○Apply silicone grease 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 silicone grease to the dust seals, and install them into the cylinders by hand.

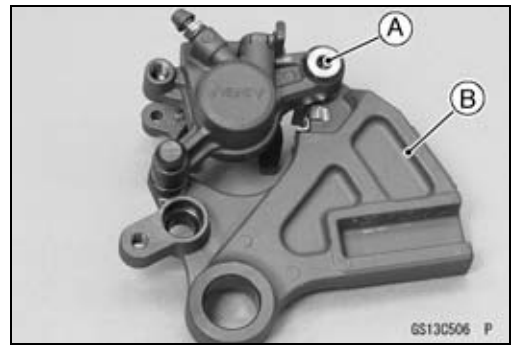


● Apply brake fluid to the outside of the pistons, and push them into each cylinder by hand.
● Install the removed parts (see appropriate chapters).
● Wipe up any spilled brake fluid on the caliper with wet cloth.

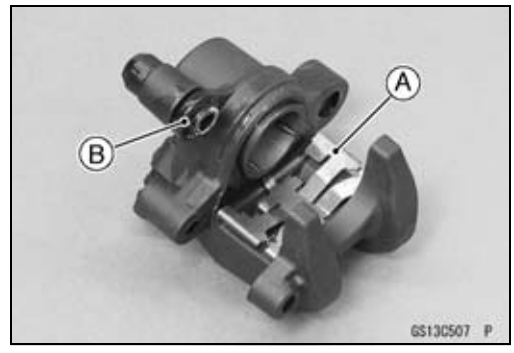
Periodic Maintenance Procedures

Rear Caliper Disassembly

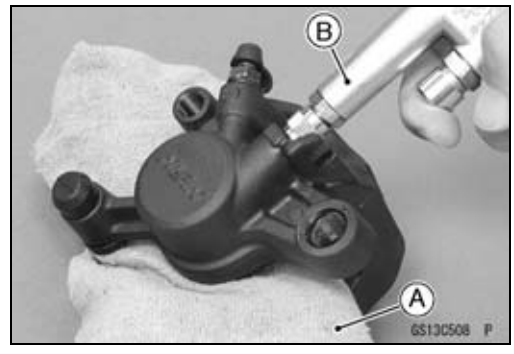
● Remove:
Rear Caliper (see Rear Caliper Removal in the Brakes chapter)
Brake Pads (see Rear Brake Pad Removal in the Brakes chapter)
Rear Caliper Pin Bolt [A]
Caliper Bracket [B]



● Remove:
Pad Spring [A]
Dust Boot [B]



● Using compressed air, remove the piston.
○Cover the caliper opening with a clean heavy cloth [A].
○Remove the piston by lightly applying compressed air [B] to where the brake line fits into the caliper.



⚠ WARNING

The piston in the brake caliper can crush hands and fingers. Never place your hand or fingers in front of the piston.

● Remove the dust seal and fluid seal.
● Remove the bleed valve and rubber cap.

Rear Caliper Assembly

● Clean the caliper parts except for the pads.

NOTICE

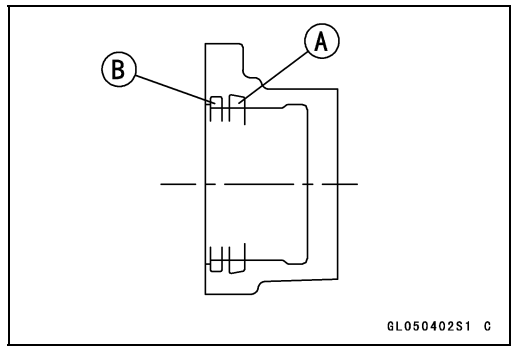
For cleaning the parts, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol.

● Install the bleed valve and rubber cap.

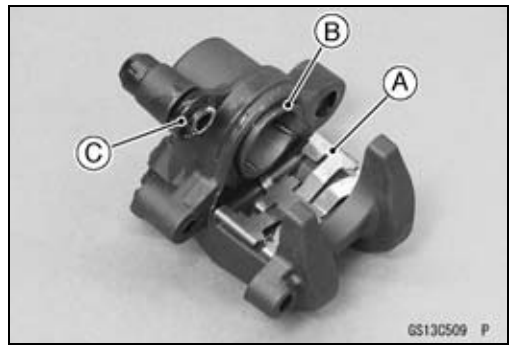
Torque - Bleed Valves: 7.8 N·m (0.80 kgf·m, 69 in·lb)

Periodic Maintenance Procedures

● Replace the fluid seal [A] with a new one.
○Apply silicone grease to the fluid seal, and install it into the cylinder by hand.
● Replace the dust seal [B] with a new one.
○Apply silicone grease to the dust seal, and install it into the cylinder by hand.



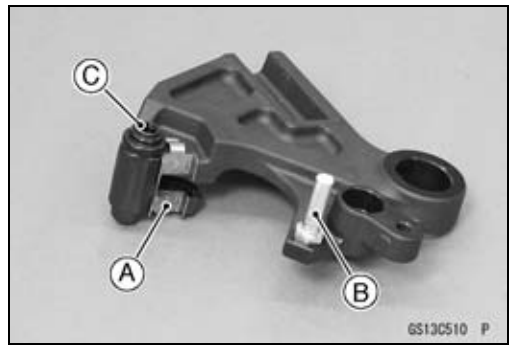
● Install the pad spring [A] in the caliper as shown.
● Apply brake fluid to the outside of the piston [B], and push it into the cylinder by hand.
● Replace the and dust boot [C].



● Install the pad spring [A] on the caliper bracket as shown.
● Apply a silicone grease to the caliper bracket shaft [B].
● Replace the friction boot [C].
● Assemble the caliper and the caliper bracket.
● Apply silicone grease to the rear caliper pin bolt.
● Tighten:

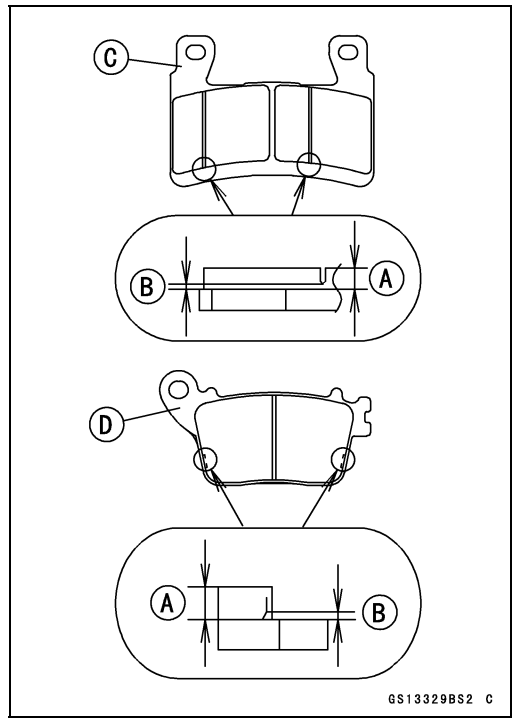
Torque - Rear Caliper Pin Bolt: 27 N·m (2.8 kgf·m, 20 ft·lb)

● Install the pads (see Rear Brake Pad Installation in the Brakes chapter).
● Wipe up any spilled brake fluid on the caliper with wet cloth.



Periodic Maintenance Procedures

Brake Pad Wear Inspection



- Remove the brake pads (see Front/Rear Brake Pad Removal in the Brakes chapter).
- Check the lining thickness [A] of the pads in each caliper.

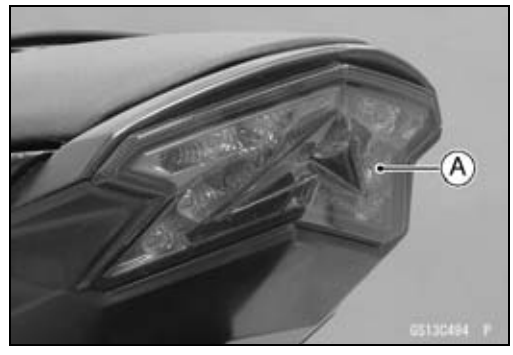
★If the lining thickness of either pad is less than the service limit [B], replace both pads in the caliper as a set.

Front Brake Pad [C]
Rear Brake Pad [D]

Pad Lining Thickness

Standard:	
Front	**4.0 mm (0.16 in.)**
Rear	**5.0 mm (0.20 in.)**
Service Limit:	**1 mm (0.04 in.)**

Brake Light Switch Operation Inspection

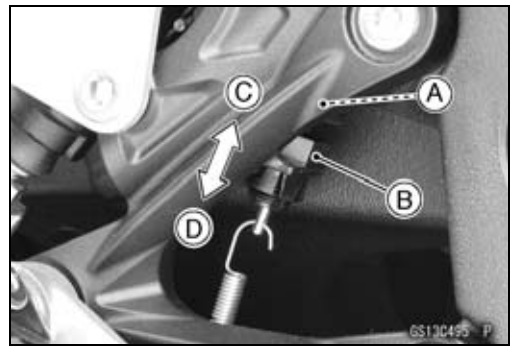


- Turn the ignition switch on.
- The brake light (LED) [A] should go on when the brake lever is applied or after the brake pedal is depressed about 10 mm (0.39 in.).

★If it does not, adjust the brake light switch.

- While holding the switch body, turn the adjusting nut to adjust the switch.

Switch Body [A]
Adjusting Nut [B]
Light sooner as the body rises [C]
Light later as the body lowers [D]



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

★If it does not go on, inspect or replace the following parts.
Battery (see Charging Condition Inspection in the Electrical System chapter)
Brake Light (LED) (see Tail/Brake Light (LED) Removal Installation in the Electrical System chapter)
Main Fuse 30 A and Brake Light/Horn Fuse 7.5 A (see Fuse Inspection in the Electrical System chapter)
Front Brake Light Switch [A] (see Switch Inspection in the Electrical System chapter)
Rear Brake Light Switch (see Switch Inspection in the Electrical System chapter)
Harness (see Wiring Inspection in the Electrical System chapter)

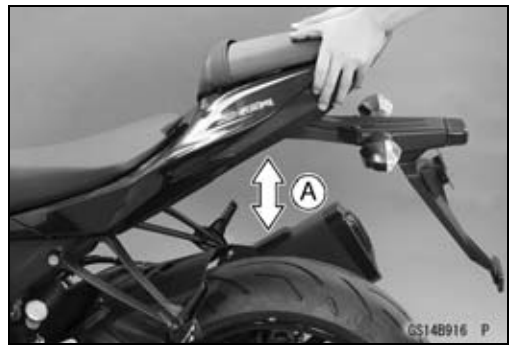
Suspension

Suspension System

Front Forks/Rear Shock Absorber Operation Inspection

● Pump the forks down and up [A] 4 or 5 times, and inspect the smooth stroke.
★If the forks do not smoothly or noise is found, inspect the fork oil level or fork clamps (see Front Fork Oil Change in the Suspension chapter).

● Pump the rear seat down and up [A] 4 or 5 times, and inspect the smooth stroke.
★If the shock absorber does not smoothly stroke or noise is found, inspect the oil leak (see Rear Shock Absorber Oil Leak Inspection).



Front Fork Oil Leak Inspection

● Visually inspect the front forks [A] for oil leakage.
★Replace or repair any defective parts, if necessary.

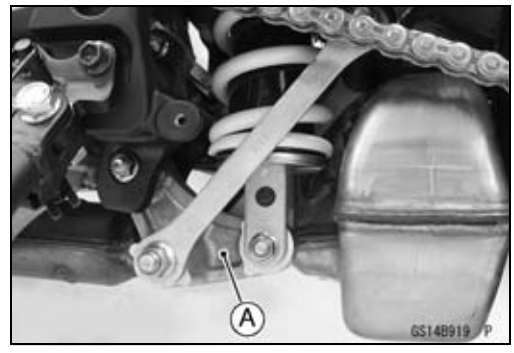
Periodic Maintenance Procedures

Rear Shock Absorber Oil Leak Inspection

- 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.

Rocker Arm Operation Inspection

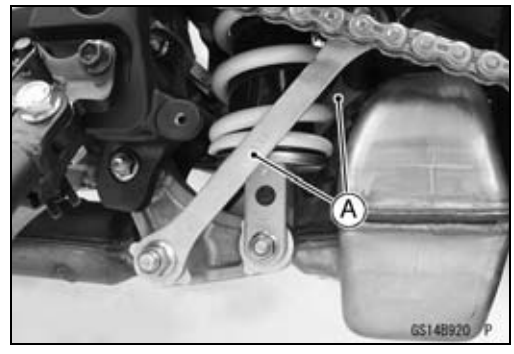


- Pump the seat down and up 4 or 5 times, and inspect the smooth stroke.

★If the rocker arm [A] does not smoothly stroke or noise is found, inspect the fasteners and bearings (see Rocker Arm/Tie-Rod Bearing, Sleeve Inspection in the Suspension chapter).

○In this photo, the left lower fairing has been removed for clarity.

Tie-Rod Operation Inspection



- Pump the seat down and up 4 or 5 times, and inspect the smooth stroke.

★If the tie-rod [A] do not smoothly stroke or noise is found, inspect the fasteners and tie-rod bearings (see Rocker Arm/Tie-Rod Bearing, Sleeve Inspection in the Suspension chapter).

○In this photo, the left lower fairing has been removed for clarity.

Steering

Steering Play Inspection

- Raise the front wheel off the ground with the jack (see Front Wheel Removal in the Wheels/Tires chapter).

Special Tools - Jack: 57001-1238
Jack Attachment: 57001-1608

- 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 [A] the forks.

★If you feel looseness, the steering is too loose.

NOTE

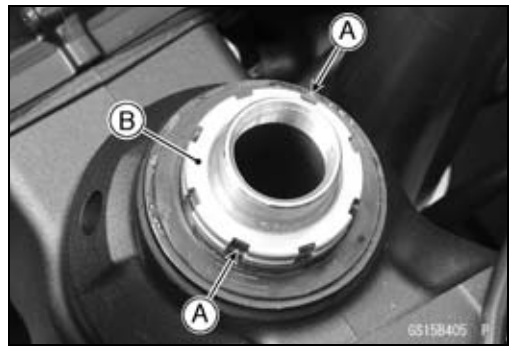
○*The cables and wiring will have some effect on the motion of the fork which must be taken into account.*

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

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

Periodic Maintenance Procedures

Steering Play Adjustment



- Remove:
  Steering Stem Head with Handlebars (see Handlebar Removal in the Steering chapter).
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
- Bend the claws [A] of the claw washer straighten.
- Remove:
  Steering Stem Locknut [B]
  Claw Washer

- Adjust the steering using the steering stem nut wrench [A].

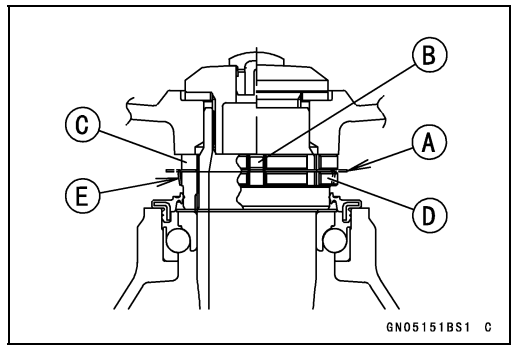
Special Tool - Steering Stem Nut Wrench: 57001-1100

★If the steering is too tight, loosen the stem nut [B] 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.
- Hand tighten the stem locknut clockwise until the claws are aligned with the second groove of stem nut [D], and bend the 2 claws downward [E].
- Install the stem head.
- Apply a non-permanent locking agent to the threads of the steering stem head bolt.
- Install the washer, and temporary tighten the stem head bolt.

NOTE

○*Tighten the upper front fork clamp bolts first, next the stem head bolt.*

Torque - Upper Front Fork Clamp Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)
Steering Stem Head Bolt: 78 N·m (8.0 kgf·m, 58 ft·lb)

⚠ WARNING

If the handlebar does not turn to the steering stop it may cause an accident resulting in injury or death. Be sure the cables, harnesses and hoses are routed properly and do not interfere with handlebar movement (see Cable, Wire, and Hose Routing section in the Appendix chapter).

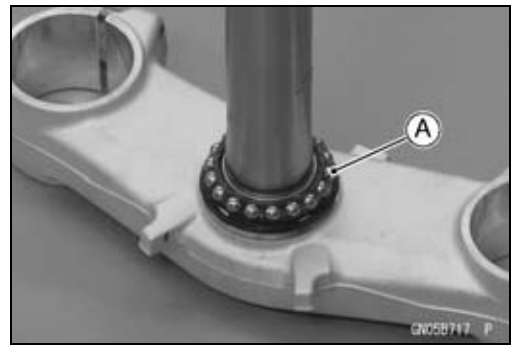
- Check the steering again.

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

- Install the removed parts (see appropriate chapters).

Periodic Maintenance Procedures

Steering Stem Bearing Lubrication



- Remove the steering stem (see Stem, Stem Bearing Removal in the Steering chapter).
- Using a high flash-point solvent, wash the upper and lower ball bearings [A] 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 in the cages with grease, and apply a light coat of grease to the upper and lower outer races.
- Install the steering stem (see Stem, Stem Bearing Installation in the Steering chapter).
- Adjust the steering (see Steering Play Adjustment).

Periodic Maintenance Procedures

Electrical System

Lights and Switches Operation Inspection

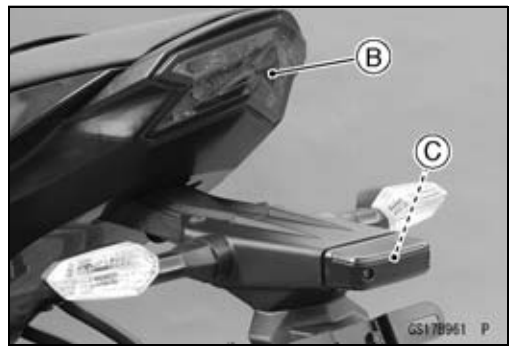
First Step

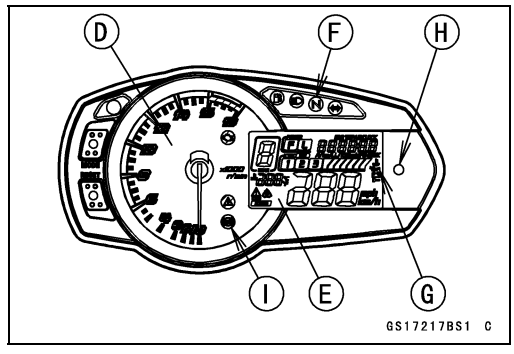
- Set the gear position in the neutral position.
- Turn the ignition switch on.
- The following lights should go on according to below table.

City Lights [A]	Go on
Taillight (LED) [B]	Goes on
License Plate Light [C]	Goes on
Meter Panel Illumination Light (LED) [D]	Goes on
Meter Panel LCD [E]	Goes on
Green Neutral Indicator Light (LED) [F]	Goes on
Oil Pressure Warning Symbol [G] and Red Warning Indicator Light (LED) [H]	Goes on
Yellow ABS Indicator Light (LED) [I] (ABS Equipped Models)	Goes on

★If the light does not go on, inspect or replace the following parts.

Battery (see Charging Condition Inspection in the Electrical System chapter)
City Light Bulb (see City Light Bulb Replacement in the Electrical System chapter)
License Plate Light Bulb (see License Plate Light Bulb Replacement in the Electrical System chapter)
Meter Panel LCD (see Meter Unit Inspection in the Electrical System chapter)
Green Neutral Indicator Light (LED) (see Meter Unit Inspection in the Electrical System chapter)
Red Warning Indicator Light (LED) (Oil Pressure Warning) (see Meter Unit Inspection in the Electrical System chapter)
Meter Panel Illumination Light (LED) (see Meter Unit Inspection in the Electrical System chapter)
ECU (see ECU Power Supply Inspection in the Fuel System (DFI) chapter)
Main Fuse 30 A, Meter Fuse 7.5 A and Brake Light/Horn Fuse 7.5 A (see Fuse Inspection in the Electrical System chapter)
Ignition Switch (see Switch Inspection in the Electrical System chapter)
Oil Pressure Switch (see Switch Inspection in the Electrical System chapter)
Gear Position Switch (see Gear Position Switch Inspection in the Electrical System chapter)
Harness (see Wiring Inspection in the Electrical System chapter)
Yellow ABS Indicator Light (LED) (ABS Equipped Models) (see Yellow ABS Indicator Light (LED) Inspection in the Brakes chapter)





Periodic Maintenance Procedures

- Turn the ignition switch off.
- The all lights should go off.

○For models equipped with an immobilizer system, red warning indicator light (LED) will blinks. Refer to the Immobilizer System (Equipped Models) section in the Electrical System chapter).

★If the light does not go off, replace the ignition switch.

Second Step

- Turn the ignition switch on.
- Turn on the turn signal switch [A] (left or right position).
- The left or right turn signal lights [B] (front and rear) according to the switch position should blink.
- The green turn signal indicator light (LED) [C] in the meter unit should blink.

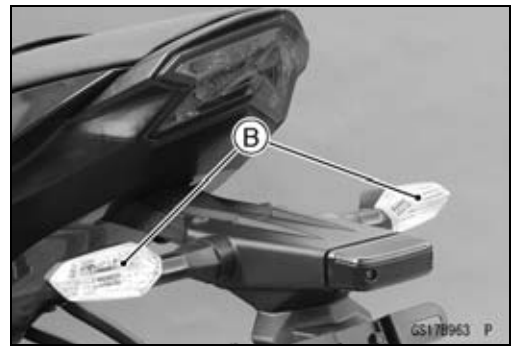
★If the each light does not blink, inspect or replace the following parts.

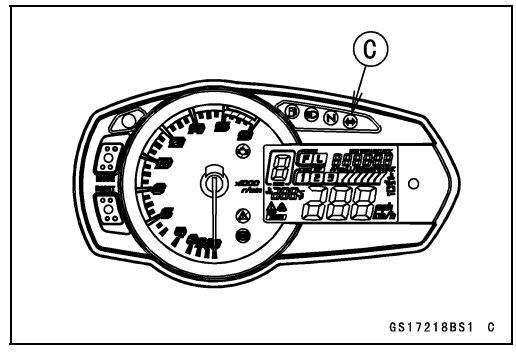
Turn Signal Light Bulb (see Turn Signal Light Bulb Replacement in the Electrical System chapter)
Green Turn Signal Indicator Light (LED) (see Meter Unit Inspection in the Electrical System chapter)
Turn Signal Relay Fuse 7.5 A (see Fuse Inspection in the Electrical System chapter)
Turn Signal Switch (see Switch Inspection in the Electrical System chapter)
Turn Signal Relay (see Turn Signal Relay Inspection in the Electrical System chapter)
Harness (see Wiring Inspection in the Electrical System chapter)

- Push the turn signal switch.
- The turn signal lights and green turn signal indicator light (LED) should go off.

★If the light does not go off, inspect or replace the following parts.

Turn Signal Switch (see Switch Inspection in the Electrical System chapter)
Turn Signal Relay (see Turn Signal Relay Inspection in the Electrical System chapter)



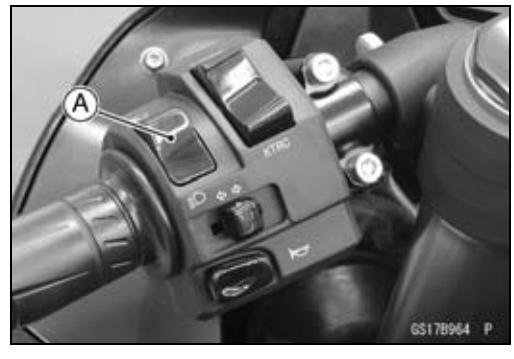


Third Step

- Set the dimmer switch [A] to low beam position.
- Start the engine.
- The low beam headlight should go on.

★If the low beam headlight does not go on, inspect or replace the following parts.

Headlight Low Beam Bulb (see Headlight Bulb Replacement in the Electrical System chapter)
Headlight Fuse 15 A (see Fuse Inspection in the Electrical System chapter)
Dimmer Switch (see Switch Inspection in the Electrical System chapter)
Headlight Relay (see Relay Circuit Inspection in the Electrical System chapter)
Harness (see Wiring Inspection in the Electrical System chapter)



Periodic Maintenance Procedures

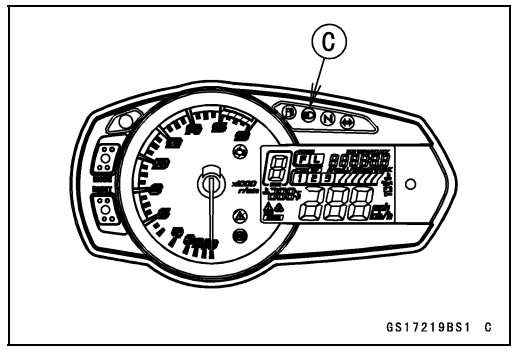
- Set the dimmer switch to high beam position.
- The low beam [A] and high beam [B] headlights should go on.
- The blue high beam indicator light (LED) [C] should go on.

★If the high beam headlight and/or blue high beam indicator light (LED) does not go on, inspect or replace the following parts.
Headlight High Beam Bulb (see Headlight Bulb Replacement in the Electrical System chapter)
Dimmer Switch (see Switch Inspection in the Electrical System chapter)

- Turn the engine stop switch to stop position.
- The low beam and high beam headlights should stay going on.

★If the headlights and blue high beam indicator light (LED) does go off, inspect or replace the headlight relay (see Relay Circuit Inspection in the Electrical System chapter).

- Turn the ignition switch off.
- The headlights and blue high beam indicator light (LED) should go off.



Headlight Aiming Inspection

- Inspect the headlight beam for aiming.

★If the headlight beam points to one side rather than straight ahead, adjust the horizontal beam.

Headlight Beam Horizontal Adjustment

- Turn the horizontal adjuster [A] in both headlights in or out until the beam points straight ahead.

★If the headlight beam points too low or high, adjust the vertical beam.

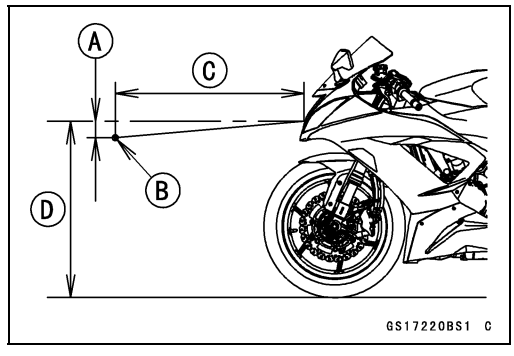
Headlight Beam Vertical Adjustment

- Turn the vertical adjuster [B] in both headlights 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 to the proper angle according to local regulations.*

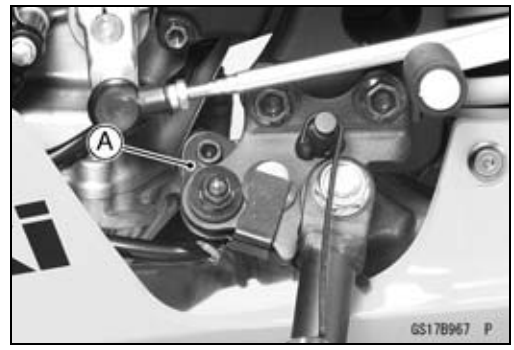
○*For the US model, the proper angle is 0.4 degrees below horizontal. This is 50 mm (2.0 in.) drop at 7.6 m (25 ft) measured from the center of the headlight with the motorcycle on its wheels and the rider seated.*



50 mm (2.0 in.) [A]
Center of Brightest Spot [B]
7.6 m (25 ft) [C]
Height of Headlight Center [D]

Periodic Maintenance Procedures

Sidestand Switch Operation Inspection



- Raise the rear wheel off the ground with the stand (see Rear Wheel Removal in the Wheels/Tires chapter).
- Inspect the sidestand switch [A] operation accordance to below table.

Sidestand Switch Operation

Sidestand	Gear Position	Clutch Lever	Engine Start	Engine Run
Up	Neutral	Released	Starts	Continue running
Up	Neutral	Pulled in	Starts	Continue running
Up	In Gear	Released	Does not start	Continue running
Up	In Gear	Pulled in	Starts	Continue running
Down	Neutral	Released	Starts	Continue running
Down	Neutral	Pulled in	Starts	Continue running
Down	In Gear	Released	Does not start	Stops
Down	In Gear	Pulled in	Does not start	Stops

★If the sidestand switch operation does not work, inspect or replace the following parts.
Battery (see Charging Condition Inspection in the Electrical System chapter)
Main Fuse 30 A (see Fuse Inspection in the Electrical System chapter)
Ignition Fuse 15 A (see Fuse Inspection in the Electrical System chapter)
Ignition Switch (see Switch Inspection in the Electrical System chapter)
Sidestand Switch (see Switch Inspection in the Electrical System chapter)
Engine Stop Switch (see Switch Inspection in the Electrical System chapter)
Starter Button (see Switch Inspection in the Electrical System chapter)
Gear Position Switch (see Gear Position Switch Inspection in the Electrical System chapter)
Starter Lockout Switch (see Switch Inspection in the Electrical System chapter)
Starter Relay (see Starter Relay Inspection in the Electrical System chapter)
Relay Box (see Relay Circuit Inspection in the Electrical System chapter)
Starter Circuit Relay (see Relay Circuit Inspection in the Electrical System chapter)
Harness (see Wiring Inspection in the Electrical System chapter)

★If the all parts are good condition, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Engine Stop Switch Operation Inspection

First Step

- Turn the ignition switch on.
- Set the gear position in the neutral position.
- Turn the engine stop switch to stop position [A].
- Push the starter button.
- The engine does not start.

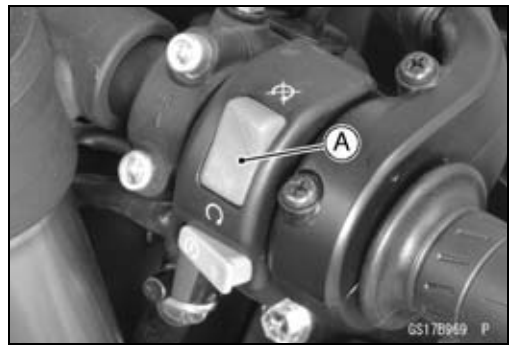
★If the engine starts, inspect or replace the engine stop switch (see Switch Inspection in the Electrical System chapter).

Second Step

- Turn the ignition switch on.
- Set the gear position in the neutral position.
- Turn the engine stop switch to run position [A].
- Push the starter button and start the engine.
- Turn the engine stop switch to stop position.
- Immediately the engine should be stop.

★If the engine does not stop, inspect or replace the engine stop switch (see Switch Inspection in the Electrical System chapter).

★If the engine stop switch is good condition, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).



Periodic Maintenance Procedures

Spark Plug Replacement

- Remove the stick coils (see Stick Coil Removal in the Electrical System chapter).
- Remove the spark plugs using the 16 mm (0.63 in.) plug wrench [A] vertically.
- Replace the spark plugs with new ones.

Standard Spark Plug
Type: NGK CR9E

- Insert the spark plug vertically into the spark plug hole with the spark plug installed in the plug wrench [A], and finger-tighten it first.

NOTICE
If tightening the spark plug with the wrench inclined, the insulator of the spark plug may break.

- Tighten:

Torque - Spark Plugs: 13 N·m (1.3 kgf·m, 115 in·lb)

- Install the stick coils (see Stick Coil Installation in the Electrical System chapter).
- After installation, be sure the stick coils are installed securely by pulling up them lightly.

Others

Chassis Parts Lubrication

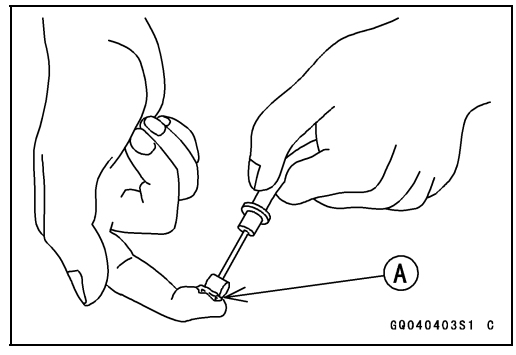
- Before lubricating each part, clean off any rusty spots with rust remover and wipe off any grease, oil, dirt, or grime.
- Lubricate the points listed below with indicated lubricant.

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 Grease.
Brake Lever
Brake Pedal
Clutch Lever
Rear Master Cylinder Push Rod Joint Pin
Sidestand

Points: Lubricate with Grease.
Clutch Inner Cable Upper and Lower Ends [A]
Throttle Inner Cable Upper and Lower Ends

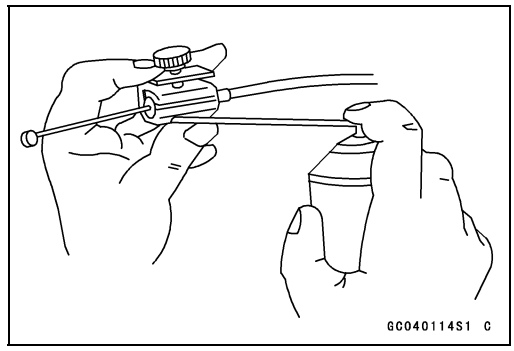


Periodic Maintenance Procedures

Cables: Lubricate with Rust Inhibitor.
Clutch Cable
Throttle Cables

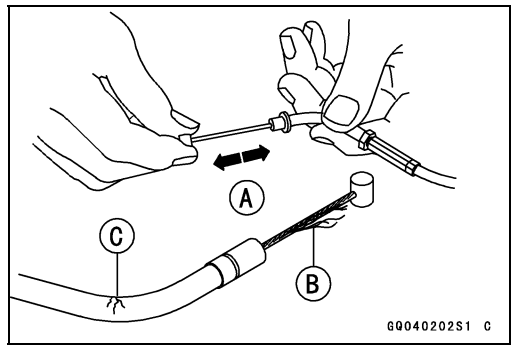
- Lubricate the cables by seeping the oil between the cable and housing.

○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 inner 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.



Condition of Bolts, Nuts and Fasteners 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. For each fastener, first loosen it by 1/2 turn, then tighten it.

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

Periodic Maintenance Procedures

Bolt, Nut and Fastener to be checked

Engine:
- Clutch Lever Pivot Bolt Locknut
- Engine Mounting Bolts and Nuts
- Exhaust Pipe Clamp Bolt
- Exhaust Pipe Holder Nuts
- Muffler Body Clamp Bolt
- Muffler Body Mounting Bolt
- Premuffler Chamber Bracket Bolt
- Premuffler Chamber Mounting Bolt
- Radiator Bolts

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

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

Suspension:
- Front Fork Clamp Bolts
- Rear Shock Absorber Nuts
- Swingarm Pivot Shaft Nut
- Tie-Rod Nuts
- Rocker Arm Nut

Steering:
- Handlebar Clamp Bolts
- Steering Stem Head Bolt

Others:
- Footpeg Bracket Bolts
- Front Fender Mounting Bolts
- Rear Frame Bolts
- Sidestand Bolt
- Sidestand Bracket Bolts

Fuel System (DFI)

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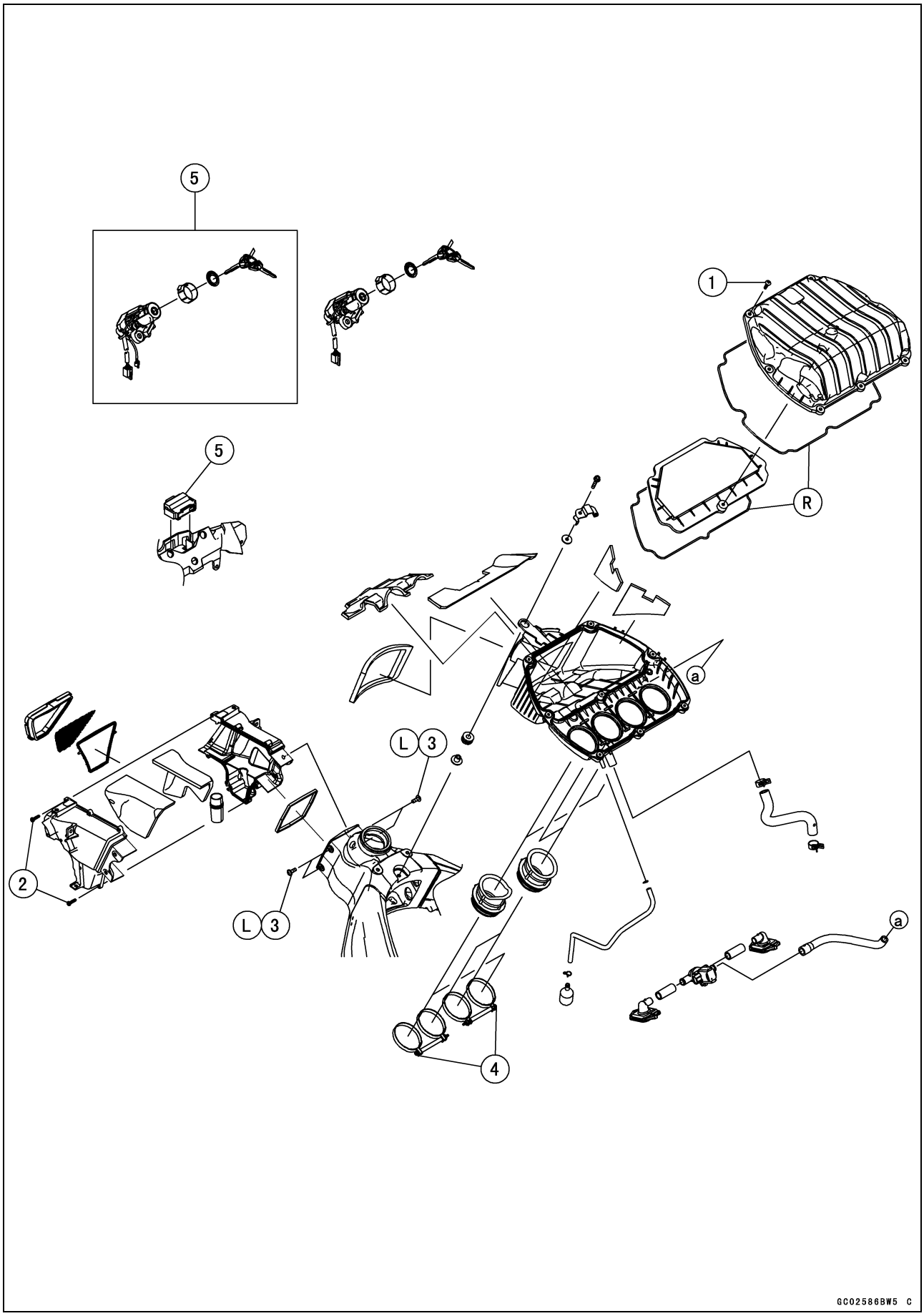
Exploded View

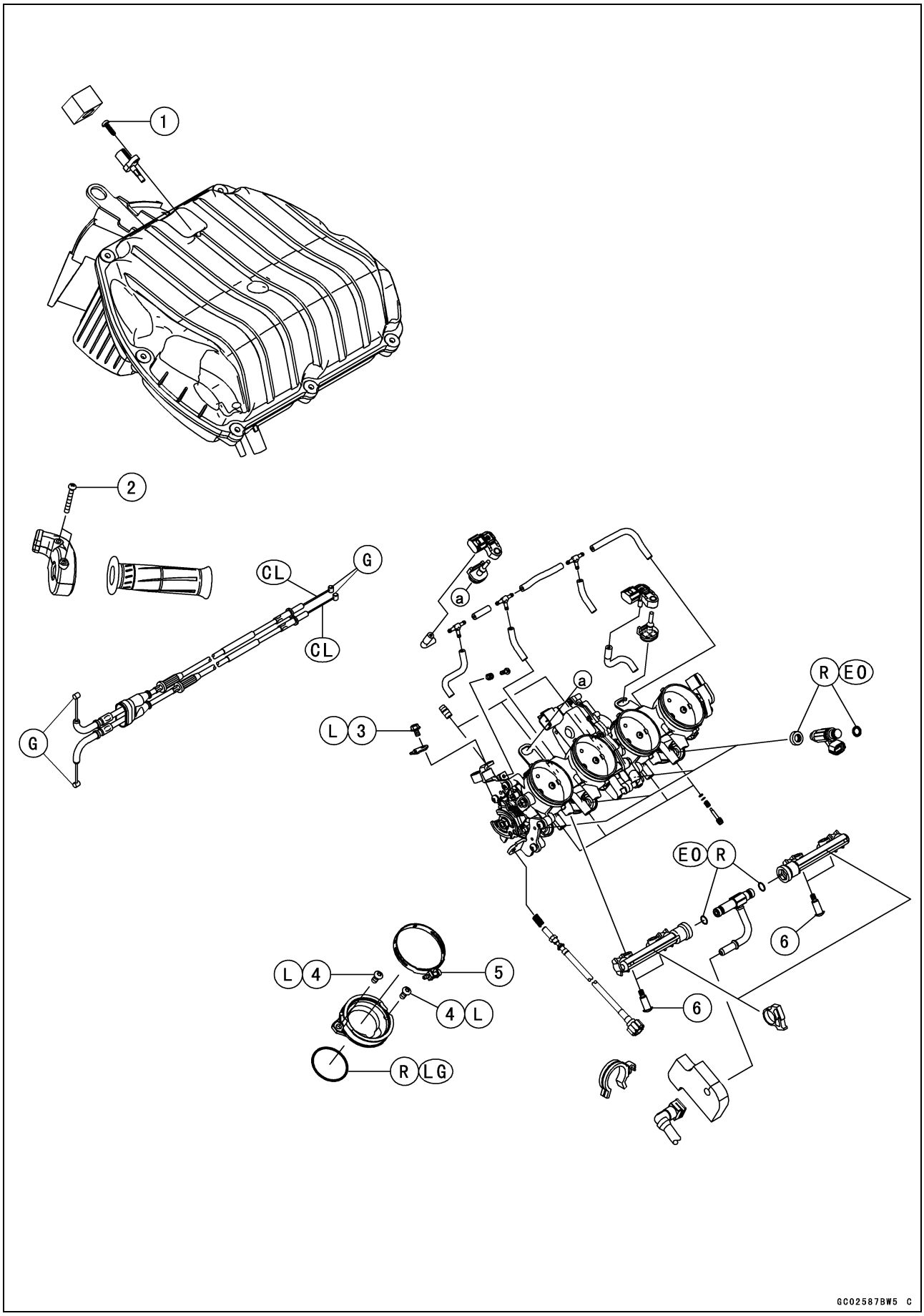


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Air Cleaner Housing Assembly Screws	1.2	0.12	11 in·lb	
2	Air Intake Duct Assembly Screws	1.5	0.15	13 in·lb	
3	Air Intake Duct Mounting Bolts	9.8	1.0	87 in·lb	L
4	Air Cleaner Housing Clamp Bolts	2.0	0.20	18 in·lb	

5. Immobilizer System Equipped Models
L: Apply a non-permanent locking agent.
R: Replacement Parts

Exploded View

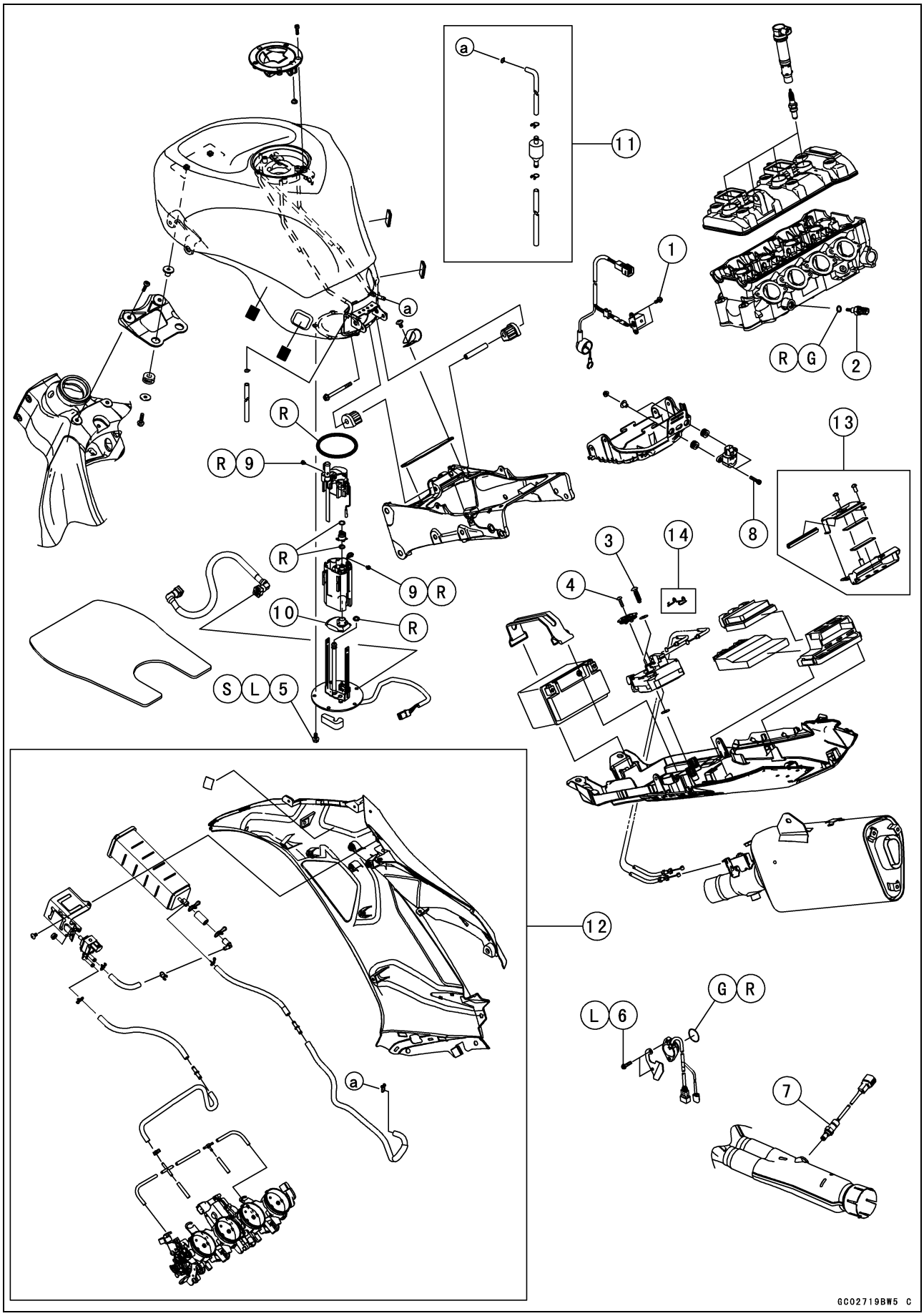


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Intake Air Temperature Sensor Screw	1.2	0.12	11 in·lb	
2	Throttle Case Screws	3.5	0.36	31 in·lb	
3	Throttle Cable Holder Plate Bolt	3.9	0.40	35 in·lb	L
4	Throttle Body Assy Holder Bolts	12	1.2	106 in·lb	L
5	Throttle Body Assy Holder Clamp Bolts	2.9	0.30	26 in·lb	
6	Delivery Pipe Assy Mounting Screws	3.43	0.35	30 in·lb	

CL: Apply cable lubricant.
EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts
LG: Apply liquid gasket.

Exploded View



Exploded View

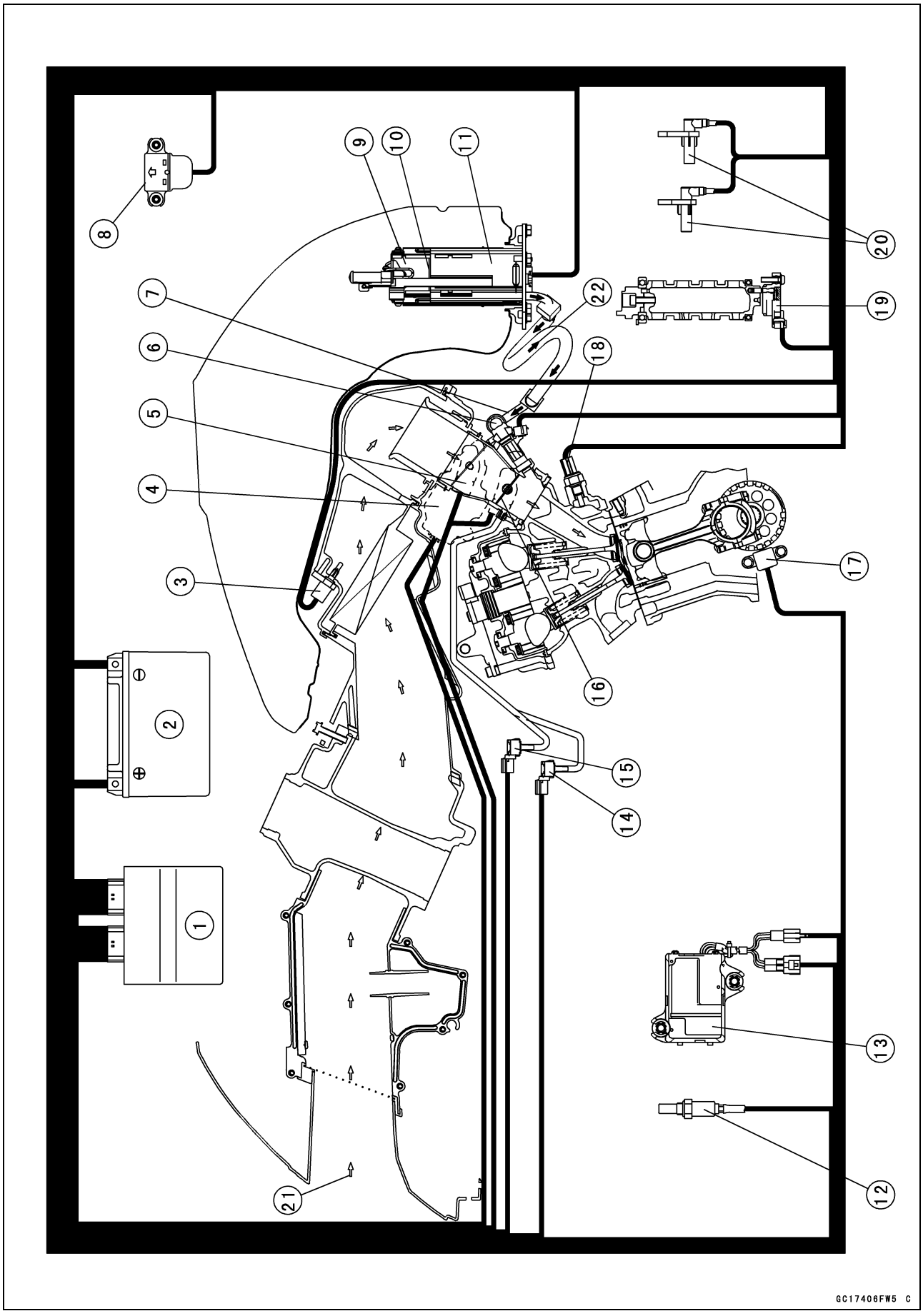
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Crankshaft Sensor Bolts	5.9	0.60	52 in·lb	
2	Water Temperature Sensor	12	1.2	106 in·lb	
3	Exhaust Butterfly Valve Actuator Mounting Screws	4.3	0.44	38 in·lb	
4	Exhaust Butterfly Valve Actuator Pulley Bolt	4.9	0.50	43 in·lb	
5	Fuel Pump Bolts	9.8	1.0	87 in·lb	L, S
6	Gear Position Switch Screws	2.9	0.30	26 in·lb	L
7	Oxygen Sensor (Equipped Models)	25	2.5	18	
8	Vehicle-down Sensor Bolts	5.9	0.60	52 in·lb	
9	Fuel Pump Assembly Screws	0.98	0.10	8.7 in·lb	R

10. Fuel Filter
11. Other than CAL Model
12. CAL Model
13. ECU Guard (GB WVTA (FULL) and WVTA (78.2) Models)
14. ZX636ED/FD Late Models ~

G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts
S: Follow the specified tightening sequence.

DFI System

DFI System

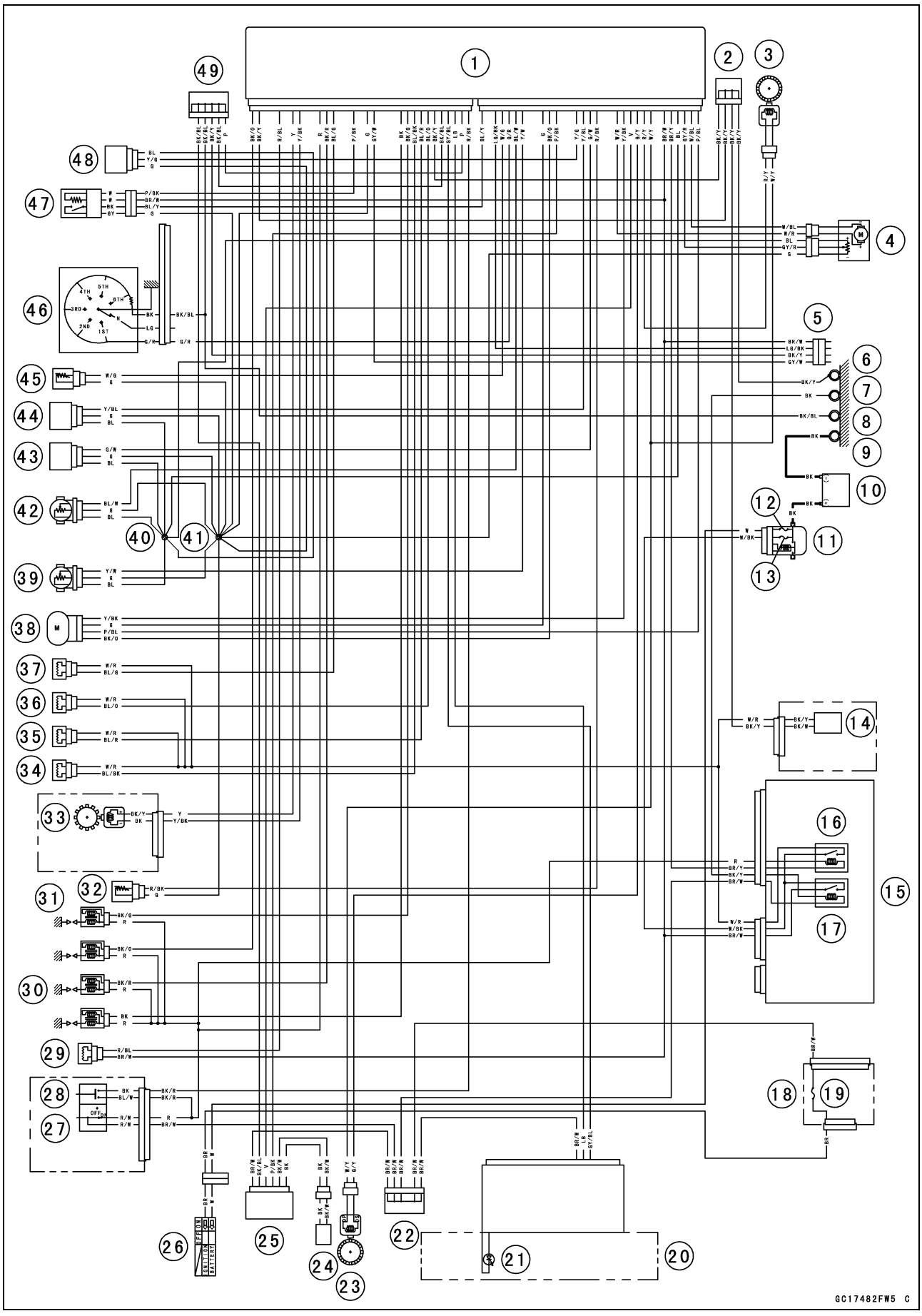


DFI System

1. ECU
2. Battery 12 V 8 Ah
3. Intake Air Temperature Sensor
4. Subthrottle Valve Actuator
5. Subthrottle Sensor
6. Fuel Injectors
7. Delivery Pipe Assy
8. Vehicle-down Sensor
9. Fuel Filter
10. Pressure Regulator
11. Fuel Pump
12. Oxygen Sensor (Equipped Models)
13. Exhaust Butterfly Valve Actuator
14. Intake Air Pressure Sensor #1
15. Intake Air Pressure Sensor #2
16. Main Throttle Sensor
17. Crankshaft Sensor
18. Water Temperature Sensor
19. Gear Position Switch
20. Wheel Rotation Sensors
21. Air Flow
22. Fuel Flow

DFI System

DFI System Wiring Diagram



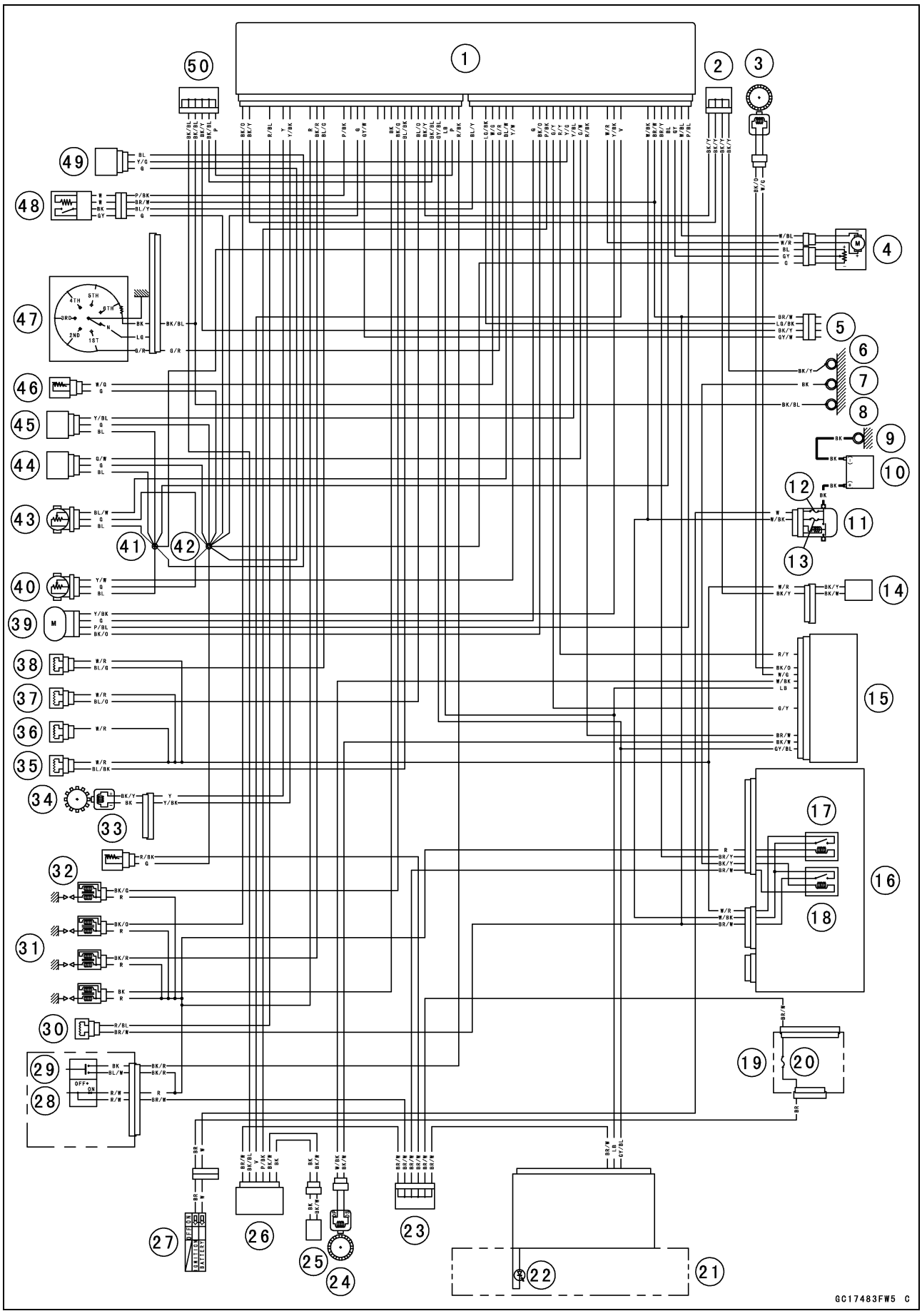
DFI System

Part Names

1. ECU
2. Joint Connector C
3. Rear Wheel Rotation Sensor
4. Exhaust Butterfly Valve Actuator
5. Immobilizer (Equipped Models)/Kawasaki Diagnostic System Connector
6. Frame Ground 2
7. Frame Ground 3
8. Frame Ground 1
9. Engine Ground
10. Battery 12 V 8 Ah
11. Starter Relay
12. Main Fuse 30 A
13. ECU Fuse 15 A
14. Fuel Pump
15. Relay Box
16. Fuel Pump Relay
17. ECU Main Relay
18. Fuse Box 1
19. Ignition Fuse 15 A
20. Meter Unit
21. Yellow Engine Warning Indicator Light (LED)
22. Joint Connector E
23. Front Wheel Rotation Sensor
24. Immobilizer Antenna (Equipped Models)
25. Immobilizer Amplifier (Equipped Models)
26. Ignition Switch
27. Engine Stop Switch
28. Starter Button
29. Air Switching Valve
30. Spark Plugs
31. Stick Coil #1, #2, #3, #4
32. Intake Air Temperature Sensor
33. Crankshaft Sensor
34. Fuel Injector #1
35. Fuel Injector #2
36. Fuel Injector #3
37. Fuel Injector #4
38. Subthrottle Valve Actuator
39. Main Throttle Sensor
40. Water-proof Joint 1
41. Water-proof Joint 2
42. Subthrottle Sensor
43. Intake Air Pressure Sensor #2
44. Intake Air Pressure Sensor #1
45. Water Temperature Sensor
46. Gear Position Switch
47. Oxygen Sensor (Equipped Models)
48. Vehicle-down Sensor
49. Joint Connector D

DFI System

DFI System Wiring Diagram (ABS Equipped Models)



DFI System

Part Names

1. ECU
2. Joint Connector C
3. Rear Wheel Rotation Sensor
4. Exhaust Butterfly Valve Actuator
5. Immobilizer (Equipped Models)/Kawasaki Diagnostic System Connector
6. Frame Ground 2
7. Frame Ground 3
8. Frame Ground 1
9. Engine Ground
10. Battery 12 V 8 Ah
11. Starter Relay
12. Main Fuse 30 A
13. ECU Fuse 15 A
14. Fuel Pump
15. ABS Hydraulic Unit
16. Relay Box
17. Fuel Pump Relay
18. ECU Main Relay
19. Fuse Box 1
20. Ignition Fuse 15 A
21. Meter Unit
22. Yellow Engine Warning Indicator Light (LED)
23. Joint Connector E
24. Front Wheel Rotation Sensor
25. Immobilizer Antenna (Equipped Models)
26. Immobilizer Amplifier (Equipped Models)
27. Ignition Switch
28. Engine Stop Switch
29. Starter Button
30. Air Switching Valve
31. Spark Plugs
32. Stick Coil #1, #2, #3, #4
33. Intake Air Temperature Sensor
34. Crankshaft Sensor
35. Fuel Injector #1
36. Fuel Injector #2
37. Fuel Injector #3
38. Fuel Injector #4
39. Subthrottle Valve Actuator
40. Main Throttle Sensor
41. Water-proof Joint 1
42. Water-proof Joint 2
43. Subthrottle Sensor
44. Intake Air Pressure Sensor #2
45. Intake Air Pressure Sensor #1
46. Water Temperature Sensor
47. Gear Position Switch
48. Oxygen Sensor (Equipped Models)
49. Vehicle-down Sensor
50. Joint Connector D

DFI System

○Color Codes:

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

DFI System

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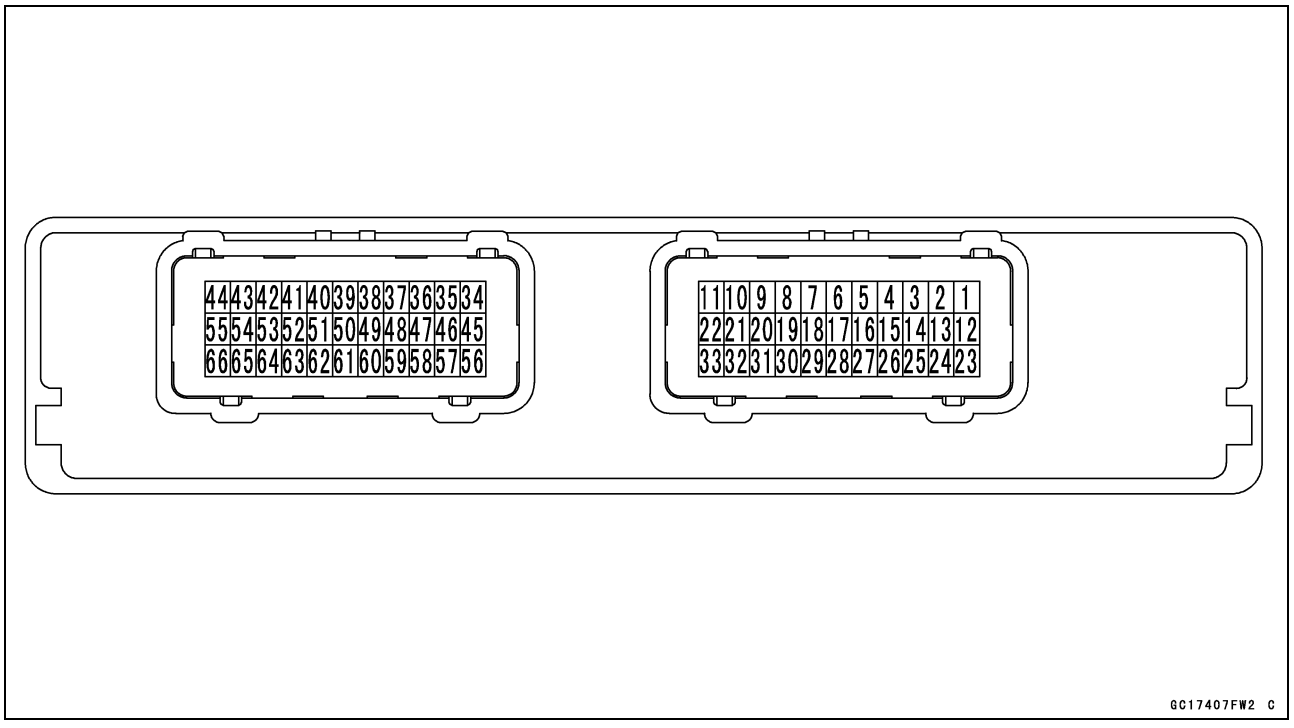
DFI System

Terminal Numbers of ECU Connectors



Terminal Names

1. Subthrottle Valve Actuator: P/BL
2. Exhaust Butterfly Valve Actuator (+): W/BL
3. Exhaust Butterfly Valve Actuator Sensor: GY
4. Power Supply to Sensors: BL
5. Fuel Pump Relay: BR/Y
6. Power Supply to ECU (from Battery): BR/W
7. Power Supply to ECU (from Battery): W/BK
8. Power Supply to Wheel Rotation Sensors (ZX636E Model): W/Y
   Unused (ZX636F Model)
9. Rear Wheel Rotation Sensor Signal (ZX636E Model): R/Y
   Unused (ZX636F Model)
10. Front Wheel Rotation Sensor Signal (ZX636E Model): G/Y
    Unused (ZX636F Model)
11. Immobilizer Amplifier (Equipped Models): V
12. Subthrottle Valve Actuator: Y/BK
13. Exhaust Butterfly Valve Actuator (–): W/R
14. Unused
15. Unused
16. Intake Air Temperature Sensor: R/BK
17. Intake Air Pressure Sensor #2: G/W
18. Intake Air Pressure Sensor #1: Y/BL
19. Vehicle-down Sensor: Y/G
20. Rear Wheel Rotation Sensor Signal (ZX636F Model): R/Y
    Unused (ZX636E Model)
21. Front Wheel Rotation Sensor Signal (ZX636F Model): G/Y
    Unused (ZX636E Model)
22. Immobilizer Amplifier (Equipped Models): P/BK
23. Subthrottle Valve Actuator: BK/O
24. Subthrottle Valve Actuator: G
25. Unused
26. Unused
27. Main Throttle Sensor: Y/W
28. Subthrottle Sensor: BL/W
29. Gear Position Switch: G/R

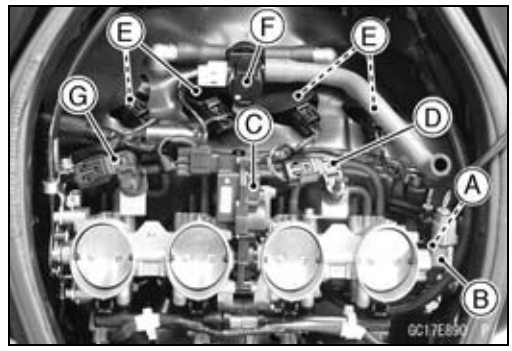
DFI System

30. Water Temperature Sensor: W/G
31. External Communication Line (Immobilizer System (Equipped Models)/*KDS): LG/BK
32. Unused
33. Oxygen Sensor (Equipped Models): BL/Y
34. Starter Button: R/BK
35. Ground for Exhaust Butterfly Valve Actuator: P
36. CAN Communication Line (Low): LB
37. CAN Communication Line (High): GY/BL
38. Ground for Control System: BK/BL
39. Ground for Fuel System: BK/Y
40. Fuel Injector #3: BL/O
41. Fuel Injector #2: BL/R
42. Fuel Injector #1: BL/BK
43. Stick Coil #4: BK/G
44. Stick Coil #1: BK
45. Starter Lockout Switch: R/G
46. Sidestand Switch: G/BK
47. Unused
48. External Communication Line (Immobilizer System (Equipped Models)/*KDS): GY/W
49. Ground for Sensors: G
50. Radiator Fan Relay: Y/BL
51. Oxygen Sensor Heater (Equipped Models): P/BK
52. Unused
53. Unused
54. Fuel Injector #4: BL/G
55. Stick Coil #2: BK/R
56. Engine Stop Switch: R
57. Unused
58. Unused
59. Crankshaft Sensor (–): Y/BK
60. Crankshaft Sensor (+): Y
61. Purge Valve (CAL Model): R/Y
62. Air Switching Valve: R/BL
63. Unused
64. Unused
65. Ground for Ignition System: BK/Y
66. Stick Coil #3: BK/O

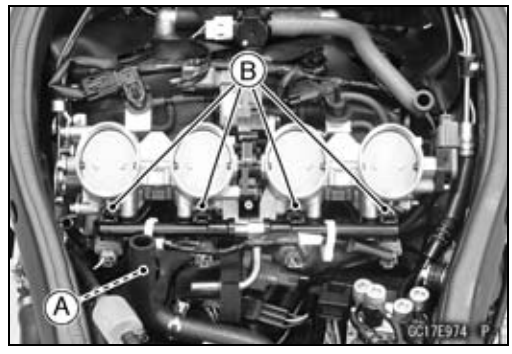
*: KDS (Kawasaki Diagnostic System)

DFI Parts Location

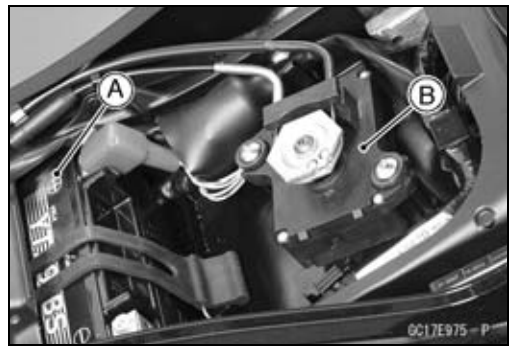
Main Throttle Sensor [A]
Subthrottle Sensor [B]
Subthrottle Valve Actuator [C]
Intake Air Pressure Sensor #2 [D]
Stick Coils #1, #2, #3, #4 [E]
Air Switching Valve [F]
Intake Air Pressure Sensor #1 [G]



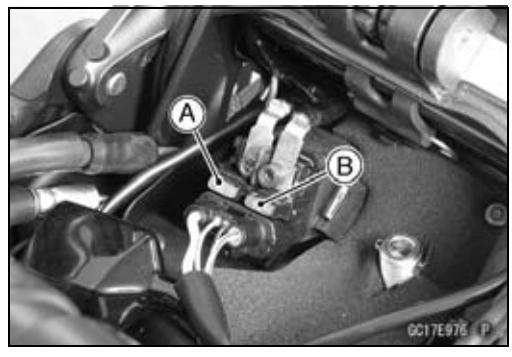
Water Temperature Sensor [A]
Fuel Injectors #1, #2, #3, #4 [B]



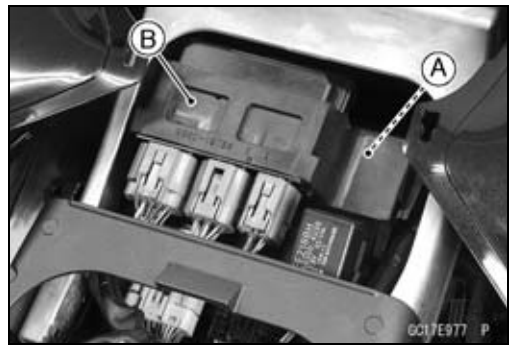
Battery 12 V 8 Ah [A]
Exhaust Butterfly Valve Actuator [B]



Main Fuse 30 A [A]
ECU Fuse 15 A [B]

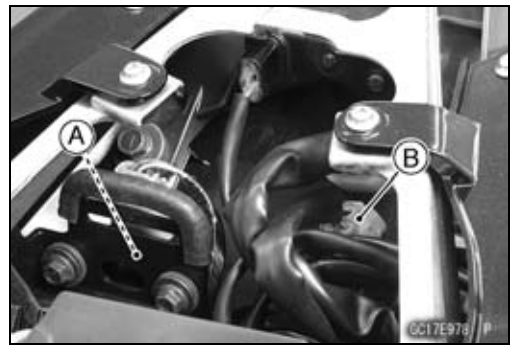


ECU [A]
Relay Box [B] (Fuel Pump Relay, Radiator Fan Relay)

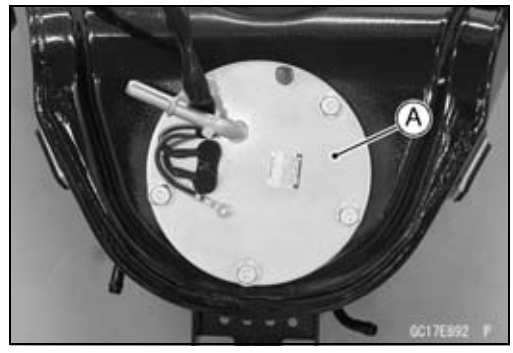


DFI Parts Location

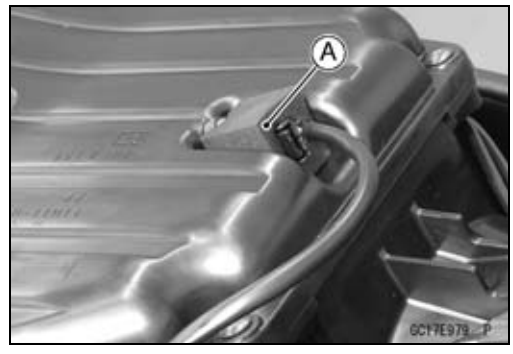
Vehicle-down Sensor [A]
Immobilizer (Equipped Models)/Kawasaki Diagnostic System Connector [B]



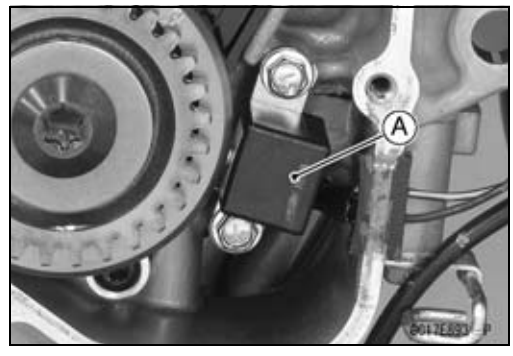
Fuel Pump [A]



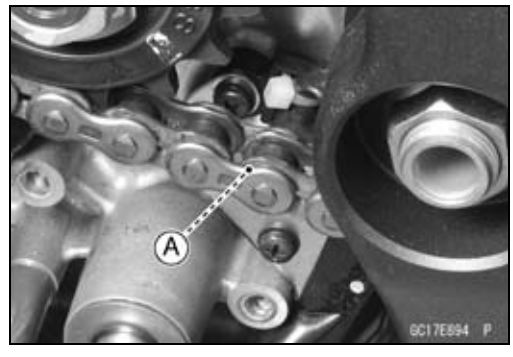
Intake Air Temperature Sensor [A]



Crankshaft Sensor [A]

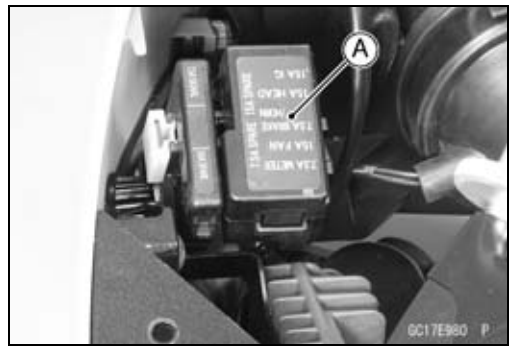


Gear Position Switch [A]

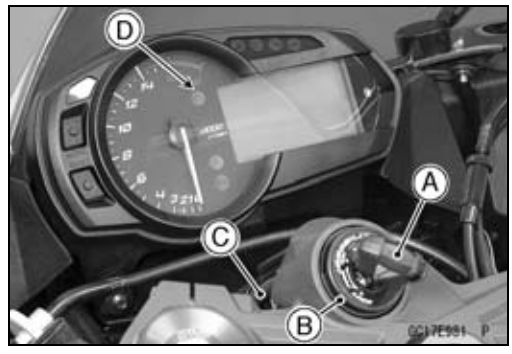


DFI Parts Location

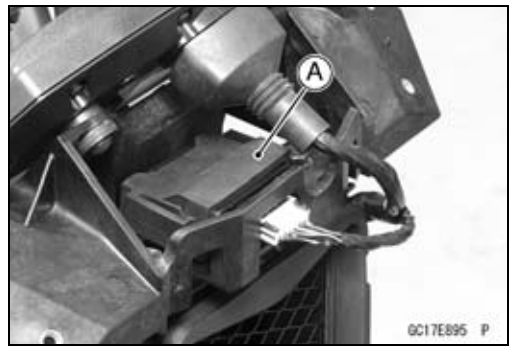
Fuse Box 1 [A]



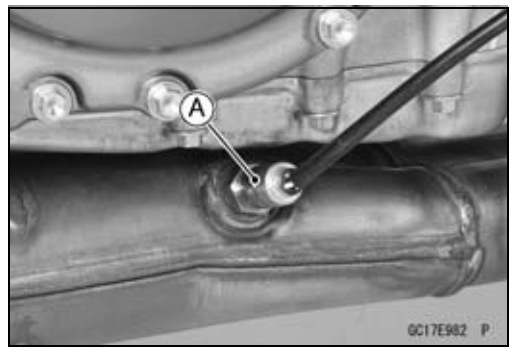
Ignition Key [A] (Transponder, Immobilizer System Equipped Models)
Immobilizer Antenna [B] (Equipped Models)
Ignition Switch [C]
Yellow Engine Warning Indicator Light (LED) [D]



Immobilizer Amplifier [A] (Equipped Models)



Oxygen Sensor [A] (Equipped Models)

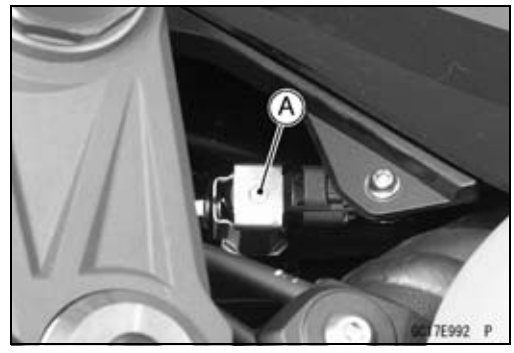


Front Wheel Rotation Sensor [A]

DFI Parts Location

Rear Wheel Rotation Sensor [A]

Purge Valve [A] (CAL Model)

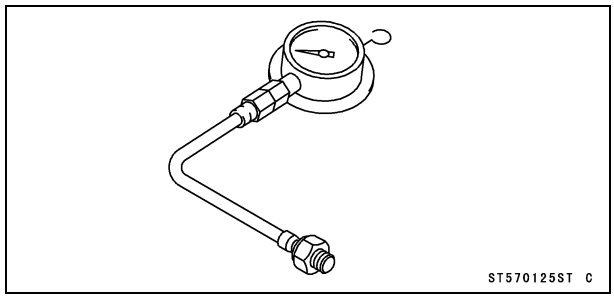


Specifications

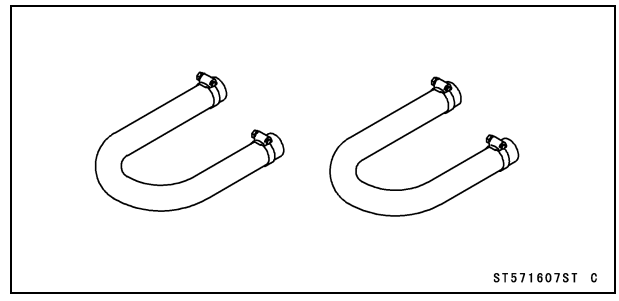
Item	Standard
Digital Fuel Injection System	
Idle Speed	1 300 ±50 r/min (rpm)
Throttle Body Assy:	
Throttle Valve	Dual throttle valve
Bore	ϕ38 mm (1.5 in.)
Throttle Body Vacuum	33.4 ±1.33 kPa (251 ±10 mmHg)
Bypass Screws (Turn Out)	0 ~ 2 1/2 (for reference)
ECU:	
Make	DENSO
Type	Digital memory type, with built in IC igniter, sealed with resin
Fuel Pressure (High Pressure Line)	294 kPa (3.0 kgf/cm², 43 psi) with engine idling
Fuel Pump:	
Type	Wesco pump
Discharge	50 mL (1.7 US oz.) or more for 3 seconds
Fuel Injectors:	
Type	EAT289
Nozzle Type	Fine atomizing type with 8 holes
Resistance	About 11.7 ~ 12.3 Ω @20°C (68°F)
CAN Communication Line:	
Resistance	118 ~ 122 Ω at ECU connector
Throttle Grip and Cables	
Throttle Grip Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)
Air Cleaner	
Element	Viscous paper element

Special Tools and Sealant

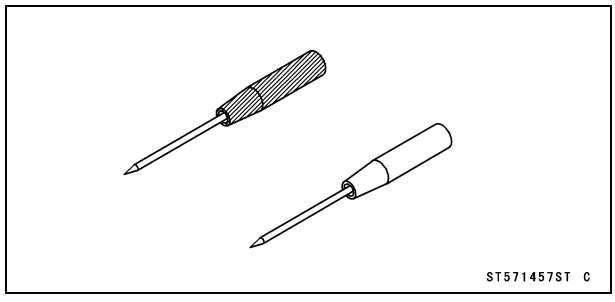
Oil Pressure Gauge, 5 kgf/cm²:
57001-125



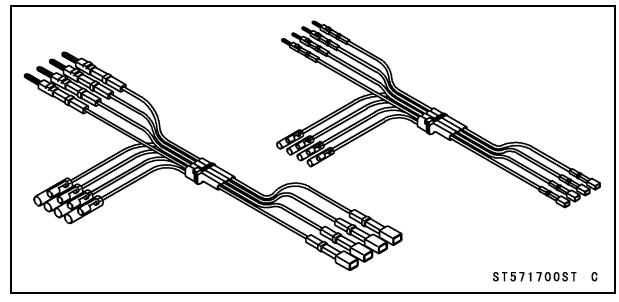
Fuel Hose:
57001-1607



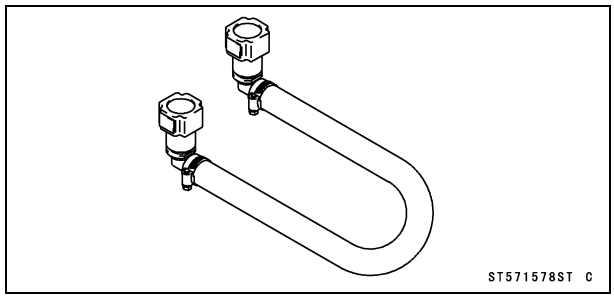
Needle Adapter Set:
57001-1457



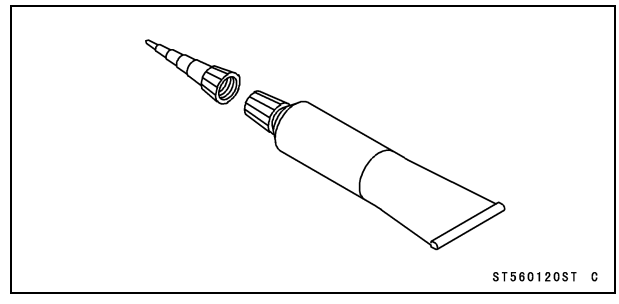
Measuring Adapter:
57001-1700



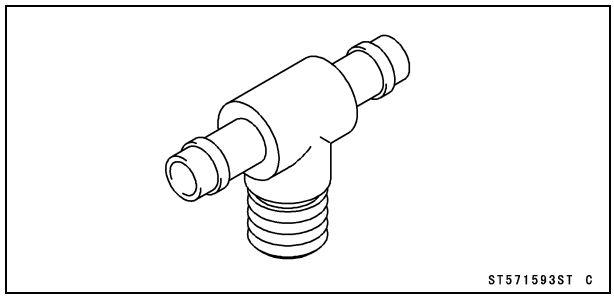
Extension Tube:
57001-1578



Liquid Gasket, TB1211:
56019-120



Fuel Pressure Gauge Adapter:
57001-1593

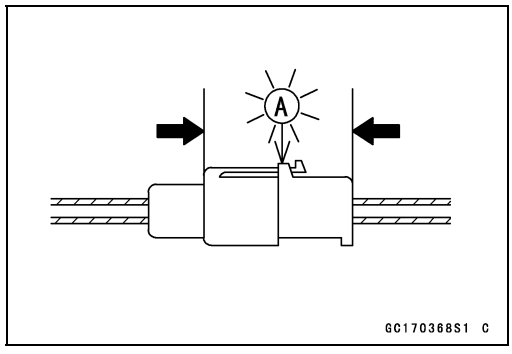


DFI Servicing Precautions

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 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.

- Whenever the DFI electrical connections are to be disconnected, first turn off the ignition 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.
- Connect these connectors until they click [A].

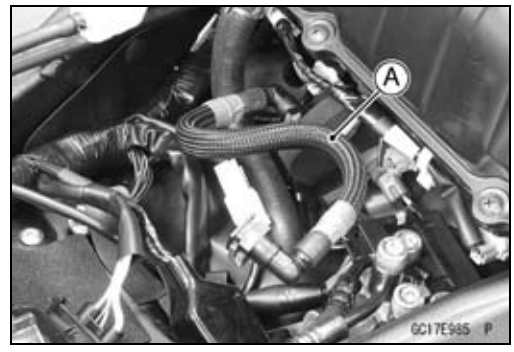


- Do not turn the ignition switch on while any of the DFI electrical connectors are disconnected. The ECU memorizes service codes.
- Do not spray water on the electrical parts, DFI parts, connectors, leads and wiring.
- If a transceiver is installed on the motorcycle, make sure that the operation of 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 switch. 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.
- When installing the fuel hoses, avoid sharp bending, kinking, flattening or twisting, and run the fuel hoses with a minimum of bending so that the fuel flow will not be obstructed.
- Run the hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.
- To prevent corrosion and deposits in the fuel system, do not add to fuel any fuel antifreeze chemicals.

DFI Servicing Precautions

○If the motorcycle is not properly handled, the high pressure inside the fuel line can cause fuel to leak or the hose to burst. Remove the fuel tank (see Fuel Tank Removal) and check the fuel hose [A].

★Replace the fuel hose if any fraying, cracks or bulges are noticed.



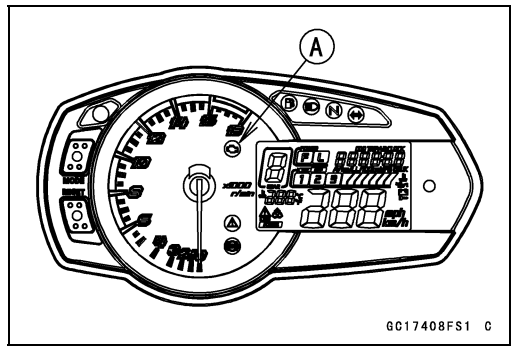
○To maintain the correct fuel/air mixture (F/A), there must be no intake air leaks in the DFI system. Be sure to install the oil filler plug [A] after filling the engine oil.

Torque - Oil Filler Plug: Hand-tighten

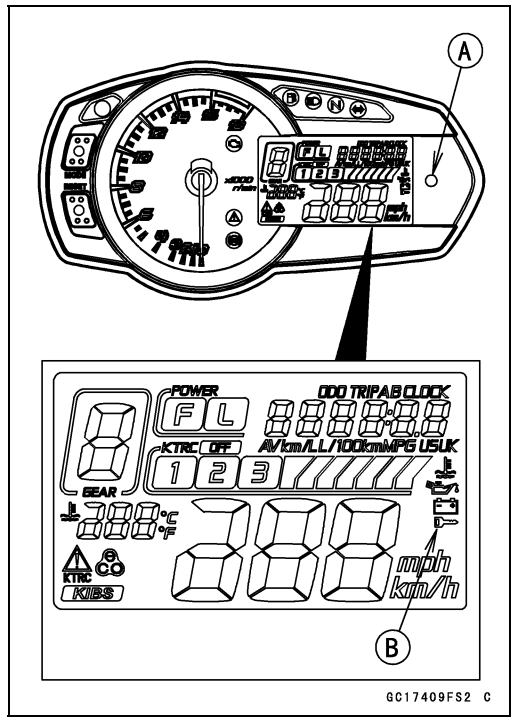
Troubleshooting the DFI System

Outline

When a problem occurs with DFI system, the yellow engine warning indicator light (LED) [A] goes on to alert the rider.



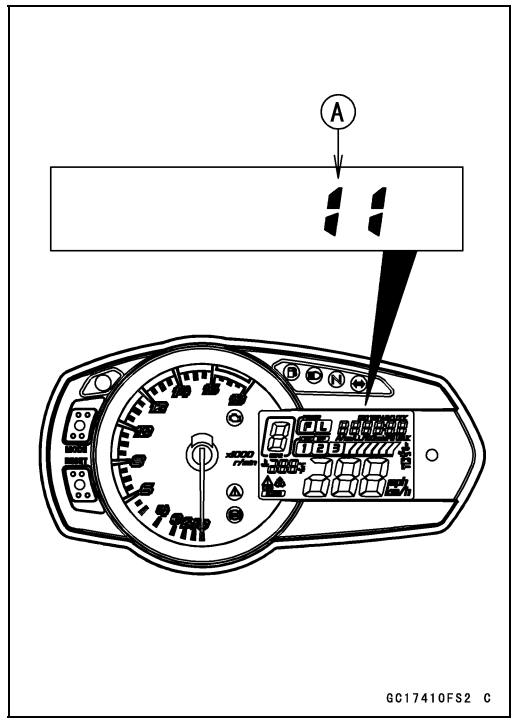
For models equipped with an immobilizer system, the red warning indicator light (LED) [A] and immobilizer warning symbol [B] blink, when a problem occurs in the system.



With the engine stopped and turned in the self-diagnosis mode, the service code [A] is displayed on the LCD (Liquid Crystal Display) by the number of two digits.

If the problem is with the following parts, the ECU can not recognize these problem. Therefore, the yellow engine warning indicator light (LED) does not go on, and service code is not displayed.

Fuel Pump
Fuel Pump Relay
Fuel Injectors
Stick Coil Secondary Wiring and Ground Wiring
ECU Main Relay

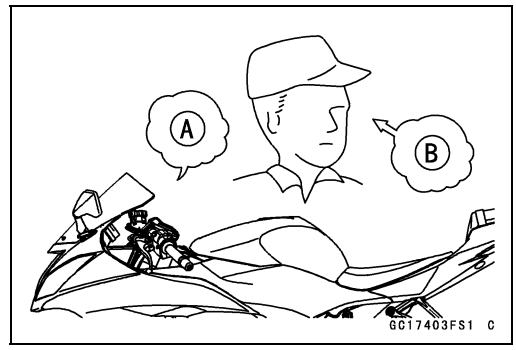


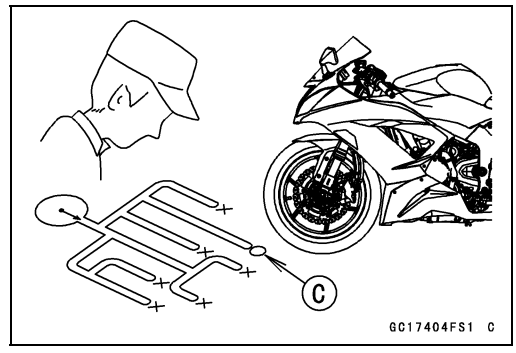
Troubleshooting the DFI System

When the service code [A] is displayed, for first ask the rider about the conditions [B] of trouble, and then start to determine the cause [C] of problem.

As a pre-diagnosis inspection, check the ECU for ground and power supply, the fuel line for no fuel leaks, and for correct pressure. The pre-diagnosis items are not indicated by the yellow engine warning indicator light (LED).

Don't rely solely on the DFI self-diagnosis function, use common sense.





Even when the DFI system is operating normally, the yellow engine warning indicator light (LED) goes on may be displayed under strong electrical interference. Additional measures are not required. Turn the ignition switch off to stop the indicator light.

If the yellow engine warning indicator light (LED) of the motorcycle brought in for repair still goes on, check the service code.

When the repair has been done, the yellow engine warning indicator light (LED) goes off. But the service codes stored in memory of the ECU are not erased to preserve the problem history. The problem history can be referred using the KDS (Kawasaki Diagnostic System) when solving unstable problems.

When the motorcycle is down, the vehicle-down sensor operates and the ECU shuts off the fuel pump relay, fuel injectors and ignition system. The ignition switch is left on. If the starter button is pushed, the electric starter turns but the engine does not start. When the starter button is pushed, the yellow engine warning indicator light (LED) blinks but the service code is not displayed. To start the engine again, raise the motorcycle, turn the ignition switch off, and then on.

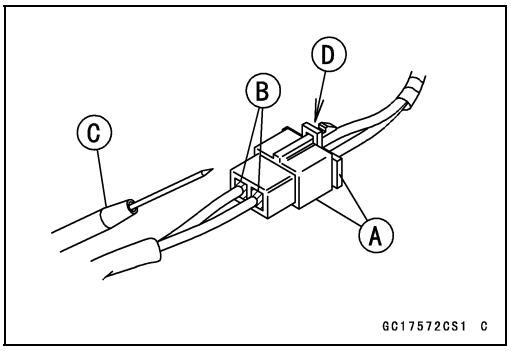
Much of the DFI system troubleshooting work consists of confirming continuity of the wiring. The DFI parts are assembled and adjusted with precision, and it is impossible to disassemble or repair them.

Troubleshooting the DFI System

- When checking the DFI parts, use a digital meter which can be read two decimal place voltage or resistance.

○The DFI part connectors [A] have seals [B], including the ECU. When measuring the input or output voltage with the connector joined, use the needle adapter set [C]. Insert the needle adapter inside the seal until the needle adapter reaches the terminal.

Special Tool - Needle Adapter Set: 57001-1457



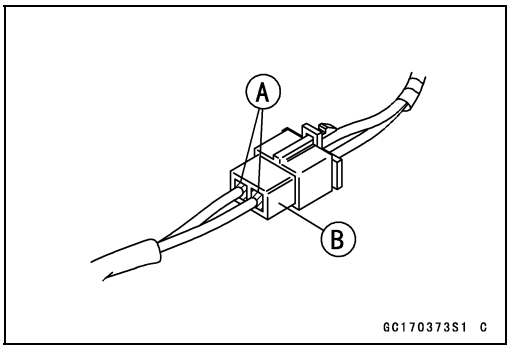
NOTICE
Insert the needle adapter straight along the terminal in the connector to prevent short-circuit between terminals.

- 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 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 switch on and measure the voltage with the connector joined.

NOTICE
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.

Sealant - Liquid Gasket, TB1211: 56019-120



- 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 the 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.

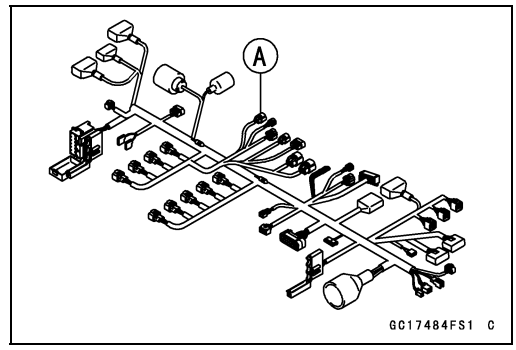
★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it. Connect the connectors securely.

- Check the wiring for continuity.

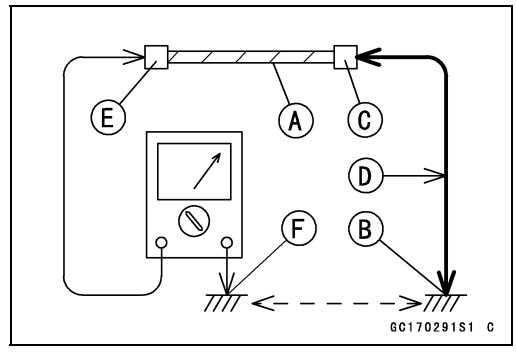
○Use the wiring diagram to find the ends of the lead which is suspected of being a problem.

○Connect a tester between the ends of the leads.

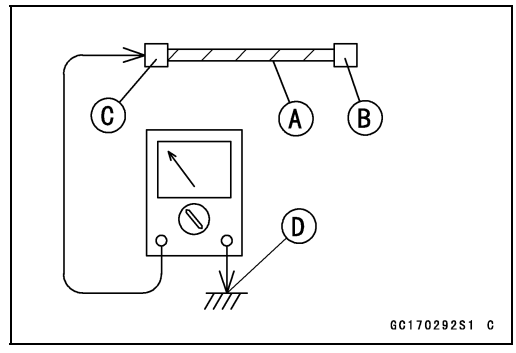
★If the tester does not read 0 Ω, the lead is defective. Replace the lead or the main harness.



○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.

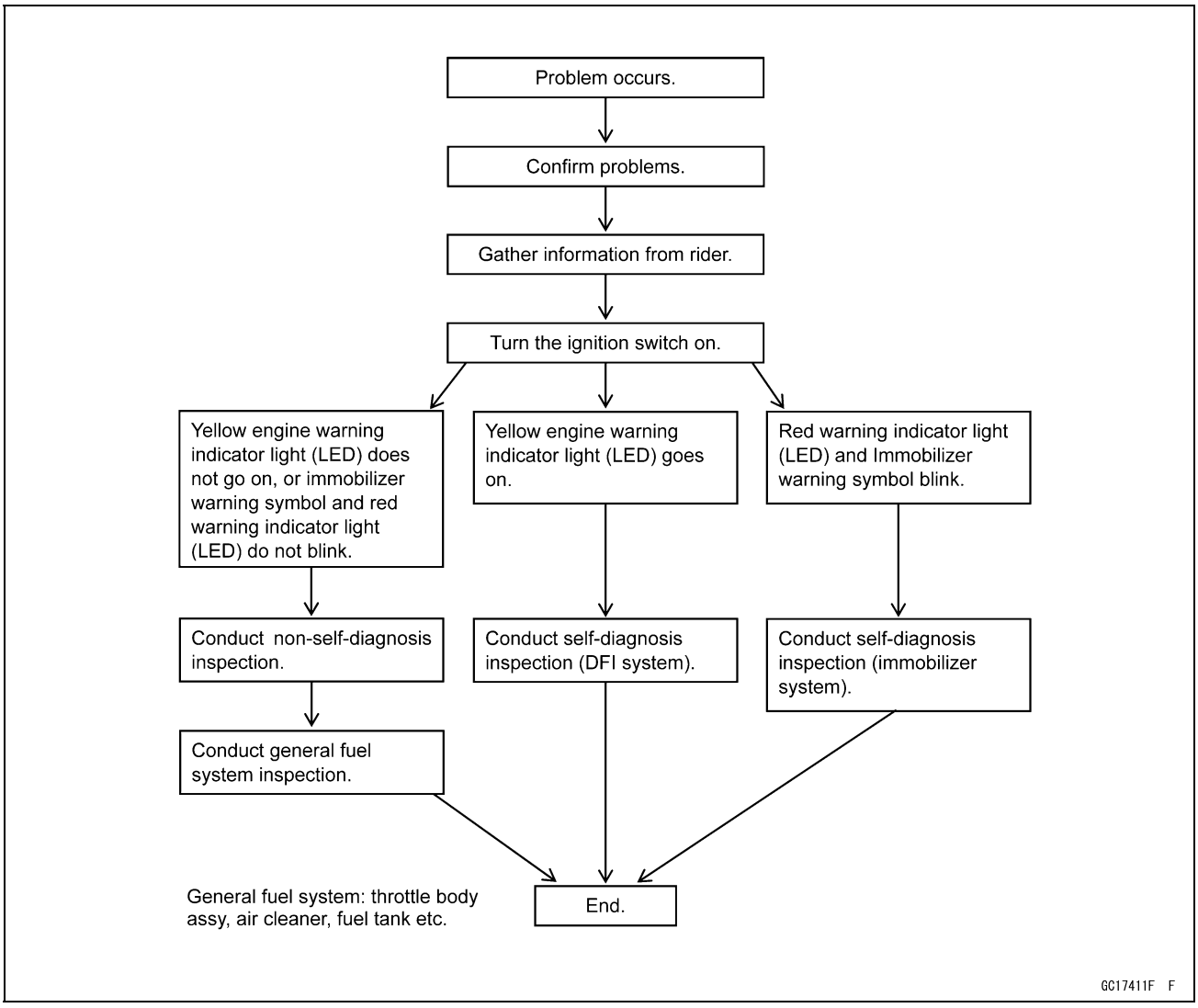
★If no abnormality is found in the wiring or connectors, the DFI parts are the next likely suspects. Check the part, starting with input and output voltages. However, there is no way to check the ECU itself.

★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.

Troubleshooting the DFI System

DFI Diagnosis Flow Chart



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, ☐ other:	
Problem frequency	☐ chronic, ☐ often, ☐once	
Road	☐ street, ☐ highway, ☐ mountain road (☐ uphill, ☐ downhill), ☐ bumpy, ☐ pebble	
Altitude	☐ normal, ☐ high (about 1 000 m or more)	
Motorcycle conditions when problem occurred.		
Yellow engine warning indicator light (LED)	☐ goes on immediately after turning the ignition switch on, and goes off after about 1 second (normal)	
	☐ goes on immediately after turning the ignition switch on, goes off after about 1 second, and goes on again after about 4 seconds (ECU communication error)	
	☐ goes on immediately after turning the ignition switch on, and stays on [DFI problem]	
	☐ does not go on after turning the ignition switch on [light (LED), meter unit fault]	
Red warning indicator light (LED)	☐ Starts blinking about 1 seconds after ignition switch on, and the immobilizer warning symbol on the LCD starts blinking (immobilizer system problem).	
	☐ Does not go on about 1 seconds after ignition switch on (meter unit fault).	
	☐ light up (battery, oil pressure, water temperature, immobilizer or meter unit problem)	
Starting difficulty	☐ starter motor not rotating.	
	☐ starter motor rotating but engine do not turn over.	
	☐ starter motor and engine do not turn over.	
	☐ no fuel flow (☐ no fuel in tank, ☐ no fuel pump sound).	
	☐ no spark.	
	☐ other:	
Engine stalls	☐ 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	☐ 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	☐ 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

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 in DFI system.*

○*The ECU may be involved in the DFI electrical and ignition system troubles. If these parts and circuits are 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 Won't Turn Over

Symptoms or possible Causes	Actions
Gear position, starter lockout or sidestand switch trouble	Inspect each switch (see chapter 16).
Immobilizer system trouble	Inspect (see chapter 17).
Vehicle-down sensor operated	Turn ignition switch off (see chapter 17).
Vehicle-down sensor trouble	Inspect (see chapter 17).
Crankshaft sensor trouble	Inspect (see chapter 16).
Stick coil shorted or not in good contact	Inspect or Reinstall (see chapter 16).
Stick coil trouble	Inspect (see chapter 16).
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 16).
Spark plug incorrect	Replace it with the correct plug (see chapter 2).
ECU ground and power supply trouble	Inspect (see chapter 3).
ECU trouble	Inspect (see chapter 3).
No or little fuel in tank	Supply fuel (see Owner's Manual).
Fuel injector trouble	Inspect and replace (see chapter 3).
Fuel pump not operating	Inspect (see chapter 3).
Fuel pump relay trouble	Inspect and replace (see chapter 3).
Fuel filter clogged	Replace fuel filter (see chapter 3).
Fuel pressure regulator trouble	Inspect fuel pressure and replace fuel pump (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).

Poor Running at Low Speed

Symptoms or Possible Causes	Actions
Spark weak:	
Stick coil shorted or not in good contact	Inspect or reinstall (see chapter 16).
Stick coil trouble	Inspect (see chapter 16).
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 16).
Spark plug incorrect	Replace it with the correct plug (see chapter 2).
ECU trouble	Inspect (see chapter 3).
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 2).
Air duct loose	Reinstall (see chapter 3).
Throttle body assy holder loose	Reinstall (see chapter 3).
Throttle body assy dust seal damage	Replace (see chapter 3).
Fuel injector O-ring damage	Replace (see chapter 3).
Fuel filter clogged	Replace fuel filter (see chapter 3).

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions
Fuel pressure regulator trouble	Inspect fuel pressure and replace fuel pump (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Intake air pressure sensor #1 trouble	Inspect (see chapter 17).
Intake air pressure sensor #2 trouble	Inspect (see chapter 17).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
Main throttle sensor trouble	Inspect (see chapter 17).
Subthrottle sensor trouble	Inspect (see chapter 17).
Subthrottle valve actuator trouble	Inspect (see chapter 17).
Unstable (rough) idling:	
Fuel pressure too low or too high	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 17).
Subthrottle sensor trouble	Inspect (see chapter 17).
Subthrottle valve actuator trouble	Inspect (see chapter 17).
Engine vacuum not synchronizing	Inspect and adjust (see chapter 2).
Intake air pressure sensor #1 trouble	Inspect (see chapter 17).
Intake air pressure sensor #2 trouble	Inspect (see chapter 17).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
Engine stalls easily:	
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 16).
Stick coil trouble	Inspect (see chapter 16).
Main throttle sensor trouble	Inspect (see chapter 17).
Subthrottle sensor trouble	Inspect (see chapter 17).
Subthrottle valve actuator trouble	Inspect (see chapter 17).
Intake air pressure sensor #1 trouble	Inspect (see chapter 17).
Intake air pressure sensor #2 trouble	Inspect (see chapter 17).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
Fuel pump trouble	Inspect (see chapter 3).
Fuel injector trouble	Inspect (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).
Fuel line clogged	Inspect and repair (see chapter 3).
Poor acceleration:	
Fuel pressure too low	Inspect (see chapter 3).
Water or foreign matter in fuel	Change fuel. Inspect and clean fuel system (see chapter 3).
Fuel filter clogged	Replace fuel filter (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 17).

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions
Subthrottle sensor trouble	Inspect (see chapter 17).
Subthrottle valve actuator trouble	Inspect (see chapter 17).
Intake air pressure sensor #1 trouble	Inspect (see chapter 17).
Intake air pressure sensor #2 trouble	Inspect (see chapter 17).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 16).
Stick coil trouble	Inspect (see chapter 16).
Stumble:	
Fuel pressure too low	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 17).
Subthrottle sensor trouble	Inspect (see chapter 17).
Subthrottle valve actuator trouble	Inspect (see chapter 17).
Intake air pressure sensor #1 trouble	Inspect (see chapter 17).
Intake air pressure sensor #2 trouble	Inspect (see chapter 17).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
Surge:	
Unstable fuel pressure	Fuel pressure regulator trouble (Inspect and replace fuel pump) or kinked fuel line (Inspect and replace fuel pump) (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 17).
Backfiring when deceleration:	
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 16).
Fuel pressure too low	Inspect (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 17).
Subthrottle sensor trouble	Inspect (see chapter 17).
Subthrottle valve actuator trouble	Inspect (see chapter 17).
Intake air pressure sensor #1 trouble	Inspect (see chapter 17).
Intake air pressure sensor #2 trouble	Inspect (see chapter 17).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
Air switching valve trouble	Inspect and replace (see chapter 16).
Air suction valve trouble	Inspect and replace (see chapter 5).
After fire:	
Spark plug burned or gap maladjusted	Replace (see chapter 2).
Fuel injector trouble	Inspect (see chapter 3).
Intake air pressure sensor #1 trouble	Inspect (see chapter 17).
Intake air pressure sensor #2 trouble	Inspect (see chapter 17).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions
Other:	
Intermittent any DFI fault and its recovery	Check that DFI connectors are clean and tight, and examine leads for signs of burning or fraying (see chapter 3).

Poor Running or No Power at High Speed

Symptoms or Possible Causes	Actions
Firing incorrect:	
Stick coil shorted or not in good contact	Inspect or Reinstall (see chapter 16).
Stick coil trouble	Inspect (see chapter 16).
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 16).
Spark plug incorrect	Replace it with the correct plug (see chapter 2).
ECU trouble	Inspect (see chapter 3).
Fuel/air mixture incorrect:	
Air cleaner clogged, poorly sealed, or missing	Clean element or inspect sealing (see chapter 2).
Air duct loose	Reinstall (see chapter 3).
Throttle body assy holder loose	Reinstall (see chapter 3).
Throttle body assy dust seal damage	Replace (see chapter 3).
Water or foreign matter in fuel	Change fuel. Inspect and clean fuel system (see chapter 3).
Fuel injector O-ring damage	Replace (see chapter 3).
Fuel injector clogged	Inspect and repair (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Fuel pump operates intermittently and often DFI fuse blows.	Fuel pump bearings may wear. Replace the fuel pump (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Intake air pressure sensor #1 trouble	Inspect (see chapter 17).
Intake air pressure sensor #2 trouble	Inspect (see chapter 17).
Cracked or obstructed intake air pressure sensor #1 and #2 vacuum hoses	Inspect and repair or replace (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
Main throttle sensor trouble	Inspect (see chapter 17).
Subthrottle sensor trouble	Inspect (see chapter 17).
Subthrottle valve actuator trouble	Inspect (see chapter 17).
Knocking:	
Fuel poor quality or incorrect	Fuel change (Use the gasoline recommended in the Owner's Manual).
Spark plug incorrect	Replace it with the correct plug (see chapter 2).
Stick coil trouble	Inspect (see chapter 16).
ECU trouble	Inspect (see chapter 3).
Engine vacuum not synchronizing	Inspect and adjust (see chapter 2).
Intake air pressure sensor #1 trouble	Inspect (see chapter 17).
Intake air pressure sensor #2 trouble	Inspect (see chapter 17).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions
Miscellaneous:	
Subthrottle sensor trouble	Inspect (see chapter 17).
Subthrottle valve actuator trouble	Inspect (see chapter 17).
Throttle valves will not fully open	Inspect throttle cables and lever linkage (see chapter 3).
Engine overheating - Water temperature sensor or crankshaft sensor trouble	(see Overheating of Troubleshooting Guide in chapter 18)
Air switching valve trouble	Inspect and replace (see chapter 16).
Air suction valve trouble	Inspect and replace (see chapter 5).
Exhaust Smokes Excessively:	
(Black smoke)	
Air cleaner element clogged	Clean element (see chapter 2).
Fuel pressure too high	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
(Brown smoke)	
Air duct loose	Reinstall (see chapter 3).
Fuel pressure too low	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).

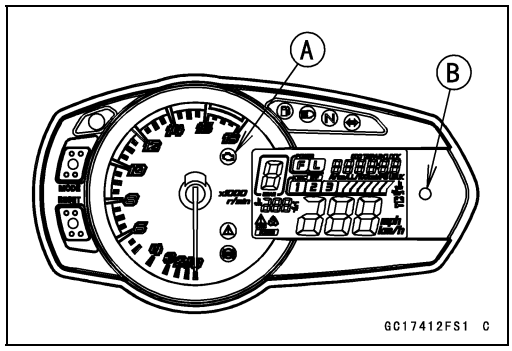
Warning Indicator Light (LED)

Yellow Engine Warning/Red Warning Indicator Light (LED) Inspection

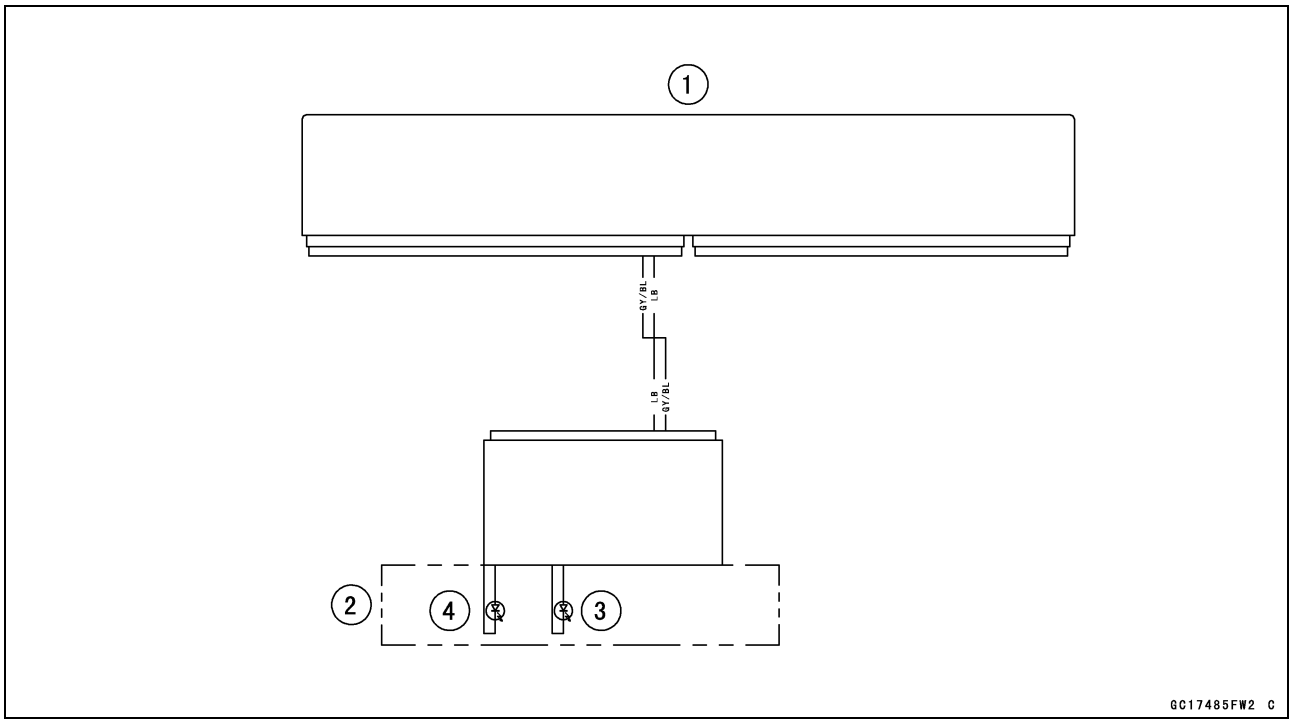
Yellow Engine Warning Indicator Light (LED) [A]
Red Warning Indicator Light (LED) [B]

○In this model, the above mentioned warning indicator lights (LED) go on or blink by the data sent from the ECU.

● Refer to the Meter Operation Inspection in the Electrical System chapter.



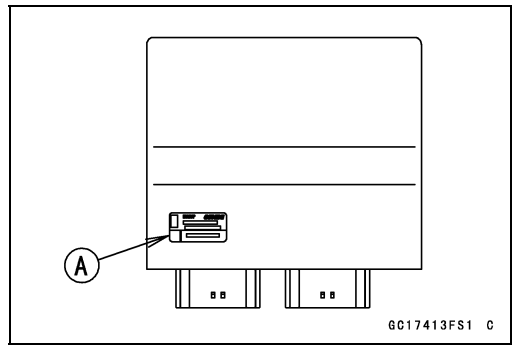
Warning Indicator Light (LED) Circuit



1. ECU
2. Meter Unit
3. Red Warning Indicator Light (LED)
4. Yellow Engine Warning Indicator Light (LED)

ECU

ECU Identification



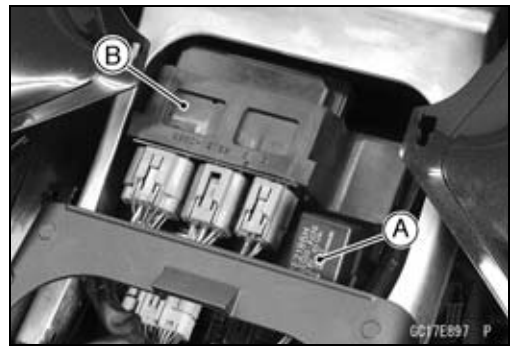
○Most countries have their own regulations, so each ECU has different characteristic. So, do not confuse ECU with each other and use only the ECU for your model. Otherwise, the motorcycle cannot clear the regulation.

ECU Identification

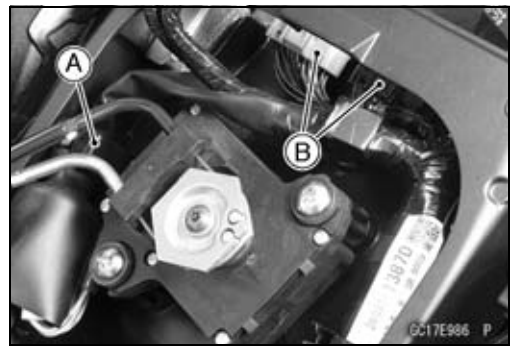
Part Number [A]	Specification
21175-0810	US, without Immobilizer
	CA, without Immobilizer
21175-0811	AU, with Immobilizer
	ID, with Immobilizer
	WVTA (FULL), with Immobilizer
	GB WVTA (FULL), with Immobilizer
	Euro 3, with Immobilizer
21175-0812	CAL, without Immobilizer
21175-0813	SEA, with Immobilizer
21175-0814	WVTA (78.2), with Immobilizer
21175-0835	BR, with Immobilizer

ECU Removal

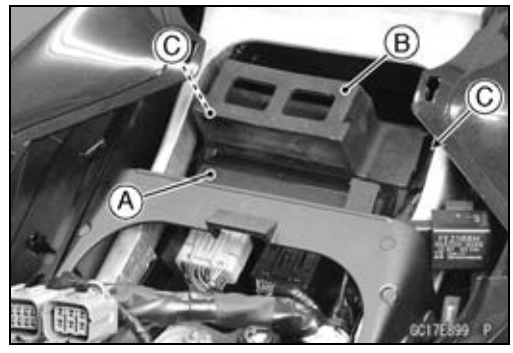
NOTICE
Never drop the ECU especially on a hard surface. Such a shock to the ECU can damage it.



- Remove the front seat cover (see Seat Cover Removal in the Frame chapter).
- Remove the turn signal relay [A] from the rear fender.
- Remove the relay box [B] from the rubber protector.



- Open the clamp [A].
- Disconnect the ECU connectors [B].

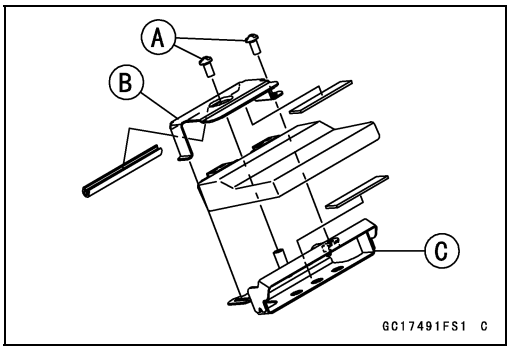


- Remove:
  ECU [A] (with Rubber Protector [B])

○Lift up the ECU with rubber protector to clear the projections [C].

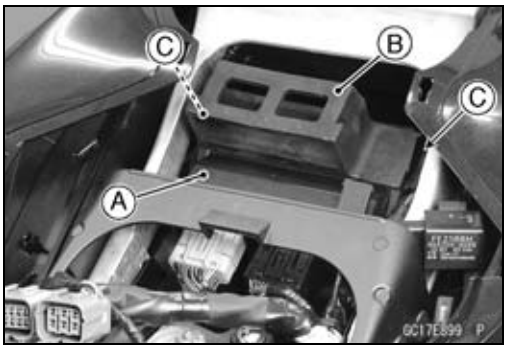
ECU

● For GB WVTA (FULL) and WVTA (78.2) models, note the following.
○Using a small chisel or other suitable tool, remove the screws [A].
○Remove:
Upper Guard [B]
Lower Guard [C]

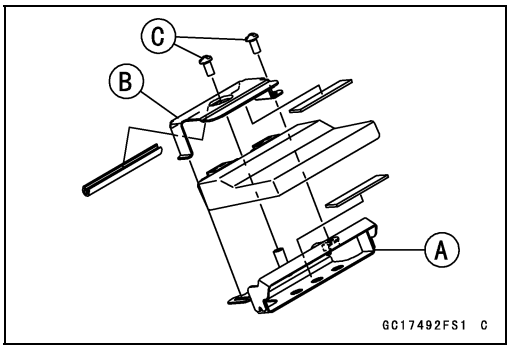


ECU Installation

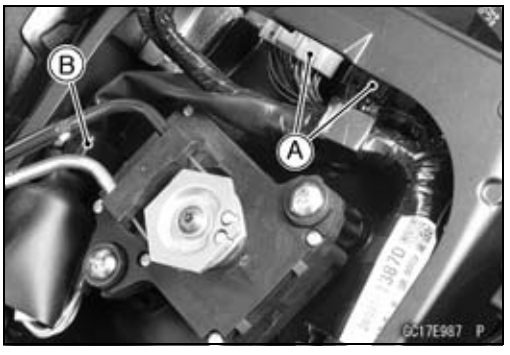
● Install:
ECU [A] (in Rubber Protector [B])
○Insert the slits of the rubber protector to the projections [C] of the rear fender.



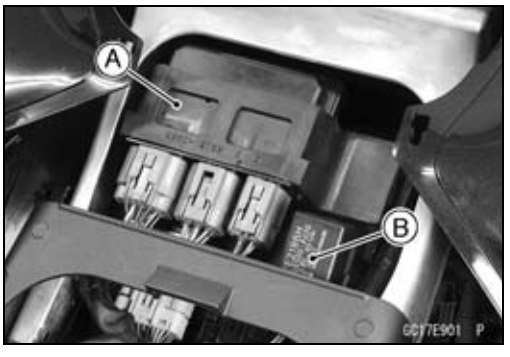
● For GB WVTA (FULL) and WVTA (78.2) models, note the following.
○Install:
Lower Guard [A]
Upper Guard [B]
○Tighten the new screws [C] using the Kawasaki genuine screws of which threads are coated with locking agent.



● Connect the ECU connectors [A].
● Hold the main harness to the clamp [B].

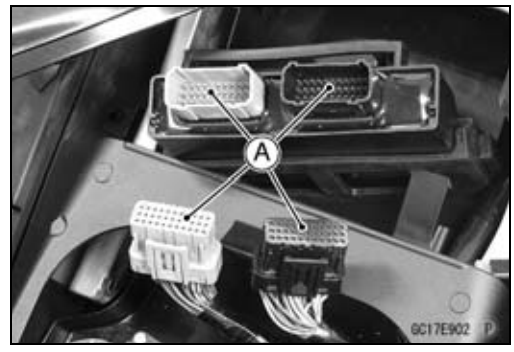


● Install:
Relay Box [A]
Turn Signal Relay [B]
Front Seat Cover (see Seat Cover Installation in the Frame chapter)



ECU

ECU Power Supply Inspection



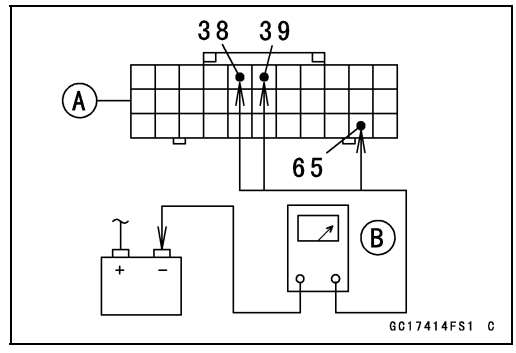
- Remove the front seat cover (see Seat Cover Removal in the Frame chapter).
- Visually inspect the ECU connectors.

★If the connector is clogged with mud or dust, blow it off with compressed air.

- Remove the ECU (see ECU Removal).
- Visually inspect the terminals [A] of the ECU and main harness connectors.

★If the terminals of the main harness connectors are damaged, replace the main harness.

★If the terminals of the ECU connectors are damaged, replace the ECU.



- Turn the ignition switch off.
- Disconnect the ECU connectors.
  Gray Connector [A]
- Set a tester [B] and check the following wiring for continuity.

ECU Grounding Inspection
Connections:

(I) BK/Y leads (ECU terminal 39 or 65) BK/BL leads (ECU terminal 38) ←→ **Battery (–) Terminal**

(II) Engine Ground ←→ **Battery (–) Terminal**

Criteria:

Both: 0 Ω

★If no continuity, check the connectors, the engine ground lead, or main harness, and repair or replace them if necessary.

ECU

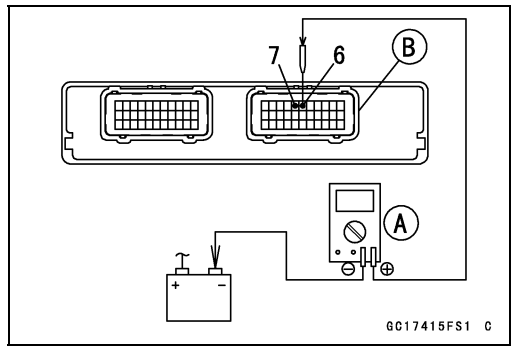
★If the wiring is good, check the power source voltage of the ECU.

NOTE

○*Be sure the battery is fully charged.*

- Connect the ECU connectors.
- Connect a digital meter [A] to the connector (black) [B] with the needle adapter set.

Special Tool - Needle Adapter Set: 57001-1457



ECU Power Supply Inspection

Connections:

(I) Digital Meter (+) → Terminal 6 (BR/W)

Digital Meter (–) → Battery (–) terminal

(II) Digital Meter (+) → Terminal 7 (W/BK)

Digital Meter (–) → Battery (–) terminal

Ignition Switch OFF:

Terminal 6 (BR/W): 0 V

Terminal 7 (W/BK): Battery Voltage

Ignition Switch ON:

All: Battery Voltage

★If the reading is out of the specification, check the following.

Main Fuse 30 A (see Fuse Inspection in the Electrical System chapter)

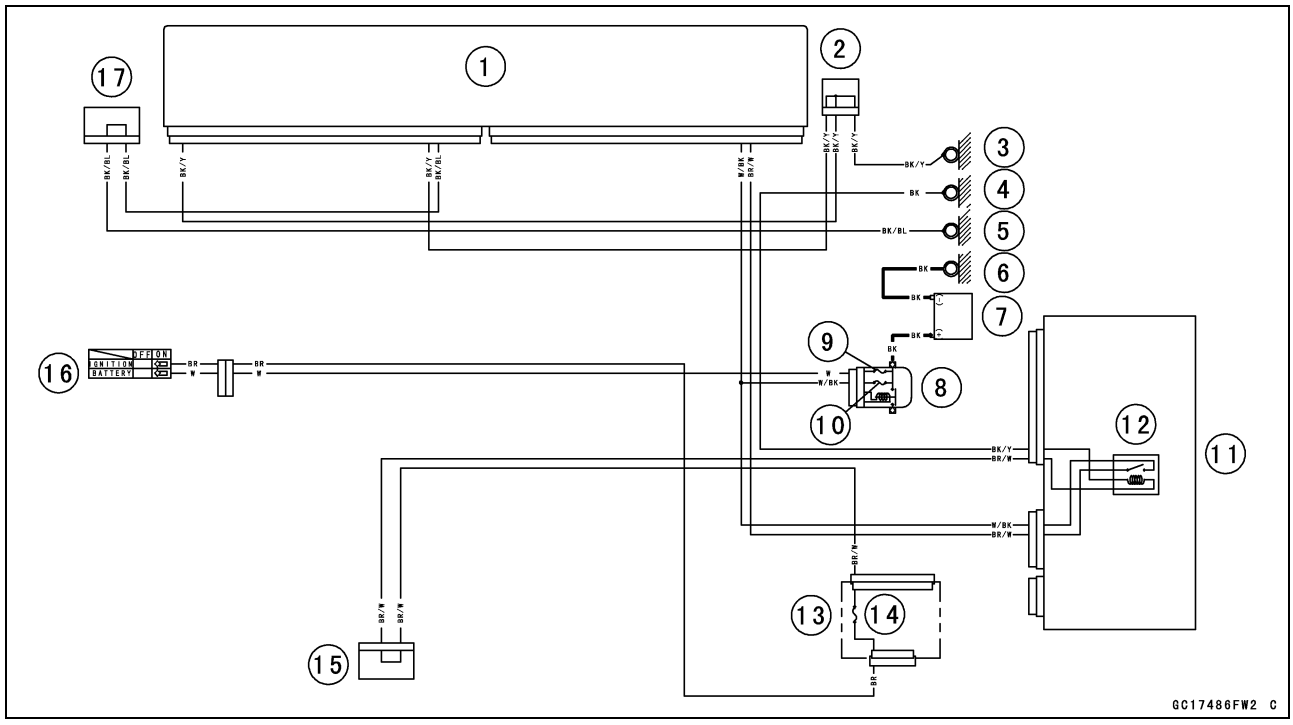
ECU Fuse 15 A (see Fuse Inspection in the Electrical System chapter)

ECU Main Relay (see Relay Circuit Inspection in the Electrical System chapter)

Power Source Wiring (see wiring diagram in this section)

ECU

ECU Power Source Circuit



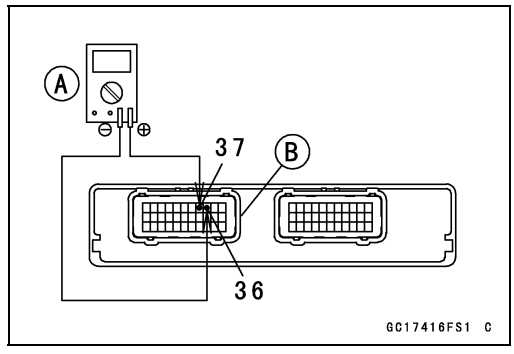
1. ECU
2. Joint Connector C
3. Frame Ground 2
4. Frame Ground 3
5. Frame Ground 1
6. Engine Ground
7. Battery 12 V 8 Ah
8. Starter Relay
9. Main Fuse 30 A
10. ECU Fuse 15 A
11. Relay Box
12. ECU Main Relay
13. Fuse Box 1
14. Ignition Fuse 15 A
15. Joint Connector E
16. Ignition Switch
17. Joint Connector D

CAN Communication Line

CAN Communication Line Resistance Inspection

○In this model, resistors for CAN communication line are built in the ECU [A] and meter unit.

- Refer to the Meter Unit Inspection in the Electrical System chapter for the resistor in the meter unit.
- Turn the ignition switch off.
- Remove:
  ECU (see ECU Removal)



- Connect a digital meter [A] to the ECU connector (gray) [B].
- Measure the resistance of the CAN communication line resistor.

CAN Communication Line Resistance (at ECU Connector)

Connections: Terminal 36 ←→ Terminal 37

Standard: 118 ~ 122 Ω

★If the reading is out of the range, replace the ECU (see ECU Removal/Installation).

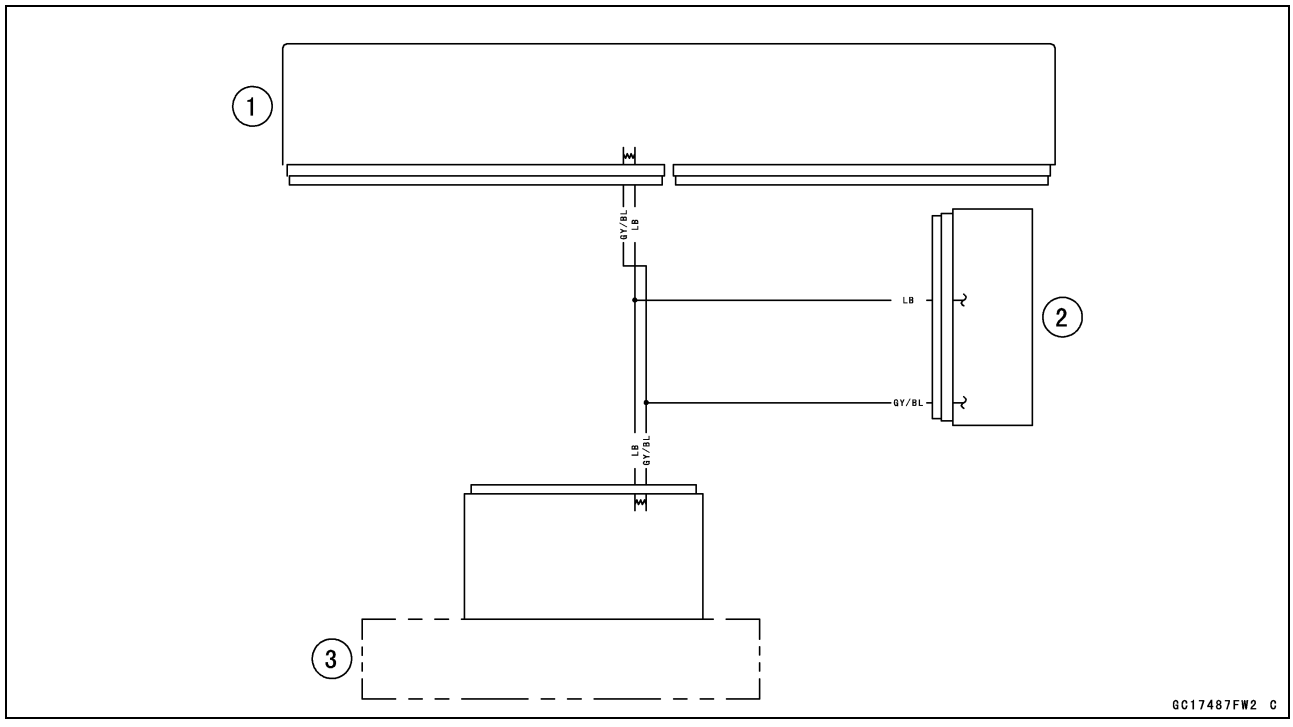
★If the reading is within the range, resistor of the ECU for CAN communication line is normal.

- Check the wiring for continuity of the CAN communication line (see wiring diagram in this section).

★If the wiring is open, repair or replace the main harness.

CAN Communication Line

CAN Communication Line Circuit



1. ECU
2. ABS Hydraulic Unit (Equipped Models)
3. Meter Unit

DFI Power Source

ECU Fuse Removal

- Refer to the 30 A Main/15 A ECU Fuse Removal in the Electrical System chapter.

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 Fuse Installation in the Electrical System chapter.

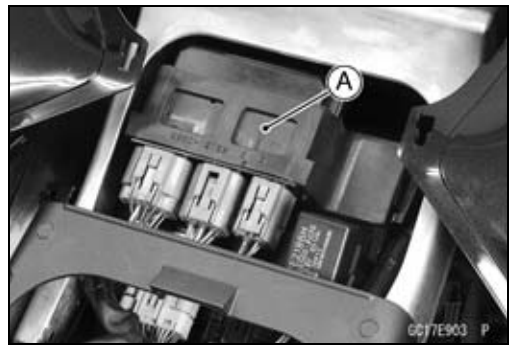
ECU Fuse Inspection

- Refer to the Fuse Inspection in the Electrical System chapter.

ECU Main Relay Removal/Installation

○The ECU main relay is built in the relay box [A].

- Refer to the Relay Box Removal in the Electrical System chapter.

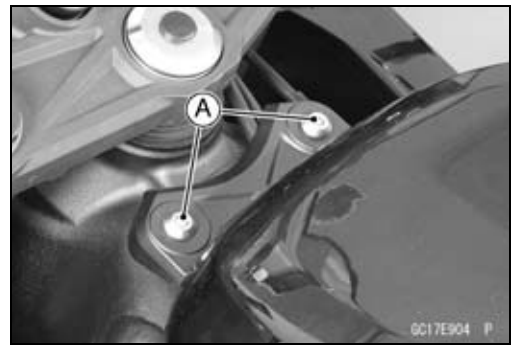


ECU Main Relay Inspection

- Refer to the Relay Circuit Inspection in the Electrical System chapter.

Fuel Line

Fuel Pressure Inspection



NOTE

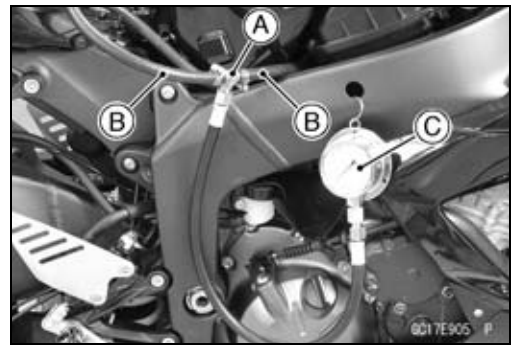
○*Be sure the battery is fully charged.*

- Remove:
  Fuel Tank Bolts [A]
  Fuel Hose (see Fuel Hose Replacement in the Periodic Maintenance chapter)

○Be sure to place a piece of cloth around the fuel outlet pipe of the fuel pump and the delivery pipe of the throttle body assy.

⚠ WARNING

Fuel is flammable and explosive under certain conditions and can cause severe burns. 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] and fuel hoses (Special Tool: 57001-1607) [B] between the fuel outlet pipe and delivery pipe.
- Secure the fuel hoses with the clamps.
- Connect the pressure gauge [C] to the fuel pressure gauge adapter.

Special Tools - Oil Pressure Gauge, 5 kgf/cm²: 57001-125
Fuel Pressure Gauge Adapter: 57001-1593
Fuel Hose: 57001-1607

⚠ WARNING

Fuel is extremely flammable and can be explosive under certain conditions resulting in serious injury or death. Do not try to start the engine with the fuel hoses disconnected.

- Turn the engine stop switch run position.
- Turn the ignition switch on.

○The fuel pump should operate for 3 seconds, and then should stop.

NOTE

○*After turning on the engine stop switch and ignition switch, inspect the fuel leakage from the connected portion of the special tools.*

NOTICE

Do not drive the fuel pump for 3 seconds or more without the fuel in the fuel tank. If the fuel pump is driven without the fuel, it may be damaged.

- Start the engine, and let it idle.
- Measure the fuel pressure with the engine idling.

Fuel Pressure (with Engine Idling)
Standard: 294 kPa (3.0 kgf/cm², 43 psi)

Fuel Line

NOTE

○*The gauge needle will fluctuate. Read the pressure at the average of the maximum and minimum indications.*

- Turn the ignition switch off.

★If the fuel pressure is much higher than specified, replace the fuel pump because the fuel pressure regulator in the fuel pump have been clogged or stuck.

★If the fuel pressure is much lower than specified, check the following.

Fuel Line Leakage (see Fuel Injector Fuel Line Inspection)

Amount of Fuel Flow (see Fuel Flow Rate Inspection)

- After above checks, measure the fuel pressure again.
- Remove the fuel pressure gauge, hoses and adapter.
- Install:

Fuel Hose (see Fuel Hose Replacement in the Periodic Maintenance chapter)

Fuel Tank (see Fuel Tank Installation)

- Start the engine and check for fuel leakage.

Fuel Flow Rate Inspection

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. 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.

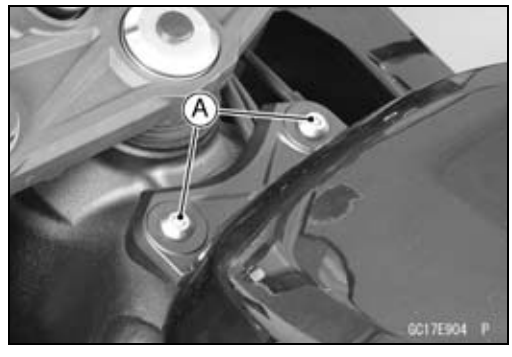
NOTE

○*Be sure the battery is fully charged.*

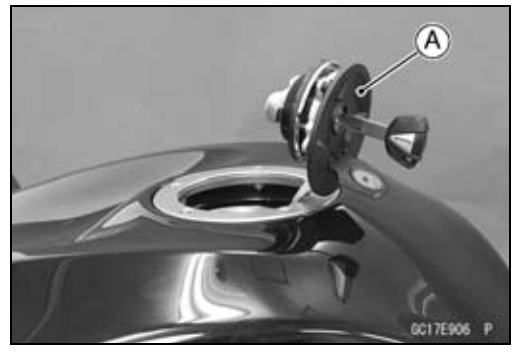
- Turn the ignition switch off.
- Wait until the engine cools down.
- Prepare a fuel hose (Special Tool: 57001-1607) and a measuring cylinder.

Special Tool - Fuel Hose: 57001-1607

- Remove the fuel tank bolts [A].



Fuel Line

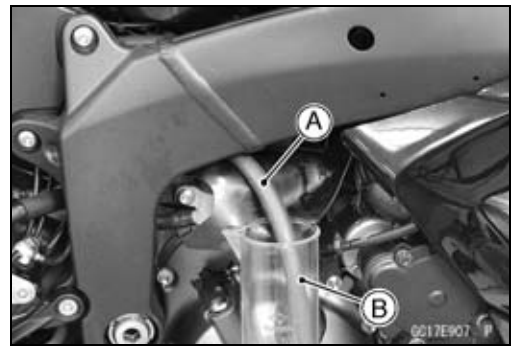


- Open the fuel tank cap [A] to lower the pressure in the tank.
- Remove the fuel hose from the fuel pump (see Fuel Tank Removal).

○Be sure to place a piece of cloth around the fuel outlet pipe of the fuel pump.

⚠ WARNING

Fuel is flammable and explosive under certain conditions and can cause severe burns. 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.



- Connect the prepared fuel hose [A] to the fuel outlet pipe.
- Secure the fuel hose with a clamp.
- Insert the fuel hose into the measuring cylinder [B].

⚠ WARNING

Wipe off spilled out fuel immediately.
Be sure to hold the measuring cylinder vertical.

- Close the fuel tank cap.
- Turn the engine stop switch to run position.
- Turn the ignition switch on.

○The fuel pump should operate for 3 seconds, and then should stop.

NOTICE

Do not drive the fuel pump for 3 seconds or more without the fuel in the fuel tank. If the fuel pump is driven without the fuel, it may be damaged.

- Measure the discharge for 3 seconds.

○Repeat this operation several times.

Amount of Fuel Flow
Standard: 50 mL (1.7 US oz.) or more for 3 seconds

- Turn the ignition switch off.

★If the fuel flow is much less than the specified, replace the fuel pump (see Fuel Pump Removal/Installation).

- Install the fuel tank (see Fuel Tank Installation).
- Start the engine and check for fuel leakage.

Fuel Pump

Fuel Pump Removal

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. 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. Disconnect the battery (–) terminal. To avoid fuel spills, draw it from the tank when the engine is cold. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

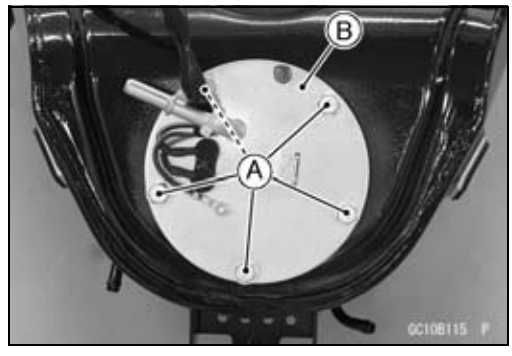
NOTICE

Never drop the fuel pump especially on a hard surface. Such a shock to the pump can damage it.

- Draw the fuel out from the fuel tank with a commercially available electric pump.
- Remove the fuel tank (see Fuel Tank Removal).

○Be careful of fuel spillage from the fuel tank since fuel still remains in the fuel tank and fuel pump. Plug the fuel pipe of the fuel tank.

- Turn the fuel tank upside down.
- Unscrew the fuel pump bolts [A], and take out the fuel pump [B].



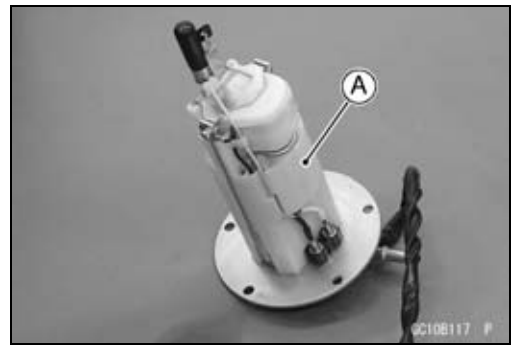
NOTICE

Do not pull the leads of the fuel pump. If they are pulled, the lead terminals may be damaged.

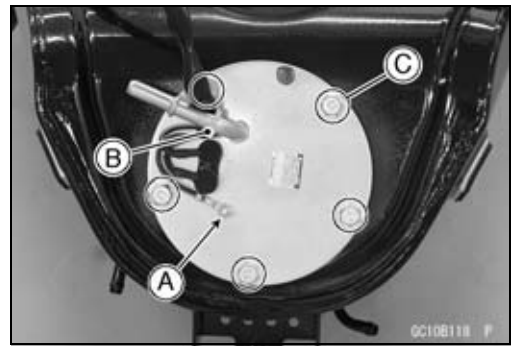
- Discard the fuel pump gasket [A].

Fuel Pump

Fuel Pump Installation



- Remove dirt or dust from the fuel pump [A] by lightly applying compressed air.
- Replace the fuel pump gasket with a new one.



- Check that the fuel pump terminal [A] and band [B] are in place.
- Apply a non-permanent locking agent to the threads of the fuel pump bolts.
- Tighten the fuel pump bolts [C] to a snug fit.
- Tighten the fuel pump bolts alternating diagonally.

Torque - Fuel Pump Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Tighten the fuel pump bolts again to check the tightness.

Fuel Pump Operation Inspection

NOTE

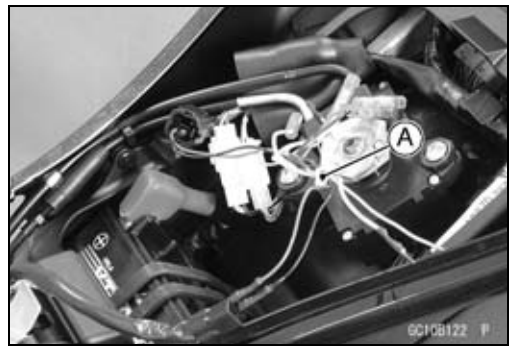
○*Be sure the battery is fully charged.*

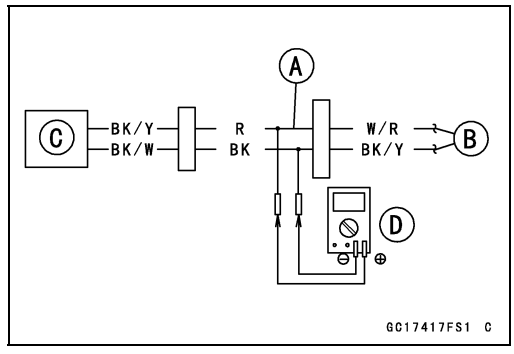
- Turn the engine stop switch to run position.
- Turn the ignition switch on and make sure that the fuel pump operates (make light sounds) for 3 seconds, and then stops.
- Turn the ignition switch off.

★If the pump does not operate as described above, check the operating voltage (see Fuel Pump Operating Voltage Inspection).

Fuel Pump

Fuel Pump Operating Voltage Inspection





NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the front seat (see Front Seat Removal in the Frame chapter).
- Disconnect the fuel pump lead connector and connect the measuring adapter [A] between these connectors as shown.
  Main Harness [B]
  Fuel Pump [C]

Special Tool - Measuring Adapter: 57001-1700

- Connect a digital meter [D] to the measuring adapter leads.

Fuel Pump Operating Voltage
Connections to Adapter:
Digital Meter (+) → R (pump BK/Y) lead
Digital Meter (–) → BK (pump BK/W) lead

- Measure the operating voltage with engine stopped and with the connector joined.
- Turn the engine stop switch run position.
- Turn the ignition switch on.

Operating Voltage
Standard: Battery Voltage for 3 seconds, and then 0 V

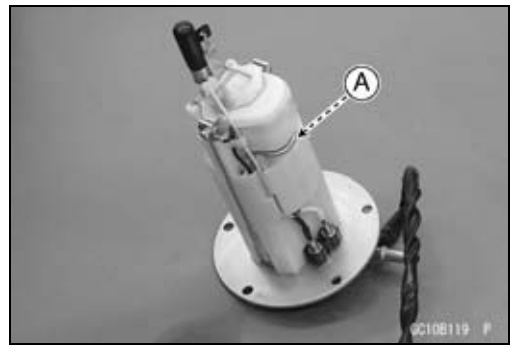
- Turn the ignition switch off.

★If the reading stays on battery voltage and never shows 0 V, check the fuel pump relay (see Relay Circuit Inspection in the Electrical System chapter).
★If the fuel pump relay is normal, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
★If there is still no battery voltage, check the fuel pump relay (see Relay Circuit Inspection in the Electrical System chapter).
★If the fuel pump relay is normal, check the wiring for continuity (see wiring diagram in this section).
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
★If the reading is in specification, but the pump does not operate, replace the fuel pump (see Fuel Pump Removal/Installation).

Fuel Pump

Pressure Regulator Removal

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



Fuel Filter Replacement

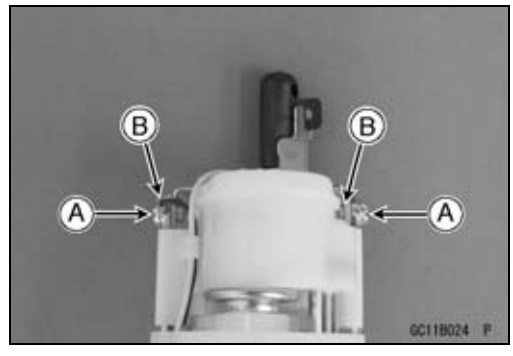
⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. 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. Disconnect the battery (-) terminal. To avoid fuel spills, draw it from the tank when the engine is cold. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

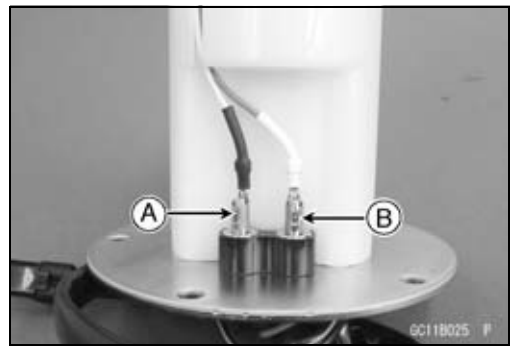
NOTICE

Never drop the fuel pump especially on a hard surface. Such a shock to the pump can damage it.

● Remove:
Fuel Pump (see Fuel Pump Removal)
Fuel Pump Assembly Screws [A]
Lead Terminals [B]

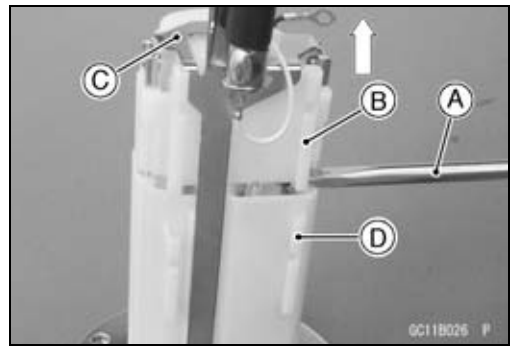


● Disconnect:
Lead Connecter (white) [A]
Lead Connecter (Light Blue) [B]

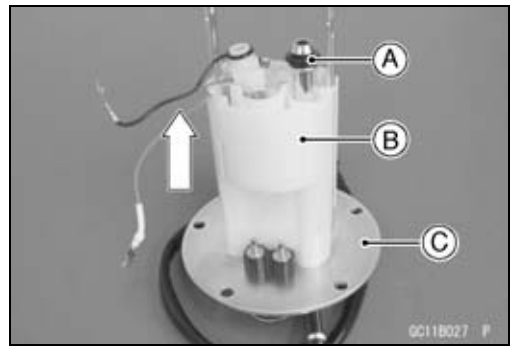


Fuel Pump

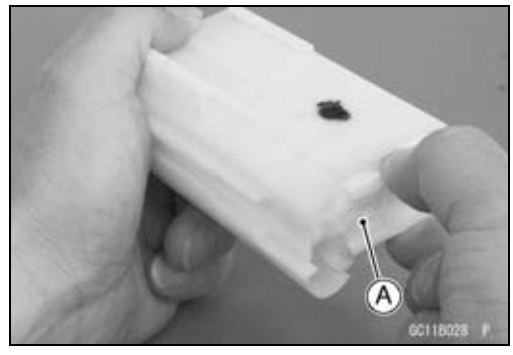
- Using the flat tip screwdriver [A], remove the fuel pump case [B] with thermistor bracket [C] from the fuel pump body [D].



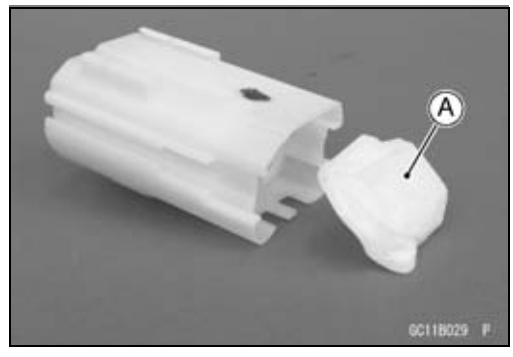
- Remove the O-ring [A].
- Remove the fuel pump body [B] from the installation plate [C].



- Remove the fuel filter [A].

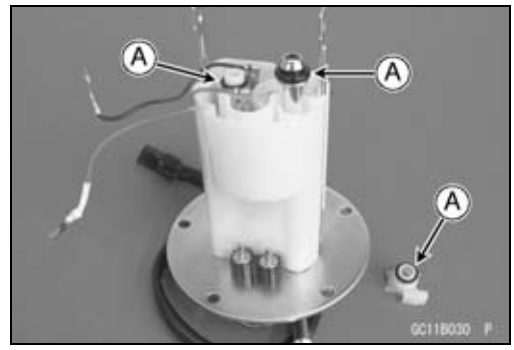


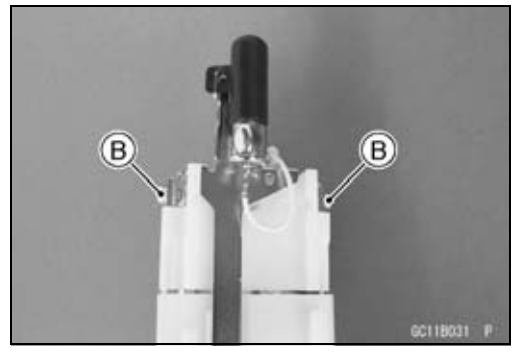
- Replace the fuel filter [A] with a new one, and install it.



Fuel Pump

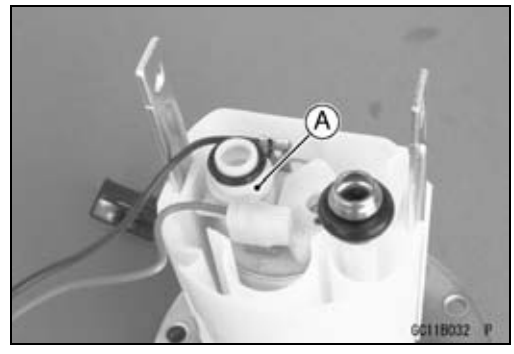
- Replace the following parts with new ones.
  O-rings [A]
  Fuel Pump Assembly Screws [B]





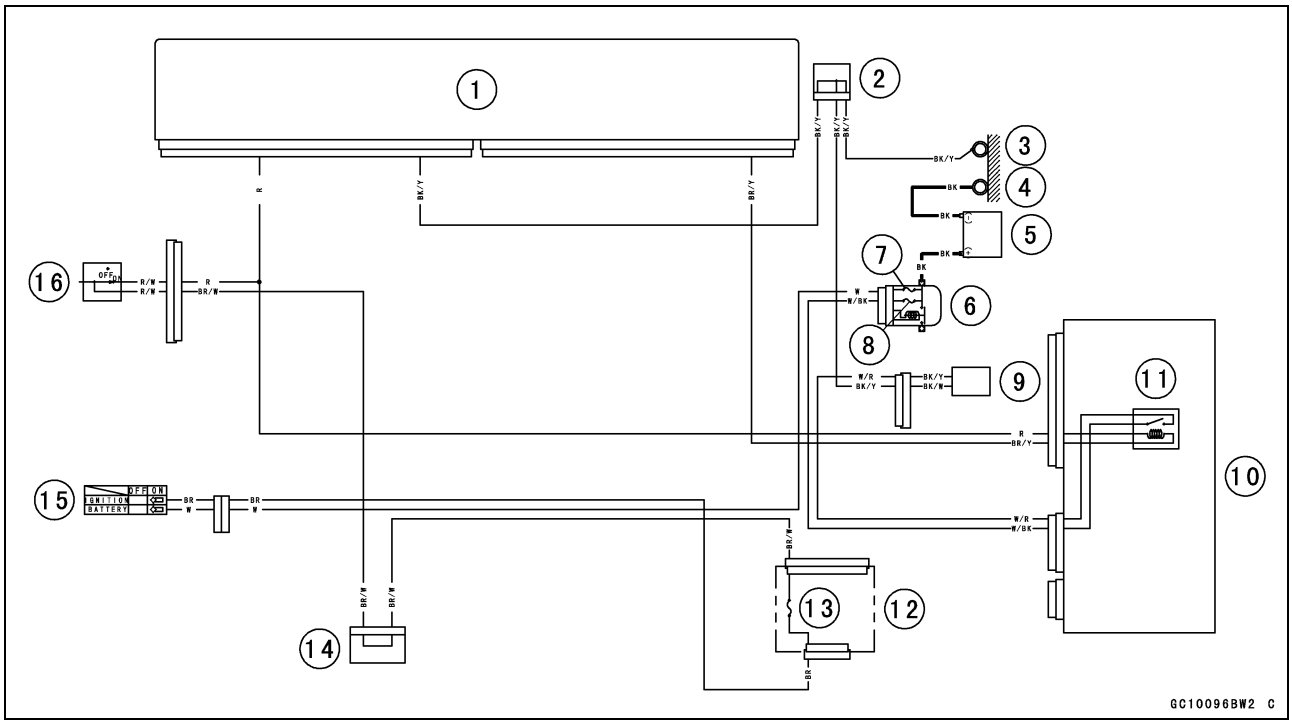
- Install the removed parts in the reverse procedure.
- Install the cap [A] so that the light blue lead terminal is covered as shown.
- Tighten:

Torque - Fuel Pump Assembly Screws: 0.98 N·m (0.10 kgf·m, 8.7 in·lb)



Fuel Pump

Fuel Pump Circuit



1. ECU
2. Joint Connector C
3. Frame Ground 2
4. Engine Ground
5. Battery 12 V 8 Ah
6. Stater Relay
7. Main Fuse 30 A
8. ECU Fuse 15 A
9. Fuel Pump
10. Relay Box
11. Fuel Pump Relay
12. Fuse Box 1
13. Ignition Fuse 15 A
14. Joint Connector E
15. Ignition Switch
16. Engine Stop Switch

Fuel Injectors

Fuel Injector Removal/Installation

● Refer to the Throttle Body Assy Disassembly/Assembly.

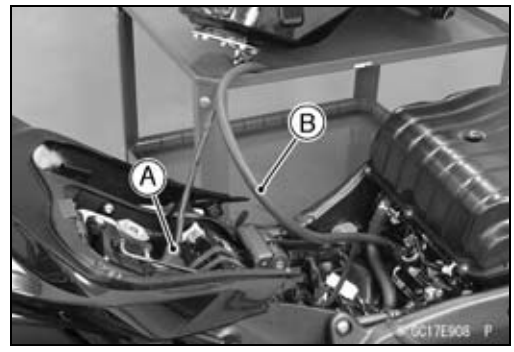
Fuel Injector Audible Inspection

NOTE

○*Be sure the battery is fully charged.*

● Remove:
Fuel Tank (see Fuel Tank Removal)
Fuel Hose (see Fuel Hose Replacement in the Periodic Maintenance chapter)
● Connect the following parts temporarily.
Fuel Pump Lead Connector [A]
Extension Tube [B]

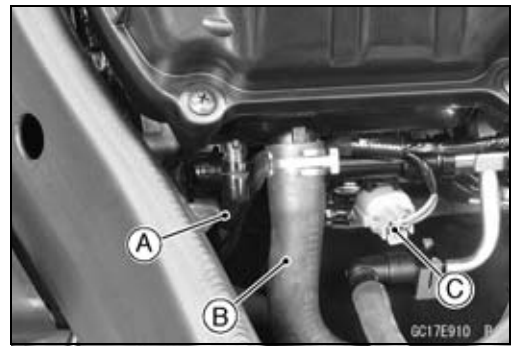
Special Tool - Extension Tube: 57001-1578



● Start the engine, and let it idle.
● Apply the standard tip screwdriver [A] to the fuel injector [B]. Put the grip end onto your ear, and listen whether the fuel injector is clicking or not.
○A sound scope can also be used.
○The click interval becomes shorter as the engine speed rises.
● Do the same for the other fuel injectors.
★If all the fuel injectors click at a regular intervals, the fuel injectors are normal.
● Turn the ignition switch off.
★If any fuel injector does not click, check the fuel injector resistance (see Fuel Injector Resistance Inspection).

Fuel Injector Resistance Inspection

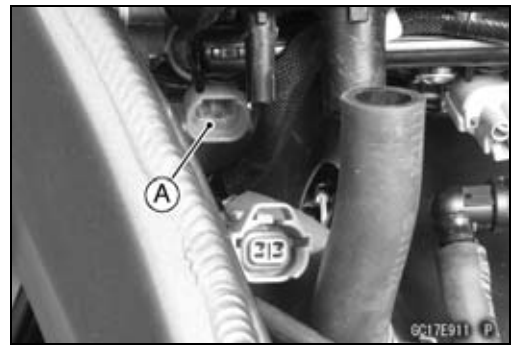
● Remove:
Fuel Tank (see Fuel Tank Removal)
● Disconnect:
Air Cleaner Drain Hose [A]
Breather Hose [B]
Fuel Injector Connector [C]



● Connect a digital meter to the terminals in each fuel injector [A].
● Measure the fuel injector resistance.

Fuel Injector Resistance
Standard: About 11.7 ~ 12.3 Ω @20°C (68°F)

★If the reading is out of the standard, replace the fuel injector.
★If the reading is within the standard, check the power source voltage (see Fuel Injector Power Source Voltage Inspection).



Fuel Injectors

Fuel Injector Power Source Voltage Inspection

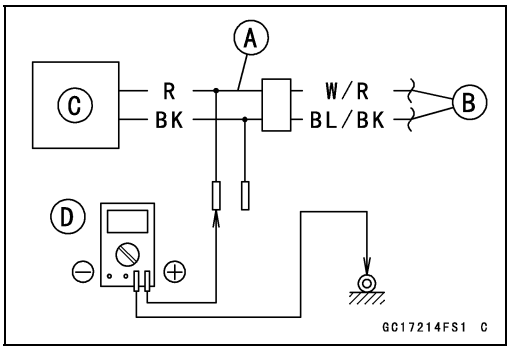
NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the air cleaner drain hose and breather hose (see Air Cleaner Housing Removal).
- Disconnect the injector connector and connect the measuring adapter [A] between these connectors as shown.
  Main Harness [B]
  Fuel Injector #1 [C]

Special Tool - Measuring Adapter: 57001-1700

- Connect a digital meter [D] to the measuring adapter lead.



Fuel Injector Power Source Voltage
Connections to Adapter:
For Fuel Injector #1, #2, #3, #4
Digital Meter (+) → R (injector W/R) lead
Digital Meter (–) → Battery (–) terminal

- Measure the power source voltage with the engine stopped.
- Turn the engine stop switch to run position.
- Turn the ignition switch on.

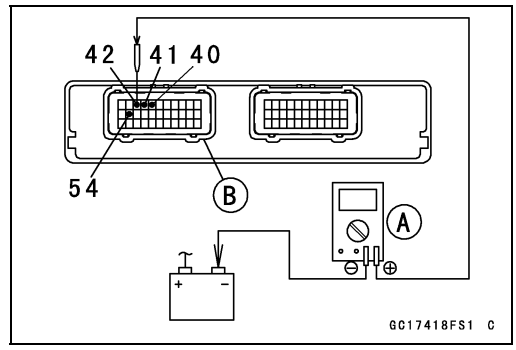
Power Source Voltage
Standard: Battery Voltage for 3 seconds, and then 0 V

- Turn the ignition switch off.

★If the reading stays on battery voltage and never shows 0 V, check the fuel pump relay (see Relay Circuit Inspection in the Electrical System chapter).
★If the fuel pump relay is normal, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
★If there is still no battery voltage, check the fuel pump relay (see Relay Circuit Inspection in the Electrical System chapter).
★If the fuel pump relay is normal, check the power source wiring (see wiring diagram in this section).
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
★If the reading is in specification, check the output voltage (see Fuel Injector Output Voltage Inspection).

Fuel Injectors

Fuel Injector Output Voltage Inspection



NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the ECU (see ECU Removal).

○Do not disconnect the ECU connector.

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

Special Tool - Needle Adapter Set: 57001-1457

Fuel Injector Output Voltage
Connections to ECU Connector:
For Fuel Injector #1
Digital Meter (+) → BL/BK lead (ECU terminal 42)
Digital Meter (–) → Battery (–) terminal
For Fuel Injector #2
Digital Meter (+) → BL/R lead (ECU terminal 41)
Digital Meter (–) → Battery (–) terminal
For Fuel Injector #3
Digital Meter (+) → BL/O lead (ECU terminal 40)
Digital Meter (–) → Battery (–) terminal
For Fuel Injector #4
Digital Meter (+) → BL/G lead (ECU terminal 54)
Digital Meter (–) → Battery (–) terminal

- Measure the output voltage with the engine stopped and with the connector joined.
- Turn the engine stop switch to run position.
- Turn the ignition switch on.

Output Voltage
Standard: Battery Voltage for 3 seconds, and then 0 V

- Turn the ignition switch off.

★If the reading is in specification, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Fuel Injectors

★If the reading is out of the specification, remove the ECU and check the wiring for continuity between main harness connectors.

○Disconnect the ECU and injector connector.

Wiring Continuity Inspection

ECU Connector (Gray) [A] ⟷ Fuel Injector Connector [B]

For Fuel Injector #1 [C]

BL/BK lead (ECU terminal 42) [D]

For Fuel Injector #2

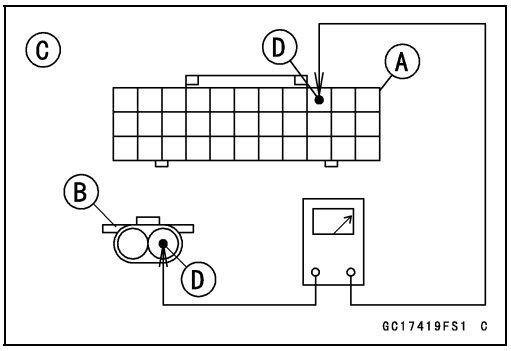
BL/R lead (ECU terminal 41)

For Fuel Injector #3

BL/O lead (ECU terminal 40)

For Fuel Injector #4

BL/G lead (ECU terminal 54)



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

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

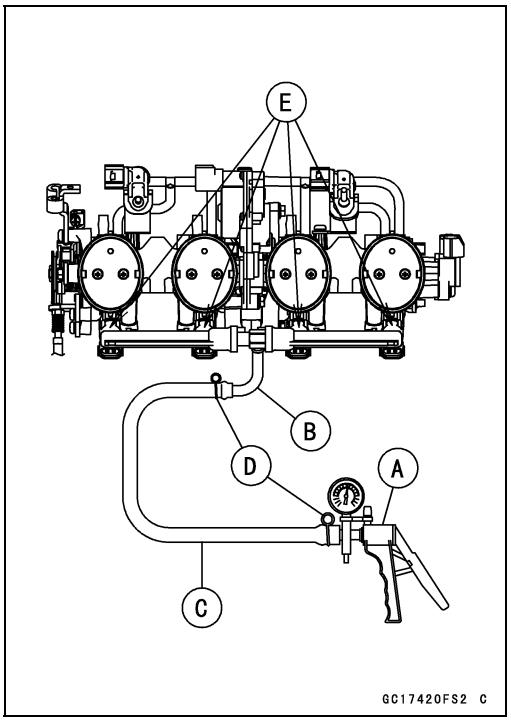
Fuel Injector Fuel Line Inspection

● Remove:
Fuel Tank (see Fuel Tank Removal)
Fuel Hose (see Fuel Hose Replacement in the Periodic Maintenance chapter)

○Be sure to place a piece of cloth around the fuel outlet pipe of the fuel pump and the delivery pipe of the throttle body assy.

⚠ WARNING

Fuel is flammable and explosive under certain conditions and can cause severe burns. 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.



● Check the fuel injector line for leakage as follows.

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

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

○Watching the pressure gauge, squeeze the pump lever, 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)

NOTICE

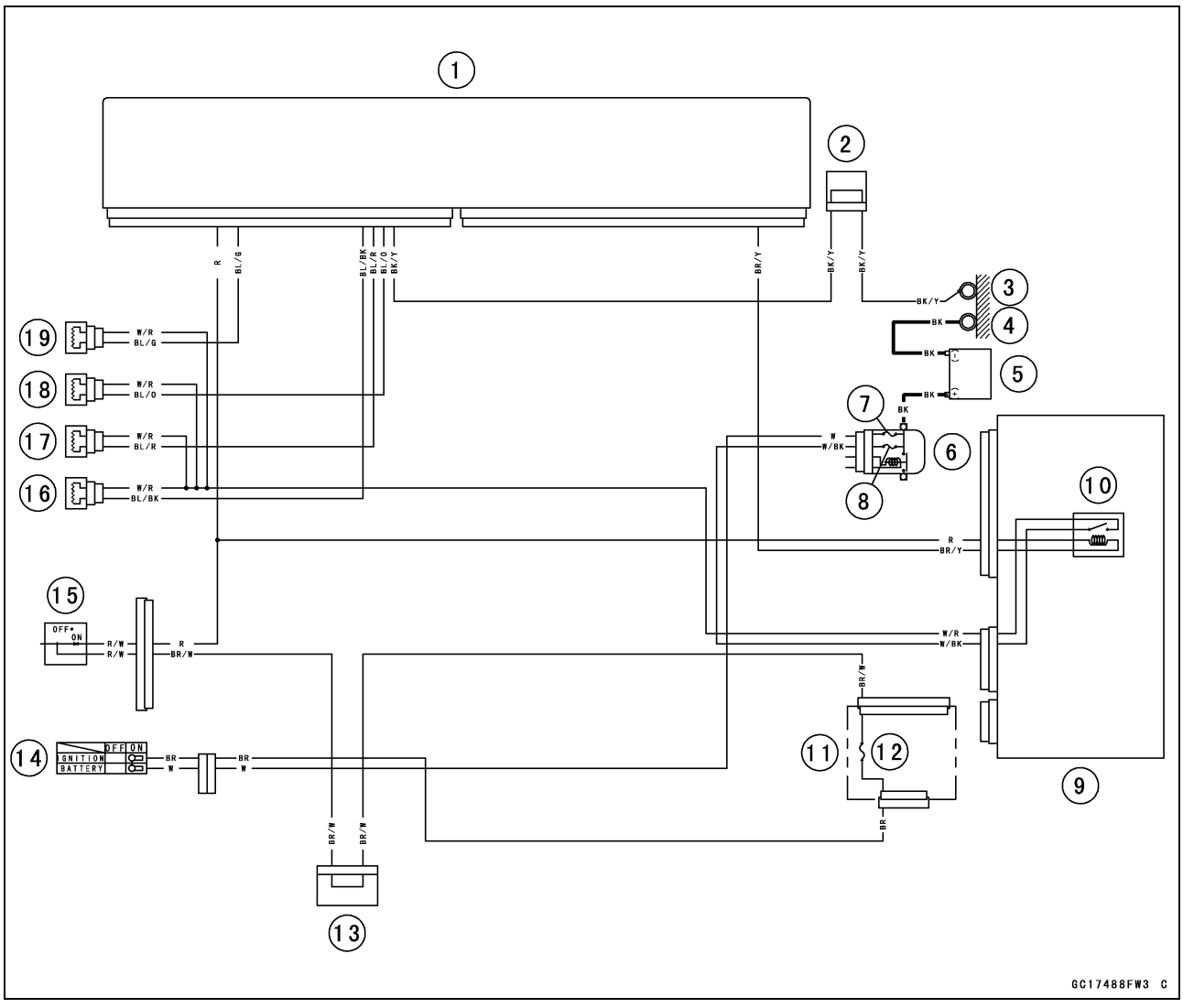
During pressure testing, do not exceed the maximum pressure for which the system is designed.

Fuel Injectors

○Watch the gauge for at least 6 seconds.
★If the pressure holds steady, the fuel line is good.
★If the pressure drops at once or if bubbles are found in the area, the fuel line is leaking. Replace the delivery pipe assy, injectors and related parts.
○Repeat the leak test, and check the fuel line for no leakage.
● Install:
Fuel Hose (see Fuel Hose Replacement in the Periodic Maintenance chapter)
Fuel Tank (see Fuel Tank Removal)
● Start the engine and check for fuel leakage.

Fuel Injectors

Fuel Injector Circuit



1. ECU
2. Joint Connector C
3. Frame Ground 2
4. Engine Ground
5. Battery 12 V 8 Ah
6. Starter Relay
7. Main Fuse 30 A
8. ECU Fuse 15 A
9. Relay Box
10. Fuel Pump Relay
11. Fuse Box 1
12. Ignition Fuse 15 A
13. Joint Connector E
14. Ignition Switch
15. Engine Stop Switch
16. Fuel Injector #1
17. Fuel Injector #2
18. Fuel Injector #3
19. Fuel Injector #4

Throttle Grip and Cables

Free Play Inspection

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

Free Play Adjustment

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

Cable Installation

- Install the throttle cables in accordance with the Cable, Wire, and Hose Routing section in the Appendix chapter.
- Install the lower ends of the throttle cables in the throttle pulley on the throttle body assy after installing the upper ends of the throttle cables in the grip.
- After installation, adjust each cable properly (see Throttle Control System Inspection in the Periodic Maintenance chapter).

⚠ WARNING

Operation with incorrectly routed or improperly adjusted cables could result in an unsafe riding condition. Be sure the cables are routed correctly and properly adjusted.

Cable Lubrication

- Refer to the Chassis Parts Lubrication in the Periodic Maintenance chapter.

Throttle Body Assy

Idle Speed Inspection

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

Synchronization Inspection/Adjustment

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

Throttle Body Assy Removal

⚠ WARNING

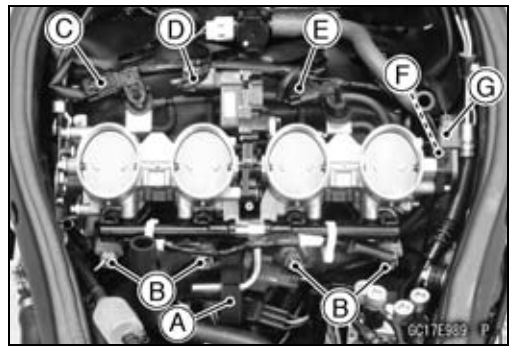
Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Be prepared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

NOTICE

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

- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal)
  Fuel Hose (see Fuel Hose Replacement in the Periodic Maintenance chapter)

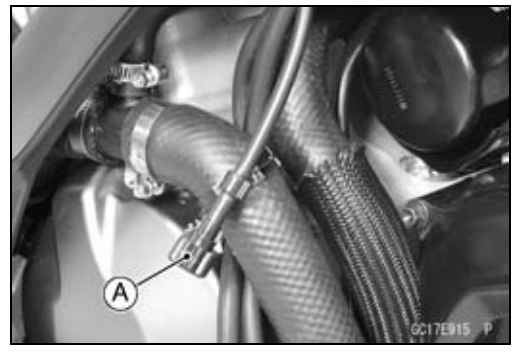
- Remove the pad [A]
- Disconnect:
  Fuel Injector Connectors [B]
  Intake Air Pressure Sensor #1 Connector [C]
  Subthrottle Valve Actuator Connector [D]
  Intake Air Pressure Sensor #2 Connector [E]
  Main Throttle Sensor Connector [F]
  Subthrottle Sensor Connector [G]
- For the CAL model, remove the vacuum hose.



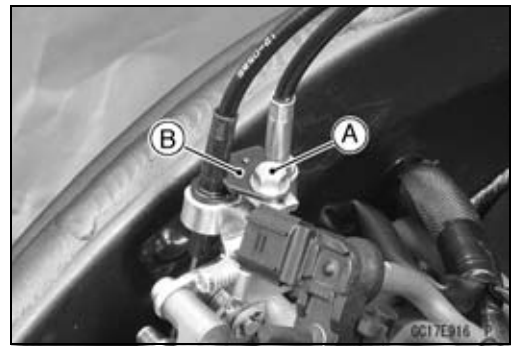
- Loosen the throttle body assy holder clamp bolts [A].

Throttle Body Assy

- Disconnect the adjusting screw [A] from the clamp.



- Remove the throttle body assy from the throttle body assy holders.
- Remove:
  Bolt [A]
  Holder Plate [B]
  Throttle Cable Lower Ends
- After removing the throttle body assy, stuff pieces of lint -free, clean cloth into the throttle body assy holders.

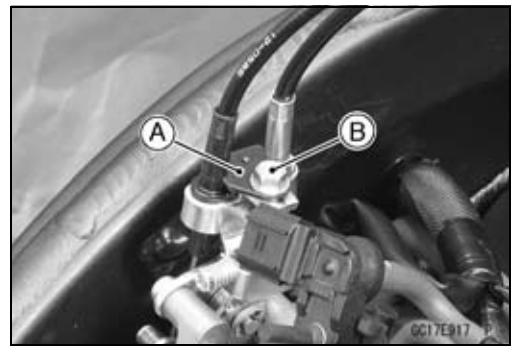


NOTICE
If dirt gets into the engine, excessive engine wear and possible engine damage will occur.

Throttle Body Assy Installation

- Apply a thin coat of grease to the throttle cable lower ends.
- Fit the accelerator cable end and the decelerator cable end into the throttle pulley.
- Install the holder plate [A] securely.
- Apply a non-permanent locking agent to the threads of the holder plate bolt [B], and tighten it.

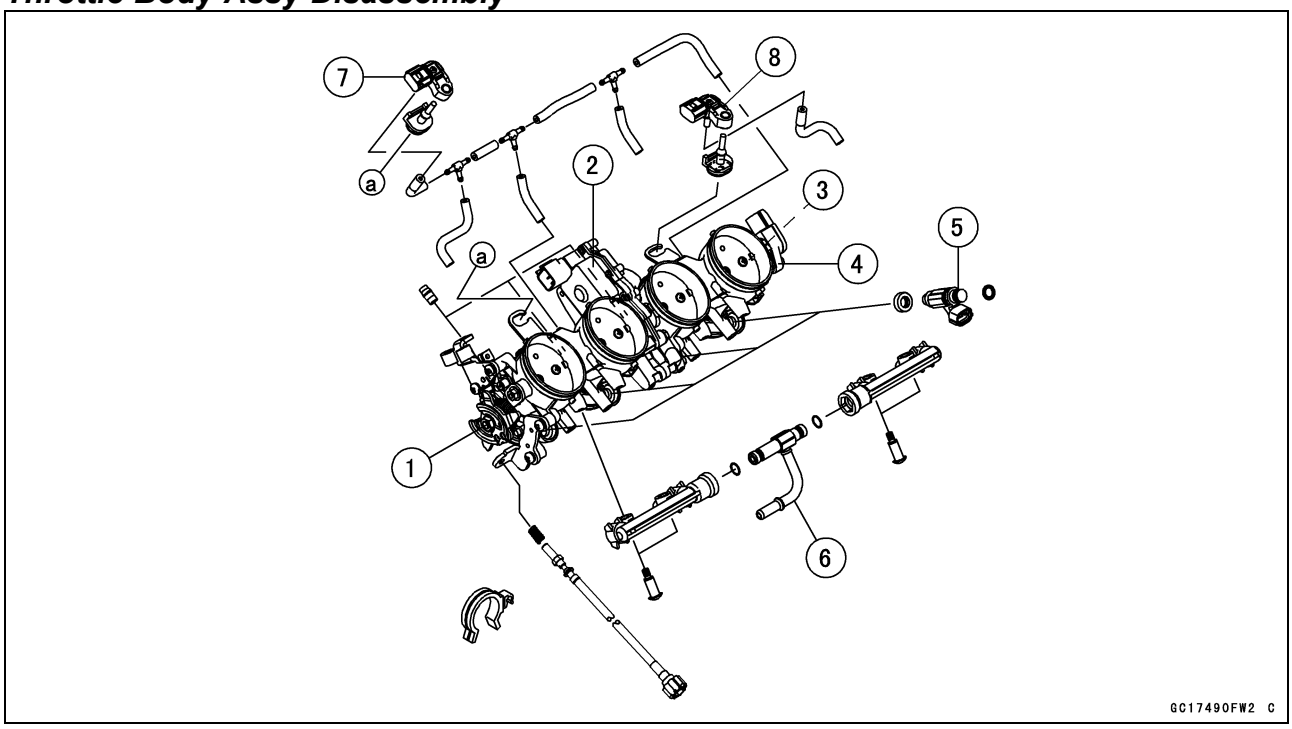
Torque - Throttle Cable Holder Plate Bolt: 3.9 N·m (0.40 kgf·m, 35 in·lb)



- Install the throttle body assy holder clamp, and tighten the clamp bolts (see Throttle Body Assy Holder Installation in the Engine Top End chapter).
- Turn the throttle grip and make sure that the throttle pulley moves smoothly and return by spring force.
- Run the leads and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).
- Adjust:
  Throttle Grip Free Play (see Throttle Control System Inspection in the Periodic Maintenance chapter)
  Idle Speed (see Idle Speed Adjustment in the Periodic Maintenance chapter)

Throttle Body Assy

Throttle Body Assy Disassembly

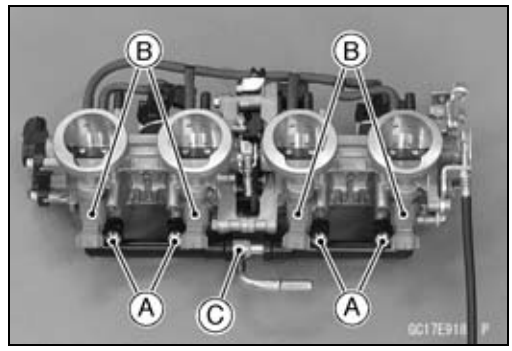


1. Throttle Body Assy
2. Subthrottle Valve Actuator
3. Main Throttle Sensor
4. Subthrottle Sensor
5. Fuel Injectors
6. Delivery Pipe Assy
7. Intake Air Pressure Sensor #1
8. Intake Air Pressure Sensor #2

NOTICE

Do not remove, disassemble or adjust the main throttle sensor, subthrottle sensor, subthrottle valve actuator, throttle link mechanism and throttle body assy, because they are adjust or set surely 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).
- Remove the screws [A] to pull out the fuel injectors [B] from the throttle body assy together with the delivery pipe assy [C].

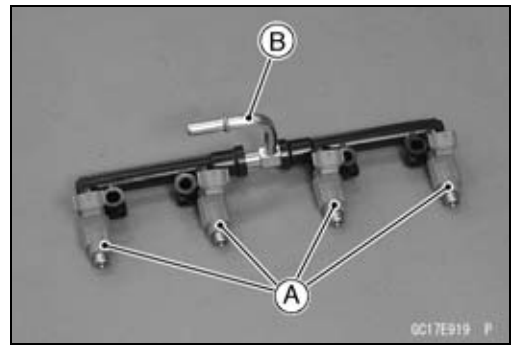


NOTE

○*Do not damage the insertion portions of the injectors when they are pulled out from the throttle body.*

Throttle Body Assy

- Remove the fuel injectors [A] from the delivery pipe assy [B].



NOTE

○*Do not damage the insertion portions of the injectors when they are pulled out from the delivery pipe assy.*

NOTICE

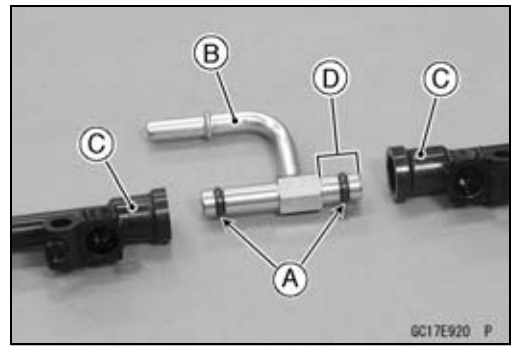
Never drop the fuel injector especially on a hard surface. Such a shock to the injector can damage it.

Throttle Body Assy Assembly

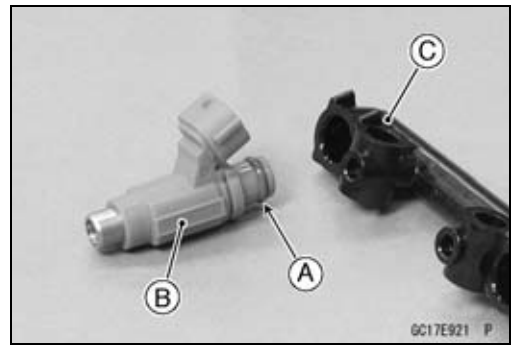
- Before assembling, blow away dirt or dust from the throttle body and delivery pipe assy by applying compressed air.
- Replace the O-rings [A] of the joint pipe [B] with new ones.
- Apply engine oil to the new O-rings, and insert it to the delivery pipes [C].

○Insert the joint pipe so that the short side [D] faces right side.

○Left and right delivery pipes are identical.



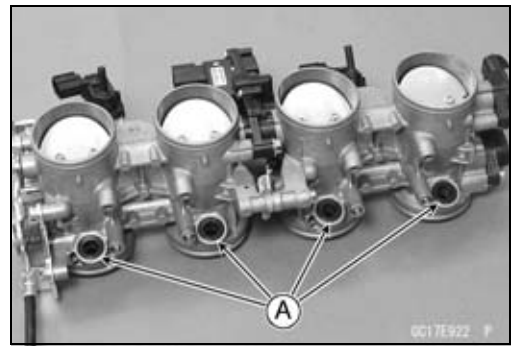
- Replace the O-rings [A] of each primary fuel injector [B] with new ones.
- Apply engine oil to the new O-rings, insert them to the delivery pipe assy [C] and confirm whether the injectors turn smoothly or not.



- Replace the dust seals [A] with new ones.
- Apply engine oil to the new dust seals.
- Install the fuel injectors along with the delivery pipe assy to the throttle body.
- Tighten:

Torque - Delivery Pipe Assy Mounting Screws: 3.43 N·m (0.35 kgf·m, 30 in·lb)

- Install the throttle body assy (see Throttle Body Assy Installation).



Air Cleaner

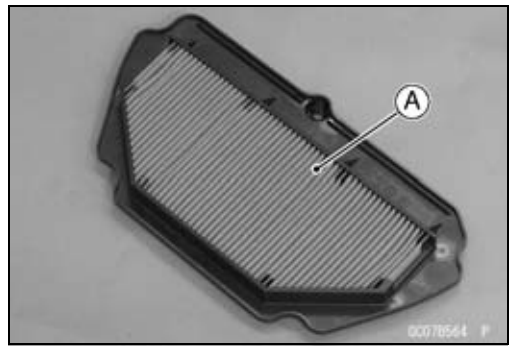
Air Cleaner Element Removal/Installation

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

Air Cleaner Element Inspection

- Remove the air cleaner element (see Air Cleaner Element Replacement in the Periodic Maintenance chapter).
- Visually check the element [A] for tears or breaks.

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

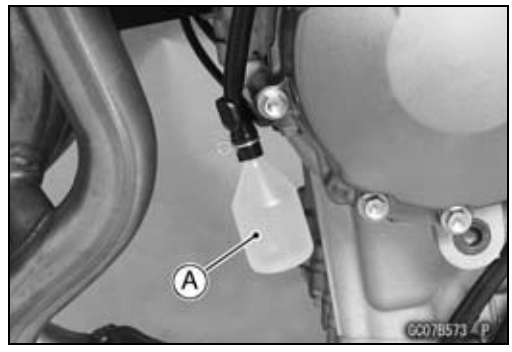


Air Cleaner Oil Draining

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

- Remove the upper fairing assembly (see Upper Fairing Assembly Removal in the Frame chapter).
- Visually check the catch tank [A] of the drain hose, if the water or oil accumulates in the tank.

★If any water or oil accumulates in the catch tank, remove the catch tank from the drain hose and drain it.

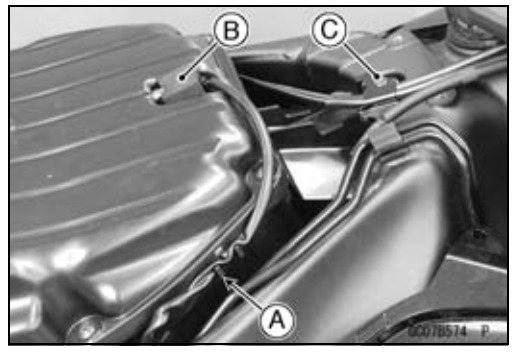


⚠ WARNING

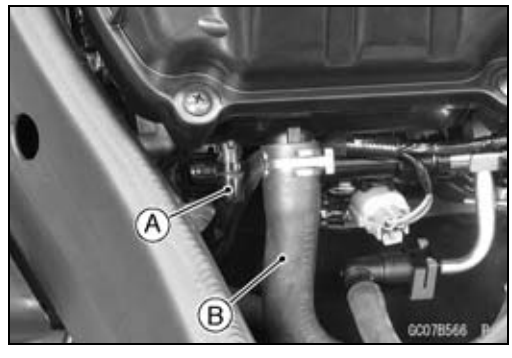
Oil on tires will make them slippery and can cause an accident and injury. Be sure to reinstall the catch tank after draining.

Air Cleaner Housing Removal

- Remove the fuel tank (see Fuel Tank Removal).
- Free the lead from the clamp [A].
- Disconnect the intake air temperature sensor lead connector [B].
- Remove the bolt [C].

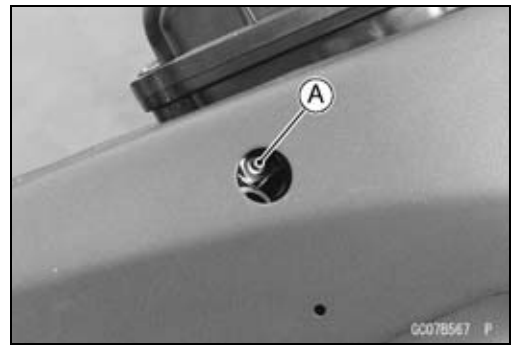


- Disconnect:
  Air Cleaner Drain Hose [A]
  Breather Hose [B]

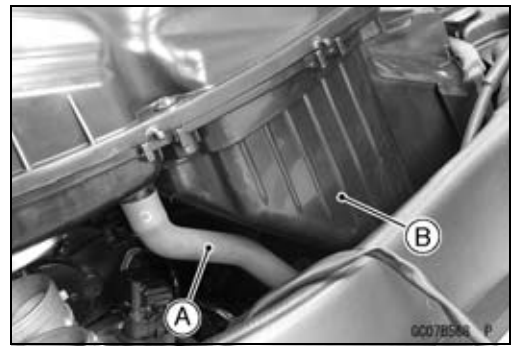


Air Cleaner

- Loosen the air cleaner housing clamp bolt [A] on both sides.



- Disconnect the air switching valve hose [A] from the air cleaner housing [B].



Air Cleaner Housing Installation

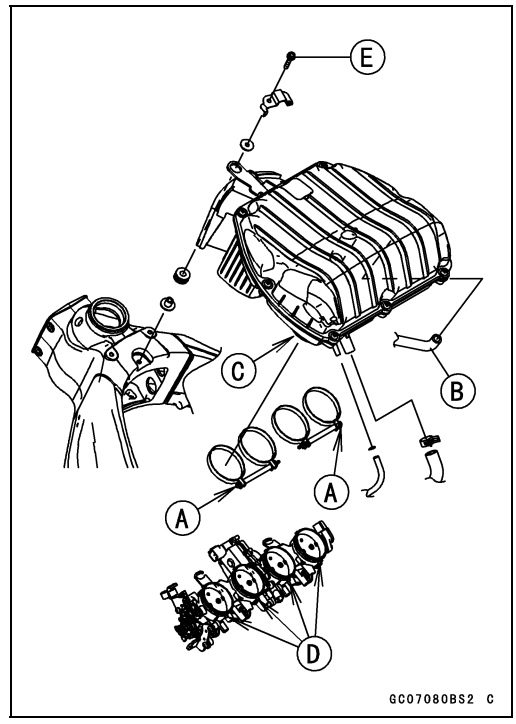
- Install the clamp bolt heads [A] outside as shown.
- Install the air switching valve hose to the air cleaner housing, so that white paint of the hose [B] is turned to the front side rib.
- Install the air cleaner housing on the throttle body assy.

○Push in the ducts [C] touch the stopper [D] of the throttle body.

- Tighten:

Torque - Air Cleaner Housing Clamp Bolts: 2.0 N·m (0.20 kgf·m, 18 in·lb)

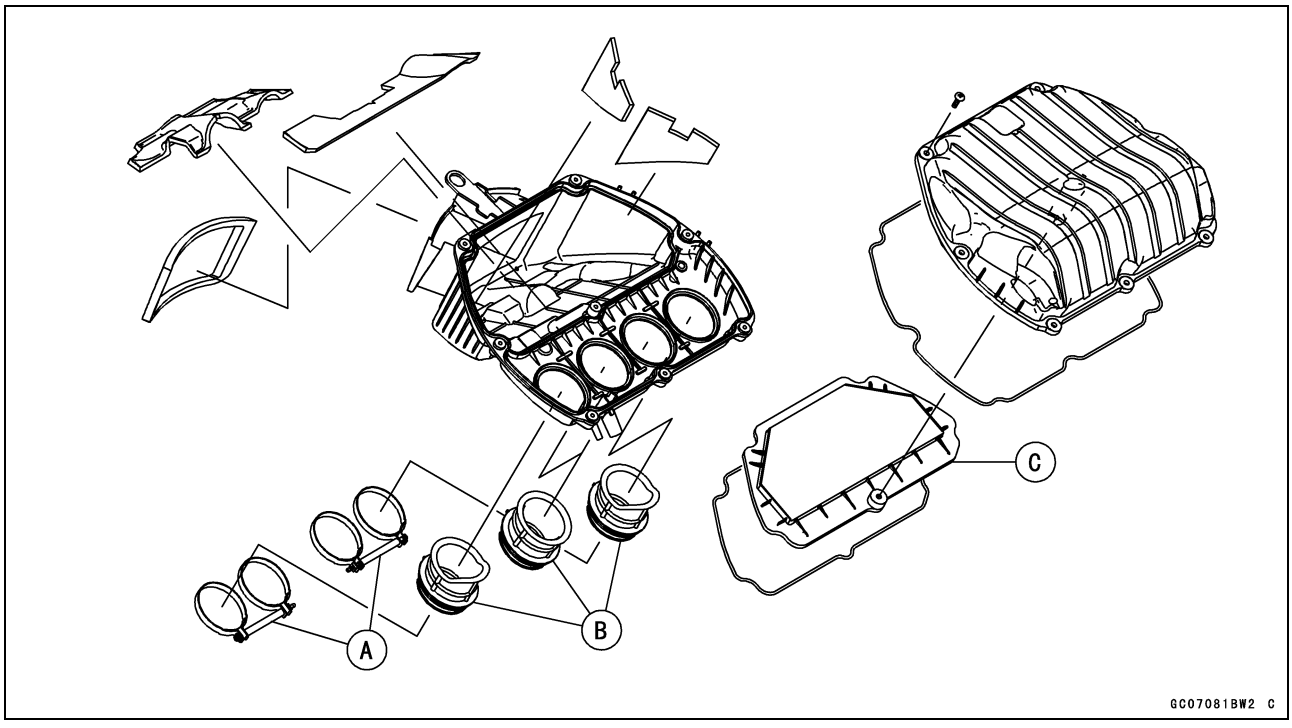
- Run the leads and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).
- Tighten the bolt [E] securely.



Air Cleaner

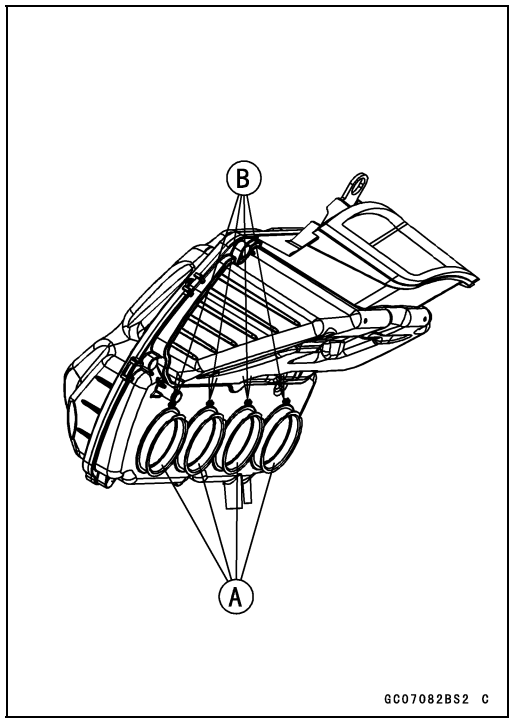
Air Cleaner Housing Disassembly

● Remove:
Air Cleaner Housing (see Air Cleaner Housing Removal)
Intake Air Temperature Sensor (see Intake Air Temperature Sensor Removal/Installation in the Self-Diagnosis System chapter)
Clamps [A]
Ducts [B]
Air Cleaner Element [C] (see Air Cleaner Element Replacement in the Periodic Maintenance chapter)



Air Cleaner Housing Assembly

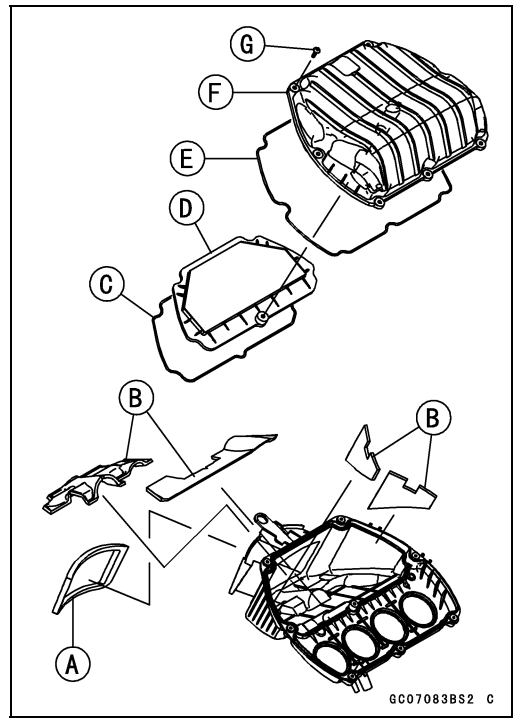
● Install the ducts [A] to the air cleaner housing.
○Fit the projections [B] of the duct into the slits on the air cleaner housing.
○Do not twist the ducts.



Air Cleaner

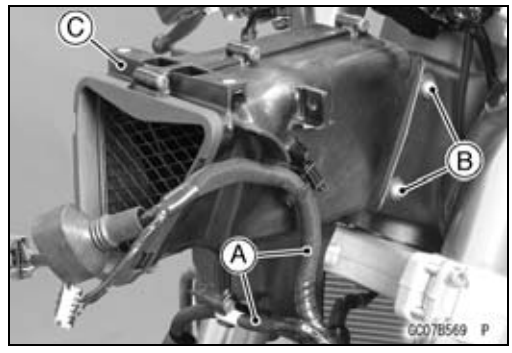
- Install:
  Air Cleaner Frame Gasket [A]
  Pads [B]
  Air Cleaner Element Gasket [C]
  Air Cleaner Element [D]
  Air Cleaner Case Gasket [E]
  Upper Air Cleaner Housing [F]
  Air Cleaner Housing Assembly Screws [G]
- Tighten:

  Torque - Air Cleaner Housing Assembly Screws: 1.2 N·m (0.12 kgf·m, 11 in·lb)
- Install the air cleaner housing (see Air Cleaner Housing Installation).



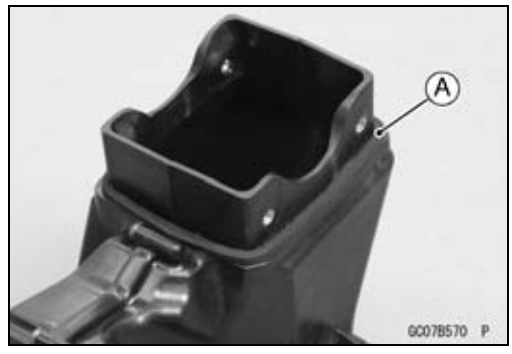
Air Line

Air Intake Duct Removal



- Remove:
  Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
  Meter Bracket (see Meter Unit Removal/Installation in the Electrical System chapter)
- Free the leads [A].
- Remove:
  Air Intake Duct Mounting Bolts [B] (Both Sides)
  Air Intake Duct [C]

Air Intake Duct Installation



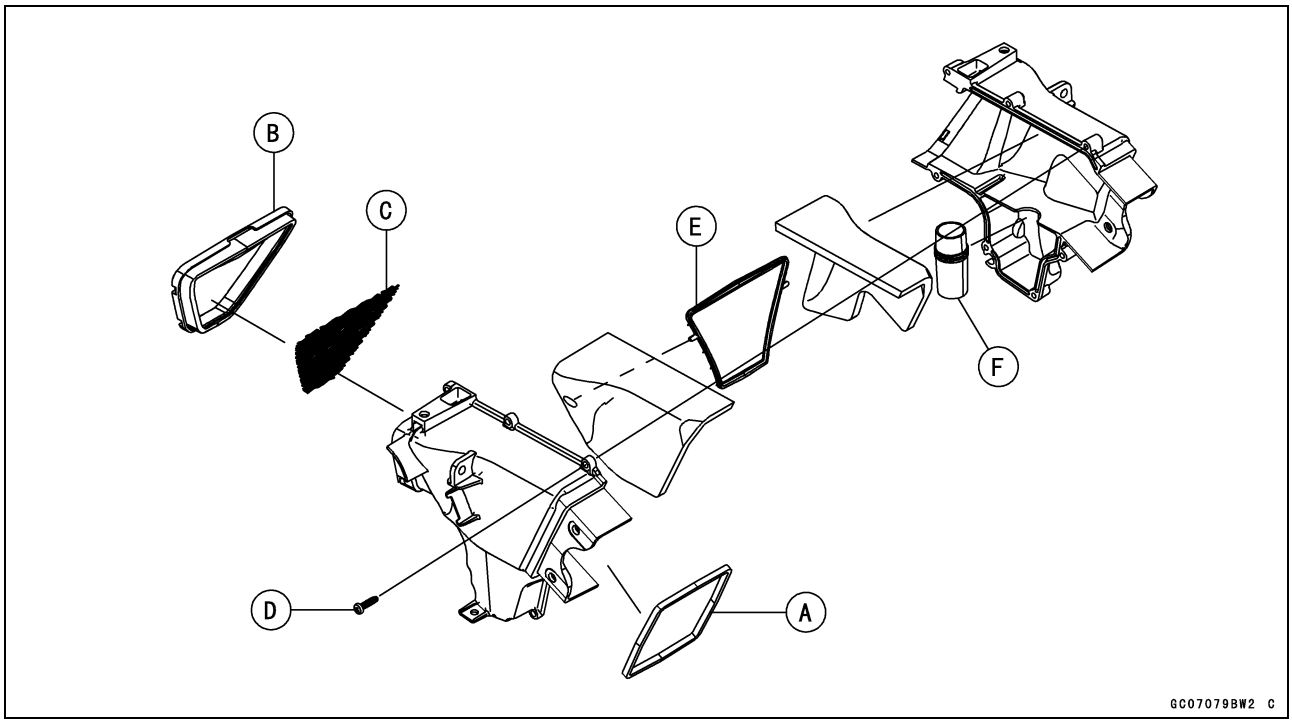
- Check that the pad [A] is in place on the air intake duct.
- Apply a non-permanent locking agent to the threads of the air intake duct mounting bolts, and tighten them.

  Torque - Air Intake Duct Mounting Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Run the lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

Air Intake Duct Disassembly

- Remove:
  Air Intake Duct (see Air Intake Duct Removal)
  Pad [A]
  Seal [B] and Screen [C]
  Air Intake Duct Assembly Screws [D]
  Holder [E]
  Pipe [F]

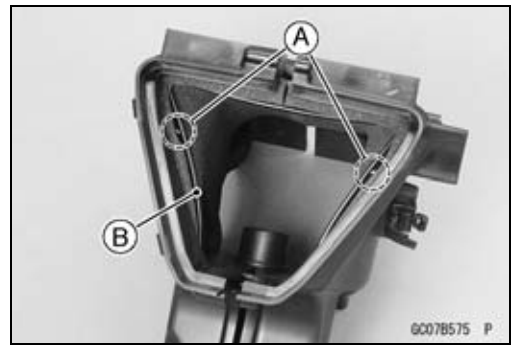


Air Line

Air Intake Duct Assembly

- Assembly is the reverse of disassembly.
- Fit the projections [A] of the holder [B] to the hole of the air intake ducts.
- Tighten:

Torque - Air Intake Duct Assembly Screws: 1.5 N·m (0.15 kgf·m, 13 in·lb)



- Install the pad so that the open side [A] faces downward.

Fuel Tank

Fuel Tank Removal

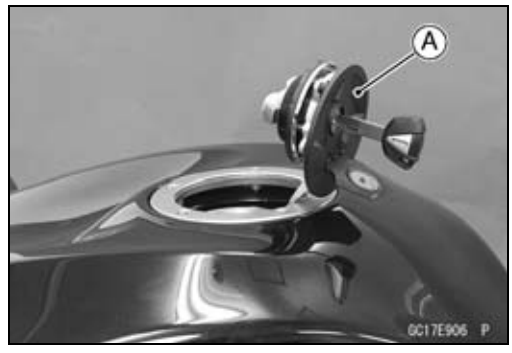
⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. 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. Disconnect the battery (-) terminal. To avoid fuel spills, draw it from the tank when the engine is cold. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

- Turn the ignition switch off.
- Wait until the engine cools down.
- Remove:
  Front Seat (see Front Seat Removal in the Frame chapter)

- Open the fuel tank cap [A] to lower the pressure in the tank.

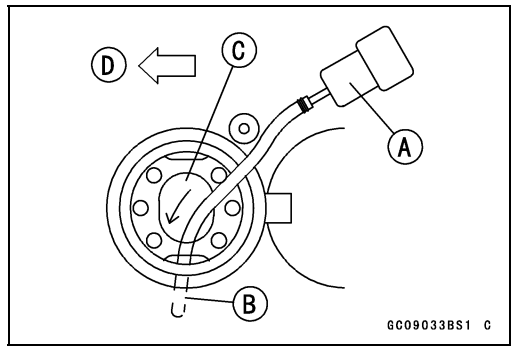
○During tank removal, keep the tank cap open to release pressure in the tank. This makes fuel spillage less.



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

○Use a soft plastic hose [B] as a pump intake 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]

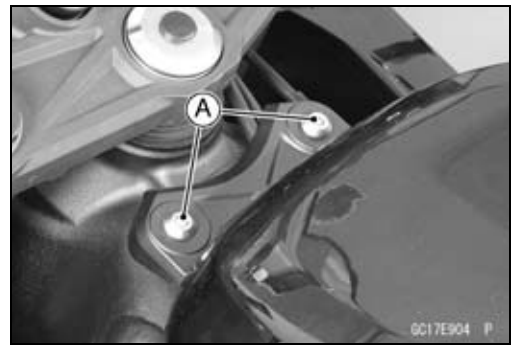


⚠ WARNING

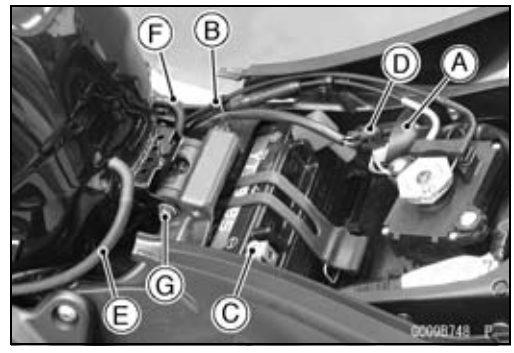
Spilled fuel is flammable and can be explosive under certain conditions. The fuel can not be removed completely from the fuel tank. Be careful for remained fuel spillage.

Fuel Tank

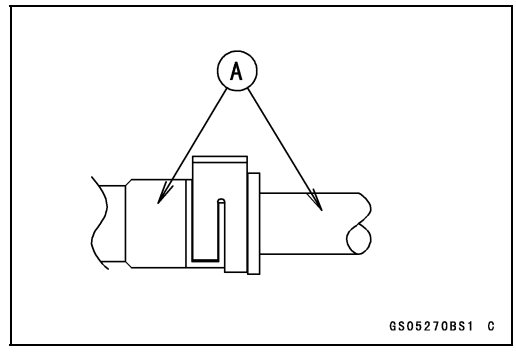
- Remove:
  Fuel Tank Bolts [A]



- Slide the dust cover [A].
- Open the clamp [B].
- Disconnect:
  Battery (–) Terminal [C]
  Fuel Pump Lead Connector [D]
  Fuel Tank Drain Hose [E]
  Fuel Tank Breather Hose [F]
- Remove:
  Fuel Tank Bolt [G]



- Be sure to place a piece of cloth around the fuel hose joint.
- Wipe off the dirt of the surface [A] around the connection using a cloth or a soft brush.

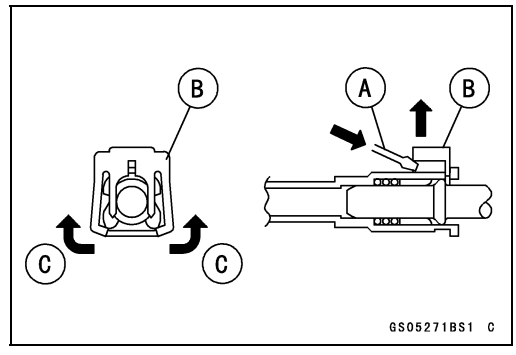


When removing with standard tip screwdriver

- Insert the standard tip screwdriver [A] into slit on the joint lock [B].
- Turn the driver to disconnect the joint lock.

When removing with fingers

- Open and push up [C] the joint lock with your fingers.

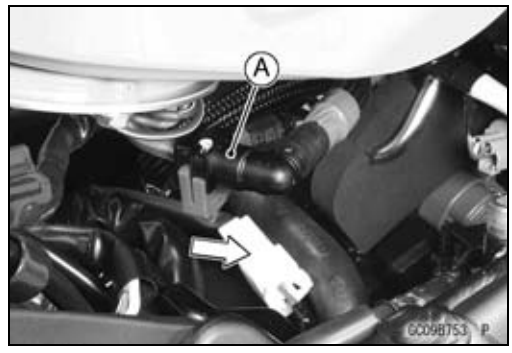


NOTICE

Prying or excessively widening the joint lock ends for fuel hose removal will permanently deform the joint lock, resulting in a loose or incomplete lock that may allow fuel to leak and create the potential for a fire explosion. To prevent fire or explosion from a damaged joint lock, do not pry or excessively widen the joint lock ends when removing the fuel hose. The joint lock has a retaining edge that locks around the housing.

Fuel Tank

● Pull the fuel hose joint [A] out of the outlet pipe.

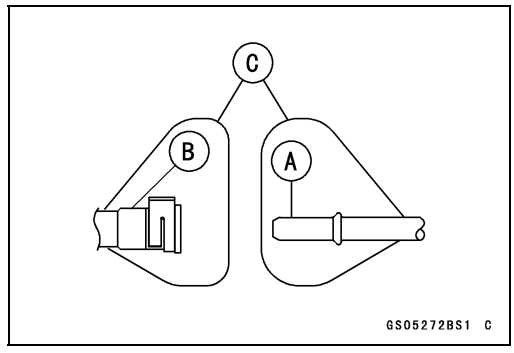


⚠ WARNING

Fuel is flammable and explosive under certain conditions and can cause severe burns. 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. Cover the hose connection with a clean shop towel to prevent fuel spillage.

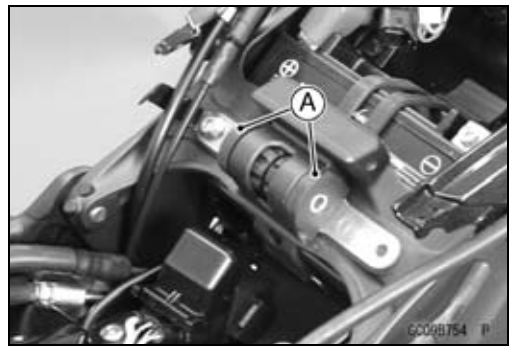
● Close the fuel tank cap.
● Remove the fuel tank, and place a it on flat surface.
○Do not apply the load to the fuel outlet pipe of the fuel pump.

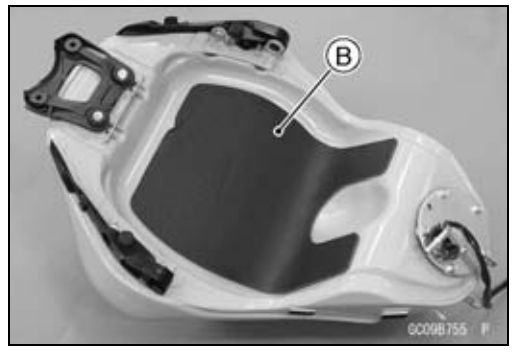
● Clean the pipe [A].
● Cover the pipe and the hose joint [B] with the vinyl bags [C] to keep it clean.



Fuel Tank Installation

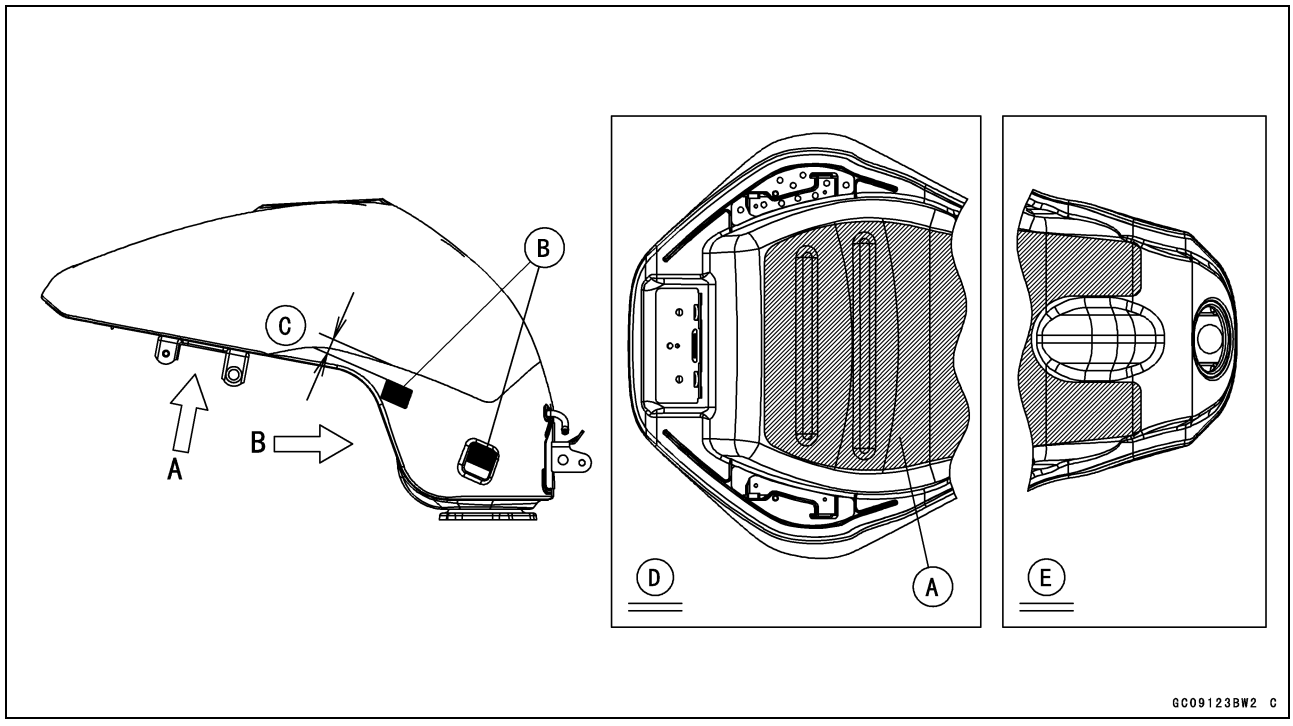
● Note the above WARNING (see Fuel Tank Removal).
● Run the hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
● Check that the dampers [A] and pad [B] are in place on the frame and the fuel tank.
★If the dampers and pad are damaged or deteriorated, replace them.



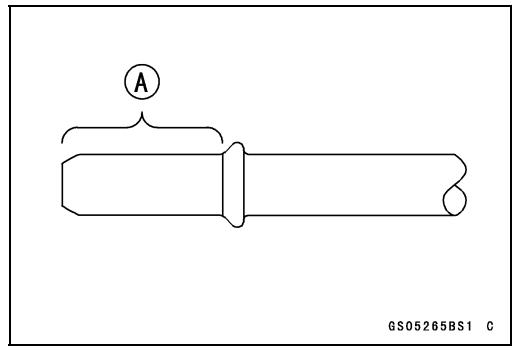


Fuel Tank

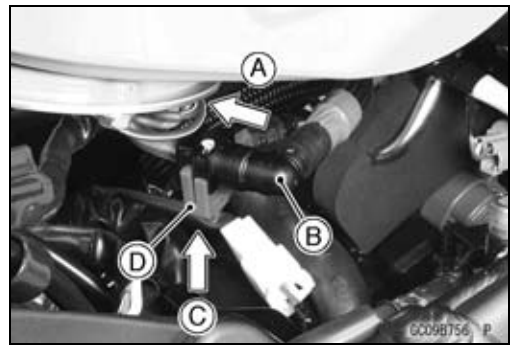
- When installing the pad [A] and hooks [B], install them as shown.
  16 mm (0.63 in.) [C]
  View A [D]
  View B [E]



- Remove the vinyl bag on the pipe and fuel hose joint.
- Check the joint lock for deformation and wear.
- ★If the joint lock is deformed, replace the fuel hose with a new one.
- Check that there are no flaws, burrs, and adhesion of foreign materials on the delivery pipe [A].
- Apply engine oil to the pipe.

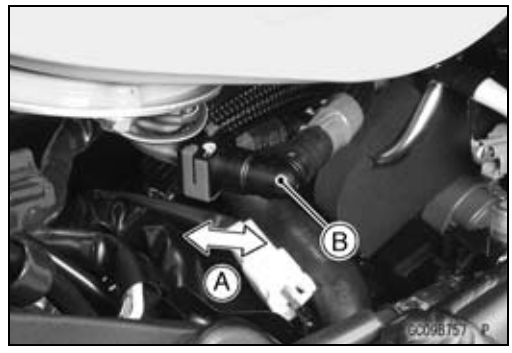


- Insert [A] the fuel hose joint [B] straight onto the fuel outlet pipe until the hose joint clicks.
- Push [C] the joint lock [D] until the hose joint clicks.



Fuel Tank

- Push and pull [A] the fuel hose joint [B] back and forth more than two times, and make sure it is locked and does not come off.



⚠ WARNING

Leaking fuel can cause a fire or explosion resulting in serious burns. Make sure the hose joint is installed correctly on the delivery pipe by sliding the joint.

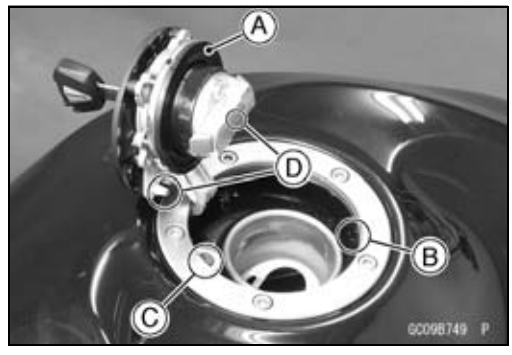
★If it comes off, reinstall the hose joint.
- Connect the fuel pump lead connector and the battery (–) terminal (see Battery Installation in the Electrical System chapter).
- Install removed parts (see appropriate chapters).

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.



NOTICE

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

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the tank in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area. Do not use gasoline or low flash-point solvents to clean the tank.

- Remove:
  Fuel Tank (see Fuel Tank Removal)
  Fuel Pump (see Fuel Pump Removal)
- 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:
  Fuel Pump (see Fuel Pump Installation)
  Fuel Tank (see Fuel Tank Installation)

Evaporative Emission Control System (CAL Model)

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

Parts Removal/Installation

⚠ WARNING

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

NOTICE

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

- Connect the hoses according to the diagram of the system (see Cable, Wire, and Hose Routing section in the Appendix chapter). Make sure they do not get pinched or kinked.

Hose Inspection

- Refer to the Evaporative Emission Control System Inspection (CAL Model) in the Periodic Maintenance chapter.

Purge Valve Inspection

- Refer to the Purge Valve Inspection in the Self-Diagnosis System chapter.

Canister Inspection

- Refer to the Evaporative Emission Control System Inspection (CAL Model) in the Periodic Maintenance chapter.

Cooling System

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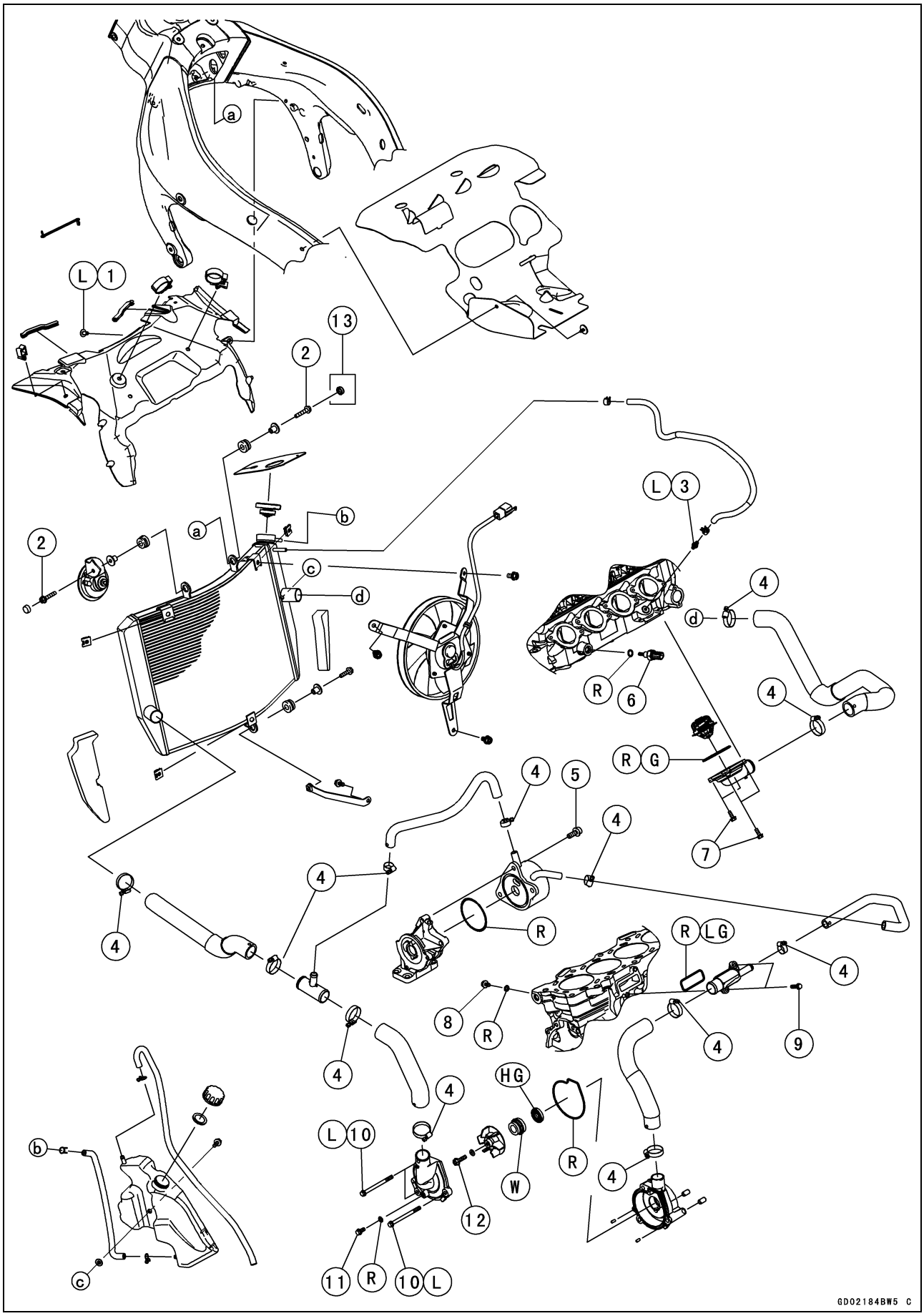
Exploded View

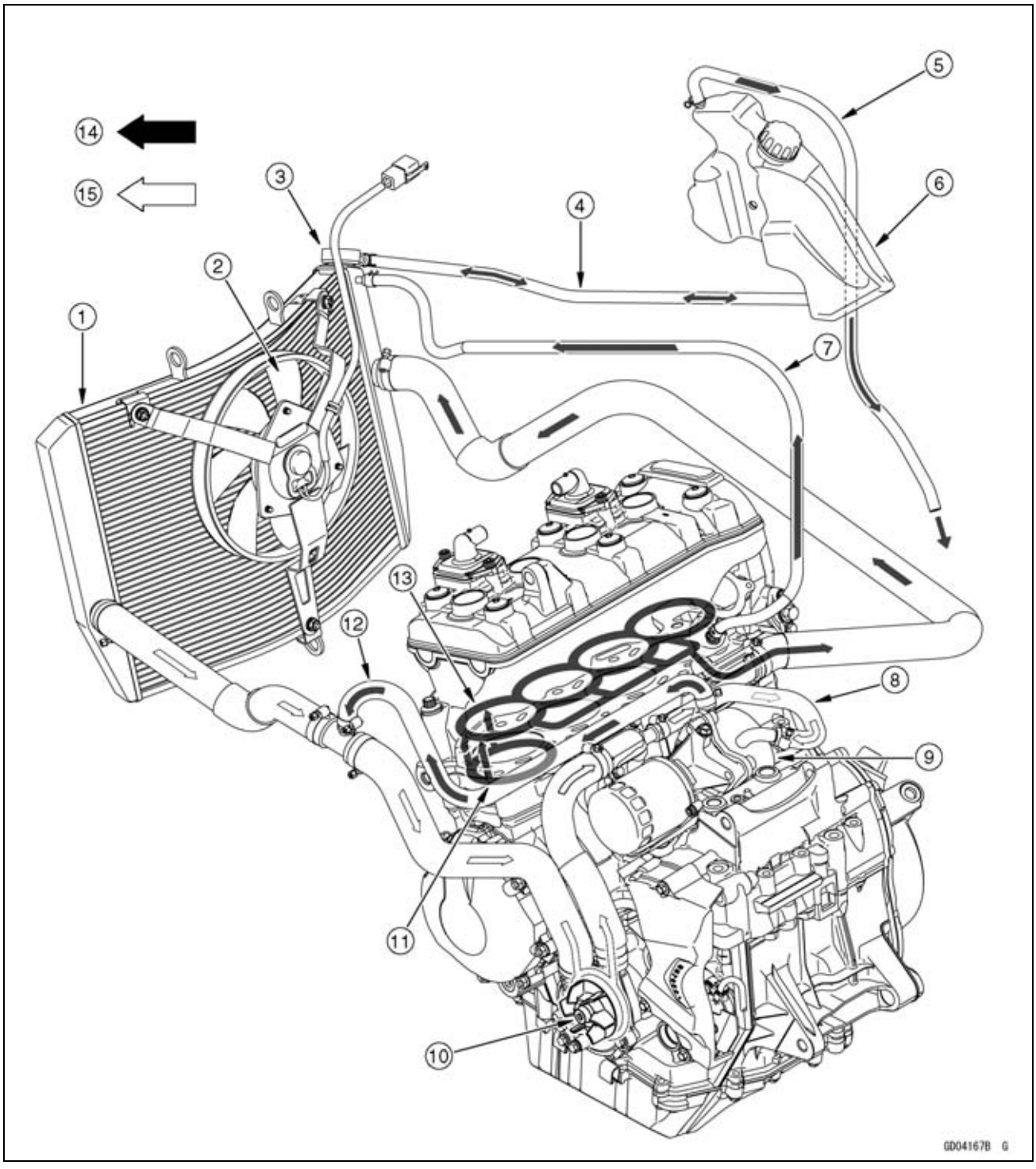


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Heat Insulation Plate Bolt	3.9	0.40	35 in·lb	L
2	Radiator Upper Bolts	9.8	1.0	87 in·lb	
3	Coolant By-pass Fitting Bolt	8.8	0.90	78 in·lb	L
4	Water Hose Clamp Screws	3.0	0.31	27 in·lb	
5	Oil Cooler Mounting Bolts	20	2.0	15	
6	Water Temperature Sensor	12	1.2	106 in·lb	
7	Thermostat Housing Cover Bolts	5.9	0.60	52 in·lb	
8	Coolant Drain Bolt (Cylinder)	9.8	1.0	87 in·lb	
9	Water Hose Fitting Bolts	9.8	1.0	87 in·lb	
10	Water Pump Cover Bolts	12	1.2	106 in·lb	L
11	Coolant Drain Bolt (Water Pump)	8.8	0.90	78 in·lb	
12	Impeller Bolt	9.8	1.0	87 in·lb	

13. ZX636E Model
G: Apply grease.
HG: Apply high-temperature grease.
L: Apply a non-permanent locking agent.
LG: Apply liquid gasket.
R: Replacement Parts
W: Apply water.

Coolant Flow Chart



1. Radiator
2. Radiator Fan
3. Radiator Cap
4. Radiator Overflow Hose
5. Reserve Tank Overflow Hose
6. Reserve Tank
7. Air Bleeder Hose
8. Oil Cooler Intake Hose
9. Oil Cooler
10. Water Pump
11. Cylinder Jacket
12. Oil Cooler Outlet Hose
13. Cylinder Head Jacket
14. Hot Coolant
15. Cold Coolant

Coolant Flow Chart

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 less than 55°C (131°F), 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 100°C (212°F), the radiator fan relay 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 is below 97.5°C (208°F), the fan relay 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, 13 ~ 18 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, 13 ~ 18 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.

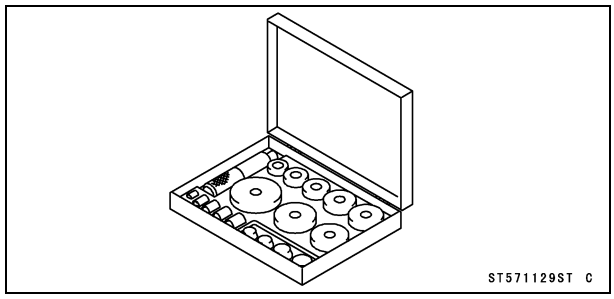
4-6 COOLING SYSTEM

Specifications

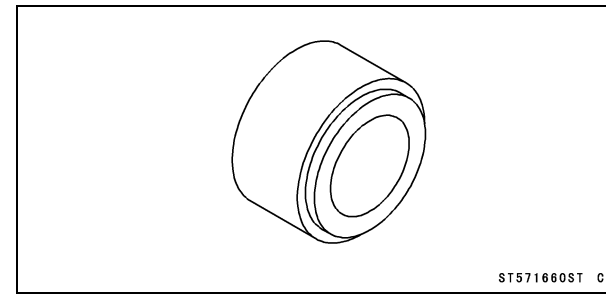
Item	Standard
Coolant Provided when Shipping	
Type (Recommended)	Permanent type of antifreeze (soft water and ethylene glycol plus corrosion and rust inhibitor chemicals for aluminum engines and radiators)
Color	Green
Mixed Ratio	Soft water 50%, coolant 50%
Freezing Point	–35°C (–31°F)
Total Amount	2.5 L (2.6 US qt) (Reserve tank full level, including radiator and engine)
Radiator Cap	
Relief Pressure	93 ~ 123 kPa (0.95 ~ 1.25 kgf/cm², 13 ~ 18 psi)
Thermostat	
Valve Opening Temperature	58 ~ 62°C (136 ~ 144°F)
Valve Full Opening Lift	8 mm (0.31 in.) or more at 75°C (167°F)

Special Tools

Bearing Driver Set:
57001-1129

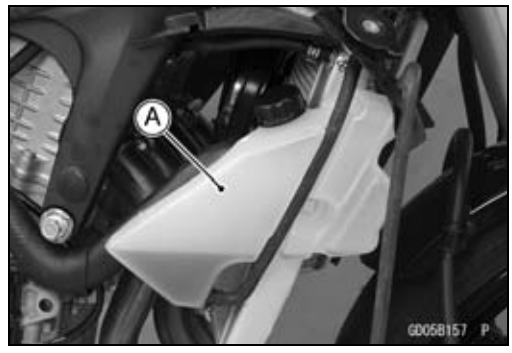


Oil Seal Driver ϕ37.5:
57001-1660



Coolant

Coolant Deterioration Inspection



- Remove the upper fairing assembly (see Upper Fairing Assembly Removal in the Frame chapter).
- Visually inspect the coolant in the reserve tank [A].

★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

- Refer to the Coolant Level Inspection in the Periodic Maintenance chapter.

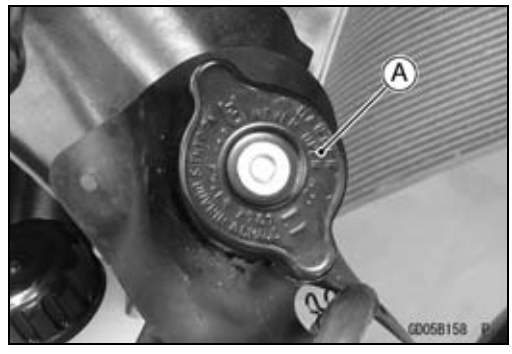
Coolant Draining

- Refer to the Coolant Change in the Periodic Maintenance chapter.

Coolant Filling

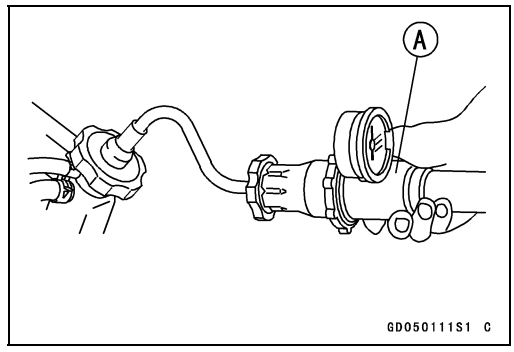
- Refer to the Coolant Change in the Periodic Maintenance chapter.

Pressure Testing



- Remove:
  Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
  Radiator Cap [A]

○Remove the radiator cap 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.



- Install the cooling system pressure tester [A] on the filler neck.

NOTE

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

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

NOTICE

During pressure testing, do not exceed the pressure for which the system is designed. The maximum pressure is 123 kPa (1.25 kgf/cm², 18 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.
- Install the upper fairing assembly (see Upper Fairing Assembly Installation in the Frame chapter).

Coolant

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.

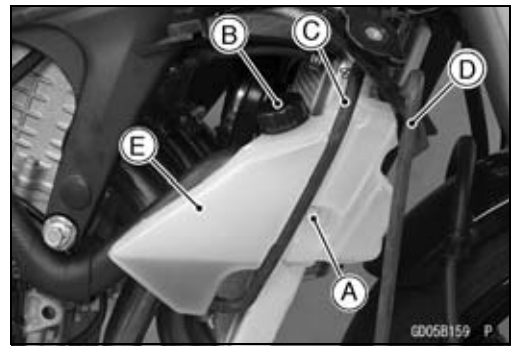
- Drain the cooling system (see Coolant Change in the Periodic Maintenance chapter).
- Fill the cooling system with fresh water mixed with a flushing compound.

NOTICE
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 Coolant Change in the Periodic Maintenance chapter).

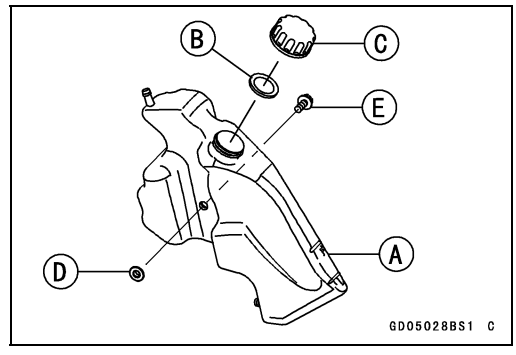
Coolant Reserve Tank Removal

- Remove:
  Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
  Bolt [A]
- Remove the cap [B] and pour the coolant into a container.
- Remove:
  Radiator Overflow Hose [C]
  Reserve Tank Overflow Hose [D]
  Coolant Reserve Tank [E]



Coolant Reserve Tank Installation

- Install the following to the coolant reserve tank [A].
  Gasket [B]
  Cap [C]
  Collar [D]
- Install the coolant reserve tank and tighten the bolt [E].
- Run the hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Fill the coolant reserve tank with coolant (see Coolant Change 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.

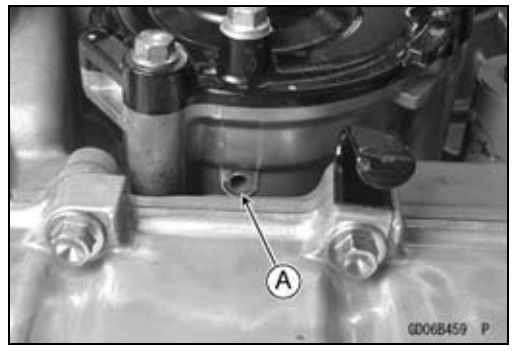
Water Pump Inspection

- Remove the left lower fairing (see Lower Fairing Removal in the Frame chapter).
- Check the drainage outlet passage [A] at the bottom of the water pump body for coolant leaks.
- If a coolant leak or ooze is found, start the engine and check if the coolant leaks continuously.

○When coolant does not continuously leak, it is normal.

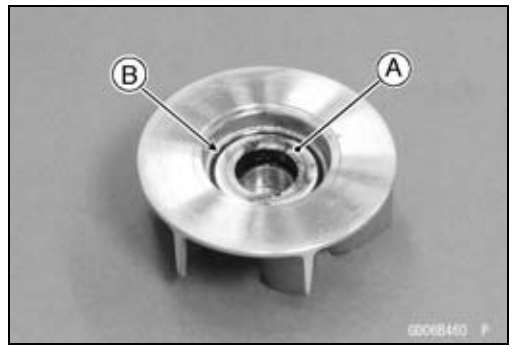
★If the mechanical seal is damaged, the coolant continuously leaks through the drainage outlet passage. Replace the mechanical seal unit.

★If the oil seal is damaged, engine oil leaks through the drainage outlet passage. Replace the oil seal.



Water Pump Impeller Disassembly/Assembly

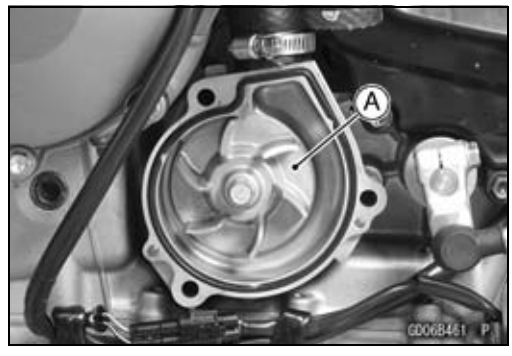
- Remove the water pump impeller (see Oil Pump Removal in the Engine Lubrication System chapter).
- The sealing seat [A] and rubber seal [B] may be removed easily by hand.
- Apply water around the surfaces of the rubber seal and sealing seat.
- Install the rubber seal and sealing seat into the impeller by pressing them by hand until the seat stops at the bottom of the hole.
- Install the water pump impeller (see Oil Pump Installation in the Engine Lubrication System chapter).



Water Pump Impeller Inspection

- Remove the water pump cover (see Oil Pump Removal in the Engine Lubrication System chapter).
- Visually inspect the impeller [A].

★If the surface is corroded or if the blades are damaged, replace the impeller.

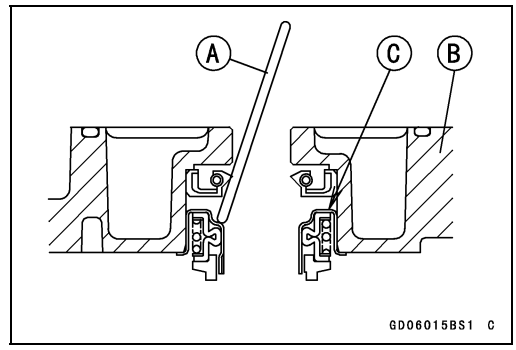


Water Pump

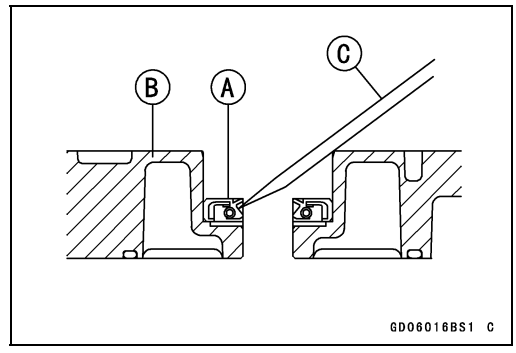
Water Pump Housing Disassembly

NOTICE
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].



- Take the oil seal [A] out of the housing [B] with a hook [C].

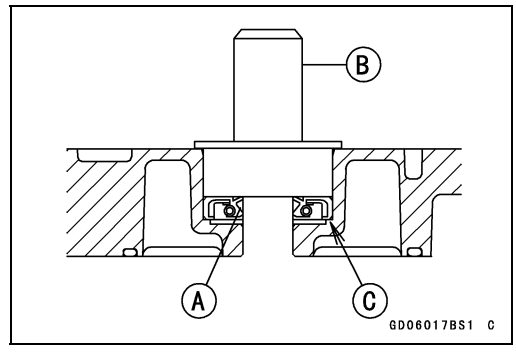


Water Pump Housing Assembly

NOTICE
Do not reuse the mechanical seal and oil seal.

- Apply high-temperature grease to the oil seal lips [A].
- Press the new oil seal into the housing with a bearing driver [B] until it stops at the bottom surface [C] of the housing.

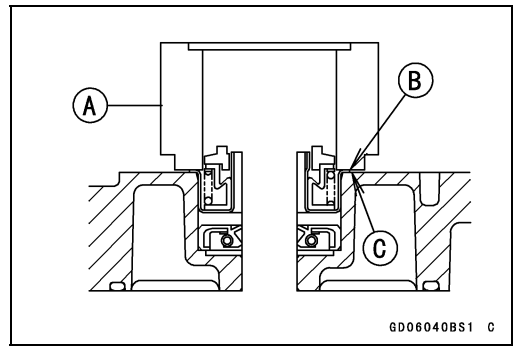
Special Tool - Bearing Driver Set: 57001-1129



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

- Press the new mechanical seal into the housing with the oil seal driver [A] until its flange [B] touches the surface [C] of the housing.

Special Tool - Oil Seal Driver ϕ37.5: 57001-1660

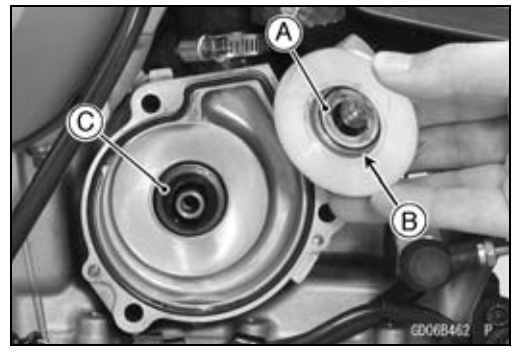


Mechanical Seal Inspection

- Remove the impeller (see Oil Pump Removal in the Engine Lubrication System chapter).
- Visually inspect the mechanical seal.

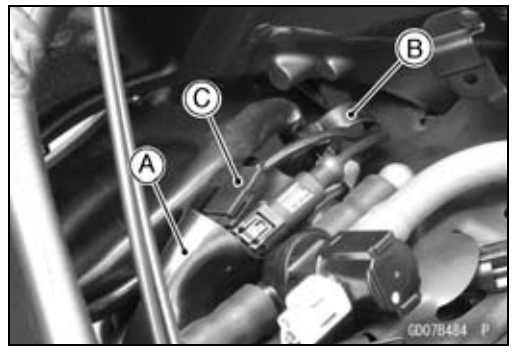
★If any one of the parts is damaged, replace the mechanical seal as a unit.

Impeller Sealing Seat Surface [A]
Rubber Seal [B]
Mechanical Seal [C]

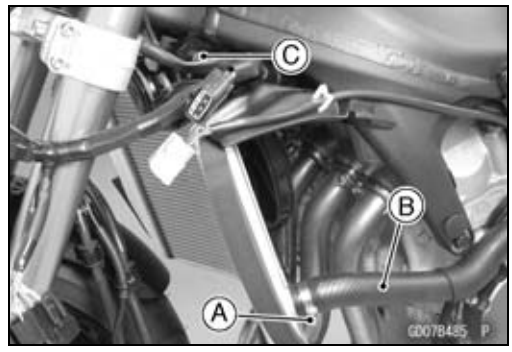


Radiator

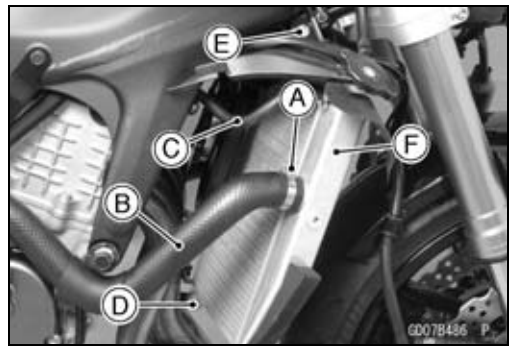
Radiator and Radiator Fan Removal



- Drain:
  Coolant (see Coolant Change in the Periodic Maintenance chapter)
- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter)
  Coolant Reserve Tank (see Coolant Reserve Tank Removal)
- Slide the dust cover [A].
- Open the clamp [B].
- Disconnect the radiator fan motor lead connector [C].



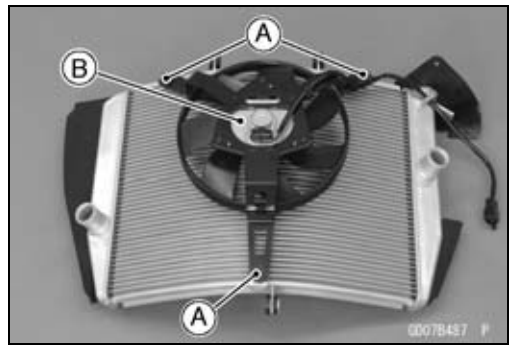
- Loosen the water hose clamp screw [A].
- Disconnect the water hose [B].
- Remove:
  Cap
  Radiator Upper Bolt (Left) [C] and Horn



- Loosen the water hose clamp screw [A].
- Disconnect:
  Water Hose [B]
  Air Bleeder Hose [C]
- Remove:
  Radiator Lower Bolt [D]
  Cap (ZX636E Model)
  Radiator Upper Bolt (Right) [E]
  Radiator [F]

NOTICE

Do not touch the radiator core. This could damage the radiator fins, resulting in loss of cooling efficiency.



- Remove:
  Radiator Fan Mounting Bolts [A]
  Radiator Fan [B]

Radiator

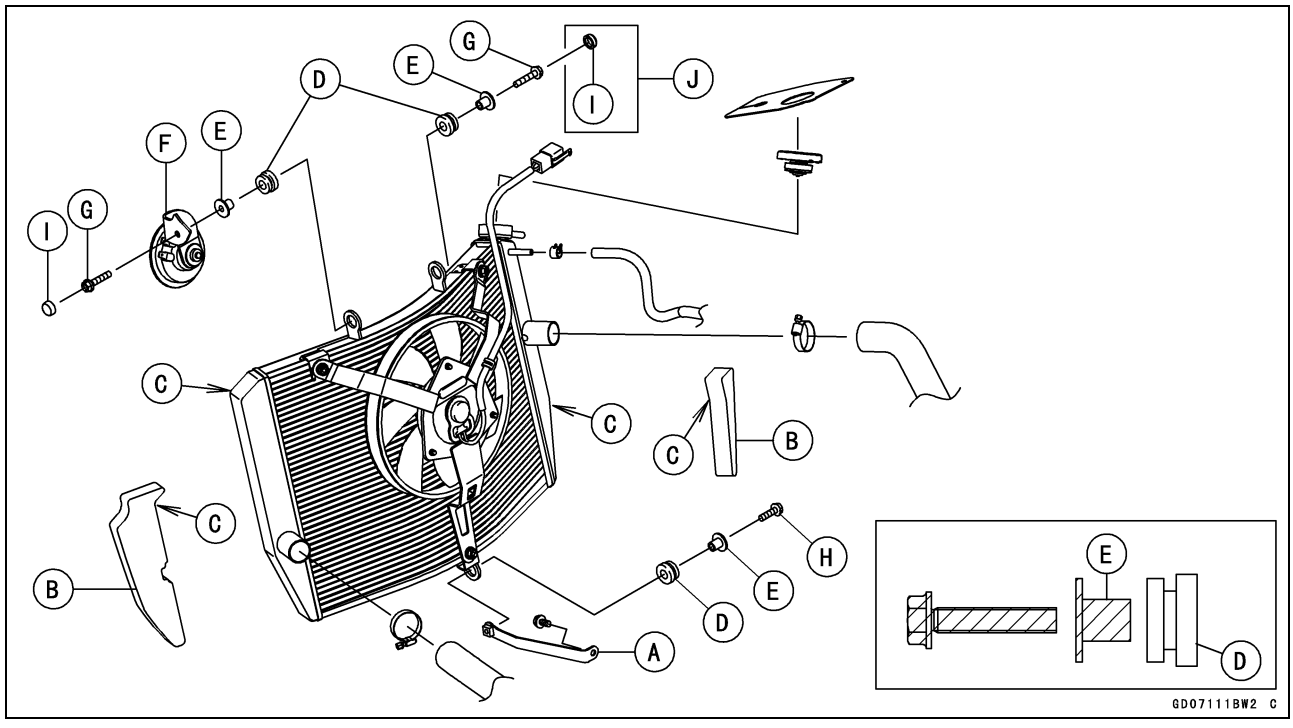
Radiator and Radiator Fan Installation

★If the radiator bracket [A] was removed, install it.
- Install the radiator fan to the radiator.
- Tighten the radiator fan mounting bolts.
- When installing the pads [B], install it so that the corners [C] align.
- Run the radiator fan motor lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the rubber dampers [D] and collars [E] as shown.

○Face the small diameter side of the damper to the collar.
- Install the horn [F].
- Tighten:

Torque - Radiator Upper Bolts [G]: 9.8 N·m (1.0 kgf·m, 87 in·lb)
- Tighten the radiator lower bolt [H].
- Install the caps [I].

ZX636E Model [J]



- Install the hoses and clamps (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Tighten:

Torque - Water Hose Clamp Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)
- Install the removed parts (see appropriate chapters).

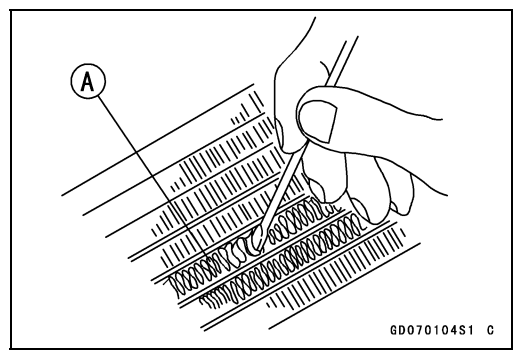
Radiator Inspection

- Remove the radiator (see Radiator and Radiator Fan Removal).
- Check the radiator core.

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

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

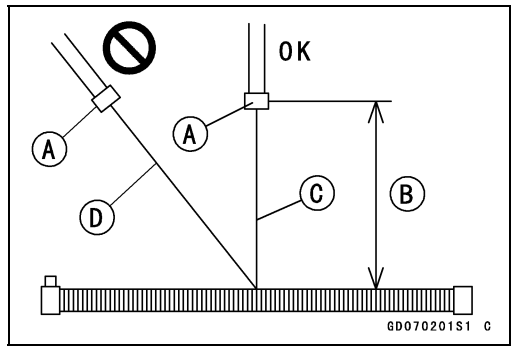
★If the air passages of the radiator core are blocked more than 20% by unremovable obstructions or irreparably deformed fins, replace the radiator with a new one.



Radiator

NOTICE

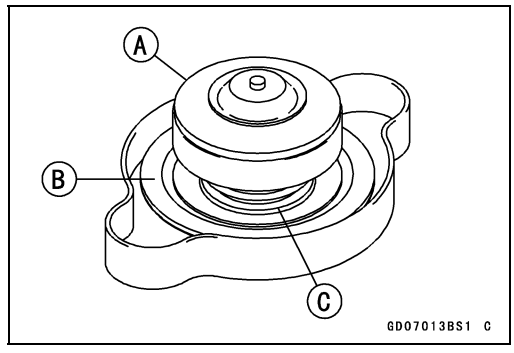
When cleaning the radiator with steam cleaner, be careful of the following to prevent radiator damage:
Keep the steam gun [A] away more than 0.5 m (1.6 ft) [B] from the radiator core.
Hold the steam gun perpendicular [C] (not oblique [D]) to the core surface.
Run the steam gun, following the core fin direction.



Radiator Cap Inspection

- Remove:
  Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
  Radiator Cap
- Check the condition of the bottom [A] and top [B] valve seals and valve spring [C].

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

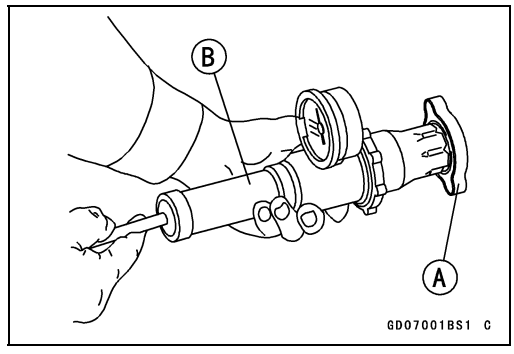


- Install the cap [A] on a cooling system pressure tester [B].

NOTE

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

- Watching the pressure gauge, pump the pressure tester to build up the pressure until the relief valve opens: the gauge needle flicks downward. Stop pumping and measure leak time at once. The relief valve must open within the specified range in the table below and the gauge hand must remain within the same range at least 6 seconds.

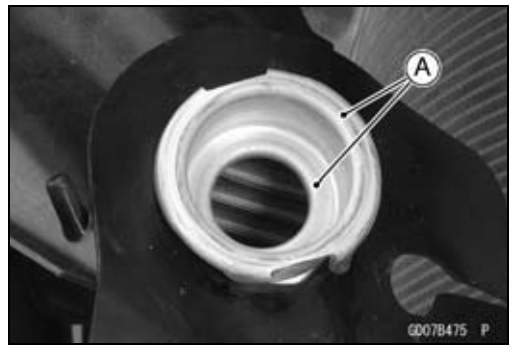


Radiator Cap Relief Pressure
Standard: 93 ~ 123 kPa (0.95 ~ 1.25 kgf/cm², 13 ~ 18 psi)

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

Radiator Filler Neck Inspection

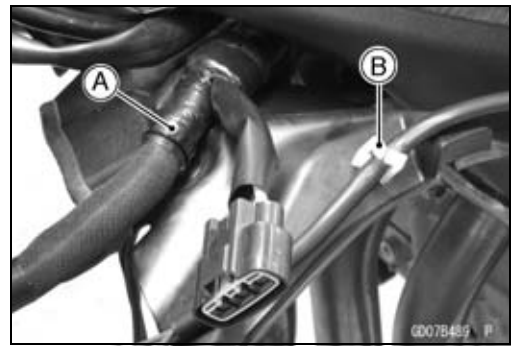
- Remove:
  Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
  Radiator Cap
- Check the radiator filler neck for signs of damage.
- Check the condition of the top and bottom sealing seats [A] in the filler neck. They must be smooth and clean for the radiator cap to function properly.



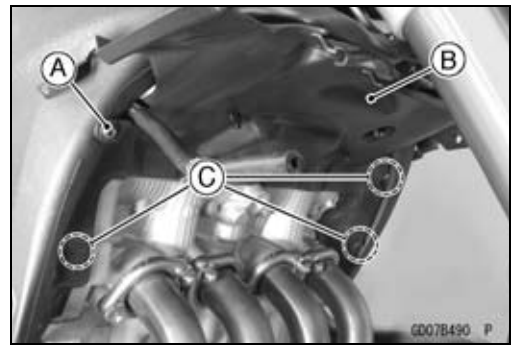
Radiator

Heat Insulation Plate Removal

- Remove:
  Radiator (see Radiator and Radiator Fan Removal)
- Open the clamps [A].



- Open the clamp [A].
- Free the lead from the clamp [B].



- Free the right switch housing lead and front wheel rotation sensor lead from the clamp on the right side of the heat insulation plate.
- Remove:
  Heat Insulation Plate Bolt [A]
  Heat Insulation Plate [B]

○Clear the projections [C] from the frame.

Heat Insulation Plate Installation

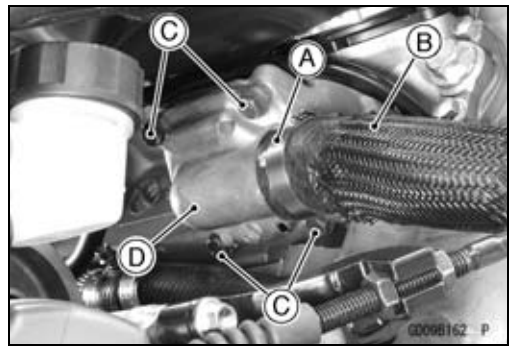
- Installation is the reverse of removal.
- Apply a non-permanent locking agent to the threads of the heat insulation plate bolt and tighten it.

  Torque - Heat insulation Plate Bolt: 3.9 N·m (0.40 kgf·m, 35 in·lb)

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

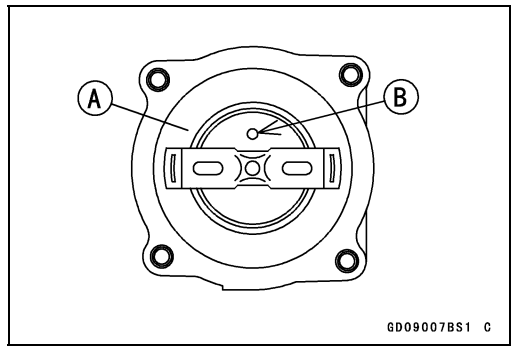
Thermostat

Thermostat Removal

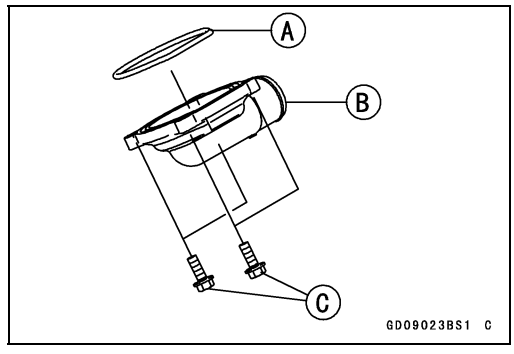


- Remove the oil cooler (see Oil Cooler Removal in the Engine Lubrication System chapter)
- Loosen the water hose clamp screw [A].
- Disconnect the water hose [B].
- Remove:
  Thermostat Housing Cover Bolts [C]
  Thermostat Housing Cover [D]
  Thermostat

Thermostat Installation



- Install the thermostat [A] in the housing so that the air bleeder hole [B] is on top.



- Replace the O-ring [A] with a new one.
- Apply grease to any three positions of the new O-ring to prevent it from coming off.
- Install a new O-ring into the thermostat housing cover [B].
- Tighten:

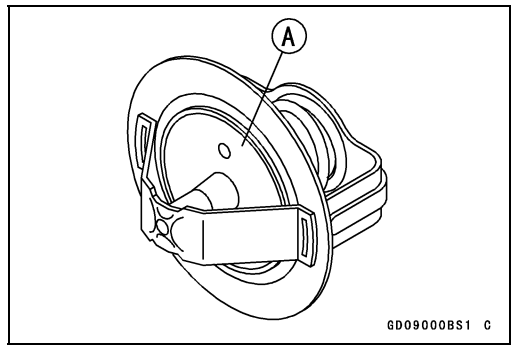
  Torque - Thermostat Housing Cover Bolts [C]: 5.9 N·m (0.60 kgf·m, 52 in·lb)

- Confirm that the thermostat is installed correctly.
- Install the water hose and tighten the clamp (see Cable, Wire, and Hose Routing section in the Appendix chapter).

  Torque - Water Hose Clamp Screw: 3.0 N·m (0.31 kgf·m, 27 in·lb)

- Install the removed parts (see appropriate chapters).

Thermostat Inspection



- Remove the thermostat (see Thermostat Removal).
- Inspect the thermostat valve [A] at room temperature.

★If the valve is open, replace the thermostat with a new one.

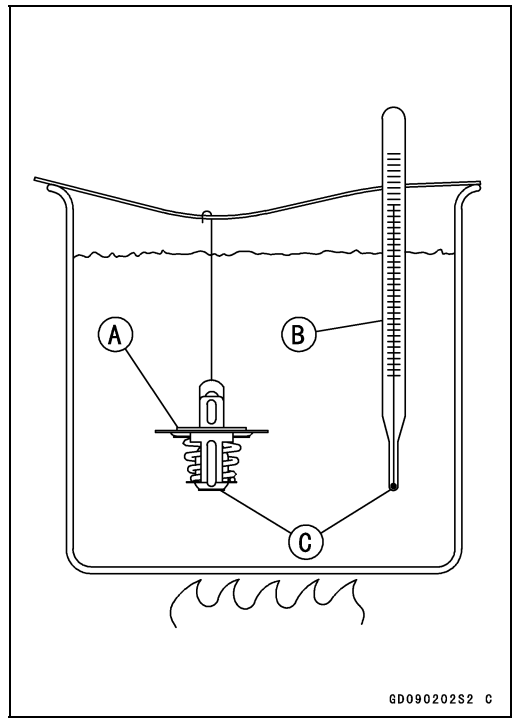
Thermostat

- To check valve opening temperature, suspend the thermostat [A] in a container of water and raise the temperature of the water.

○The thermostat must be completely submerged and must not touch the container sides or bottom. Suspend an accurate thermometer [B] in the water so that the heat sensitive portions [C] are located in almost the same depth. It must not touch the container, either.

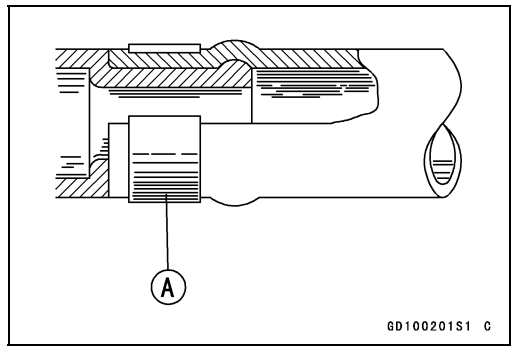
★If the measurement is out of the specified range, replace the thermostat with a new one.

Thermostat Valve Opening Temperature
58 ~ 62°C (136 ~ 144°F)



Hoses and Pipes

Hose Installation



- Install the hoses and pipes, being careful to follow bending direction. Avoid sharp bending, kinking, flattening or twisting.
- Run the hoses (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the clamp [A] as near as possible to the hose end to clear the raised rib of the fitting. This will prevent the hoses from working loose.

○The clamp screws should be positioned correctly to prevent the clamps from contacting the other parts.

- Tighten:

Torque - Water Hose Clamp Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)

Hose Inspection

- Refer to the Radiator Hose and Pipe Inspection in the Periodic Maintenance chapter.

Water Temperature Sensor

Water Temperature Sensor Removal/Installation

- Refer to the Water Temperature Sensor Removal/Installation in the Self-Diagnosis System chapter.

Water Temperature Sensor Inspection

- Refer to the Water Temperature Sensor Inspection in the Electrical System chapter.

Engine Top End

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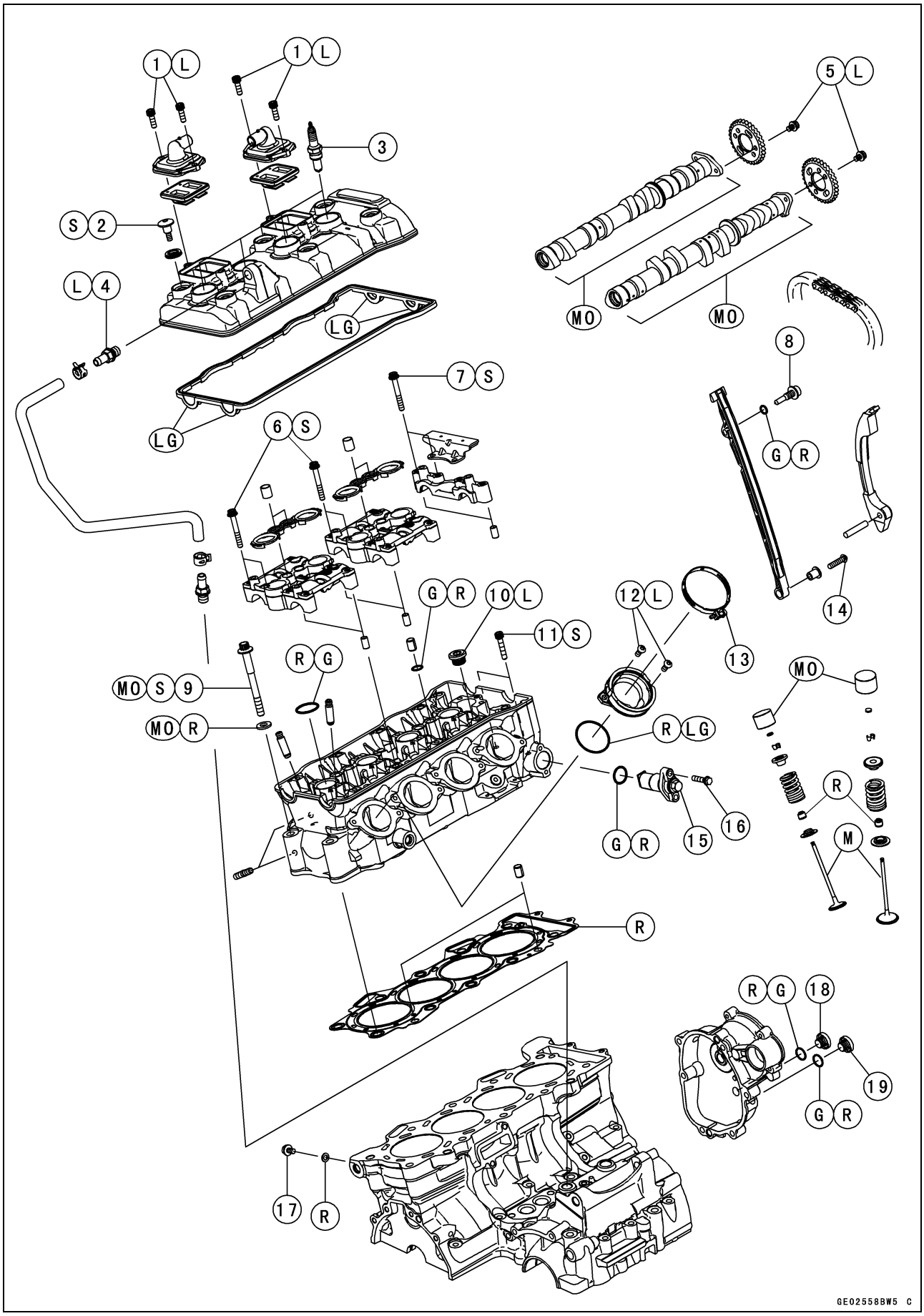
Exploded View

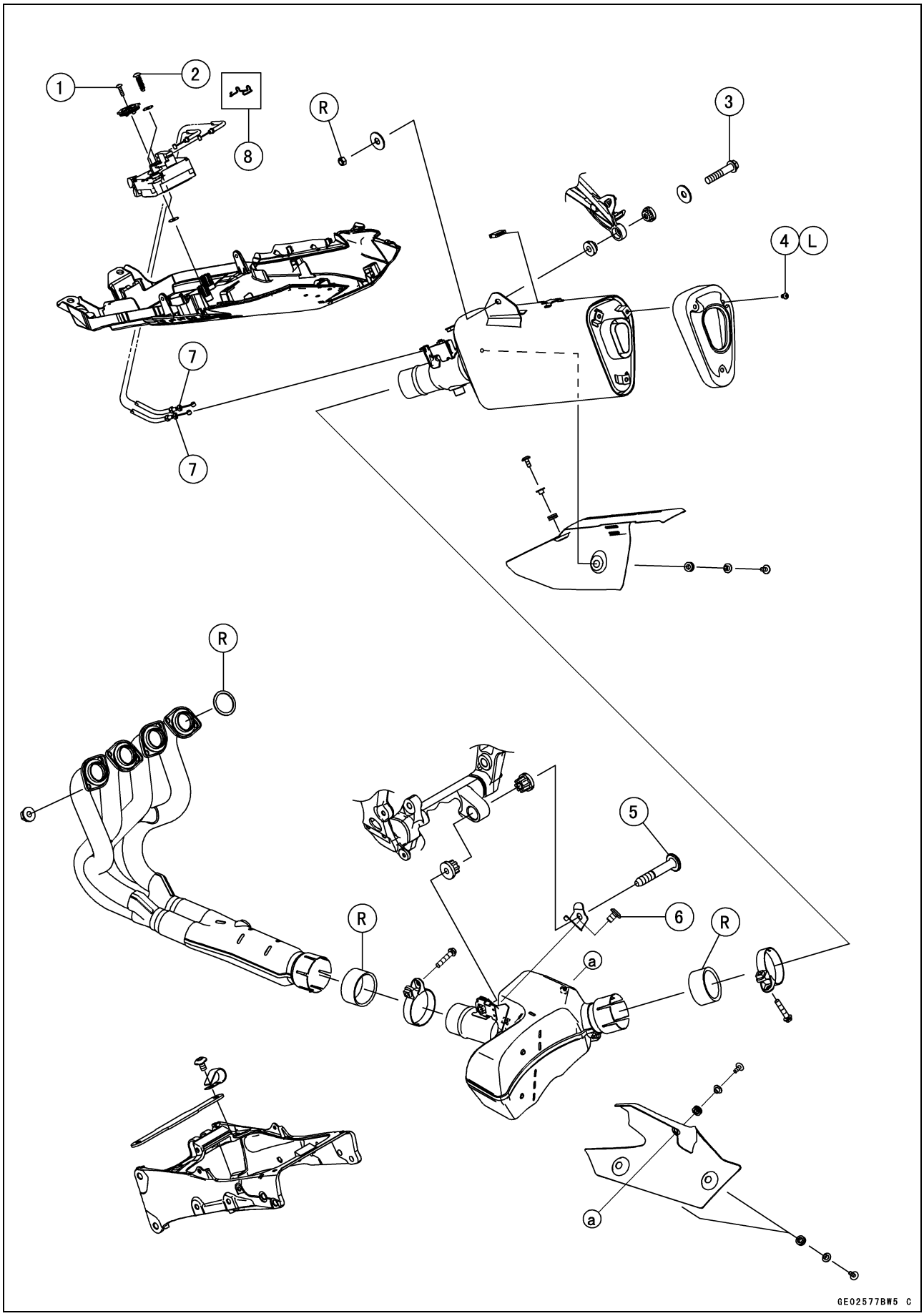


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Air Suction Valve Cover Bolts	9.8	1.0	87 in·lb	L
2	Cylinder Head Cover Bolts	9.8	1.0	87 in·lb	S
3	Spark Plugs	13	1.3	115 in·lb	
4	Breather Hose Fitting	15	1.5	11	L
5	Camshaft Sprocket Bolts	15	1.5	11	L
6	Camshaft Cap Bolts	12	1.2	106 in·lb	S
7	Upper Camshaft Chain Guide Bolts	12	1.2	106 in·lb	S
8	Front Camshaft Chain Guide Bolt (Upper)	25	2.5	18	
9	Cylinder Head Bolts (M9)	see the text	←	←	MO, S
10	Water Passage Plugs	19.6	2.00	14.5	L
11	Cylinder Head Bolts (M6)	12	1.2	106 in·lb	S
12	Throttle Body Assy Holder Bolts	12	1.2	106 in·lb	L
13	Throttle Body Assy Holder Clamp Bolts	2.9	0.30	26 in·lb	
14	Front Camshaft Chain Guide Bolt (Lower)	12	1.2	106 in·lb	
15	Camshaft Chain Tensioner Cap Bolt	20	2.0	15	
16	Camshaft Chain Tensioner Mounting Bolts	11	1.1	97 in·lb	
17	Coolant Drain Bolt (Cylinder)	9.8	1.0	87 in·lb	
18	Starter Clutch Bolt Cap	2.9	0.30	26 in·lb	
19	Timing Inspection Cap	2.9	0.30	26 in·lb	

G: Apply grease.
L: Apply a non-permanent locking agent.
LG: Apply liquid gasket.
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
S: Follow the specified tightening sequence.

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Exhaust Butterfly Valve Actuator Pulley Bolt	4.9	0.50	43 in·lb	
2	Exhaust Butterfly Valve Actuator Mounting Screws	4.3	0.44	38 in·lb	
3	Muffler Body Mounting Bolt	25	2.5	18	
4	Muffler Body End Cover Bolts	7.0	0.71	62 in·lb	L
5	Premuffler Chamber Mounting Bolt	40	4.1	30	
6	Premuffler Chamber Bracket Bolt	40	4.1	30	
7	Exhaust Butterfly Valve Cable Locknuts	5.0	0.51	44 in·lb	

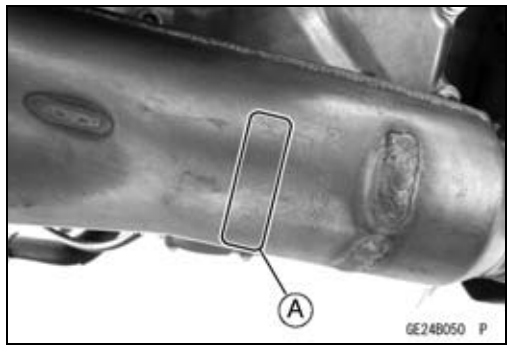
8. ZX636ED/FD Late Models ~
L: Apply a non-permanent locking agent.
R: Replacement Parts

Exhaust System Identification

MANIFOLD		MUFFLER BODY	SPECIFICATION	MODEL
Honeycomb Type Catalyst with Oxygen Sensor Exhaust Pipe P/No. 39178-0206 Mark: KHI M 146	**Non-Catalyst** Premuffler Chamber P/No. 49062-0713 Mark: KHI M 147	**Non-Catalyst** P/No. 18091-0909 Mark: KHI K 623	WVTA (FULL H) GB WVTA (FULL H) WVTA (78.2 H) AU SEA-B2 ID BR MY SEA-B3 Euro 3	ZX636ED ~ EG/FE ~ FG ZX636ED ~ EG/FE ~ FG ZX636ED ~ EG/FE ~ FG ZX636ED ~ EE/FD ~ ZX636ED/FD ~ FG ZX636ED ~ EG/FE ~ FH ZX636ED ~ EG/FE ~ FG ZX636EG ~ EH/FG ~ FH ZX636ED ~ EH/FE ~ FH ZX636FH ~
Honeycomb Type Catalyst without Oxygen Sensor Exhaust Pipe P/No. 39178-0207 Mark: None	**Non-Catalyst** Premuffler Chamber P/No. 49062-0713 Mark: KHI M 147	**Non-Catalyst** P/No. 18091-0909 Mark: KHI K 623 EPA Noise Emission Control Information	US CAL CA	ZX636ED ~/FD ~ ZX636ED ~/FD ~ ZX636ED ~/FD ~

GE24715C F

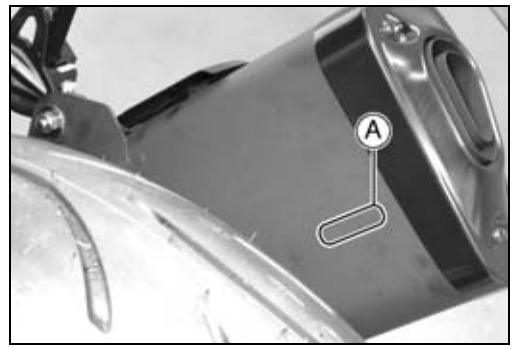
Exhaust Pipe Mark Position [A]



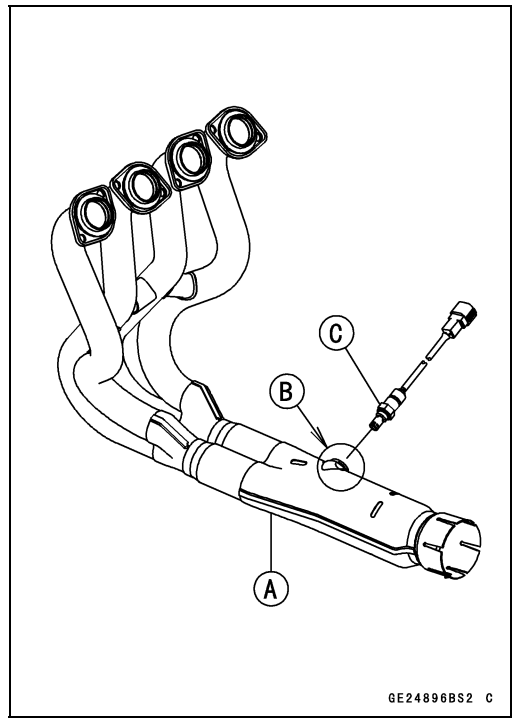
Premuffler Chamber Mark Position [A]

Exhaust System Identification

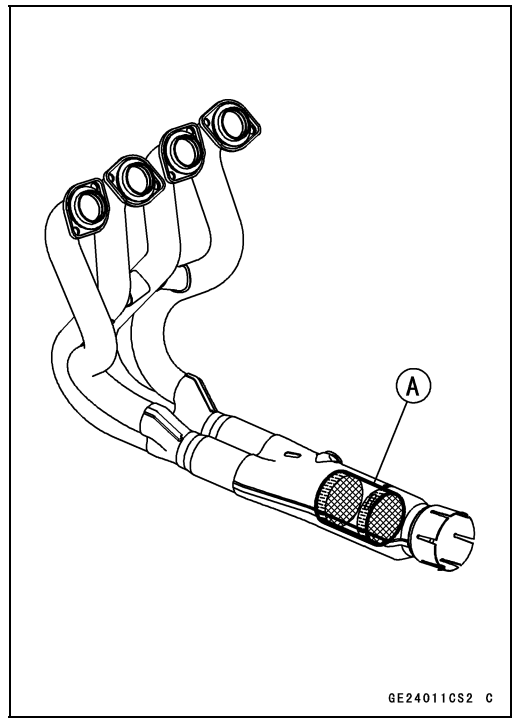
Muffler Body Mark Position [A]



Exhaust Pipe [A] with Hole [B] for Oxygen Sensor [C]



Honeycomb Type Catalyst Position [A]

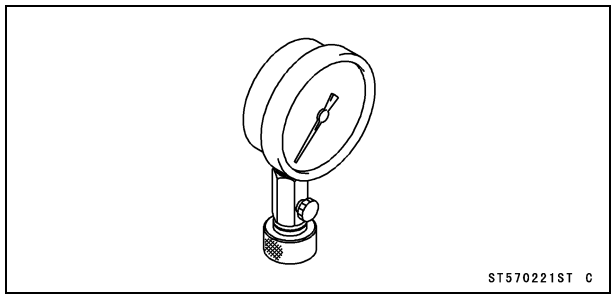


Specifications

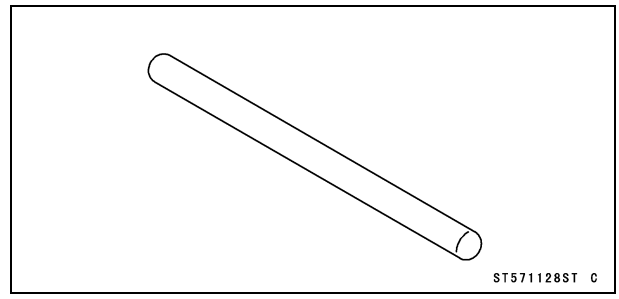
Item	Standard	Service Limit
Camshafts		
Cam Height:		
Exhaust	33.343 ~ 33.457 mm (1.3127 ~ 1.3172 in.)	33.24 mm (1.309 in.)
Intake	34.743 ~ 34.857 mm (1.3678 ~ 1.3723 in.)	34.64 mm (1.364 in.)
Camshaft Journal/Camshaft Cap Clearance	0.038 ~ 0.081 mm (0.0015 ~ 0.0032 in.)	0.17 mm (0.0067 in.)
Camshaft Journal Diameter	23.940 ~ 23.962 mm (0.9425 ~ 0.9434 in.)	23.91 mm (0.941 in.)
Camshaft Bearing Inside Diameter	24.000 ~ 24.021 mm (0.9449 ~ 0.9457 in.)	24.08 mm (0.948 in.)
Camshaft Runout	TIR 0.02 mm (0.0008 in.) or less	TIR 0.1 mm (0.004 in.)
Cylinder Head		
Cylinder Compression	(Usable Range) 1 050 ~ 1 598 kPa (10.7 ~ 16.3 kgf/cm², 152 ~ 232 psi) @300 r/min (rpm)	– – –
Cylinder Head Warp	– – –	0.05 mm (0.002 in.)
Valves		
Valve Clearance:		
Exhaust	0.24 ~ 0.31 mm (0.0094 ~ 0.0122 in.)	– – –
Intake	0.13 ~ 0.19 mm (0.0051 ~ 0.0075 in.)	– – –
Valve Head Thickness:		
Exhaust	1.0 mm (0.039 in.)	0.5 mm (0.020 in.)
Intake	0.5 mm (0.020 in.)	0.3 mm (0.012 in.)
Valve Stem Bend	TIR 0.01 mm (0.0004 in.) or less	TIR 0.05 mm (0.002 in.)
Valve Stem Diameter:		
Exhaust	3.955 ~ 3.970 mm (0.1557 ~ 0.1563 in.)	3.94 mm (0.155 in.)
Intake	3.975 ~ 3.990 mm (0.1565 ~ 0.1571 in.)	3.96 mm (0.156 in.)
Valve Guide Inside Diameter:		
Exhaust	4.000 ~ 4.012 mm (0.1575 ~ 0.1580 in.)	4.08 mm (0.161 in.)
Intake	4.000 ~ 4.012 mm (0.1575 ~ 0.1580 in.)	4.08 mm (0.161 in.)
Valve/Valve Guide Clearance (Wobble Method):		
Exhaust	0.08 ~ 0.16 mm (0.0031 ~ 0.0063 in.)	0.36 mm (0.014 in.)
Intake	0.03 ~ 0.10 mm (0.0012 ~ 0.0039 in.)	0.30 mm (0.012 in.)
Valve Seat Cutting Angle	32°, 45°, 60°	– – –
Valve Seating Surface:		
Width:		
Exhaust	0.8 ~ 1.2 mm (0.031 ~ 0.047 in.)	– – –
Intake	0.5 ~ 1.0 mm (0.020 ~ 0.039 in.)	– – –
Outside Diameter:		
Exhaust	22.8 ~ 23.0 mm (0.898 ~ 0.906 in.)	– – –
Intake	26.93 ~ 27.13 mm (1.060 ~ 1.068 in.)	– – –
Valve Spring Free Length:		
Exhaust	41.01 mm (1.615 in.)	40.2 mm (1.583 in.)
Intake	39.99 mm (1.574 in.)	39.0 mm (1.535 in.)

Special Tools and Sealant

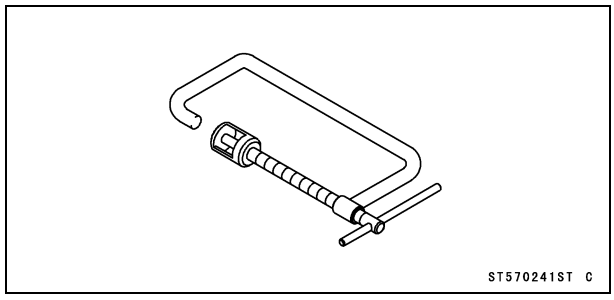
Compression Gauge, 20 kgf/cm²:
57001-221



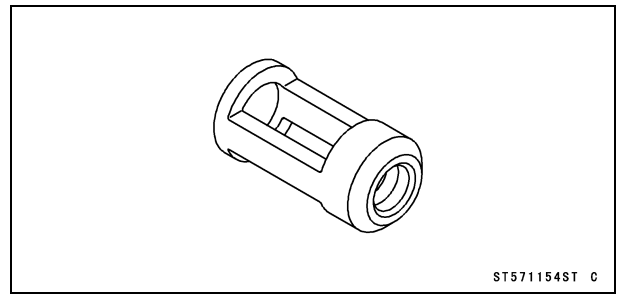
Valve Seat Cutter Holder Bar:
57001-1128



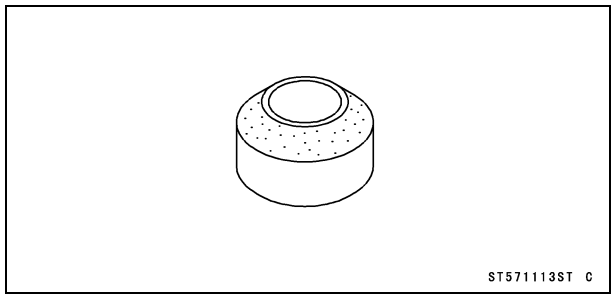
Valve Spring Compressor Assembly:
57001-241



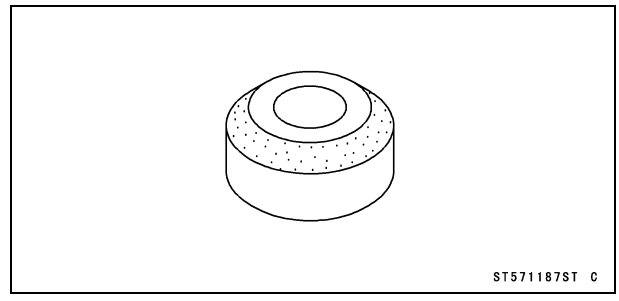
Valve Spring Compressor Adapter, ϕ20:
57001-1154



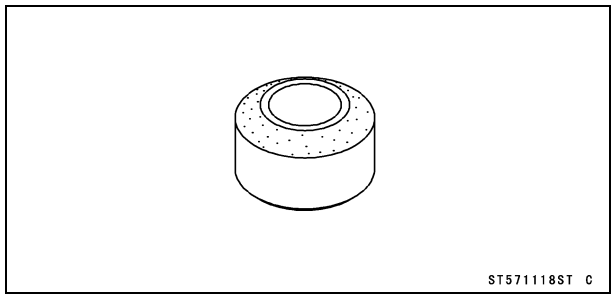
Valve Seat Cutter, 45° - ϕ24.5:
57001-1113



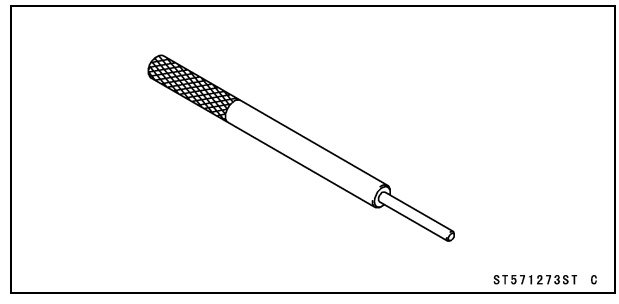
Valve Seat Cutter, 45° - ϕ30:
57001-1187



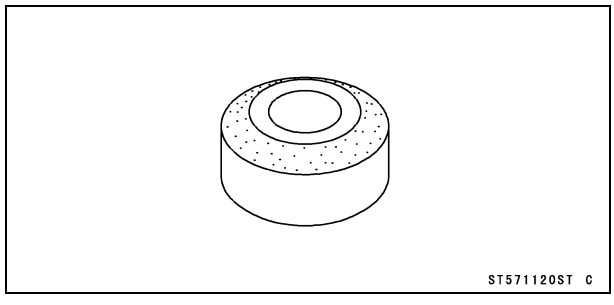
Valve Seat Cutter, 32° - ϕ25:
57001-1118



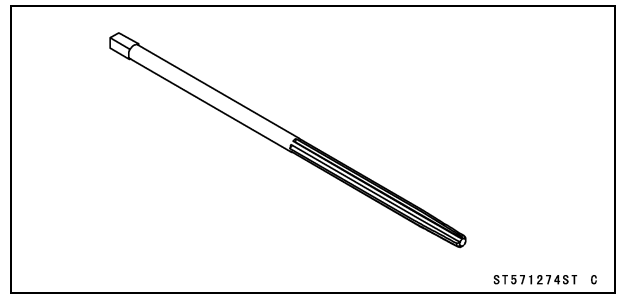
Valve Guide Arbor, ϕ4:
57001-1273



Valve Seat Cutter, 32° - ϕ30:
57001-1120

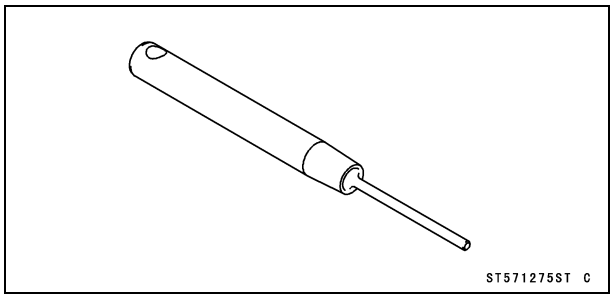


Valve Guide Reamer, ϕ4:
57001-1274

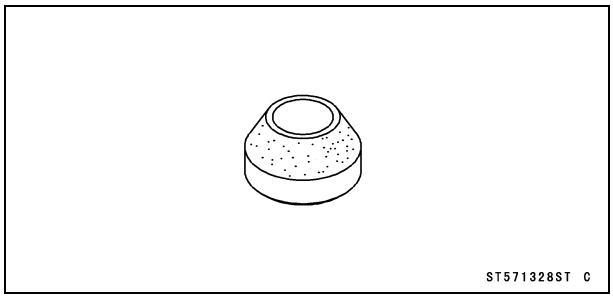


Special Tools and Sealant

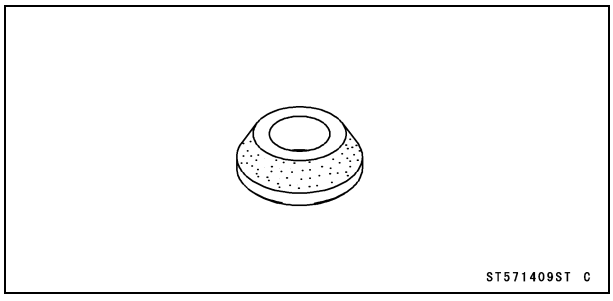
Valve Seat Cutter Holder, ϕ4:
57001-1275



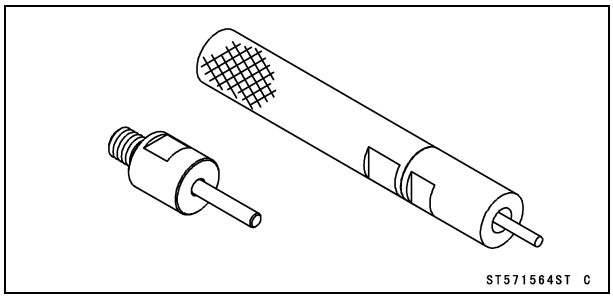
Valve Seat Cutter, 60° - ϕ25:
57001-1328



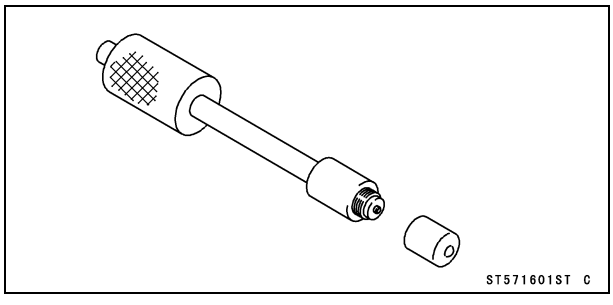
Valve Seat Cutter, 60° - ϕ27:
57001-1409



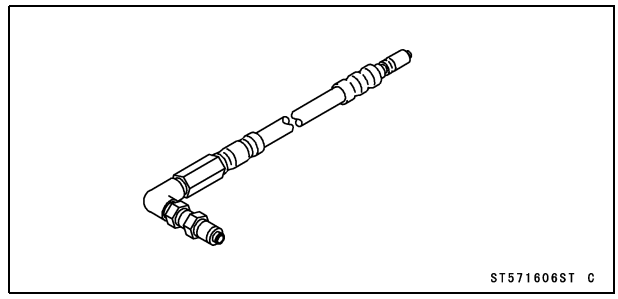
Valve Guide Driver:
57001-1564



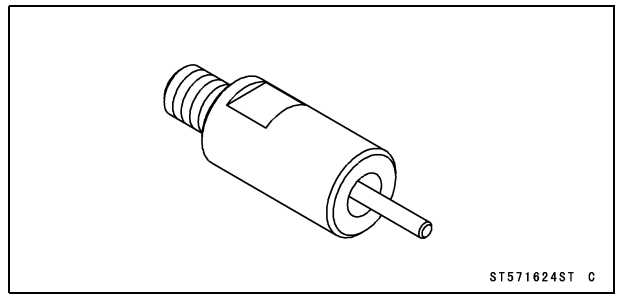
Compression Gauge Adapter, M10 × 1.0:
57001-1601



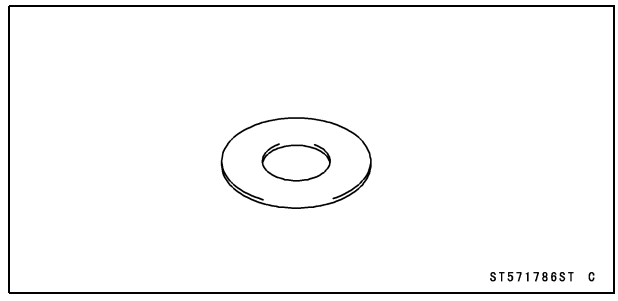
L-Shape Hose:
57001-1606



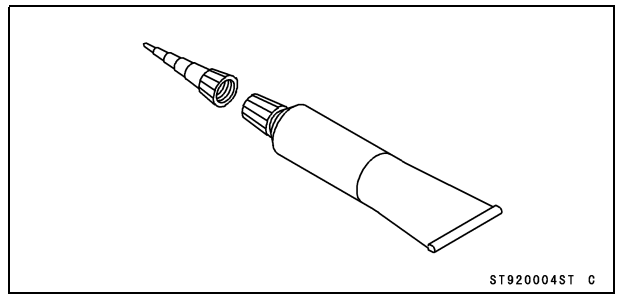
Valve Guide Driver Attachment, C:
57001-1624



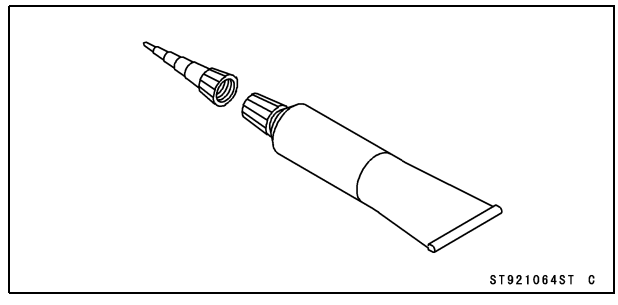
Spacer:
57001-1786



Liquid Gasket, TB1211F:
92104-0004



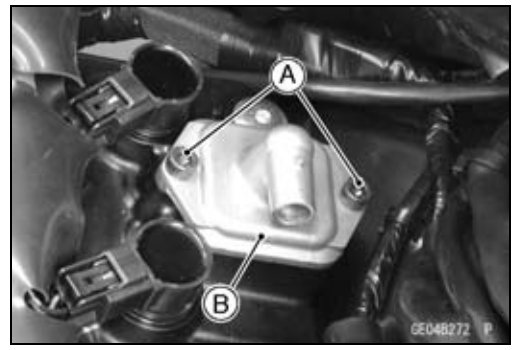
Liquid Gasket, TB1216B:
92104-1064



Clean Air System

Air Suction Valve Removal

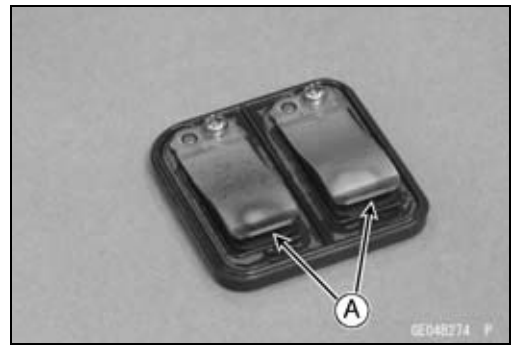
- Remove:
  Air Switching Valve (see Air Switching Valve Removal)
  Air Suction Valve Cover Bolts [A] (Both Sides)
  Air Suction Valve Cover [B] (Both Sides)



- Remove the air suction valve [A] on both sides.

Air Suction Valve Installation

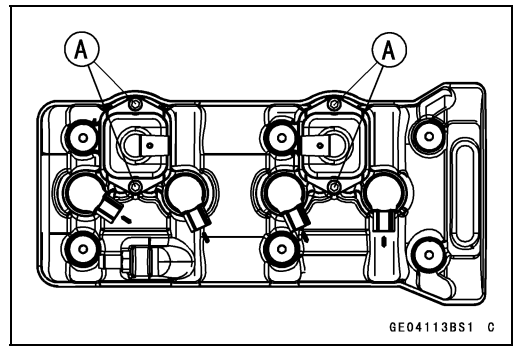
- Install the air suction valve so that opening [A] of the reed faces the rear and downward.



- Apply a non-permanent locking agent to the threads of the air suction valve cover bolts [A], and tighten them.

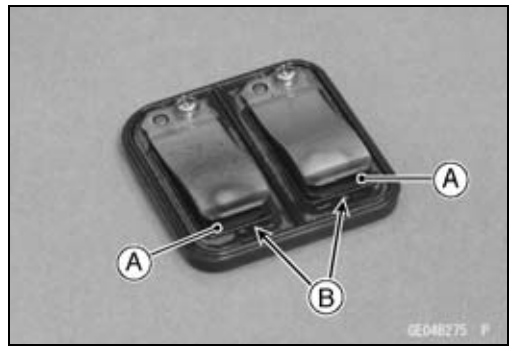
  Torque - Air Suction Valve Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Install the air switching valve (see Air Switching Valve Installation).



Clean Air System

Air Suction Valve Inspection



- Remove the air suction valve (see Air Suction Valve Removal).
- Visually inspect the reeds [A] for cracks, folds, warps, heat damage or other damage.

★If there is any doubt as to the condition of the reeds, 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.

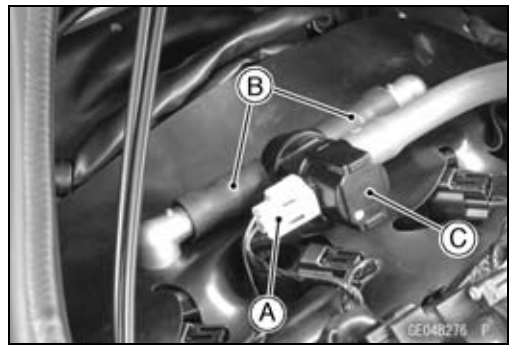
★If there is any doubt as to the condition of the reed contact areas, replace the air suction valve as an assembly.

★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.

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

Air Switching Valve Removal

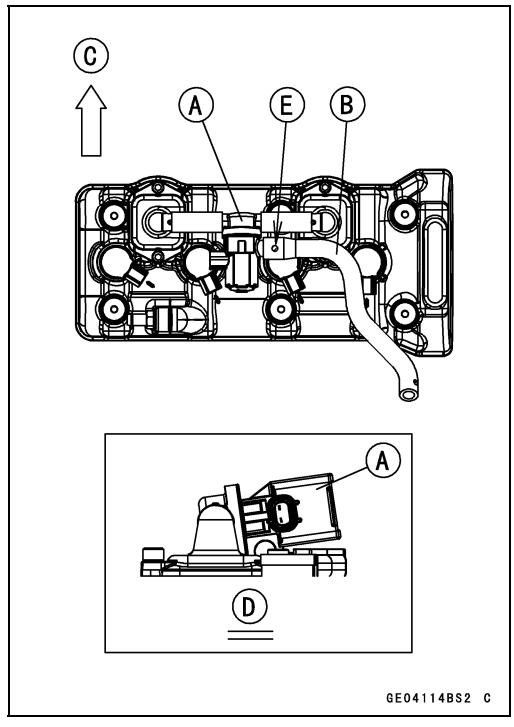
NOTICE
Never drop the air switching valve especially on a hard surface. Such a shock to the air switching valve can damaged it.



- Remove the air cleaner housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter).
- Disconnect the connector [A].
- Disconnect the hoses [B] from the air suction valve covers, and remove the air switching valve [C].

Air Switching Valve Installation

- Install the air switching valve [A] with hose [B] as shown.
  Front [C]
  Left Side View [D]
  White Paint [E]



Clean Air System

Air Switching Valve Operation Test

- Refer to the Air Suction System Damage Inspection in the Periodic Maintenance chapter.

Air Switching Valve Unit Test

- Refer to the Air Switching Valve Unit Test in the Electrical System chapter.

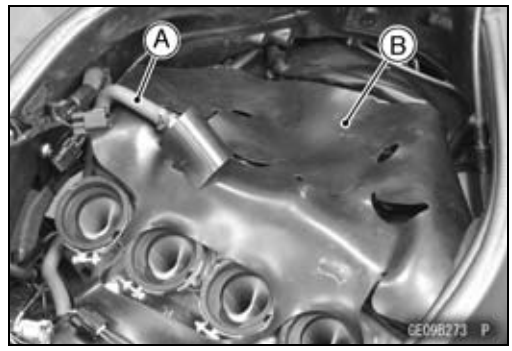
Clean Air System Hose Inspection

- Be certain that all the hoses are routed without being flattened or kinked, and are connected correctly to the air cleaner housing, air switching valve and air suction valve covers.

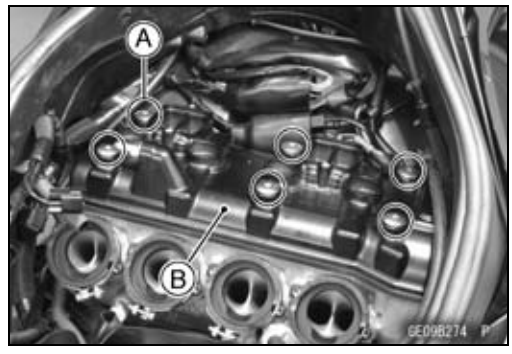
★If they are not, correct them. Replace them if they are damaged.

Cylinder Head Cover

Cylinder Head Cover Removal

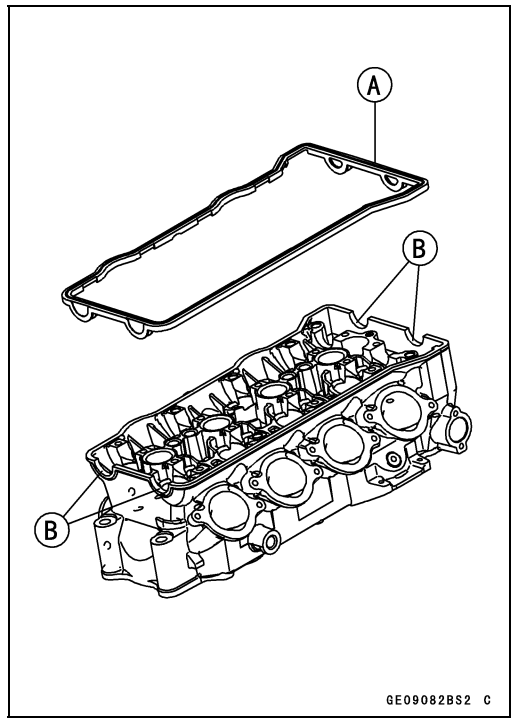


- Remove:
  Air Suction Valves (see Air Suction Valve Removal)
  Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
  Stick Coils (see Stick Coil Removal in the Electrical System chapter)
- Disconnect the breather hose [A].
- Turn up the front side of the heat insulation rubber plate [B].



- Remove:
  Cylinder Head Cover Bolts [A] with Rubber Washers
  Cylinder Head Cover [B]

Cylinder Head Cover Installation



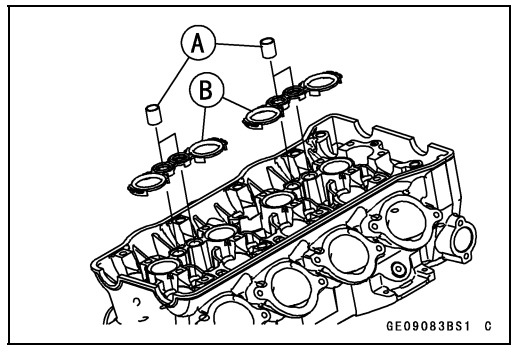
- Replace the cylinder head cover gasket [A] with a new one.
- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket [B] to the cylinder head as shown.

  Sealant - Liquid Gasket, TB1216B: 92104-1064

- Install the new cylinder head cover gasket.

NOTE

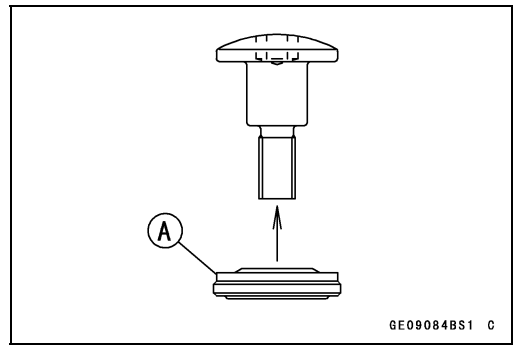
○*Make the application finish within 20 minutes with the liquid gasket (TB1216B) to the mating surface of the cylinder head cover is applied.*



- Be sure to install the following parts.
  Dowel Pins [A]
  Plug Hole Gaskets [B]

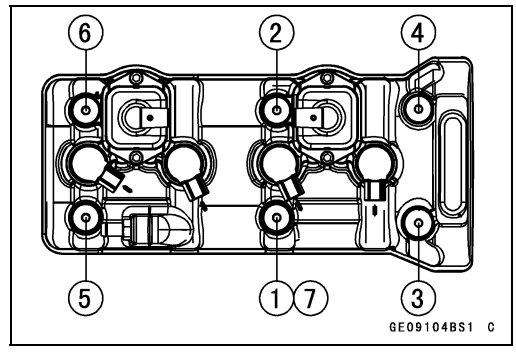
Cylinder Head Cover

- Install the cylinder head cover.
- Install the rubber washers [A] with the metal side faces upward.



- Tighten the cover bolts following the specified tightening sequence.

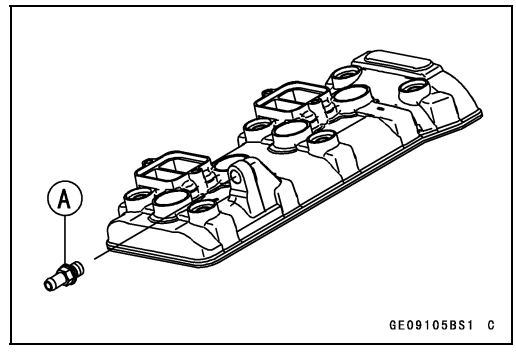
Torque - Cylinder Head Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)



- When installing the breather hose fitting [A], note the following.

○Apply a non-permanent locking agent to the threads of the breather hose fitting, and tighten it.

Torque - Breather Hose Fitting: 15 N·m (1.5 kgf·m, 11 ft·lb)



- Install the heat insulation rubber plate (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

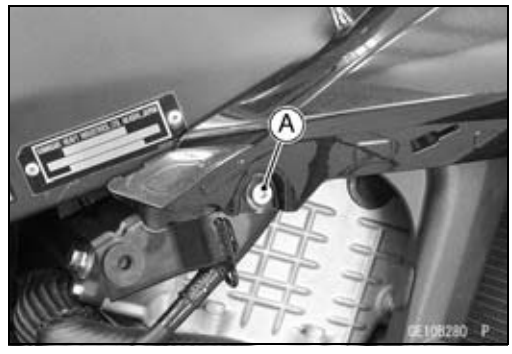
Camshaft Chain Tensioner

Camshaft Chain Tensioner Removal

NOTICE

This is a non-return type camshaft chain tensioner. The push rod does not return to its original position once it moves out to take up camshaft chain slack. Observe all the rules listed below.
When removing the tensioner, do not take out the mounting bolts only halfway. Retightening the mounting bolts from this position could damage the tensioner and the camshaft chain. Once the bolts are loosened, the tensioner must be removed and reset as described in "Camshaft Chain Tensioner Installation".
Do not turn over the crankshaft while the tensioner is removed. This could upset the camshaft chain timing, and damage the valves.

- Remove:
  Right Fairing Cover (see Fairing Cover Removal in the Frame chapter)
  Right Side Cover (see Side Cover Removal in the Frame chapter)
  Bolt [A] and Washer

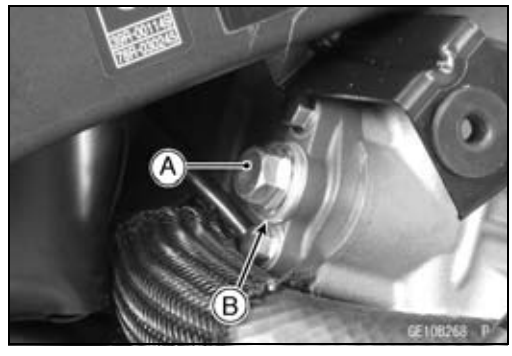


- Remove the bolt [A].
- Free the clutch cable from the bracket [B].

NOTE

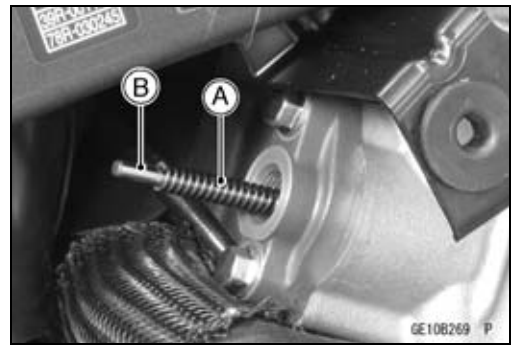
○*Cover the bracket with a cloth to avoid damaging other parts.*

- Remove:
  Cap Bolt [A]
  Washer [B]

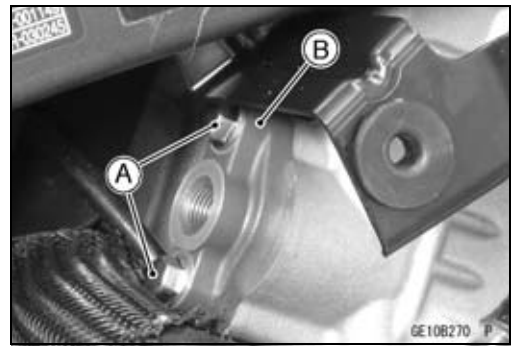


Camshaft Chain Tensioner

- Remove:
  Spring [A]
  Rod [B]

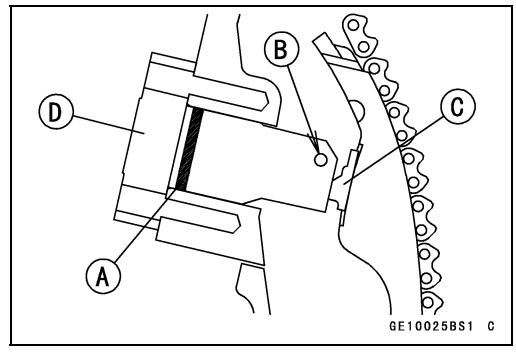


- Remove:
  Camshaft Chain Tensioner Mounting Bolts [A]
  Camshaft Tensioner Body [B]



Camshaft Chain Tensioner Installation

- Replace the O-ring [A] with a new one.
- Apply grease to the new O-ring.
- Release the stopper [B] and push the push rod [C] into the interior of the tensioner body [D].
- Install the tensioner body so that the stopper faces upward.



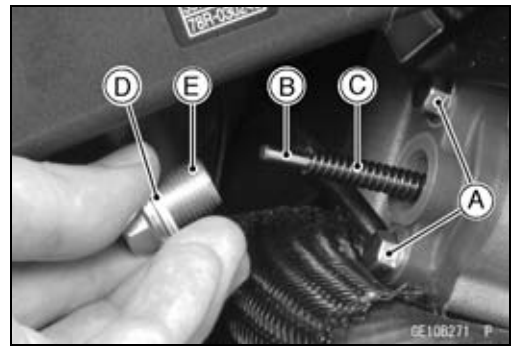
- Tighten:

Torque - Camshaft Chain Tensioner Mounting Bolts [A]: 11 N·m (1.1 kgf·m, 97 in·lb)

- Install:
  Rod [B]
  Spring [C]
  Washer [D]
- Tighten:

Torque - Camshaft Chain Tensioner Cap Bolt [E]: 20 N·m (2.0 kgf·m, 15 ft·lb)

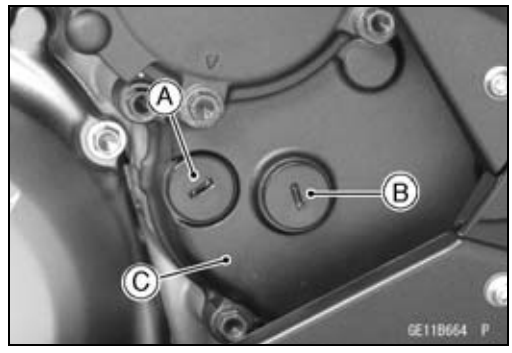
- Install the removed parts (see appropriate chapters).



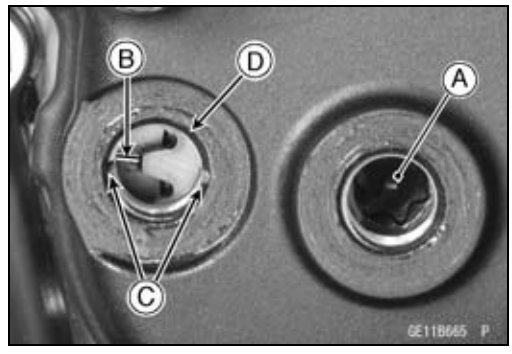
Camshaft, Camshaft Chain

Camshaft Removal

- Remove the cylinder head cover (see Cylinder Head Cover Removal).
- Remove the timing inspection cap [A] and starter clutch bolt cap [B] on the starter clutch cover [C].

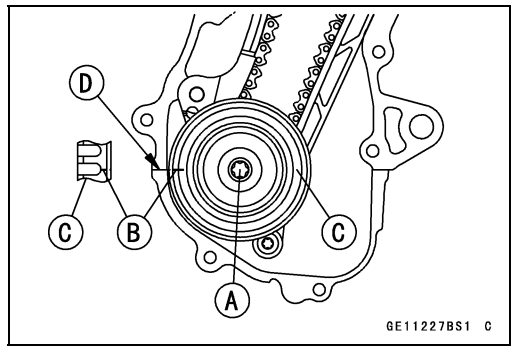


- Using a wrench on the starter clutch bolt [A], turn the crankshaft clockwise until the line [B] (TDC mark for #1,4 pistons) on the starter clutch is aligned with the notches [C] in the edge of the timing inspection hole [D] in the starter clutch cover.



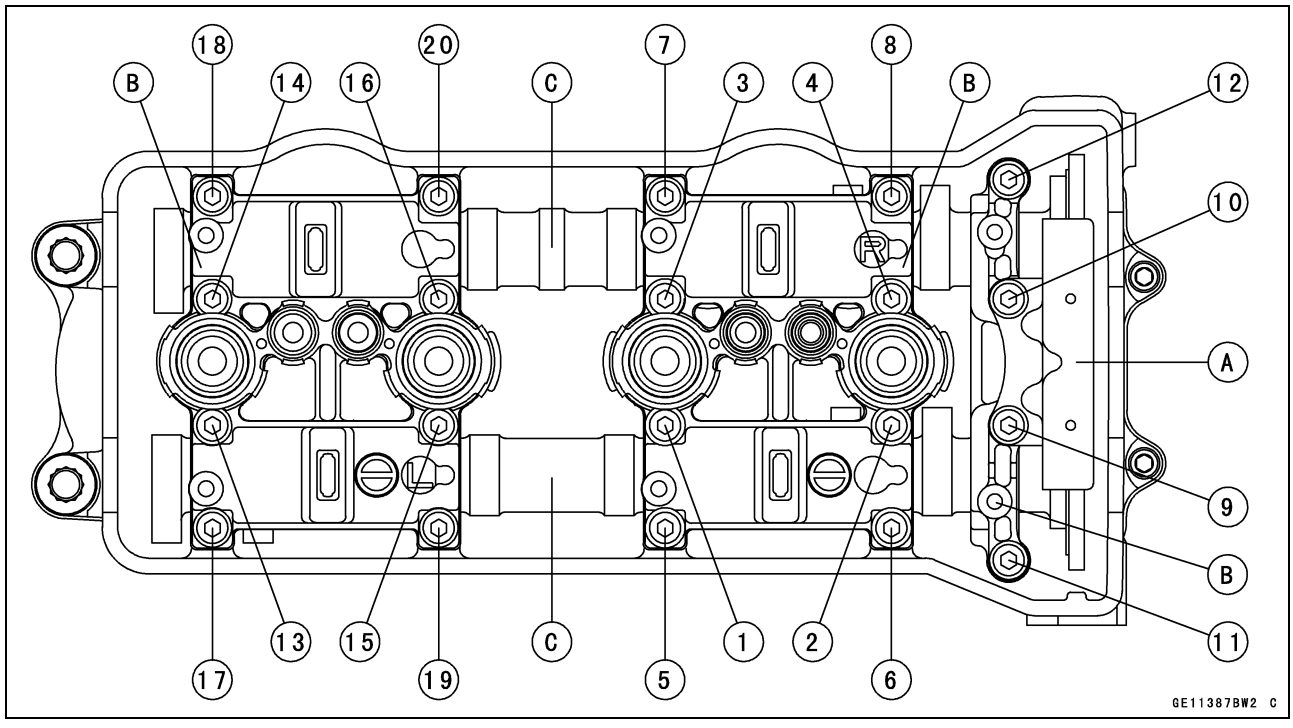
★If the starter clutch cover was removed, perform the next procedure.

○Using a wrench on the starter clutch bolt [A], turn the crankshaft clockwise until the line [B] (TDC mark for #1,4 pistons) on the starter clutch [C] is aligned with the mating surface [D] of the crankcase.

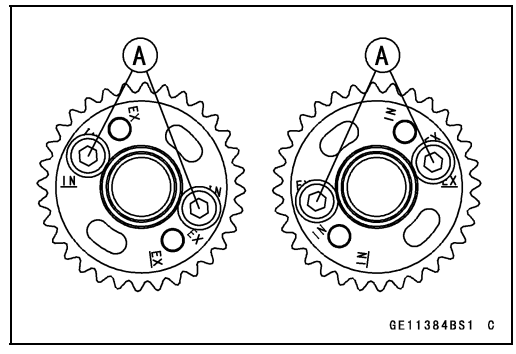


Camshaft, Camshaft Chain

- Remove the camshaft chain tensioner (see Camshaft Chain Tensioner Removal).
- Loosen the upper camshaft chain guide bolts and camshaft cap bolts gradually and evenly as shown sequence [1 ~ 20], and remove them.
- Remove:
  Upper Camshaft Chain Guide [A]
  Camshaft Caps [B]
  Camshafts [C]
- Stuff a clean cloth into the chain tunnel to keep any parts from dropping into the crankcase.



- Remove:
  Camshaft Sprocket Bolts [A]
  Camshaft Sprockets



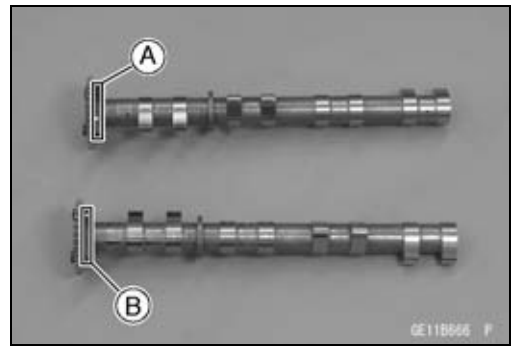
NOTICE

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

Camshaft Installation

NOTE

○*The exhaust camshaft has a 2716 EX mark [A] and the intake camshaft has a 2716 IN mark [B]. Be careful not to mix up these shafts.*



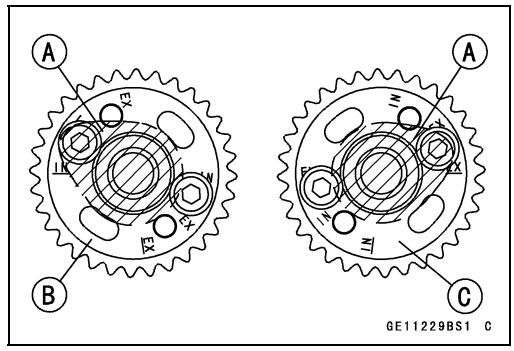
Camshaft, Camshaft Chain

● Install the camshaft sprockets as shown.
#4 Cam Positions [A]
Intake Camshaft Sprocket [B]
Exhaust Camshaft Sprocket [C]

○The intake camshaft sprocket and exhaust camshaft sprocket are identical.

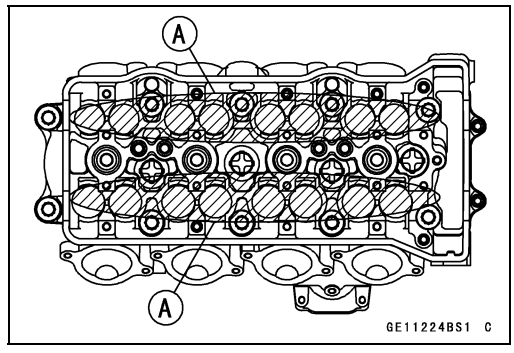
● Apply a non-permanent locking agent to the threads of the camshaft sprocket bolts and tighten them.

Torque - Camshaft Sprocket Bolts: 15 N·m (1.5 kgf·m, 11 ft·lb)



● Apply molybdenum disulfide oil solution [A] to all cam parts, journals and tappets.

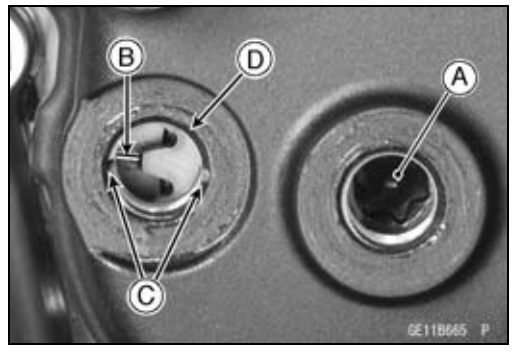
★If a new camshaft is to be used, apply a thin coat of molybdenum disulfide grease to the cam surfaces.



● Using a wrench on the starter clutch bolt [A], turn the crankshaft clockwise until the line [B] (TDC mark for #1,4 pistons) on the starter clutch is aligned with the notches [C] in the edge of the timing inspection hole [D] in the starter clutch cover.

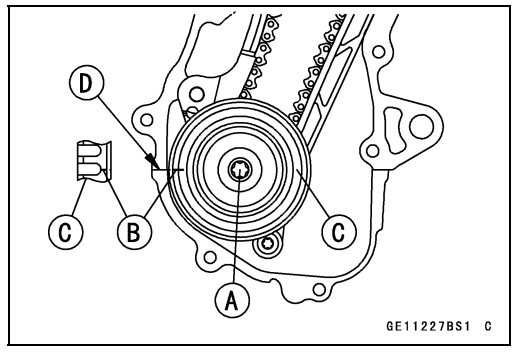
NOTICE

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



★If the starter clutch cover was removed, perform the next procedure.

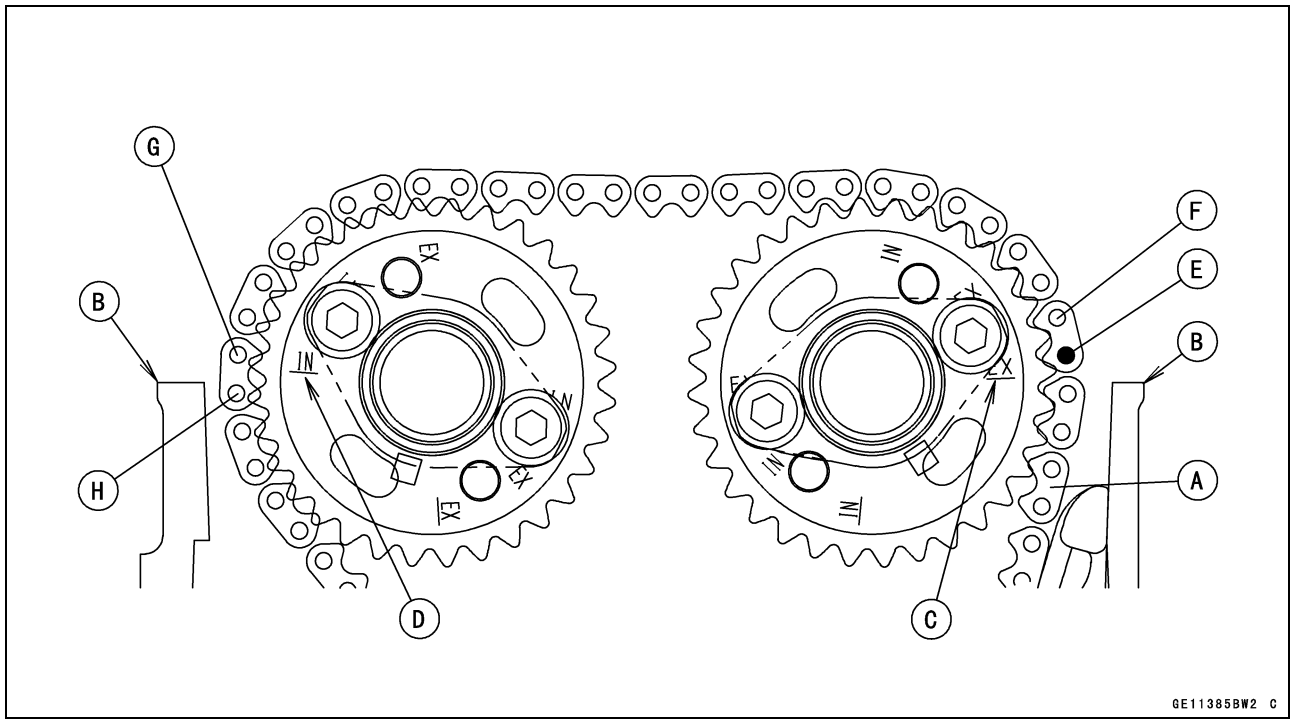
○Using a wrench on the starter clutch bolt [A], turn the crankshaft clockwise until the line [B] (TDC mark for #1,4 pistons) on the starter clutch [C] is aligned with the mating surface [D] of the crankcase.



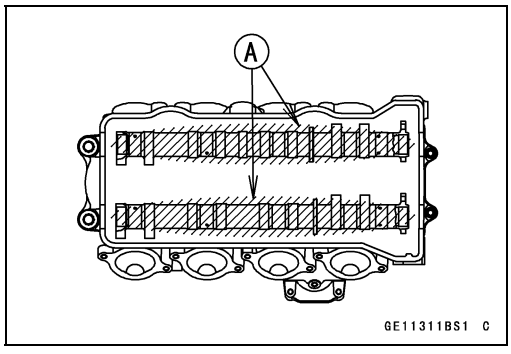
Camshaft, Camshaft Chain

- Pull the tension side (exhaust side) [A] of the chain taut to install the chain.
- Engage the camshaft chain with the sprockets so that timing marks on the sprockets are positioned as shown.

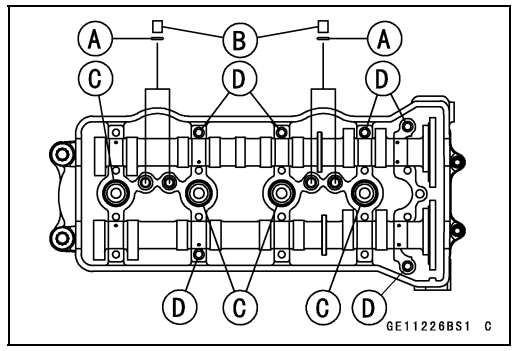
○The timing marks must be aligned with the cylinder head upper surface [B].
EX Mark [C]
IN Mark [D]
#1 Pin [E]
#2 Pin [F]
#27 Pin [G]
#28 Pin [H]



- Apply molybdenum disulfide oil solution [A] to all cam lobes, journals and thrust journals.



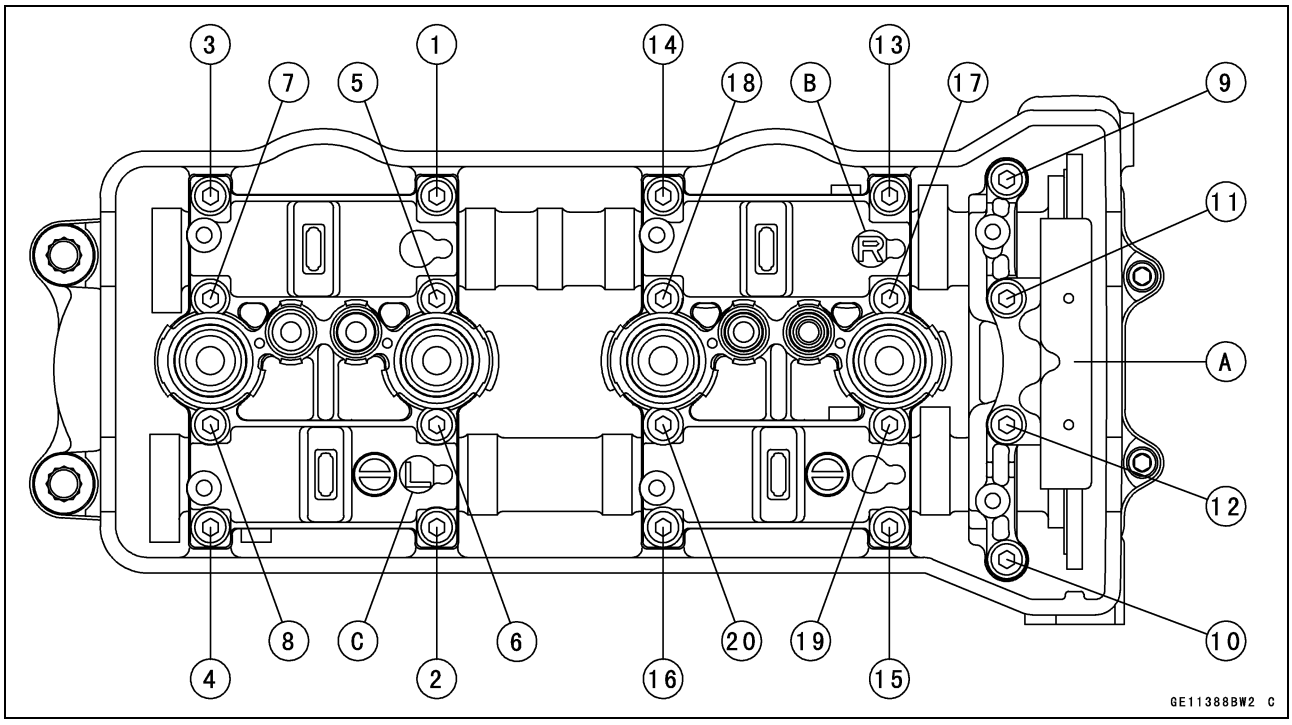
Camshaft, Camshaft Chain



- Replace the O-rings with new ones.
- Apply grease to the new O-rings
- Install:
  O-rings [A]
  Dowel Pins [B]
  O-rings [C]
  Dowel Pins [D]

- Install the camshaft caps and upper camshaft chain guide [A] as shown.
  "R" Mark [B]
  "L" Mark [C]
- First tighten the all camshaft cap bolts evenly to seat the camshaft in place, then tighten all bolts following the specified tightening sequence.

Torque - Camshaft Cap Bolts (1 ~ 10, 13 ~ 20):
First: 5.9 N·m (0.60 kgf·m, 52 in·lb)
Final: 12 N·m (1.2 kgf·m, 106 in·lb)
Upper Camshaft Chain Guide Bolts (11, 12):
First: 5.9 N·m (0.60 kgf·m, 52 in·lb)
Final: 12 N·m (1.2 kgf·m, 106 in·lb)



Camshaft, Camshaft Chain

- Install the camshaft chain tensioner (see Camshaft Chain Tensioner Installation).
- Turn the crankshaft 2 turns clockwise to allow the tensioner to expand and recheck the camshaft chain timing.
- Replace the O-ring of the timing inspection cap and starter clutch bolt cap with new ones.
- Apply grease to the new O-rings.
- Tighten:

Torque - Timing Inspection Cap: 2.9 N·m (0.30 kgf·m, 26 in·lb)
Starter Clutch Bolt Cap: 2.9 N·m (0.30 kgf·m, 26 in·lb)

- Install the cylinder head cover (see Cylinder Head Cover Installation).

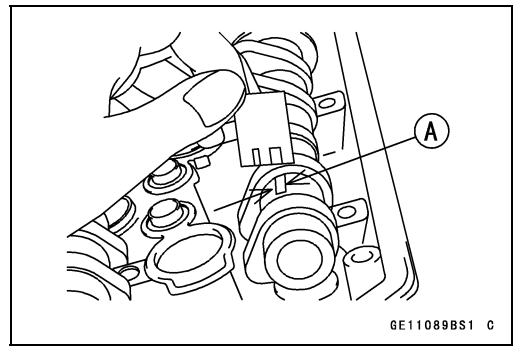
Camshaft, Camshaft Cap Wear Inspection

- Remove the camshaft caps (see Camshaft Removal).
- Cut the strips of plastigage (press gauge) to journal width. Place a strip on each journal parallel to the camshaft installed in the correct position.
- Tighten the camshaft cap bolts and upper camshaft chain guide bolts to the specified torque (see Camshaft Installation).

NOTE

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

- Remove the camshaft cap again, measure each clearance between the camshaft journal and the camshaft cap using plastigage [A].



Camshaft Journal/Camshaft Cap Clearance
Standard: 0.038 ~ 0.081 mm (0.0015 ~ 0.0032 in.)
Service Limit: 0.17 mm (0.0067 in.)

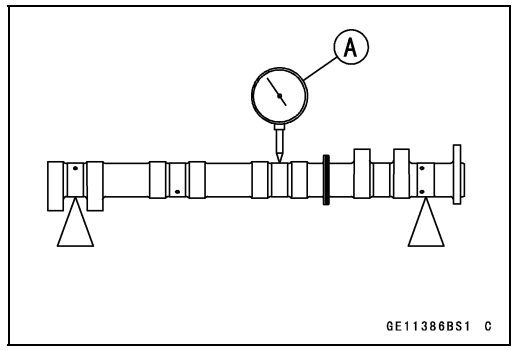
★If any clearance exceeds the service limit, measure the diameter of each camshaft journal with a micrometer.

Camshaft Journal Diameter
Standard: 23.940 ~ 23.962 mm (0.9425 ~ 0.9434 in.)
Service Limit: 23.91 mm (0.941 in.)

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

Camshaft, Camshaft Chain

Camshaft Runout Inspection



- Remove the camshafts (see Camshaft Removal).
- Set the camshaft in a camshaft alignment jig or on V blocks.
- Measure the runout with a dial gauge [A] at the specified place as shown.

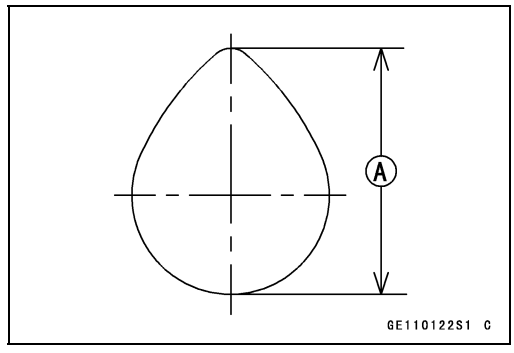
★If the runout exceeds the service limit, replace the camshaft.

Camshaft Runout

Standard: TIR 0.02 mm (0.0008 in.) or less

Service Limit: TIR 0.1 mm (0.004 in.)

Cam Wear Inspection



- Remove the camshafts (see Camshaft Removal).
- Measure the height [A] of each cam with a micrometer.

★If the cams are worn down past the service limit, replace the camshaft.

Cam Height

Standard:

Exhaust 33.343 ~ 33.457 mm (1.3127 ~ 1.3172 in.)

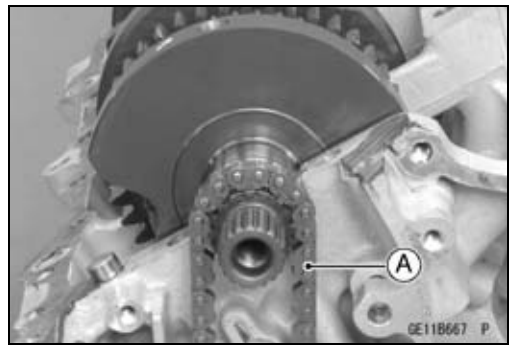
Intake 34.743 ~ 34.857 mm (1.3678 ~ 1.3723 in.)

Service Limit:

Exhaust 33.24 mm (1.309 in.)

Intake 34.64 mm (1.364 in.)

Camshaft Chain Removal



- Split the crankcase (see Crankcase Splitting in the Crankshaft/Transmission chapter).
- Remove the camshaft chain [A] from the crankshaft sprocket.

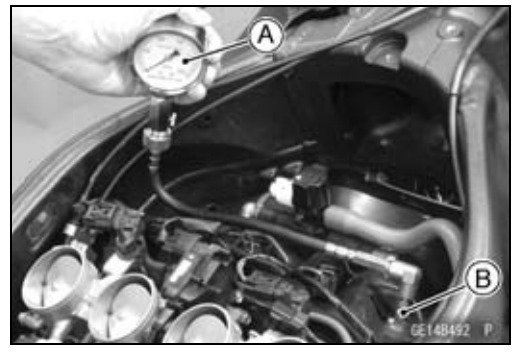
Cylinder Head

Cylinder Compression Measurement

NOTE

○*Use the battery which is fully charged.*

- Warm up the engine thoroughly.
- Stop the engine.
- Remove the spark plugs (see Spark Plug Replacement in the Periodic Maintenance chapter).



- Attach the compression gauge [A] and adapter [B] firmly into the spark plug hole.
- Using the starter motor, turn the engine over with the throttle fully open until the compression gauge stops rising; the compression is the highest reading obtainable.

Special Tools - Compression Gauge, 20 kgf/cm²: 57001-221
Compression Gauge Adapter, M10 × 1.0: 57001-1601
L-Shape Hose: 57001-1606

Cylinder Compression
Usable Range: 1 050 ~ 1 598 kPa (10.7 ~ 16.3 kgf/cm², 152 ~ 232 psi) @300 r/min (rpm)

- Repeat the measurement for the other cylinders.
- Install the spark plugs (see Spark Plug Replacement in the Periodic Maintenance chapter).

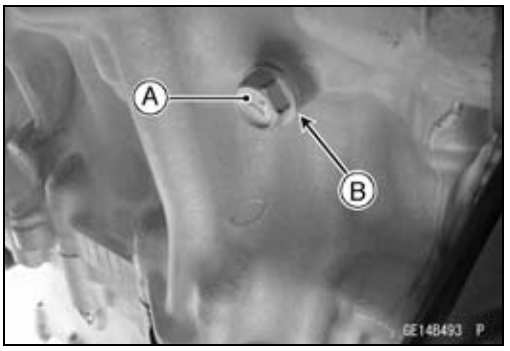
○The following table should be consulted if the obtainable compression reading is not within the usable range.

Problem	Diagnosis	Remedy (Action)
Cylinder compression is higher than usable range.	Carbon accumulation on piston and in combustion chamber possibly due to damaged valve stem oil seal and/or damaged piston oil rings (This may be indicated by white exhaust smoke).	Remove the carbon deposits and replace damaged parts if necessary.
	Incorrect cylinder head gasket thickness	Replace the gasket with a standard part.
Cylinder compression is lower than usable range.	Gas leakage around cylinder head	Replace damaged gasket and check cylinder head warp.
	Bad condition of valve seating	Repair if necessary.
	Incorrect valve clearance	Adjust the valve clearance.
	Incorrect piston/cylinder clearance	Replace the piston and/or cylinder.
	Piston seizure	Inspect the cylinder and replace/repair the cylinder and/or piston as necessary.
	Bad condition of piston ring and/or piston ring grooves	Replace the piston and/or the piston rings.

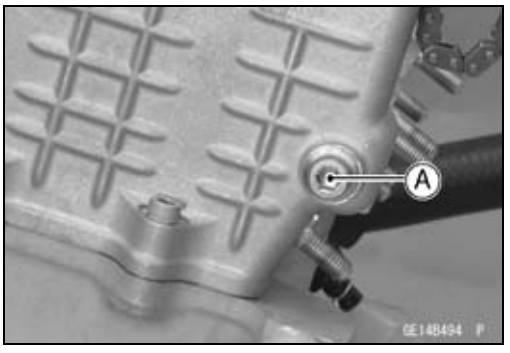
Cylinder Head

Cylinder Head Removal

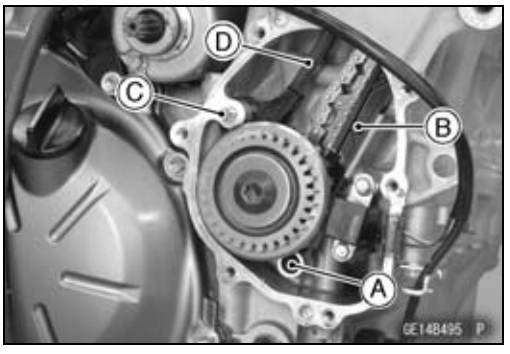
- Remove:
  Engine (see Engine Removal in the Engine Removal/Installation chapter)
  Thermostat Housing (see Thermostat Removal in the Cooling System chapter)
  Cylinder Head Cover (see Cylinder Head Cover Removal)
  Camshafts (see Camshaft Removal)
  Coolant Drain Bolt (Cylinder) [A]
  Washer [B]



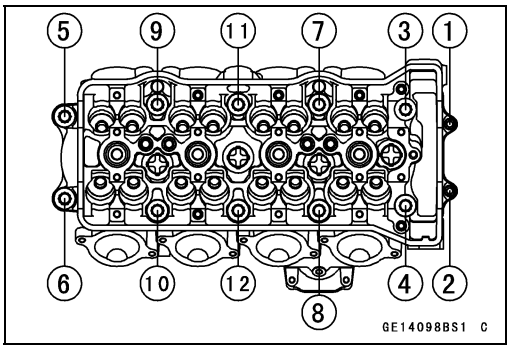
- Remove the front camshaft chain guide bolt (upper) [A].



- Remove:
  Front Camshaft Chain Guide Bolt (Lower) [A]
  Collar
  Front Camshaft Chain Guide [B]
  Dowel Pin [C]
  Rear Camshaft Chain Guide [D]



- Loosen the M6 and M9 cylinder head bolts as shown sequence [1 ~ 12], and remove them with washers.
- Remove the cylinder head.

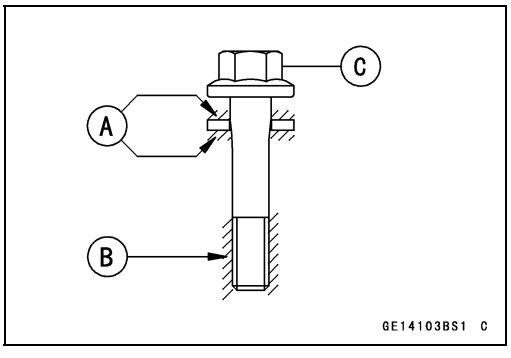


Cylinder Head Installation

NOTE

○*The camshaft cap is machined with the cylinder head, so if a new cylinder head is installed, use the cap that is supplied with the new head.*

- Install the dowel pins.
- Replace the cylinder head gasket with a new one.
- Replace the cylinder head bolt washers with new ones.
- Apply molybdenum disulfide oil solution to both sides [A] of the cylinder head bolt washers and the threads [B] of the head bolts [C].



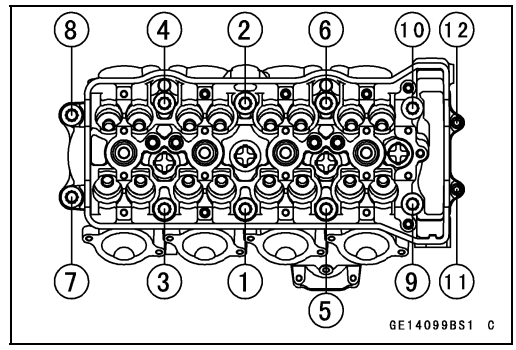
Cylinder Head

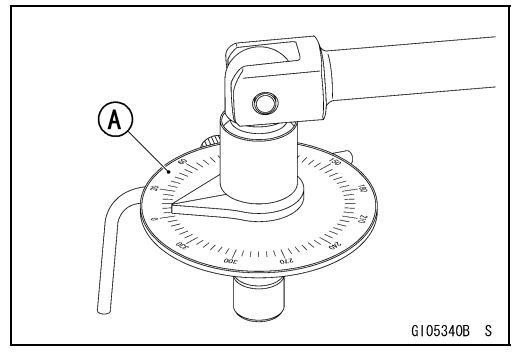
● Tighten the M9 cylinder head bolts following the tightening sequence [1 ~10].

○First, tighten the bolts with **12 N·m (1.2 kgf·m, 106 in·lb)** of torque.

○Next, in accordance with the following table tighten the bolts with the specified torque. And using a torque angle gauge [A], tighten the bolts with the specified angle.

Order	Cylinder Head Bolts (M9)	New Bolt Torque N·m (kgf·m, ft·lb) or Angle	Used Bolt Torque N·m (kgf·m, ft·lb) or Angle
1	[1] → [2]	35 (3.6, 26)	33 (3.4, 24)
2	[1] → [2]	50° ±3	50° ±3
3	[3] → [4]	35 (3.6, 26)	33 (3.4, 24)
4	[3] → [4]	50° ±3	50° ±3
5	[5] → [6]	35 (3.6, 26)	33 (3.4, 24)
6	[5] → [6]	50° ±3	50° ±3
7	[7] → [8]	30 (3.1, 22)	28 (2.9, 21)
8	[7] → [8]	50° ±3	50° ±3
9	[9] → [10]	35 (3.6, 26)	33 (3.4, 24)
10	[9] → [10]	50° ±3	50° ±3





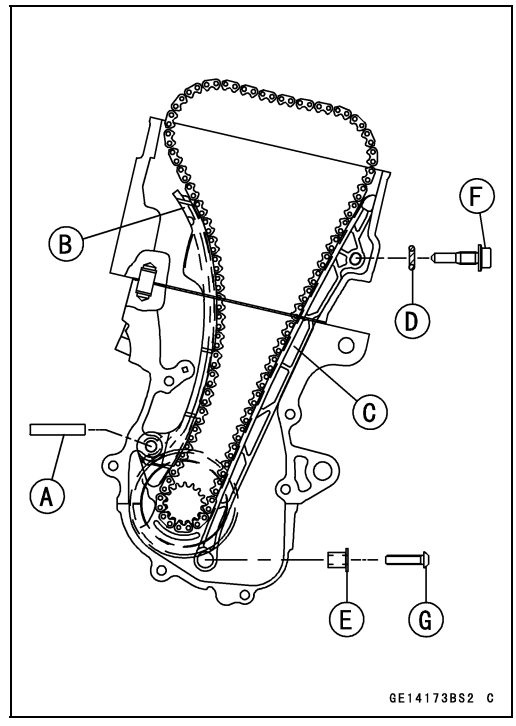
● Tighten the M6 cylinder head bolts as shown sequence [11, 12].

Torque - Cylinder Head Bolts (M6): 12 N·m (1.2 kgf·m, 106 in·lb)

● Install:
Dowel Pin [A]
Rear Camshaft Chain Guide [B]
Front Camshaft Chain Guide [C]
New O-ring [D]
Collar [E]

● Tighten:

Torque - Front Camshaft Chain Guide Bolt (Upper) [F]: 25 N·m (2.5 kgf·m, 18 ft·lb)
Front Camshaft Chain Guide Bolt (Lower) [G]: 12 N·m (1.2 kgf·m, 106 in·lb)

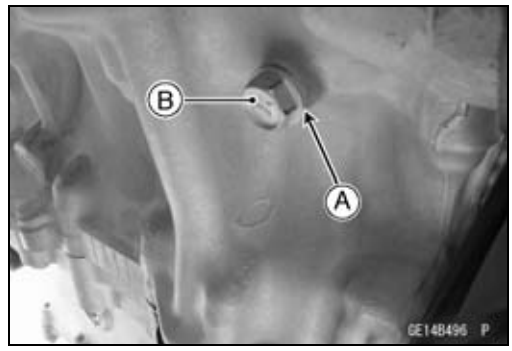


Cylinder Head

- Replace the washer [A] with a new one.
- Tighten:

Torque - Coolant Drain Bolt (Cylinder) [B]: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Install the removed parts (see appropriate chapters).



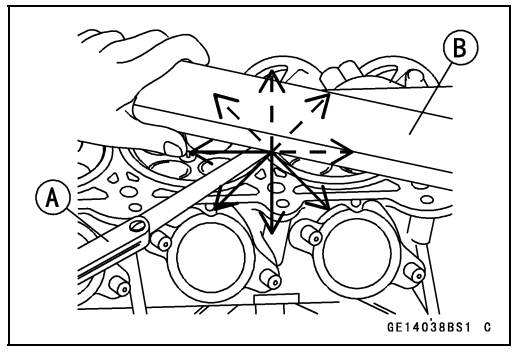
Cylinder Head Warp Inspection

- 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 Valve Clearance Inspection in the Periodic Maintenance chapter.

Valve Removal

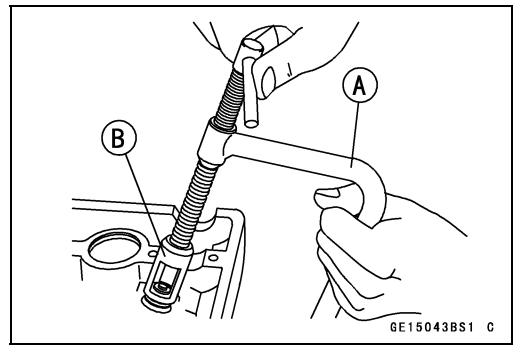
- Remove the cylinder head (see Cylinder Head Removal).
- Remove the valve lifter and shim.

NOTE

○*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.

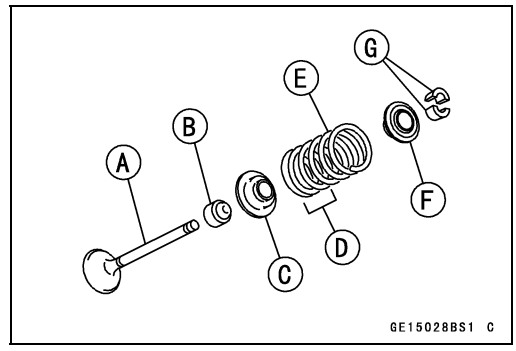
Special Tools - Valve Spring Compressor Assembly [A]: 57001-241
Valve Spring Compressor Adapter, ϕ20 [B]: 57001-1154



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 [E]:
EX - Purple Paint
IN - Blue Paint
Retainer [F]
Split Keepers [G]



Valve Guide Removal

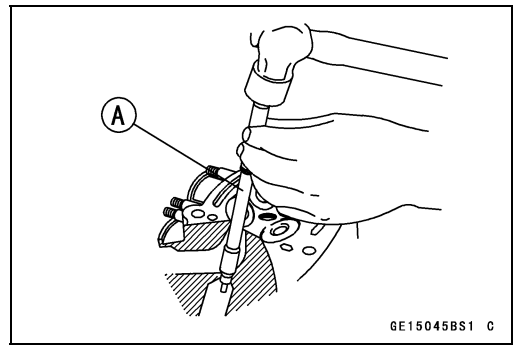
- Remove:

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.

NOTICE
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

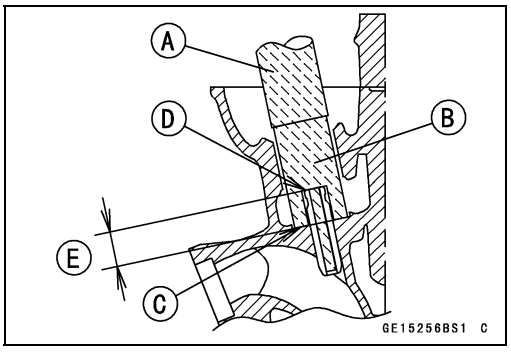
- Apply engine oil to the valve guide outer surface before installation.
- Heat the area around the valve guide hole to about 120 ~ 150°C (248 ~ 302°F).

NOTICE
Do not heat the cylinder head with a torch. This will warp the cylinder head. Soak the cylinder head and heat the oil.

Exhaust

- Using the valve guide driver [A] and attachment [B], press and insert the valve guide in until the attachment surface [C] touches the head surface [D].
  13.3 ~ 13.5 mm (0.52 ~ 0.53 in.) [E]

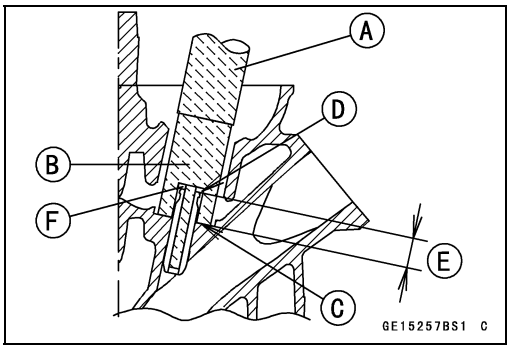
Special Tools - Valve Guide Driver: 57001-1564
Valve Guide Driver Attachment, C: 57001 -1624



Intake

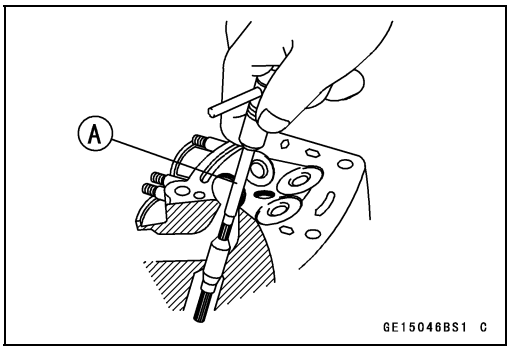
- Using the valve guide driver [A] and attachment [B], press and insert the valve guide in until the attachment surface [C] touches the head surface [D].
  12.6 ~ 12.8 mm (0.496 ~ 0.504 in.) [E]

Special Tools - Valve Guide Driver: 57001-1564
Valve Guide Driver Attachment, C: 57001 -1624
Spacer: 57001-1786 [F]



- Ream the valve guide with valve guide reamer [A], even if the old guide is reused.

Special Tool - Valve Guide Reamer, ϕ4: 57001-1274

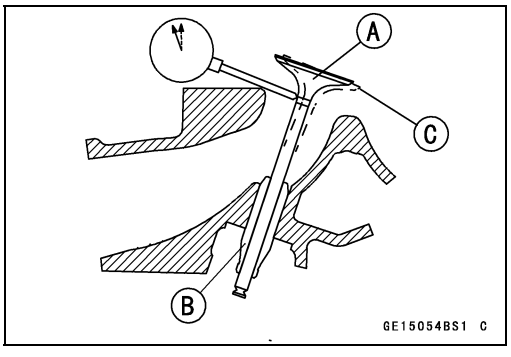


Valve-to-Guide Clearance Measurement (Wobble Method)

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.



Valves

NOTE

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

Valve/Valve Guide Clearance (Wobble Method)

Standard:

Exhaust **0.08 ~ 0.16 mm (0.0031 ~ 0.0063 in.)**

Intake **0.03 ~ 0.10 mm (0.0012 ~ 0.0039 in.)**

Service Limit:

Exhaust **0.36 mm (0.014 in.)**

Intake **0.30 mm (0.012 in.)**

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 Valve Seat Repair).

Valve Seating Surface Outside Diameter

Standard:

Exhaust **22.8 ~ 23.0 mm (0.898 ~ 0.906 in.)**

Intake **26.93 ~ 27.13 mm (1.060 ~ 1.068 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]

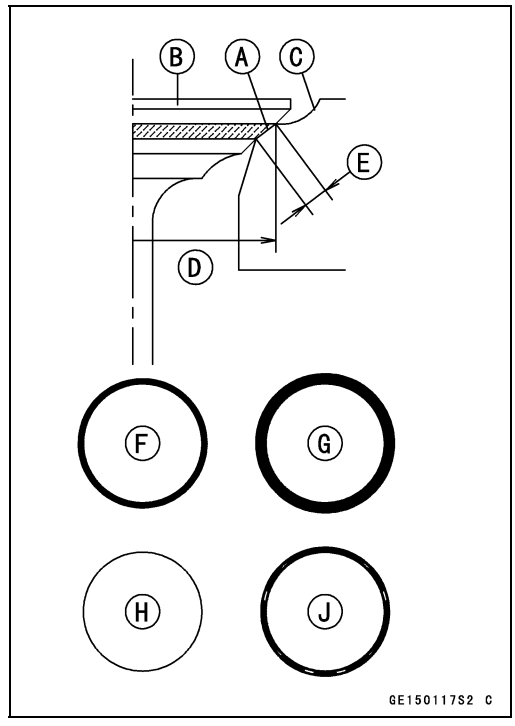
★If the width is too wide [G], too narrow [H] or uneven [J], repair the seat (see Valve Seat Repair).

Valve Seating Surface Width

Standard:

Exhaust **0.8 ~ 1.2 mm (0.031 ~ 0.047 in.)**

Intake **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 Bar [B]: 57001 -1128

Valve Seat Cutter Holder, ϕ4 [C]: 57001-1275

[For Exhaust Valve Seat]

Valve Seat Cutter, 45° - ϕ24.5: 57001-1113

Valve Seat Cutter, 32° - ϕ25: 57001-1118

Valve Seat Cutter, 60° - ϕ25: 57001-1328

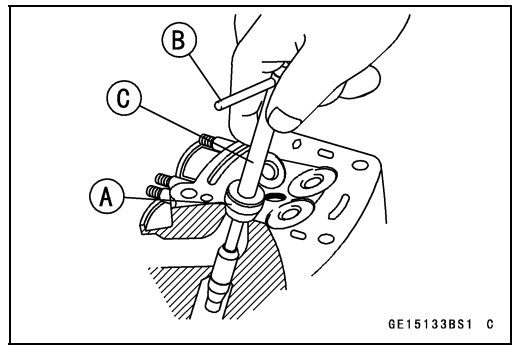
[For Intake Valve Seat]

Valve Seat Cutter, 45° - ϕ30: 57001-1187

Valve Seat Cutter, 32° - ϕ30: 57001-1120

Valve Seat Cutter, 60° - ϕ27: 57001-1409

★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.

NOTICE
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.*

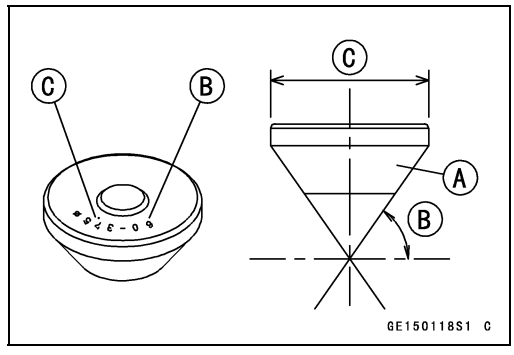
5. After use, wash it with washing oil and apply thin layer of engine oil before storing.

Marks Stamped on the Cutter

The marks stamped on the back of the cutter [A] represent the following.

60° ..... Cutter angle [B]

37.5ϕ ..... 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.

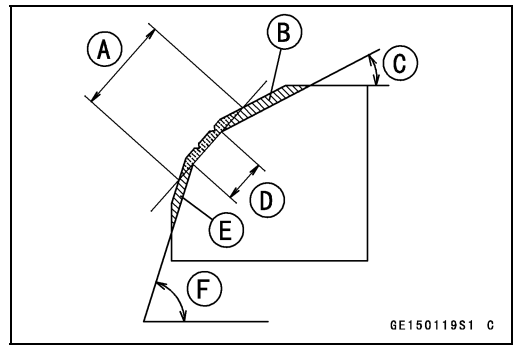
NOTICE
Do not grind the seat too much. Overgrinding will reduce valve clearance by sinking the valve into the head. If the valve sinks too far into the head, it will be impossible to adjust the clearance, and the cylinder head must be replaced.

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° [A] grind until the diameter is within the specified range.

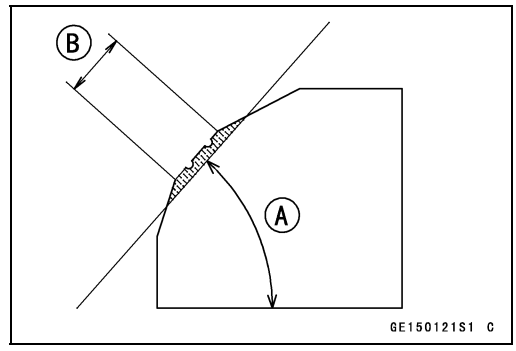
Original Seating Surface [B]

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.*



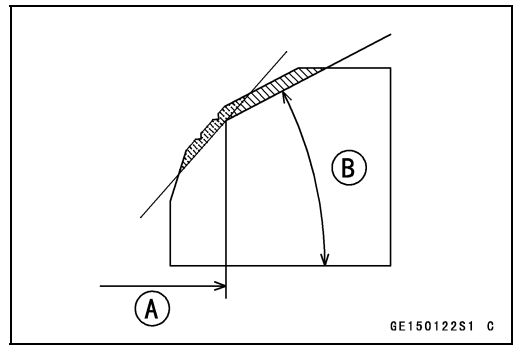
★If the outside diameter [A] of the seating surface is too large, make the 32° [B] grind described below.

★If the outside diameter of the seating surface is within the specified range, measure the seat width as described below.

● Grind the seat at a 32° angle until the seat outside diameter 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.



NOTICE

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

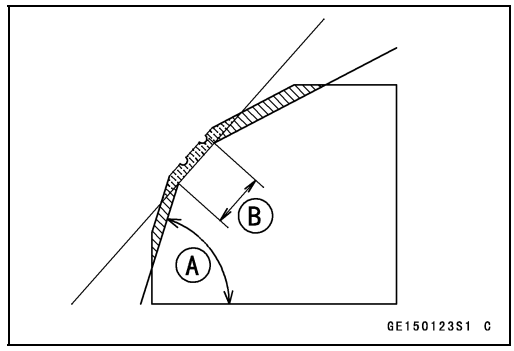
○After making the 32° grind, return to the seat outside diameter measurement step above.

● 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.

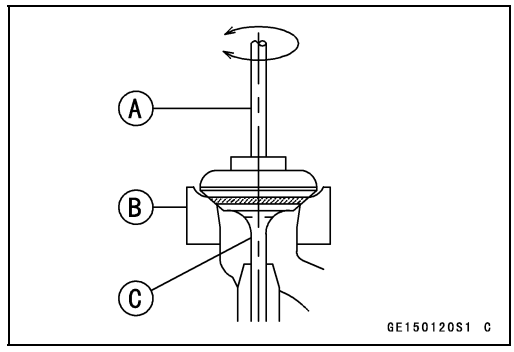
★If the seat width is too narrow, repeat the 45° grind until the seat is slightly too wide, and then return to the seat outside diameter measurement step above.

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]

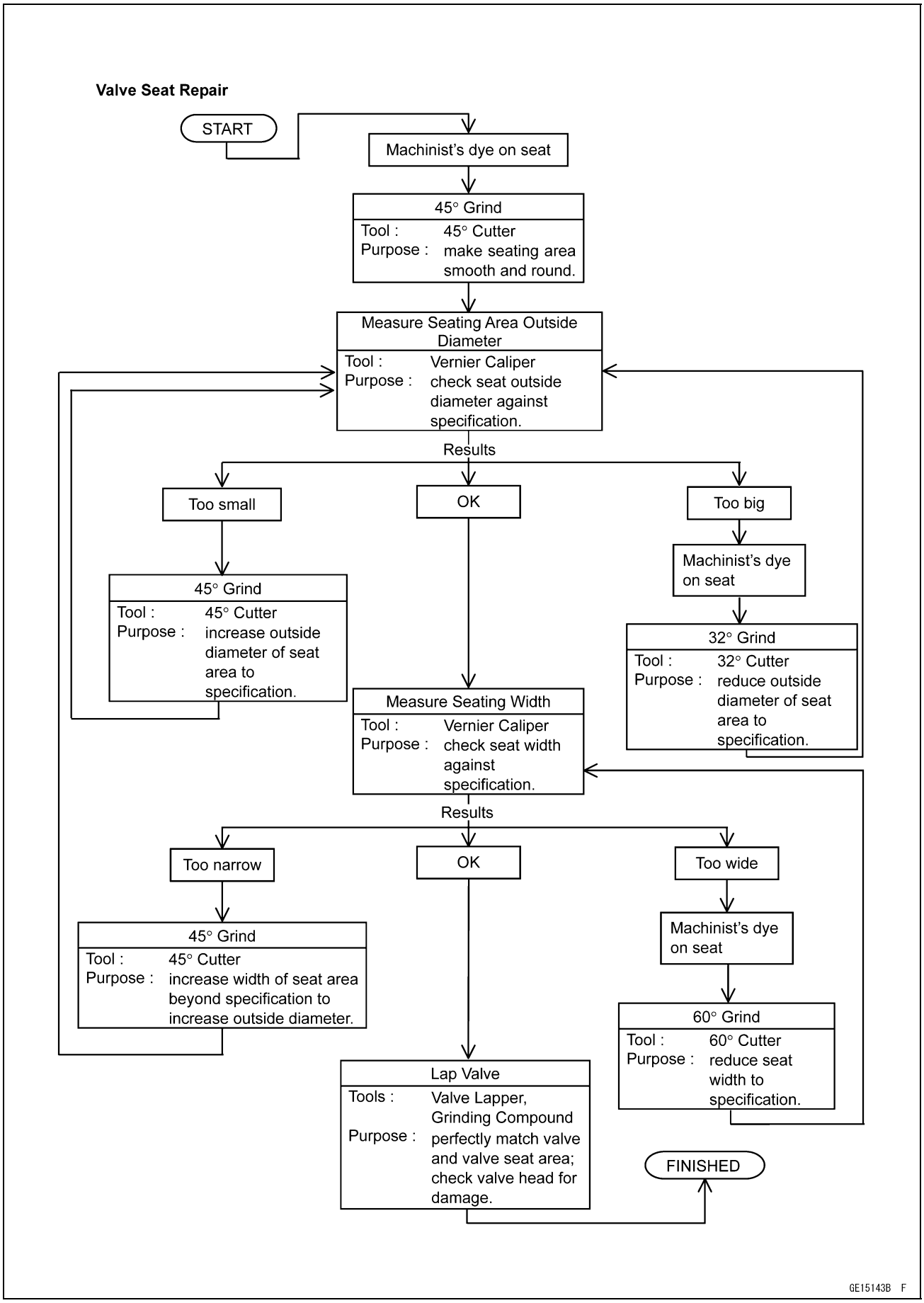


● Lap the valve to the valve seat, once the seat width and outside diameter are within the ranges specified above.
○Put a little coarse grinding compound on the face of the valve in a number of places around the valve head.
○Spin the valve against the seat until the grinding compound produces a smooth, matched surface on both the seat and the valve.
○Repeat the process with a fine grinding compound.
Lapper [A]
Valve Seat [B]
Valve [C]



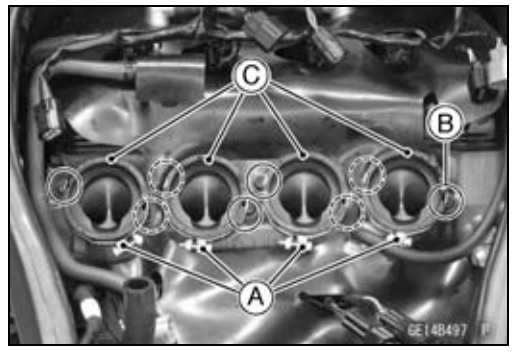
● The seating area should be marked about in the middle of the valve face.
★If the seat area is not in the right place on the valve, check to be sure the valve is the correct part. If it is, it may have been refaced too much; replace it.
● Be sure to remove all grinding compound before assembly.
● When the engine is assembled, be sure to adjust the valve clearance (see Valve Clearance Inspection 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 Outside Diameter
Tool : Vernier Caliper
Purpose : check seat outside diameter against specification.
Results
Too small
OK
Too big
45° Grind
Tool : 45° Cutter
Purpose : increase outside diameter of seat area to specification.
Machinist's dye on seat
32° Grind
Tool : 32° Cutter
Purpose : reduce outside diameter of seat area to specification.
Measure Seating Width
Tool : Vernier Caliper
Purpose : check seat width against specification.
Results
Too narrow
OK
Too wide
45° Grind
Tool : 45° Cutter
Purpose : increase width of seat area beyond specification to increase outside diameter.
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 valve seat area; check valve head for damage.
FINISHED
GE15143B F

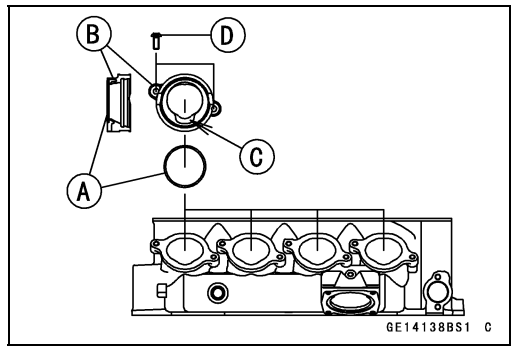
Throttle Body Assy Holder

Throttle Body Assy Holder Removal



- Remove:
  Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
  Clamps [A]
  Throttle Body Assy Holder Bolts [B]
  Throttle Body Assy Holders [C]

Throttle Body Assy Holder Installation

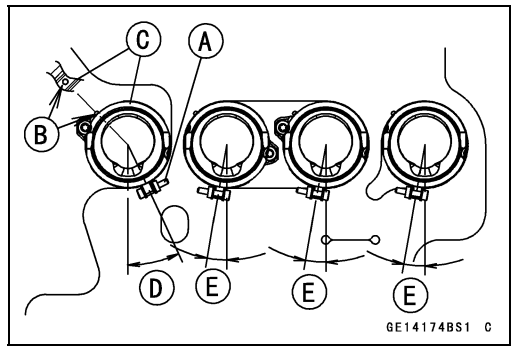


- Replace the O-rings [A] with new ones.
- Apply liquid gasket to any three positions of the O-rings to prevent it from coming off, and install them.

  Sealant - Liquid Gasket, TB1211F: 92104-0004

- Install the holders [B] as shown.
  Recession [C]
- Apply a non-permanent locking agent to the threads of the throttle body assy holder bolts [D], and tighten them.

  Torque - Throttle Body Assy Holder Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)



- Fit the hole of the clamp [A] to the projection [B] of the holder [C].
  25° [D]
  10° [E]
- Install:
  Throttle Body Assy (see Throttle Body Assy Installation in the Fuel System (DFI) chapter)

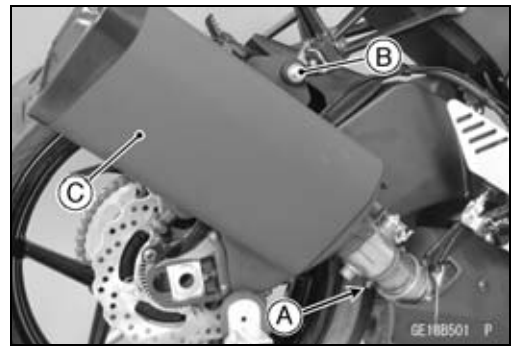
Muffler

⚠ WARNING

The muffler can become extremely hot during normal operation and cause severe burns. Do not remove the muffler while it is hot.

Muffler Body Removal

- Remove the lower ends of the exhaust butterfly valve cables from the pulley of the muffler body (see Exhaust Butterfly Valve Cable Removal).
- Loosen the muffler body clamp bolt [A].
- Remove the muffler body mounting bolt [B], and pull out the muffler body [C] backward from the premuffler chamber.



Muffler

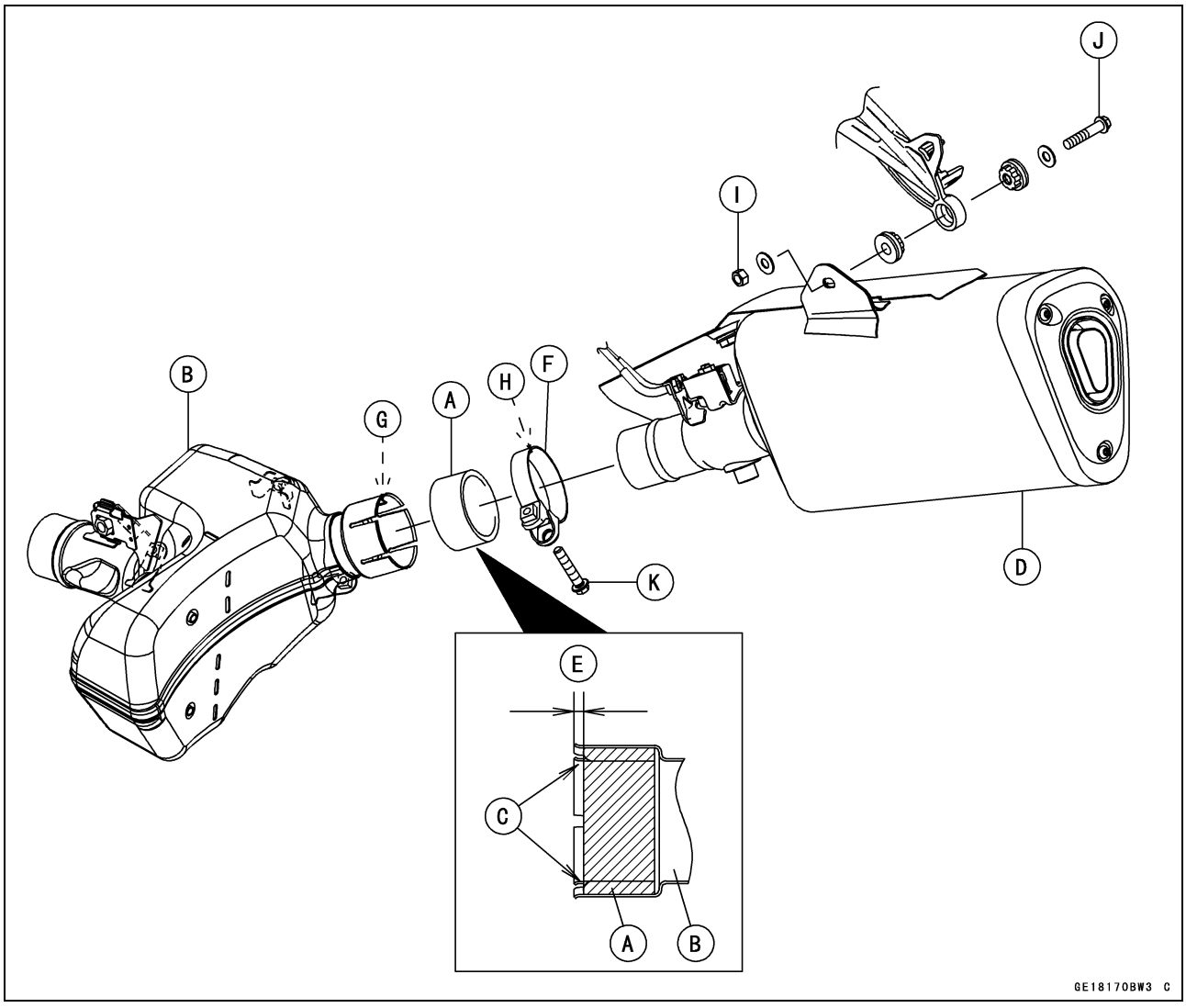
Muffler Body Installation

- Replace the premuffler chamber gasket [A] with a new one.
- Install the muffler body gasket to the premuffler chamber [B] until it is bottomed so that the chamfer side [C] faces muffler body [D].
  About 4.0 mm (0.16 in.) [E]
- Install the muffler body clamp [F] as shown.

○Insert the projection [G] into the slot [H].

- Replace the muffler body mounting nut [I].
- Install the muffler body.
- Tighten the muffler body mounting bolt [J] and muffler body clamp bolt [K].

Torque - Muffler Body Mounting Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

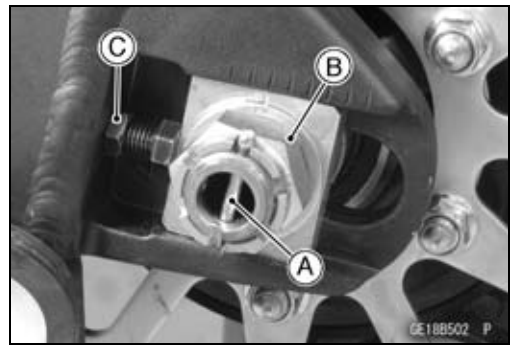


- Install the lower ends of the exhaust butterfly valve cables, and adjust the cables correctly (see Exhaust Butterfly Valve Cable Installation).
- Thoroughly warm up the engine, wait until the engine cools down, retighten all the bolts.
- Install the removed parts (see appropriate chapters).

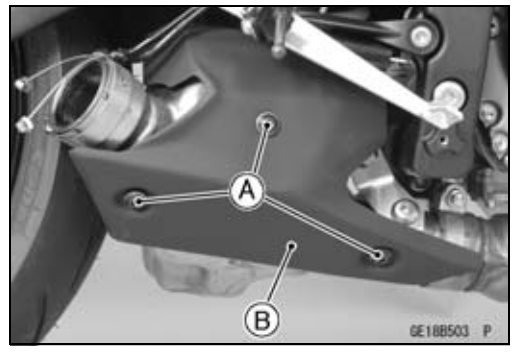
Muffler

Premuffler Chamber Removal

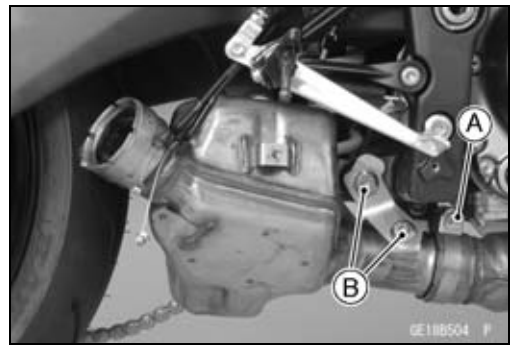
- Remove:
  Muffler Body (see Muffler Body Removal)
  Cotter Pin [A]
- Loosen the rear axle nut [B].
- Loosen the both chain adjuster locknuts [C].
- Remove the drive chain from the rear sprocket.
- Pull the rear wheel backward.



- Remove:
  Guard Bolts [A]
  Premuffler Chamber Guard [B]



- Loosen the exhaust pipe clamp bolt [A].
- Remove the bolts [B].
- Pull out the premuffler chamber backward from the exhaust pipe.



Muffler

Premuffler Chamber Installation

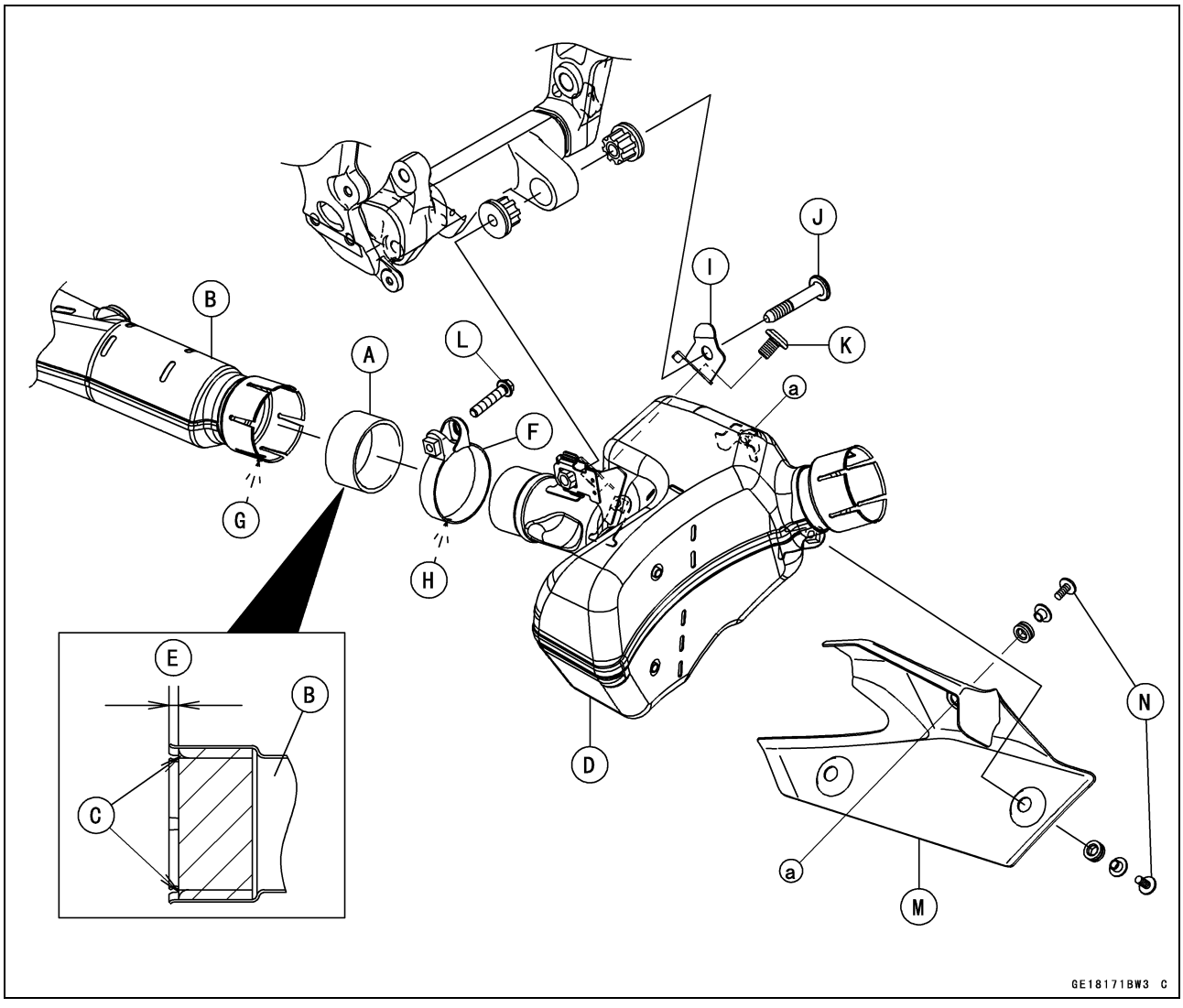
- Replace the exhaust pipe gasket [A] with a new one.
- Install the exhaust pipe gasket to the exhaust pipe [B] until it is bottomed so that the chamfer side [C] faces premuffler chamber [D].
  About 4.0 mm (0.16 in.) [E]
- Install the exhaust pipe clamp [F] as shown.

○Insert the projection [G] into the slot [H].

- Install the premuffler chamber and bracket [I].
- Tighten the premuffler chamber mounting bolt [J], bracket bolt [K] and exhaust pipe clamp bolt [L] securely.

Torque - Premuffler Chamber Mounting Bolt: 40 N·m (4.1 kgf·m, 30 ft·lb)
Premuffler Chamber Bracket Bolt: 40 N·m (4.1 kgf·m, 30 ft·lb)

- Install the premuffler chamber guard [M], and tighten the guard bolt [N].

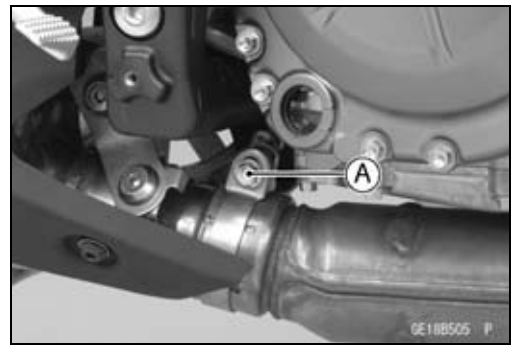


- Install the removed parts (see appropriate chapters).
- Thoroughly warm up the engine, wait until the engine cools down, retighten all the bolts.

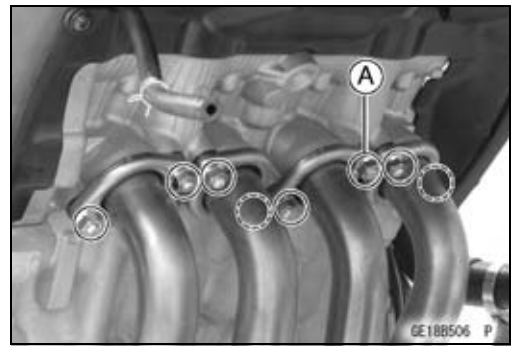
Muffler

Exhaust Pipe Removal

- Remove:
  Radiator (see Radiator and Radiator Fan Removal in the Cooling System chapter)
  Oxygen Sensor (Equipped Models) (see Oxygen Sensor Removal (Equipped Models) in the Electrical System chapter)
  Exhaust Pipe Clamp Bolt [A]



- Remove the exhaust pipe holder nuts [A], and pull out the exhaust pipe forward from the premuffler chamber.



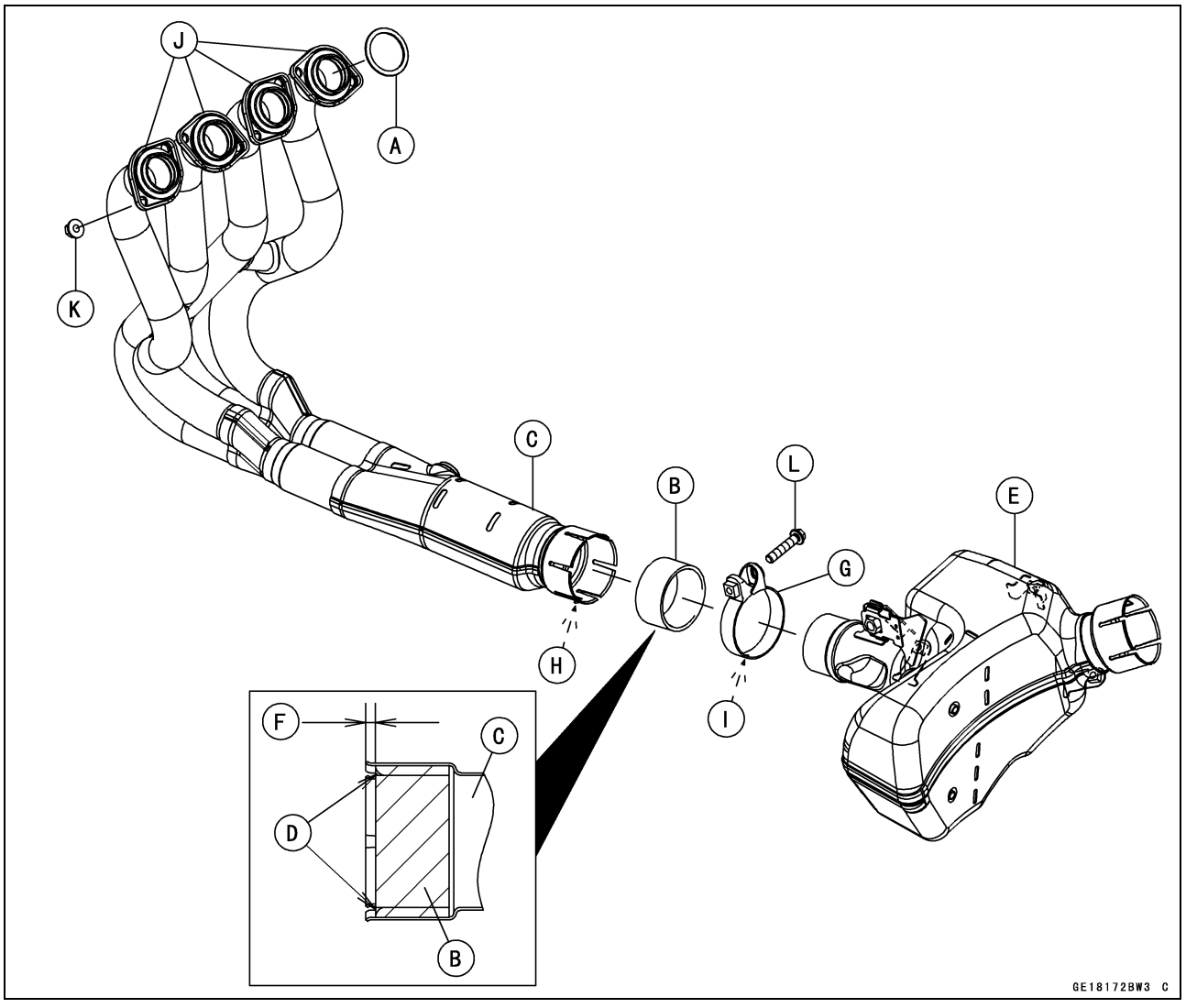
Muffler

Exhaust Pipe Installation

- Replace the exhaust pipe gaskets [A] [B] with new ones.
- Install the exhaust pipe gasket [B] to the exhaust pipe [C] until it is bottomed so that the chamfer side [D] faces premuffler chamber [E].
  About 4.0 mm (0.16 in.) [F]
- Install the exhaust pipe clamp [G] as shown.

○Insert the projection [H] into the slot [I].

- Install the exhaust pipe.
- Turn the [UP] mark to the top of the exhaust pipe holders [J].
- Tighten the following bolt and nuts securely.
  Exhaust Pipe Holder Nuts [K]
  Exhaust Pipe Clamp Bolt [L]

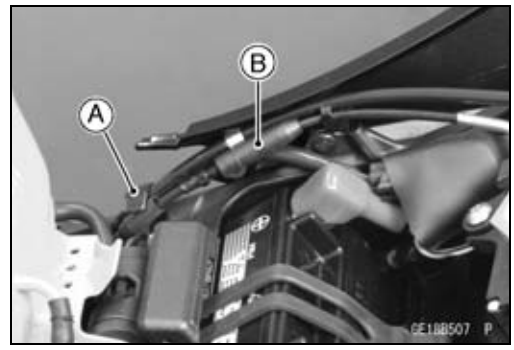


- Install the removed parts (see appropriate chapters).
- Thoroughly warm up the engine, wait until the engine cools down, retighten all the bolts and nuts.

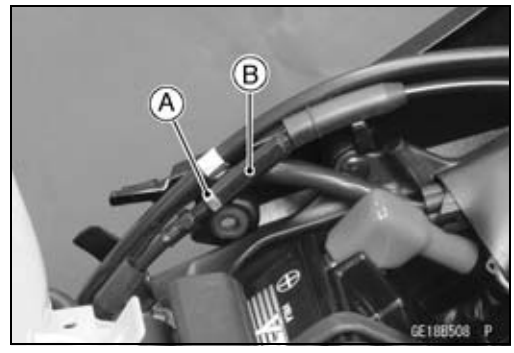
Muffler

Exhaust Butterfly Valve Cable Removal

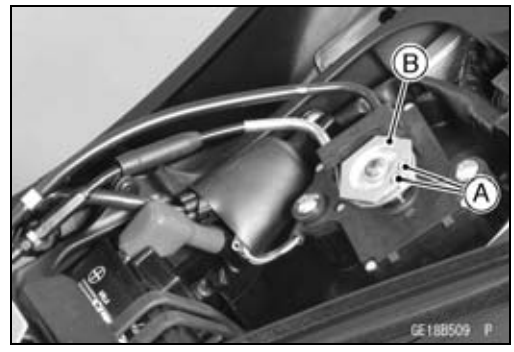
- Remove the front seat (see Front Seat Removal in the Frame chapter).
- Open the clamp [A] and free the cables.
- Slide the dust cover [B].



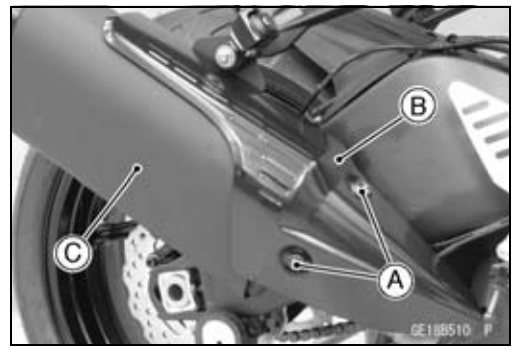
- Loosen the locknut [A], and turn the adjuster [B] to give the cable plenty of play.



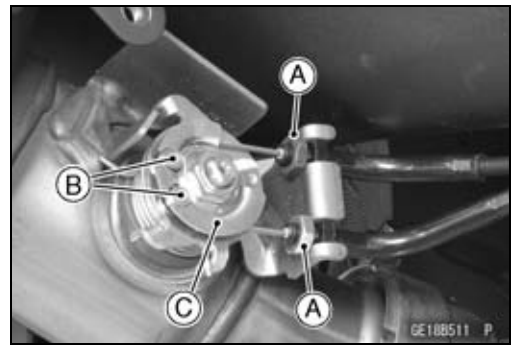
- Remove the clamp (ZX636ED/FD Late Models ~).
- Remove the upper ends [A] of the exhaust butterfly valve cables from the pulley [B].



- Remove:
  Bolts [A]
- Remove the muffler body cover [B] forward from the muffler body [C].

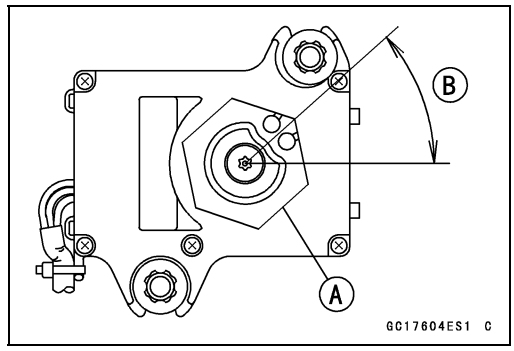


- Loosen the locknuts [A].
- Remove the lower ends [B] of the exhaust butterfly valve cables from the pulley [C].
- Pull the exhaust butterfly valve cables out of the frame.



Muffler

Exhaust Butterfly Valve Cable Installation



- Confirm whether pulley [A] is an angle shown.
  41.7° ±7° [B]

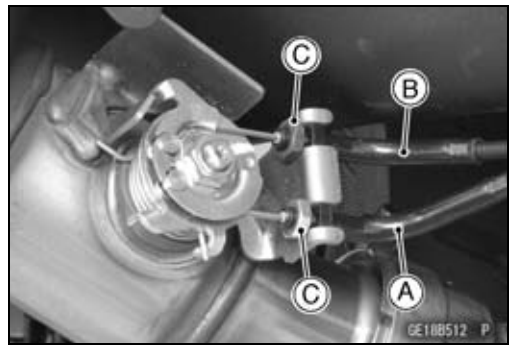
○This position is original position of the pulley.

NOTE

○*Correct the position electrically after confirming use is discontinued and there is no damage when differing from the angle of shown.*

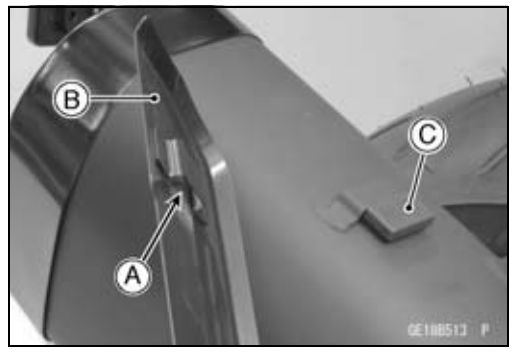
NOTICE
Do not correct the pulley position with the tool, forcibly. The actuator damage will occur.

★If the angle is wrong, adjust the pulley (see Exhaust Butterfly Valve Actuator Installation in the Self-Diagnosis System chapter).



- Run the exhaust butterfly valve cables correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the lower ends of the exhaust butterfly valve cables to the pulley of the muffler body as shown.
  Open Cable [A] (White Locknut)
  Close Cable [B] (Black Locknut)
- Tighten:

Torque - Exhaust Butterfly Valve Cable Locknuts [C]: 5.0 N·m (0.51 kgf·m, 44 in·lb)



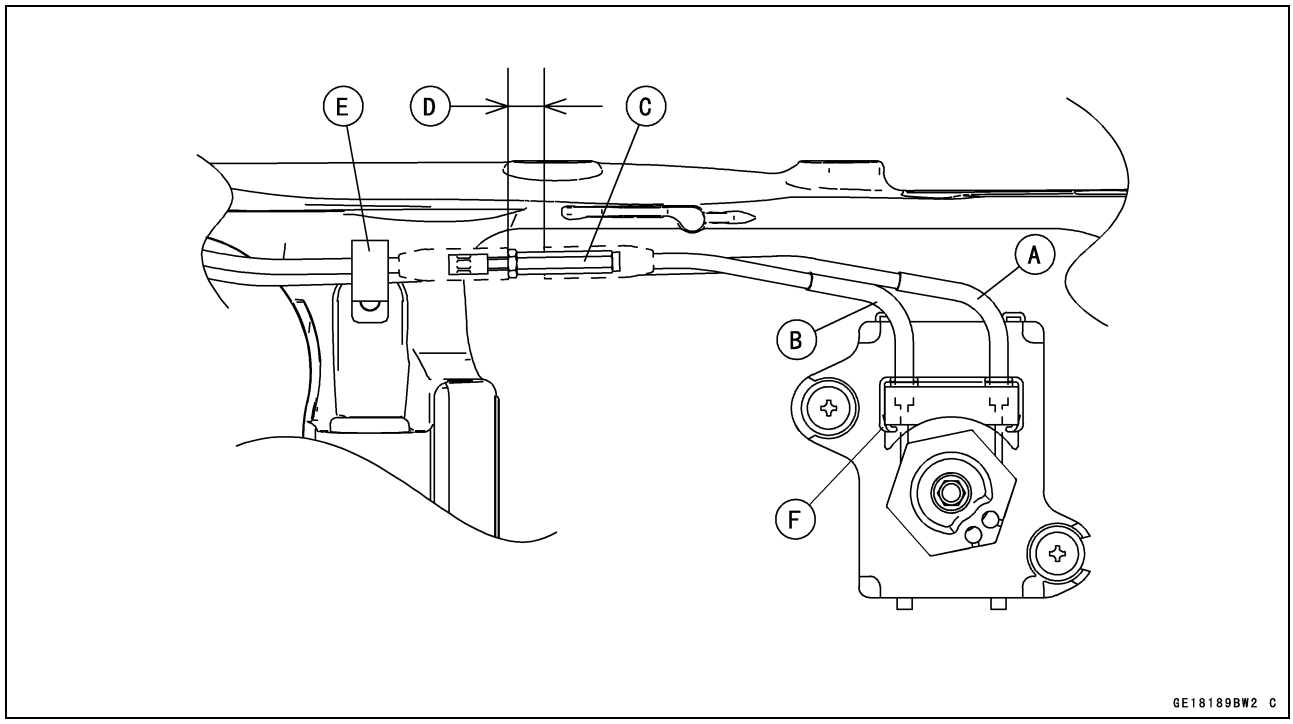
- Fit the slot [A] of the muffler cover [B] to the damper [C] of the muffler body, and tighten the bolts.

Muffler

- Install the upper ends of the exhaust butterfly valve cables to the pulley of the exhaust butterfly valve actuator, following the specified installing sequence.

○First, install the close cable (black) [A].
○Second, install the open cable (white) [B].
○Third, stretch the open cable (white) by using the adjuster [C].
○Turn the adjuster counterclockwise until the play of the open cable becomes no play.
○Fourth, turn the adjuster of the open cable clockwise by 1/2 to 1 rotation.
○Lastly, tighten the adjuster locknut of the open cable securely.

- After installation, cover the dust cover on the adjuster as shown.
  15 mm (0.59 in.) or less [D]
- Fix the exhaust butterfly valve cables with the clamp [E].
- Fix the exhaust butterfly valve cables with the clamp [F] (ZX636ED/FD Late Models ~).
- After connecting the cables, turn the ignition switch on and make sure that the pulley turns clockwise and counterclockwise, then it returns clockwise slightly.



Clutch

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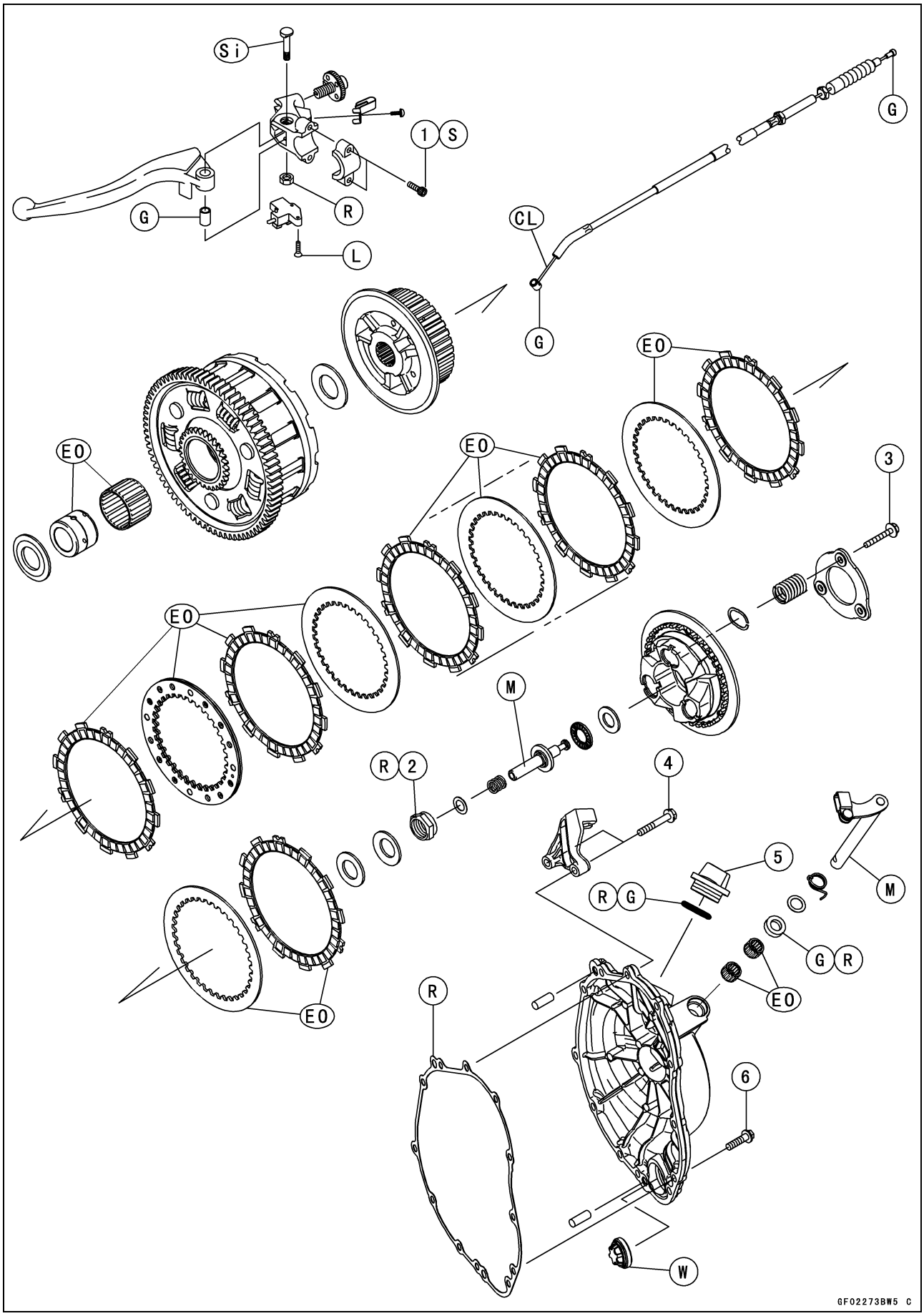
Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Clutch Lever Holder Clamp Bolts	7.8	0.80	69 in·lb	S
2	Clutch Hub Nut	135	13.8	100	R
3	Clutch Stopper Bolts	8.8	0.90	78 in·lb	
4	Clutch Cover Bolts (M6, L = 40 mm)	9.8	1.0	87 in·lb	
5	Oil Filler Plug	–	–	–	Hand-tighten
6	Clutch Cover Bolts (M6, L = 25 mm)	9.8	1.0	87 in·lb	

CL: Apply cable lubricant.
EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
M: Apply molybdenum disulfide grease.
R: Replacement Parts
S: Follow the specified tightening sequence.
Si: Apply silicone grease.
W: Apply water.

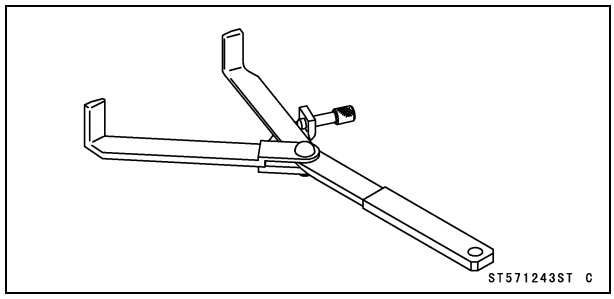
6-4 CLUTCH

Specifications

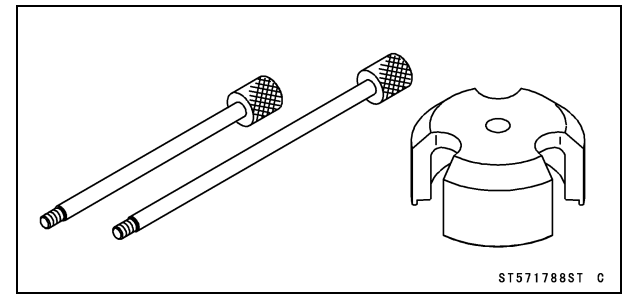
Item	Standard	Service Limit
Clutch Lever Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	– – –
Clutch		
Clutch Plate Assembly Length	40.5 ~ 41.3 mm (1.59 ~ 1.63 in.)	– – –
Friction Plate Thickness	2.72 ~ 2.88 mm (0.107 ~ 0.113 in.)	2.5 mm (0.098 in.)
Friction and Steel Plate Warp	0.15 mm (0.0059 in.) or less	0.3 mm (0.012 in.)

Special Tool and Sealant

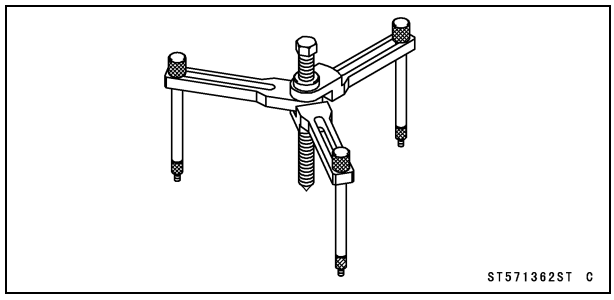
Clutch Holder:
57001-1243



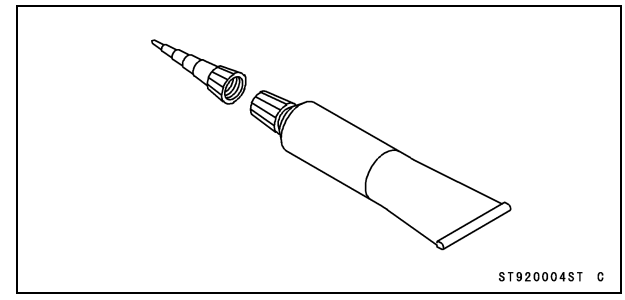
Clutch Plate Holder:
57001-1788



Crankcase Splitting Tool Assembly:
57001-1362



Liquid Gasket, TB1211F:
92104-0004



Clutch Lever and Cable

Clutch Lever Free Play Inspection

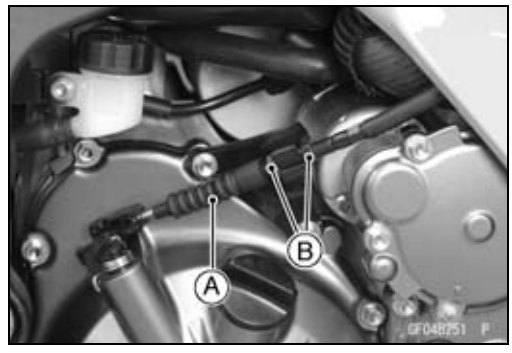
- Refer to the Clutch Operation Inspection in the Periodic Maintenance chapter.

Clutch Lever Free Play Adjustment

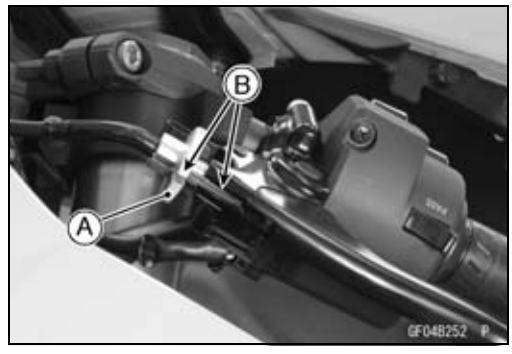
- Refer to the Clutch Operation Inspection in the Periodic Maintenance chapter.

Cable Removal

- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter)
- 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 [A].
- Line up the slots [B] in the clutch lever and adjuster, and then free the cable from the lever.
- Free the clutch inner cable tip from the clutch release lever.
- Remove the clutch cable out of the frame.



Cable Installation

- Run the clutch cable correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Adjust the clutch cable (see Clutch Operation Inspection in the Periodic Maintenance chapter).
- Install the removed parts (see appropriate chapters).

Cable Lubrication

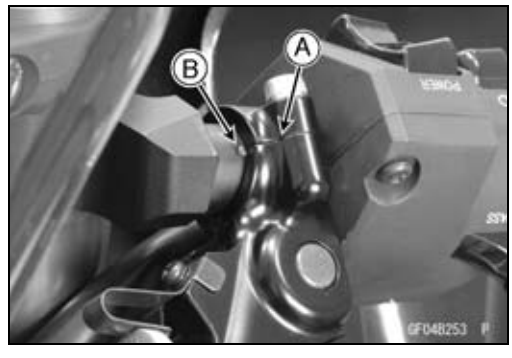
- Refer to the Chassis Parts Lubrication in the Periodic Maintenance chapter.

Clutch Lever Holder Installation

- Install the clutch lever holder so that the mating surface [A] of the clutch lever holder clamp is aligned with the punch mark [B] of the handlebar.
- 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 Holder Clamp Bolts: 7.8 N·m (0.80 kgf·m, 69 in·lb)



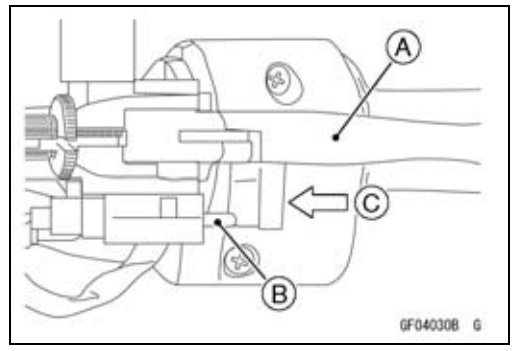
Clutch Lever and Cable

Clutch Lever Installation

⚠ WARNING

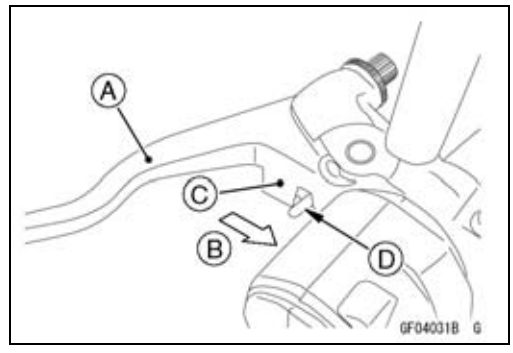
If the starter lockout switch pin has been damaged the starter lockout system will not work properly. This allows the motorcycle to be started in gear with the clutch lever released (clutch engaged), creating sudden forward movement that can result in an accident or injury. Check that the starter lockout switch operates properly when installing the clutch lever.

- Replace the locknut with a new one.
- Apply grease to the clutch lever collar.
- Install the clutch lever [A] from frame left side [C] so that it may not damage a pin [B] of the starter lockout switch.

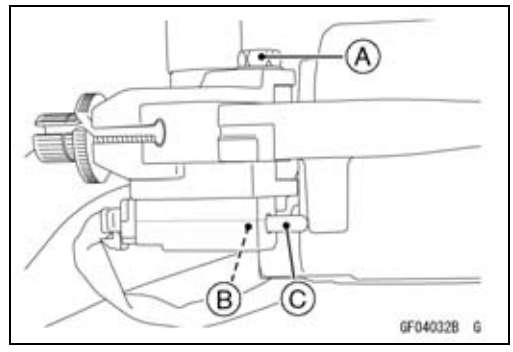


NOTICE

Do not install the clutch lever [A] from the front side [B]. The pin [D] of the starter lockout switch may be damaged in the projection [C] of a clutch lever.



- Tighten the bolt [A] and locknut [B].
- Install the upper end of the clutch cable (see Clutch Cable Installation).
- Adjust the clutch cable (see Clutch Operation Inspection in the Periodic Maintenance chapter).
- Check that the pin [C] of the starter lockout switch moves smoothly.



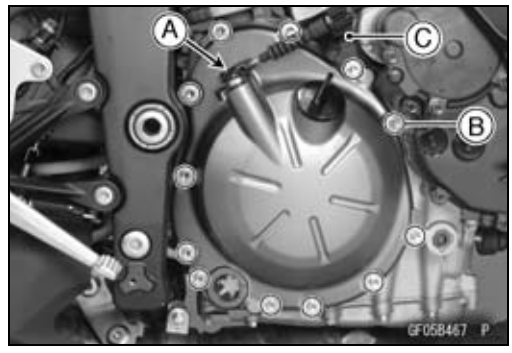
⚠ WARNING

Too much cable play can prevent clutch disengagement and cause an accident resulting in serious injury or death. When adjusting the clutch or replacing the cable, be sure the upper end of the clutch outer cable is fully seated in its fitting, or it could slip into place later, creating enough cable play to prevent clutch disengagement.

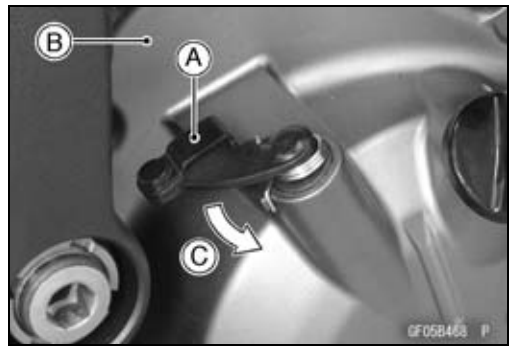
Clutch Cover

Clutch Cover Removal

- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove:
  Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Clutch Cable Lower End [A] (see Cable Removal)
  Clutch Cover Bolts [B]
  Bracket [C]



- Turn the release lever [A] counterclockwise as shown, and remove the clutch cover [B].
  About 90° [C]



Clutch Cover Installation

- Using a cleaning fluid, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth
- Apply liquid gasket to the area [A] where the mating surface of the crankcase touches the clutch cover gasket.

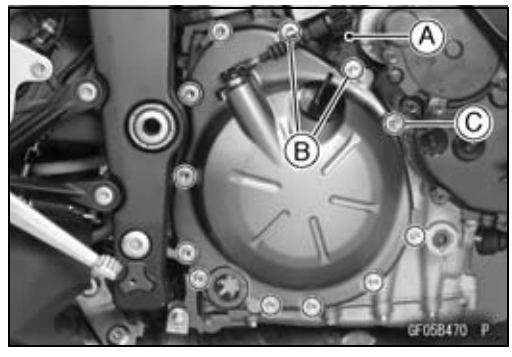
  Sealant - Liquid Gasket, TB1211F: 92104-0004

- Be sure that the dowel pins [B] are in position.
- Replace the clutch cover gasket with a new one.

- Install the bracket [A].
- Tighten:

  Torque - Clutch Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

  L = 40 mm (1.57 in.) [B]
  L = 25 mm (0.98 in.) [C]



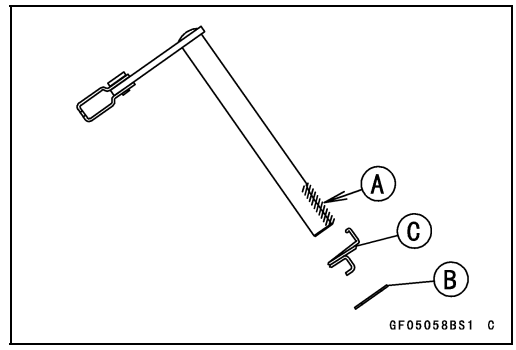
Release Shaft Removal

NOTICE
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 release lever and shaft assembly [A] straight out of the clutch cover.

Clutch Cover

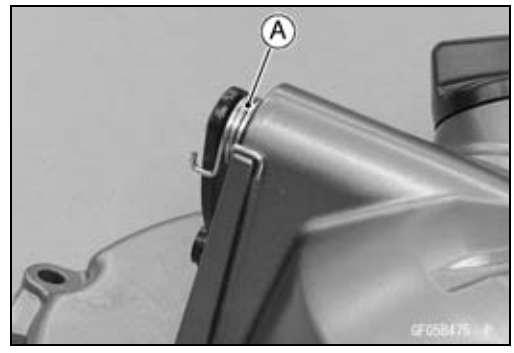
Release Shaft Installation



- Apply grease to the oil seal lips on the upper ridge of the clutch cover.
- Apply engine 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.

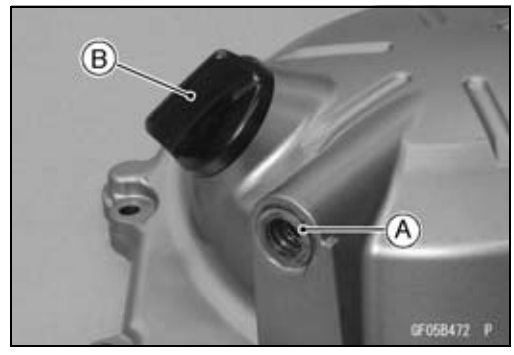
NOTICE
When inserting the release shaft, be careful not to remove the spring of the oil seal.

- Fit the spring [A] as shown.

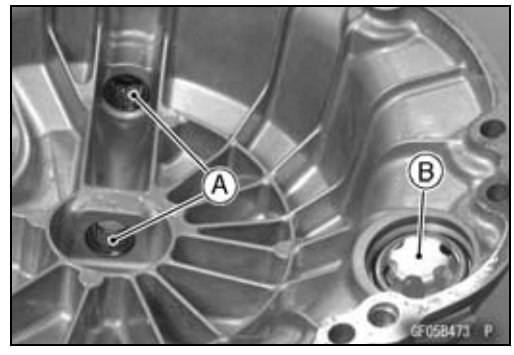


Clutch Cover Disassembly

- Remove:
  Clutch Cover (see Clutch Cover Removal)
  Release Lever and Shaft Assembly (see Release Shaft Removal)
  Oil Seal [A]
  Oil Filler Plug [B]



- Remove:
  Needle Bearings [A]
  Oil Level Inspection Window [B]



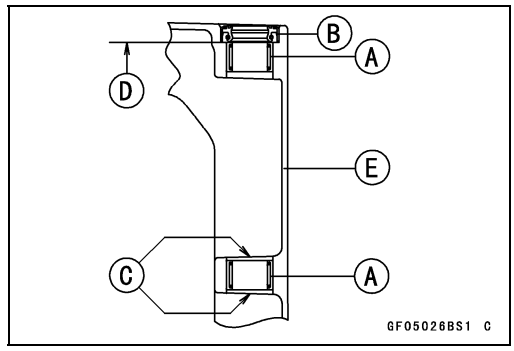
Clutch Cover

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.

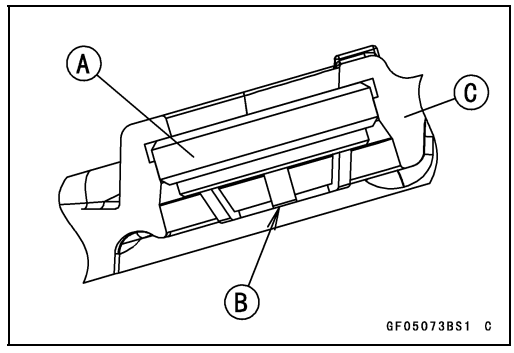
○Press the lower bearing, do not protrude from the boss [C] of the clutch cover.

○Press the upper bearing so that the bearing surface [D] is flush with the housing end of clutch cover [E].

○Press the oil seal until the bottom.

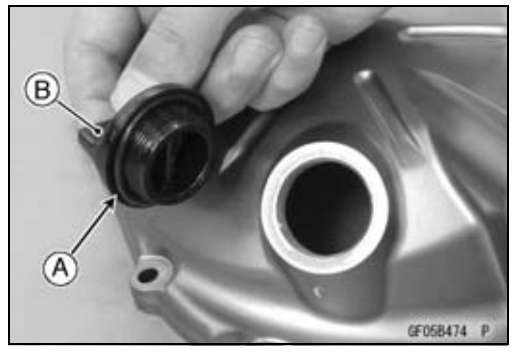
- Apply grease to the oil seal lips.

- Apply water to the rubber portion [A] of the oil level inspection window.
- Press the oil level inspection window so that its projection [B] faces inside of the clutch cover [C].



- Replace the O-ring [A] of the oil filler plug [B] with a new one.
- Apply grease to the new O-ring.
- Tighten:

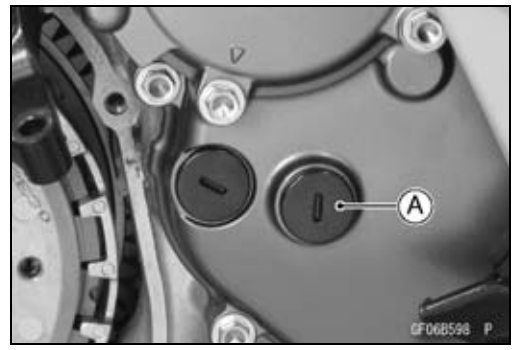
Torque - Oil Filler Plug: Hand-tighten



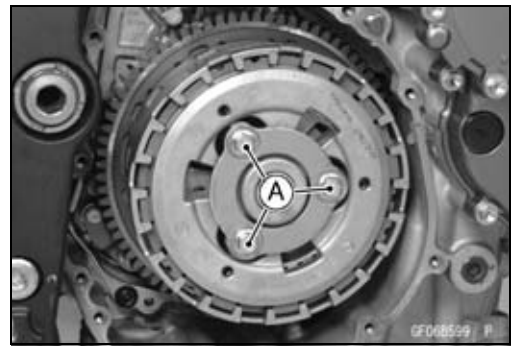
Clutch

Clutch Removal

- Remove:
  Clutch Cover (see Clutch Cover Removal)
  Starter Clutch Bolt Cap [A]



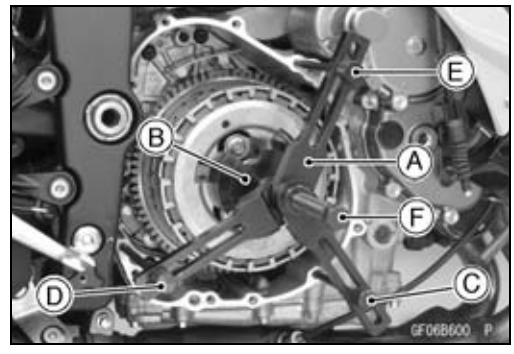
- Using a wrench on the starter clutch bolt, turn the crankshaft clockwise until the clutch stopper bolts [A] reaches the position as shown.



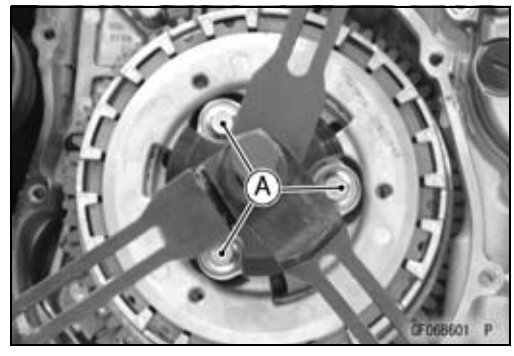
- Set the special tools as shown to hold the clutch stopper plate.

  Special Tools - Crankcase Splitting Tool Assembly [A]: 57001-1362
  Clutch Plate Holder [B]: 57001-1788

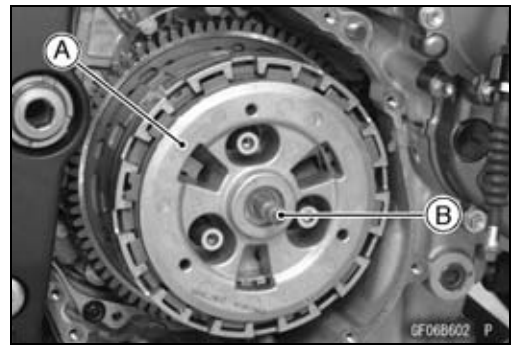
  128 mm [C] (57001-1362)
  173 mm [D] (57001-1788)
  139 mm [E] (57001-1788)
- Screw the center bolt [F] of the crankcase splitting tool assembly tightly.



- Remove the clutch stopper bolts [A].
- Remove the crankcase splitting tool assembly and clutch plate holder.
- Remove:
  Clutch Stopper Plate
  Clutch Springs



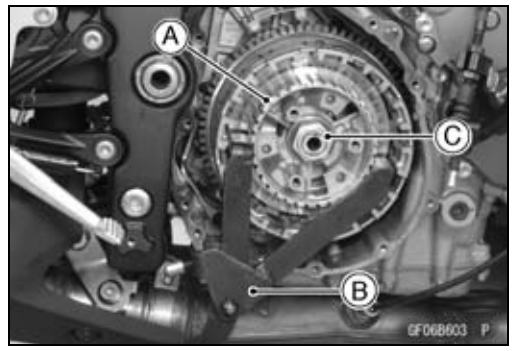
- Remove:
  Clutch Pressure Plate [A] (with Shim, Bearing, Pusher [B], Spring and Washer)
  Friction Plates and Steel Plates



Clutch

● Hold the sub clutch hub [A] steady with the clutch holder [B], and remove the nut [C] and washers.

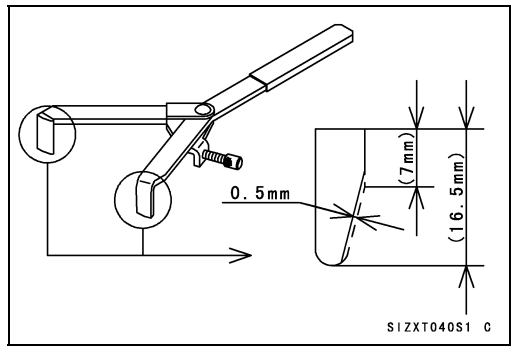
Special Tool - Clutch Holder: 57001-1243



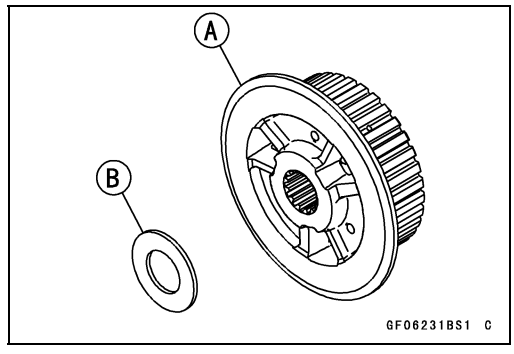
○Use the clutch holder with sharpened hook nose by grinding.

Special Tool - Clutch Holder: 57001-1243

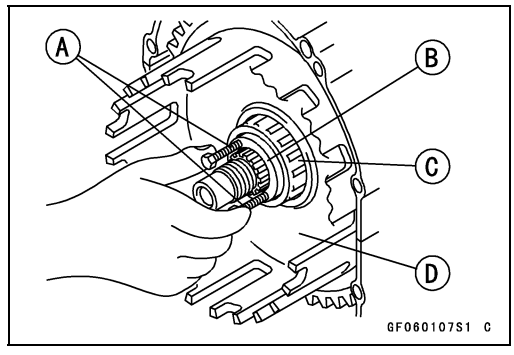
○Grind the hook nose by 0.5 mm (0.02 in.) as shown.



● Remove:
Clutch Hub [A]
Spacer [B]

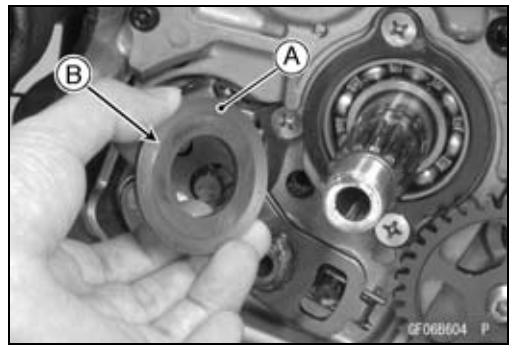


● Using the two 4 mm (0.16 in.) bolts [A], pull out the sleeve [B], needle bearing [C] and clutch housing [D].
● Remove the spacer.



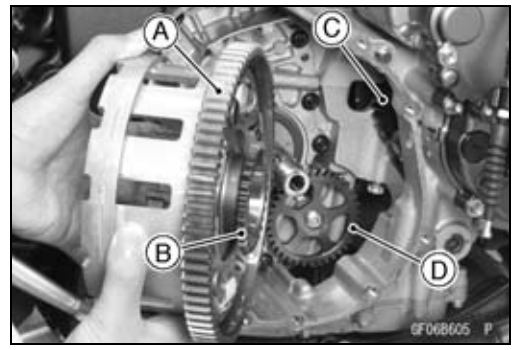
Clutch Installation

● Install the spacer [A] so that the stepped side [B] faces inward.

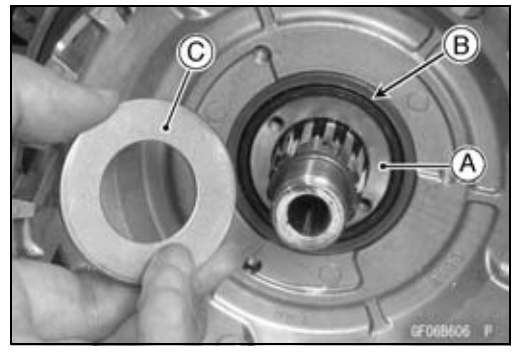


Clutch

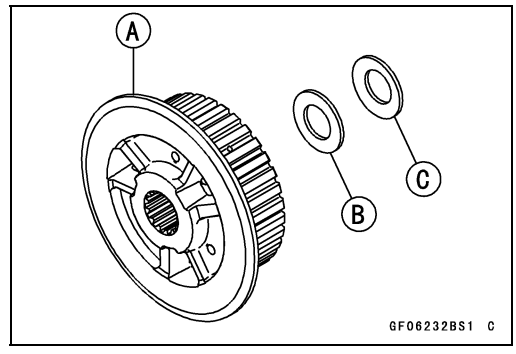
- Engage the clutch housing gear [A] and oil pump drive gear [B] with the crankshaft primary gear [C] and oil pump drive gear [D].



- Apply engine oil to the sleeve [A] and needle bearing [B].
- Install:
  Needle Bearing
  Sleeve
  Spacer [C]



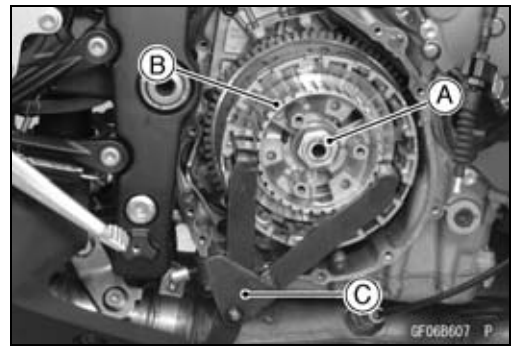
- Install:
  Clutch Hub [A]
  Washer [B]
- Install the washer [C] so that the “OUT SIDE” mark faces outward.



- Replace the clutch hub nut [A] with a new one.
- Hold the sub clutch hub [B] steady with the clutch holder [C], and tighten the clutch hub nut.

  Special Tool - Clutch Holder: 57001-1243

  Torque - Clutch Hub Nut: 135 N·m (13.8 kgf·m, 100 ft·lb)

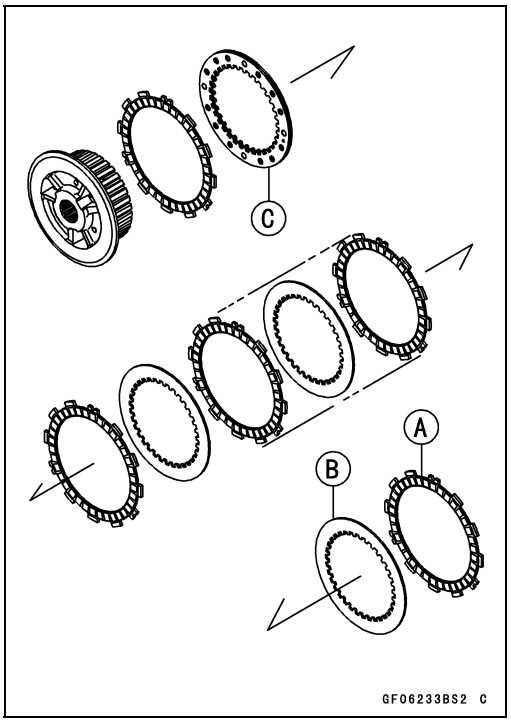


Clutch

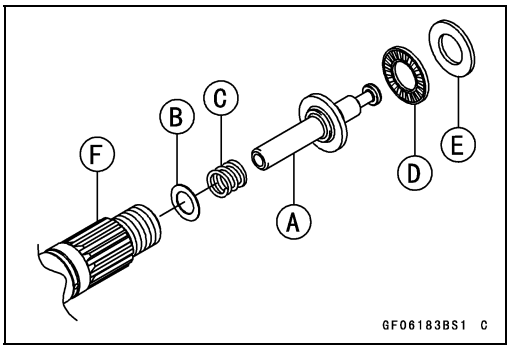
- Install the friction plates [A] and steel plates [B] alternately as shown.
  Thick Steel Plate [C]

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

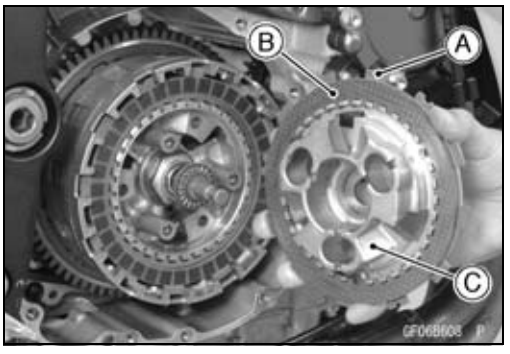
○Install the last friction plate and steel plate later with the clutch pressure plate.



- Apply molybdenum disulfide grease to the pusher end [A].
- Install the washer [B], spring [C], bearing [D] and shim [E] to the pusher.
- Install the pusher to the drive shaft [F] direction as shown.



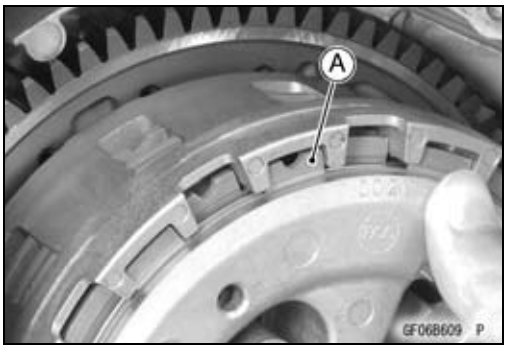
- Put the last friction plate [A] and steel plate [B] on the clutch pressure plate [C] and install them.



- Install the last friction plate so that the tangs [A] fit into the grooves in the housing as shown.

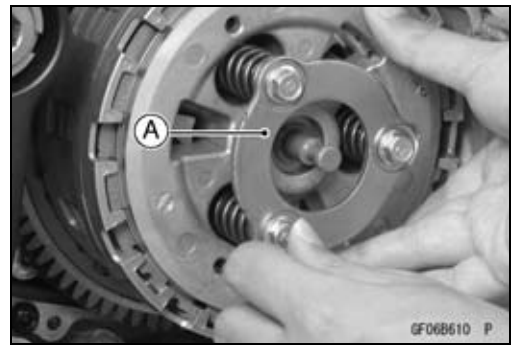
NOTE

○*Make sure that the clutch pressure plate is installed without a gap.*



Clutch

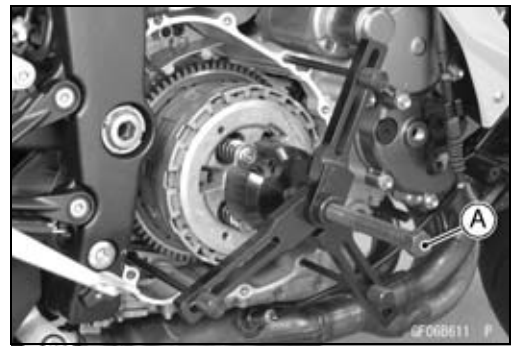
● Be sure to install the spring seats on the clutch pressure plate.
● Install:
Clutch Springs
Clutch Stopper Plate [A]
● Tighten the clutch stopper bolts by hand.
○Hold the clutch pressure plate by hand while tightening the clutch stopper bolts.
● Check the clutch stopper bolts position is correct (see Clutch Removal).



● Set the special tools.
○Refer to the Clutch Removal for setting the special tools.

Special Tools - Crankcase Splitting Tool Assembly: 57001 -1362
Clutch Plate Holder: 57001-1788

● To press the clutch springs, tighten the center bolt [A] of the crankcase splitting tool assembly until the clutch stopper plate stops.
○The clutch stopper plate stops in contact with the boss of the clutch hub.



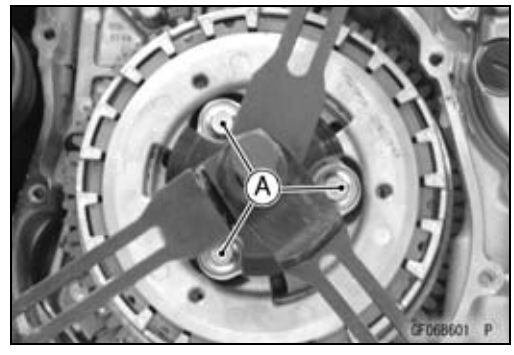
NOTICE

Tightening the center bolt of the crankcase splitting tool assembly too much may damage the special tools.

● Tighten:

Torque - Clutch Stopper Bolts [A]: 8.8 N·m (0.90 kgf·m, 78 in·lb)

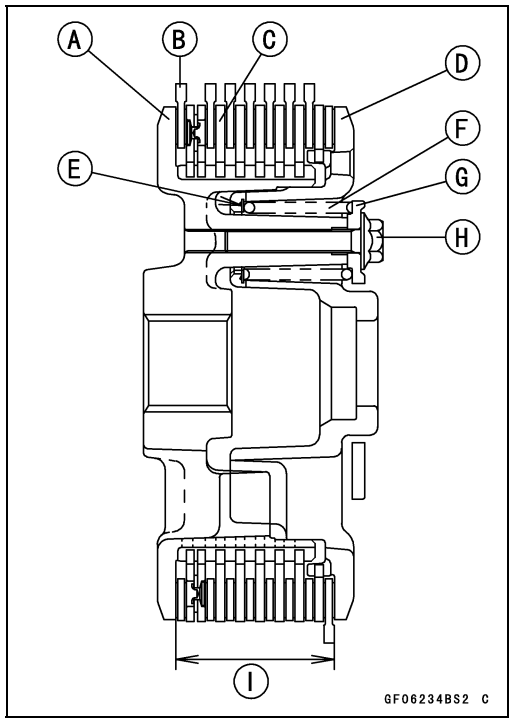
● Remove the crankcase splitting tool assembly and clutch plate holder.



● Install:
Clutch Cover (see Clutch Cover Installation)

Clutch

Clutch Plate Assembly Length Measurement



- Assemble the following parts.
  Clutch Hub [A]
  Friction Plates [B]
  Steel Plates [C]
  Clutch Pressure Plate [D]
  Spring Seats [E]
  Clutch Springs [F]
  Clutch Stopper Plate [G]
  Clutch Stopper Bolts [H]

Torque - Clutch Stopper Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

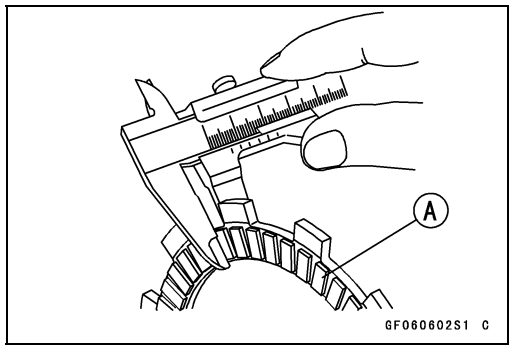
- Measure the clutch plate assembly length [I].

Clutch Plate Assembly Length
40.5 ~ 41.3 mm (1.59 ~ 1.63 in.)

NOTE

○*The length of the clutch plate assembly changes by the steel plate thickness.*

Clutch Plate, Wear, Damage Inspection

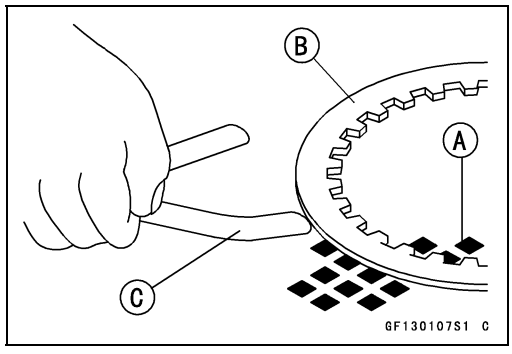


- Visually inspect the friction and steel plates for signs of seizure, overheating (discoloration), or uneven wear.
- Measure the thickness of each friction plate [A] at several points.

★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: 2.5 mm (0.098 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.

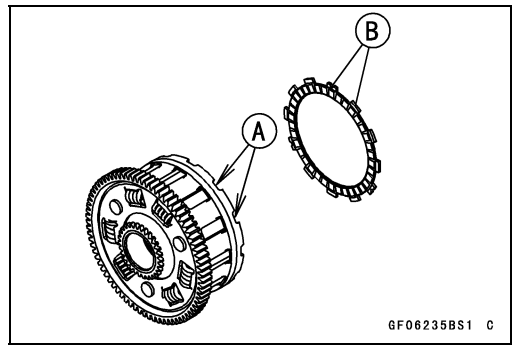
Friction and Steel Plate Warp
Standard: 0.15 mm (0.0059 in.) or less
Service Limit: 0.3 mm (0.012 in.)

Clutch

Clutch Housing Finger Inspection

- Visually inspect the clutch housing fingers [A] where the friction plate tangs [B] hit them.

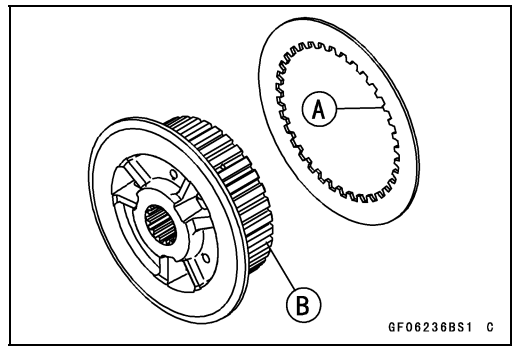
★If they are badly worn or if there are groove cuts where the tangs hit, replace the housing. Also, replace the friction plates if their tangs are damaged.



Clutch Housing Spline Inspection

- Visually inspect where the teeth [A] on the steel plates wear against the sub clutch hub splines [B].

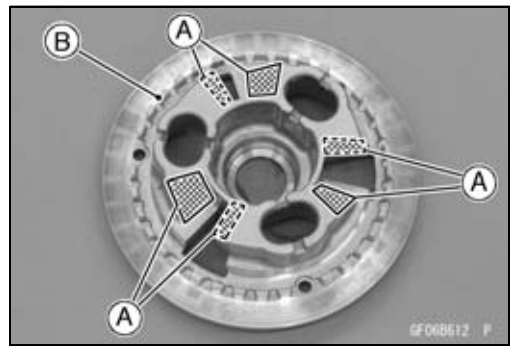
★If there are notches worn into the splines, replace the sub clutch hub. Also, replace the steel plates if their teeth are damaged.

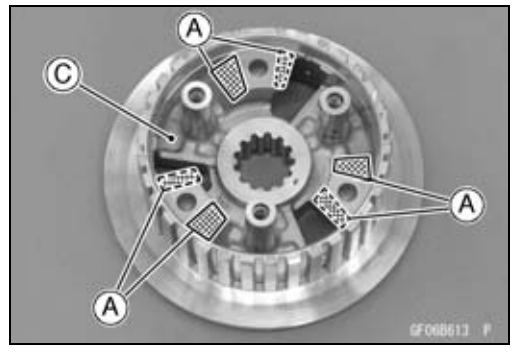


Clutch Pressure Plate and Clutch Hub Inspection

- Visually inspect the contact areas [A] of the clutch pressure plate [B] and clutch hub [C] for damage.

★If the contact areas are damaged replace them with new ones.





Clutch Spring Inspection

★If all the components are good, but the problem still exists, replace the clutch springs (see Clutch Removal and Clutch Installation).

Engine Lubrication System

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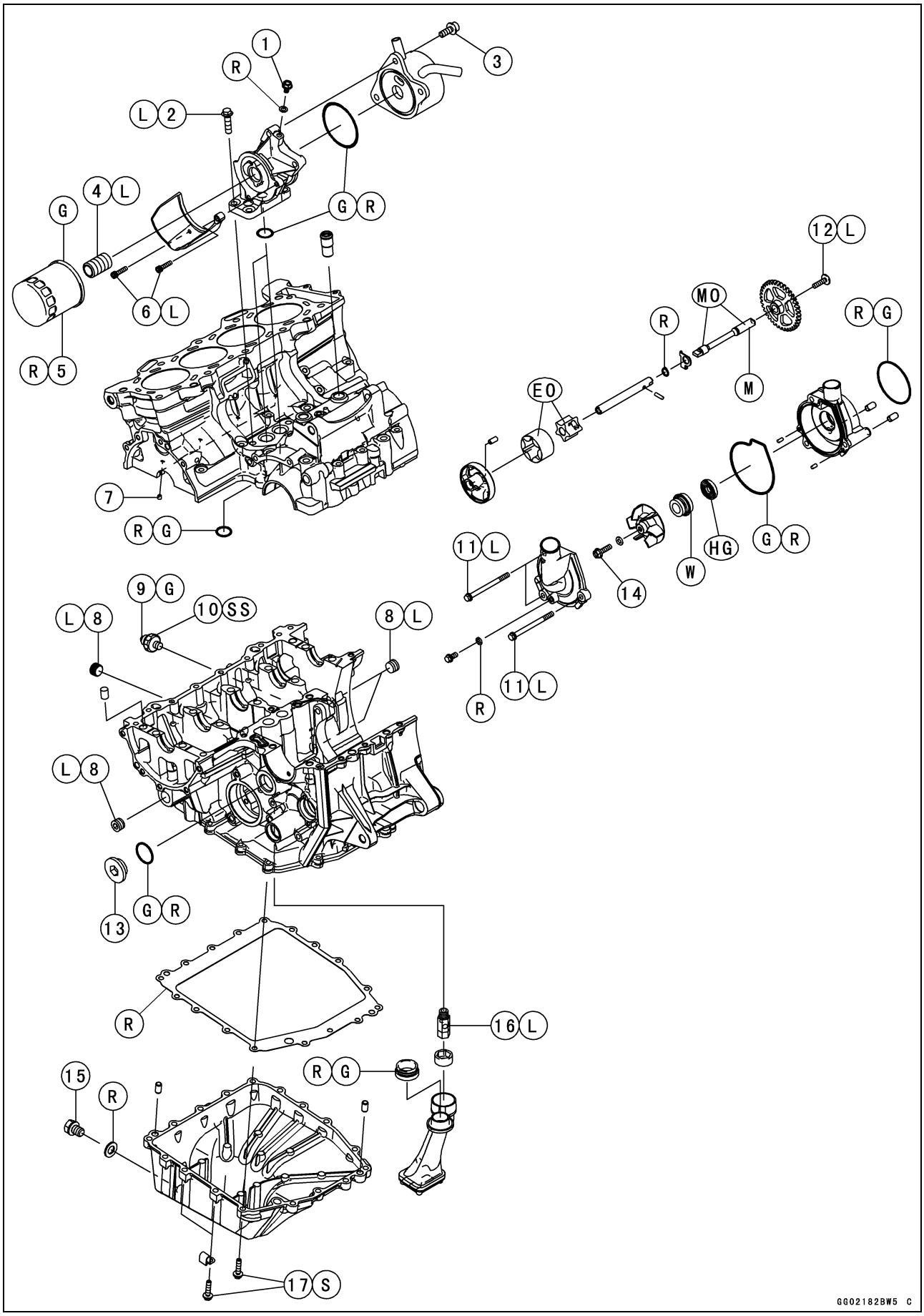
7-2 ENGINE LUBRICATION SYSTEM

Exploded View

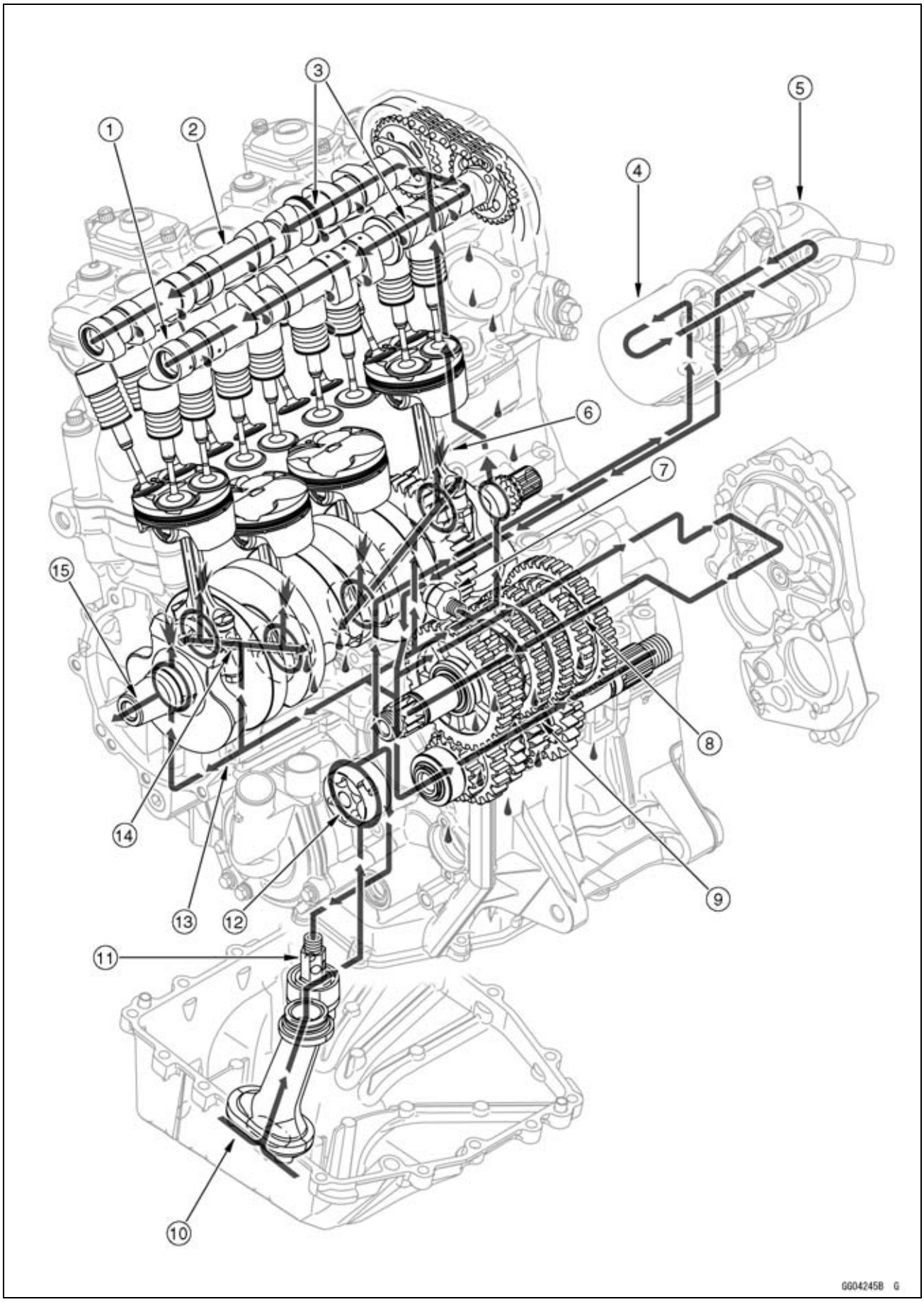


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Air Bleed Bolt	9.8	1.0	87 in·lb	
2	Oil Cooler/Oil Filter Case Mounting Bolts	20	2.0	15	L
3	Oil Cooler Mounting Bolts	20	2.0	15	
4	Oil Filter Holder Bolt	25	2.5	18	L
5	Oil Filter	17	1.7	13	G, R
6	Oil Filter Guard Bolts	4.0	0.41	35 in·lb	L
7	Oil Jet Nozzles	2.9	0.30	26 in·lb	
8	Oil Passage Plugs (Taper)	20	2.0	15	L
9	Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	G
10	Oil Pressure Switch	15	1.5	11	SS
11	Water Pump Cover Bolts	12	1.2	106 in·lb	L
12	Oil Pump Drive Gear Bolt	9.8	1.0	87 in·lb	L
13	Oil Passage Plug	17	1.7	13	
14	Impeller Bolt	9.8	1.0	87 in·lb	
15	Engine Oil Drain Bolt	29	3.0	21	
16	Oil Pressure Relief Valve	15	1.5	11	L
17	Oil Pan Bolts	9.8	1.0	87 in·lb	S

EO: Apply engine oil.
G: Apply grease.
HG: Apply high-temperature grease.
L: Apply a non-permanent locking agent.
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
S: Follow the specified tightening sequence.
SS: Apply silicone sealant.
W: Apply water.

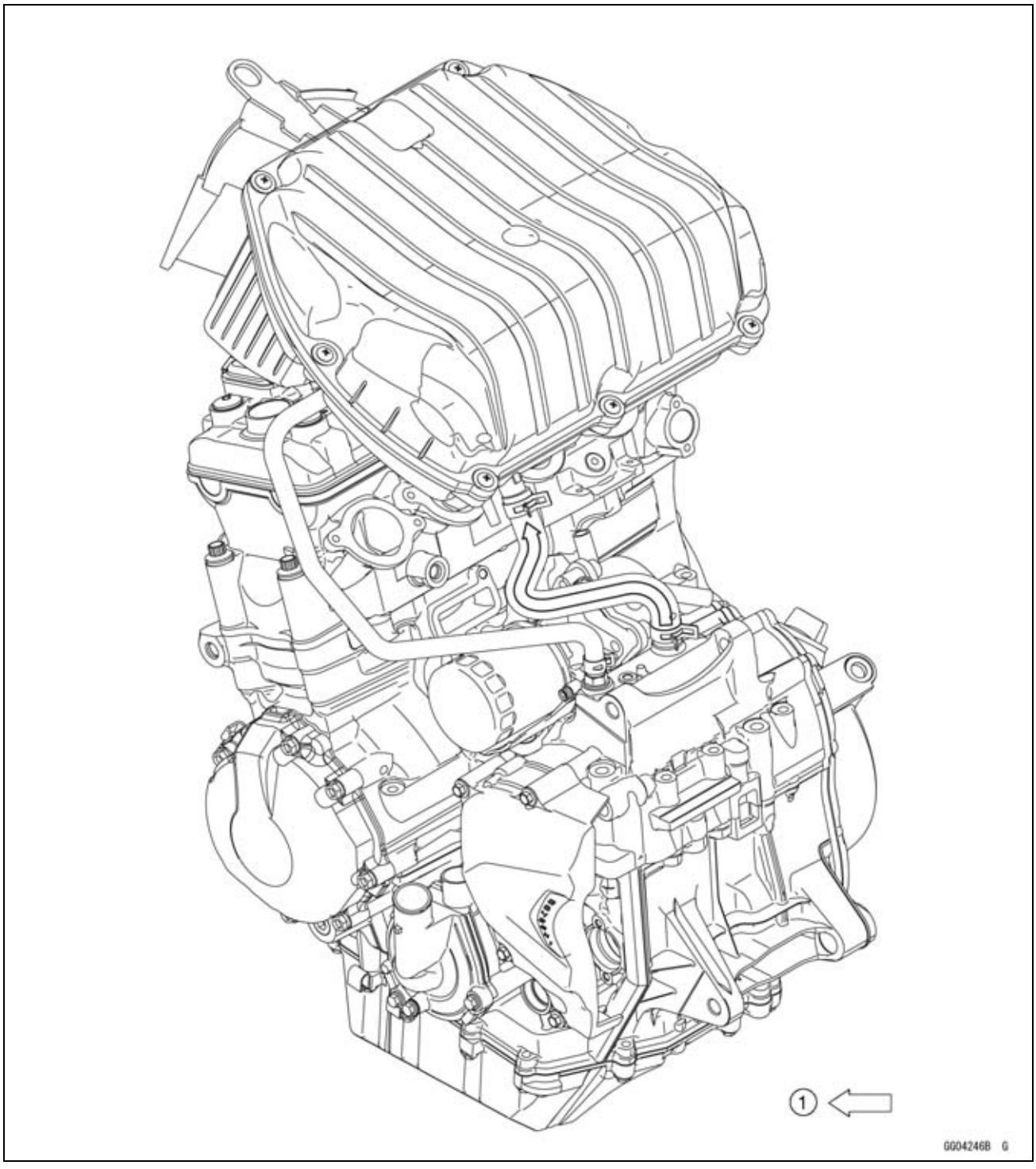
Engine Oil Flow Chart



Engine Oil Flow Chart

1. Intake Camshaft
2. Exhaust Camshaft
3. Camshaft Oil Passage
4. Oil Filter
5. Oil Cooler
6. Oil Jet
7. Oil Pressure Switch
8. Drive Shaft Oil Passage
9. Output Shaft Oil Passage
10. Oil Screen
11. Oil Pressure Relief Valve
12. Oil Pump
13. Main Oil Passage
14. Crankshaft Oil Passage
15. Alternator Oil Passage

Engine Oil Flow Chart



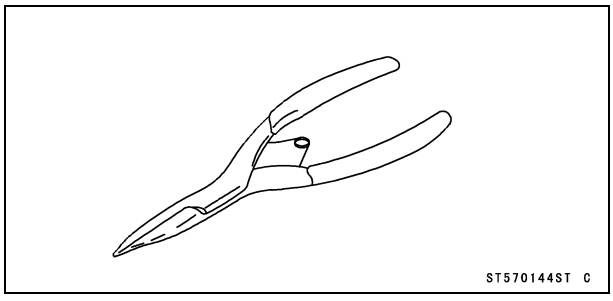
1. Blowby Gas

Specifications

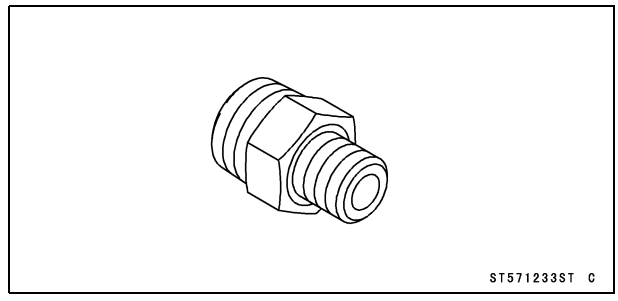
Item	Standard
Engine Oil	
Type	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2
Viscosity	SAE 10W-40
Capacity	2.8 L (3.0 US qt) (when filter is not removed)
	3.1 L (3.3 US qt) (when filter is removed)
	3.6 L (3.8 US qt) (when engine is completely dry)
Level	Between upper and lower level lines (Wait 2 ~ 3 minutes after idling or running)
Oil Pressure Measurement	
Oil Pressure	93 ~ 123 kPa (0.95 ~ 1.25 kgf/cm², 13 ~ 18 psi) @4 000 r/min (rpm), Oil Temperature 90°C (194°F)

Special Tools and Sealant

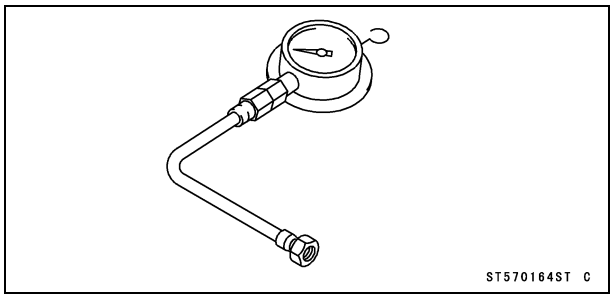
Outside Circlip Pliers:
57001-144



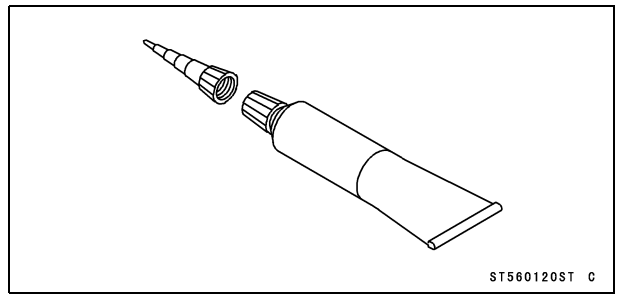
Oil Pressure Gauge Adapter, PT3/8:
57001-1233



Oil Pressure Gauge, 10 kgf/cm²:
57001-164



Liquid Gasket, TB1211:
56019-120

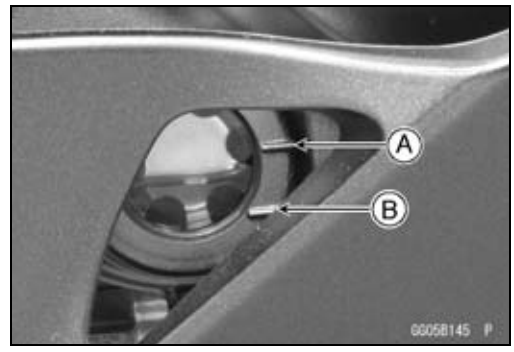


Engine Oil and Oil Filter

⚠ WARNING

Vehicle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated wear and may result in engine seizure, accident, and injury. Check the oil level before each use and change the oil and filter according to the periodic maintenance chart.

Oil Level Inspection



- Check that the engine oil level is between the upper [A] and lower [B] levels in the oil level inspection window.

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.*

NOTICE

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 red warning indicator light (LED) and oil pressure warning symbol will light. If this light stays on when the engine is running above idle speed, stop the engine immediately and find the cause.

★If the oil level is too high, remove the excess oil, using a syringe or some other suitable device.

★If the oil level is too low, add the correct amount of oil through the oil filler opening. Use the same type and make of oil that is already in the engine.

NOTE

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

Engine Oil Change

- Refer to the Engine Oil Change in the Periodic Maintenance chapter.

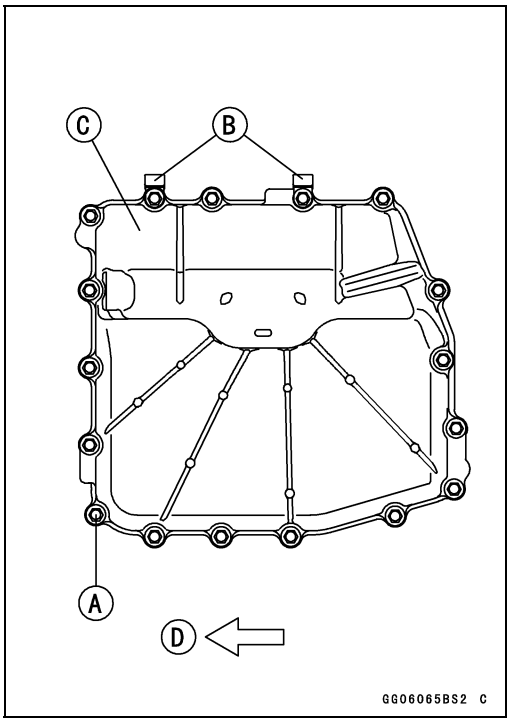
Oil Filter Replacement

- Refer to the Oil Filter Replacement in the Periodic Maintenance chapter.

Oil Pan

Oil Pan Removal

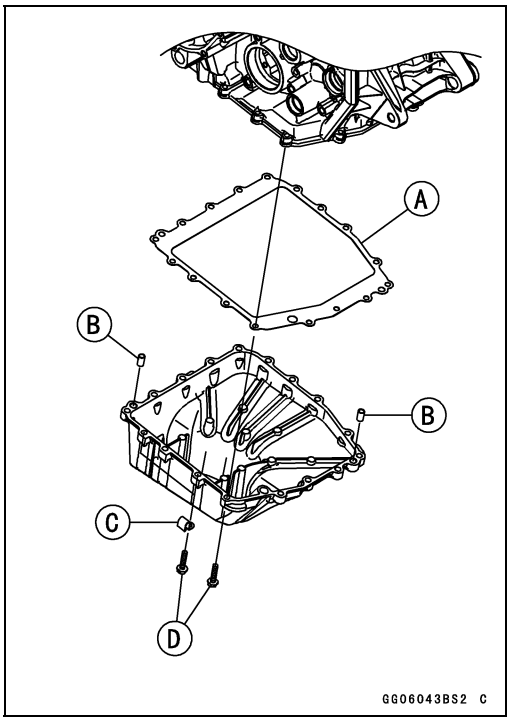
- Drain:
  Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
- Remove:
  Exhaust Pipe (see Exhaust Pipe Removal in the Engine Top End chapter)
  Oil Pan Bolts [A]
  Clamps [B]
  Oil Pan [C]
  Front [D]

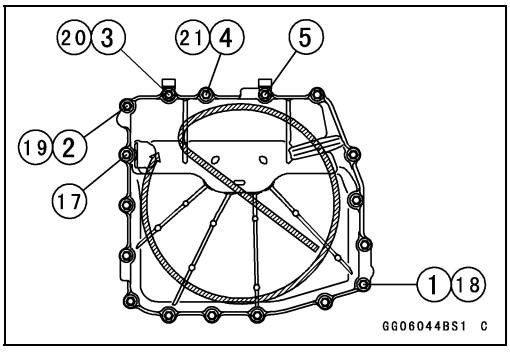


Oil Pan Installation

- Replace the oil pan gasket [A] with a new one.
- Install the dowel pins [B] and clamps [C] as shown.
- Tighten the oil pan bolts [D] as shown sequence [1 ~ 21].

Torque - Oil Pan Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

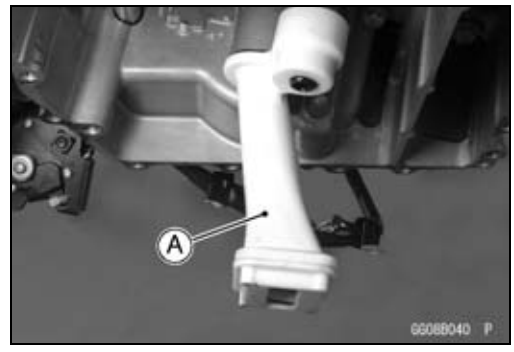




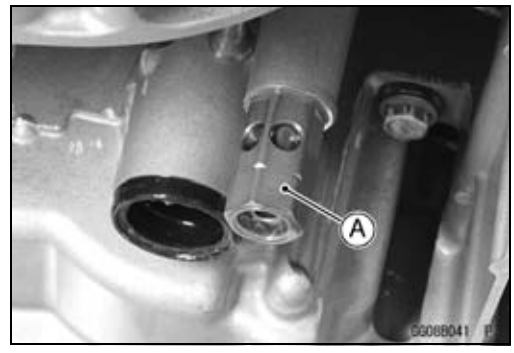
Oil Pressure Relief Valve

Oil Pressure Relief Valve Removal

- Remove:
  Oil Pan (see Oil Pan Removal)
  Oil Screen [A]



- Remove the oil pressure relief valve [A].



Oil Pressure Relief Valve

Oil Pressure Relief Valve Installation

● Apply a non-permanent locking agent to the threads of the oil pressure relief valve [A], and tighten it.

NOTICE

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)

● Clean the oil screen [B] with a high flash-point solvent and remove any particles stuck to them.

○Blow away the particles by applying compressed air from the inside to the outside (from the clean side to the dirty side).

⚠ WARNING

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the screen 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. Do not use gasoline or a low flash-point solvent to clean the screen.

NOTE

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

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

★If the screen is damaged, replace it.

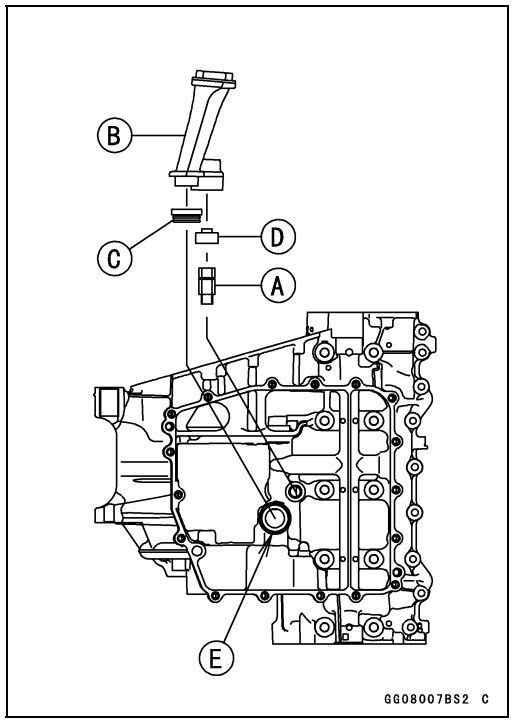
● Replace the O-ring [C] with a new one.

● Apply grease to the O-ring.

● Install the O-ring and damper [D] to the oil screen.

● Install the oil screen so that the crankcase rib [E] and relief valve fits the oil screen.

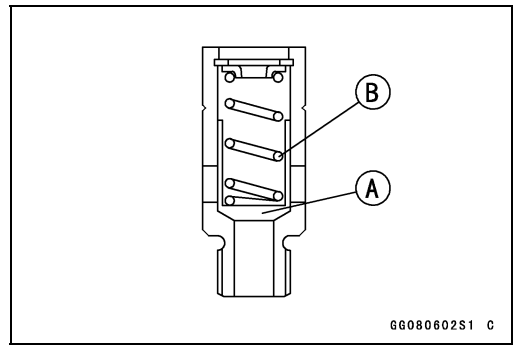
● Install the oil pan (see Oil Pan Installation).



Oil Pressure Relief Valve

Oil Pressure Relief Valve Inspection

- Remove the oil pressure relief valve (see Oil Pressure Relief Valve Removal).
- 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.

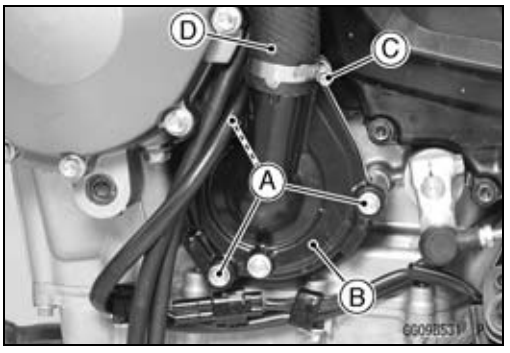
⚠ WARNING

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the oil pressure relief valve 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. Do not use gasoline or a low flash-point solvent to clean the oil pressure relief valve.

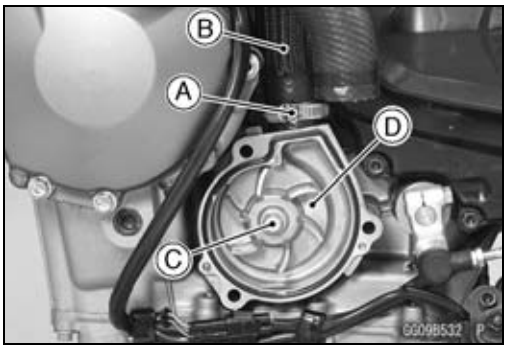
★If cleaning does not solve the problem, replace the oil pressure relief valve as an assembly. The oil pressure relief valve is precision made with no allowance for replacement of individual parts.

Oil Pump

Oil Pump Removal

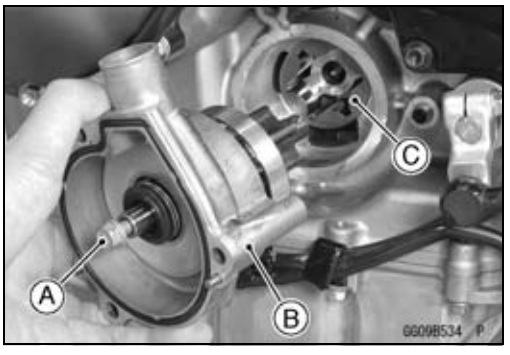


- Drain:
  Coolant (see Coolant Change in the Periodic Maintenance chapter)
  Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
- Remove:
  Water Pump Cover Bolts [A]
  Water Pump Cover [B]
- Loosen the water hose clamp screw [C].
- Disconnect the water hose [D].

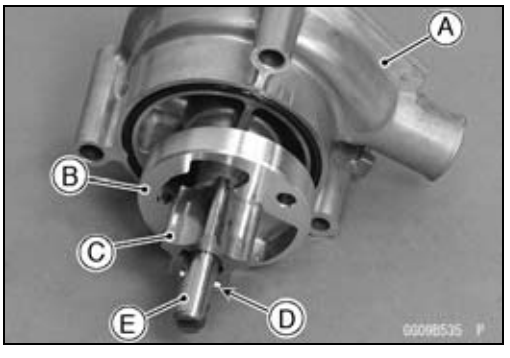


- Loosen the water hose clamp screw [A].
- Disconnect the water hose [B].
- Remove:
  Impeller Bolt [C] and Washer
  Impeller [D]

- Install the impeller bolt [A] temporary.



- Using the impeller bolt [A], remove the oil (water) pump [B] as an assembly.
- Remove the outer rotor [C] and impeller bolt.



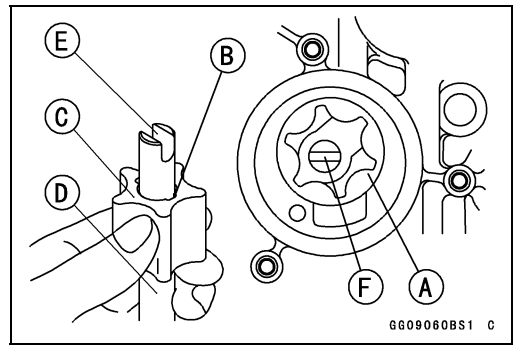
- Remove:
  Water Pump Body [A]
  Oil Pump Cover [B]
  Inner Rotor [C]
  Pin [D]
  Oil (Water) Pump Shaft [E]

Oil Pump

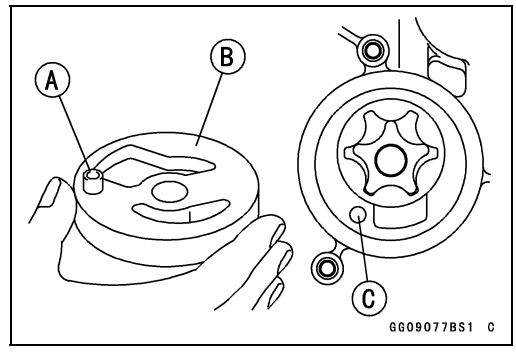
Oil Pump Installation

- Install the outer rotor [A] into the crankcase.
- Install the pin [B] and inner rotor [C] to the oil (water) pump shaft [D], and install the assy.

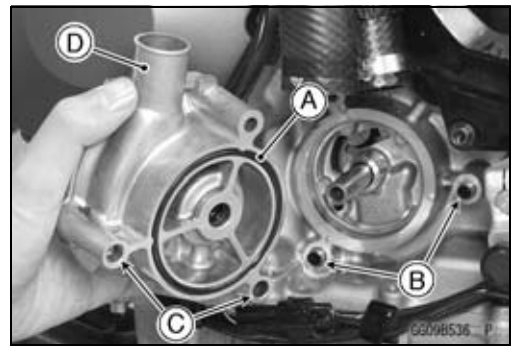
○Turn the pump shaft so that the slot [E] in its shaft fits onto the projection [F] of the pump drive gear shaft.



- Fit the pin [A] of the oil pump cover [B] into the hole [C] in the crankcase.

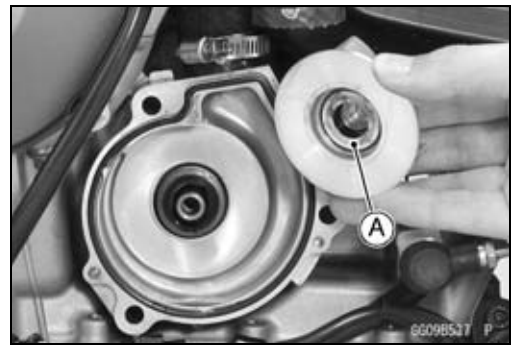


- Replace the O-ring [A] with a new one.
- Install the dowel pins [B].
- Fit the dowel pins of the crankcase into the holes [C] in the water pump body [D].



- Apply coolant to the seating surface [A] on the impeller.
- Install the impeller, washer and bolt.
- Tighten:

Torque - Impeller Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

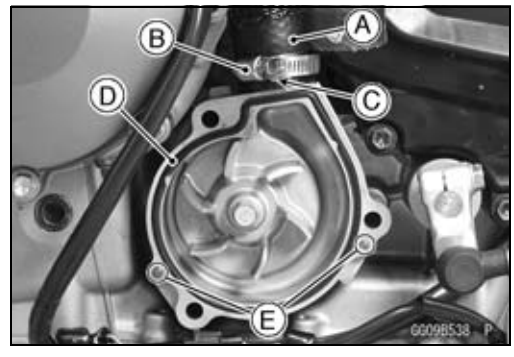


- Install the water hose [A] and hose clamp [B] as shown. White Mark [C]
- Tighten:

Torque - Water Hose Clamp Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)

- Replace the O-ring [D] with a new one.
- Install the dowel pins [E] and water pump cover.
- Apply a non-permanent locking agent to the threads of the water pump cover bolts, and tighten them.

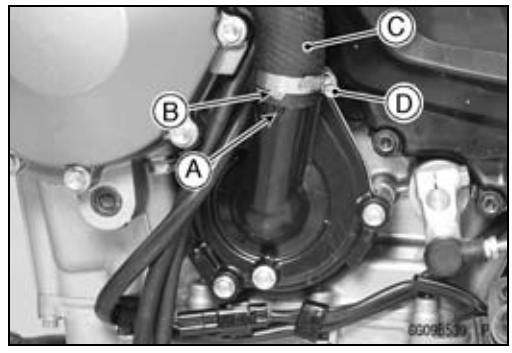
Torque - Water Pump Cover Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)



Oil Pump

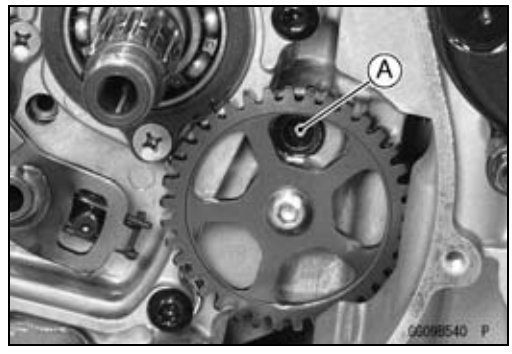
- Align the line [A] of the water pump cover and the white mark [B] of the water hose [C].
- Install the water hose clamp [D] as shown.
- Tighten:

Torque - Water Hose Clamp Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)

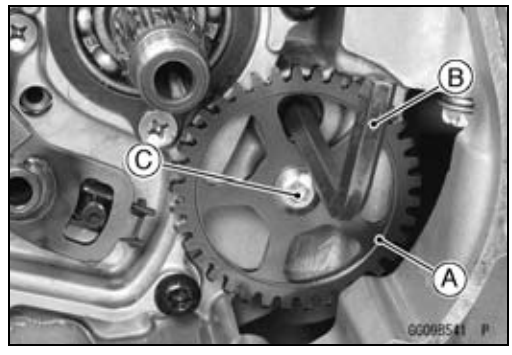


Oil Pump Drive Gear Removal

- Remove the clutch (see Clutch Removal in the Clutch chapter).
- Fit the suitable tool into the hole of the oil passage plug [A].



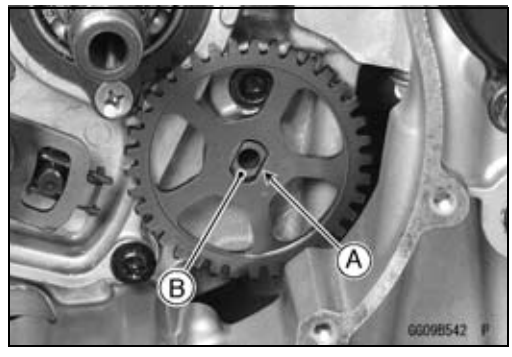
- Hold the oil pump drive gear [A] steady with the suitable tool [B], and remove the oil pump drive gear bolt [C].
- Remove the oil pump drive gear.



Oil Pump Drive Gear Installation

- Align the groove [A] of the oil pump drive gear to the oil pump drive gear shaft [B] to install the oil pump drive gear.
- Apply a non-permanent locking agent to the threads of the oil pump drive gear bolt.
- Hold the oil pump drive gear steady with the suitable tool, and tighten the bolt.

Torque - Oil Pump Drive Gear Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

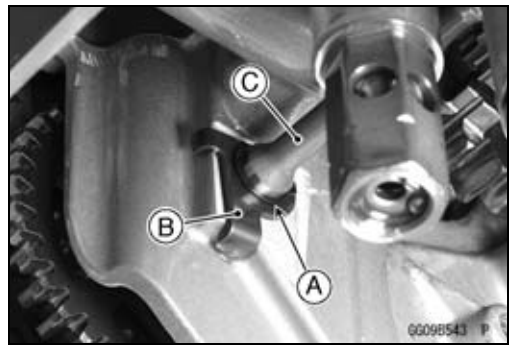


Oil Pump Drive Gear Shaft Removal

- Remove:

Oil Pump Drive Gear (see Oil Pump Drive Gear Removal)
Oil Pan (see Oil Pan Removal)
Oil Screen (see Oil Pressure Relief Valve Removal)
Circlip [A]
Washer [B]
Oil Pump Drive Gear Shaft [C]

Special Tool - Outside Circlip Pliers: 57001-144

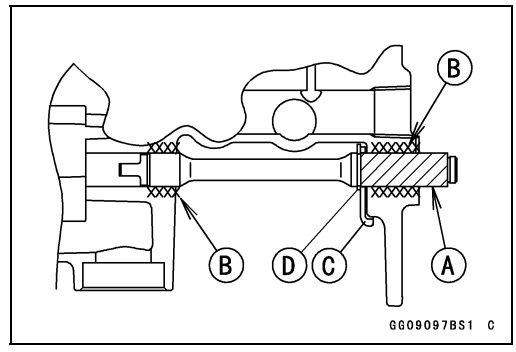


Oil Pump

Oil Pump Drive Gear Shaft Installation

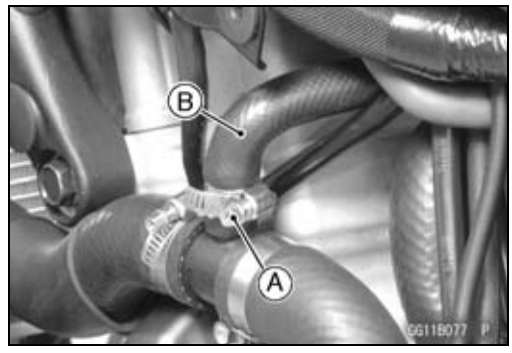
- Apply molybdenum disulfide grease [A] to the oil pump drive gear shaft.
- Apply molybdenum disulfide oil solution [B] to the crankcase.
- Install the oil pump drive gear shaft and washer [C] as shown.
- Install the new circlip [D] into the groove of the oil pump drive gear shaft.

Special Tool - Outside Circlip Pliers: 57001-144

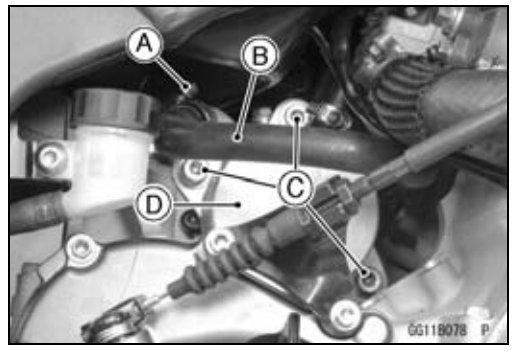


Oil Cooler

Oil Cooler Removal

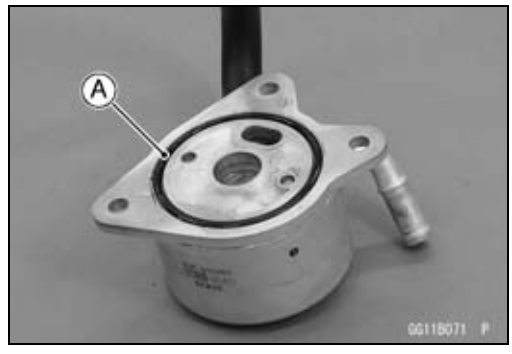


- Drain:
  Coolant (see Coolant Change in the Periodic Maintenance chapter)
  Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
- Remove:
  Starter Motor (see Starter Motor Removal in the Electrical System chapter)
- Loosen the water hose clamp screw [A].
- Disconnect the water hose [B].

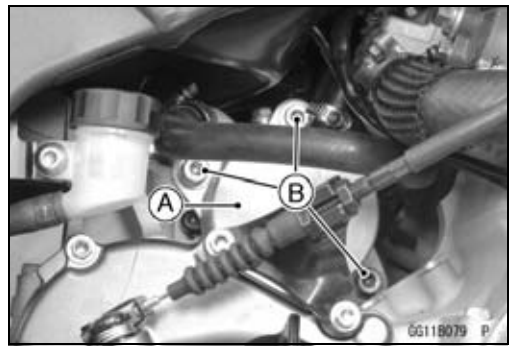


- Loosen the water hose clamp screw [A].
- Disconnect the water hose [B].
- Remove:
  Oil Cooler Mounting Bolts [C]
  Oil Cooler [D]

Oil Cooler Installation



- Replace the O-ring [A] with a new one.



- Install the oil cooler [A].
- Tighten:

Torque - Oil Cooler Mounting Bolts [B]: 20 N·m (2.0 kgf·m, 15 ft·lb)

- Install the water hoses and hose clamps (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Tighten:

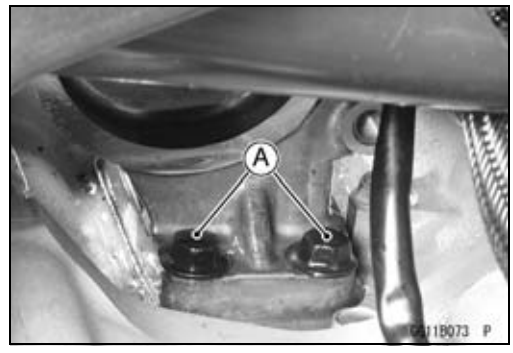
Torque - Water Hose Clamp Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)

- Install the removed parts (see appropriate chapters).
- Pour:
  Coolant (see Coolant Change in the Periodic Maintenance chapter)
  Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)

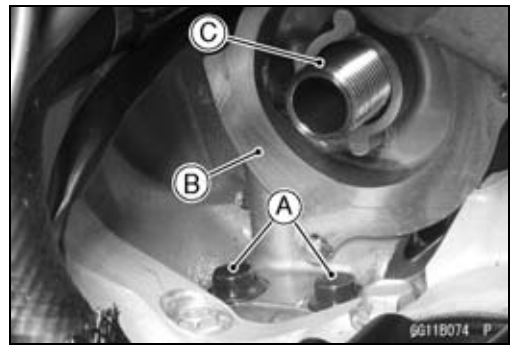
Oil Cooler

Oil Cooler/Oil Filter Case Removal

- Remove:
  Oil Filter (see Oil Filter Replacement in the Periodic Maintenance chapter)
  Oil Cooler (see Oil Cooler Removal)
  Oil Filter Guard Bolts [A]
  Oil Filter Guard [B]



- Remove:
  Oil Cooler/Oil Filter Case Mounting Bolts [A]

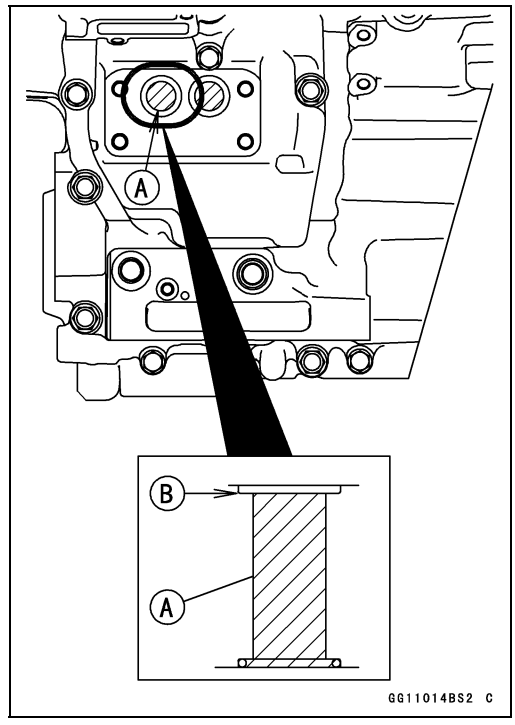


- Remove:
  Oil Cooler/Oil Filter Case Mounting Bolts [A]
  Oil Cooler/Oil Filter Case [B]

○Remove the oil filter holder bolt [C] as necessary.

Oil Cooler/Oil Filter Case Installation

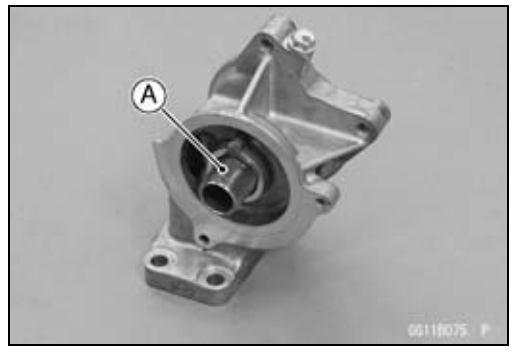
★If the crankcase was disassembled, pour the engine oil into the oil passage [A] until O-ring insert portion [B] of the upper crankcase.



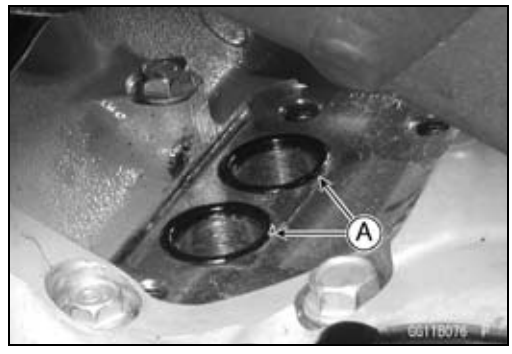
Oil Cooler

★If the oil filter holder bolt [A] was removed, install it.
○Apply a non-permanent locking agent to the threads of the oil filter holder bolt, and tighten it.

Torque - Oil Filter Holder Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)



- Replace the O-rings [A] with new ones.
- Apply grease to the new O-rings.



- Install the oil cooler/oil filter case.
- Apply a non-permanent locking agent to the threads of the oil cooler/oil filter case mounting bolts, and tighten them.

Torque - Oil Cooler/Oil Filter Case Mounting Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)

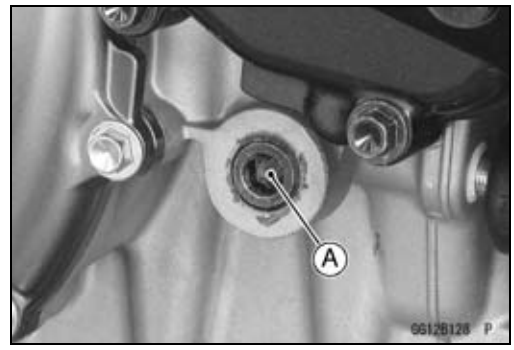
- Install the oil filter guard.
- Apply a non-permanent locking agent to the threads of the oil filter guard bolts, and tighten them.

Torque - Oil Filter Guard Bolts: 4.0 N·m (0.41 kgf·m, 35 in·lb)

- Install:
  Oil Cooler (see Oil Cooler Installation)
  Oil Filter (see Oil Filter Replacement in the Periodic Maintenance chapter)

Oil Pressure Measurement

Oil Pressure Measurement



- Remove:
  Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Oil Passage Plug [A]

- 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, PT3/8: 57001 -1233

- Start the engine and warm up the engine.
- Run the engine at the specified speed, and read the oil pressure gauge.

Oil Pressure
Standard: 93 ~ 123 kPa (0.95 ~ 1.25 kgf/cm², 13 ~ 18 psi) @4 000 r/min (rpm), Oil Temperature 90°C (194°F)

★If the reading 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.

- Stop the engine.
- Remove the oil pressure gauge and adapter.

⚠ WARNING

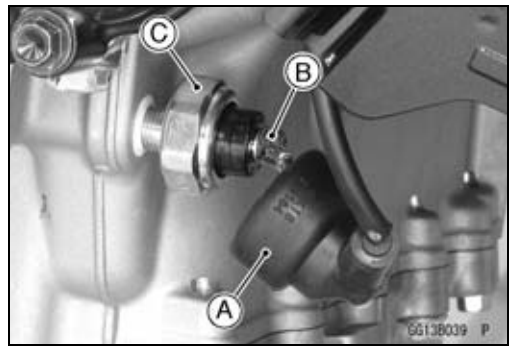
Hot oil can cause severe burns. Beware of hot engine oil that will drain through the oil passage when the gauge adapter is removed.

- Apply a non-permanent locking agent to the oil passage plug, and install it.

Torque - Oil Passage Plug (Taper): 20 N·m (2.0 kgf·m, 15 ft·lb)

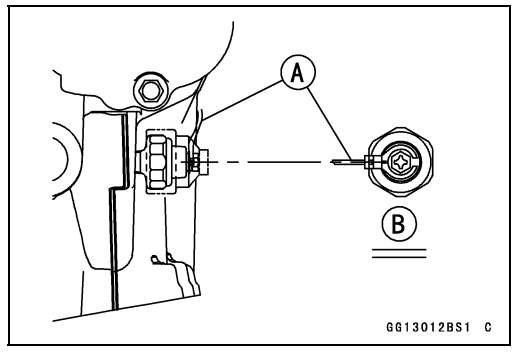
Oil Pressure Switch

Oil Pressure Switch Removal



- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove the right lower fairing (see Lower Fairing Removal in the Frame chapter).
- Slide the switch cover [A].
- Remove:
  Switch Terminal Bolt [B]
  Oil Pressure Switch [C]

Oil Pressure Switch Installation



- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the threads of the oil pressure switch, and tighten it.

Sealant - Liquid Gasket, TB1211: 56019-120

Torque - Oil Pressure Switch: 15 N·m (1.5 kgf·m, 11 ft·lb)

- Install the switch lead [A] as shown.
  Front View [B]
- Apply grease to the terminal.
- Tighten:

Torque - Oil Pressure Switch Terminal Bolt: 1.5 N·m (0.15 kgf·m, 13 in·lb)

- Install the switch cover.
- Install the removed parts (see appropriate chapters).

Engine Removal/Installation

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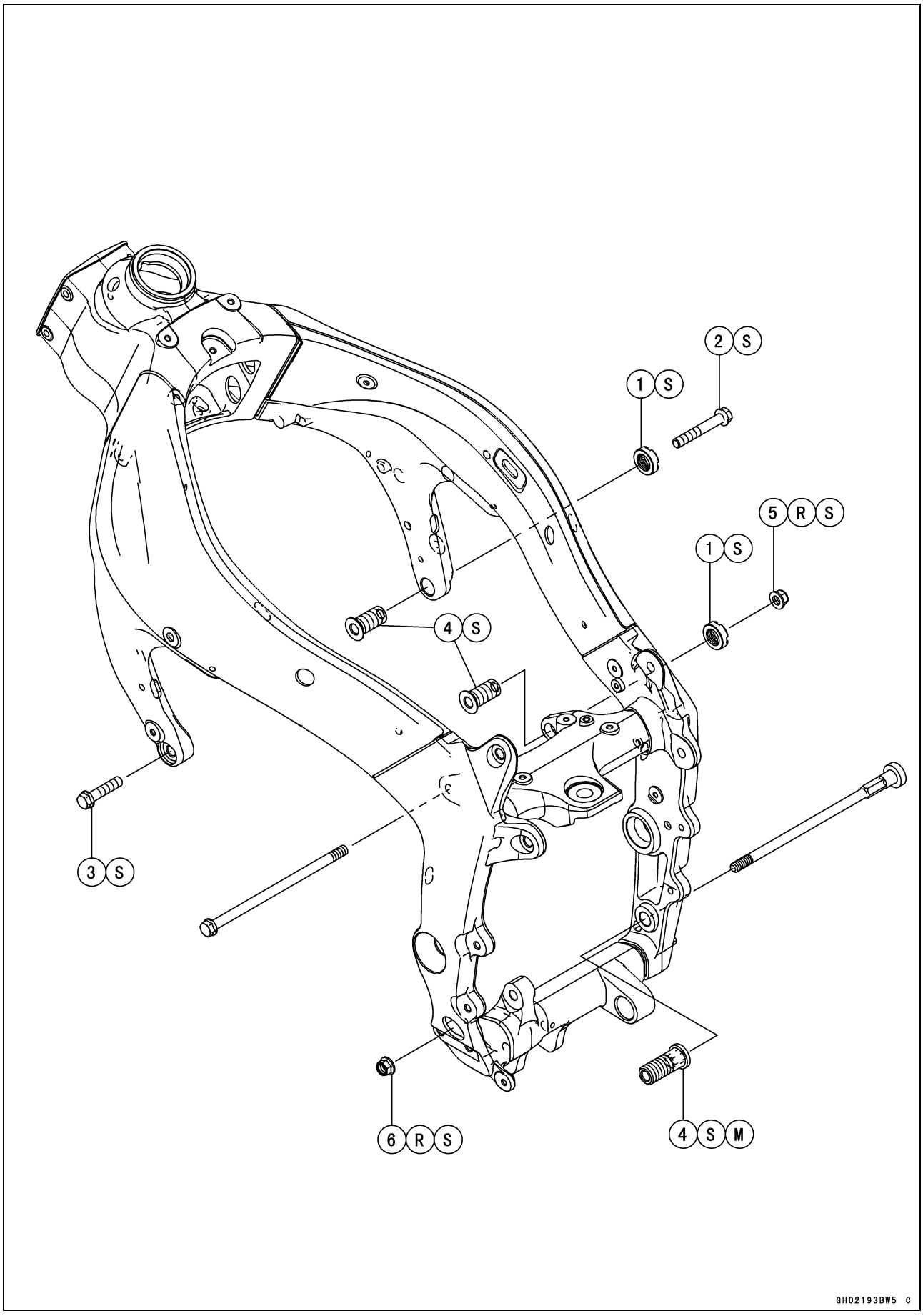
Exploded View



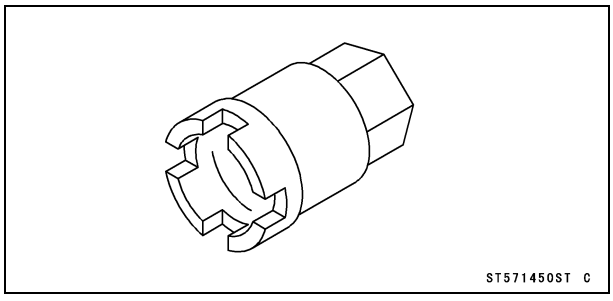
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Adjusting Collar Locknuts	49	5.0	36	S
2	Right Front Engine Mounting Bolt	44	4.5	32	S
3	Left Front Engine Mounting Bolt	44	4.5	32	S
4	Adjusting Collars	9.8	1.0	87 in·lb	S, (M)
5	Middle Engine Mounting Nut	44	4.5	32	R, S
6	Lower Engine Mounting Nut	44	4.5	32	R, S

M: Apply molybdenum disulfide grease.
R: Replacement Parts
S: Follow the specified tightening sequence.

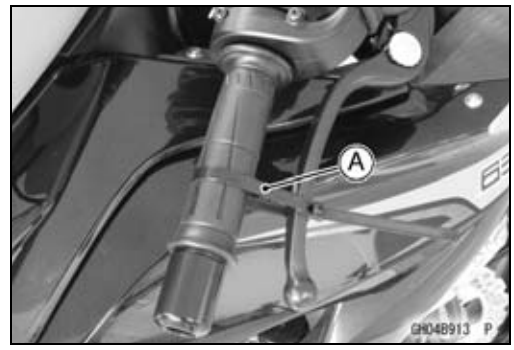
Special Tool

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].

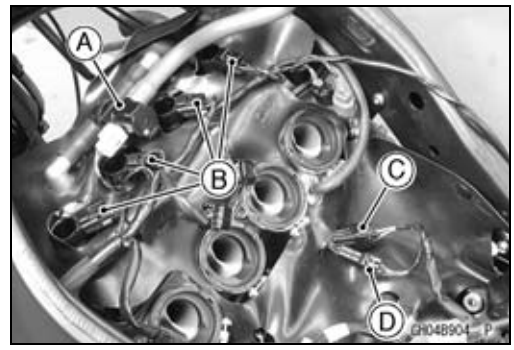
⚠ WARNING

Motorcycle may fall over unexpectedly resulting in an accident or injury. Be sure to hold the front brake when removing the engine.

NOTICE

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.

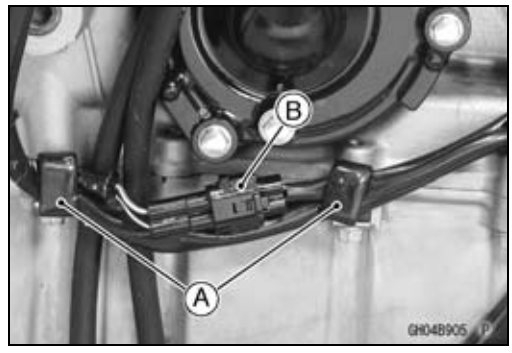
- Drain:
  Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
  Coolant (see Coolant Change in the Periodic Maintenance chapter)
- Remove:
  Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
  Coolant Reserve Tank (see Coolant Reserve Tank Removal in the Cooling System chapter)
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter)
  Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
  Clutch Cable Lower End (see Cable Removal in the Clutch chapter)
  Radiator (see Radiator and Radiator Fan Removal in the Cooling System chapter)
  Heat Insulation Plate (see Heat Insulation Plate Removal in the Cooling System chapter)
  Exhaust Pipe (see Exhaust Pipe Removal in the Engine Top End chapter)
  Shift Lever (see Shift Pedal Removal in the Crankshaft/Transmission chapter)
  Engine Sprocket (see Engine Sprocket Removal in the Final Drive chapter)



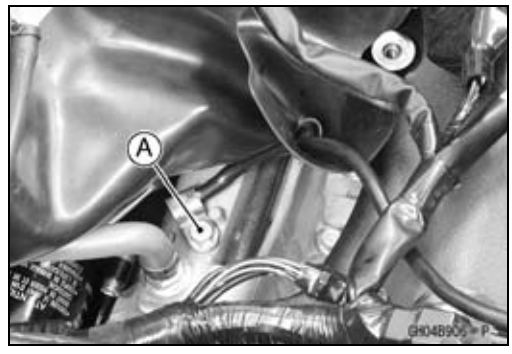
- Remove the air switching valve [A] (see Air Switching Valve Removal in the Engine Top End chapter).
- Disconnect:
  Stick Coil Connectors [B]
  Water Temperature Sensor Connector (see Water Temperature Sensor Removal/Installation in the Self-Diagnosis System chapter)
  Starter Motor Cable (see Starter Motor Removal in the Electrical System chapter)
  Gear Position Switch/Sidestand Switch Lead Connector [C]
  Crankshaft Sensor/Oil Pressure Switch Lead Connector [D]

Engine Removal/Installation

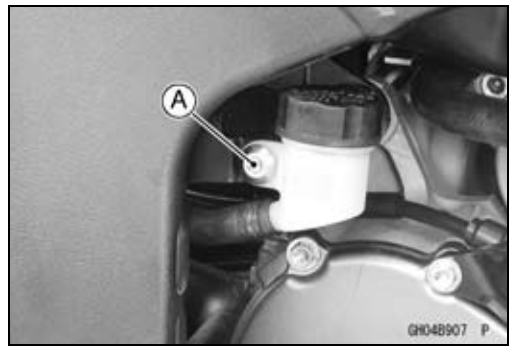
● Free the lead from the clamps [A].
● Disconnect the sidestand switch lead connector [B].



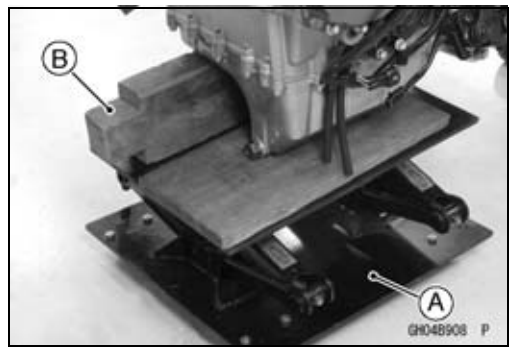
● Remove the engine ground cable terminal bolt [A].



● Remove:
Bolt [A]



● Support the engine with a suitable stand [A].
○Put a plank [B] onto the suitable stand for engine balance.



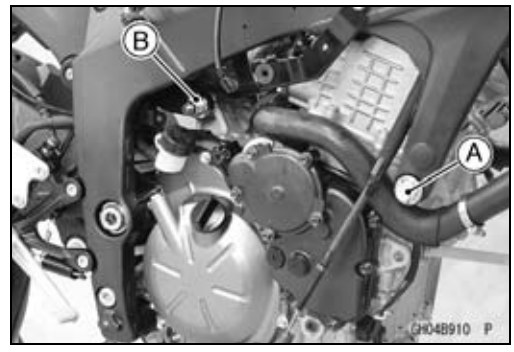
● Remove:
Left Front Engine Mounting Bolt [A]

Engine Removal/Installation

- Remove:
  Right Front Engine Mounting Bolt [A]
  Middle Engine Mounting Nut [B]
  Lower Engine Mounting Nut

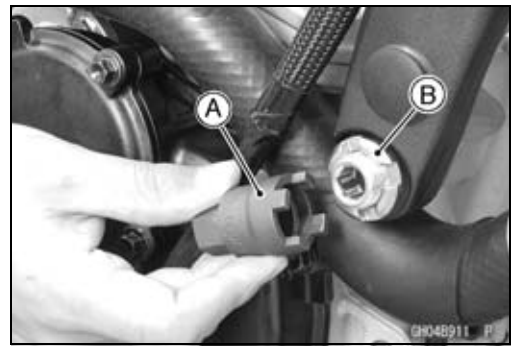
NOTE

○*Hold the mounting bolt not to turn when loosening the middle and lower engine mounting nuts.*

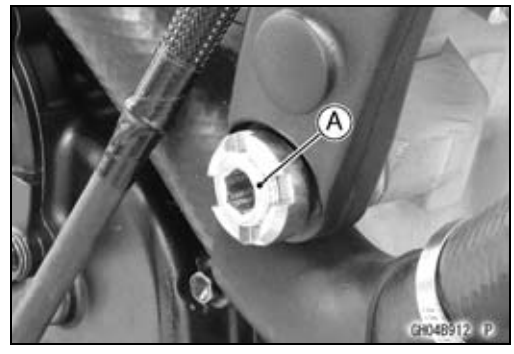


- Using the engine mount nut wrench [A], loosen the locknuts [B].

Special Tool - Engine Mount Nut Wrench: 57001-1450



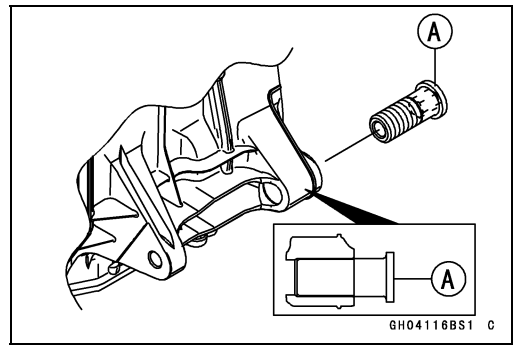
- Using the Hexagon Wrench, turn the adjusting collars [A] counterclockwise to make the gap between the engine and adjusting collar.



- Turn the lower engine mounting bolt clockwise to make the gap between the adjusting collar and frame.
- Pull out the engine mounting bolts.
- Using the stand, take out the engine.

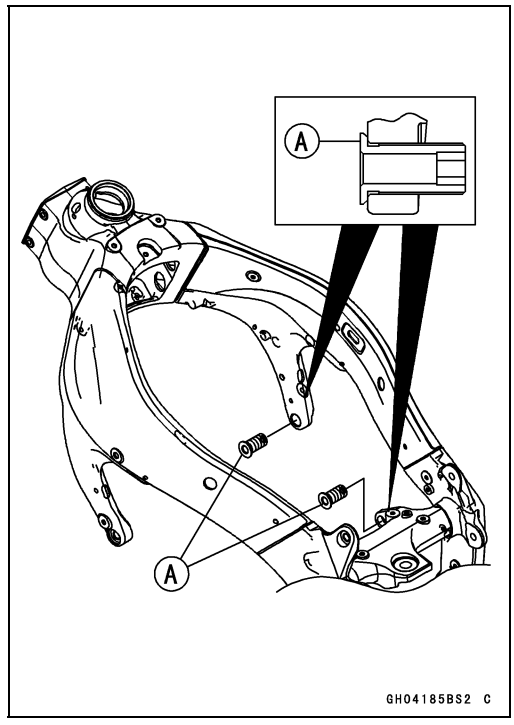
Engine Installation

- Apply molybdenum disulfide grease to the threads of the adjusting collar [A].
- Install the adjusting collar to crankcase backside until end of the threads.



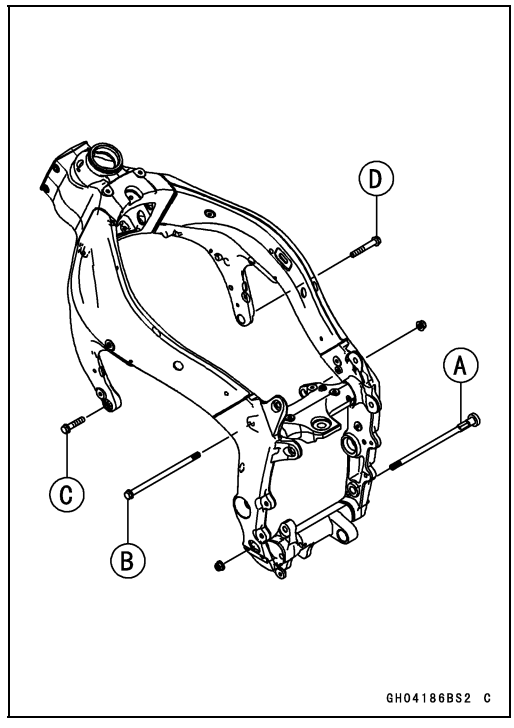
Engine Removal/Installation

● Install the adjusting collars [A] to the frame until end of the threads.



● Replace the engine mounting nuts with new ones.
● Support the engine with a suitable stand.
○Put a plank onto the suitable stand for engine balance.
○Support the engine until all bolts have been tightened.

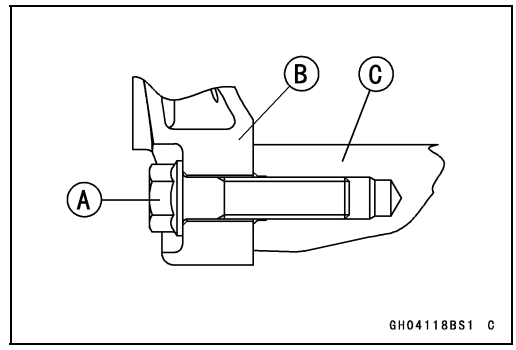
● Install the engine mounting bolts and nuts, following the specified installing sequence.
○First, tighten the following bolts and nuts temporarily.
Lower Engine Mounting Bolt [A] and Nut
Middle Engine Mounting Bolt [B] and Nut
Left Front Engine Mounting Bolt [C]
Right Front Engine Mounting Bolt [D]



Engine Removal/Installation

○Second, tighten the left front engine mounting bolt [A].
Frame [B]
Engine [C]

Torque - Left Front Engine Mounting Bolt: 44 N·m (4.5 kgf·m, 32 ft·lb)



○Third, tighten the lower engine mounting bolt [A] counterclockwise until the adjusting collar [B] touches [C] the frame [D].
○Fourth, tighten the adjusting collar [E] counterclockwise until the adjusting collar touches [C] the engine [D].
○Fifth, tighten the adjusting collars [B] and [E] .

Torque - Adjusting Collars: 9.8 N·m (1.0 kgf·m, 87 in·lb)

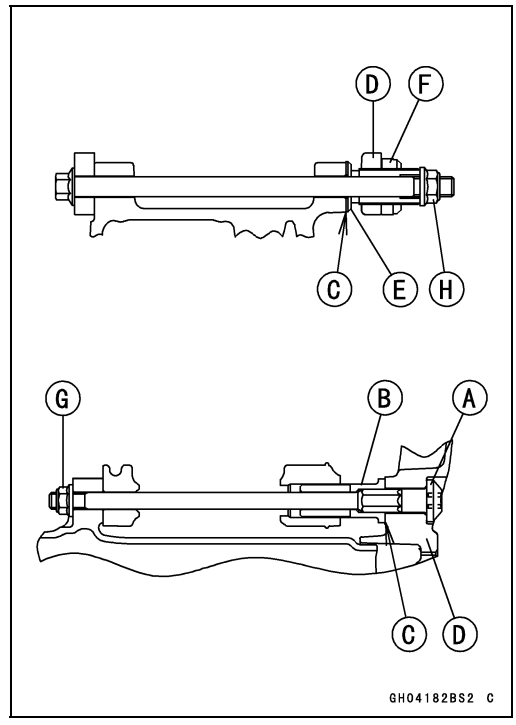
○Sixth, tighten the adjusting collar locknut [F].

Special Tool - Engine Mount Nut Wrench: 57001-1450

Torque - Adjusting Collar Locknut: 49 N·m (5.0 kgf·m, 36 ft·lb)

○Seventh, tighten the lower and middle engine mounting nuts.

Torque - Lower Engine Mounting Nut [G]: 44 N·m (4.5 kgf·m, 32 ft·lb)
Middle Engine Mounting Nut [H]: 44 N·m (4.5 kgf·m, 32 ft·lb)



NOTE

○*Hold the mounting bolt not to turn when tightening the middle and lower engine mounting nuts.*

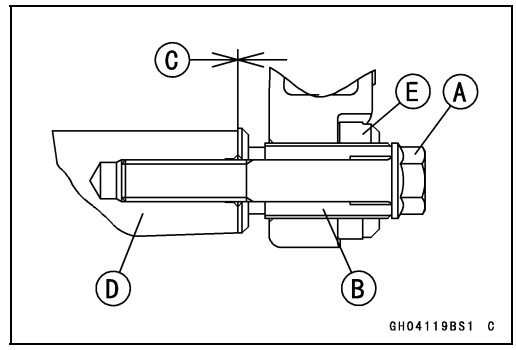
○Eighth, remove the right front engine mounting bolt [A], and tighten the adjusting collar [B] counterclockwise until the clearance [C] between the engine [D] and collar come to 0 mm (0 in.).
○Ninth, tighten the adjusting collar locknut [E].

Special Tool - Engine Mount Nut Wrench: 57001-1450

Torque - Adjusting Collar Locknut: 49 N·m (5.0 kgf·m, 36 ft·lb)

○Lastly, tighten the right front engine mounting bolt.

Torque - Right Front Engine Mounting Bolt: 44 N·m (4.5 kgf·m, 32 ft·lb)



Engine Removal/Installation

- Run the leads, cables and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).
- Adjust:
  Throttle Cables (see Throttle Control System Inspection in the Periodic Maintenance chapter)
  Clutch Cable (see Clutch Operation Inspection in the Periodic Maintenance chapter)
  Drive Chain (see Drive Chain Slack Inspection in the Periodic Maintenance chapter)
- Fill the engine with engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Fill the engine with coolant (see Coolant Change in the Periodic Maintenance chapter).

Crankshaft/Transmission

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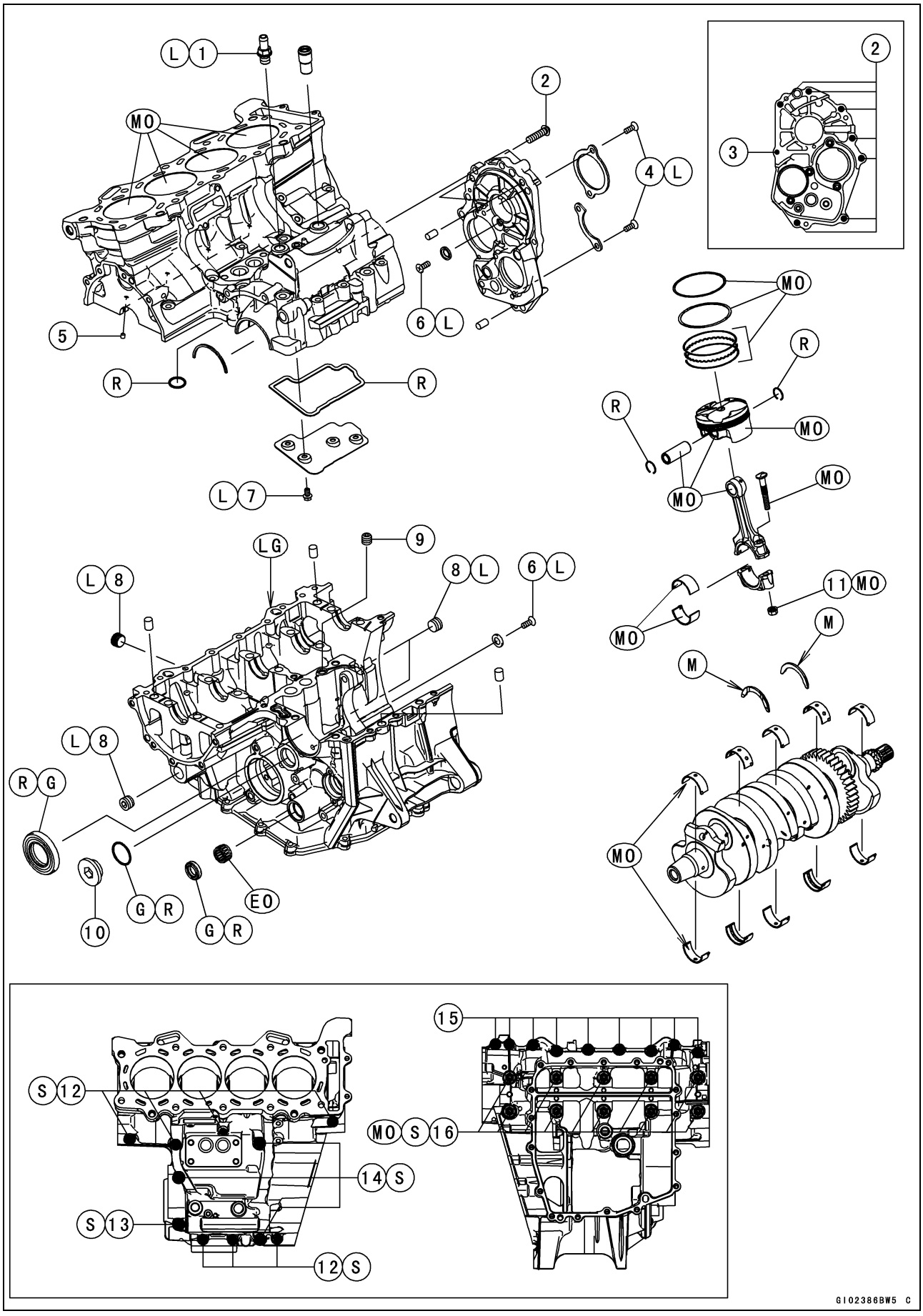
Exploded View

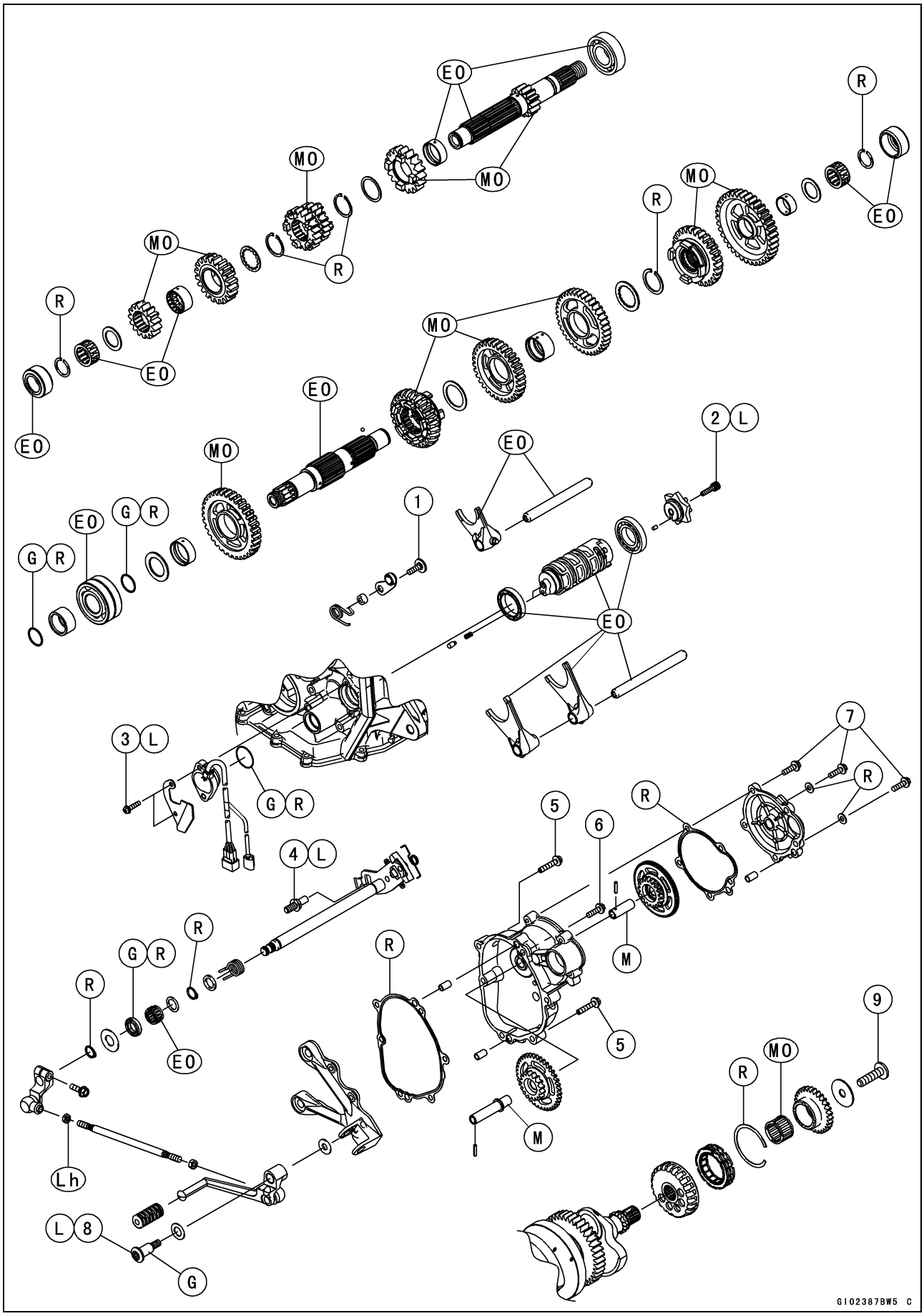


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Breather Hose Fitting	15	1.5	11	L
2	Transmission Case Bolts (M8)	20	2.0	15	
3	Transmission Case Bolt (M6)	9.8	1.0	87 in·lb	
4	Bearing Holder Screws	4.9	0.50	43 in·lb	L
5	Oil Jet Nozzles	2.9	0.30	26 in·lb	
6	Race Holder Screws	4.9	0.50	43 in·lb	L
7	Breather Plate Bolts	9.8	1.0	87 in·lb	L
8	Oil Passage Plugs (Taper)	20	2.0	15	L
9	Oil Passage Nozzle	4.9	0.50	43 in·lb	
10	Oil Passage Plug	17	1.7	13	
11	Connecting Rod Big End Nuts	see the text	←	←	MO
12	Crankcase Bolts (M6, L = 68 mm)	12	1.2	106 in·lb	S
13	Crankcase Bolt (M8, L = 90 mm)	27	2.8	20	S
14	Crankcase Bolts (M8, L = 75 mm)	27	2.8	20	S
15	Crankcase Bolts (M6, L = 50 mm)	12	1.2	106 in·lb	
16	Crankcase Bolts (M8, L = 95 mm)	31	3.2	23	MO, S

EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
LG: Apply liquid gasket.
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
S: Follow the specified tightening sequence.

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Gear Positioning Lever Bolt	12	1.2	106 in·lb	
2	Shift Drum Cam Holder Bolt	12	1.2	106 in·lb	L
3	Gear Position Switch Screws	2.9	0.30	26 in·lb	L
4	Shift Shaft Return Spring Pin	28	2.9	21	L
5	Starter Clutch Cover Bolts (L = 30 mm)	9.8	1.0	87 in·lb	
6	Starter Clutch Cover Bolt (L = 20 mm)	9.8	1.0	87 in·lb	
7	Idle Gear Cover Bolts	9.8	1.0	87 in·lb	
8	Shift Pedal Mounting Bolt	25	2.5	18	L
9	Starter Clutch Bolt	49	5.0	36	

EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
Lh: Left-hand Threads
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts

Specifications

Item	Standard	Service Limit
Crankcase, 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	0.044 ~ 0.081 mm (0.0017 ~ 0.0032 in.)	0.11 mm (0.0043 in.)
Crankpin Diameter:	29.984 ~ 30.000 mm (1.1805 ~ 1.1811 in.)	29.97 mm (1.1799 in.)
Marking:		
None	29.984 ~ 29.992 mm (1.1805 ~ 1.1808 in.)	– – –
○	29.993 ~ 30.000 mm (1.1808 ~ 1.1811 in.)	– – –
Connecting Rod Big End Inside Diameter:	33.000 ~ 33.016 mm (1.2992 ~ 1.2998 in.)	– – –
Marking:		
None	33.000 ~ 33.008 mm (1.2992 ~ 1.2995 in.)	– – –
○	33.009 ~ 33.016 mm (1.2996 ~ 1.2998 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 Bolt Stretch	(Usable Range)	
	0.28 ~ 0.38 mm (0.0110 ~ 0.0150 in.)	– – –
Crankshaft Side Clearance	0.05 ~ 0.25 mm (0.0020 ~ 0.0098 in.)	0.45 mm (0.0177 in.)
Crankshaft #3 Main Journal Width	21.09 ~ 21.14 mm (0.8303 ~ 0.8323 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	0.028 ~ 0.060 mm (0.0011 ~ 0.0024 in.)	0.09 mm (0.0035 in.)
Crankshaft Main Journal Diameter:	30.984 ~ 31.000 mm (1.2198 ~ 1.2205 in.)	30.96 mm (1.2189 in.)
Marking:		
None	30.984 ~ 30.992 mm (1.2198 ~ 1.2202 in.)	– – –
1	30.993 ~ 31.000 mm (1.2202 ~ 1.2205 in.)	– – –
Crankcase Main Bearing Inside Diameter:	34.000 ~ 34.016 mm (1.3386 ~ 1.3392 in.)	– – –
Marking		
○	34.000 ~ 34.008 mm (1.3386 ~ 1.3389 in.)	– – –
None	34.009 ~ 34.016 mm (1.3389 ~ 1.3392 in.)	– – –

Specifications

Item	Standard	Service Limit
Crankshaft Main Bearing Insert Thickness:		
Brown, Yellow	1.491 ~ 1.495 mm (0.05870 ~ 0.05886 in.)	– – –
Black, Green	1.495 ~ 1.499 mm (0.05886 ~ 0.05902 in.)	– – –
Blue, Purple	1.499 ~ 1.503 mm (0.05902 ~ 0.05917 in.)	– – –
Cylinder , Pistons		
Cylinder (Upper Crankcase) Inside Diameter	67.000 ~ 67.012 mm (2.6378 ~ 2.6383 in.)	67.09 mm (2.6413 in.)
Piston Diameter	66.960 ~ 66.975 mm (2.6362 ~ 2.6368 in.)	66.81 mm (2.6303 in.)
Piston/Cylinder Clearance	0.025 ~ 0.052 mm (0.0010 ~ 0.0020 in.)	– – –
Piston Ring/Groove Clearance:		
Top	0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in.)	0.17 mm (0.0067 in.)
Second	0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in.)	0.17 mm (0.0067 in.)
Piston Ring Groove Width:		
Top	0.82 ~ 0.84 mm (0.0323 ~ 0.0331 in.)	0.92 mm (0.036 in.)
Second	0.82 ~ 0.84 mm (0.0323 ~ 0.0331 in.)	0.92 mm (0.036 in.)
Piston Ring Thickness:		
Top	0.77 ~ 0.79 mm (0.0303 ~ 0.0311 in.)	0.70 mm (0.028 in.)
Second	0.77 ~ 0.79 mm (0.0303 ~ 0.0311 in.)	0.70 mm (0.028 in.)
Piston Ring End Gap:		
Top	0.12 ~ 0.22 mm (0.0047 ~ 0.0087 in.)	0.5 mm (0.020 in.)
Second	0.30 ~ 0.45 mm (0.0118 ~ 0.0177 in.)	0.8 mm (0.031 in.)
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.)
Shift Fork Guide Pin Diameter	5.9 ~ 6.0 mm (0.232 ~ 0.236 in.)	5.8 mm (0.228 in.)
Shift Drum Groove Width	6.05 ~ 6.20 mm (0.238 ~ 0.244 in.)	6.3 mm (0.248 in.)

Specifications

Connecting Rod Big End Bearing Insert Selection

Con-rod Big End Inside Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Size Color	Part Number
None	○	Brown	92139-0167
None	None	Black	92139-0166
○	○		
○	None	Blue	92139-0165

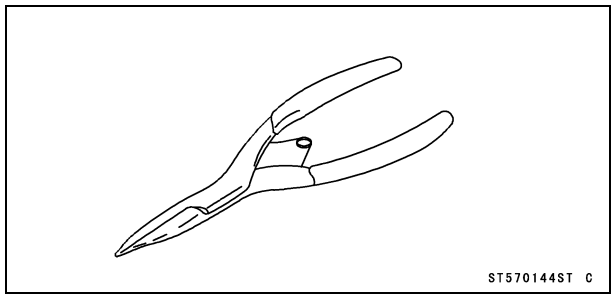
Crankshaft Main Bearing Insert Selection

Crankcase Main Bearing Inside Diameter Marking	Crankshaft Main Journal Diameter Marking	Bearing Insert*		
		Size Color	Part Number	Journal Nos.
○	1	Brown	92139-0247	1, 5
			92139-0250	2, 4
		Yellow	92139-0253	3
None	1	Black	92139-0246	1, 5
			92139-0249	2, 4
		Green	92139-0252	3
○	None	Black	92139-0246	1, 5
			92139-0249	2, 4
		Green	92139-0252	3
None	None	Blue	92139-0245	1, 5
			92139-0248	2, 4
		Purple	92139-0251	3

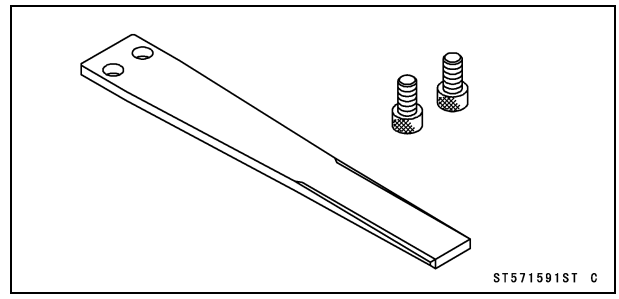
*: The bearing inserts for Nos. 2 and 4 journals have an oil groove, respectively.

Special Tools and Sealants

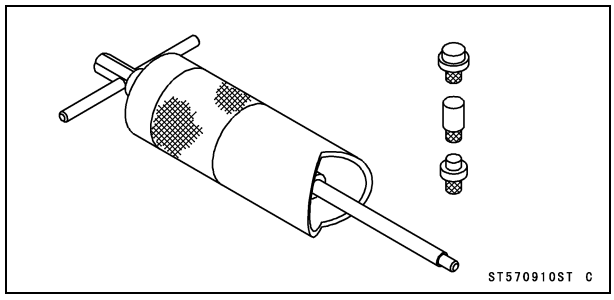
Outside Circlip Pliers:
57001-144



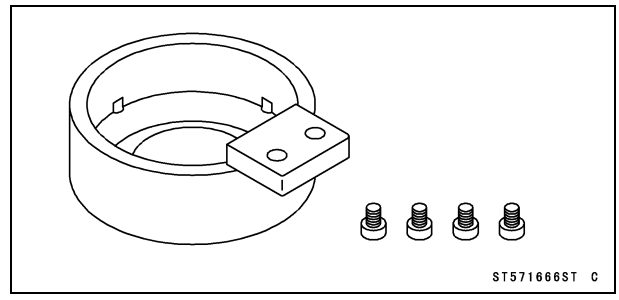
Grip:
57001-1591



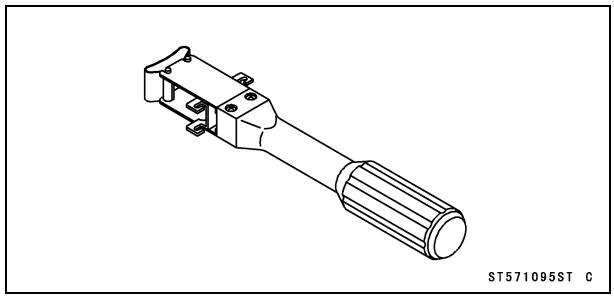
Piston Pin Puller Assembly:
57001-910



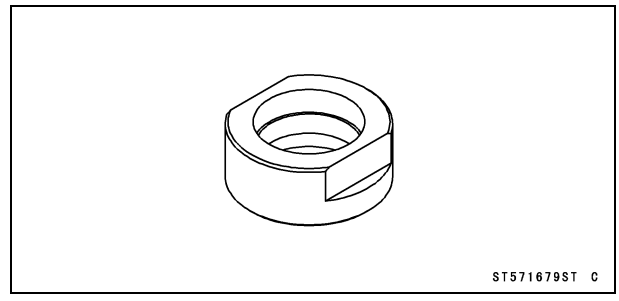
Rotor Holder:
57001-1666



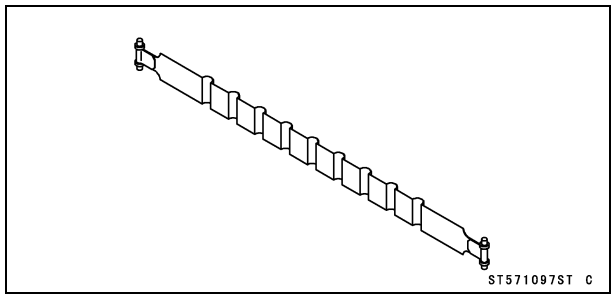
Piston Ring Compressor Grip:
57001-1095



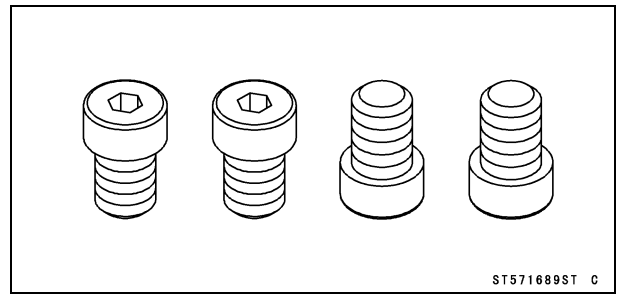
Stopper:
57001-1679



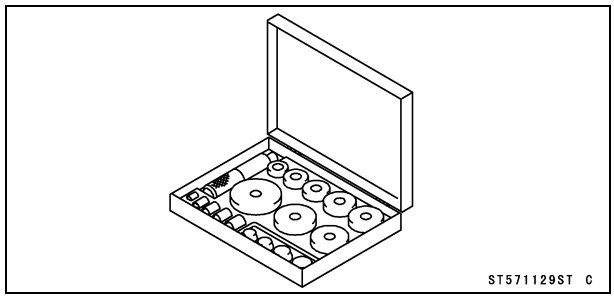
Piston Ring Compressor Belt, ϕ67 ~ ϕ79:
57001-1097



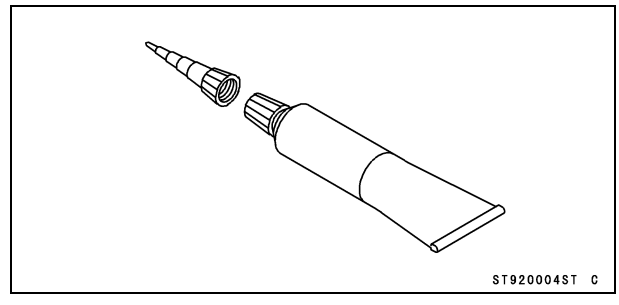
Rotor Holder Attachment:
57001-1689



Bearing Driver Set:
57001-1129

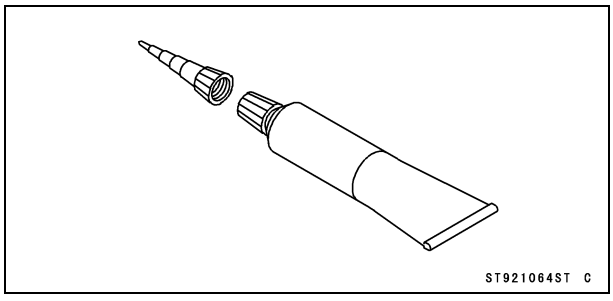


Liquid Gasket, TB1211F:
92104-0004



Special Tools and Sealants

Liquid Gasket, TB1216B:
92104-1064



Crankcase

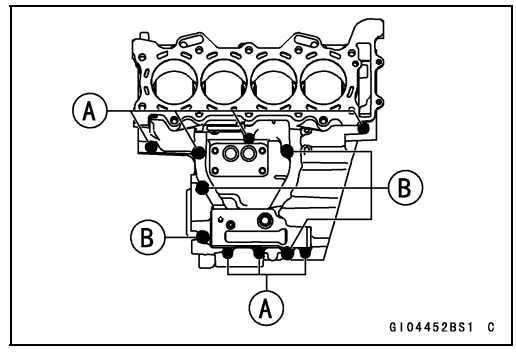
Crankcase Splitting

- Remove the engine (see Engine Removal in the 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 Crankshaft Sensor Removal in the Electrical System chapter)
  Starter Clutch (see Starter Clutch Removal)
  Cylinder Head (see Cylinder Head Removal in the Engine Top End chapter)
  Starter Motor (see Starter Motor Removal in the Electrical System chapter)
  Clutch (see Clutch Removal in the Clutch chapter)
  Oil Pump (see Oil Pump Removal in the Engine Lubrication System chapter)
  Alternator Rotor (see Alternator Rotor Removal in the Electrical System chapter)
  Oil Cooler/Oil Filter Case (see Oil Cooler/Oil Filter Case Removal in the Engine Lubrication System chapter)
  Oil Pan (see Oil Pan Removal in the Engine Lubrication System chapter)
  Oil Screen (see Oil Pressure Relief Valve Removal in the Engine Lubrication System chapter)
  External Shift Mechanism (see External Shift Mechanism Removal)
  Transmission Assy (see Transmission Assy Removal)

- Remove the upper crankcase bolts, following the specified sequence.

○Firstly, loosen the M6 bolts [A].
○Secondly, loosen the M8 bolts [B].

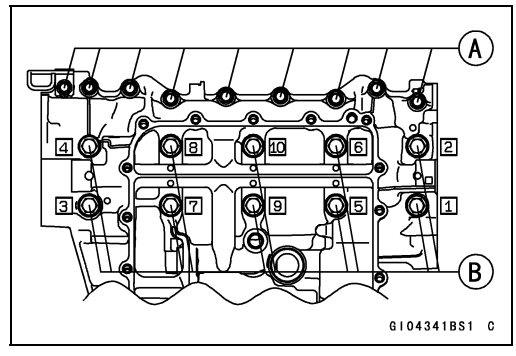


- Remove the lower crankcase bolts, following the specified sequence.

○Firstly, loosen the M6 bolts [A].
○Lastly, loosen the M8 bolts [B] as shown sequence [1 ~ 10].

- Tap lightly around the crankcase mating surface with a plastic mallet, and split the crankcase.

○Take care not to damage the crankcase.



Crankcase

Crankcase Assembly

NOTICE
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 crankcase halves and wipe dry.

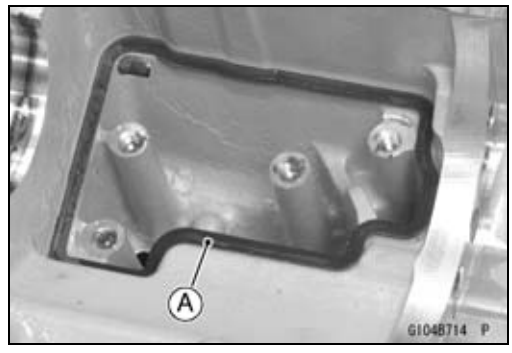
⚠ WARNING
Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the crankcase in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the crankcase.

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

Upper Crankcase Assembly

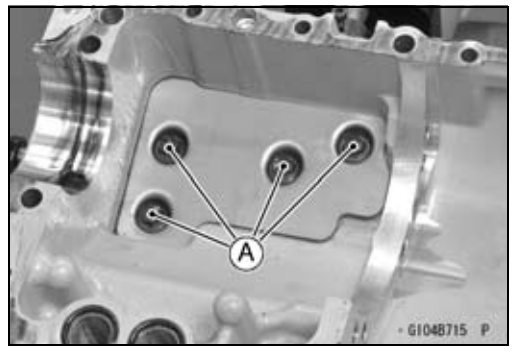
- When installing the breather plate note the following.

○Replace the gasket [A] with a new one.



○Apply a non-permanent locking agent to the threads of the bolts [A] and tighten them.

Torque - Breather Plate Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)



Crankcase

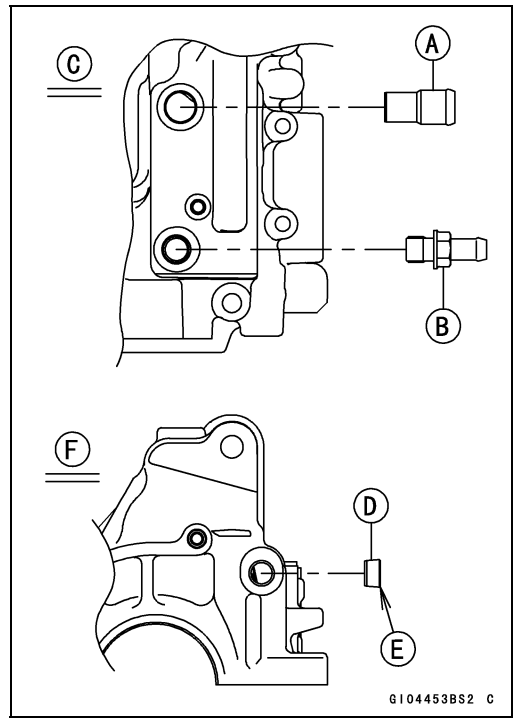
- Press the fitting [A] until it is bottomed.

  Special Tool - Bearing Driver Set: 57001-1129

- Apply a non-permanent locking agent to the threads of the breather hose fitting [B] and tighten it.
  View from Upside [C]

  Torque - Breather Hose Fitting: 15 N·m (1.5 kgf·m, 11 ft·lb)

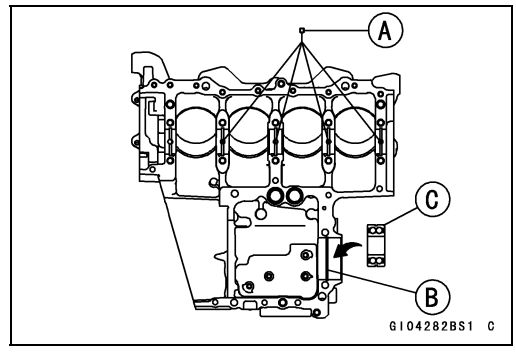
- Install the plug [D] so that the plug surface [E] is flush with the end of the hole.
  View from Left Side [F]



- Install the oil jet nozzles [A], and tighten them.

  Torque - Oil Jet Nozzles: 2.9 N·m (0.30 kgf·m, 26 in·lb)

- Install:
  Position Ring [B]
  Ball Bearing [C]



Lower Crankcase Assembly

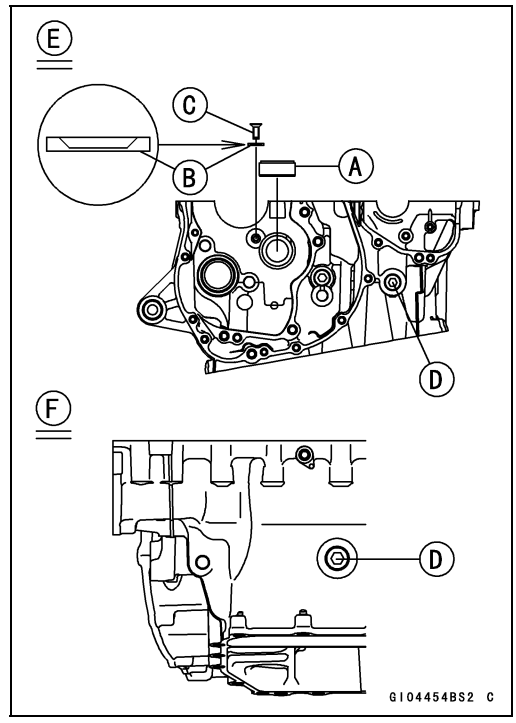
- Press the race [A] so that the big stepped side faces to inside of the crankcase until it is bottomed.
- Install the race holder [B] as shown.
- Apply a non-permanent locking agent to the threads of the race holder screw [C].
- Tighten:

  Torque - Race Holder Screws: 4.9 N·m (0.50 kgf·m, 43 in·lb)

- Apply a non-permanent locking agent to the oil passage plugs [D].
- Tighten:

  Torque - Oil Passage Plugs (Taper): 20 N·m (2.0 kgf·m, 15 ft·lb)

  View from Right Side [E]
  View from Front Side [F]

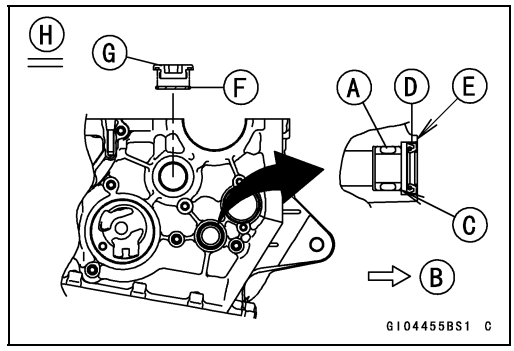


Crankcase

- Press the new needle bearing [A] for the shift shaft so that its marked side faces outside [B] and its surface [C] is flush with the end of the hole.
- Install the new oil seal [D] so that its surface [E] is flush with the end of the hole.
- Apply grease to the oil seal lips.
- Replace the O-ring [F] with a new one.
- Apply grease to the O-ring.
- Tighten:

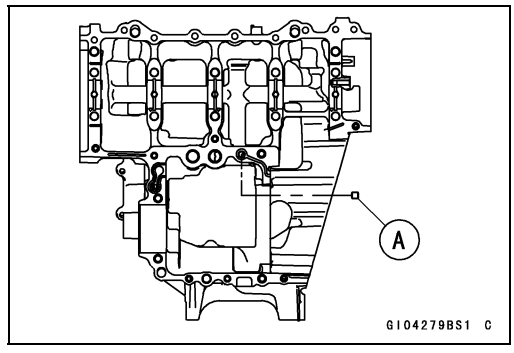
Torque - Oil Passage Plug [G]: 17 N·m (1.7 kgf·m, 13 ft·lb)

View from Left Side [H]



- Install the oil passage nozzle [A], and tighten it.

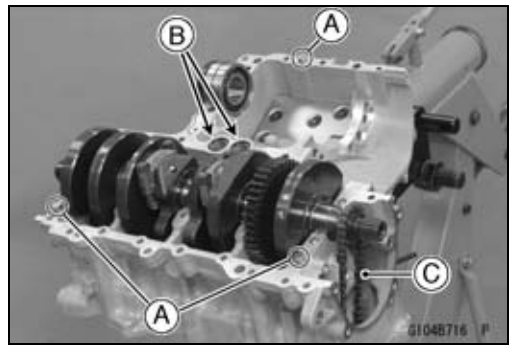
Torque - Oil Passage Nozzle: 4.9 N·m (0.50 kgf·m, 43 in·lb)



Crankcase Halves Assembly

- Install:
  Crankshaft (see Crankshaft Installation)
  Connecting Rods (see Connecting Rod Installation)
  Dowel Pins [A]
  O-rings [B]
- Before fitting the lower case on the upper case, check the following.

○Be sure to hang the camshaft chain [C] on the crankshaft.



Crankcase

- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket, coating area. Dry them with a clean cloth.
- Apply liquid gasket [A] to the mating surface of the lower crankcase half.

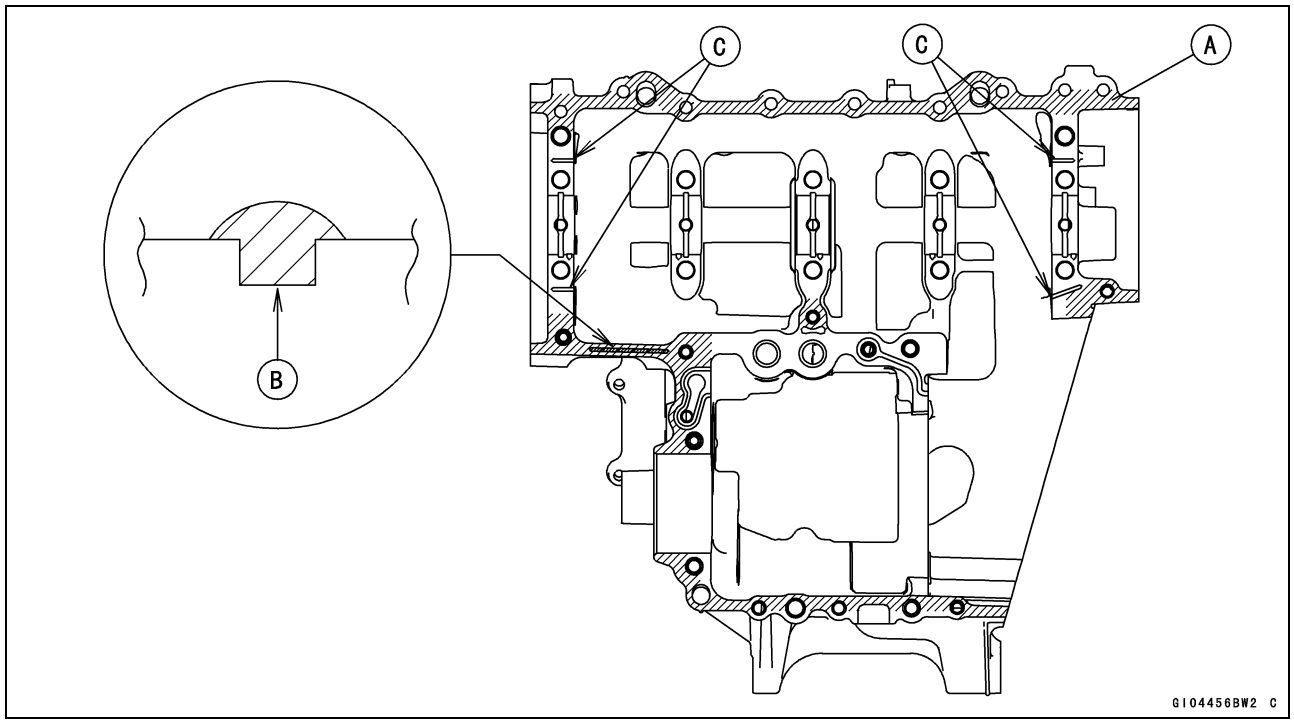
Sealant - Liquid Gasket, TB1216B: 92104-1064

NOTE

○*Especially, apply a sealant so that it shall be filled up on the groove [B].*

○*Do not apply liquid gasket to the inside of the grooves [C].*

NOTICE
Do not apply liquid gasket around the crankshaft main bearing inserts and oil passage.



- Fit the lower crankcase half to the upper crankcase half.

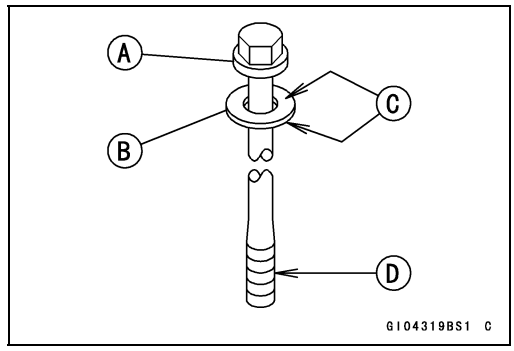
NOTE

○*Make the application finish within 20 minutes when the liquid gasket to the mating surface of the lower crankcase half is applied.*

○*Moreover fit the case and tighten the bolts just after application of the liquid gasket.*

Crankcase

- The M8 bolts [A] has a copper plated washer [B], replace it with a new one.
- Apply molybdenum disulfide oil solution to both sides [C] of the washers and threads [D] of M8 bolts.



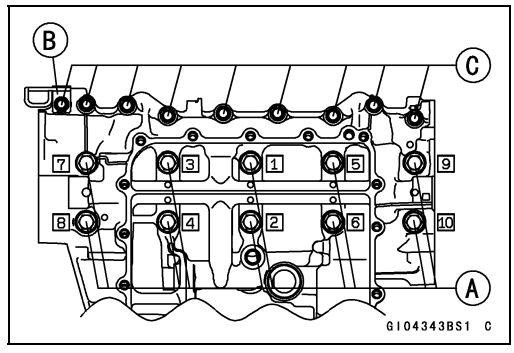
- Tighten the lower crankcase bolts using the following steps.

○Following the sequence numbers on the lower crankcase half, tighten M8 bolts [1 ~ 10] with copper plated washers.

Torque - Crankcase Bolts (M8) [A]:
First: 15 N·m (1.5 kgf·m, 11 ft·lb)
Final: 31 N·m (3.2 kgf·m, 23 ft·lb)

○Install the clamp [B], and tighten the M6 bolts [C].

Torque - Crankcase Bolts (M6): 12 N·m (1.2 kgf·m, 106 in·lb)



- Tighten the upper crankcase bolts using the following steps.

○Replace the M8 bolt washers [A] with new ones.

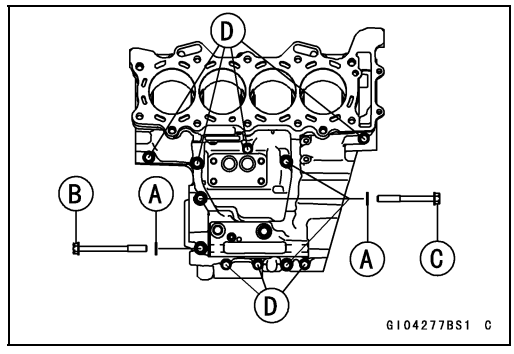
○Tighten the M8 bolts with washers.

Torque - Crankcase Bolts (M8): 27 N·m (2.8 kgf·m, 20 ft·lb)

L = 90 mm (3.54 in.) [B]
L = 75 mm (2.95 in.) [C]

○Tighten the M6 bolts [D].

Torque - Crankcase Bolts (M6): 12 N·m (1.2 kgf·m, 106 in·lb)



- After tightening all crankcase bolts, check the following items.

○Wipe up the liquid gasket that seeps out around the crankcase mating surface.

○Crankshaft turns freely.

- Install the removed parts (see appropriate chapters).

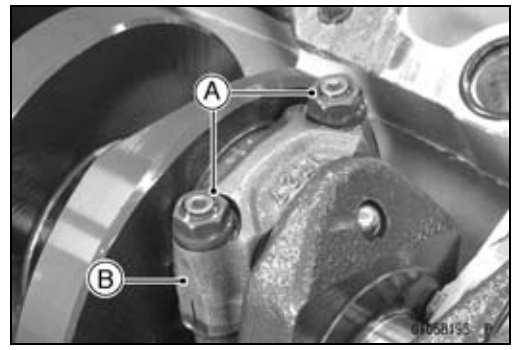
Crankshaft and Connecting Rods

Crankshaft Removal

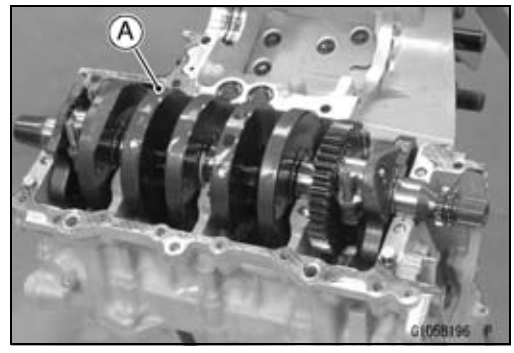
- Split the crankcase (see Crankcase Splitting).
- Remove:
  Connecting Rod Big End Nuts [A]
  Connecting Rod Big End Caps [B]

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.*

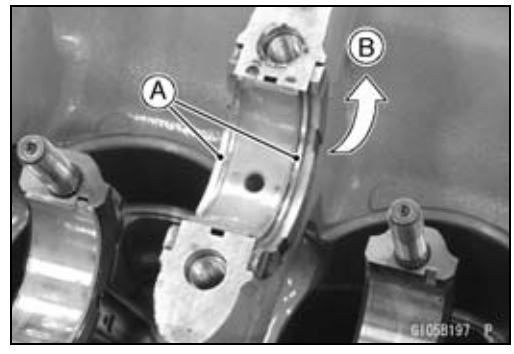


- Remove the camshaft chain and crankshaft [A].



- Remove the thrust washers [A] from the #3 main journal of the upper crankcase half as follows.

○Slide [B] the thrust washers upward and remove them.



Crankshaft Installation

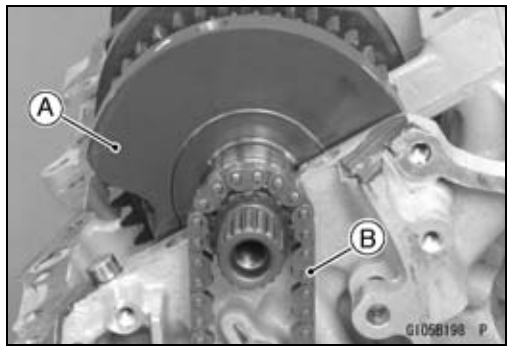
NOTE

○*If the crankshaft is replaced with a new one, refer to the Connecting Rod Big End Bearing/Crankshaft Main Bearing Insert Selection in the Specifications.*

NOTICE
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.

Crankshaft and Connecting Rods

- Apply molybdenum disulfide oil solution to the crankshaft main bearing inserts.
- Install the crankshaft [A] with the camshaft chain [B] hanging on it.
- Install the connecting rod big end caps (see Connecting Rod Installation).



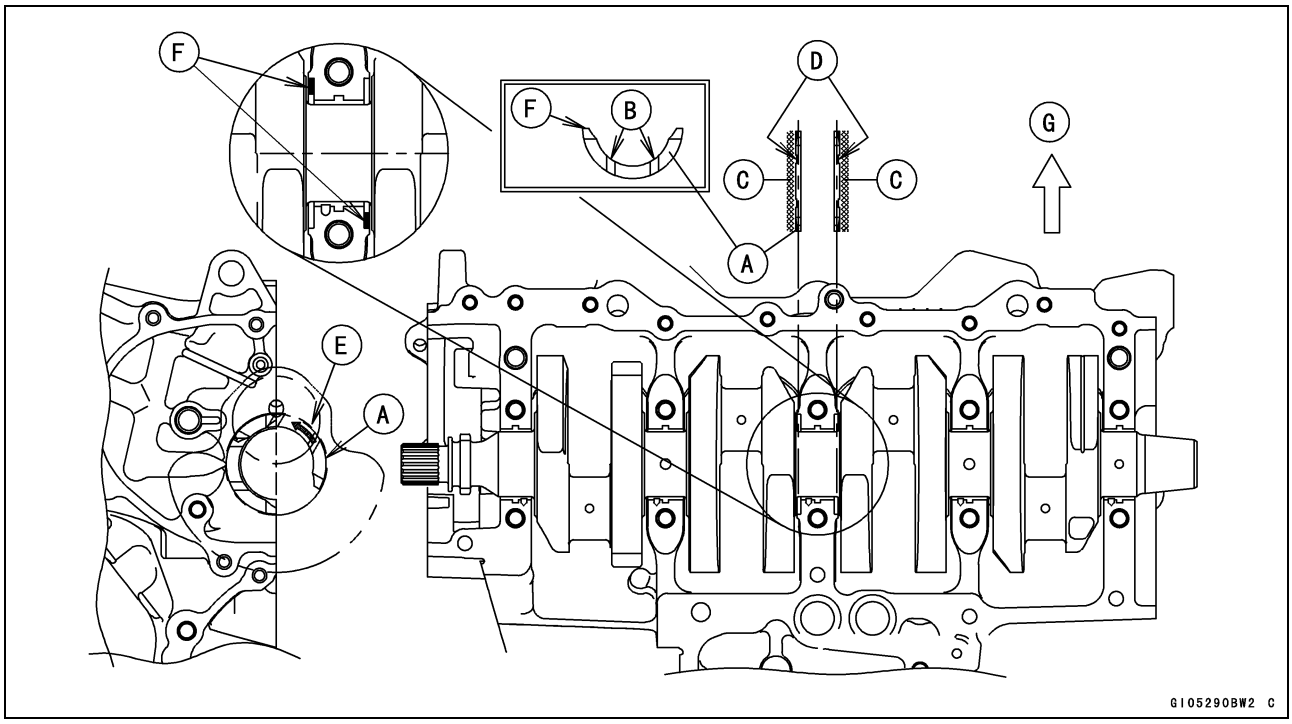
NOTE

○*The thrust washer [A] has oil grooves [B] on the one side.*

○*The thrust washers are identical.*

- Apply molybdenum disulfide grease [C] to the oil groove side [D] of the thrust washers.
- Slide [E] the thrust washer of the one side into the groove of the #3 main journal so that the oil grooves face outward.
- Move the crankshaft to the left or right, and then slide the thrust washer of the other side into the groove of the #3 main journal in the same way.
- After installation, confirm that the blue-painted edges [F] of the thrust washers are positioned as shown.

Front [G]

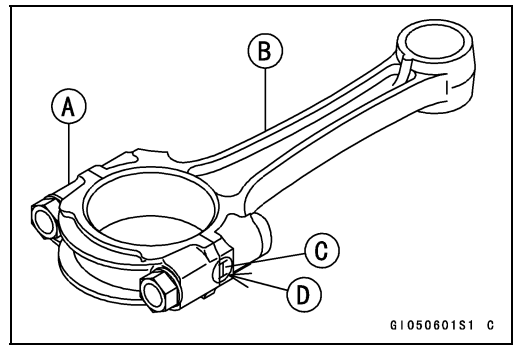


Connecting Rod Removal

- Refer to the Piston Removal.

Crankshaft and Connecting Rods

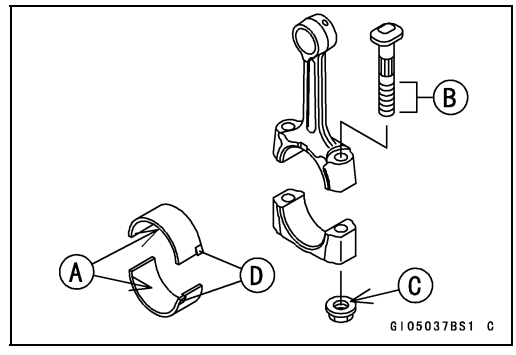
Connecting Rod Installation



NOTICE
To minimize vibration, the connecting rods should have the same weight mark.

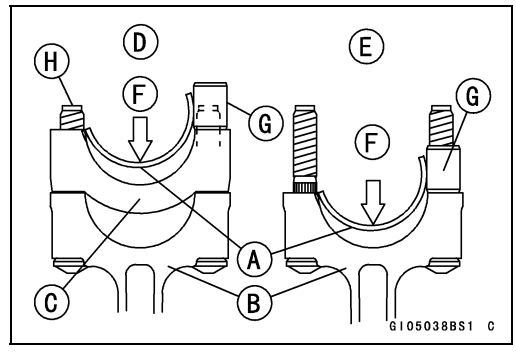
Big End Cap [A]
Connecting Rod [B]
Weight Mark, Alphabet [C]
Diameter Mark [D]: "○" or no mark

NOTICE
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.



- Apply molybdenum disulfide oil solution to the inner surface of the upper and lower bearing inserts [A].
- Apply molybdenum disulfide oil solution to the threads [B] and seating surface [C] of the connecting rod nuts.
- 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.

NOTICE
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]

- Remove debris and clean the surface of inserts.
- Install the cap on the connecting rod, aligning the weight and diameter marks.

- 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.

Crankshaft and Connecting Rods

NOTICE

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.

NOTICE

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.

(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

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the bolts, nuts, and connecting rods 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. Do not use gasoline or a low flash-point solvent to clean them.

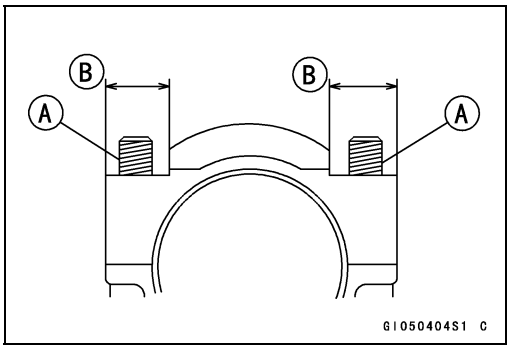
NOTICE

Immediately dry the bolts and nuts with compressed air after cleaning. Clean and dry the bolts and nuts completely.

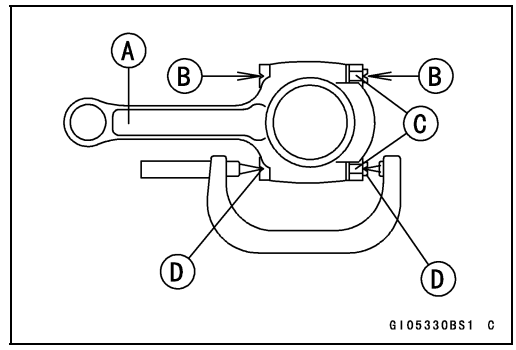
- Install new bolts and nuts in reused connecting rod.

★If the connecting rod assembly was replaced, use the bolts and nuts attached to the new connecting rod assembly.

- Apply a small amount of molybdenum disulfide oil solution to the following portions.
  Threads [A] of Nuts and Bolts
  Seating Surfaces [B] of Nuts and Connecting Rods



Crankshaft and Connecting Rods



- Dent both bolt head and bolt tip with a punch as shown.
- Before tightening, use a point micrometer to measure the length of new connecting rod bolts and record the values to find the bolt stretch.
  Connecting Rod [A]
  Dent here with a punch [B].
  Nuts [C]
  Fit micrometer pins into dents [D].
- Tighten the big end nuts until the bolt elongation reaches the length specified as follows.

Bolt Length after tightening – Bolt Length before tightening = Bolt Stretch

Connecting Rod Bolt Stretch
Usable Range: 0.28 ~ 0.38 mm (0.0110 ~ 0.0150 in.)

- Check the length 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.

(2) Rotation Angle Method

★If you don't have a point micrometer, you may tighten the nuts using the "Rotation Angle Method".

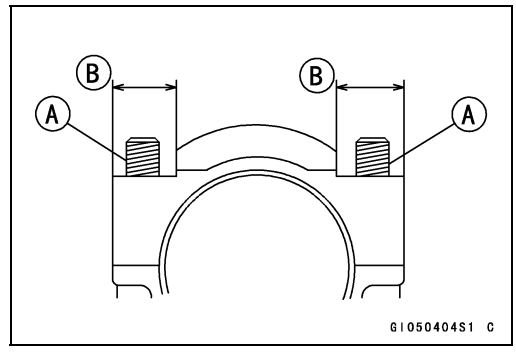
- Be sure to clean the bolts, nuts and connecting rods thoroughly with a high flash-point solvent, because the new connecting rods, bolts and nuts are treated with an anti-rust solution.

⚠ WARNING

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the bolts, nuts, and connecting rods 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. Do not use gasoline or a low flash-point solvent to clean them.

NOTICE

Immediately dry the bolts and nuts with compressed air after cleaning.
Clean and dry the bolts and nuts completely.



- Install new bolts and nuts in reused connecting rod.

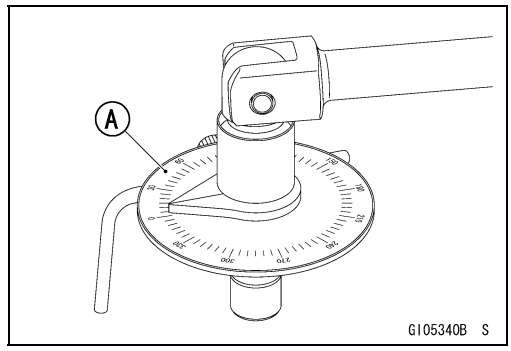
★If the connecting rod assembly was replaced, use the bolts and nuts attached to the new connecting rod assembly.

- Apply a small amount of molybdenum disulfide oil solution to the following portions.
  Threads [A] of Nuts and Bolts
  Seating Surfaces [B] of Nuts and Connecting Rods

Crankshaft and Connecting Rods

- First, tighten the nuts with **12.8 N·m (1.3 kgf·m, 113 in·lb)** of torque.
- Next, tighten the nuts **175°**.

○Using a torque angle gauge [A], tighten the nuts specified angle.

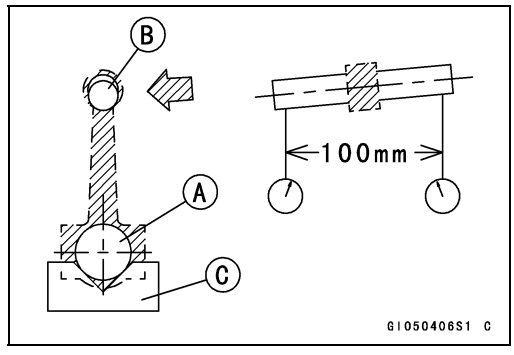


Connecting Rod Assy	Bolt	Nut	Torque + Angle N·m (kgf·m, in·lb)
New	Attached to new con-rod	Attached to new con-rod	12.8 (1.3, 113) + 175°
	New	New	
Used	Replace the bolts with new ones	Replace the nuts with new ones	12.8 (1.3, 113) + 175°

Crankshaft/Connecting Rod Cleaning

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

Connecting Rod Bend Inspection

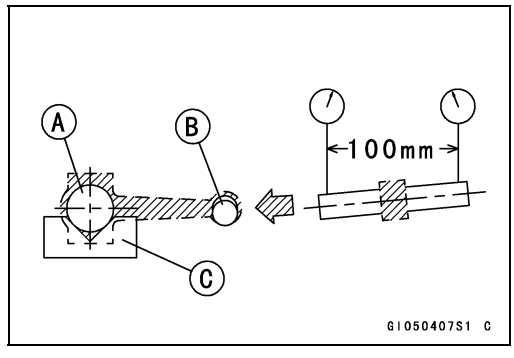


- Remove the connecting rod big end bearing inserts, and reinstall the connecting rod big end cap.
- Select an arbor [A] of the same diameter as the connecting rod big end, and insert the arbor through the connecting rod big end.
- Select an arbor of the same diameter as the piston pin and at least 100 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 the 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 Inspection



- 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 the 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.)

Crankshaft and Connecting Rods

Connecting Rod Big End Side Clearance Inspection

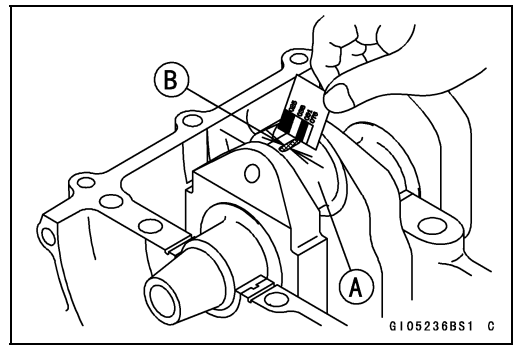
- Measure connecting rod big end side clearance.

○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 the clearance is too large after connecting rod replacement, the crankshaft also must be replaced.

Connecting Rod Big End Bearing Insert/Crankpin Wear Inspection



- Remove the connecting rod big end (see Connecting Rod Removal).
- Cut strips of plastigage (press gauge) to crankpin width. Place a strip on the crankpin parallel to the crankshaft installed in the correct position.
- Tighten the connecting rod big end nuts to the specified torque (see Connecting Rod Installation).

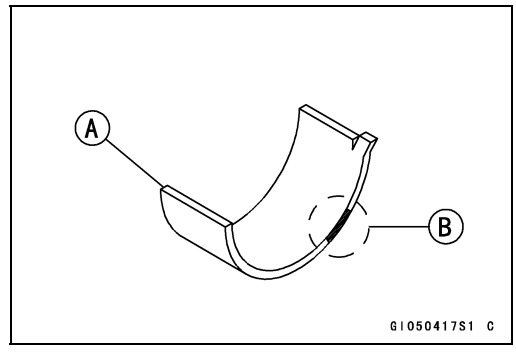
NOTE

○*Do not move the connecting rod and crankshaft during clearance measurement.*

- Remove the connecting rod big end again, measure each clearance between the bearing insert and crankpin [A] using plastigage (press gauge) [B].

NOTICE
After measurement, replace the connecting rod bolts and nuts.

Connecting Rod Big End Bearing Insert/Crankpin Clearance
Standard: 0.044 ~ 0.081 mm (0.0017 ~ 0.0032 in.)
Service Limit: 0.11 mm (0.0043 in.)



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

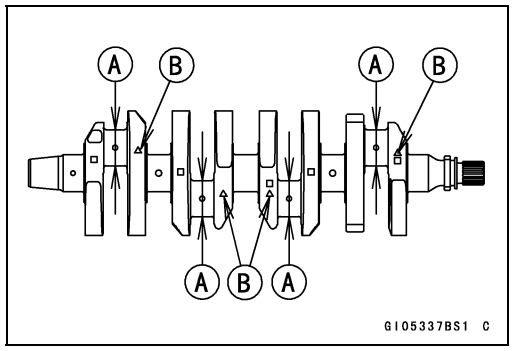
★If the clearance is between 0.082 mm (0.0032 in.) and the service limit (0.11 mm, 0.0043 in.), replace the bearing inserts [A] with inserts painted blue [B]. Check insert/crankpin clearance with the plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.

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

Crankpin Diameter
Standard: 29.984 ~ 30.000 mm (1.1805 ~ 1.1811 in.)
Service Limit: 29.97 mm (1.1799 in.)

Crankshaft and Connecting Rods

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



Crankpin Diameter Marks
None 29.984 ~ 29.992 mm (1.1805 ~ 1.1808 in.)
○ 29.993 ~ 30.000 mm (1.1808 ~ 1.1811 in.)

△: Crankpin Diameter Marks, "○" or no mark.

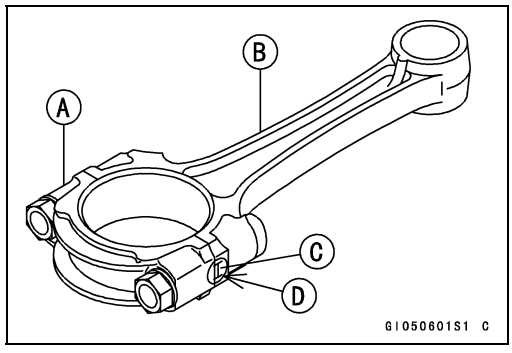
- Measure the connecting rod big end inside diameter, and mark each connecting rod big end in accordance with the inside diameter.
- Tighten the connecting rod big end nuts to the specified torque (see Connecting Rod Installation).

NOTE

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

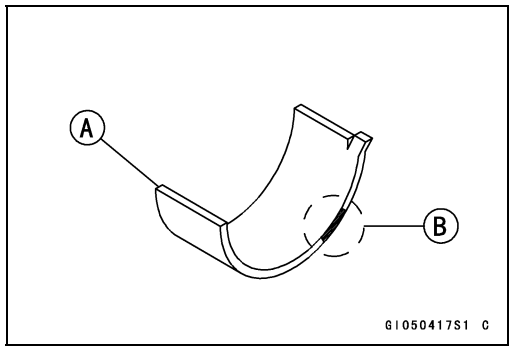
Connecting Rod Big End Inside Diameter Marks
None 33.000 ~ 33.008 mm (1.2992 ~ 1.2995 in.)
○ 33.009 ~ 33.016 mm (1.2996 ~ 1.2998 in.)

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]

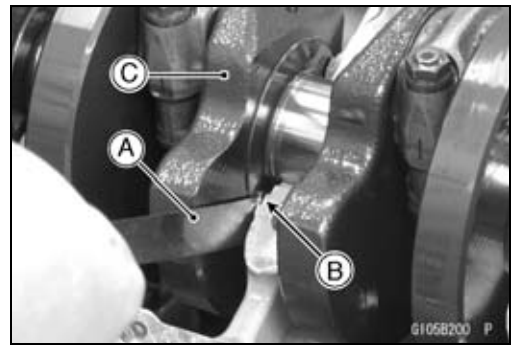
Con-rod Big End Inside Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Size Color	Part Number
None	○	Brown	92139-0167
None	None	Black	92139-0166
○	○		
○	None	Blue	92139-0165



- Install the new inserts in the connecting rod and check insert/crankpin clearance with the plastigage.

Crankshaft and Connecting Rods

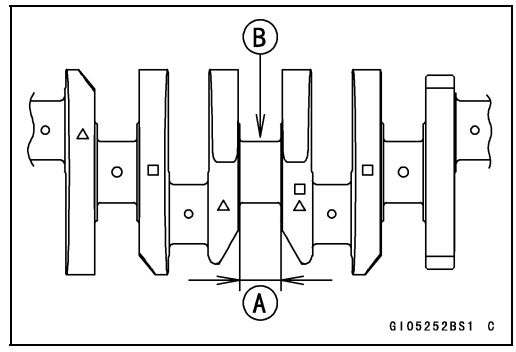
Crankshaft Side Clearance Inspection



- Insert a thickness gauge [A] between the thrust washer [B] on the crankcase and the crank web [C] at the #3 main journal to determine clearance.

★If the clearance exceeds the service limit, replace the thrust washers as a set and check the width of the crankshaft #3 main journal.

Crankshaft Side Clearance
Standard: 0.05 ~ 0.25 mm (0.0020 ~ 0.0098 in.)
Service Limit: 0.45 mm (0.0177 in.)

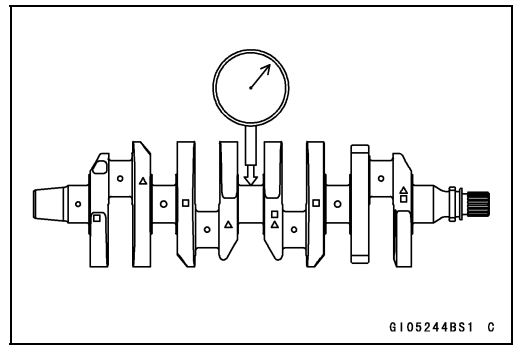


- Measure the width [A] of the crankshaft #3 main journal [B].

★If the measurement exceeds the standard, replace the crankshaft.

Crankshaft #3 Main Journal Width
Standard: 21.09 ~ 21.14 mm (0.8303 ~ 0.8323 in.)

Crankshaft Runout Inspection

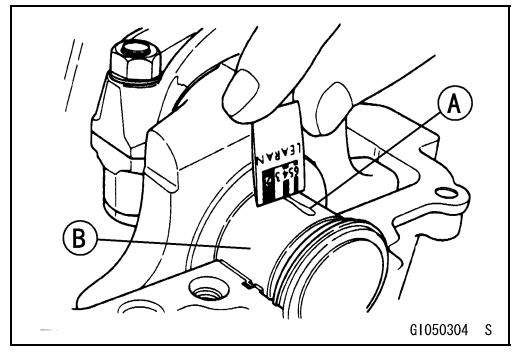


- Measure the crankshaft runout.

★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 Inspection



- Split the crankcase (see Crankcase Splitting).
- Cut strips of plastigage (press gauge) to journal width.
- Place a strip on each journal parallel to the crankshaft installed in the correct position.
- Tighten the crankcase bolts to the specified torque (see Crankcase Assembly).

NOTE

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

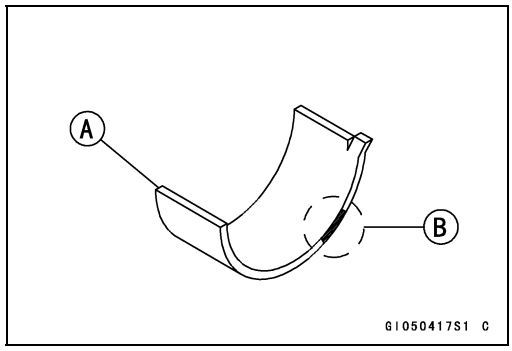
○*Journal clearance less than 0.025 mm (0.00098 in.) can not be measured by plastigage [A], however, using genuine parts maintains the minimum standard clearance.*

- Split the crankcase again, measure each clearance between the bearing insert and journal [B] using plastigage (press gauge).

Crankshaft Main Bearing Insert/Journal Clearance
Standard: 0.028 ~ 0.060 mm (0.0011 ~ 0.0024 in.)
Service Limit: 0.09 mm (0.0035 in.)

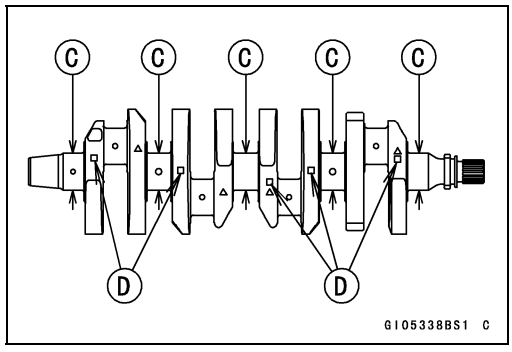
Crankshaft and Connecting Rods

★If the clearance is within the standard, no bearing replacement is required.
★If the clearance is between 0.061 mm (0.0024 in.) and the service limit (0.09 mm, 0.0035 in.), replace the bearing inserts [A] with inserts painted blue and purple [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: 30.984 ~ 31.000 mm (1.2198 ~ 1.2205 in.)
Service Limit: 30.96 mm (1.2189 in.)

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

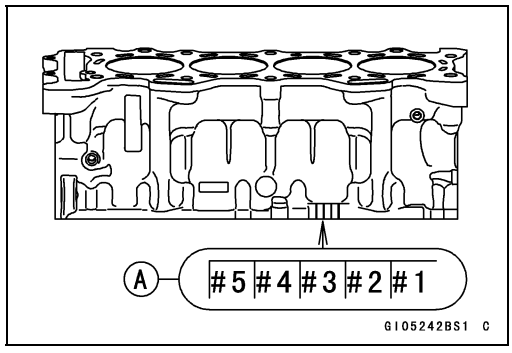


Crankshaft Main Journal Diameter Marks
None 30.984 ~ 30.992 mm (1.2198 ~ 1.2202 in.)
1 30.993 ~ 31.000 mm (1.2202 ~ 1.2205 in.)

□: Crankshaft Main Journal Diameter Marks, "1" or no mark.

● Measure the main bearing inside diameter, and mark the upper crankcase half in accordance with the inside diameter.
[A]: Crankcase Main Bearing Inside Diameter Marks, "○" or no mark.

● Tighten the crankcase bolts to the specified torque (see Crankcase Assembly).

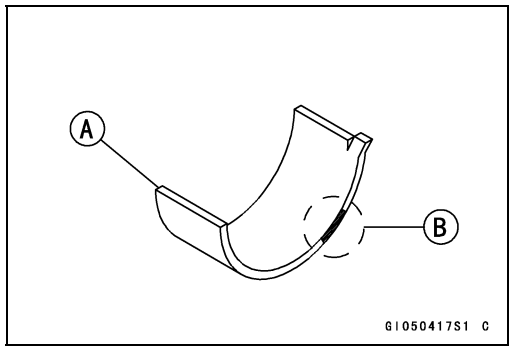


NOTE

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

Crankcase Main Bearing Inside Diameter Marks
○ 34.000 ~ 34.008 mm (1.3386 ~ 1.3389 in.)
None 34.009 ~ 34.016 mm (1.3389 ~ 1.3392 in.)

● Select the proper bearing insert [A] in accordance with the combination of the crankcase and crankshaft coding.
Size Color [B]



Crankshaft and Connecting Rods

Crankcase Main Bearing Inside Diameter Marking	Crankshaft Main Journal Diameter Marking	Bearing Insert*		
		Size Color	Part Number	Journal Nos.
○	1	Brown	92139-0247	1, 5
			92139-0250	2, 4
		Yellow	92139-0253	3
None	1	Black	92139-0246	1, 5
			92139-0249	2, 4
		Green	92139-0252	3
○	None	Black	92139-0246	1, 5
			92139-0249	2, 4
		Green	92139-0252	3
None	None	Blue	92139-0245	1, 5
			92139-0248	2, 4
		Purple	92139-0251	3

*: The bearing inserts for Nos. 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.

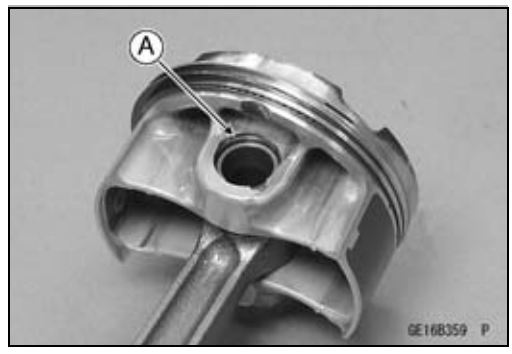
Pistons

Piston Removal

- Remove:
  Crankshaft (see Crankshaft Removal)
- Remove the piston together with the connecting rod to the cylinder head side.

NOTICE
Discard the connecting rod bolts and nuts. To prevent damage to the crankpin surfaces, do not allow the connecting rod bolts to bump against the crankpins.

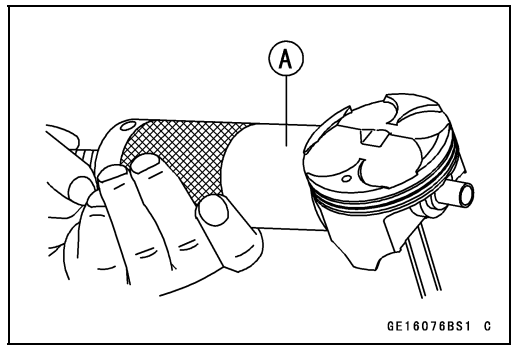
- Remove the piston pin snap ring [A] (Both Sides).



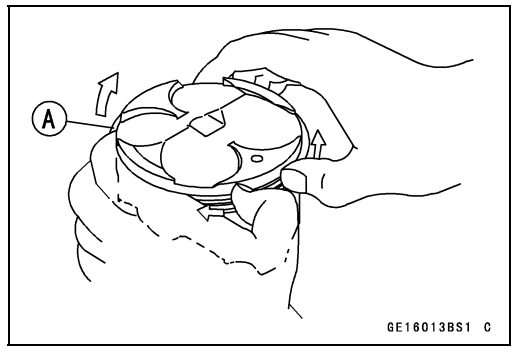
- Using the piston pin puller assembly [A], remove the piston pin.

  Special Tool - Piston Pin Puller Assembly: 57001-910

- Remove the piston from the connecting rod.

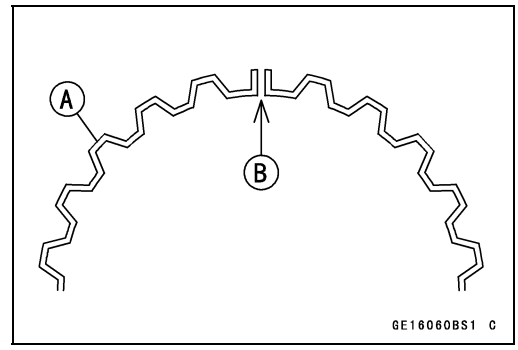


- Carefully spread the ring opening with your thumbs and then push up on the opposite side of the ring [A] to remove it.
- Remove the 3-piece oil ring with your thumbs in the same manner.



Pistons

Piston Installation



NOTE

○*If a new piston is used, use new piston ring.*

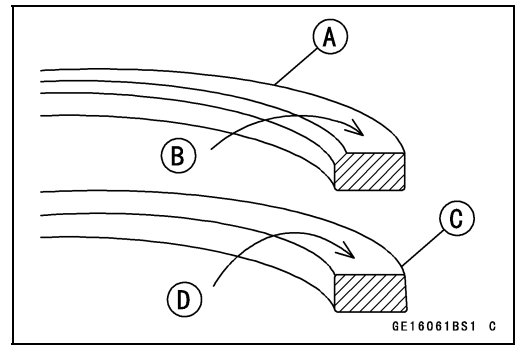
- Apply molybdenum disulfide oil solution to the oil ring expander, and install the oil ring expander [A] in the bottom piston ring groove so the ends [B] not butt together.
- Apply molybdenum disulfide oil solution to the oil ring steel rails, and install the oil ring steel rails, one above the expander 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".*

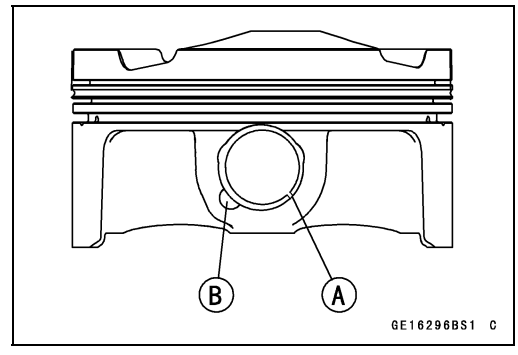


- Apply molybdenum disulfide oil solution to the piston rings.

NOTE

○*Do not mix up the top and second ring.*

- Install the top ring [A] so that the "R" mark [B] faces up.
- Install the second ring [C] so that the "RN" mark [D] faces up.

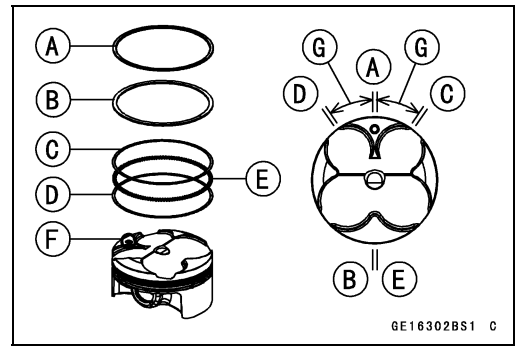


- Apply molybdenum disulfide oil solution to the piston pins and piston journals.
- Fit a new piston pin snap ring into the side of the piston so that the ring opening [A] does not coincide with the slit [B] of the piston pin hole.

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

NOTICE

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

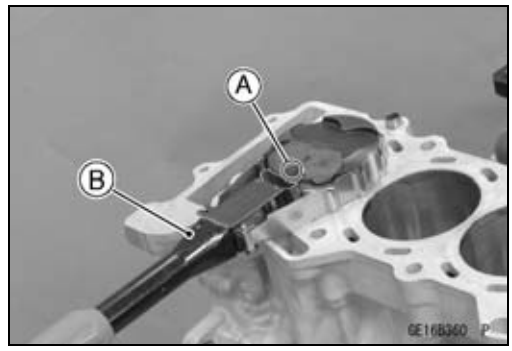


- The piston ring openings must be positioned as shown. The openings of the oil ring steel rails must be about 30 ~ 40° of angle from the opening of the top ring.
  Top Ring [A]
  Second Ring [B]
  Upper Oil Ring Steel Rail [C]
  Lower Oil Ring Steel Rail [D]
  Oil Ring Expander [E]
  Dent [F]
  30 ~ 40° [G]

Pistons

- Apply molybdenum disulfide oil solution to the cylinder bore and piston skirt.
- Install the piston with its dent mark [A] facing exhaust side.
- Using the piston ring compressor assembly [B] to install the piston from the cylinder head side.

Special Tools - Piston Ring Compressor Grip: 57001-1095
Piston Ring Compressor Belt, ϕ67 ~ ϕ79: 57001-1097

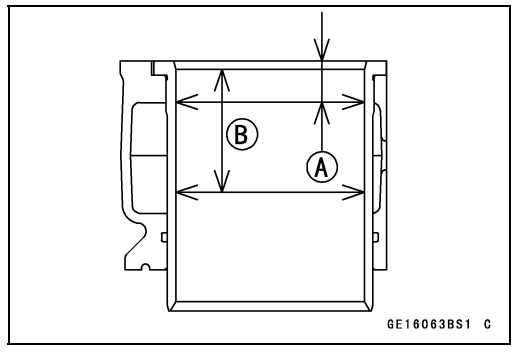


- Install:
  Crankshaft (see Crankshaft Installation)
  Connecting Rod Big End Caps (see Connecting Rod Installation)

Cylinder (Upper Crankcase) Wear Inspection

- Since there is a difference in cylinder wear (upper crankcase) in different directions, take a side-to-side and a front-to-back measurement at each of the two locations (total of four measurements) as shown.

★If any of the cylinder inside diameter measurements exceeds the service limit, replace the crankcase.
10 mm (0.39 in.) [A]
60 mm (2.36 in.) [B]

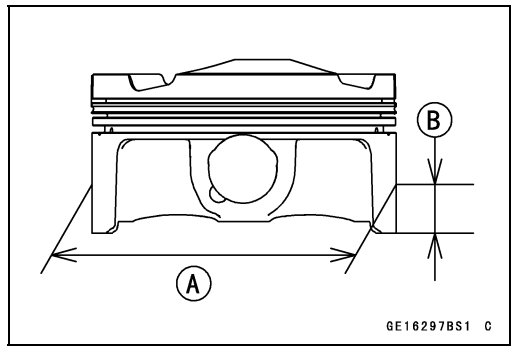


Cylinder (Upper Crankcase) Inside Diameter
Standard: 67.000 ~ 67.012 mm (2.6378 ~ 2.6383 in.)
Service Limit: 67.09 mm (2.6413 in.)

Piston Wear Inspection

- 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.



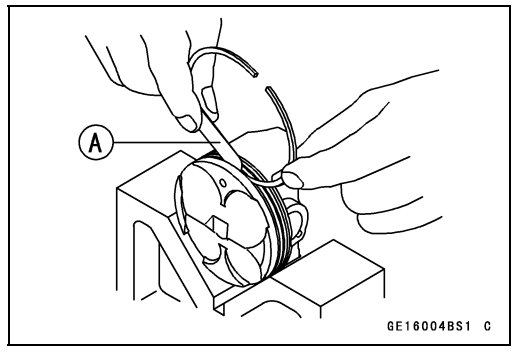
Piston Diameter
Standard: 66.960 ~ 66.975 mm (2.6362 ~ 2.6368 in.)
Service Limit: 66.81 mm (2.6303 in.)

Piston Ring, Piston Ring Groove Wear Inspection

- 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.

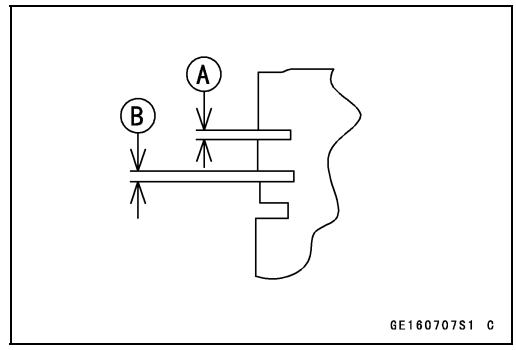
- With the piston rings in their grooves, make several measurements with a thickness gauge [A] to determine piston ring/groove clearance.



Piston Ring/Groove Clearance
Standard:
Top 0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in.)
Second 0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in.)
Service Limit:
Top 0.17 mm (0.0067 in.)
Second 0.17 mm (0.0067 in.)

Pistons

Piston Ring Groove Width Inspection

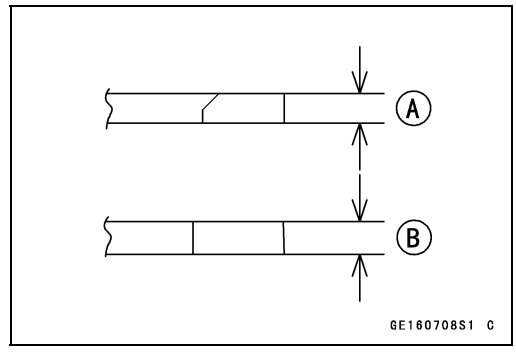


● Measure the piston ring groove width.
○Use a vernier caliper at several points around the piston.

Piston Ring Groove Width
Standard:
Top [A] 0.82 ~ 0.84 mm (0.0323 ~ 0.0331 in.)
Second [B] 0.82 ~ 0.84 mm (0.0323 ~ 0.0331 in.)
Service Limit:
Top 0.92 mm (0.036 in.)
Second 0.92 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 Inspection



● Measure the piston ring thickness.
○Use the micrometer to measure at several points around the ring.

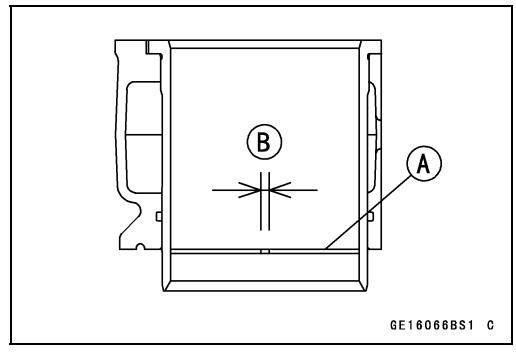
Piston Ring Thickness
Standard:
Top [A] 0.77 ~ 0.79 mm (0.0303 ~ 0.0311 in.)
Second [B] 0.77 ~ 0.79 mm (0.0303 ~ 0.0311 in.)
Service Limit:
Top 0.70 mm (0.028 in.)
Second 0.70 mm (0.028 in.)

★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.*

Piston Ring End Gap Inspection



● Place the piston ring [A] inside the cylinder (upper crankcase), 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.

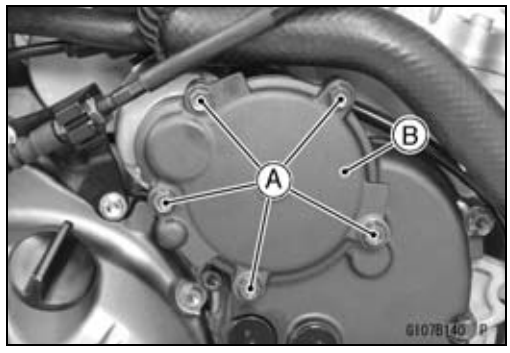
Piston Ring End Gap
Standard:
Top 0.12 ~ 0.22 mm (0.0047 ~ 0.0087 in.)
Second 0.30 ~ 0.45 mm (0.0118 ~ 0.0177 in.)
Service Limit:
Top 0.5 mm (0.020 in.)
Second 0.8 mm (0.031 in.)

★If the end gap of either ring is greater than the service limit, replace all the rings.

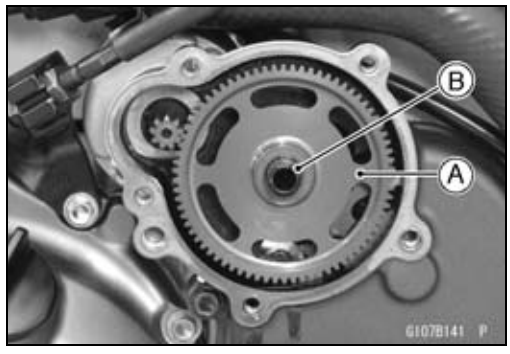
Starter Idle Gear and Starter Clutch

Starter Idle Gear Removal

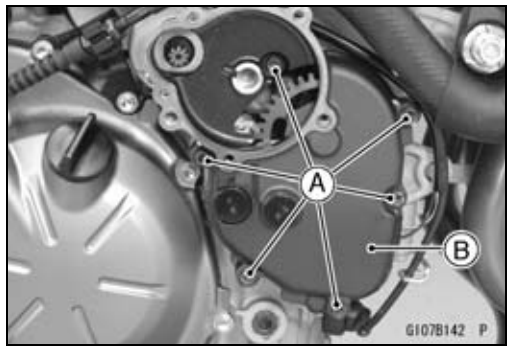
- Remove:
  Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
  Idle Gear Cover Bolts [A]
  Idle Gear Cover [B]



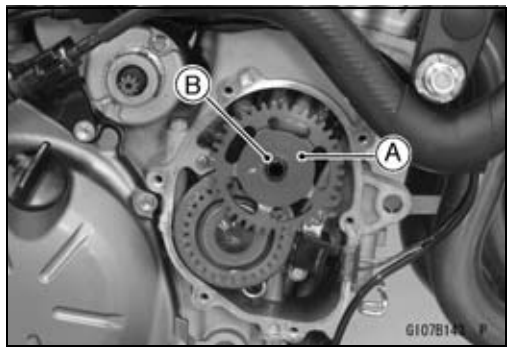
- Remove the idle gear (starter motor side) [A] with the shaft [B].



- Remove:
  Starter Clutch Cover Bolts [A]
  Starter Clutch Cover [B]

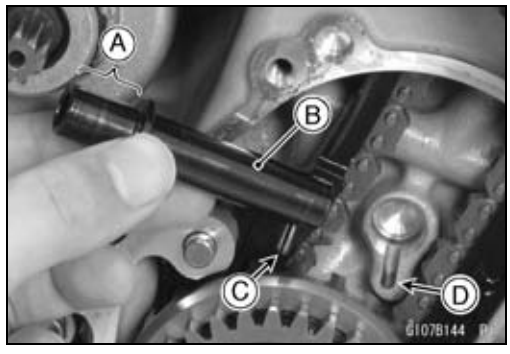


- Remove the idle gear (starter clutch side) [A] with the shaft [B].



Starter Idle Gear Installation

- Apply molybdenum disulfide grease [A] to the idle gear shaft (starter clutch side) [B].
- Fit the pin [C] into the groove [D] of the crankcase.

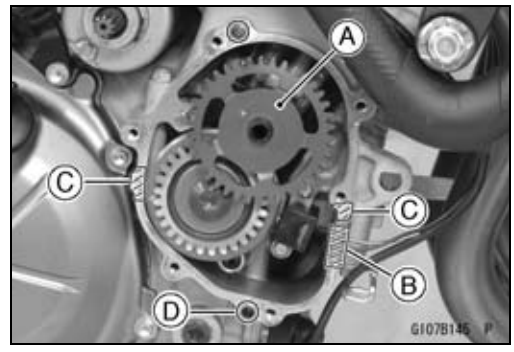


Starter Idle Gear and Starter Clutch

● Install the idle gear (starter clutch side) [A] on the shaft.
○Engage the idle gear with the starter clutch gear.
● Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
● Apply liquid gasket to the following portion.
Crankshaft Sensor Lead Grommet [B]
Crankcase Halves Mating Surfaces [C]

Sealant - Liquid Gasket, TB1211F: 92104-0004

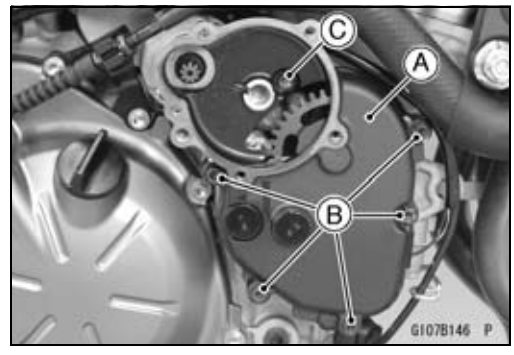
● Install the dowel pins [D] and new gasket.



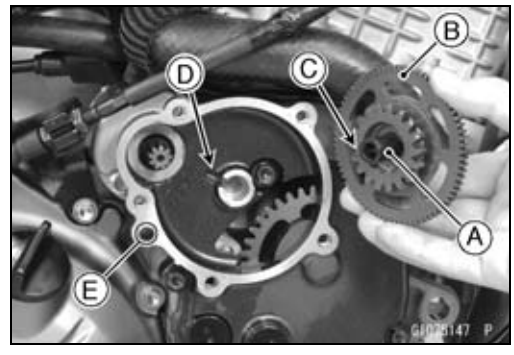
● Apply grease to the O-ring of the starter motor.
● Install the starter clutch cover [A].
● Tighten:

Torque - Starter Clutch Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

L = 30 mm (1.18 in.) [B]
L = 20 mm (0.79 in.) [C]



● Apply molybdenum disulfide grease to the idle gear shaft (starter motor side) [A].
● Install the idle gear (starter motor side) [B] on the shaft.
○Engage the idle gear with the starter motor gear and idle gear (starter clutch side).
○Fit the pin [C] into the groove [D] of the starter clutch cover.
● Install the dowel pin [E] and new gasket.

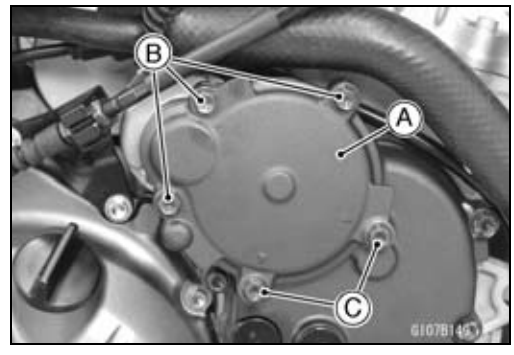


● Position the idle gear [A] to inside of the mating surface [B] of the starter clutch cover.

● Install:
Idle Gear Cover [A]
Idle Gear Cover Bolts [B]
Idle Gear Cover Bolts [C] with New Gaskets
● Tighten:

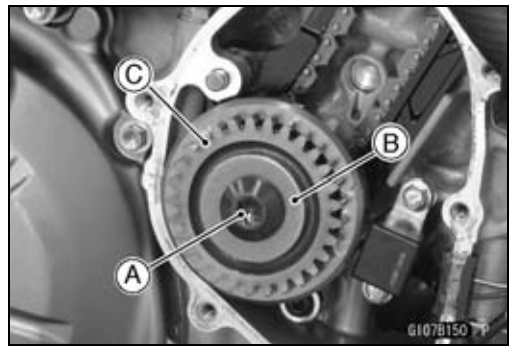
Torque - Idle Gear Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

● Install the removed parts (see appropriate chapters).



Starter Idle Gear and Starter Clutch

Starter Clutch Removal

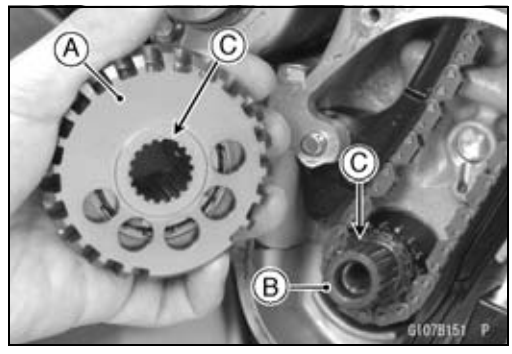


- Remove:
  Alternator Cover (see Alternator Cover Removal in the Electrical System chapter)
  Starter Clutch Cover (see Starter Idle Gear Removal)
  Idle Gear (Starter Clutch Side) (see Starter Idle Gear Removal)
- Remove the starter clutch bolt [A], while holding the alternator rotor steady with the rotor holder (see Alternator Rotor Removal in the Electrical System chapter).

Special Tools - Grip: 57001-1591
Rotor Holder: 57001-1666
Stopper: 57001-1679
Rotor Holder Attachment: 57001-1689

- Remove:
  Washer [B]
  Starter Clutch [C]

Starter Clutch Installation



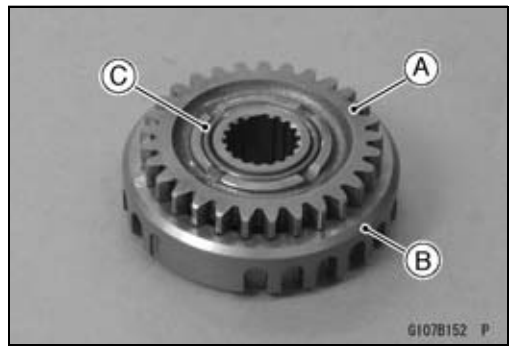
- Install the starter clutch [A] on the crankshaft [B] with their teeth [C] aligned.
- Install the washer.
- Tighten the starter clutch bolt, while holding the alternator rotor steady with the rotor holder (see Alternator Rotor Installation in the Electrical System chapter).

Special Tools - Grip: 57001-1591
Rotor Holder: 57001-1666
Stopper: 57001-1679
Rotor Holder Attachment: 57001-1689

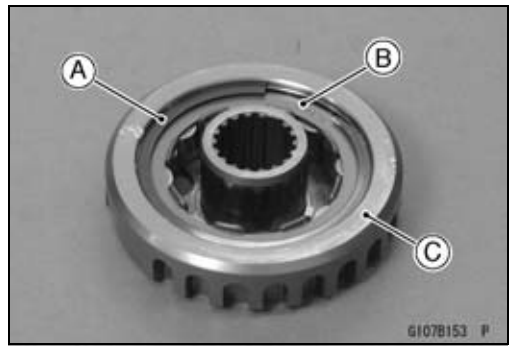
Torque - Starter Clutch Bolt: 49 N·m (5.0 kgf·m, 36 ft·lb)

- Install the removed parts (see appropriate chapters).

Starter Clutch Disassembly



- Remove the starter clutch (see Starter Clutch Removal).
- Remove the starter clutch gear [A] from the starter clutch [B].
- Remove the needle bearing [C].

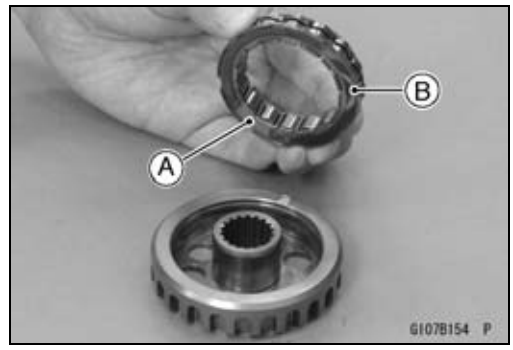


- Remove the snap ring [A].
- Remove the one-way clutch [B] from the starter clutch case [C].

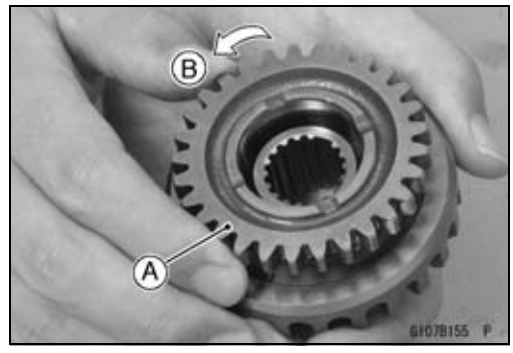
Starter Idle Gear and Starter Clutch

Starter Clutch Assembly

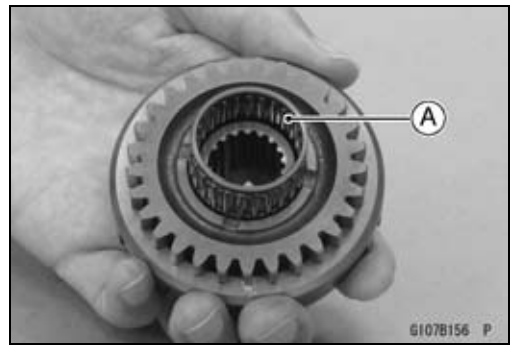
- Install the one-way clutch [A] so that its circlip side [B] faces inward.
- Install the new snap ring.



- Push the starter clutch gear [A] in and turn it counterclockwise [B] and install it.



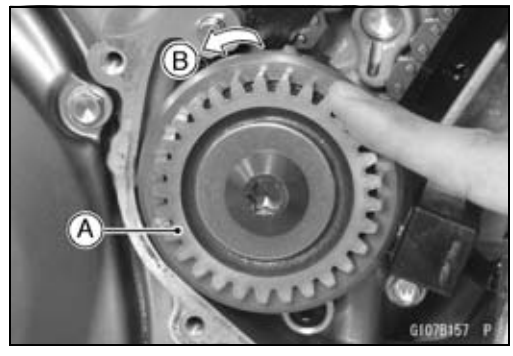
- Apply molybdenum disulfide oil solution to the needle bearing [A], and install it.



Starter Clutch Inspection

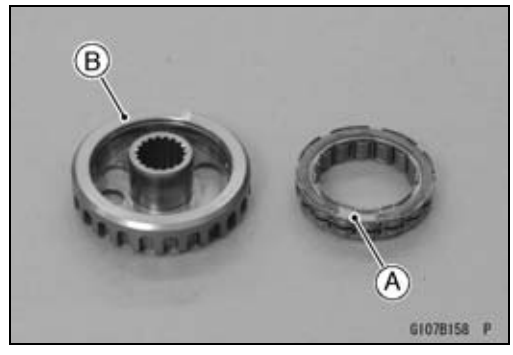
- Remove:
  Starter Clutch Cover (see Starter Idle Gear Removal)
  Idle Gear (Starter Clutch Side) (see Starter Idle Gear Removal)
- Turn the starter clutch gear [A] by hand. The starter clutch gear should turn counterclockwise freely [B], but should not turn clockwise.

★If the starter clutch does not operate as it should or if it makes noise, go to the next step.



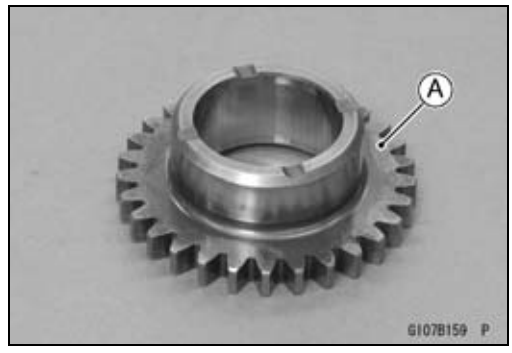
- Disassemble the starter clutch, and visually inspect the clutch parts.
  One-way Clutch [A]
  Starter Clutch Case [B]

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



Starter Idle Gear and Starter Clutch

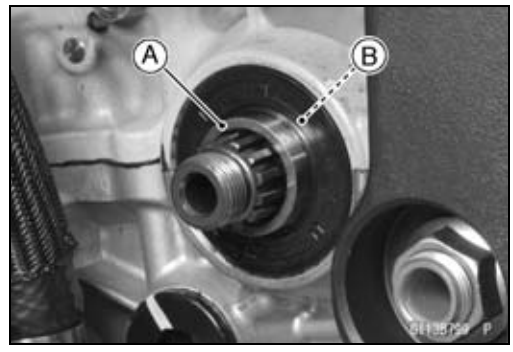
○Examine the starter clutch gear [A] as well. Replace the clutch gear if it is worn or damaged.



Transmission

Transmission Assy Removal

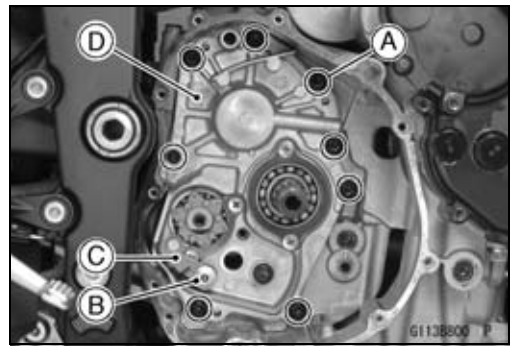
- Remove:
  Engine Sprocket (see Engine Sprocket Removal in the Final Drive chapter)
  Gear Position Switch (see Gear Position Switch Removal in the Electrical System chapter)
  Collar [A]
  O-ring [B]



- Remove:
  Clutch (see Clutch Removal in the Clutch chapter)
  Shift Shaft Assembly (see External Shift Mechanism Removal)
  Transmission Case Bolts [A]

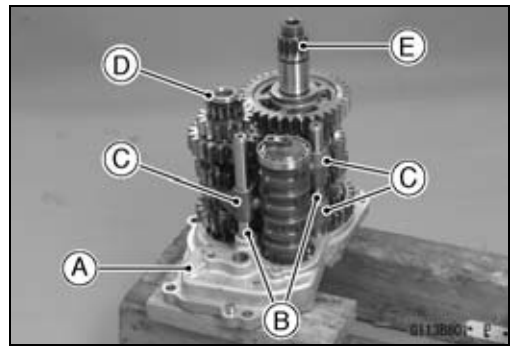
★If the transmission assy is to be disassembled, remove the following.
  Gear Positioning Lever Bolt [B]
  Gear Positioning Lever [C], Spring and Collar

- Remove the transmission assy [D] from the crankcase.

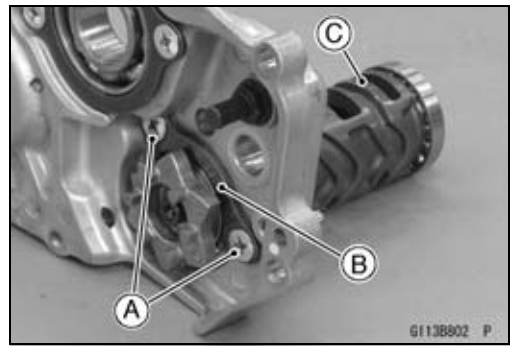


Transmission Assy Disassembly

- Remove the transmission assy (see Transmission Assy Removal).
- Remove the following from the transmission case [A].
  Shift Rods [B]
  Shift Forks [C]
  Drive Shaft [D]
  Output Shaft [E]



- Remove:
  Bearing Holder Screws [A]
  Bearing Holder [B]
  Shift Drum Assembly [C]



Transmission Assy Assembly

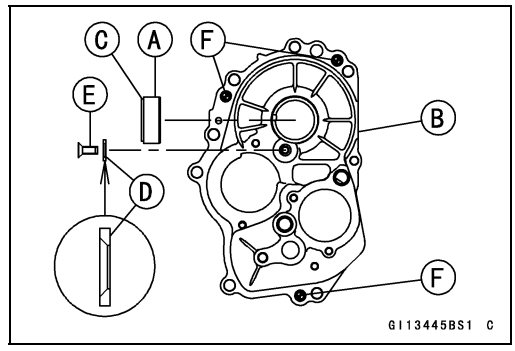
- Press the race [A] in the transmission case [B] so that the big stepped side [C] faces to transmission gears side until it is bottomed.

  Special Tool - Bearing Driver Set: 57001-1129

- Install the race holder [D] as shown.
- Apply a non-permanent locking agent to the threads of the race holder screw [E].
- Tighten:

  Torque - Race Holder Screws: 4.9 N·m (0.50 kgf·m, 43 in·lb)

- Install the dowel pins [F] in the transmission case until they are bottomed.



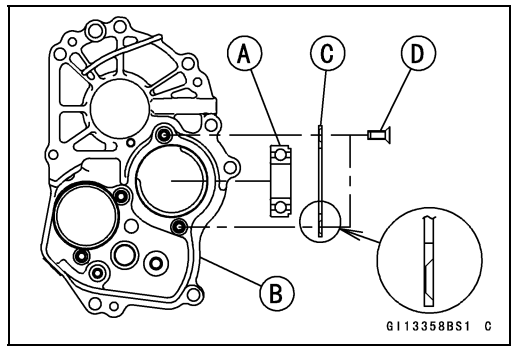
Transmission

● Press the ball bearing [A] in the transmission case [B] so that the stepped side faces outside until it is bottomed.

Special Tool - Bearing Driver Set: 57001-1129

● Install the bearing holder [C] as shown.
● Apply a non-permanent locking agent to the threads of the bearing holder screws [D].
● Tighten:

Torque - Bearing Holder Screws: 4.9 N·m (0.50 kgf·m, 43 in·lb)



● Apply a non-permanent locking agent to the shift shaft return spring pin.
● Tighten:

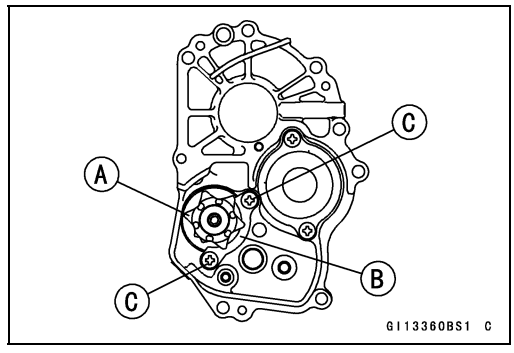
Torque - Shift Shaft Return Spring Pin: 28 N·m (2.9 kgf·m, 21 ft·lb)

● Install:
Shift Drum Assembly [A]
Bearing Holder [B]

○Install the bearing holder so that the taper side faces outside.

● Apply a non-permanent locking agent to the threads of the bearing holder screws [C].
● Tighten:

Torque - Bearing Holder Screws: 4.9 N·m (0.50 kgf·m, 43 in·lb)



Transmission

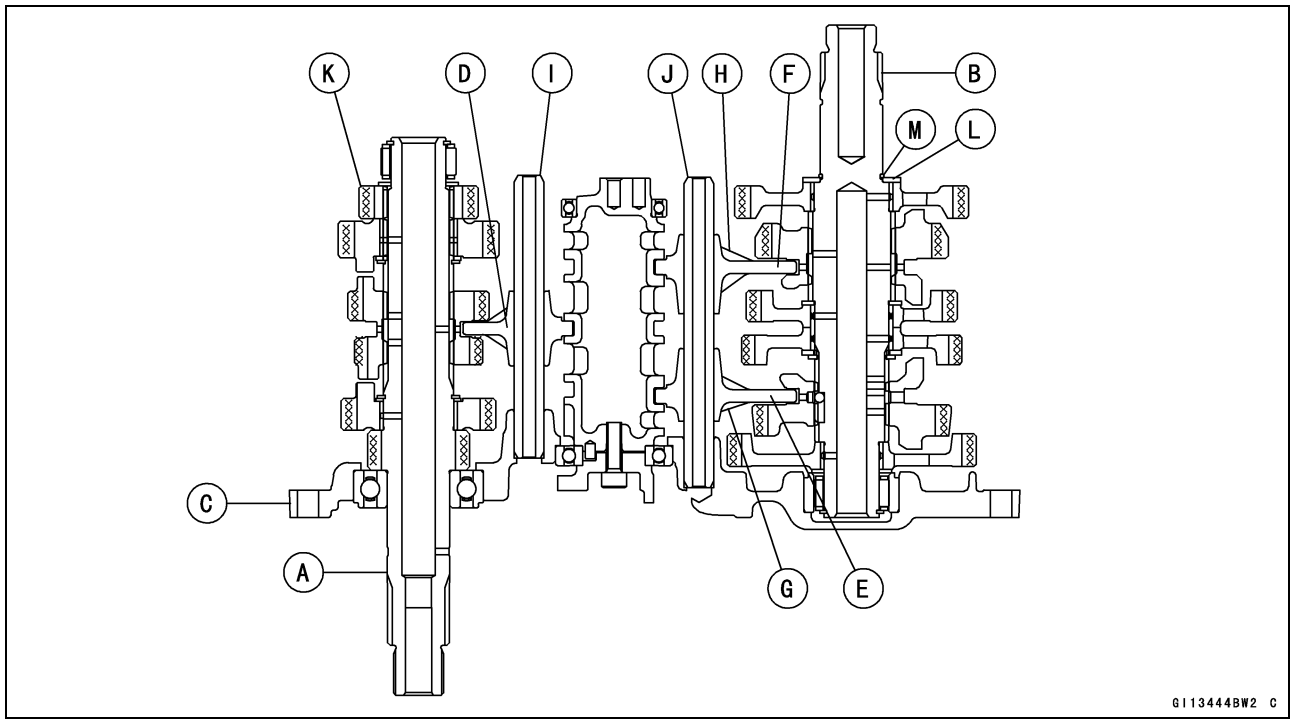
- Install the drive shaft [A] and output shaft [B] as a set in the transmission case [C].
- Install the shift forks as shown.

○The shift fork [D] for drive shaft gears has the short ears.
○The shift forks [E] [F] for output shaft gears have the long ears.
○The shift fork [E] has R mark [G].
○The shift fork [F] has L mark [H].

- Install the shift rods so that the ends of the rods are same height.

○The shift rod [I] of the drive shaft side is shorter than the shift rod [J] of the output shaft side.

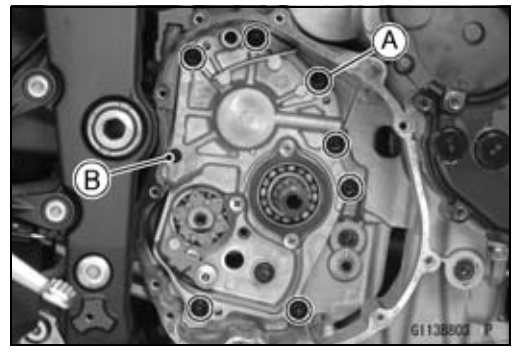
- Apply molybdenum disulfide oil solution to the transmission gears (x marks) [K].
- Install the spacer [L] on the output shaft.
- Apply grease to the O-ring [M] and install it to its position on the output shaft.



Transmission Assy Installation

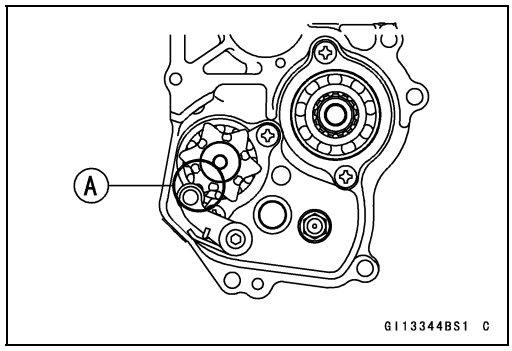
- Be sure that the dowel pins are in position.
- Install the transmission assy on the crankcase.
- Tighten:

Torque - Transmission Case Bolts (M8) [A]: 20 N·m (2.0 kgf·m, 15 ft·lb)
Transmission Case Bolts (M6) [B]: 9.8 N·m (1.0 kgf·m, 87 in·lb)



Transmission

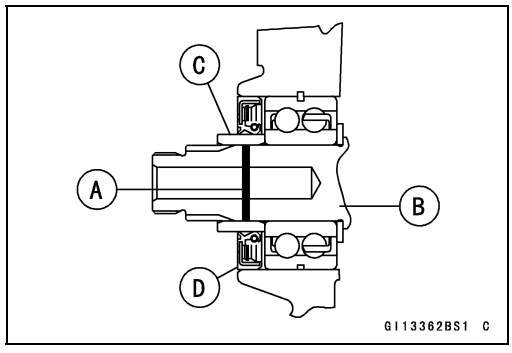
- Install the gear positioning lever (see External Shift Mechanism Installation).
- Set the gear positioning lever to the neutral position [A].
- Check that the drive and output shaft turn freely.



- Apply grease to the new O-ring [A] and install it to its position on the output shaft [B].
- Install the collar [C].
- When installing the oil seal [D], install it as follows.

○Apply grease to the oil seal lips.
○Apply soap and water solution to the outer circumference of the oil seal so that it will go into place smoothly.
○Press the oil seal to the crankcase so that the surface of the oil seal is flush with the surface of the crankcase as shown.

- Install the removed parts (see appropriate chapters).



Transmission Shaft Removal

- Refer to the Transmission Assy Disassembly.

Transmission Shaft Installation

- Refer to the Transmission Assy Assembly.

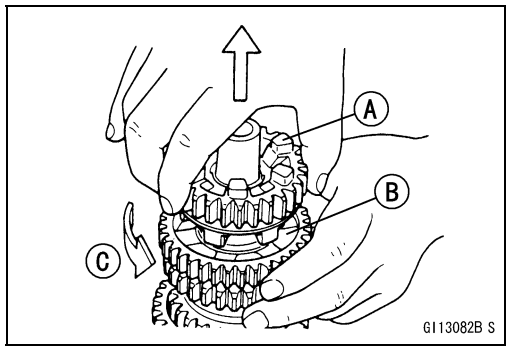
Transmission Shaft Disassembly

- Remove the transmission shafts (see Transmission Shaft Removal).
- Remove the circlips, and then disassemble the transmission shafts.

Special Tool - Outside Circlip Pliers: 57001-144

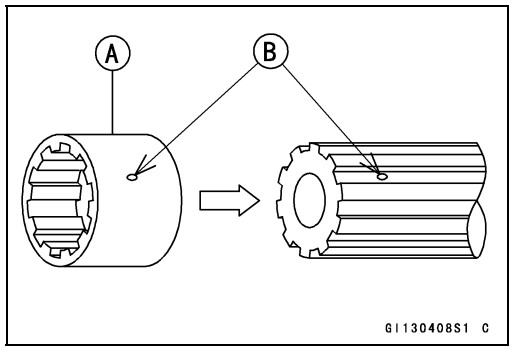
- The 5th gear [A] on the output shaft has three steel balls assembled into it for the positive neutral finder mechanism. Remove the 5th gear.

○Set the output shaft in a vertical position holding the 3rd gear [B].
○Spin the 5th gear quickly [C] and pull it off upward.



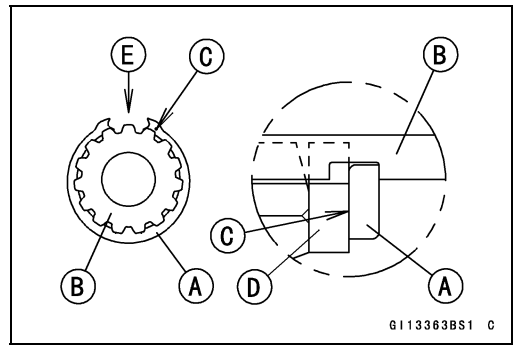
Transmission Shaft Assembly

- Apply molybdenum disulfide oil solution to the sliding surfaces of the gears and shafts.
- Install the gear bushings [A] on the shaft with their holes [B] aligned.

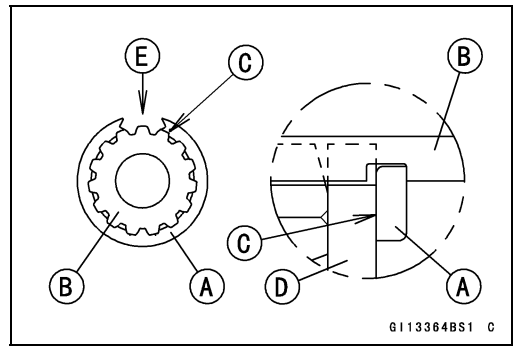


Transmission

- Replace any circlips removed with new ones.
- Install the circlip [A] on the drive shaft [B] so that the punch mark [C] faces the washer [D] and position the opening [E] as shown.



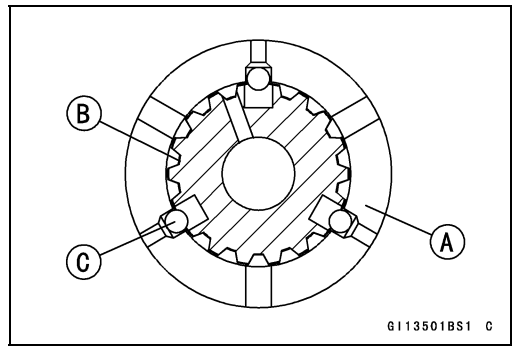
- Install the circlip [A] on the output shaft [B] so that the punch mark [C] faces the washer [D] and position the opening [E] as shown.



- 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 5th and 6th gear bushings 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 6th gears onto the output shaft with their oil holes aligned.
- Install the 1st, 2nd and 3rd/4th gear bushings onto the output shaft with their oil holes aligned.

Transmission

- Fit the steel balls into the 5th gear holes in the output shaft.
  5th Gear [A]
  Output Shaft [B]
  Steel Balls [C]

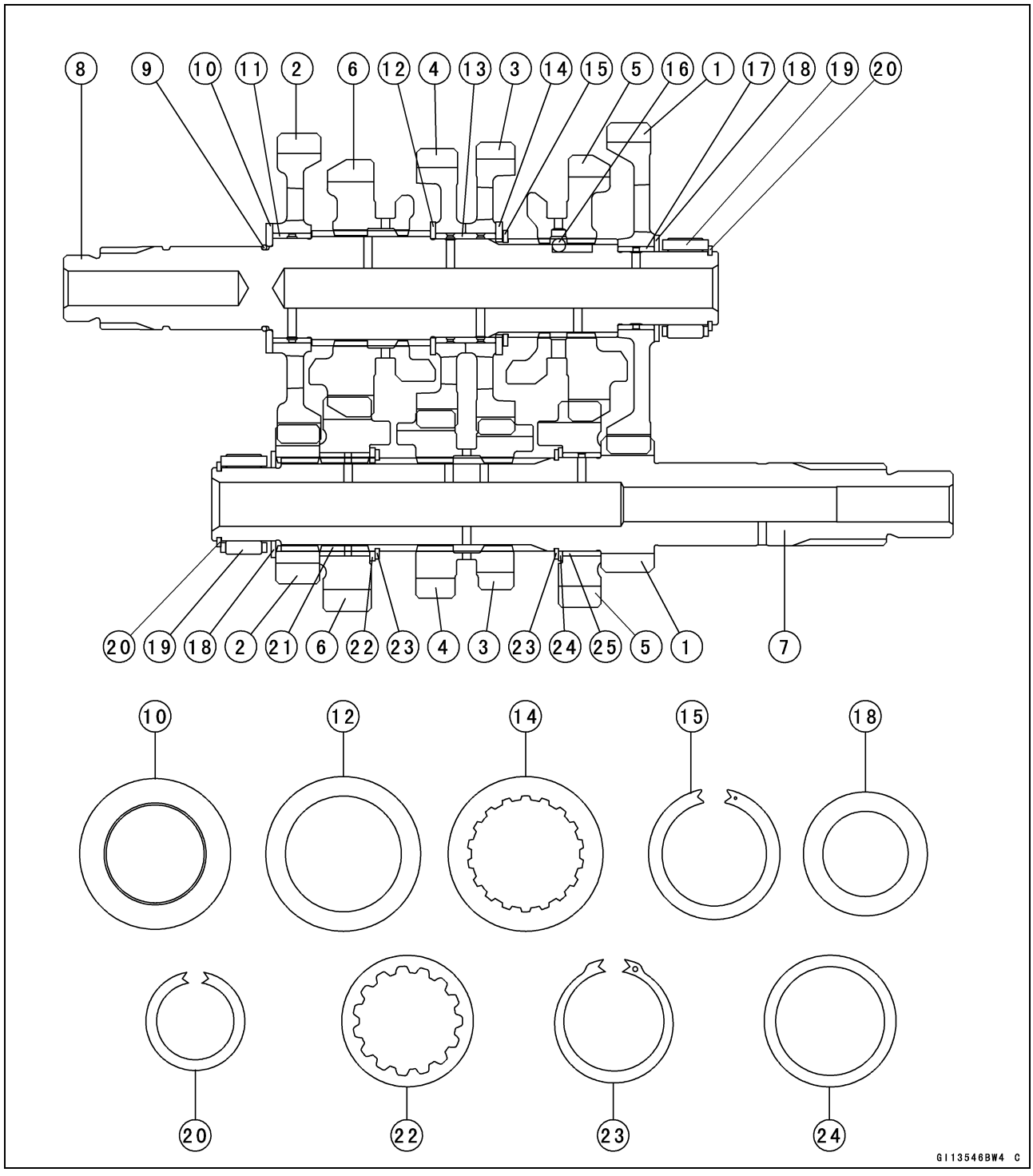


NOTICE
Do not apply grease to the balls to hold them in place. This will cause the positive neutral finder mechanism to malfunction.

○After assembling the 5th gear with steel balls in place on the output shaft, check the ball-locking effect that the 5th gear does not 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. Drive Shaft
8. Output Shaft
9. O-ring
10. Spacer
11. Bushing
12. Washer, ϕ40 mm (1.57 in.)
13. Bushing
14. Toothed Washer, ϕ40 mm (1.57 in.)
15. Circlip
16. Steel Ball
17. Bushing
18. Washer, ϕ32 mm (1.26 in.)
19. Needle Bearing
20. Circlip
21. Bushing
22. Toothed Washer, ϕ34 mm (1.34 in.)
23. Circlip
24. Washer, ϕ34 mm (1.34 in.)
25. Bushing

Transmission

Shift Drum and Fork Removal

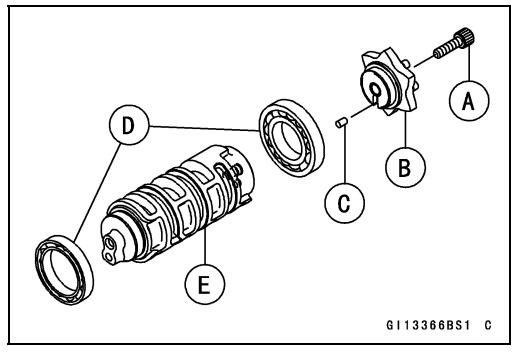
● Refer to the Transmission Assy Disassembly.

Shift Drum and Fork Installation

● Refer to the Transmission Assy Assembly.

Shift Drum Disassembly

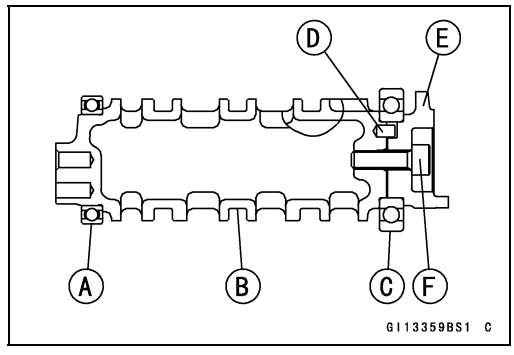
● Remove the shift drum (see Transmission Assy Disassembly).
● While holding the shift drum with a vise, remove the shift drum cam holder bolt [A].
● Remove:
Shift Drum Cam [B]
Dowel Pin [C]
Ball Bearings [D]
Shift Drum [E]



Shift Drum Assembly

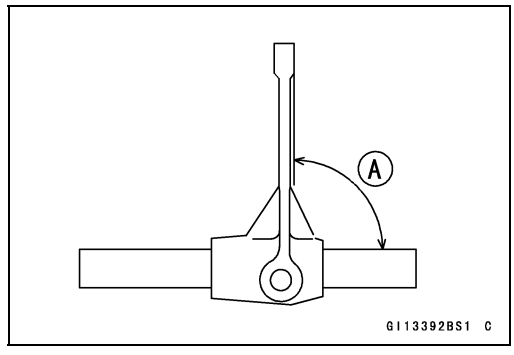
● Press the ball bearing [A] on the shift drum [B] until it is bottomed.
● Install:
Ball Bearing [C]
Dowel Pin [D] and Shift Drum Cam [E]
○Align the pin with the groove in the shift drum cam.
● Apply a non-permanent locking agent to the threads of the shift drum cam holder bolt [F] and tighten it.

Torque - Shift Drum Cam Holder Bolt: 12 N·m (1.2 kgf·m, 106 in·lb)



Shift Fork Bending Inspection

● 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]



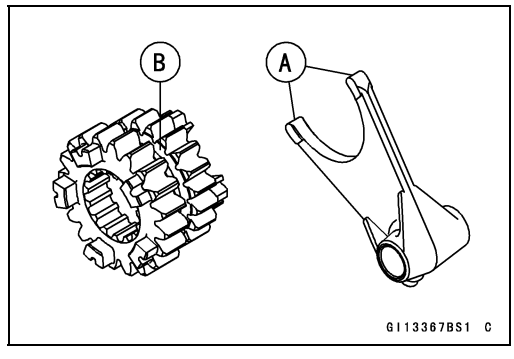
Shift Fork/Gear Groove Wear Inspection

● 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.)

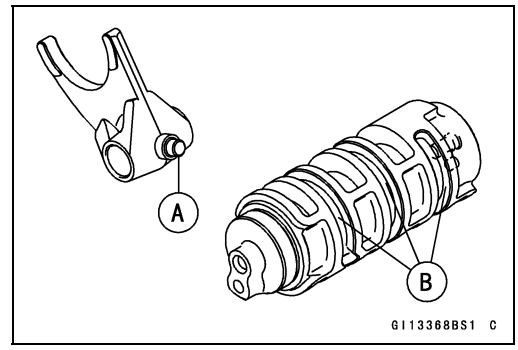
★If the gear groove is worn over the service limit, the gear must be replaced.

Gear Groove Width
Standard: 6.05 ~ 6.15 mm (0.238 ~ 0.242 in.)
Service Limit: 6.25 mm (0.246 in.)



Transmission

Shift Fork Guide Pin/Drum Groove Wear Inspection



- Measure the diameter of each shift fork guide pin [A], and measure the width of each shift drum groove [B].

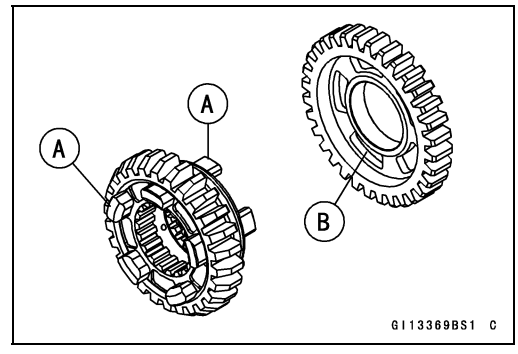
★If the guide pin on any shift fork is less than the service limit, the fork must be replaced.

Shift Fork Guide Pin Diameter
Standard: 5.9 ~ 6.0 mm (0.232 ~ 0.236 in.)
Service Limit: 5.8 mm (0.228 in.)

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

Shift Drum Groove Width
Standard: 6.05 ~ 6.20 mm (0.238 ~ 0.244 in.)
Service Limit: 6.3 mm (0.248 in.)

Gear Dog and Gear Dog Hole Damage Inspection

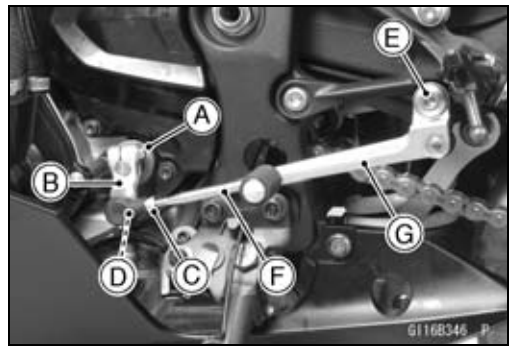


- Visually inspect the gear dogs [A] and gear dog holes [B].

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

External Shift Mechanism

Shift Pedal Removal



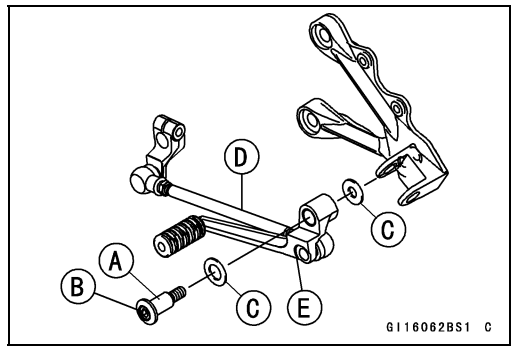
- Remove:
  Shift Lever Bolt [A]
  Shift Lever [B]

★If the tie-rod is removed from the shift pedal and shift lever, note the following.

○The following portions have left-hand threads.
  Shift Lever Side of Tie-Rod
  Locknut [C] of Shift Lever Side
  Ball Joint [D] of Shift Lever

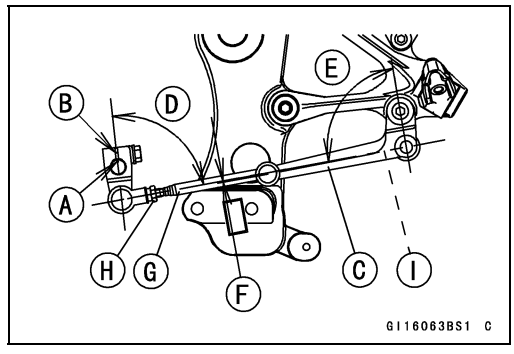
- Remove:
  Shift Pedal Mounting Bolt [E]
  Tie-Rod [F] and Shift Pedal [G]

Shift Pedal Installation



- Apply grease to the sliding surface [A] on the shift pedal mounting bolt [B].
- Apply a non-permanent locking agent to the threads of the shift pedal mounting bolt.
- Install:
  Washers [C]
  Tie-Rod [D] and Shift Pedal [E]
- Tighten:

Torque - Shift Pedal Mounting Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)



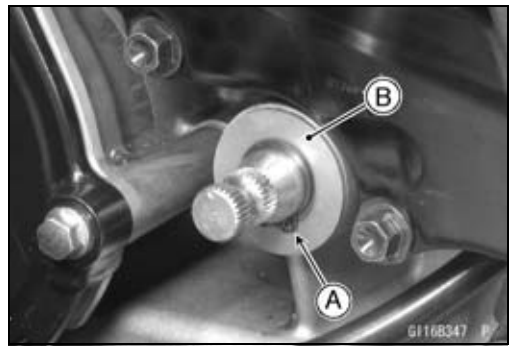
- Align the punch mark [A] on the shift shaft with the slit [B] of the shift lever.
- Tighten the shift lever bolt.
- After installation, confirm that the shift pedal [C] is positioned as shown.
  About 86° [D]
  About 91° [E]
  0 ~ 2 mm (0 ~ 0.08 in.) [F] (The distance between the center line of the tie-rod [G] and center in the shift pedal end.)

★If the pedal position is different, adjust it as follows.

○To adjust the pedal position, loosen the front locknut [H] (left-hand threads) and rear locknut [I], and then turn the tie-rod.

○Tighten the locknuts securely.

External Shift Mechanism Removal

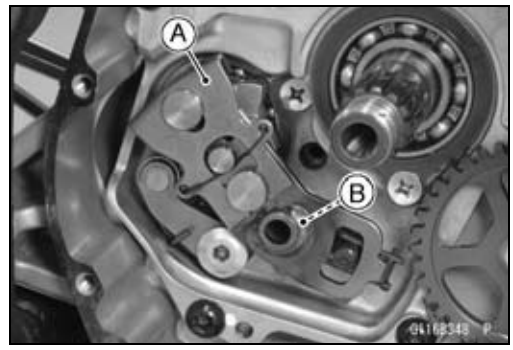


- Remove:
  Shift Lever (see Shift Pedal Removal)
  Clutch (see Clutch Removal in the Clutch chapter)
  Circlip [A]
  Washer [B]

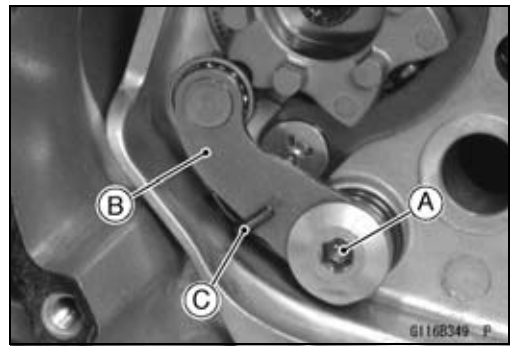
Special Tool - Outside Circlip Pliers: 57001-144

External Shift Mechanism

● Remove:
Shift Shaft Assembly [A]
Washer [B]



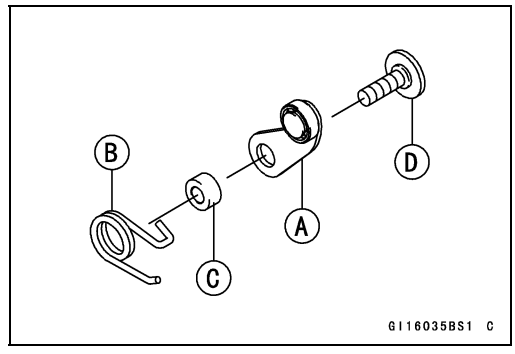
● Remove:
Gear Positioning Lever Bolt [A]
Gear Positioning Lever [B]
Collar and Spring [C]



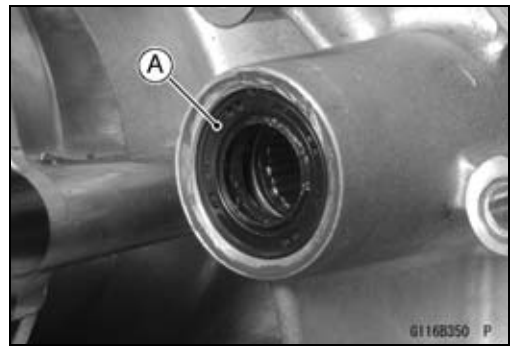
External Shift Mechanism Installation

● Install the gear positioning lever [A] as shown.
● Install:
Spring [B]
Collar [C]
● Tighten:

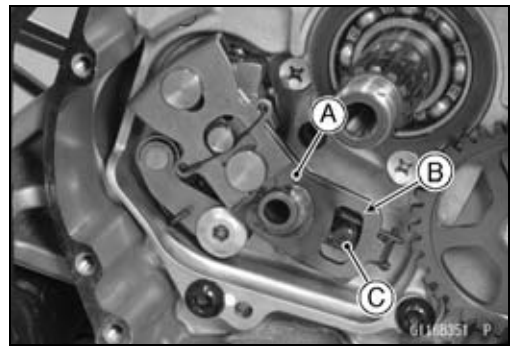
Torque - Gear Positioning Lever Bolt [D]: 12 N·m (1.2 kgf·m, 106 in·lb)



● Replace the oil seal [A] with a new one.
● Apply grease to the lips of the grease seal.



● Install:
Shift Shaft Assembly [A] and Washer
○Fit the hole [B] and return spring pin [C].



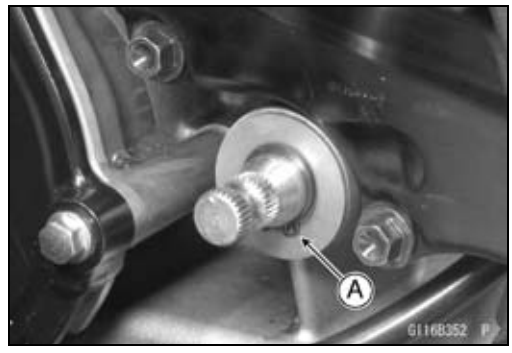
External Shift Mechanism

- Replace the circlip [A] with a new one.
- Install:
  Circlip

Special Tool - Outside Circlip Pliers: 57001-144

○Fit the circlip into the groove of the shift shaft securely.

- Install the removed parts (see appropriate chapters).



External Shift Mechanism Inspection

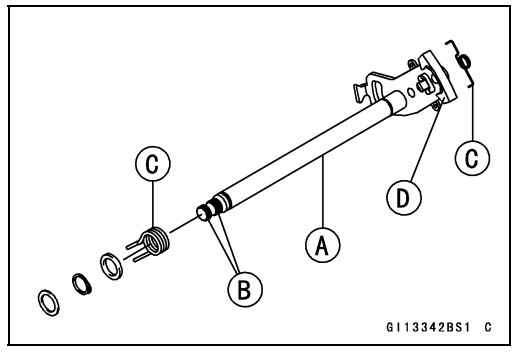
- Examine the shift shaft [A] for any damage.

★If the shaft is bent, straighten or replace it.

★If the serration [B] is 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 shaft.



- 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.

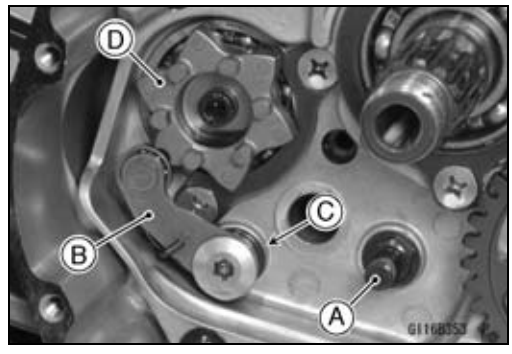
Torque - Shift Shaft Return Spring Pin: 28 N·m (2.9 kgf·m, 21 ft·lb)

- Check the gear positioning lever [B] and spring [C] for breaks or distortion.

★If the lever or spring are damaged in any way, replace them.

- Visually inspect the shift drum cam [D].

★If they are badly worn or if they show any damage, replace it.



Wheels/Tires

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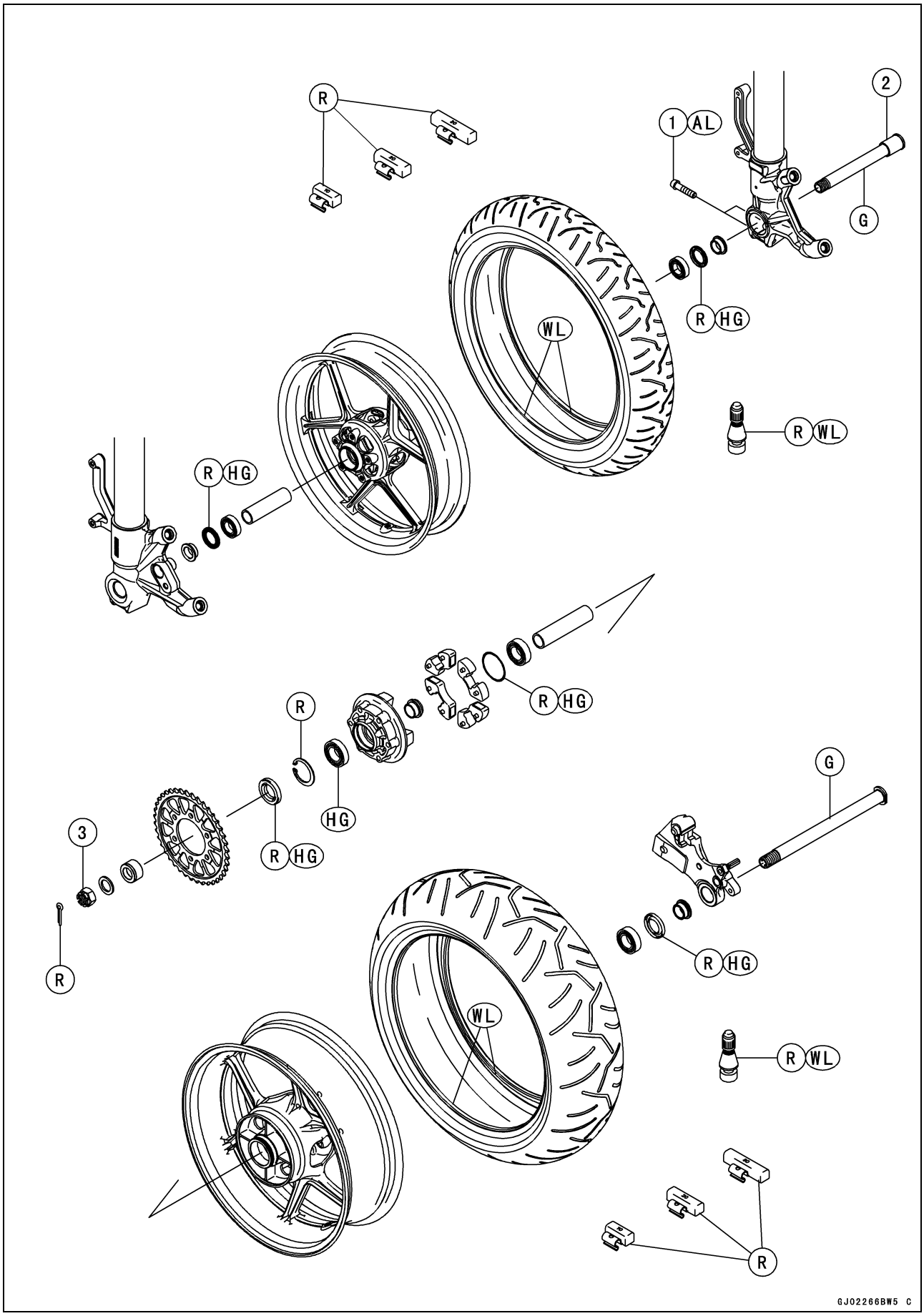
Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Axle Clamp Bolts	20	2.0	15	AL
2	Front Axle	127	13.0	93.7	
3	Rear Axle Nut	127	13.0	93.7	

AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque.
G: Apply grease.
HG: Apply high-temperature grease.
R: Replacement Parts
WL: Apply soap and water solution or rubber lubricant.

Specifications

Item	Standard	Service Limit
Wheels (Rims)		
Rim Runout:		
Axial	TIR 0.3 mm (0.01 in.) or less	TIR 1.0 mm (0.04 in.)
Radial	TIR 0.5 mm (0.02 in.) or less	TIR 1.0 mm (0.04 in.)
Axle Runout/100 mm (3.94 in.)	TIR 0.03 mm (0.0012 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.)	– – –
Rim Size:		
Front	17MC × MT3.50	– – –
Rear	17MC × MT5.50	– – –
Tires		
Air Pressure (when Cold):		
Front	Up to 180 kg (397 lb) load: 250 kPa (2.50 kgf/cm², 36 psi)	– – –
Rear	Up to 180 kg (397 lb) load: 290 kPa (2.90 kgf/cm², 42 psi)	– – –
Tread Depth:		
Front	3.6 mm (0.14 in.)	1 mm (0.04 in.) (AT, CH, DE) 1.6 mm (0.06 in.)
Rear	5.1 mm (0.20 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 HYPERSPORT S20F J	120/70ZR17 M/C (58W)
Rear	BRIDGESTONE, BATTLAX HYPERSPORT S20R J	180/55ZR17 M/C (73W)
Replacement Tires:	Make, Type	Size
Front	BRIDGESTONE, BATTLAX BT003F RACING STREET	120/70 ZR17 M/C (58 W)
	BRIDGESTONE, BATTLAX SPORT TOURING T30F	120/70 ZR17 M/C (58 W)
	BRIDGESTONE, BATTLAX HYPERSPORT S20 F	120/70 ZR17 M/C (58 W)
	MICHELIN, PILOT POWER 3	120/70 ZR17 M/C (58 W)
	DUNLOP, SPORTMAX SPORTSMART 2	120/70 ZR17 M/C (58 W)
	Continental, ContiMOTION Z	120/70 ZR17 M/C (58 W)
Rear	BRIDGESTONE, BATTLAX BT003F RACING STREET	180/55 ZR17 M/C (73W)
	BRIDGESTONE, BATTLAX SPORT TOURING T30R	180/55 ZR17 M/C (73W)
	BRIDGESTONE, BATTLAX HYPERSPORT S20 R	180/55 ZR17 M/C (73W)

Specifications

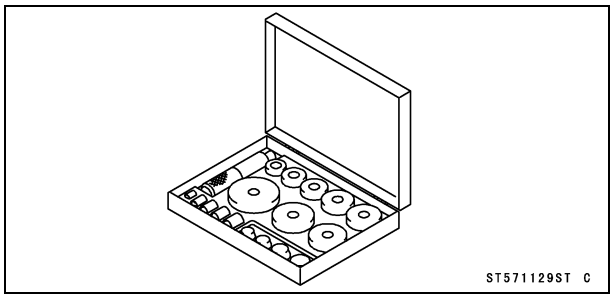
Item	Standard	Service Limit
	MICHELIN, PILOT POWER 3	180/55 ZR17 M/C (73W)
	DUNLOP, SPORTMAX SPORTSMART 2	180/55 ZR17 M/C (73W)
	Continental, ContiMOTION M	180/55 ZR17 M/C (73W)

⚠ WARNING

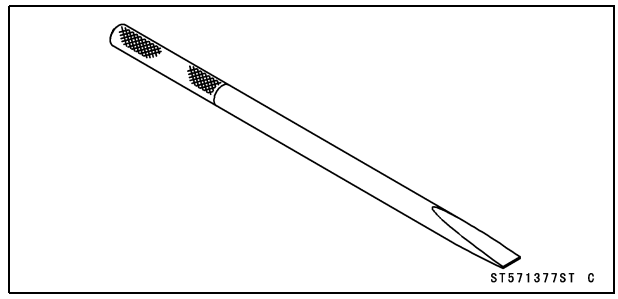
Some replacement tires may adversely affect handling and cause an accident resulting in serious injury or death. To ensure proper handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.

Special Tools

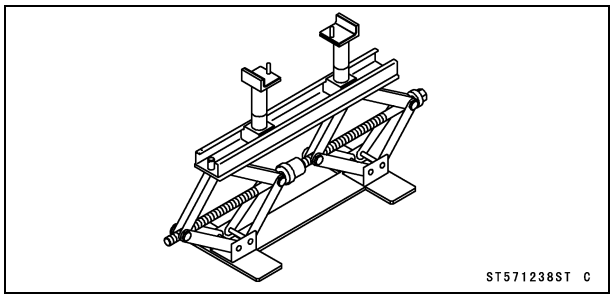
Bearing Driver Set:
57001-1129



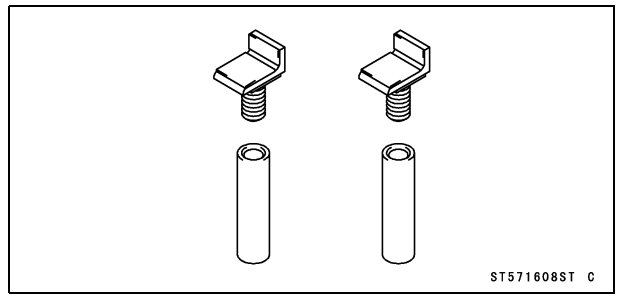
Bearing Remover Shaft, ϕ13:
57001-1377



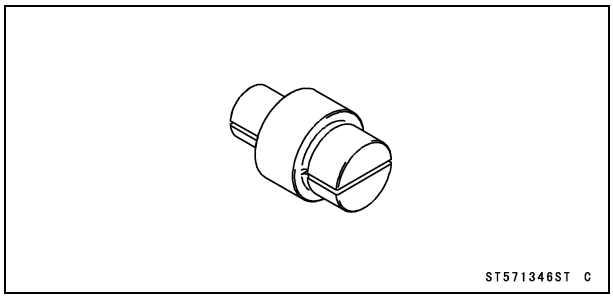
Jack:
57001-1238



Jack Attachment:
57001-1608

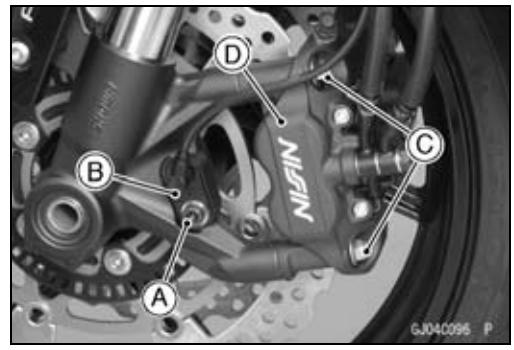


Bearing Remover Head, ϕ25 × ϕ28:
57001-1346

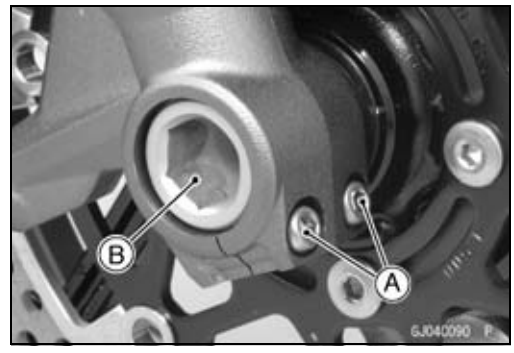


Wheels (Rims)

Front Wheel Removal



- Remove:
  Bolt [A]
  Front Wheel Rotation Sensor [B]
  Front Caliper Mounting Bolts [C] (Both Sides)
  Front Caliper [D] (Both Sides)



- Loosen:
  Front Axle Clamp Bolts [A]
  Front Axle [B]

- Remove the lower fairings (see Lower Fairing Removal in the Frame chapter).
- Raise the front wheel off the ground.

Special Tools - Jack: 57001-1238
Jack Attachment: 57001-1608

- Pull out the front axle to the right side and drop the front wheel out of the front forks.

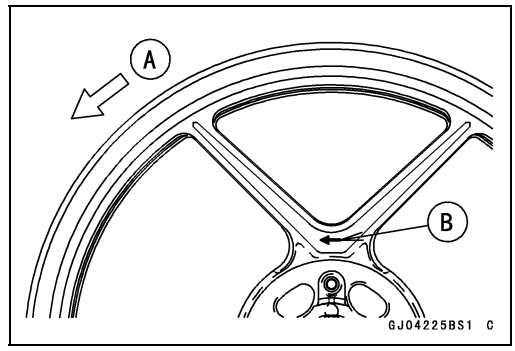
NOTICE
Do not lay the wheel down on one of the discs. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

Front Wheel Installation

NOTE

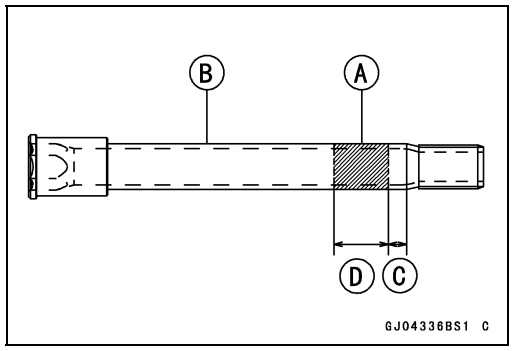
○*The direction of the wheel rotation [A] is shown by an arrow [B] on the wheel spoke.*

- Check the wheel rotation mark on the front wheel and install it.



Wheels (Rims)

● Apply a thin coat of grease [A] to the front axle [B] for rust prevention.
About 10 mm (0.4 in.) [C]
About 30 mm (1.2 in.) [D]



NOTE

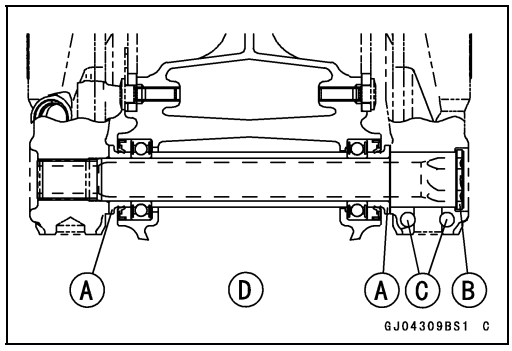
○*Do not apply grease to the threads of the axle.*

★If the front axle nut adhere, wipe off any grease.

● Apply high-temperature grease to the grease seal lips.
● Fit the collars [A] on the both sides of the hub.
○The collars are identical.
● Insert the front axle [B] from the right side.
● Tighten:

Torque - Front Axle: 127 N·m (13.0 kgf·m, 93.7 ft·lb)

Front Axle Clamp Bolts [C]
Viewed from Rear [D]



● Before tightening the front axle clamp bolts 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:

Torque - Front Axle Clamp Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)

NOTE

○*Tighten the two clamp bolts alternately two times to ensure even tightening torque.*

● Install the removed parts (see appropriate chapters).
● Check the front brake effectiveness (see Brake Operation Inspection in the Periodic Maintenance chapter).

⚠ WARNING

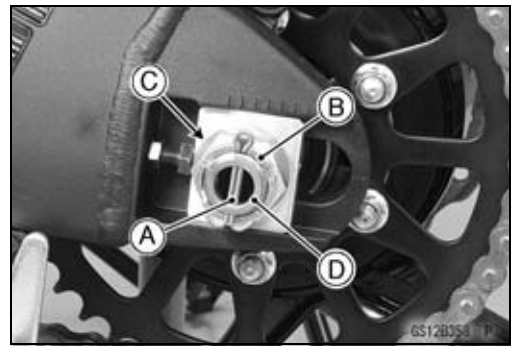
After servicing, it takes several applications of the brake lever before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever is obtained by pumping the lever until the pads are against the disc.

Wheels (Rims)

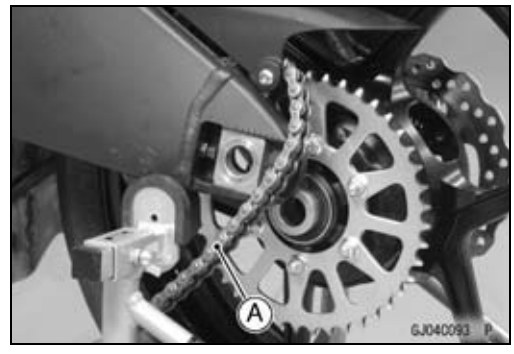
Rear Wheel Removal

- Raise the rear wheel off the ground with the stand [A].

- Remove the rear wheel rotation sensor from the caliper bracket (see Rear Wheel Rotation Sensor Removal in the Brakes chapter).
- Remove:
  Cotter Pin [A]
  Rear Axle Nut [B]
  Washer [C]
  Rear Axle [D] (from Right Side)



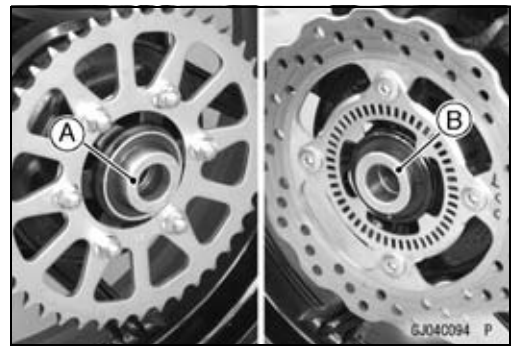
- Remove the drive chain [A] from the rear sprocket toward the left.
- Move the rear wheel back and remove it.



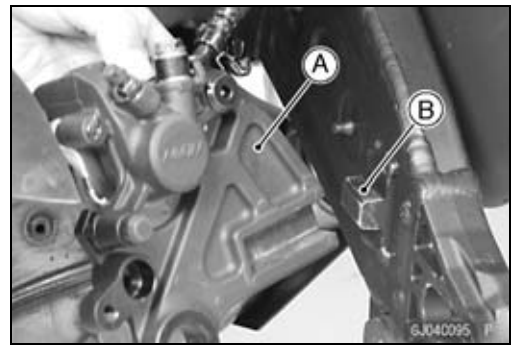
NOTICE
Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

Rear Wheel Installation

- Apply high-temperature grease to the grease seal lips.
- Fit the collars on the both sides of the hub.
  Left Side Collar [A]
  Right Side Collar [B] (with Flange)

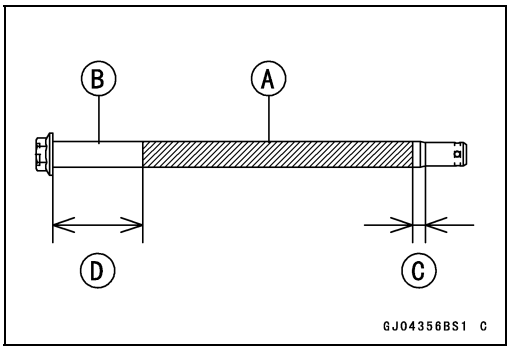


- Engage the drive chain with the rear sprocket.
- Install the caliper bracket [A] onto the stopper [B] of the swingarm.



Wheels (Rims)

● Apply a thin coat of grease [A] to the rear axle [B] for rust prevention.
About 10 mm (0.4 in.) [C]
About 70 mm (2.8 in.) [D]



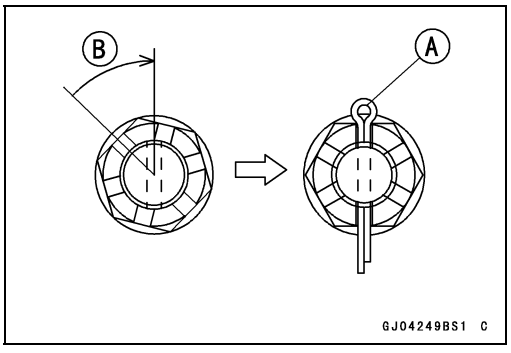
NOTE

○*Do not apply grease to the threads of the axle.*

★If the rear axle nut adhere, wipe off any grease.
● Insert the rear axle from the right side of the wheel.
● Install the washer and rear axle nut.
● Adjust the drive chain slack before tightening the rear axle nut (see Drive Chain Slack Inspection in the Periodic Maintenance chapter).
● Tighten:

Torque - Rear Axle Nut: 127 N·m (13.0 kgf·m, 93.7 ft·lb)

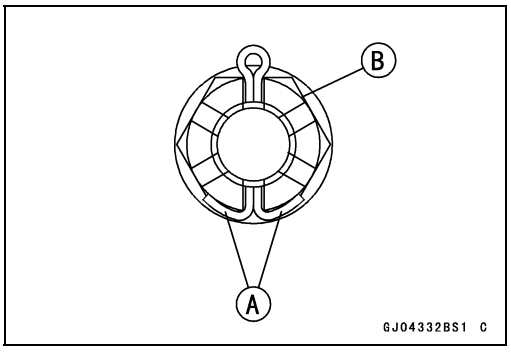
● Insert a new cotter pin [A].



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

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



⚠ WARNING

A loose axle nut can lead to an accident resulting in serious injury or death. Tighten the axle nut to the proper torque and install a new cotter pin.

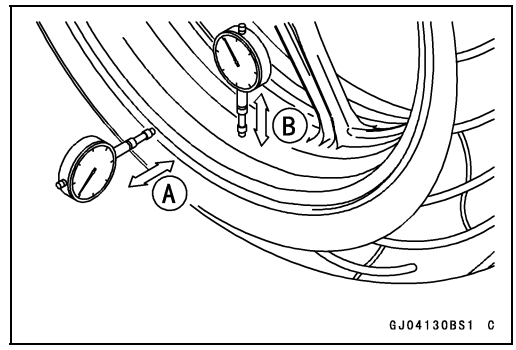
● Install the rear wheel rotation sensor (see Rear Wheel Rotation Sensor Installation in the Brakes chapter).
● Check the rear brake effectiveness (see Brake Operation Inspection in the Periodic Maintenance chapter).

⚠ WARNING

After servicing, it takes several applications of the brake pedal before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake pedal is obtained by pumping the pedal until the pads are against the disc.

Wheels (Rims)

Wheel Inspection



- Raise the front/rear wheel off the ground.

Special Tools - Jack: 57001-1238
Jack Attachment: 57001-1608

- Spin the wheel lightly, and check for roughness or binding.
★If roughness or binding is found, replace the hub bearings (see Hub Bearing Removal/Installation).
- 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 with the tire by the axle.
- Measure the rim runout, axial [A] and radial [B], with a dial gauge.
★If rim runout exceeds the service limit, check the hub bearings (see Hub Bearing Inspection).
★If the problem is not due to the bearings, replace the wheel.

Rim Runout (with tire installed)
Standard:

Axial	**TIR 0.3 mm (0.01 in.) or less**
Radial	**TIR 0.5 mm (0.02 in.) or less**

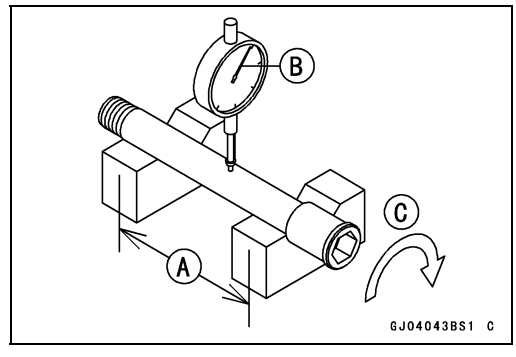
Service Limit:

Axial	**TIR 1.0 mm (0.04 in.)**
Radial	**TIR 1.0 mm (0.04 in.)**

⚠ WARNING

Damaged wheel parts may fail and cause an accident resulting in serious injury or death. Never attempt to repair a damaged wheel part. If the wheel part is damaged, it must be replaced with a new one.

Axle Inspection



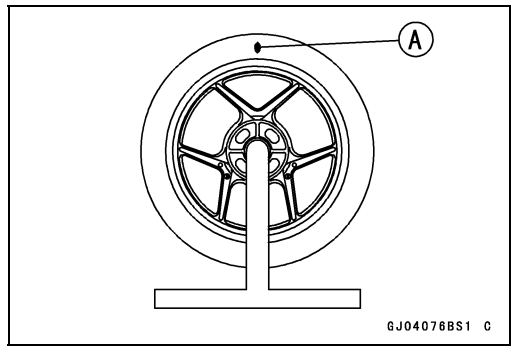
- Remove the front and rear axles (see Front/Rear Wheel Removal).
- Visually inspect the front and rear axle for damages.
★If the axle is damaged or bent, replace it.
- Place the axle in V blocks that are 100 mm (3.94 in.) [A] apart, and set a dial gauge [B] on the axle at a point halfway between the 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 0.03 mm (0.0012 in.) or less**
Service Limit:	**TIR 0.2 mm (0.008 in.)**

Wheels (Rims)

Balance Inspection

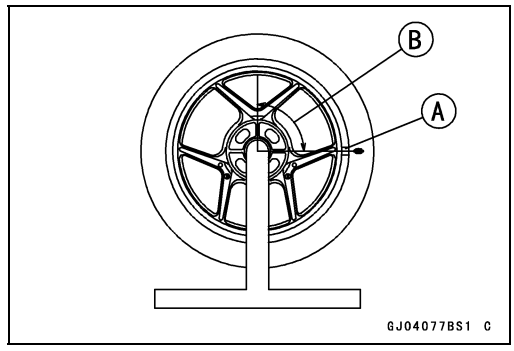


- Remove the front and rear wheels (see Front/Rear Wheel Removal).
- Support the wheel so that it can be spun freely.
- Spin the wheel lightly, and mark [A] the wheel at the top when the wheel stops.

○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 (see Balance Adjustment).

Balance Adjustment

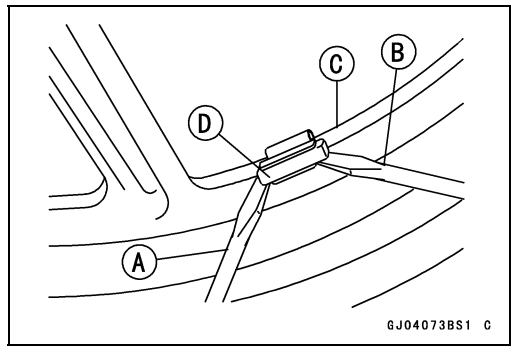


- If the wheel always stops in one position, provisionally attach a balance weight [A] on the rim at the marking using adhesive tape.
- Rotate the wheel 1/4 turn [B], and see whether or not the wheel stops in this position. If it does, the correct balance weight is being used.

★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.

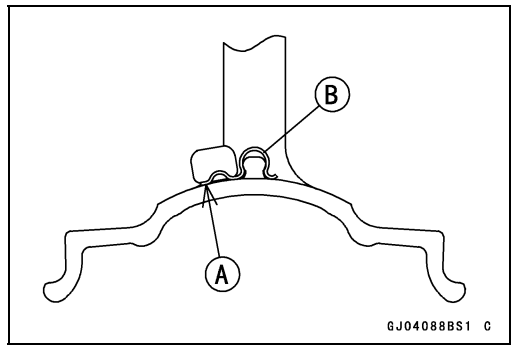
Balance Weight Removal



- Insert standard tip screwdrivers [A] [B] between the rib [C] and weight [D] as shown.
- Pry the balance weight with two screwdrivers and remove the balance weight.
- Discard the used balance weight.

NOTICE
Do not tap the screwdrivers. The rim could be damaged.

Balance Weight Installation



- Check if the weight portion has any play on the blade [A] and clip [B].

★If it does, discard it.

⚠ WARNING
Unbalanced wheels can create an unsafe riding condition. If the balance weight has any play on the rib of the rim, the blade and/or clip have been stretched. Replace the loose balance weight. Do not reuse used balance weight.

Wheels (Rims)

Balance Weight

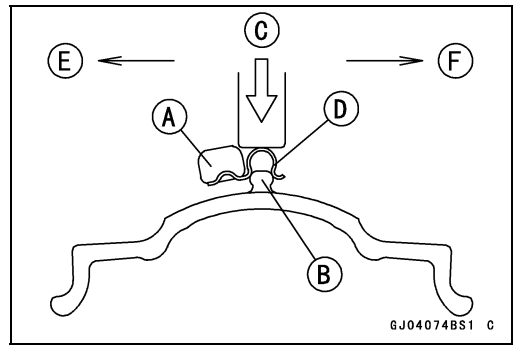
Part Number	Weight
41075-0007	10 g (0.35 oz.)
41075-0008	20 g (0.71 oz.)
41075-0009	30 g (1.06 oz.)

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.*

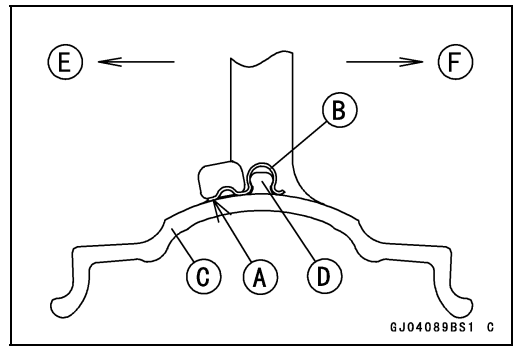
○*Do not use four or more balance weight (more than 90 gram, 3.2 oz.). If the wheel requires an excess balance weight, disassemble the wheel to find the cause.*

● Slip the balance weight [A] onto the rib [B] by pushing or lightly hammering [C] the clip [D].
Left Side [E]
Right Side [F]



● Be sure to install the balance weight.

○Check that the blade [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]



Tires

Air Pressure Inspection/Adjustment

- Refer to the Air Pressure Inspection in the Periodic Maintenance chapter.

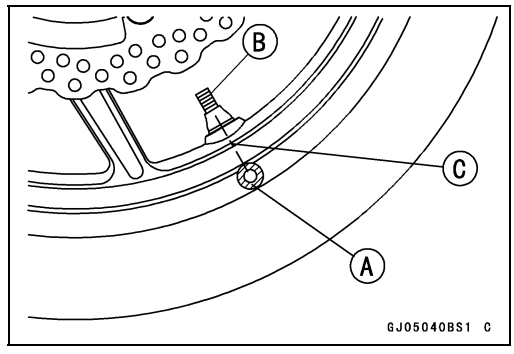
Tire Inspection

- Refer to the Wheel/Tire Damage Inspection in the Periodic Maintenance chapter.

Tire Removal

- Remove:
  Wheels (see Front/Rear Wheel Removal)
  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]
  Valve Stem [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.

NOTICE
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
Mixing tire brands and types can adversely affect handling and cause an accident resulting in injury or death. Always use the same manufacturer's tires on both front and rear wheels.

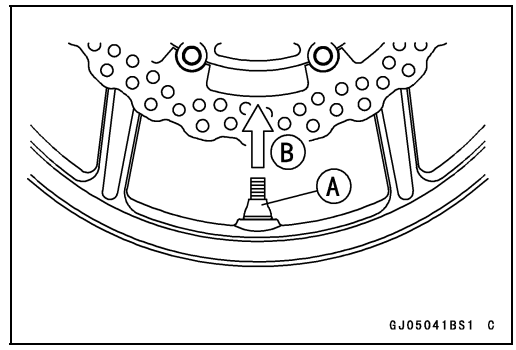
- Inspect the rim and tire, and replace them if necessary.
- Clean the sealing surfaces of the rim and tire, and smooth the sealing surfaces of the rim with a fine emery cloth if necessary.
- Remove the air valve and discard it.

NOTICE
Replace the air valve whenever the tire is replaced. Do not reuse the air valve.

Tires

● Install a new valve in the rim.

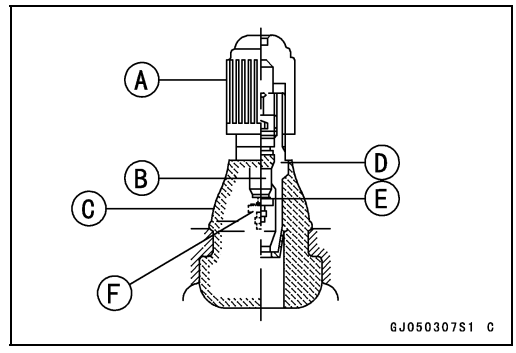
○Remove the valve cap, lubricate the stem seal [A] with a soap and water solution or rubber lubricant, and pull [B] the valve stem through the rim from the inside out until it snaps into place.



NOTICE
Do not use engine oil or petroleum distillates to lubricate the stem because they will deteriorate the rubber.

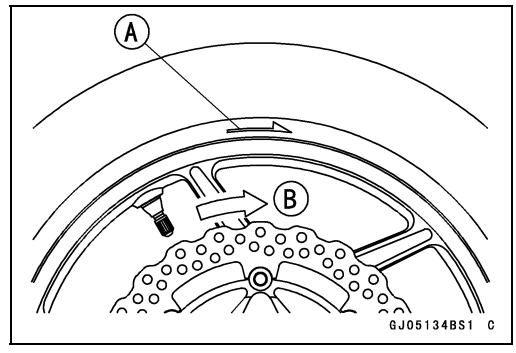
○The air valve is as shown.

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]
Rotating Direction [B]

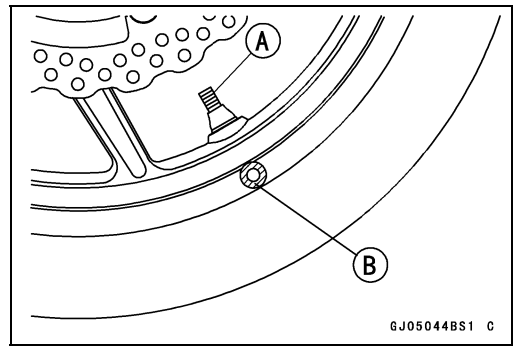


● Position the tire on the rim so that the valve [A] align with the tire balance mark [B] (the chalk mark made during removal, or the yellow paint mark on a new tire).

● Install the tire bead over the rim flange using a suitable commercially available tire changer.

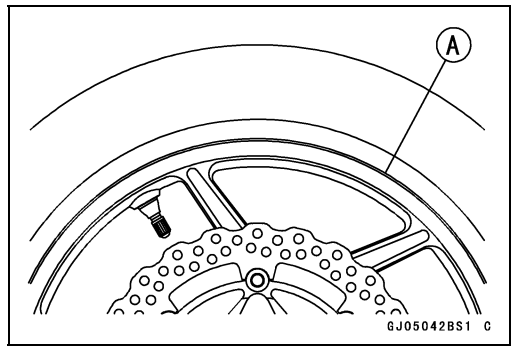
● Lubricate the tire beads and rim flanges with a soap and water solution or rubber lubricant to help seat the tire beads in the sealing surfaces of the rim while inflating the tire.

● Center the rim in the tire beads, and inflate the tire with compressed air until the tire beads seat in the sealing surfaces.



⚠ WARNING
Overinflating a tire can cause it to explode, causing serious injury or death. 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).

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 Air Pressure Inspection in the Periodic Maintenance chapter).
- Install the air valve cap.
- Adjust the wheel balance (see Balance Adjustment).

Tire Repair

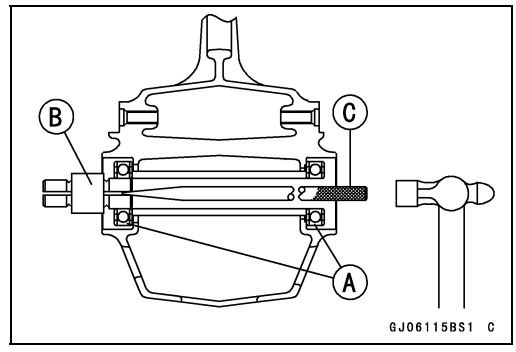
Currently two types of repair for tubeless tires have come into wide use. One type is called a temporary (external) repair which can be carried out without removing the tire from the rim, and the other type is called permanent (internal) repair which requires tire removal. It is generally understood 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 wheels (see Front/Rear Wheel Removal), and take out the following.
  Collars
  Coupling (Out of rear hub)
  Grease Seals

- Use the bearing remover to remove the hub bearings [A].

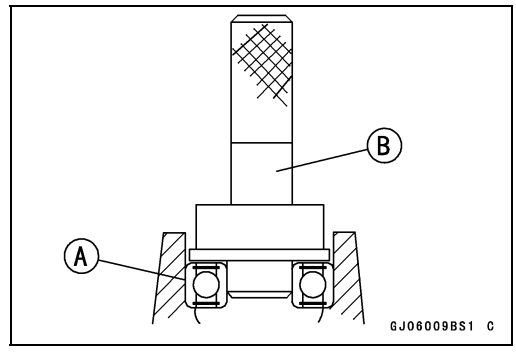


NOTICE
Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

Special Tools - Bearing Remover Head, ϕ25 × ϕ28 [B]: 57001-1346
Bearing Remover Shaft, ϕ13 [C]: 57001 -1377

Hub Bearing Installation

- Before installing the hub 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.
- Install the bearings by using the bearing driver set which does not contact the bearing inner race.



NOTE

○*Install the bearings so that the marked side faces out.*

- Press in the right side bearing [A] until they are bottomed.

Special Tool - Bearing Driver Set [B]: 57001-1129

- Install the collar into the hub from left side.
- Press in the left side bearing until they are bottomed.

Special Tool - Bearing Driver Set: 57001-1129

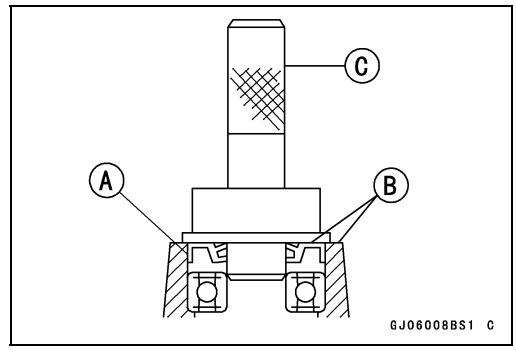
- Confirm that the axle can be inserted smoothly.
- Confirm that the each bearing inner race can be turned smoothly. Then visually inspect that the inner race of the opposite side turns.

★If they do not turn smoothly, remove the bearings and collar and visually inspect the wheel and collar.

- Replace the grease seals with new ones.
- Press in the grease seals [A] so that the seal surface is flush [B] with the end of the hole.

○Apply high-temperature grease to the grease seal lips.

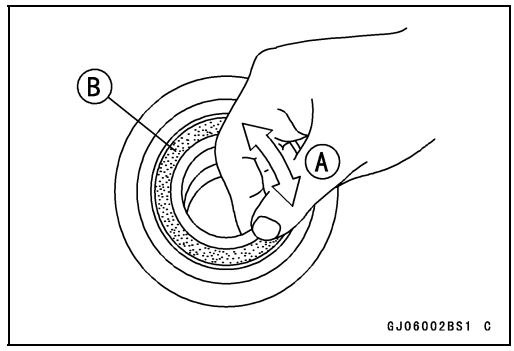
Special Tool - Bearing Driver Set [C]: 57001-1129



Hub Bearing

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.

Hub Bearing Lubrication

NOTE

○*Since the hub bearings are packed with grease and sealed, lubrication is not required.*

Final Drive

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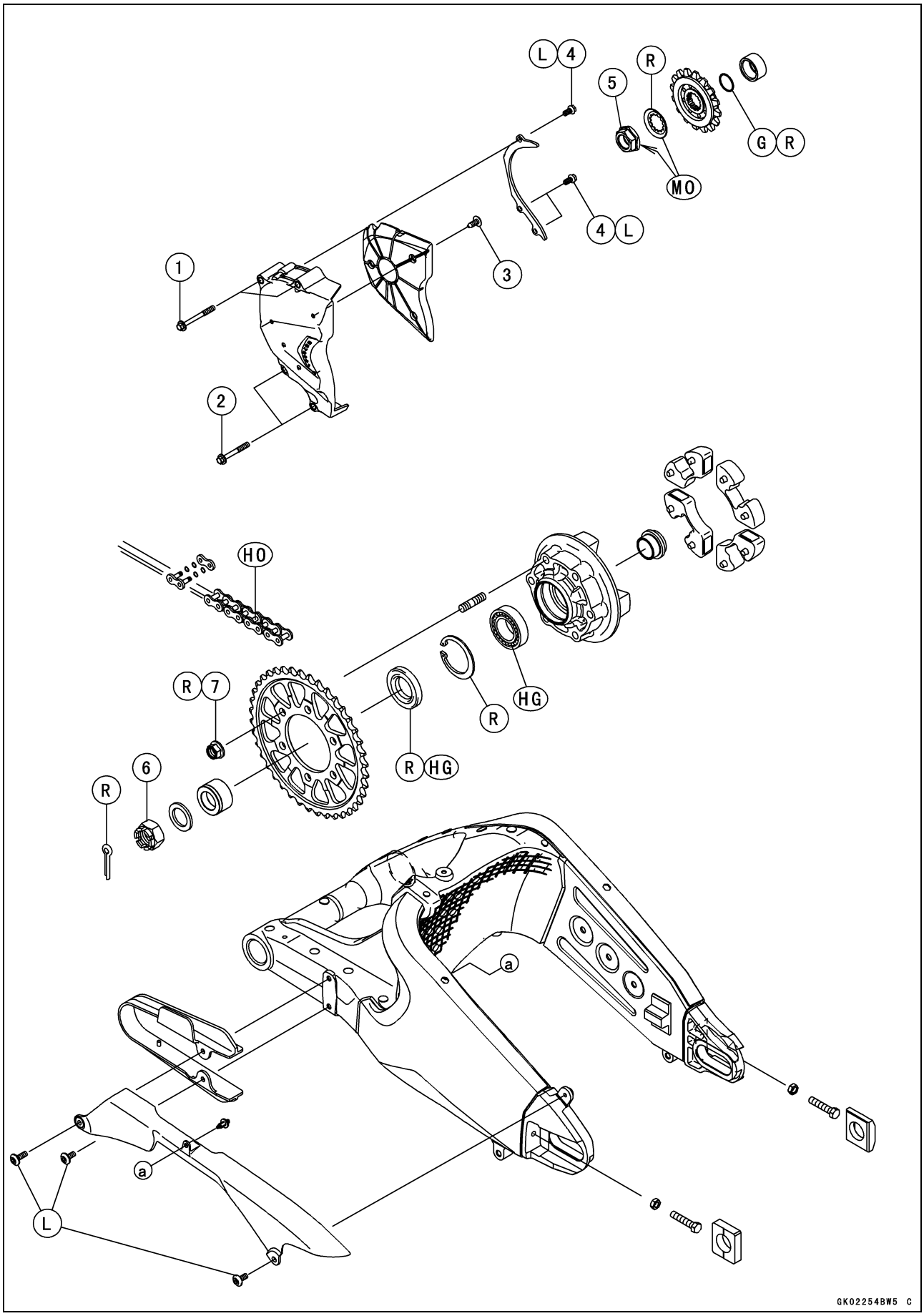
Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Engine Sprocket Cover Bolts (L = 55)	9.8	1.0	87 in·lb	
2	Engine Sprocket Cover Bolts (L = 45)	9.8	1.0	87 in·lb	
3	Engine Sprocket Cover Damper Screws	3.0	0.31	27 in·lb	
4	Chain Guide Bolts	12	1.2	106 in·lb	L
5	Engine Sprocket Nut	147	15.0	108	MO
6	Rear Axle Nut	127	13.0	93.7	
7	Rear Sprocket Nuts	59	6.0	44	R

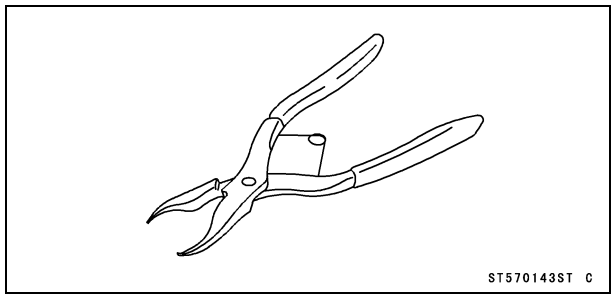
G: Apply grease.
HG: Apply high-temperature grease.
HO: Apply heavy oil.
L: Apply a non-permanent locking agent.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts

Specifications

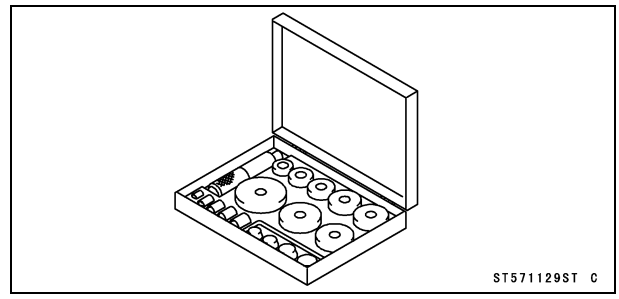
Item	Standard	Service Limit
Drive Chain		
Drive Chain Slack	30 ~ 40 mm (1.2 ~ 1.6 in.)	– – –
Drive Chain Wear (20-link Length)	317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)	319 mm (12.6 in.)
Standard Chain:		
Make	ENUMA	– – –
Type	EX520RMX/3D	– – –
Link	112 links	– – –
Sprockets		
Rear Sprocket Warp	TIR 0.4 mm (0.016 in.) or less	TIR 0.5 mm (0.020 in.)

Special Tools

Inside Circlip Pliers:
57001-143



Bearing Driver Set:
57001-1129



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.

Wheel Alignment Inspection/Adjustment

● Refer to the Wheel Alignment Inspection 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 Condition Inspection in the Periodic Maintenance chapter.

Drive Chain Guide Wear Inspection

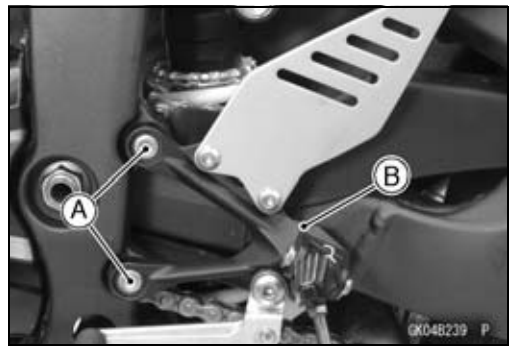
● Refer to the Chain Guide Wear Inspection in the Periodic Maintenance chapter.

Drive Chain Removal/Installation

NOTE

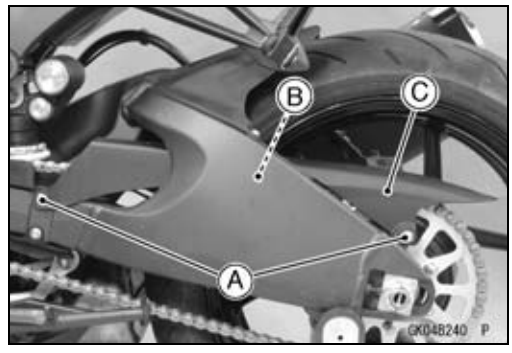
○*Since the drive chain is installed through the swingarm, The chain can not be removed other than by cutting it. Prepare the new link pin, link plate, grease seals, and tools for rejoining the chain.*

● Remove:
Front Footpeg Bracket Bolts [A]
Front Footpeg Bracket [B]



● Remove:
Bolts [A]
Quick Rivet [B]
Chain Cover [C]

○Push the central pin, and then remove the quick rivet.

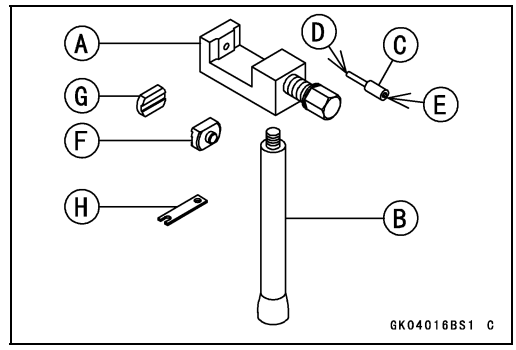


NOTICE
For safety, if the drive chain shall be replaced, replace it using a recommended tool.

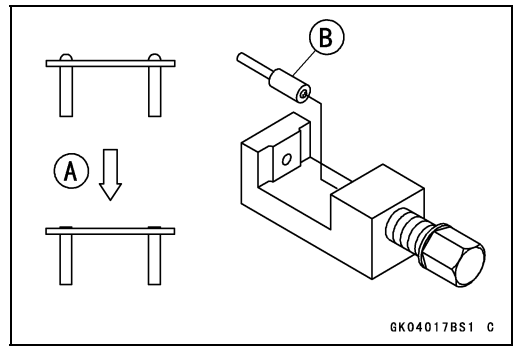
Recommended Tool - Type: EK Joint Tool #50
Brand: ENUMA

Drive Chain

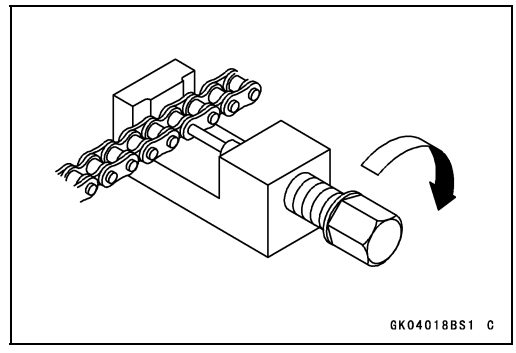
Body [A]
Handlebar [B]
Cutting and Riveting Pin [C]
For Cutting [D]
For Riveting [E]
Plate Holder (A) [F]
Plate Holder (B) [G]
Gauge [H]



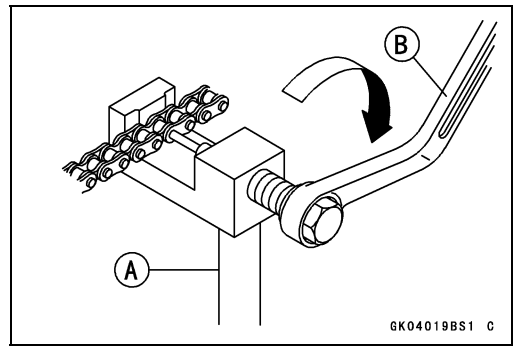
- Grind [A] the pin head to make it flat.
- Set the cutting and riveting pin [B] as shown.



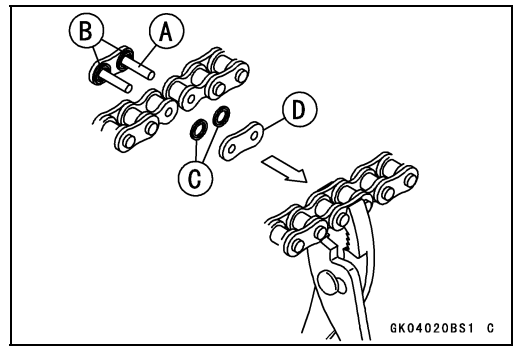
- Screw the pin holder until it touches the link pin.
- Be sure that the cutting pin hits center of the link pin.



- Screw the handlebar [A] into the body.
- Turn the pin holder with the wrench [B] clockwise to extract the link pin.

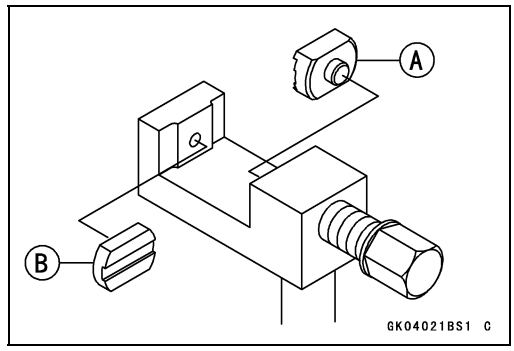


- Replace the link pin, link plate and grease seals.
- Apply grease to the link pins [A] and grease seals [B] [C].
- Engage the drive chain on the engine and rear sprockets.
- Insert the link pins in the drive chain ends.
- Install the grease seals.
- Install the link plate so that the mark [D] faces out.
- Push the link plate by hand or plier to fix it.
- Be sure to set the grease seals correctly.

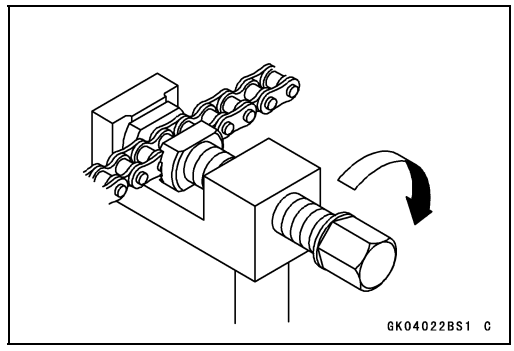


Drive Chain

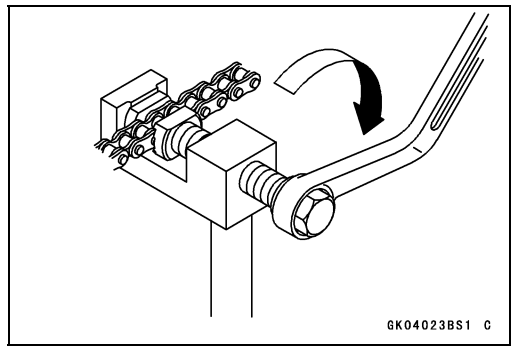
- Set the plate holder (A) [A] and plate holder (B) [B] on the body.



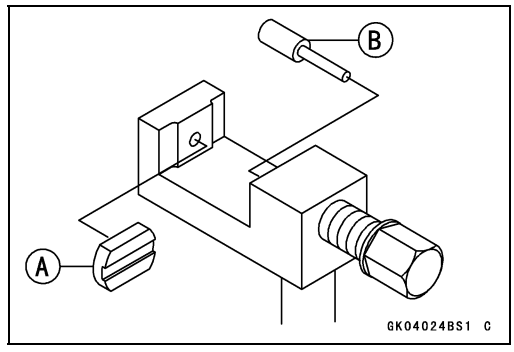
- Fit the plate holder (A) to the link plate.
- Turn the pin holder by hand until the plate holder (B) touches the other link plate.



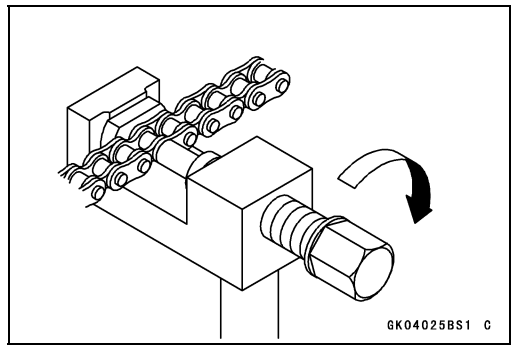
- Turn the pin holder by a wrench clockwise until two pins of link come into groove of the plate holder (A).
- Take off the plate holder.



- Set the plate holder (B) [A] and cutting and riveting pin [B] as shown.

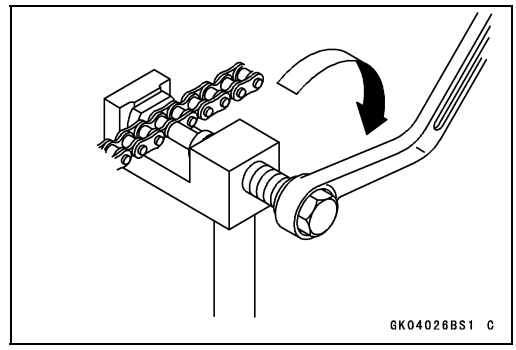


- Turn the pin holder until the riveting pin touches the link pin.



Drive Chain

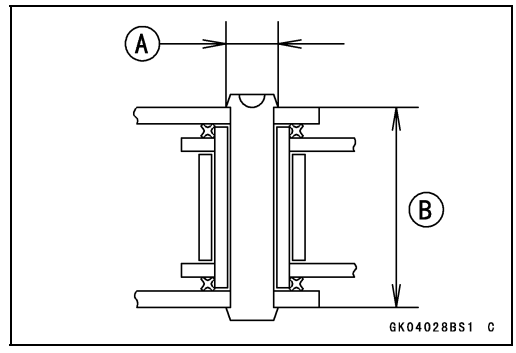
- Turn the wrench clockwise until the tip of riveting pin hits of the link pin.
- Rivet it.
- Same work for the other link pin.



- 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: 16.40 ~ 16.55 mm (0.646 ~ 0.652 in.)

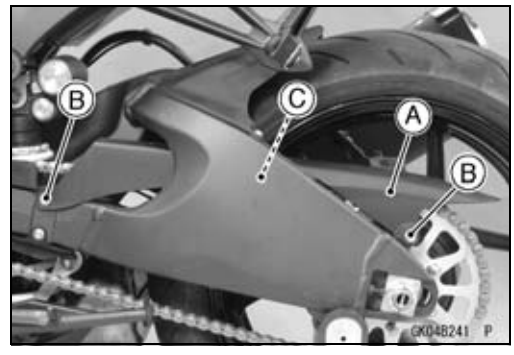


★If the reading exceeds the specified length, cut and rejoin the chain again.

- Check:
  Movement of the Rollers
- Adjust the drive chain slack after installing the chain (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).

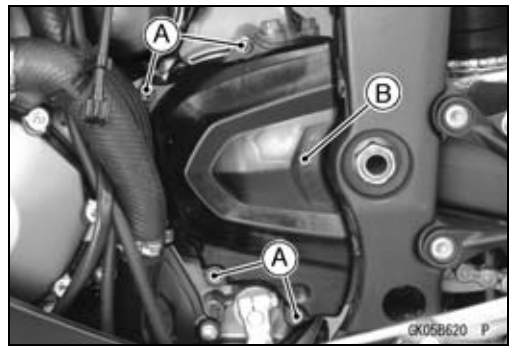
- Install the chain cover [A].
- Apply a non-permanent locking agent to the threads of the bolts [B] and tighten them.
- Set the quick rivet [C] and push the core of it.
- Install the front footpeg bracket.
- Apply a non-permanent locking agent to the threads of the front footpeg bracket bolts, and tighten them.

Torque - Front Footpeg Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

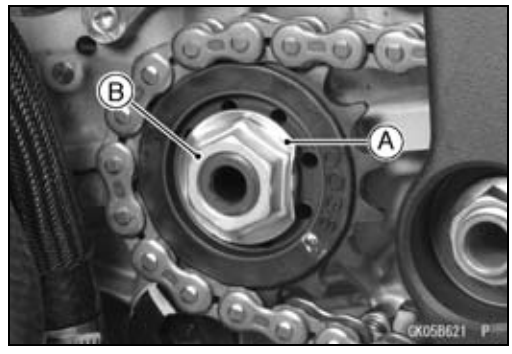


Sprocket, Coupling

Engine Sprocket Removal



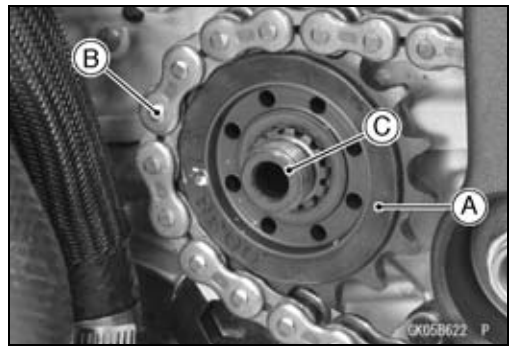
- Remove:
  Engine Sprocket Cover Bolts [A]
  Engine Sprocket Cover [B]



- Flatten out the bended washer [A].
- Remove the engine sprocket nut [B] and washer.

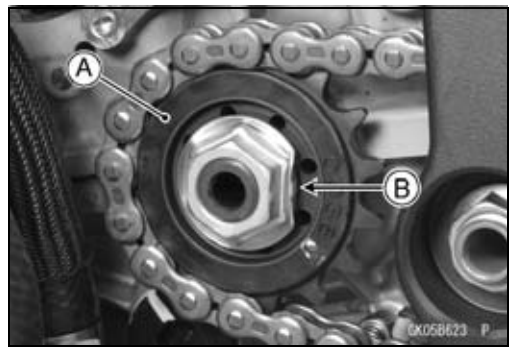
NOTE

○*When loosening the engine sprocket nut, hold the rear brake on.*



- Raise the rear wheel off the ground with the stand.
- Loosen the drive chain (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).
- Pull the engine sprocket [A] with drive chain [B] off the output shaft [C].
- Disengage the drive chain from the engine sprocket.

Engine Sprocket Installation



- Replace the sprocket washer and axle cotter pin.
- Install the engine sprocket [A] onto the output shaft.
- Apply molybdenum disulfide oil solution to the threads and seating surface of the engine sprocket nut.
- Tighten:

Torque - Engine Sprocket Nut: 147 N·m (15.0 kgf·m, 108 ft·lb)

NOTE

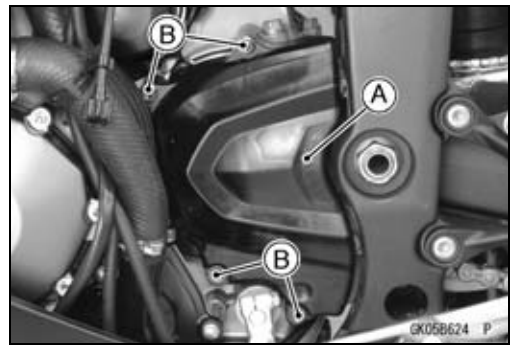
○*Tighten the engine sprocket nut while applying the rear brake.*

- After torquing the engine sprocket nut, bend [B] the one side of the washer over the nut.
- Adjust the drive chain slack after installing the engine sprocket (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).

Sprocket, Coupling

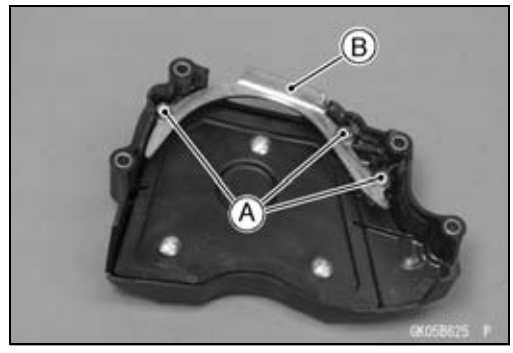
- Install:
  Engine Sprocket Cover [A]
- Tighten:

Torque - Engine Sprocket Cover Bolts [B]: 9.8 N·m (1.0 kgf·m, 87 in·lb)

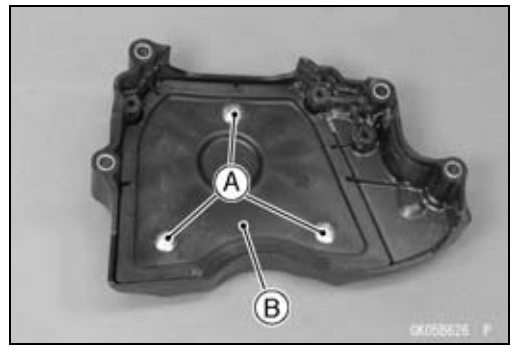


Engine Sprocket Cover Disassembly

- Remove:
  Engine Sprocket Cover (see Engine Sprocket Removal)
  Chain Guide Bolts [A]
  Chain Guide [B]



- Remove:
  Engine Sprocket Cover Damper Screws [A]
  Damper [B]



Engine Sprocket Cover Assembly

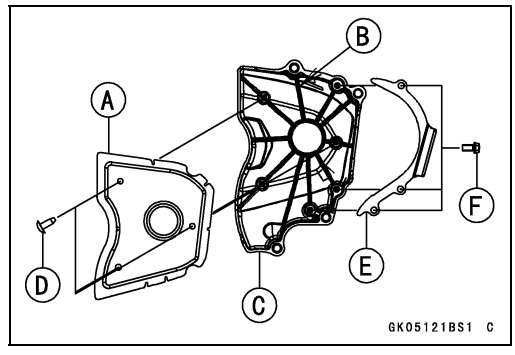
- Fit the grooves of the damper [A] to the ribs [B] of the engine sprocket cover [C].
- Tighten:

Torque - Engine Sprocket Cover Damper Screws [D]: 3.0 N·m (0.31 kgf·m, 27 in·lb)

- Install the chain guide [E].
- Apply a non-permanent locking agent to the threads of the chain guide bolts [F], and tighten them.

Torque - Chain Guide Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)

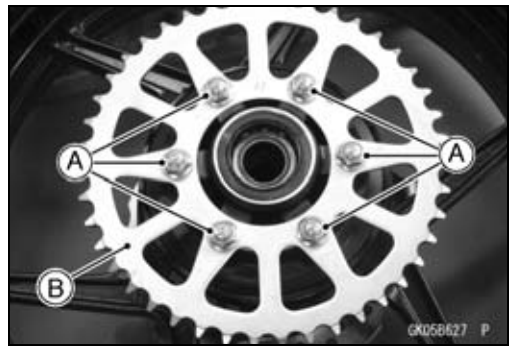
- Install:
  Engine Sprocket Cover (see Engine Sprocket Installation)



Sprocket, Coupling

Rear Sprocket Removal

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



NOTICE
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:
  Rear Sprocket Nuts [A]
  Rear Sprocket [B]

Rear Sprocket Installation

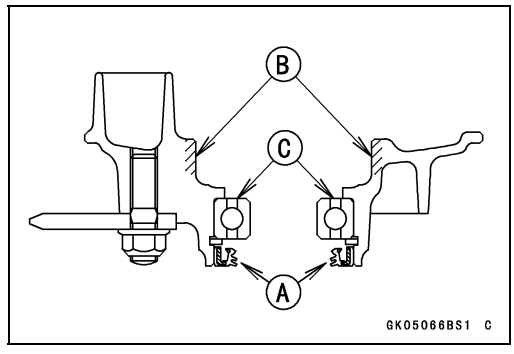
- Install the sprocket facing the tooth number marking [A] outward.
- Replace the rear sprocket nuts with new ones.
- Tighten:

  Torque - Rear Sprocket Nuts: 59 N·m (6.0 kgf·m, 44 ft·lb)

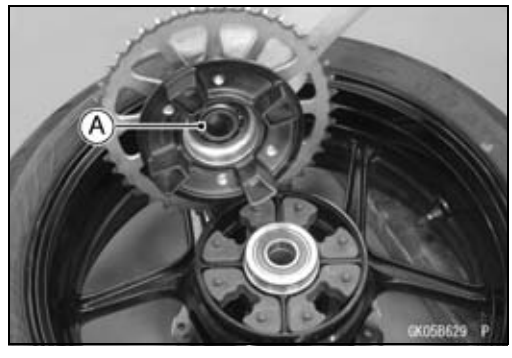
- Install the rear wheel (see Rear Wheel Installation in the Wheels/Tires chapter).

Coupling Installation

- Apply high-temperature grease to the following.
  Coupling Grease Seal Lips [A]
  Coupling Internal Surface [B]
  Ball Bearing [C]

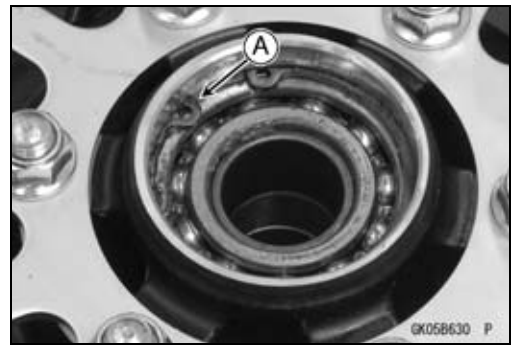


- Install:
  Collar [A]
  Coupling



Sprocket, Coupling

Coupling Bearing Removal

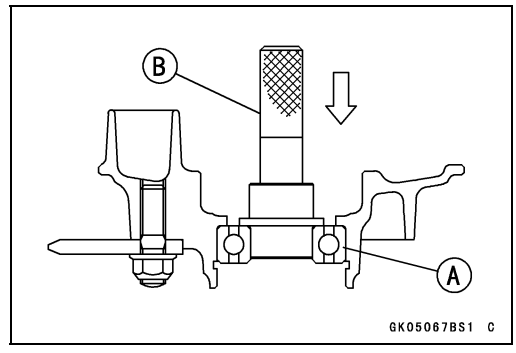


- Remove:
  Coupling
  Grease Seal
  Circlip [A]

Special Tool - Inside Circlip Pliers: 57001-143

- Remove the bearing [A] by tapping from the wheel side.

Special Tool - Bearing Driver Set [B]: 57001-1129



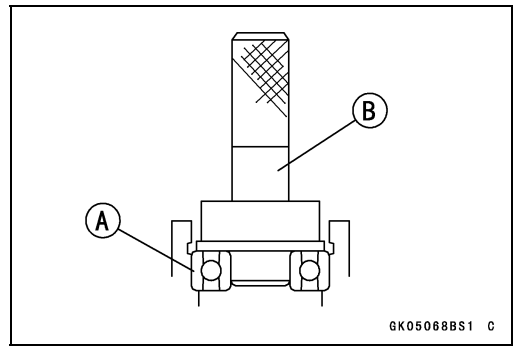
Coupling Bearing Installation

- Replace the bearing with a new one.
- Press in the bearing [A] until it is bottomed.

Special Tool - Bearing Driver Set [B]: 57001-1129

- Pack the bearing with high-temperature grease.
- Replace the circlip with a new one.

Special Tool - Inside Circlip Pliers: 57001-143



- 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.

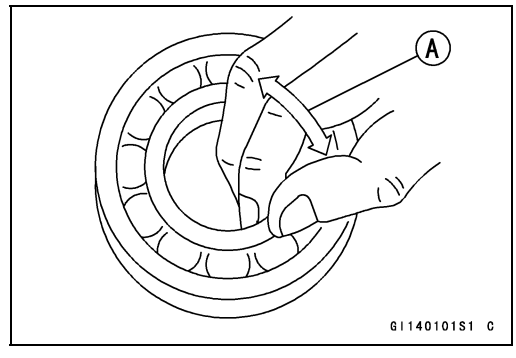
Special Tool - Bearing Driver Set: 57001-1129

Coupling 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.*



- Turn the bearing in the coupling back and forth [A] while checking for plays, roughness or binding.

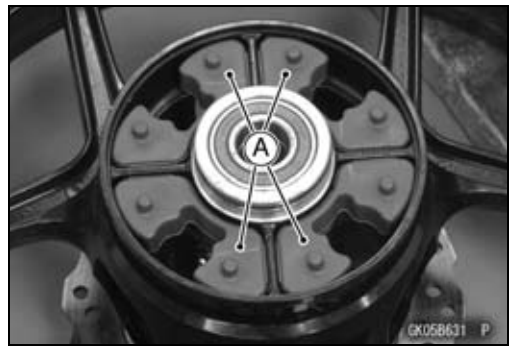
★If the bearing play, roughness or binding is found, replace the bearing.

Coupling Bearing Lubrication

- Pack the bearing with high-temperature grease. Turn the bearing around by hand a few times to make sure the grease is distributed uniformly inside the bearing.

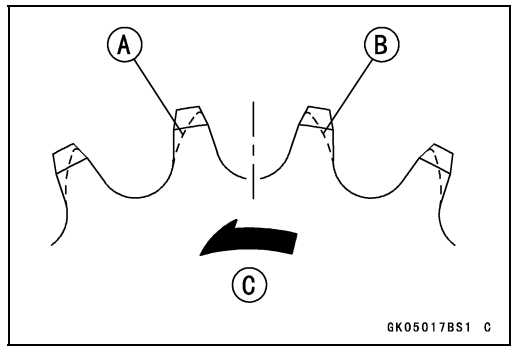
Sprocket, Coupling

Coupling Damper Inspection



- Remove the rear wheel coupling, and inspect the rubber dampers [A].
- Replace the damper if it appears damaged or deteriorated.

Sprocket Wear Inspection



- Visually inspect the engine and rear sprocket teeth for wear and damage.

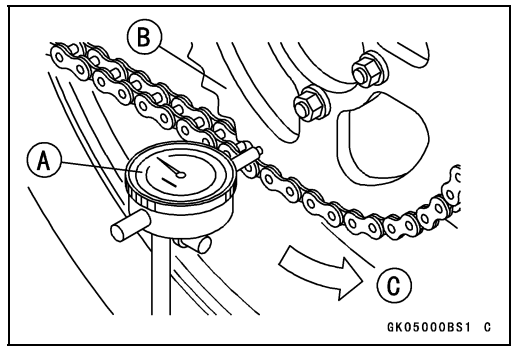
★If the teeth are worn as illustrated, replace the sprocket, and inspect the drive chain wear (see Drive Chain Wear Inspection in the Periodic Maintenance chapter).

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 with the stand 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: TIR 0.4 mm (0.016 in.) or less
Service Limit: TIR 0.5 mm (0.020 in.)

Brakes

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Exploded View

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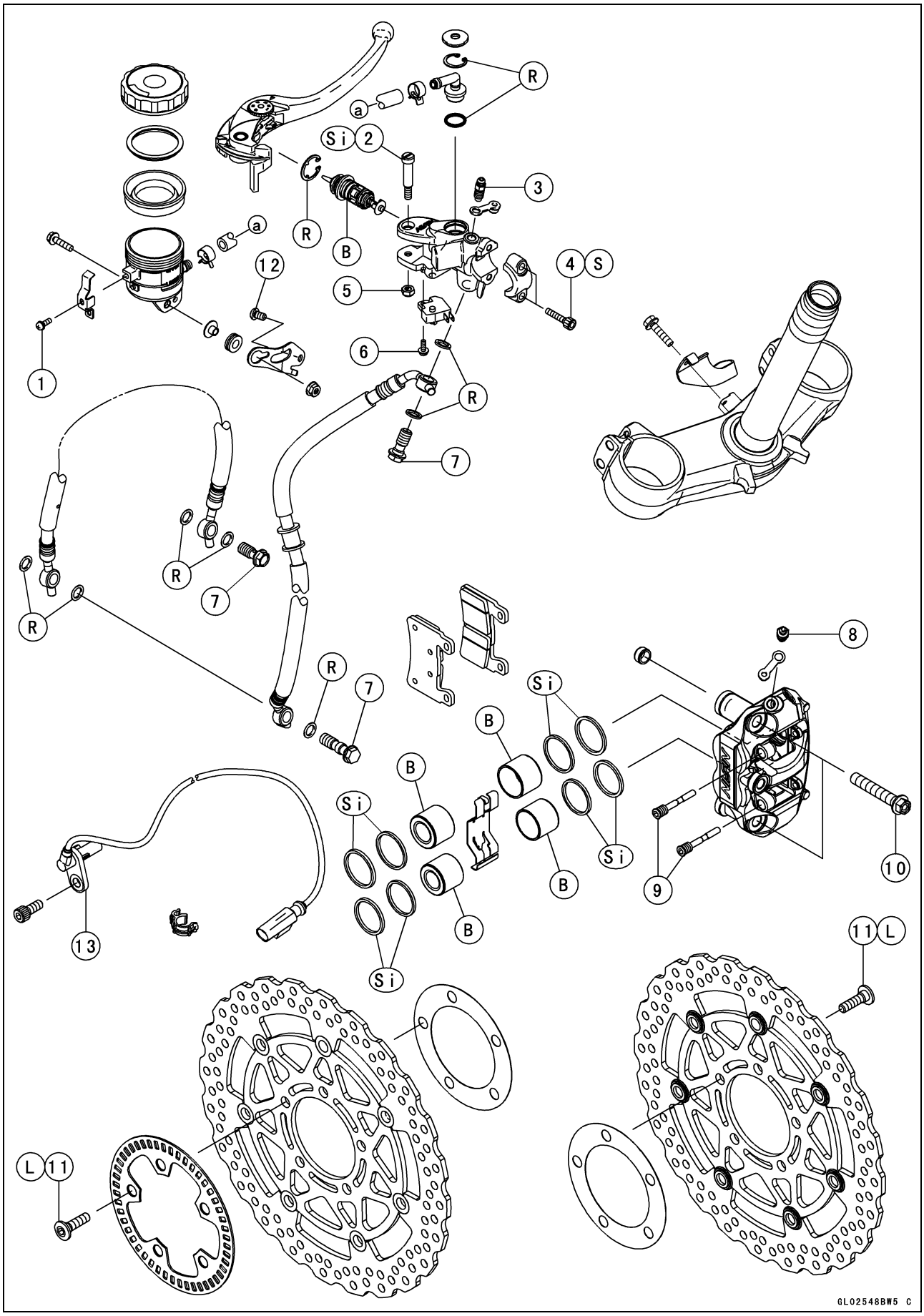
Exploded View

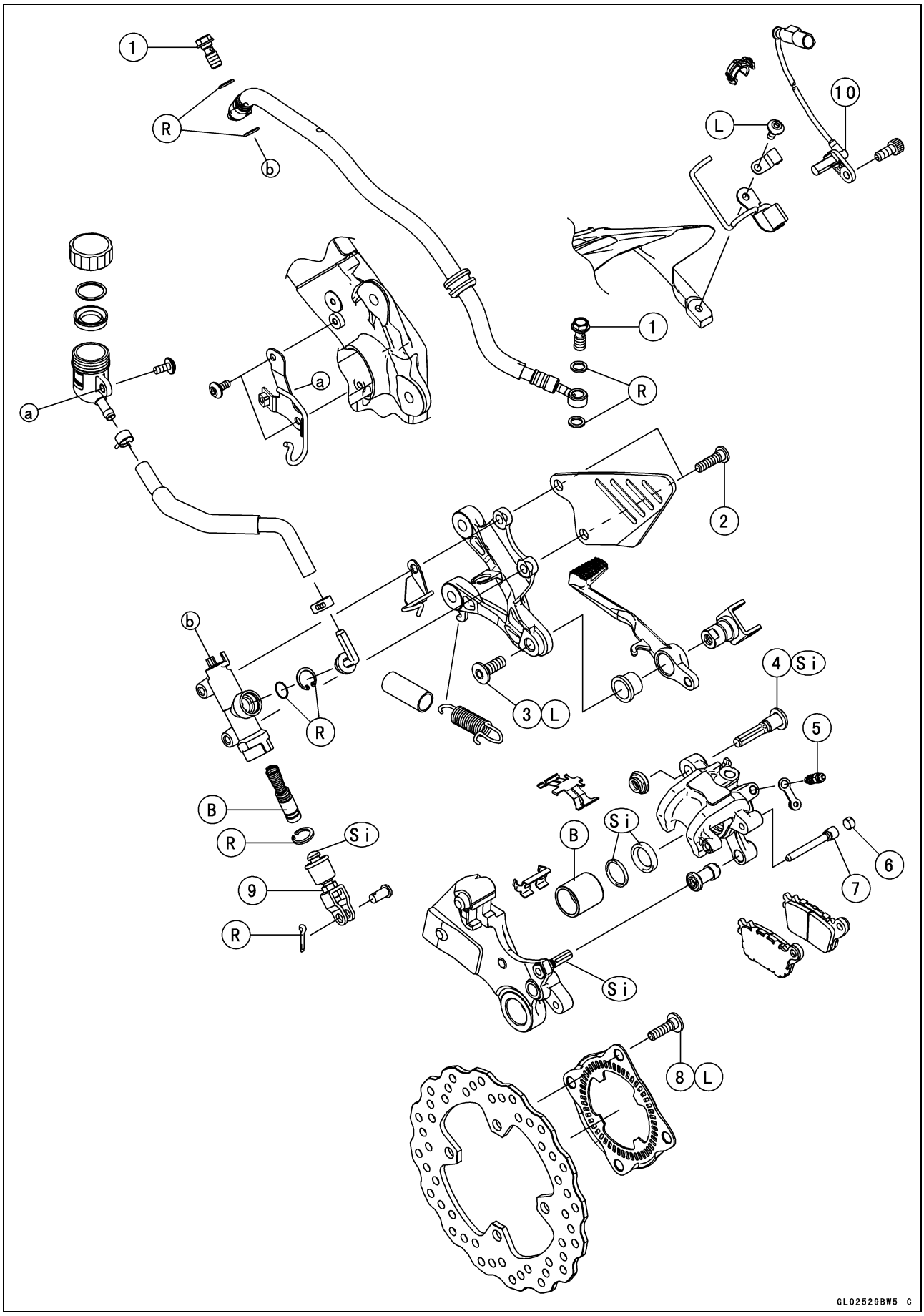


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Brake Reservoir Cap Stopper Screw	1.2	0.12	11 in·lb	
2	Brake Lever Pivot Bolt	1.0	0.10	8.9 in·lb	Si
3	Front Master Cylinder Bleed Valve	5.4	0.55	48 in·lb	
4	Front Master Cylinder Clamp Bolts	11	1.1	97 in·lb	S
5	Brake Lever Pivot Bolt Locknut	5.9	0.60	52 in·lb	
6	Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
7	Brake Hose Banjo Bolts	25	2.5	18	
8	Bleed Valves	7.8	0.80	69 in·lb	
9	Front Brake Pad Pins	17	1.7	13	
10	Front Caliper Mounting Bolts	34	3.5	25	
11	Front Brake Disc Mounting Bolts	27	2.8	20	L
12	Front Master Cylinder Bracket Bolt	8.8	0.90	78 in·lb	

13. Front Wheel Rotation Sensor
B: Apply brake fluid.
L: Apply a non-permanent locking agent.
R: Replacement Parts
S: Follow the specified tightening sequence.
Si: Apply silicone grease.

Exploded View



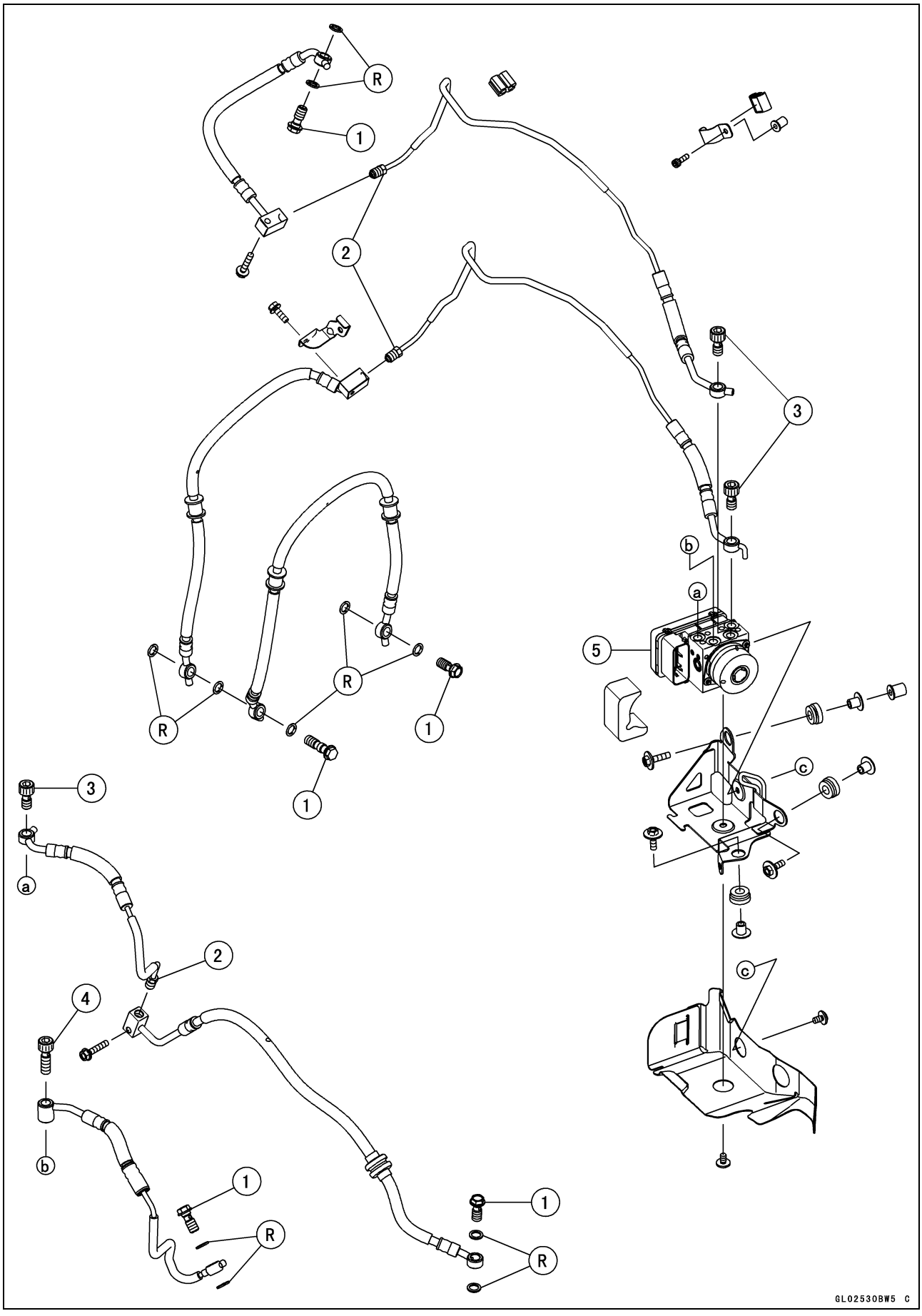
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Brake Hose Banjo Bolts	25	2.5	18	
2	Rear Master Cylinder Mounting Bolts	25	2.5	18	
3	Brake Pedal Mounting Bolt	34	3.5	25	L
4	Rear Caliper Pin Bolt	27	2.8	20	Si
5	Bleed Valve	7.8	0.80	69 in·lb	
6	Rear Brake Pad Pin Plug	2.45	0.25	22 in·lb	
7	Rear Brake Pad Pin	17	1.7	13	
8	Rear Brake Disc Mounting Bolts	27	2.8	20	L
9	Rear Master Cylinder Push Rod Locknut	17	1.7	13	

10. Rear Wheel Rotation Sensor
B: Apply brake fluid.
L: Apply a non-permanent locking agent.
R: Replacement Parts
Si: Apply silicone grease.

Exploded View

ABS Equipped Models



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Brake Hose Banjo Bolts	25	2.5	18	
2	Brake Pipe Joint Nuts	18	1.8	13	
3	Brake Pipe Banjo Bolts (L = 20.8)	23	2.3	17	
4	Brake Pipe Banjo Bolt (L = 32.3)	23	2.3	17	

5. ABS Hydraulic Unit
R: Replacement Parts

NOTE

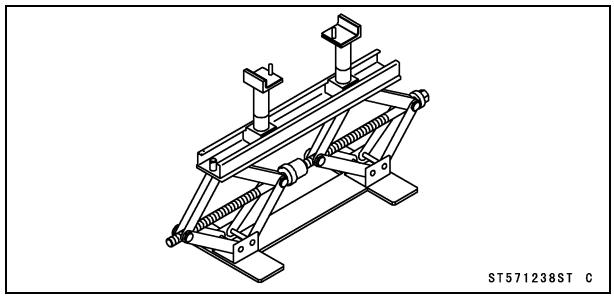
○*When disassembling the brake hose and pipe, disassemble them by the unit as shown in the exploded view.*

Specifications

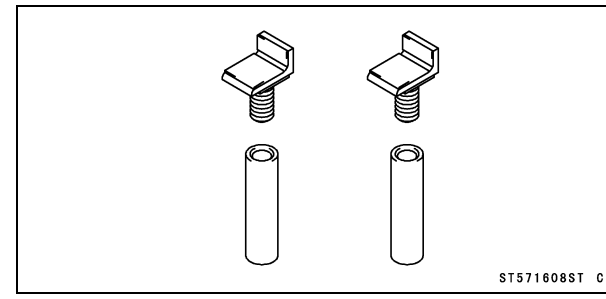
Item	Standard	Service Limit
Brake Lever, Brake Pedal		
Brake Lever Position	6-way adjustable (to suit rider)	– – –
Brake Lever Free Play	Non-adjustable	– – –
Pedal Free Play	Non-adjustable	– – –
Pedal Position	About 75 mm (2.95 in.) below top of footpeg	– – –
Brake Pads		
Lining Thickness:		
Front	4.0 mm (0.16 in.)	1 mm (0.04 in.)
Rear	5.0 mm (0.20 in.)	1 mm (0.04 in.)
Brake Discs		
Thickness:		
Front	4.8 ~ 5.2 mm (0.19 ~ 0.20 in.)	4.5 mm (0.18 in.)
Rear	4.8 ~ 5.2 mm (0.19 ~ 0.20 in.)	4.5 mm (0.18 in.)
Runout:		
Front	TIR 0.15 mm (0.006 in.) or less	TIR 0.3 mm (0.01 in.)
Rear	TIR 0.20 mm (0.008 in.) or less	TIR 0.3 mm (0.01 in.)
ABS (Equipped Models)		
ABS Hydraulic Unit:		
Make	BOSCH	– – –
Wheel Rotation Sensor Air Gap:		
Front	0.4 ~ 1.6 mm (0.02 ~ 0.06 in.)	– – –
Rear	0.4 ~ 1.6 mm (0.02 ~ 0.06 in.)	– – –

Special Tools

Jack:
57001-1238



Jack Attachment:
57001-1608



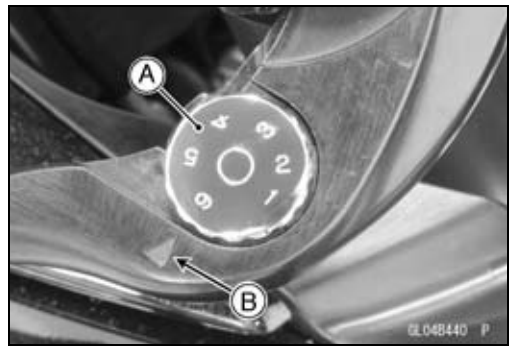
Brake Lever, Brake Pedal

Brake Lever Position Adjustment

The brake lever adjuster has 6 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.

○The distance from the grip to the lever is minimum at number 6 and maximum at number 1.



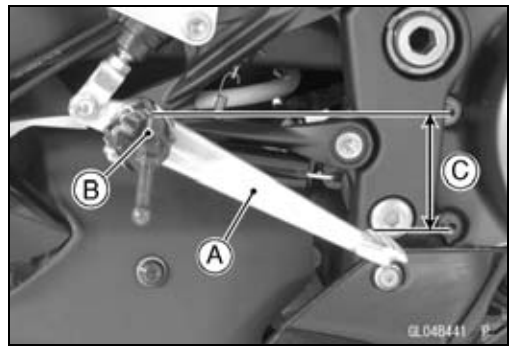
Brake Pedal Position Inspection

- Check that the brake pedal [A] is in the correct position.
  Footpeg [B]

Pedal Position

Standard: About 75 mm (2.95 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 push rod locknut has been loosened.*

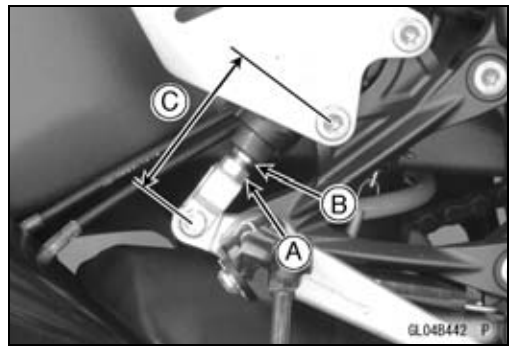
- Loosen the locknut [A] and turn the push rod with the hex head [B] to achieve the correct pedal position.

★If the length [C] shown is **70 ±1 mm (2.8 ±0.04 in.)**, the pedal position will be within the standard range.

- Tighten:

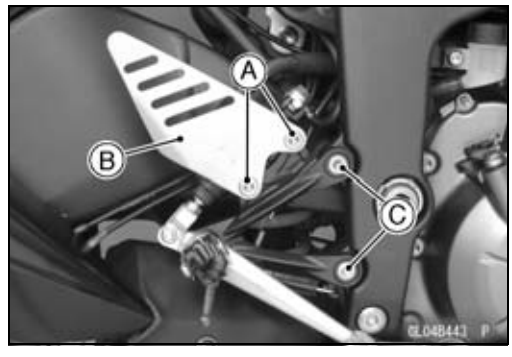
Torque - Rear Master Cylinder Push Rod Locknut: 17 N·m (1.7 kgf·m, 13 ft·lb)

- Check the brake light switch operation (see Brake Light Switch Operation Inspection in the Periodic Maintenance chapter).



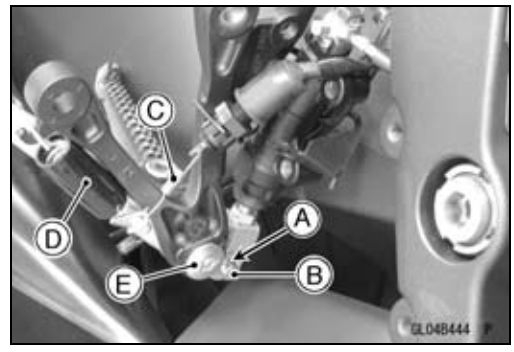
Brake Pedal Removal

- Remove:
  Rear Master Cylinder Mounting Bolts [A]
  Foot Guard [B]
  Front Footpeg Bracket Bolts [C]



Brake Lever, Brake Pedal

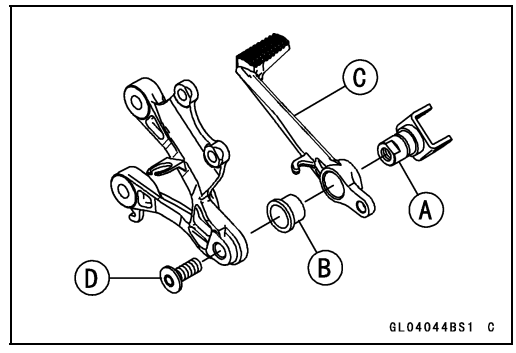
- Remove:
  Cotter Pin [A]
  Joint Pin [B]
  Rear Brake Light Switch Spring [C]
  Return Spring [D]
- Remove the brake pedal mounting bolt [E] and take out the brake pedal.



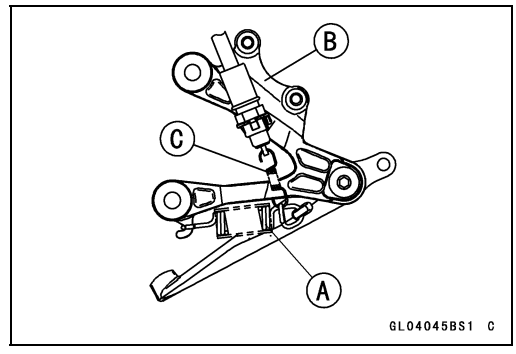
Brake Pedal Installation

- Apply grease to the footpeg pivot shaft [A].
- Install:
  Bushing [B]
  Brake Pedal [C]
- Apply a non-permanent locking agent to the threads of the brake pedal mounting bolt [D], and tighten it.

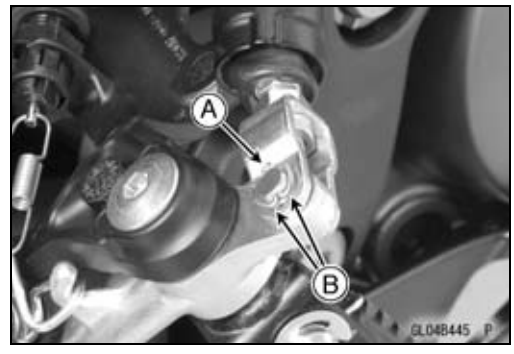
Torque - Brake Pedal Mounting Bolt: 34 N·m (3.5 kgf·m, 25 ft·lb)



- Hook the return spring [A] on the brake pedal and front footpeg bracket [B] as shown.
- Hook the rear brake light switch spring [C] on the switch and return spring as shown.



- Replace the cotter pin [A] with a new one.
- Insert the cotter pin and bend the pin ends [B].



Brake Lever, Brake Pedal

- Install the front footpeg bracket.
- Apply a non-permanent locking agent to the threads of the front footpeg bracket bolts, and tighten them.

Torque - Front Footpeg Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Install the rear master cylinder [A] and foot guard.

NOTE

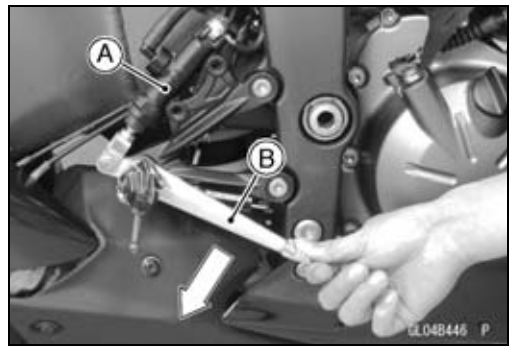
○*Depress the brake pedal [B] and then align the holes of the master cylinder.*

○*After installation, check that the rear brake light switch spring is hooked on the return spring.*

- Apply a non-permanent locking agent to the threads of the front bracket bolts, and tighten them.

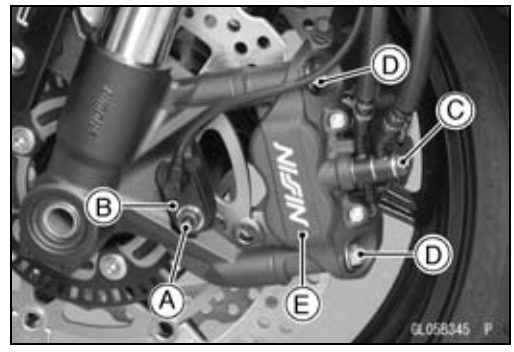
Torque - Rear Master Cylinder Mounting Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Check the brake pedal position (see Brake Pedal Position Inspection).



Calipers

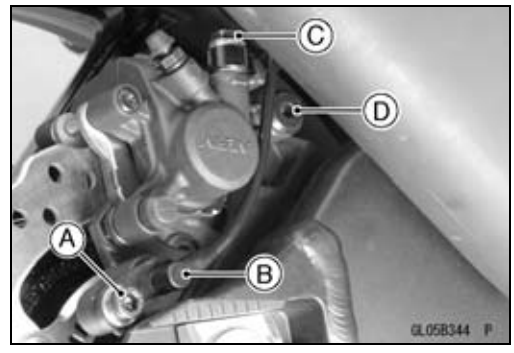
Front Caliper Removal



- Remove:
  Bolt [A]
  Front Wheel Rotation Sensor [B]
- Loosen the banjo bolt [C] at the brake hose lower end, and tighten it loosely.
- Remove the caliper mounting bolts [D], and detach the caliper [E] from the disc.
- Unscrew the banjo bolt and remove the brake hose from the caliper (see Brake Hose and Pipe Replacement in the Periodic Maintenance chapter).

NOTICE
Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.

Rear Caliper Removal

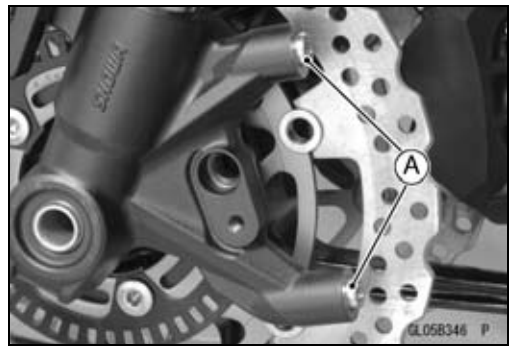


- Remove:
  Bolt [A]
  Rear Wheel Rotation Sensor [B]
- Loosen the banjo bolt [C] at the brake hose lower end, and tighten it loosely.
- Loosen the rear caliper pin bolt [D].
- Remove the rear wheel (see Rear Wheel Removal in the Wheels/Tires chapter).
- Unscrew the banjo bolt and remove the brake hoses from the caliper (see Brake Hose and Pipe Replacement in the Periodic Maintenance chapter).

NOTICE
Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.

Calipers

Caliper Installation



- Install the caliper and brake hose lower end.
  - ○For the front caliper, be sure to install the collars [A].
  - ○Replace the washers on each side of hose fitting with new ones.
  - ○Touch the brake hoses to the stopper of the caliper.
- Tighten:

Torque - Front Caliper Mounting Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)
Rear Caliper Pin Bolt: 27 N·m (2.8 kgf·m, 20 ft·lb)
Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Check the fluid level in the brake reservoirs.
- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

⚠ WARNING

After servicing, it takes several applications of the brake lever or pedal before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever or pedal is obtained by pumping the lever or pedal until the pads are against the disc.

Front Caliper Disassembly

- Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Front Caliper Assembly

- Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Rear Caliper Disassembly

- Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Rear Caliper Assembly

- Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Calipers

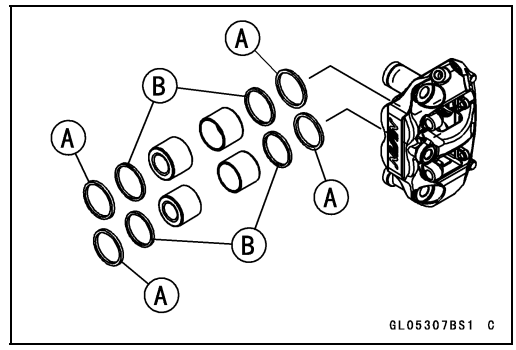
Caliper Fluid Seal Damage Inspection

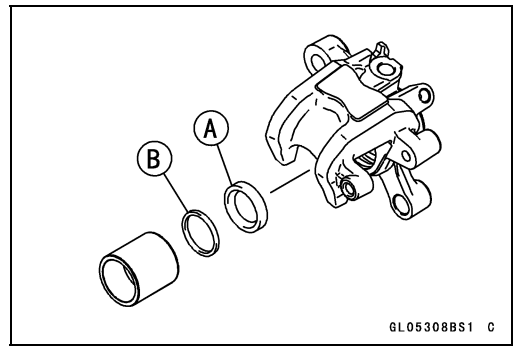
The fluid seal (piston seal) [A] is placed around the piston to maintain clearance between the pad and the disc. If the seal is in a poor condition, it could lead the pad to wear excessively or the brake to drag, which may cause the temperature of the discs or the brake fluid to increase.

- Replace the fluid seal if it exhibits any of the conditions listed below.

○Brake fluid leakage around the pad.
○Brakes overheat.
○Considerable difference in inner and outer pad wear.
○Seal and piston are stuck together.

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



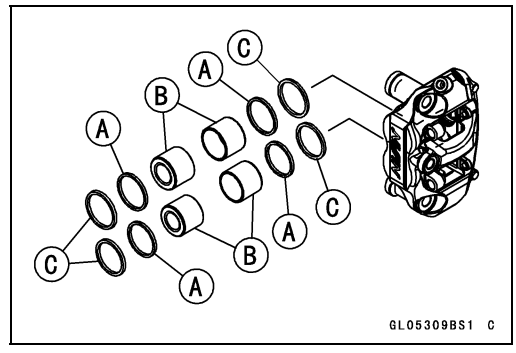


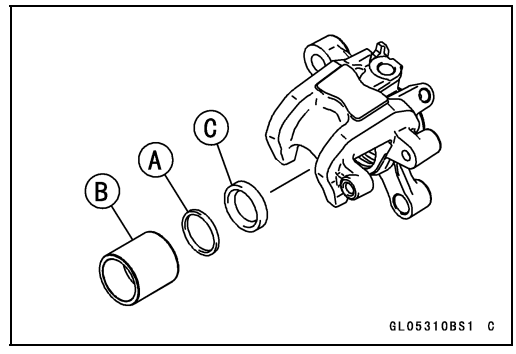
Caliper Dust Seal Damage Inspection

- Check that the dust seals [A] are not cracked, worn, swollen, or otherwise damaged.

★If they show any damage, replace the dust seals with new ones.

Pistons [B]
Fluid Seals [C]

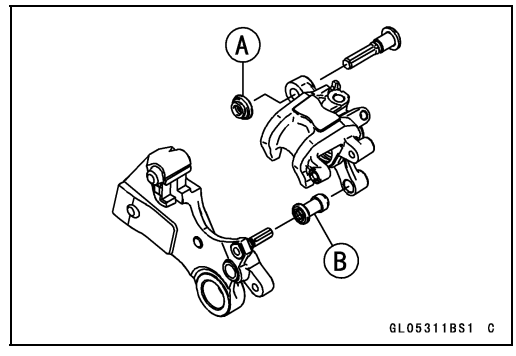




Rear Caliper Dust Boot and Friction Boot Damage Inspection

- Check that the dust boot [A] and friction boot [B] are not cracked, worn, swollen, or otherwise damaged.

★If they show any damage, replace it.

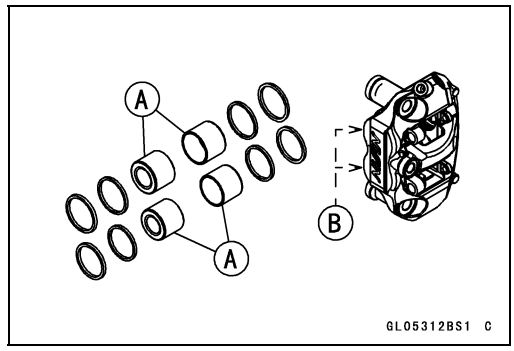


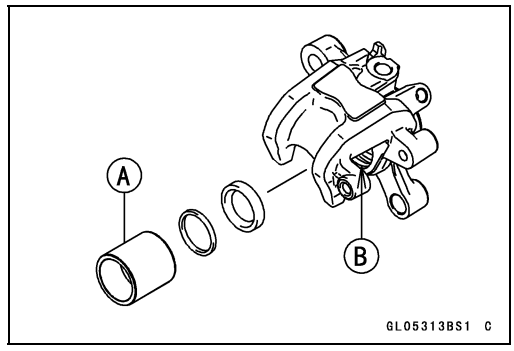
Calipers

Caliper Piston and Cylinder Damage Inspection

- Visually inspect the pistons [A] and cylinder surfaces [B].

★Replace the caliper if the cylinder and piston are badly scores or rusty.





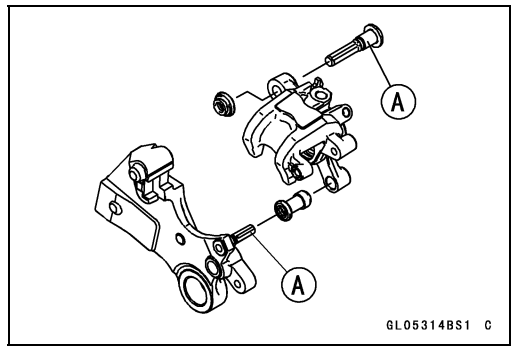
Rear Caliper Holder Shaft Wear Inspection

The caliper body must slide smoothly on the caliper holder shafts [A]. If the body does not slide smoothly, one pad will wear more than the other, pad wear will increase, and constant drag on the disc will raise brake and brake fluid temperature.

- Check to see that the caliper holder shafts are not badly worn or stepped, and that the rubber boots are not damaged.

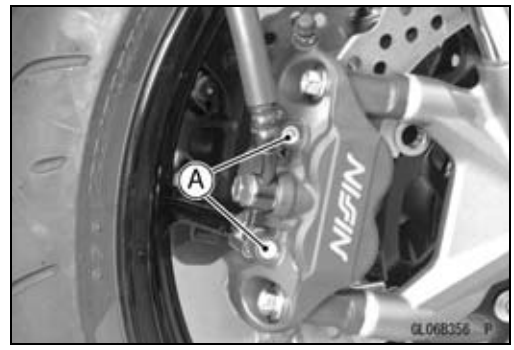
★If the rubber boot is damaged, replace the rubber boot. To replace the rubber boot, remove the pads and the caliper bracket.

★If the caliper holder shaft is damage, replace the caliper bracket.



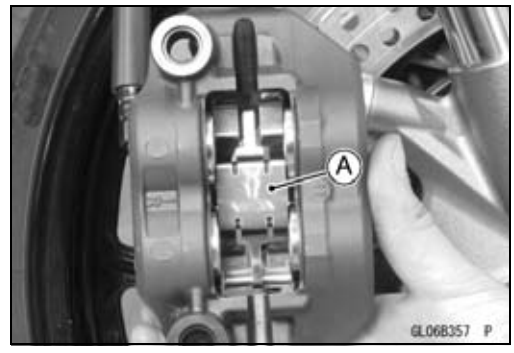
Brake Pads

Front Brake Pad Removal

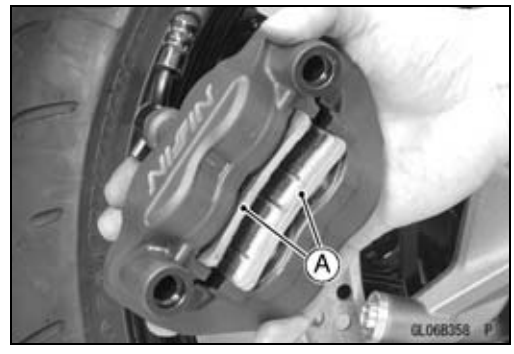


- Loosen the pad pins [A].
- Remove the front caliper with the hose installed (see Front Caliper Removal).
- Remove:
  Pad Pins
  Brake Pads

Front Brake Pad Installation

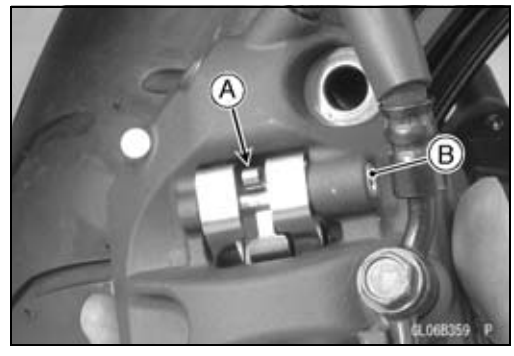


- Check that the pad spring [A] is in place on the caliper.
- Push the caliper pistons in by hand as far as they will go.



- Install the brake pads [A] on the pad spring correctly.

○Fit the pad into the groove of the caliper.



- Tighten the pad pins temporarily.

○Push down the pin holder [A] and insert the pad pin [B].

- Install the front caliper (see Caliper Installation).
- Tighten:

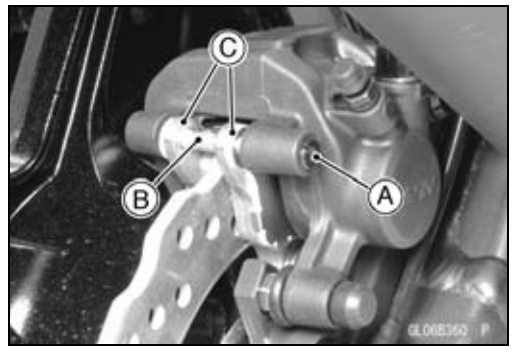
Torque - Front Brake Pad Pins: 17 N·m (1.7 kgf·m, 13 ft·lb)

⚠ WARNING

After servicing, it takes several applications of the brake lever before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever is obtained by pumping the lever until the pads are against the disc.

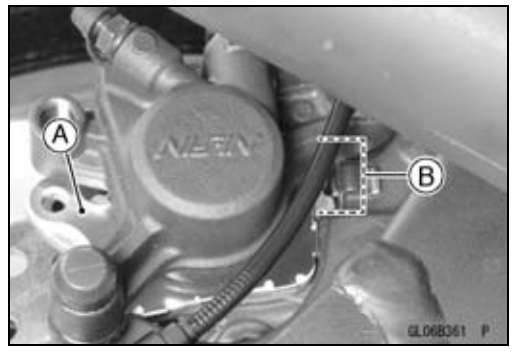
Brake Pads

Rear Brake Pad Removal



- Remove:
  Pad Pin Plug [A]
  Pad Pin [B]
  Brake Pads [C]

Rear Brake Pad Installation



- Check that the pad spring is in place on the caliper.
- Push the caliper piston in as far as it will go.
- Install the piston side pad [A] first, and then another pad.

○Fit the brake pad end into the recess [B] of the caliper bracket.

- Install the pad pin and the plug.
- Tighten:

Torque - Rear Brake Pad Pin: 17 N·m (1.7 kgf·m, 13 ft·lb)
Rear Brake Pad Pin Plug: 2.45 N·m (0.25 kgf·m, 22 in·lb)

⚠ WARNING

After servicing, it takes several applications of the brake pedal before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake pedal is obtained by pumping the pedal until the pads are against the disc.

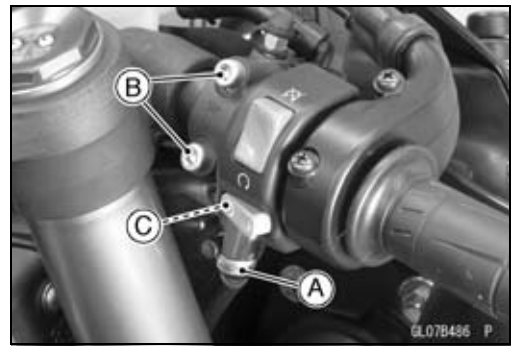
Brake Pad Wear Inspection

- Refer to the Brake Pad Wear Inspection in the Periodic Maintenance chapter.

Master Cylinder

Front Master Cylinder Removal

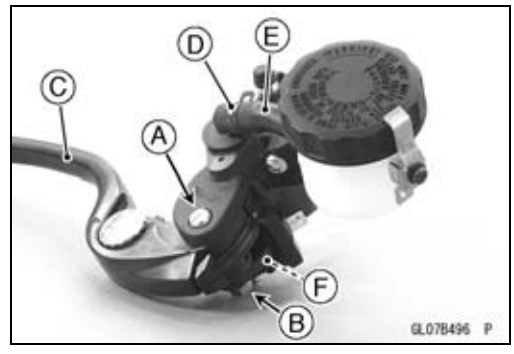
- Remove the reservoir mounting bolt and nut [A].



- Unscrew the banjo bolt [A] and remove the brake hose from the master cylinder (see Brake Hose and Pipe Replacement in the Periodic Maintenance chapter).
- Unscrew the clamp bolts [B], and take off the master cylinder as an assembly with the reservoir, brake lever, and front brake light switch installed.
- Disconnect the front brake light switch connector [C].

NOTICE

Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.



- Remove:
  Brake Lever Pivot Bolt [A] and Locknut [B]
  Brake Lever [C]
  Clamp [D]
  Brake Hose [E]
  Front Brake Light Switch [F]

Front Master Cylinder Installation

- Apply silicone grease to the sliding surface of the brake lever pivot bolt.
- Tighten:

Torque - Brake Lever Pivot Bolt: 1.0 N·m (0.10 kgf·m, 8.9 in·lb)
Brake Lever Pivot Bolt Locknut: 5.9 N·m (0.60 kgf·m, 52 in·lb)

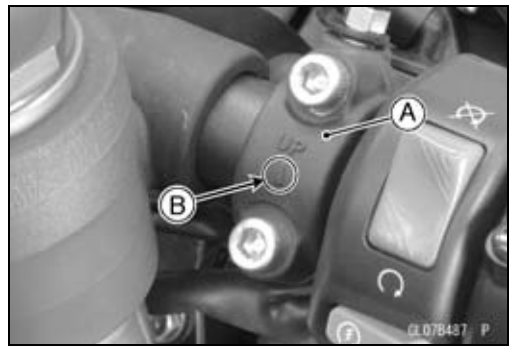
- Install the front brake light switch.
- Tighten:

Torque - Front Brake Light Switch Screw: 1.2 N·m (0.12 kgf·m, 11 in·lb)

- Install the front brake reservoir to the front master cylinder.

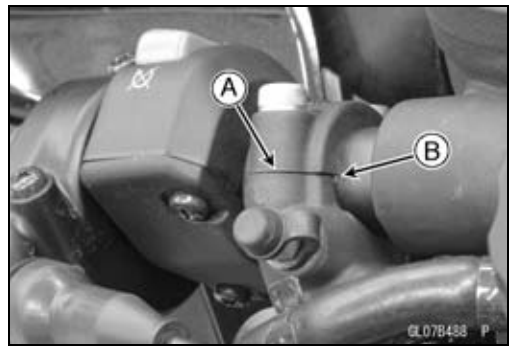
Master Cylinder

- Install the master cylinder clamp [A] so that the arrow mark [B] faces upward.



- Set the front master cylinder to match its mating surface [A] to the punch mark [B] of the handlebar.
- Tighten the upper clamp bolt first, and then the lower clamp bolt.

Torque - Front Master Cylinder Clamp Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)



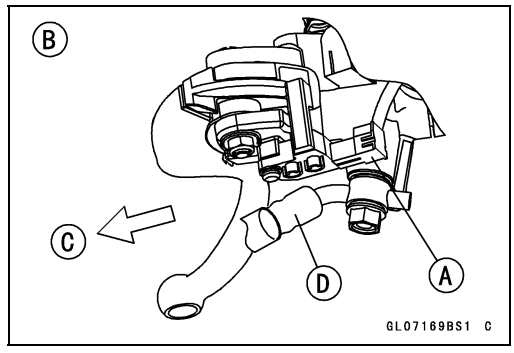
- Connect the front brake light switch connector [A] as shown.
  Left Side View [B]
  Front [C]
- Replace the washers that are on each side of the hose fitting with new ones.
- Install the brake hose [D].

○Touch the brake hose to the stopper of the front master cylinder.

- Tighten:

Torque - Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Tighten the front brake reservoir mounting nut.
- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

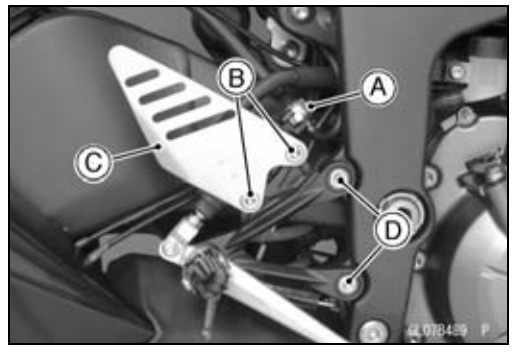


Rear Master Cylinder Removal

- Unscrew the brake hose banjo bolt [A] and remove the brake hose (see Brake Hose and Pipe Replacement in the Periodic Maintenance chapter).

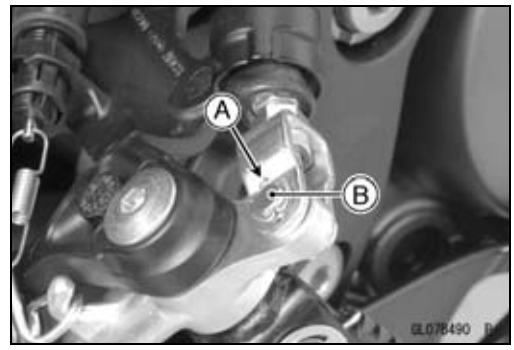
NOTICE
Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.

- Remove:
  Rear Master Cylinder Mounting Bolts [B]
  Foot Guard [C]
  Front Footpeg Bracket Bolts [D]

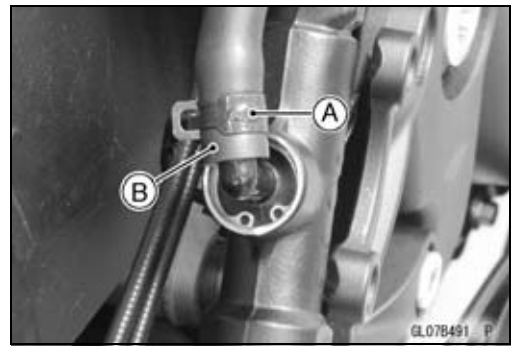


Master Cylinder

- Remove:
  Cotter Pin [A]
  Joint Pin [B]

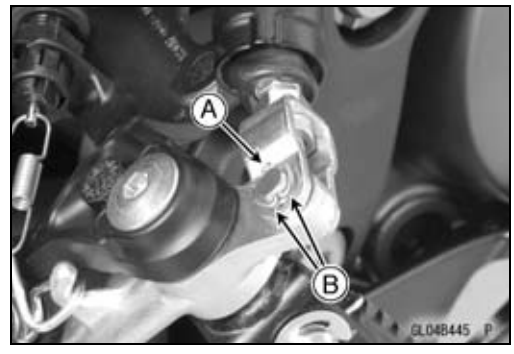


- Slide the reservoir hose lower end clamp [A].
- Remove the reservoir hose lower end [B], and drain the brake fluid into a container.



Rear Master Cylinder Installation

- Replace the cotter pin [A] with a new one.
- Insert the cotter pin and bend the pin ends [B].
- Install the reservoir hose lower end to the rear master cylinder.

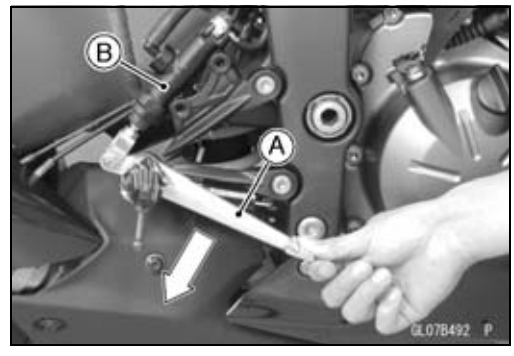


- Apply a non-permanent locking agent to the threads of the front footpeg bracket bolts.
- Tighten:

Torque - Front Footpeg Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)
Rear Master Cylinder Mounting Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

NOTE

○*Depress the brake pedal [A] and then align the holes of the master cylinder [B].*
○*After installation, check that the rear brake light switch spring is hooked on the return spring.*



- Replace the washers that are on each side of hose fitting with new ones.
- Install the brake hose.

○Touch the brake hose to the stopper of the rear master cylinder.

- Tighten:

Torque - Brake Hose Banjo Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

Master Cylinder

Front Master Cylinder Disassembly

- Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.

Rear Master Cylinder Disassembly

- Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.

Master Cylinder Assembly

- Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.

Master Cylinder Inspection (Visual Inspection)

- Remove the master cylinders (see Front/Rear Master Cylinder Removal).
- Disassemble the front and rear master cylinders (see Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter).
- 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.

- Check the dust covers [E] for damage.

★If they are damaged, replace them.

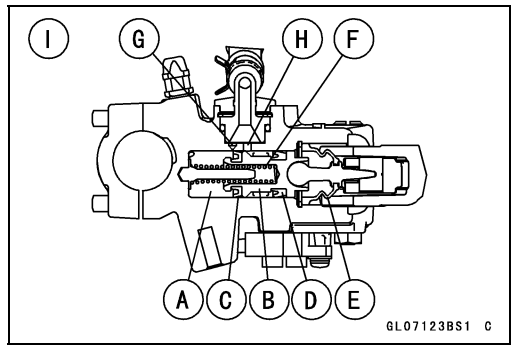
- Check the piston return springs [F] for any damage.

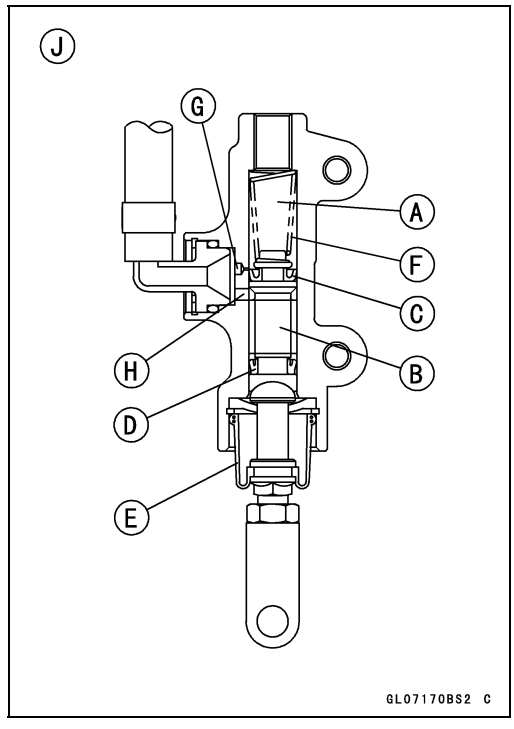
★If the springs are damaged, replace them.

- 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.

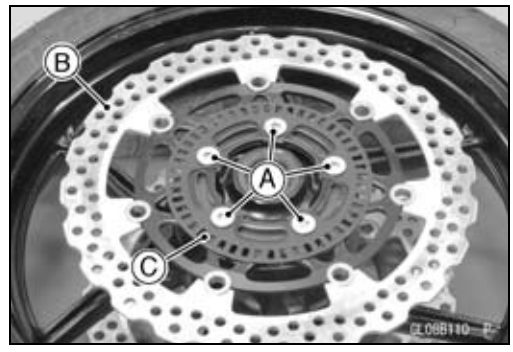
Front Master Cylinder [I]
Rear Master Cylinder [J]





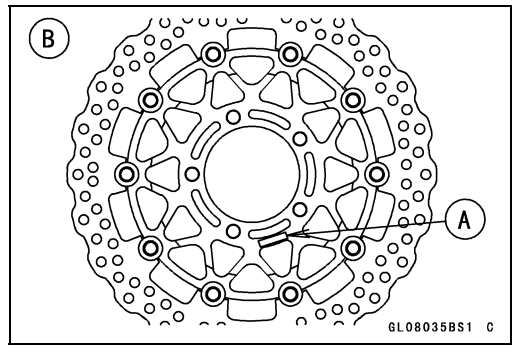
Brake Disc

Brake Disc Removal



- Remove the wheels (see Front/Rear Wheel Removal in the Wheels/Tires chapter).
- Remove the brake disc mounting bolts [A], and take off the disc [B].
- Remove the wheel rotation sensor rotor [C].

Brake Disc Installation

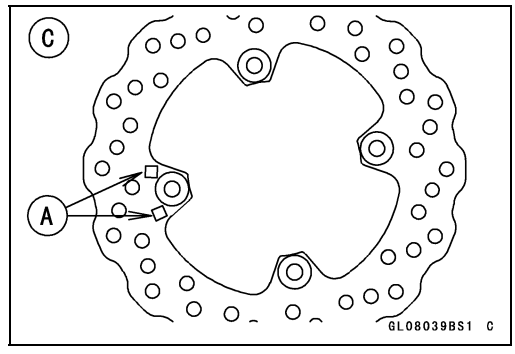


- Replace the gaskets with new ones.
- Install the brake disc on the wheel so that the marked side [A] faces out.
  Front Brake Discs [B]
  Rear Brake Disc [C]
- Install the wheel rotation sensor rotor on the brake disc.

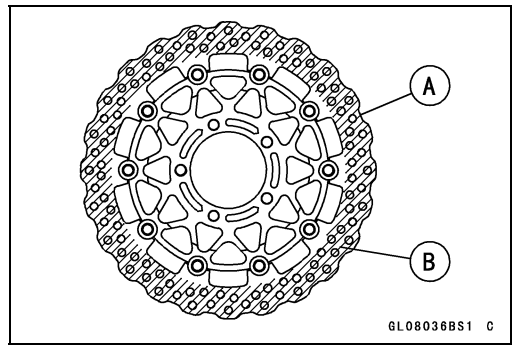
○When installing the rear wheel rotation sensor rotor, the bended end faces to disc side.

- Apply a non-permanent locking agent to the threads of the brake disc mounting bolts.
- Tighten:

Torque - Brake Disc Mounting Bolts: 27 N·m (2.8 kgf·m, 20 ft·lb)



Brake Disc Wear Inspection



- Measure the thickness of each disc [A] at the point where it has worn the most.

★If the disc has worn past the service limit, replace it.
Measuring Area [B]

Brake Discs Thickness

Standard:

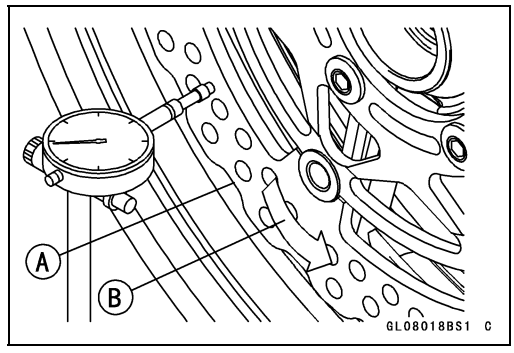
Front	**4.8 ~ 5.2 mm (0.19 ~ 0.20 in.)**
Rear	**4.8 ~ 5.2 mm (0.19 ~ 0.20 in.)**

Service Limit:

Front	**4.5 mm (0.18 in.)**
Rear	**4.5 mm (0.18 in.)**

Brake Disc

Brake Disc Warp Inspection



● Raise the wheel off the ground with jack.

Special Tools - Jack: 57001-1238
Jack Attachment: 57001-1608

○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:

Front	**TIR 0.15 mm (0.006 in.) or less**
Rear	**TIR 0.20 mm (0.008 in.) or less**
Service Limit:	**TIR 0.3 mm (0.01 in.)**

Brake Fluid

Brake Fluid Level Inspection

● Refer to the Brake Fluid Level Inspection in the Periodic Maintenance chapter.

Brake Fluid Change

● Refer to the Brake Fluid Change in the Periodic Maintenance chapter.

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.

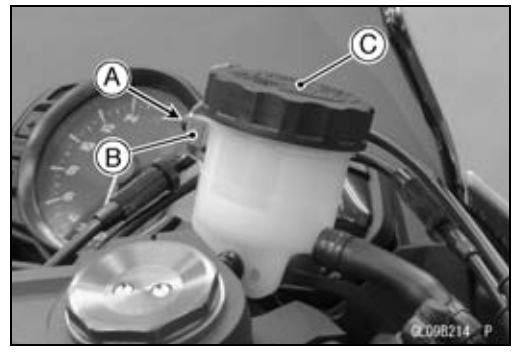
⚠ WARNING

Air in the brake lines diminish braking performance and can cause an accident resulting in injury or death. If the brake lever or pedal has a soft or "spongy" feeling mushy when it is applied, there might be air in the brake lines or the brake may be defective. Do not operate the vehicle and service the brake system immediately.

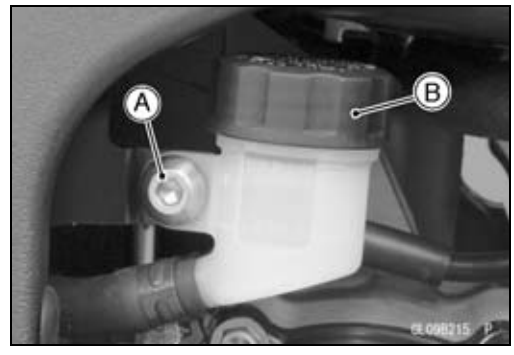
NOTE

○ *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:
Screw [A]
Stopper [B]
Front Brake Reservoir Cap [C]



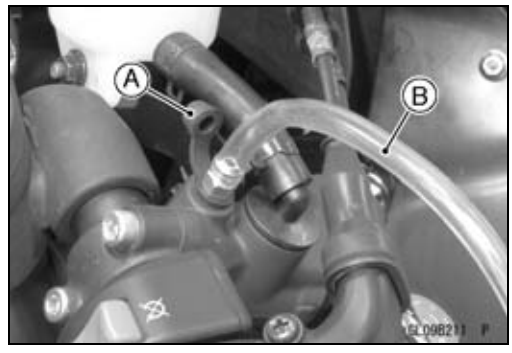
● Remove:
Bolt [A]
Rear Brake Reservoir Cap [B]



Brake Fluid

- Remove:
  Diaphragm Plate
  Diaphragm
- Fill the reservoir with fresh brake fluid to the upper level line in the reservoir.
- 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.

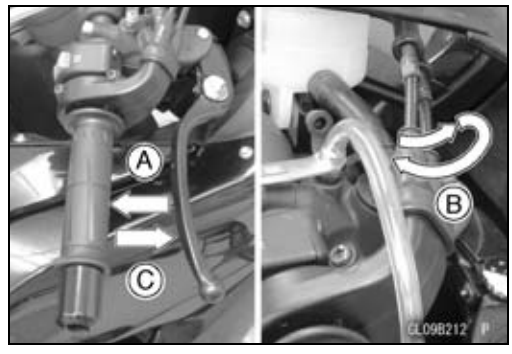
- Remove the rubber cap [A] from the bleed valve on the front master cylinder.
- Attach a clear plastic hose [B] to the bleed valve, and run the other end of the hose into a container.



- Bleed the brake line and the master cylinder.

○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].



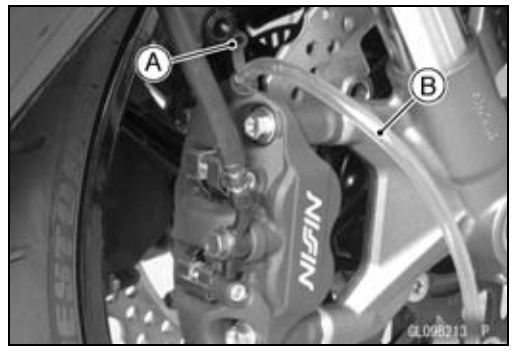
NOTE

○*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.*

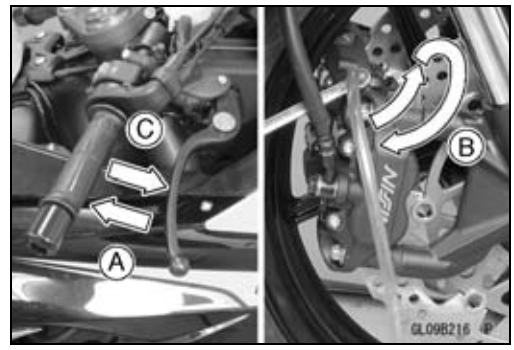
- Remove the clear plastic hose.
- Tighten the bleed valve, and install the rubber cap.

Torque - Front Master Cylinder Bleed Valve: 5.4 N·m (0.55 kgf·m, 48 in·lb)

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



Brake Fluid



- 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].

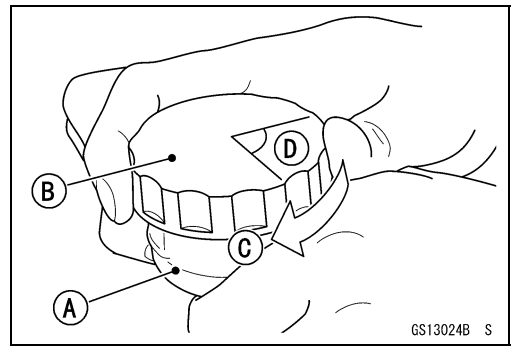
NOTE

○*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: First bleeding the right caliper then repeat the above steps for the left caliper.*

- Remove the clear plastic hose.
- Install:
  Diaphragm
  Diaphragm Plate
  Front Brake Reservoir Cap



- Follow the procedure below to install the front/rear brake fluid reservoir cap correctly.

○First, tighten the 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].

- Install the stopper and screw.
- Tighten:

Torque - Front Brake Reservoir Cap Stopper Screw: 1.2 N·m (0.12 kgf·m, 11 in·lb)

- Install the rear brake reservoir, and tighten the bolt.
- Tighten the bleed valve, and install the rubber cap.

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

- Check the fluid level (see Brake Fluid Level Inspection in the Periodic Maintenance chapter).
- After bleeding is done, check the brake for good braking power, no brake drag, and no fluid leakage.

Brake Fluid

⚠ WARNING

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

- **Never reuse old brake fluid.**
- **Do not use fluid from a container that has been left unsealed or that has been open for a long time.**
- **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.**
- **Do not leave the reservoir cap off for any length of time to avoid moisture contamination of the fluid.**
- **Do not change the fluid in the rain or when a strong wind is blowing.**
- **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.**
- **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.**
- **Brake fluid quickly damages painted surfaces; any spilled fluid should be completely wiped up immediately.**
- **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 Hose

Brake Hose Removal/Installation

- Refer to the Brake Hose and Pipe Replacement in the Periodic Maintenance chapter.

Brake Hose Inspection

- Refer to the Brake Hose and Pipe Damage and Installation Condition Inspection in the Periodic Maintenance chapter.

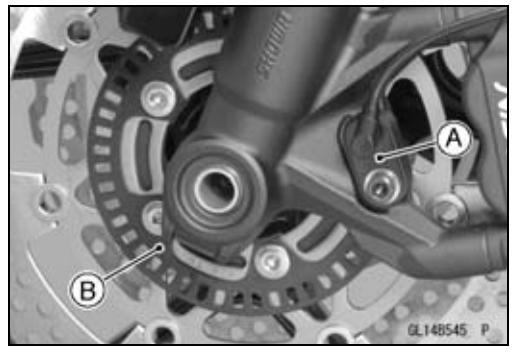
Anti-Lock Brake System (Equipped Models)

Parts Location

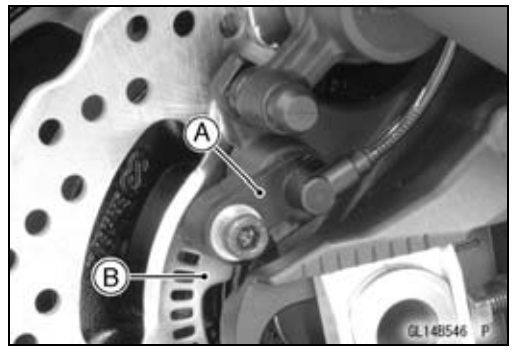
NOTE

○*The front and rear wheel rotation sensors and rotors are standard parts of this motorcycle.*

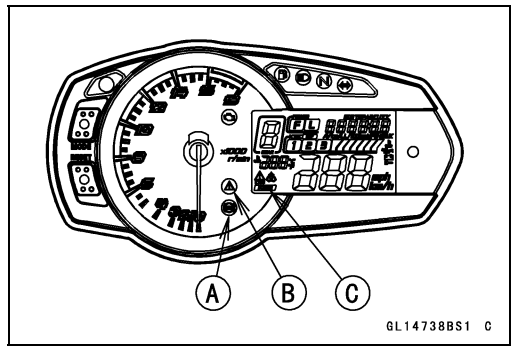
Front Wheel Rotation Sensor [A]
Front Wheel Rotation Sensor Rotor [B]



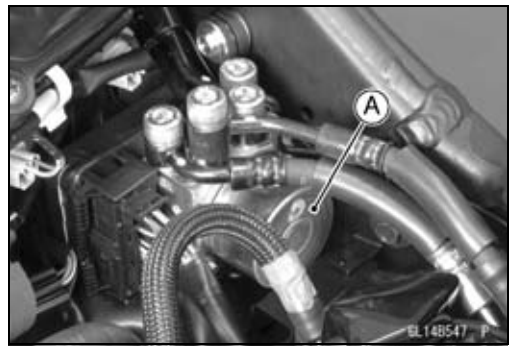
Rear Wheel Rotation Sensor [A]
Rear Wheel Rotation Sensor Rotor [B]



Yellow ABS Indicator Light (LED) [A]
Yellow Warning Indicator Light [B]
KIBS Warning Symbol [C]



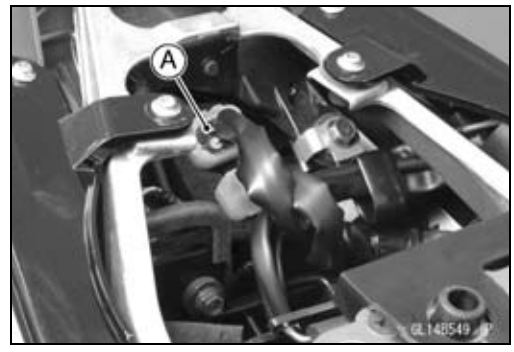
ABS Hydraulic Unit [A]



Fuse Box 3 [A]

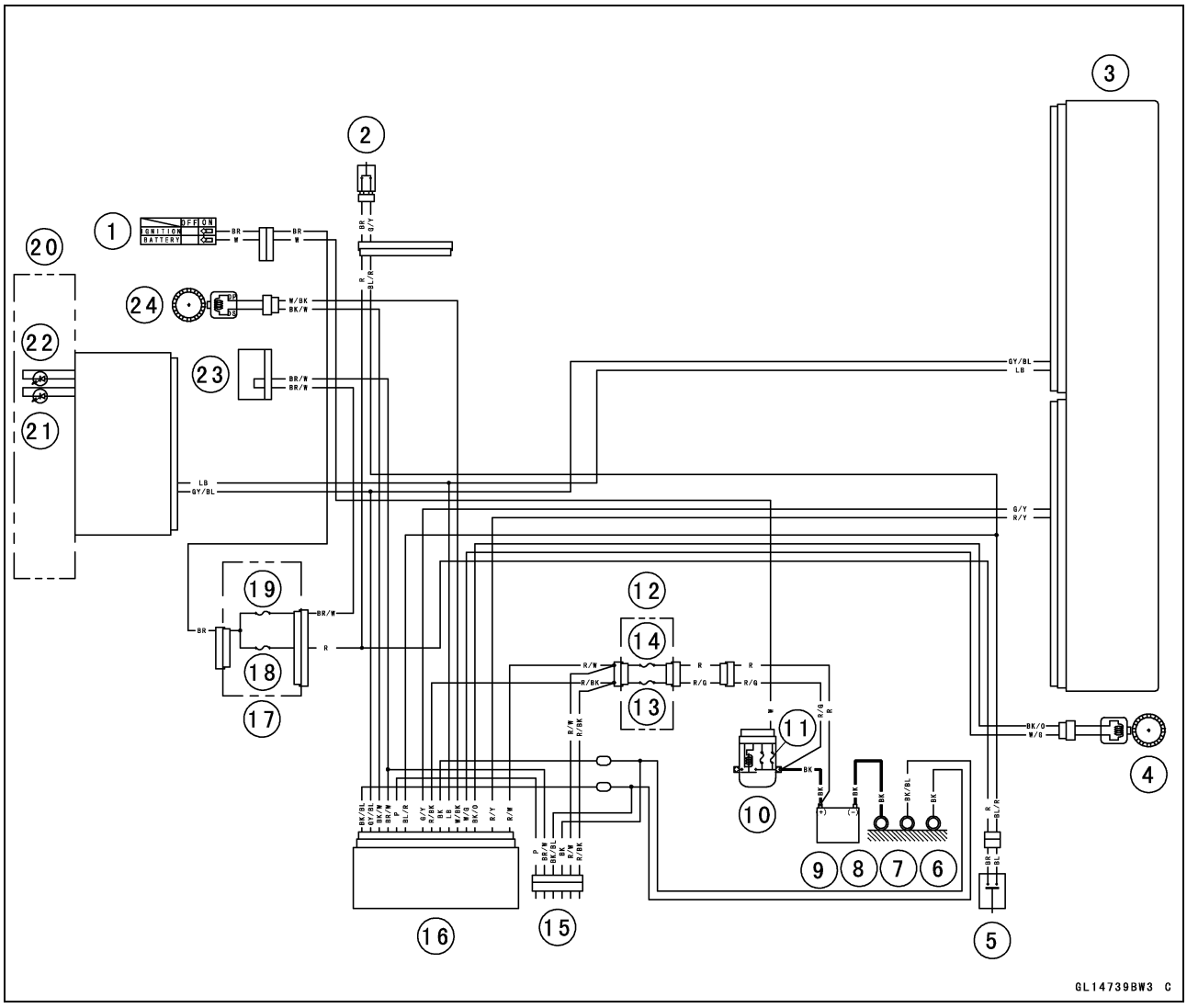
Anti-Lock Brake System (Equipped Models)

ABS Kawasaki Self-Diagnosis System Connector [A]



Anti-Lock Brake System (Equipped Models)

ABS System Circuit



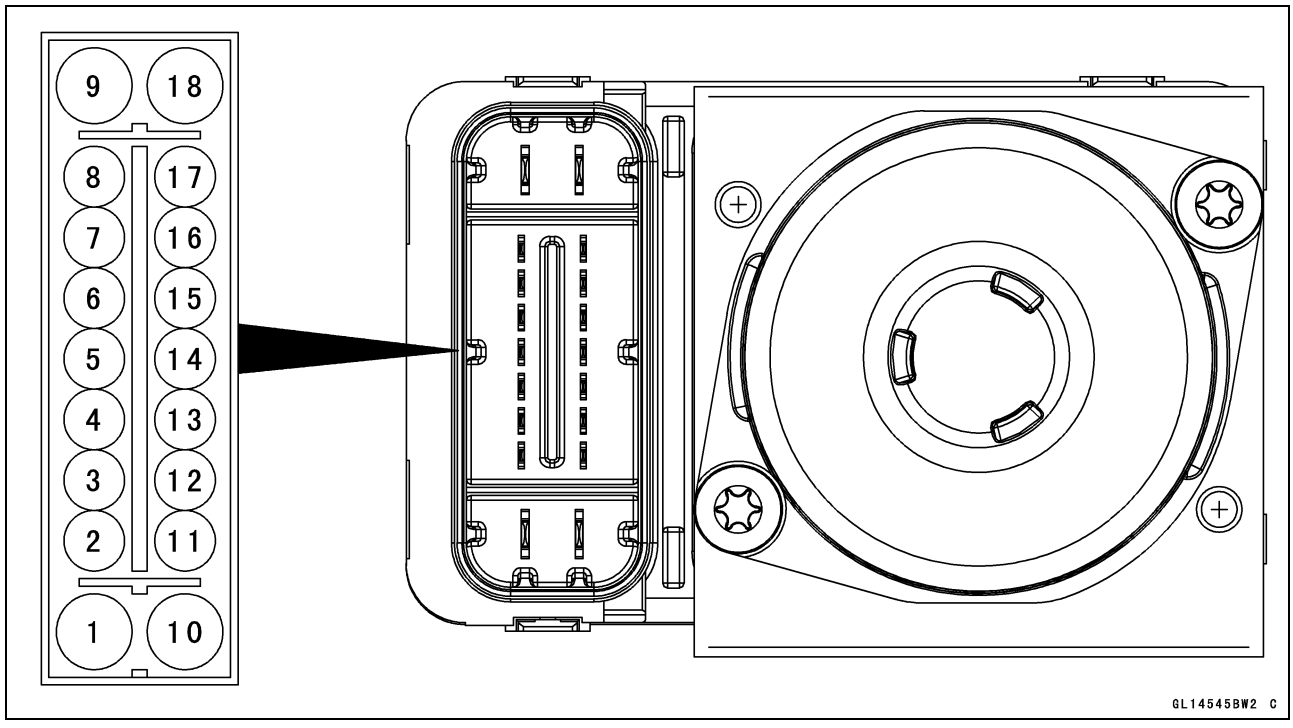
1. Ignition Switch
2. Front Brake Light Switch
3. ECU
4. Rear Wheel Rotation Sensor
5. Rear Brake Light Switch
6. Frame Ground 5
7. Frame Ground 4
8. Engine Ground
9. Battery 12 V 8 Ah
10. Starter Relay
11. Main Fuse 30 A
12. Fuse Box 3
13. ABS Solenoid Valve Relay Fuse 15 A
14. ABS Motor Relay Fuse 25 A
15. ABS Kawasaki Self-diagnosis System Connector
16. ABS Hydraulic Unit
17. Fuse Box 1
18. Brake Light/Horn Fuse 7.5 A
19. Ignition Fuse 15 A
20. Meter Unit
21. Yellow ABS Indicator Light (LED)
22. Yellow Warning Indicator Light (LED)
23. Joint Connector E
24. Front Wheel Rotation Sensor

○Color Codes:

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

Anti-Lock Brake System (Equipped Models)

ABS Hydraulic Unit Terminal Names



1. Ground: BK/BL
2. CAN Communication Line (High): GY/BL
3. Front Wheel Rotation Sensor Signal Input: BK/W
4. Power Supply: BR/W
5. ABS Kawasaki Self-Diagnosis System Terminal: P
6. Front and Rear Brake Light Switch Signal: BL/R
7. Unused
8. Front Wheel Rotation Sensor Signal Output: G/Y
9. Power Supply to ABS Solenoid Valve Relay: R/BK
10. Ground to Motor: BK
11. CAN Communication Line (Low): LB
12. Power Supply to Front Wheel Rotation Sensor: W
13. Power Supply to Rear Wheel Rotation Sensor: W
14. Rear Wheel Rotation Sensor Signal Input: BK/O
15. Unused
16. Rear Wheel Rotation Sensor Signal Output: R/Y
17. Unused
18. Power Supply to ABS Motor Relay: R/W

Anti-Lock Brake System (Equipped Models)

ABS Servicing Precautions

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

- This ABS 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 ABS hydraulic unit.
- To prevent damage to the ABS parts, do not disconnect the battery cables or any other electrical connections when the ignition 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.
- Do not turn the ignition switch on while any of the ABS electrical connectors are disconnected. The ABS hydraulic unit memorizes service codes.
- Do not spray water on the electrical parts, ABS parts, connectors, leads and wiring.
- If a transceiver is installed on the motorcycle, make sure that the operation of the ABS is not influenced by electric wave radiated from the antenna. Locate the antenna as far as possible away from the ABS hydraulic unit.
- Whenever the ABS electrical connections are to be disconnected, first turn off the ignition switch.
- The ABS 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.
- The ABS parts cannot be disassembled. Even if a fault is found, do not try to disassemble and repair the ABS parts, replace it.
- The ABS has many brake lines, pipes, and leads. And the ABS cannot detect problems with the conventional braking system (brake disc wear, unevenly worn brake pad, and other mechanical faults). To prevent trouble, check the brake lines and pipes for correct routing and connection, the wiring for correct routing, and the brakes for proper braking power. Be sure to check for fluid leakage, and bleed the brake line thoroughly.

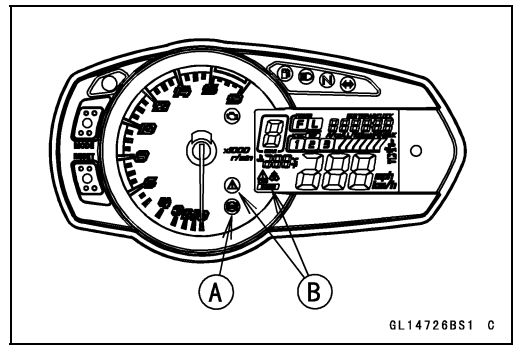
⚠ WARNING

Air in the brake lines diminish braking performance and can cause an accident resulting in injury or death. If any of the brake line fittings, including the ABS hydraulic unit joint nuts, or the bleed valve is opened at any time, the air must be bled completely from the brake line. If the brake lever has a soft or "spongy" feeling mushy when it is applied, there might be air in the brake lines or the brake may be defective. Do not operate the vehicle and service the brake system immediately.

NOTICE

Do not ride the motorcycle with air in the brake line, or the ABS could malfunction.

Anti-Lock Brake System (Equipped Models)



○The yellow ABS indicator light (LED) [A] and yellow warning indicator light (LED)/KIBS warning symbol [B] may light if the tire pressure is incorrect, a non-recommended tire is installed, or the wheel is deformed. If the indicator light lights, remedy the problem and clear the service code.

⚠ WARNING

Use of non-recommended tires may cause malfunctioning of ABS and can lead to extended braking distance resulting in an accident causing serious injury or death. Always use recommended standard tires for this motorcycle.

○The yellow ABS indicator light (LED) may come on if the engine is run with the motorcycle on a stand and the transmission in gear. If the indicator light comes on, just turn the ignition switch off, then clear service code b 42, which indicates a “Faulty front wheel rotation sensor”.

○When the ABS operates, the ABS makes noise and the rider feels the reaction force on the brake lever and brake pedal. This is a normal condition. It informs the rider that the ABS is operating normally.

○Service codes detected once by the ABS hydraulic unit will be memorized in the ABS hydraulic unit.

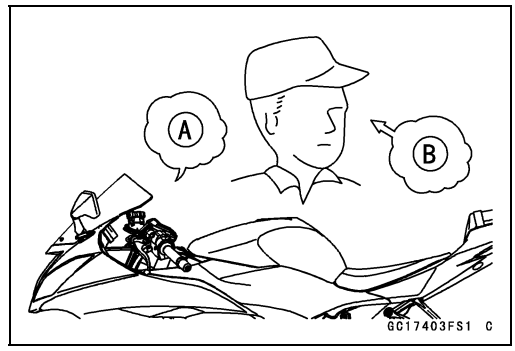
○A fully charged battery is a must for conducting reliable self-diagnosis. Test run the motorcycle at a speed of more than 20 km/h (12 mph) to see that the yellow ABS indicator light (LED) and yellow warning indicator light (LED) do not come on. Finally, test run the motorcycle at a speed of more than 30 km/h (20 mph) and brake suddenly to see that the motorcycle stops without loss of steering control and the ABS operates normally (The reaction force generated is felt in the brake lever and pedal.). This completes the final inspection.

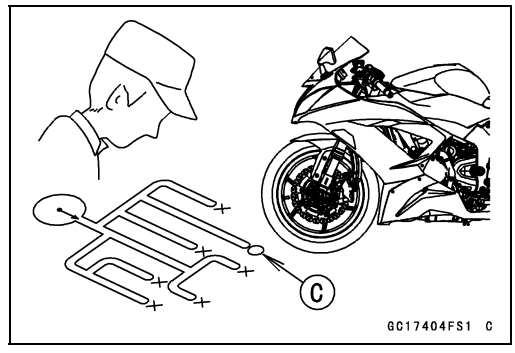
Anti-Lock Brake System (Equipped Models)

ABS Troubleshooting Outline

When an abnormality in the system occurs, the yellow ABS indicator light (LED) and yellow warning indicator light (LED) light up and the KIBS warning symbol are displayed on the LCD (Liquid Crystal Display) to alert the rider. In addition, the nature of the fault is stored in the memory of the ABS hydraulic unit and FI ECU, and when in the self-diagnosis mode, the service code [A] is displayed on the LCD by the “b” and the number of two digits. When repair has been done, the both warning indicator lights (LED) and KIBS warning symbol go off and service codes are not displayed. But the service codes stored in memory of the ABS hydraulic unit ECU and FI ECU are not erased to preserve the problem history.

When, due to a malfunction, the yellow ABS indicator light (LED) and yellow warning indicator light (LED) remain lit, get a thorough understanding of the background before starting the repair work. Ask the rider about the conditions [B] under which the problem occurred and try to determine the cause [C]. Do not rely solely on the ABS and DFI self-diagnosis function, use common sense; check the brakes for proper braking power, and brake fluid level, search for leaks, etc.





Even when the ABS and DFI are operating normally, the yellow ABS indicator light (LED) and yellow warning indicator light (LED) may light up and the KIBS warning symbol are displayed on the LCD under the conditions listed below. Turn the ignition switch off to go off the indicator lights and the KIBS warning symbol.

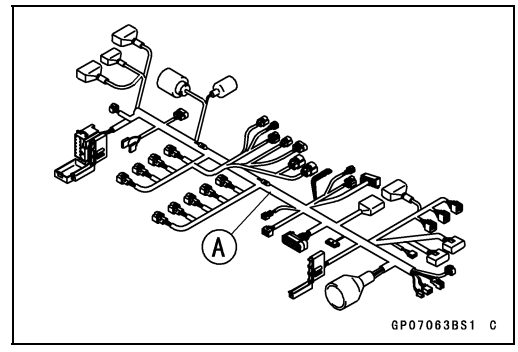
- ○After continuous riding on a rough road.
- ○When the engine is started with the stand raised and the transmission engaged, and the rear wheel turns.
- ○When accelerating so abruptly that the front wheel leaves the ground.
- ○When the ABS has been subjected to strong electrical interference.
- ○When tire pressure is abnormal. Adjust tire pressure.
- ○When a tire different in size from the standard size is being used. Replace with standard size.
- ○When the wheel is deformed. Replace the wheel.

Much of the ABS troubleshooting work consists of confirming continuity of the wiring. The ABS parts are assembled and adjusted by the manufacturer, so there is no need to disassemble or repair them. Replace the ABS hydraulic unit.

The basic troubleshooting procedures are listed below.

- ● Carry out pre-diagnosis inspections as a preliminary inspection.
- ● Determine the fault using the self-diagnosis function.
- ● Check wiring and connections from the ABS hydraulic unit connector to the suspected faulty ABS part, using a digital meter.

Anti-Lock Brake System (Equipped Models)



- Visually inspect the wiring for signs of burning or fraying.

★If any wiring is poor, replace the damaged wiring.

- Pull each connector apart and inspect it for corrosion, dirt and damage.

★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.

- Check the wiring for continuity.

○Use the wiring diagram to find the ends of the lead which is suspected of being a problem.

○Connect the digital meter between the ends of the leads.

★If the digital meter does not read about 0 Ω, the lead is defective. Replace the main harness [A] if necessary.

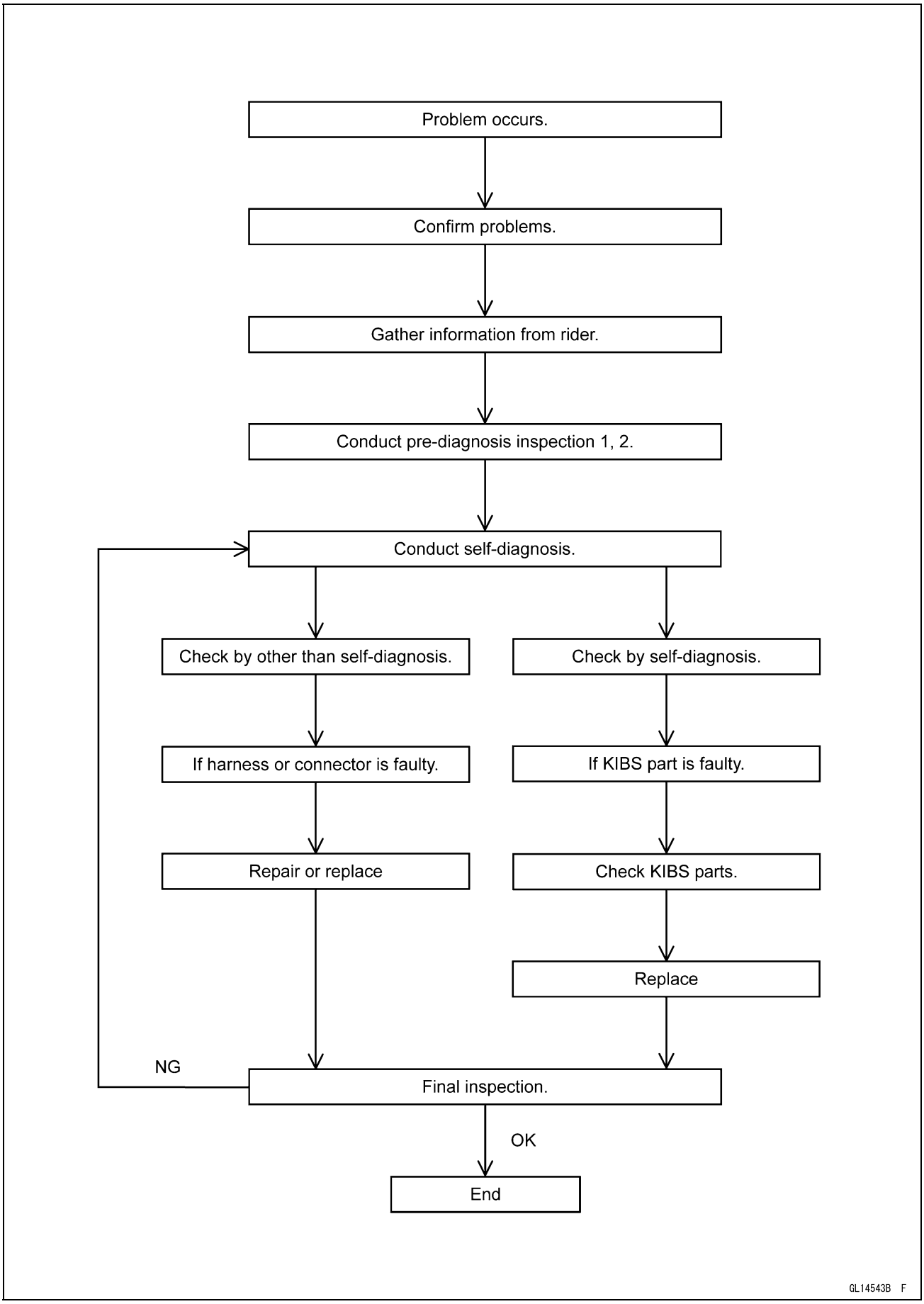
- Narrow down suspicious parts and close in on the faulty ABS part by repeating the continuity tests.

★If no abnormality is found in the wiring or connectors, the ABS parts are the next likely suspects. Check each part one by one.

★If an abnormality is found, replace the affected ABS part.

Anti-Lock Brake System (Equipped Models)

ABS Diagnosis Flow Chart



Inquiries to Rider

○Each rider reacts to problems in different ways, so it is important to confirm what kind of problem the rider is experiencing.
○Try to find out exactly what problem occurs under exactly what conditions by asking the rider; knowing this information may help you reproduce the problem in the workshop.
○The diagnosis sheet will help prevent you from overlooking any key information, so always use it.

Sample Diagnosis Sheet 1

Rider Name: ……..…….. Registration No. (license plate No.): ……
Date of registration: …..……. Model: ……
Vin No.: …..……..……..... Odometer reading: …….. km or miles
Engine No.: ..…… Odometer reading when problem first occured: …… km or miles

Question	Description			Answer	Advice to customer
Which statement/s best describes the fault with the ABS system?	*Yellow ABS indicator light (LED) illuminated?*	*Flashing*			A fault has been detected with the ABS system.
		Continuous			
		Not working			
	ABS not working				Further inspection by technician required.
	ABS operates too frequently				Continuous riding on rough or un-even surfaces can cause the ABS to operate more frequently.
	Stopping distance too long				
	Does the wheel lock when you apply the brakes				Further inspection by technician required.
	Brake can't be released				
	Other				
Do the front and rear brake levers feel normal during application?	*Normal*				Further inspection by technician required.
	Abnormal	*Long stroke (lever feels soft and moves back close to the handle bar)*			This indicates a probable fault with the braking system and should be inspected immediately.
		Limited stroke (lever feels hard and has little movement)			
		Pulsing/vibrating			
	Which lever? (front, rear or both)				
When does the fault occur?	*During start up / stationary*	*(Is a centre stand or service stand used)*			If the motorcycle engine is left running whilst on its centre or service stand, mechanical drag can cause the rear wheel to rotate. If the rear wheel rotates the ABS system may detect a fault. Turning off the ignition switch and restarting should reset the yellow ABS indicator light (LED) if no problems are detected. However the service code will be stored in the ABS ECU and should be reset by the dealer.
	Driving below 6 km/h (4mph) (Speeds vary depending on model)				The ABS system is not active at these speeds.
	Driving above 6 km/h (4mph) (Speeds vary depending on model)				This may be normal ABS operation if the road conditions are poor.
	When slowing or stopping (Rate of brake application)	*Gradual braking*	*front only*		
			rear only		
			both brakes		
		During abrupt braking	*front only*		Abrupt braking may cause the ABS to function early as the suspension may not have had enough time to react to the situation.
			rear only		
			both brakes		
		There is no specific pattern			
	Other				

Anti-Lock Brake System (Equipped Models)

Question	Description		Answer	Advice to customer
How often does the fault occur?	*Every time ignition is switched on*			Further inspection by technician required.
	Every time the brakes are used (Continually)			
	No regularity (Intermittent)			
	Other			
During which riding conditions does the fault occur?	*Highway riding*			Braking and handling characteristics can vary with vehicle speed, therefore ABS operation during braking at highway speed may be more frequent.
	City riding			Accelerating abruptly between traffic signals so that the front wheel leaves the ground can trigger the ABS warning indicator. Normal riding on good condition roads should allow the yellow ABS indicator light (LED) to reset automatically.
	Minor/country roads riding	*Any comment on riding style maybe applicable.*		Continuous riding on rough or uneven surfaces can cause the ABS to operate more frequently.
	Cross country riding			Continuous riding on loose or off road surfaces can trigger the ABS warning indicator. Normal riding on good condition roads should allow the yellow ABS indicator light (LED) to reset automatically.
	Track/closed circuit riding			Excessive use of the ABS system due to continuous fast riding can trigger the ABS warning indicator. Normal riding on good condition roads should allow the yellow ABS indicator light (LED) to reset automatically.
	All			Further inspection by technician required.
In what road conditions does the problem occur?	*Dry*			Further inspection by technician required.
	Wet			In wet conditions it is possible that the ABS is operating normally
	Snow/Ice			In snow/icy conditions it is possible that the ABS is operating normally
	Loose/rough surface (gravel)			On loose/rough surfaces it is possible that the ABS is operating normally
Motorcycle condition	*Has the machine been regularly serviced according to the periodic maintenance schedule?*			If the service history is incomplete it is possible that a fault may become apparent. For example, failure to replace the brake fluid during periodic maintenance can cause the hydraulic unit to become internally damaged.
	Have there been any previous braking problems?			Any previous braking problems may be related to the ABS complaint. It is important that the customer provides as much information as possible so that diagnosis can be made as quickly as possible.
	Have any aftermarket parts been fitted?	*OE Tires and brakes?*		Further inspection by technician required.
	Have the daily safety checks been carried out? (tire pressures / condition etc.)			Worn tires or tires with incorrect pressures can cause an ABS fault. It is important to regularly check both tire condition and pressure.

Anti-Lock Brake System (Equipped Models)

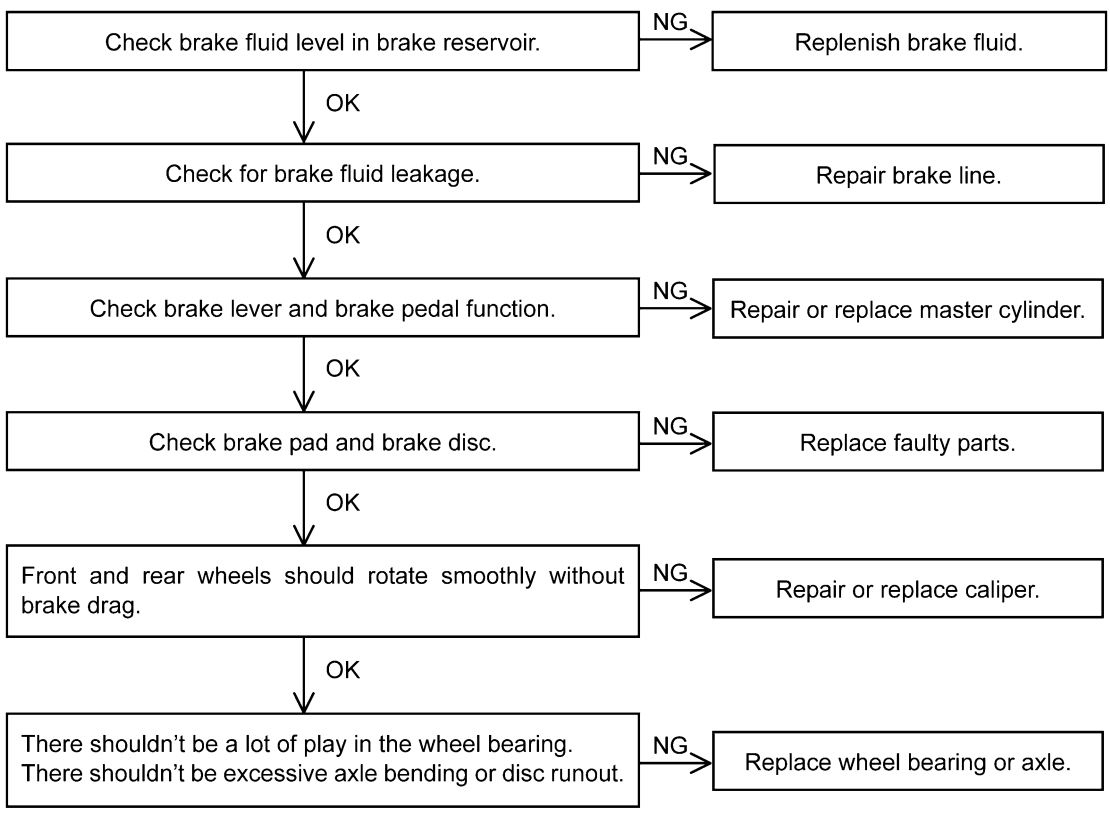
Dealer Findings

Sample Diagnosis Sheet 2

Question/Action	Description		Answer	Advice to technician
Review customer feedback information	*Carefully analyze the information that has been collected from the customer. Use this information to help you perform your initial diagnosis.*			
Check to see if any diagnostic codes are present	*1*			If codes are present refer to service manual.
	2			
	3			
	4			
	5			
Inspect the following	*Battery voltage*			The ABS is designed to be used with a 12 V sealed battery as its power source. Only use the battery specified by the service manual as a power source. If low battery voltage is detected service codes: B52 or B53 will be displayed.
	Tires type/size		Front …… Rear ……	Refer to service manual.
	Tire pressures		Front …… Rear ……	
	Tire condition		Front …… Rear ……	Excessive or abnormal wear can be recognized as an ABS fault.
	Wheel rotation sensor air gap		Front …… Rear ……	Refer to service manual. Also check that the wheel orientation is correct.
	Wheel condition (damaged or deformed)		Front …… Rear ……	Refer to service manual.
	Brake system general condition		Front …… Rear ……	Pad wear/Front and rear operation/Condition of hoses etc.
	Brake disc run-out		Front …… Rear ……	Refer to service manual.
Additional information on the yellow ABS indicator light (LED)	*Continuous*	*Stays on all the time while ignition on*		Check for diagnostic trouble codes.
		Turns off when first moving off but turns on again and stays on		
		Turns on when brake(s) are operated		
		Other:		
	Not working	*Turns off soon after moving off*		Test the operation of the light by turning on the ignition. If the light fails to illuminate ensure that the bike is equipped with ABS before inspecting the meter panel for faults as per the service manual.
		Turns off after riding for a while		
		Other:		
	How many times does it flash per 10 seconds?		5, 15, or 20	By flashing the ABS unit is indicating additional fault codes that may not be listed in the service manual. Please carefully count the number of flashes per 10 seconds before contacting Kawasaki. *(Kawasaki may request a video of the flashing sequence)*
			Other: ……. times	

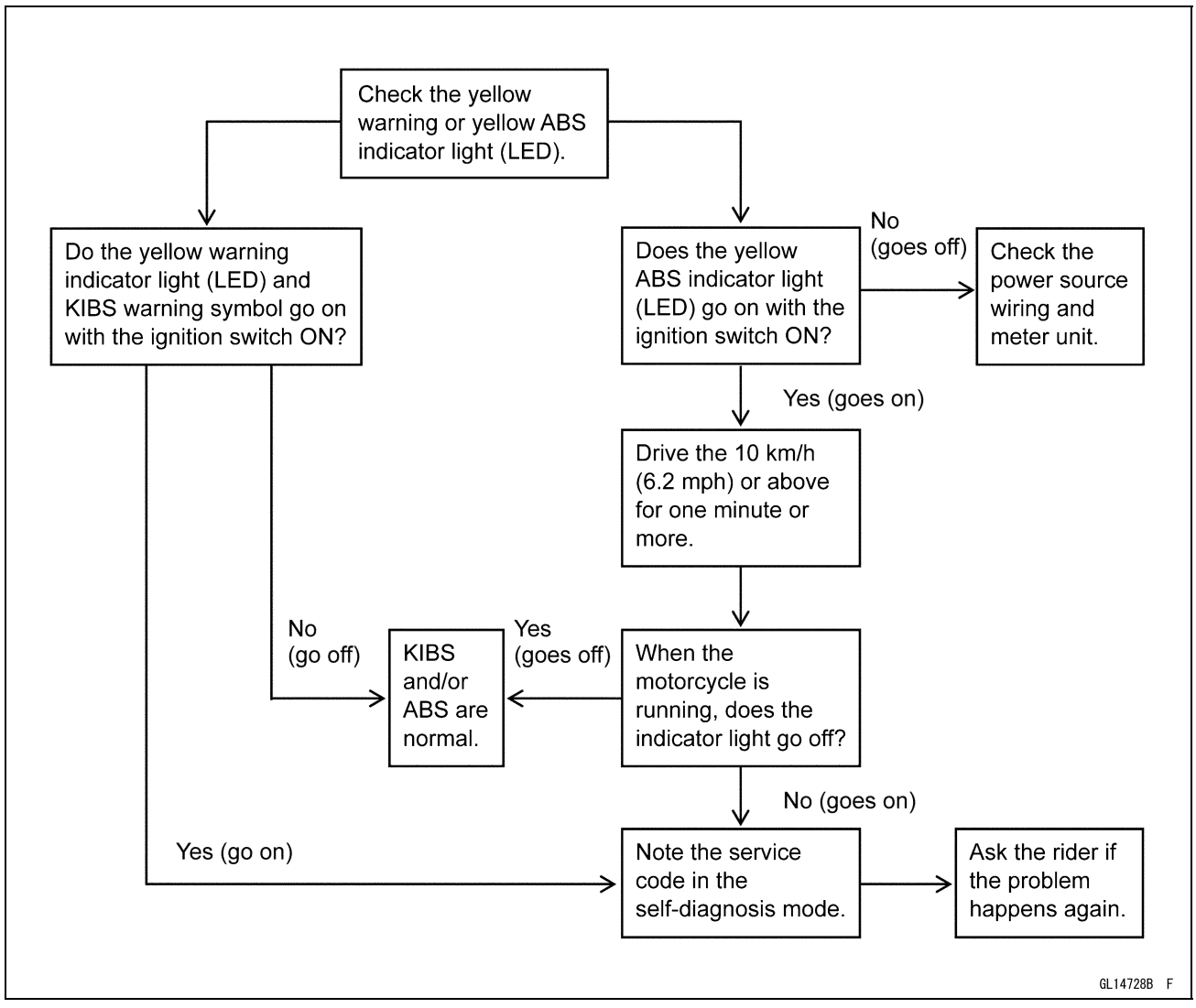
Anti-Lock Brake System (Equipped Models)

Pre-Diagnosis Inspection 1



Anti-Lock Brake System (Equipped Models)

Pre-Diagnosis Inspection 2

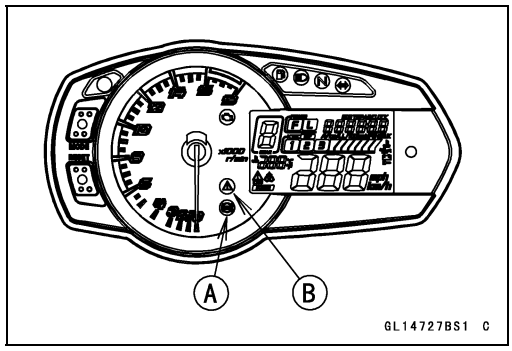


Self-diagnosis Outline

Refer to the Self-Diagnosis System chapter for the self-diagnosis or service code.

Anti-Lock Brake System (Equipped Models)

ABS and KIBS Indicator Lights (LED) Inspection



○In this model, the yellow ABS indicator light (LED) [A] and yellow warning indicator light (LED) [B] go on or blink by the data sent from the ABS hydraulic unit.

● Refer to the Meter Unit Inspection in the Electrical System chapter.

Yellow ABS Indicator Light (LED) and Yellow Warning Indicator Light (LED) Function

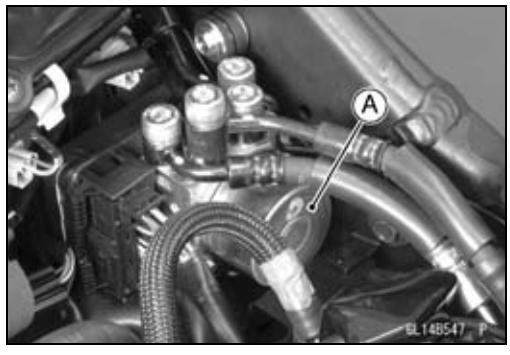
Status	Brake Condition	Yellow ABS Indicator Light (LED)	Yellow Warning Indicator Light (LED)	Multi-function Meter (LCD)
Normal	KIBS	Goes off	Goes off	None
Engine information communication error	ABS	Goes off	Goes on	KIBS
Battery voltage decreases	Low voltage ABS*	Blinks	Goes off	None
ABS error	Normal brake	Goes on	Goes off	None

*: The mode of “Low voltage ABS” controls ABS while reducing the load to the battery.

NOTE

○*When the yellow ABS indicator light is blinking, the ABS has been in the low voltage mode (insufficient battery voltage). When it is in the low voltage mode, the KIBS system does not function, but the ABS functions. To recover the KIBS system, charge the battery. (see Refreshing Charge in the Electrical System chapter).*

ABS Hydraulic Unit Removal



NOTICE

The ABS hydraulic unit [A] has been adjusted and set with precision at the factory. Therefore, it should be handled carefully, never struck sharply, as with a hammer, or allowed to fall on a hard surface.
Be careful not to get water or mud on the ABS hydraulic unit.

● Drain the brake fluid from the front and rear brake lines.

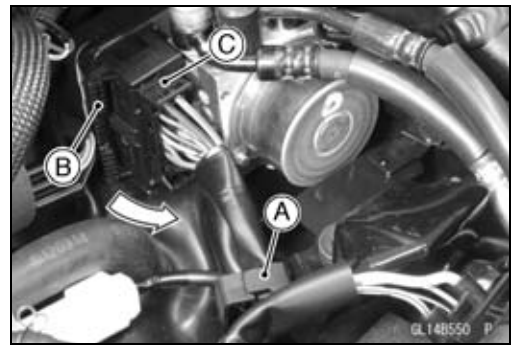
○Drain the brake fluid through the bleed valve by pumping the brake lever and pedal.

● Remove:
Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)

Anti-Lock Brake System (Equipped Models)

● Clean the ABS hydraulic unit.

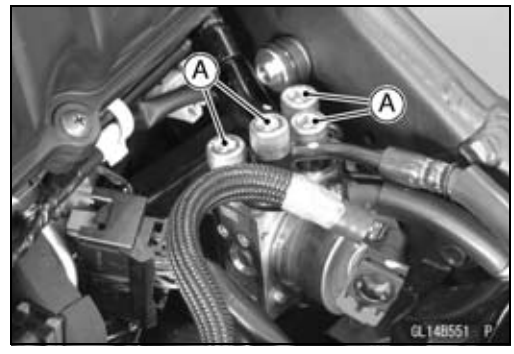
NOTICE
Clean all fittings on the ABS hydraulic unit and the rear master cylinder because dirt around the banjo bolts could contaminate the brake fluid in the line during removal/installation. **Spread over a shop towel around the ABS hydraulic unit before removing the brake line so that brake fluid does not leak on the parts.**



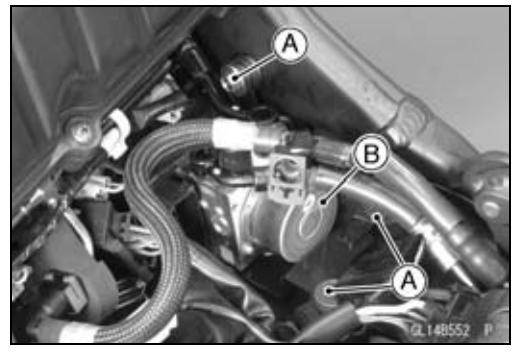
● Open the clamp [A].
● Pull the lever [B] backward to disconnect the ABS hydraulic unit connector [C].

● Remove:
Brake Pipe Banjo Bolts [A]

NOTICE
Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.

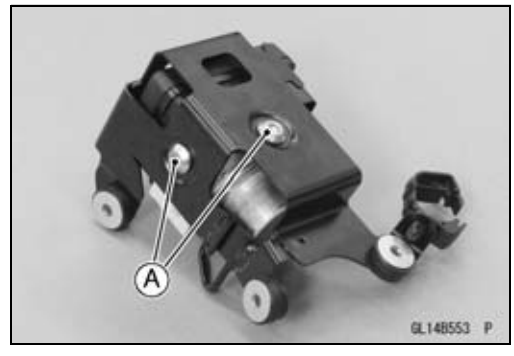


● Remove the bolts [A].
● Remove the ABS hydraulic unit [B] together with the bracket.
○Clear the bracket from the ABS hydraulic unit rubber cover.



● Remove the bolts [A] and bracket.

NOTICE
The ABS hydraulic unit has been adjusted and set with precision at the factory. Do not try to disassemble and repair the ABS hydraulic unit.



ABS Hydraulic Unit Installation

NOTICE
Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.

Anti-Lock Brake System (Equipped Models)

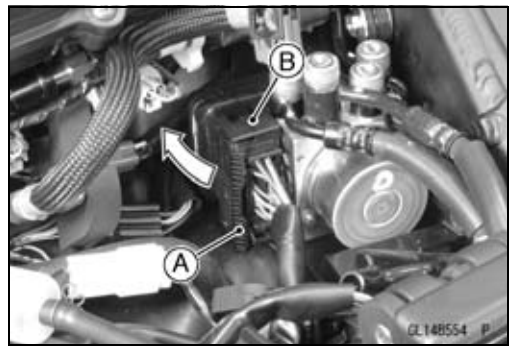
- Install the ABS hydraulic unit together with the bracket, and tighten the bolts.

○Fit the bracket and ABS hydraulic unit rubber cover (see Cable, Wire, and Hose Routing section in the Appendix chapter).

- Replace the washers that are on each side of pipe fitting with new ones.
- Install the brake pipes (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Tighten:

Torque - Brake Pipe Banjo Bolts: 23 N·m (2.3 kgf·m, 17 ft·lb)

- Pull the lever [A] forward to connect the ABS hydraulic unit connector [B].
- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.
- Install the fuel tank (see Fuel Tank Installation in the Fuel System (DFI) chapter).



ABS Hydraulic Unit Inspection

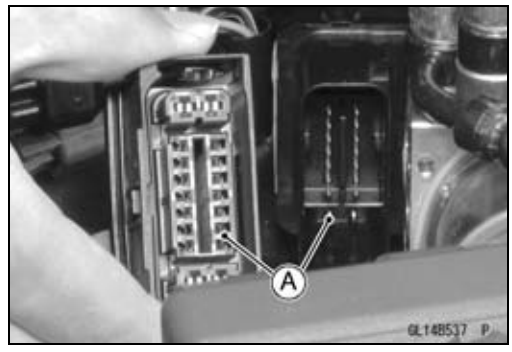
- Remove the ABS hydraulic unit (see ABS Hydraulic Unit Removal).
- Visually inspect the connector terminals [A].

★Replace the ABS hydraulic unit or main harness if either of the terminals are cracked, bent, or otherwise damaged.

★If the ABS hydraulic unit connector is clogged with mud or dust, blow it off with compressed air.

- Visually inspect the ABS hydraulic unit.

★Replace the ABS hydraulic unit if any of them are cracked, or otherwise damaged.

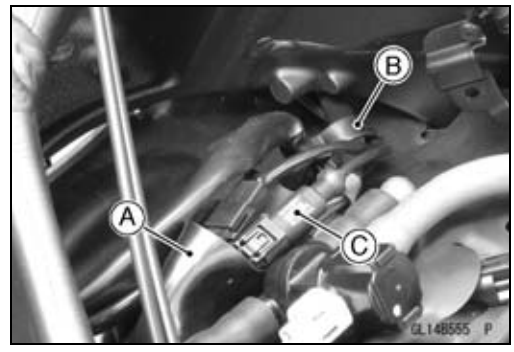


Front Wheel Rotation Sensor Removal

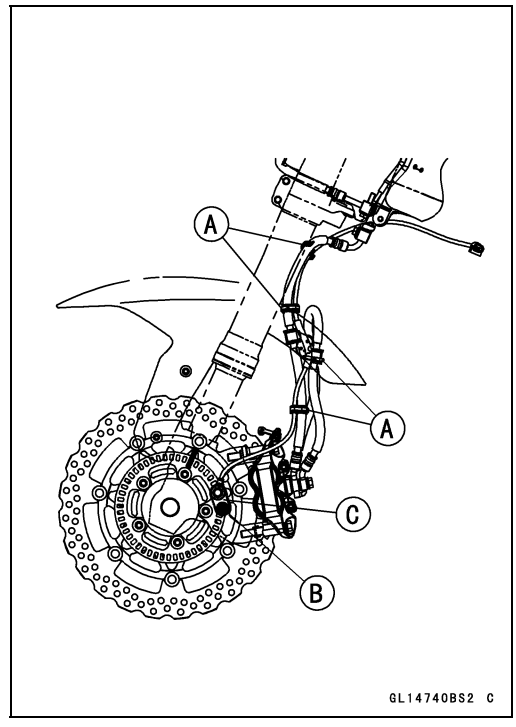
NOTICE
The wheel rotation sensor should be handled carefully, never struck sharply, as with a hammer, or allowed to fall on a hard surface since the wheel rotation sensor is precision made. Be careful not to get water or mud on the wheel rotation sensor. **Do not try to disassemble or repair the wheel rotation sensor.**

Anti-Lock Brake System (Equipped Models)

- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter)
- Slide the dust cover [A].
- Open the clamp [B].
- Disconnect the front wheel rotation sensor lead connector [C].



- Clear the sensor lead from the clamps [A].
- Remove:
  Bolt [B]
  Front Wheel Rotation Sensor [C]



Front Wheel Rotation Sensor Installation

- Installation is the reverse of removal.

○When installing the sensor which is fastened by bolt, tighten the bolt after placing the sensor on the bottom surface completely.

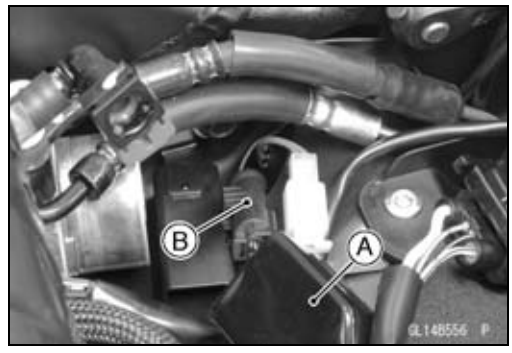
○Run the lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Rear Wheel Rotation Sensor Removal

NOTICE
The wheel rotation sensor should be handled carefully, never struck sharply, as with a hammer, or allowed to fall on a hard surface since the wheel rotation sensor is precision made. Be careful not to get water or mud on the wheel rotation sensor. **Do not try to disassemble or repair the wheel rotation sensor.**

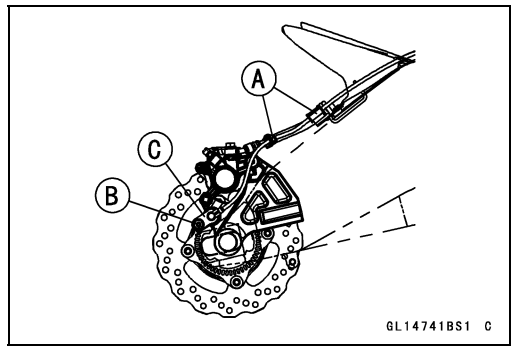
Anti-Lock Brake System (Equipped Models)

- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
- Slide the dust cover [A].
- Disconnect the rear wheel rotation sensor lead connector [B].



- Clear the sensor lead from the clamps [A].

- Clear the sensor lead from the clamps [A].
- Remove:
  Bolt [B]
  Rear Wheel Rotation Sensor [C]



Rear Wheel Rotation Sensor Installation

- Installation is the reverse of removal.

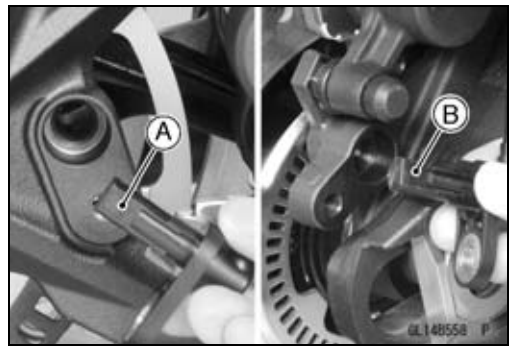
○When installing the sensor which is fastened by bolt, tighten the bolt after placing the sensor on the bottom surface completely.

○Route the lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Wheel Rotation Sensor Inspection

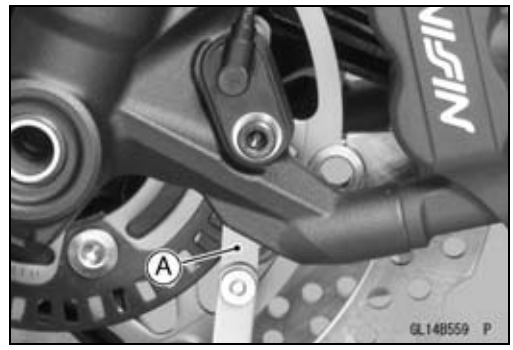
- Remove the front wheel rotation sensor [A] from the front fork.
- Remove the rear wheel rotation sensor [B] from the caliper bracket.
- Visually inspect the wheel rotation sensors.

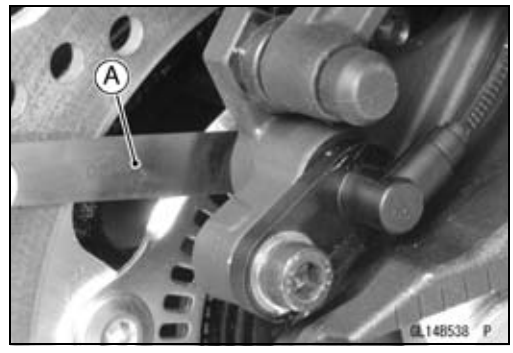
★Replace the wheel rotation sensor if it is cracked, bent, or otherwise damaged.



Anti-Lock Brake System (Equipped Models)

Wheel Rotation Sensor Air Gap Inspection





- Raise the front/rear wheel off the ground (see Front/Rear Wheel Removal in the Wheels/Tires chapter).
- Measure the air gap between the sensor and sensor rotor at several points by turning the wheel slowly.
  Thickness Gauge [A]

Wheel Rotation Sensor Air Gap
Standard:

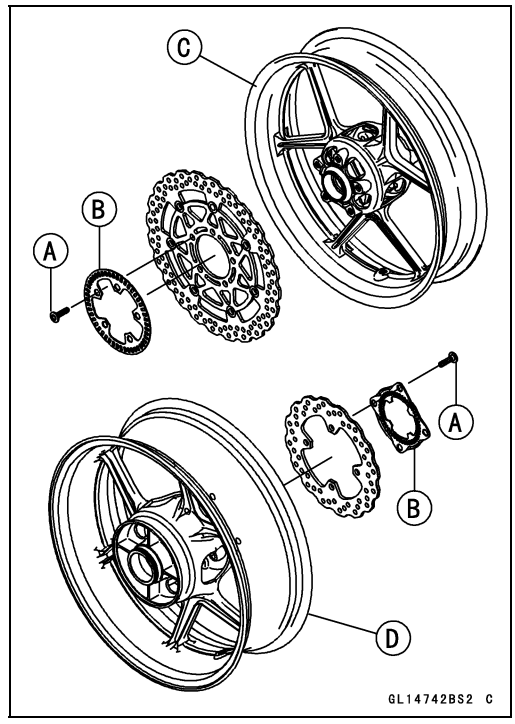
Front	**0.4 ~ 1.6 mm (0.02 ~ 0.06 in.)**
Rear	**0.4 ~ 1.6 mm (0.02 ~ 0.06 in.)**

NOTE

○ *The sensor air gap cannot be adjusted.*

★ If the air gap is not within the specification, inspect the hub bearing (see Hub Bearing Inspection in the Wheels/Tires chapter), sensor installation condition and sensor (see Wheel Rotation Sensor Inspection).

Wheel Rotation Sensor Rotor Inspection



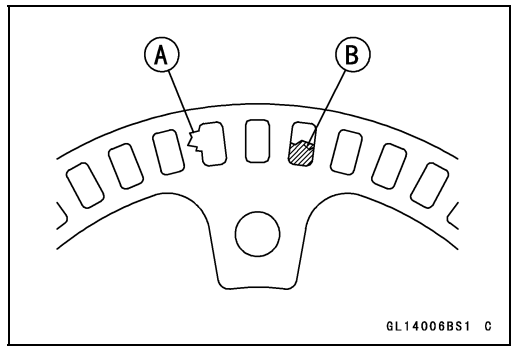
- Remove:
  Wheels (see Front/Rear Wheel Removal in the Wheels/Tires chapter)
  Brake Disc Mounting Bolts [A]
  Sensor Rotor [B]
  Front Wheel [C]
  Rear Wheel [D]

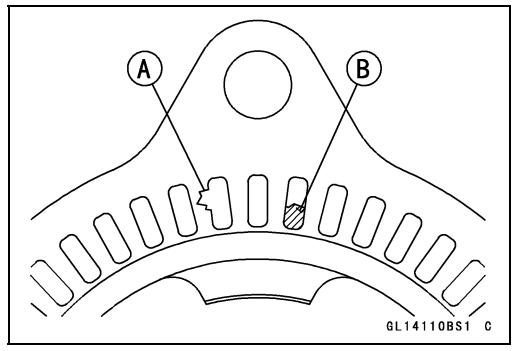
Anti-Lock Brake System (Equipped Models)

- Visually inspect the wheel rotation sensor rotor.

★If the rotor is deformed or damaged (chipped teeth [A]), replace the sensor rotor with a new one.

★If there is iron or other magnetic deposits [B], remove the deposits.

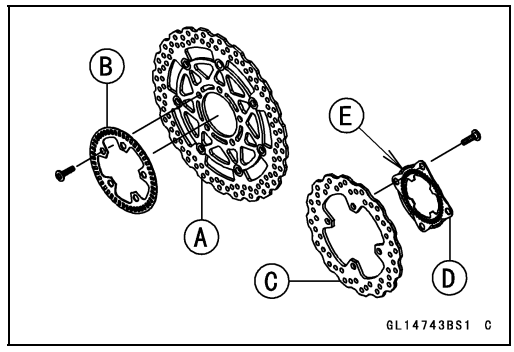




- Install:
  Front Brake Disc [A]
  Front Wheel Rotation Sensor Rotor [B]
  Rear Brake Disc [C]
  Rear Wheel Rotation Sensor Rotor [D]

○When installing the rear wheel rotation sensor rotor, the bended end [E] faces to disc side.

○Install the brake discs (see Brake Disc Installation).



ABS Solenoid Valve Relay Fuse (15 A) Removal

- Refer to the Fuse Box Fuse Removal in the Electrical System chapter.

ABS Motor Relay Fuse (25 A) Removal

- Refer to the Fuse Box Fuse Removal in the Electrical System chapter.

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 (see Fuse Installation in the Electrical System chapter).

Fuse Inspection

- Remove the fuses (see ABS Solenoid Valve Relay Fuse (15 A)/ABS Motor Relay Fuse (25 A) Removal).
- Refer to the Fuse Inspection in the Electrical System chapter.

Suspension

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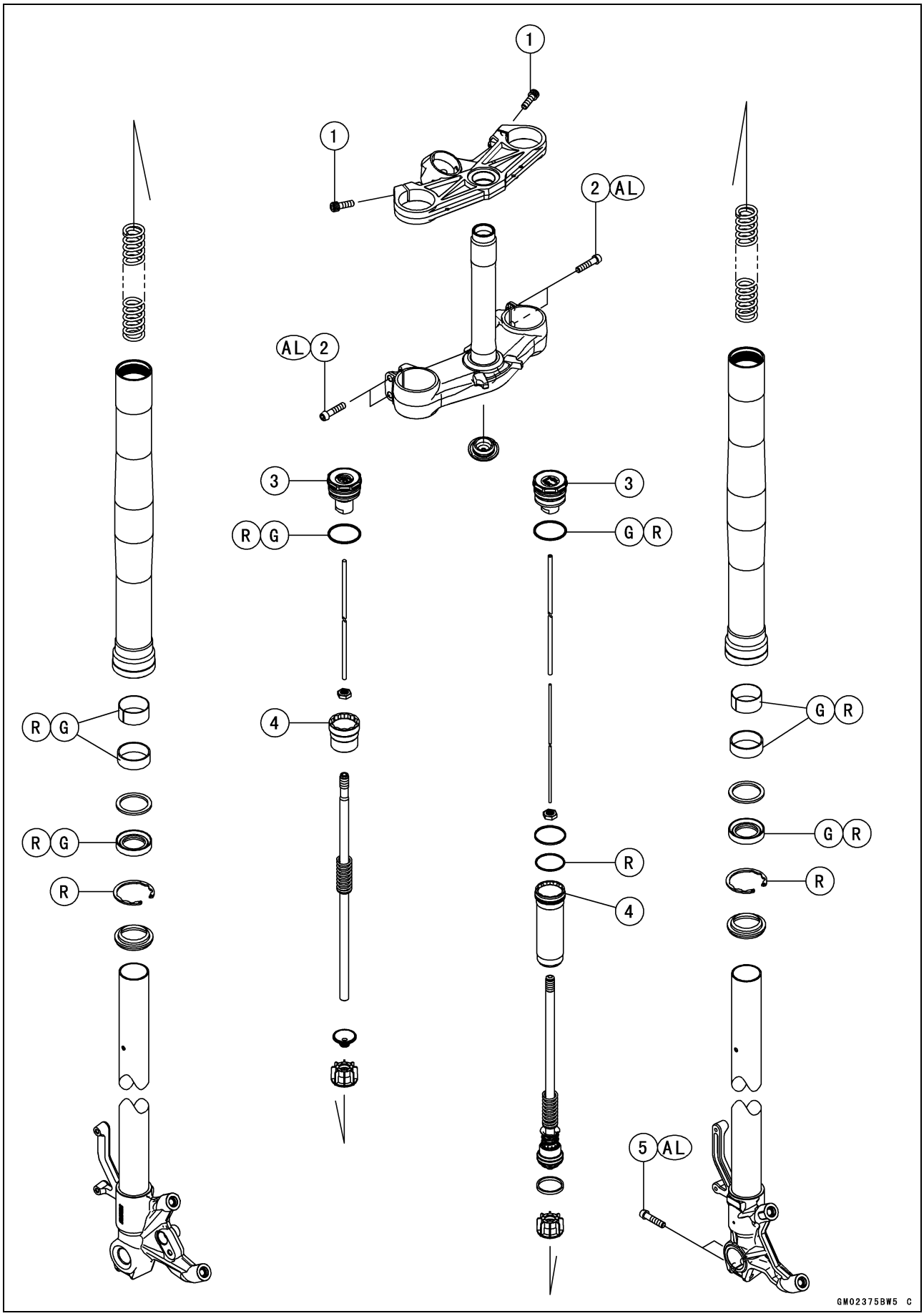
Exploded View

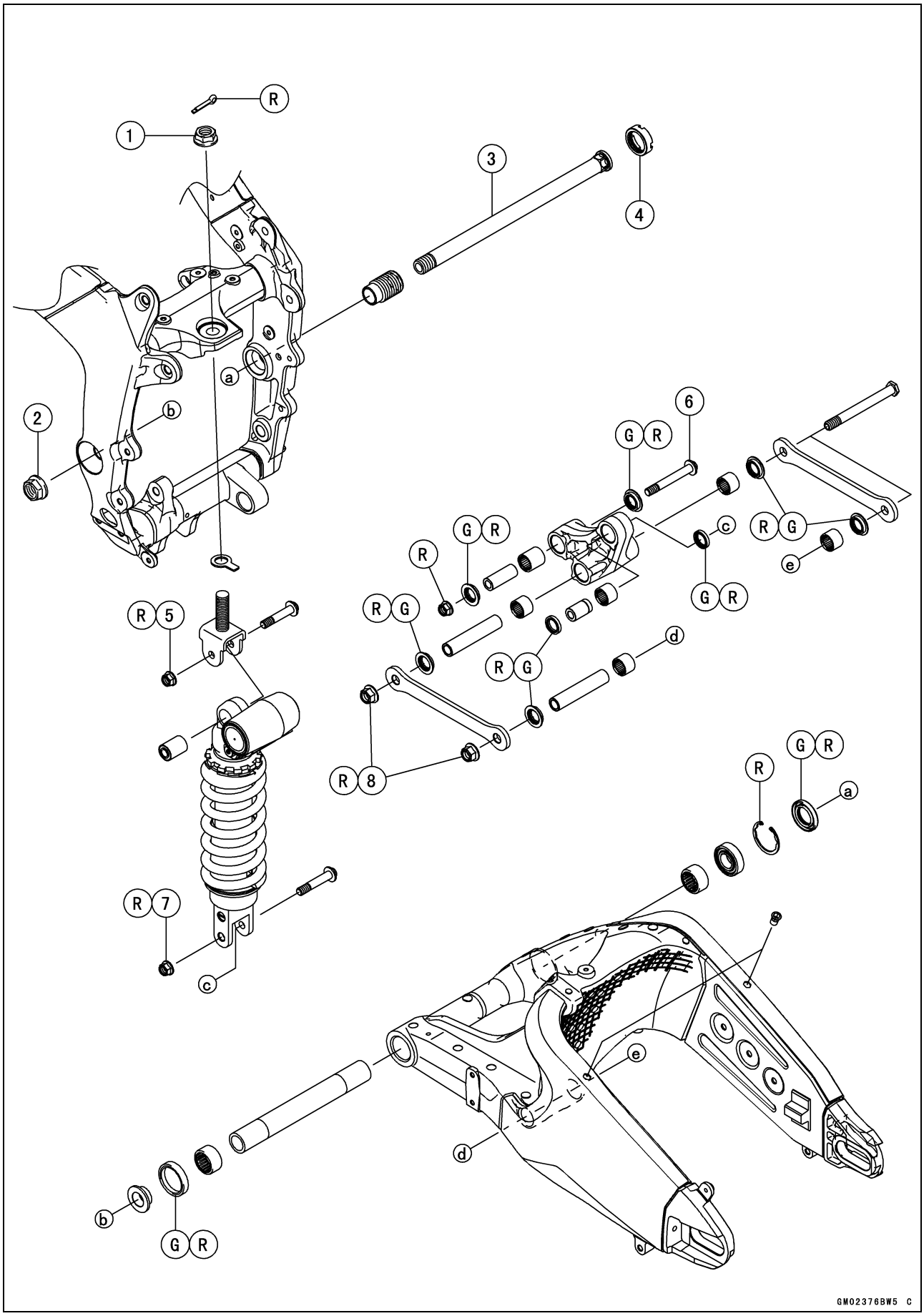


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Upper Front Fork Clamp Bolts	20	2.0	15	
2	Lower Front Fork Clamp Bolts	23	2.3	17	AL
3	Front Fork Top Plugs	35	3.6	26	
4	Piston Rod Guide Case	90	9.2	66	
5	Front Axle Clamp Bolts	20	2.0	15	AL

AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque.
G: Apply grease.
R: Replacement Parts

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Rear Shock Absorber Bracket Nut	59	6.0	44	
2	Swingarm Pivot Shaft Nut	108	11.0	79.7	
3	Swingarm Pivot Shaft	20	2.0	15	
4	Swingarm Pivot Adjusting Collar Locknut	98	10.0	72	
5	Upper Rear Shock Absorber Nut	34	3.5	25	R
6	Rocker Arm Bolt	34	3.5	25	
7	Lower Rear Shock Absorber Nut	34	3.5	25	R
8	Tie-Rod Nuts	59	6.0	44	R

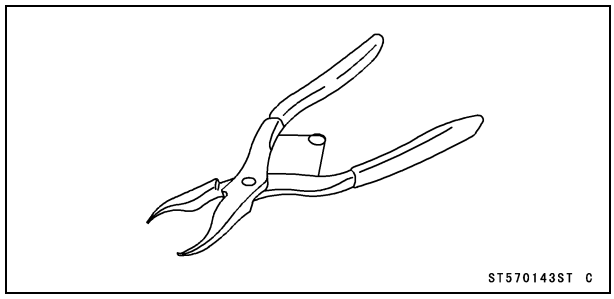
G: Apply grease.
R: Replacement Parts

Specifications

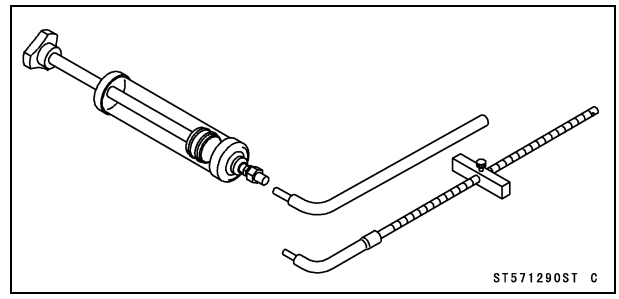
Item	Standard
Front Fork (Per One Unit)	
Fork Inner Tube Diameter	ϕ41 mm (1.6 in.)
Air Pressure	Atmospheric pressure (Non-adjustable)
Rebound Damper Setting	4 1/2 turns out from the fully clockwise position
	(Usable Range: 0 ←→ 5 1/2 turns out)
Compression Damper Setting	6 turns out from the fully clockwise position
	(Usable Range: 0 ←→ 7 turns out)
Fork Spring Preload Setting	5 turns in from the fully counterclockwise position
	(Usable Range: 0 ←→ 20 turns in)
Suspension Oil	Kawasaki SS-47 or equivalent
Amount:	
Right Front Fork	Approx. 460 mL (15.6 US oz.) (when changing oil)
	538 ±2.5 mL (18.2 ±0.085 US oz.) (after disassembly and completely dry)
Left Front Fork	Approx. 480 mL (16.2 US oz.) (when changing oil)
	566 ±2.5 mL (19.1 ±0.085 US oz.) (after disassembly and completely dry)
Oil Level:	
Right Front Fork	90 ±2 mm (3.54 ±0.08 in.) (fully compressed, below from the top of outer tube)
Left Front Fork	80 ±2 mm (3.15 ±0.08 in.) (fully compressed, below from the top of outer tube)
Fork Spring Free Length	256 mm (10.08 in.) (Service Limit: 251 mm (9.88 in.))
Rear Shock Absorber	
Rebound Damper Setting	1 1/2 turns out from the fully clockwise position
	(Usable Range: 0 ←→ 3 turns out)
Compression Damper Setting	2 1/2 turns out from the fully clockwise position (Usable Range: 0 ←→ 5 turns out)
Spring Preload Setting Position:	
Standard	Spring length: 205 mm (8.07 in.)
Usable Range	Spring length: 199 ~ 209 mm (7.83 ~ 8.23 in.) (stronger to weaker)
Gas Pressure	980 kPa (10.0 kgf/cm², 142 psi, Non-adjustable)

Special Tools

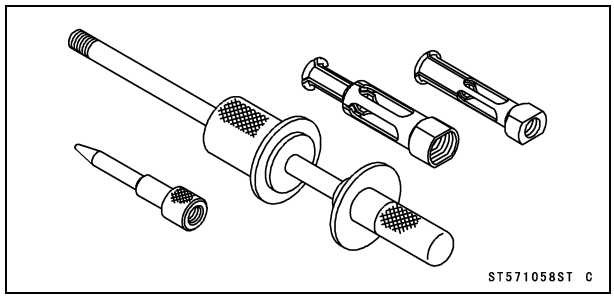
Inside Circlip Pliers:
57001-143



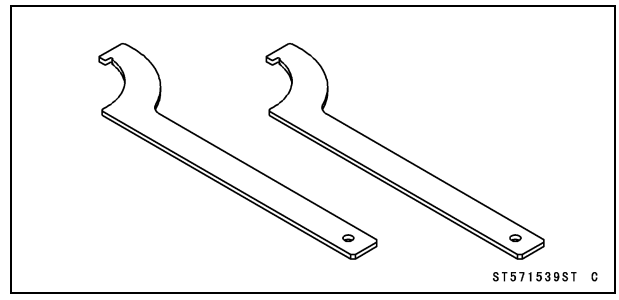
Fork Oil Level Gauge:
57001-1290



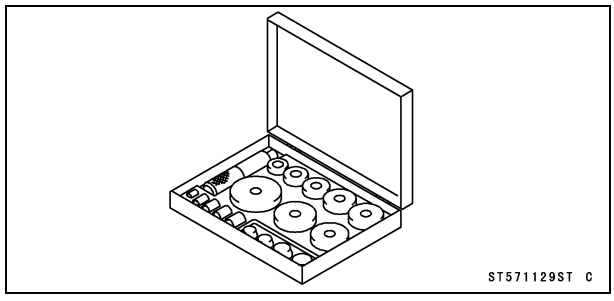
Oil Seal & Bearing Remover:
57001-1058



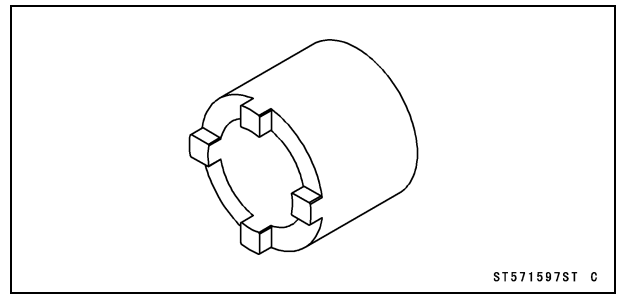
Hook Wrench T=3.2 R37:
57001-1539



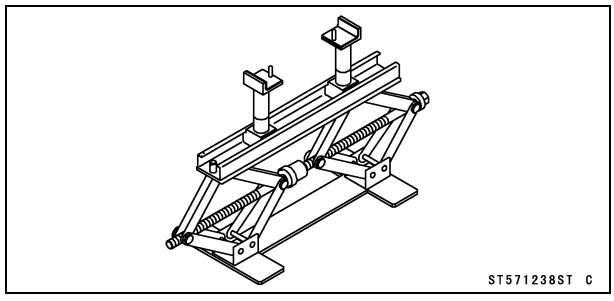
Bearing Driver Set:
57001-1129



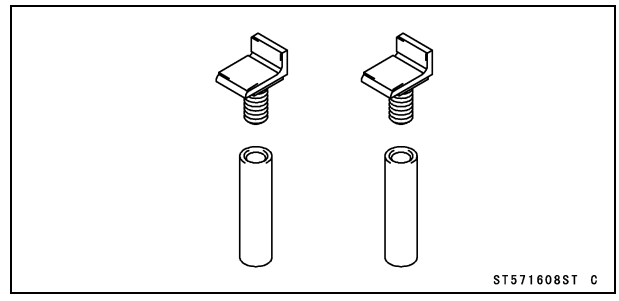
Swingarm Pivot Nut Wrench:
57001-1597



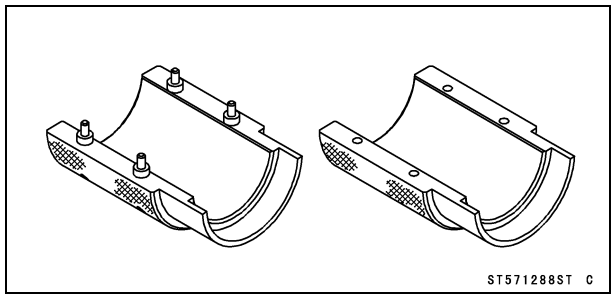
Jack:
57001-1238



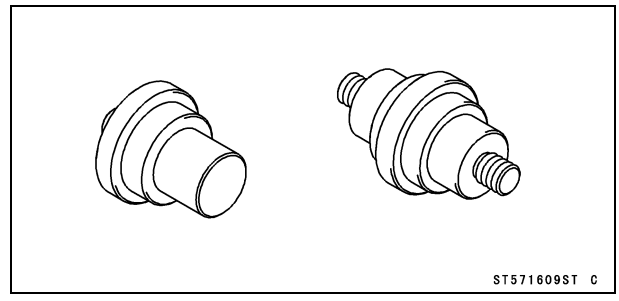
Jack Attachment:
57001-1608



Fork Oil Seal Driver, ϕ41:
57001-1288

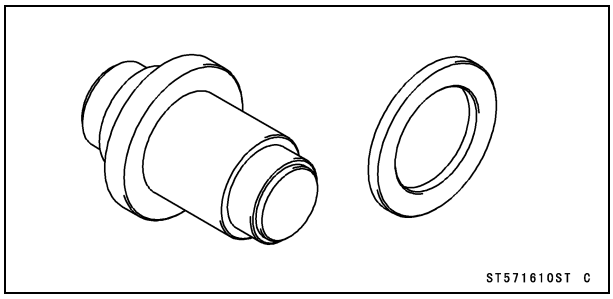


Needle Bearing Driver, ϕ17/ϕ18:
57001-1609

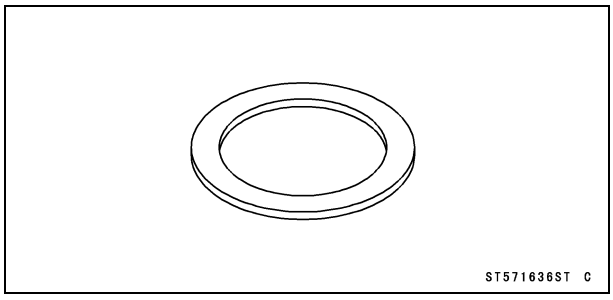


Special Tools

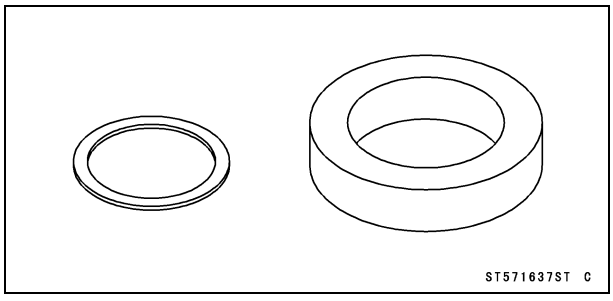
Needle Bearing Driver, ϕ28:
57001-1610



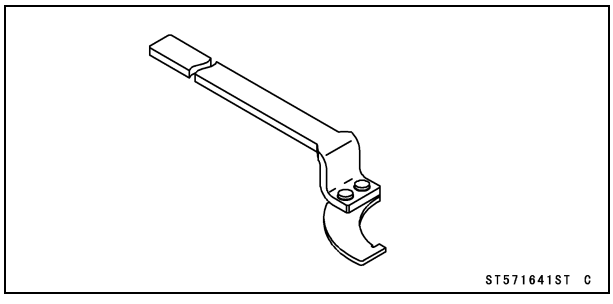
Spacer, ϕ18:
57001-1636



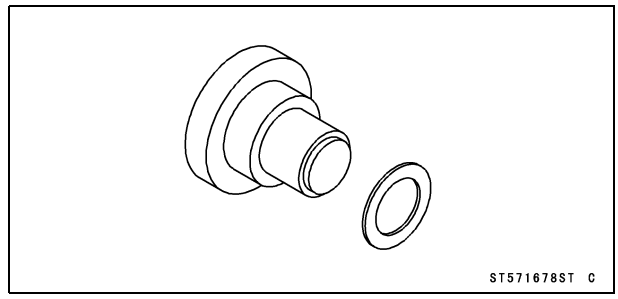
Spacer, ϕ28:
57001-1637



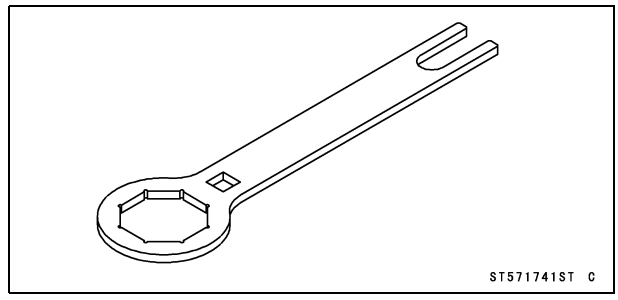
Hook Wrench:
57001-1641



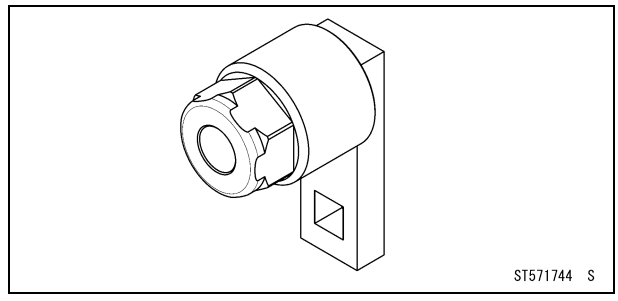
Needle Bearing Driver, ϕ20 & Spacer, ϕ28:
57001-1678



Top Plug Wrench (45 mm):
57001-1741

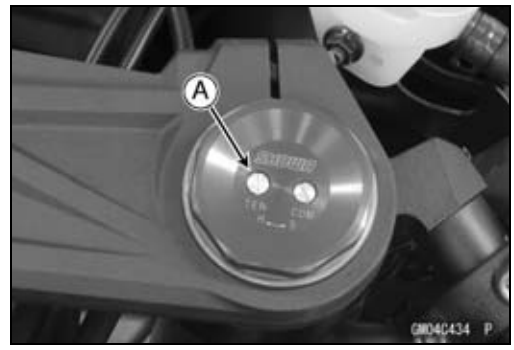


Rod Guide Case Wrench, 33 mm:
57001-1744



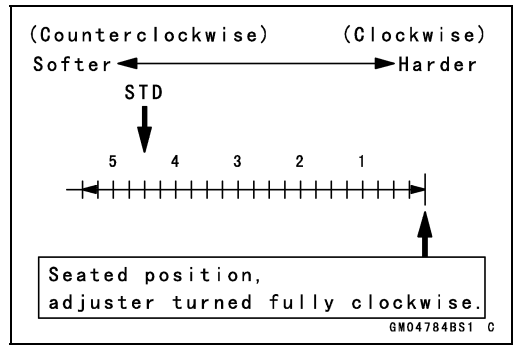
Front Fork

Rebound Damping Force Adjustment



- To adjust the rebound damping force, turn the rebound damping adjuster [A].

○The standard adjuster setting is the **4 1/2 turns out** from the fully clockwise position.

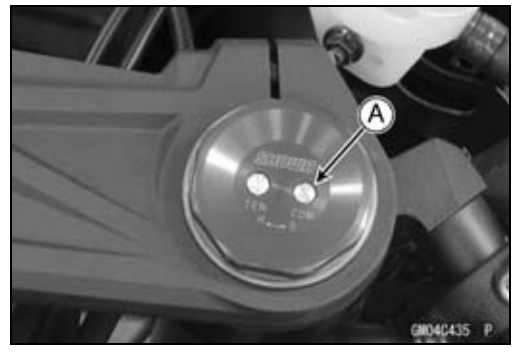


○The damping force can be left soft for average riding. But it should be adjusted harder for high speed riding or riding with a passenger. If the damping feels too soft or too stiff, adjust it in accordance with the following table.

Rebound Damping Force Adjustment

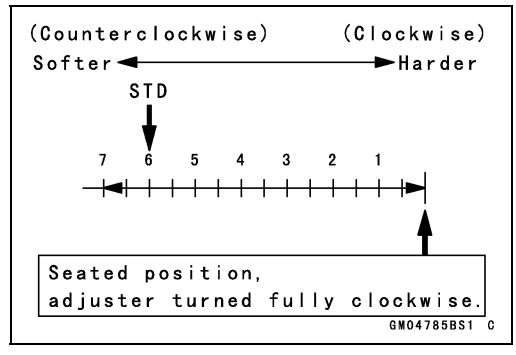
Adjuster Position	Damping Force	Setting	Load	Road	Speed
5 1/2 turns out	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
0	Strong	Hard	Heavy	Bad	High

Compression Damping Force Adjustment



- To adjust the compression damping force, turn the compression damping adjuster [A].

○The standard adjuster setting is the **6 turns out** from the fully clockwise position.



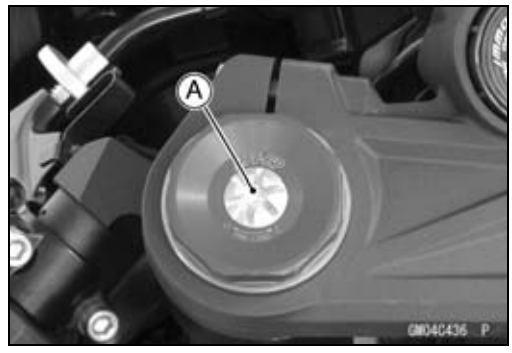
○The damping force can be left soft for average riding. But it should be adjusted harder for high speed riding or riding with a passenger. If the damping feels too soft or too stiff, adjust it in accordance with the following table.

Compression Damping Force Adjustment

Adjuster Position	Damping Force	Setting	Load	Road	Speed
7 turns out	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
0	Strong	Hard	Heavy	Bad	High

Front Fork

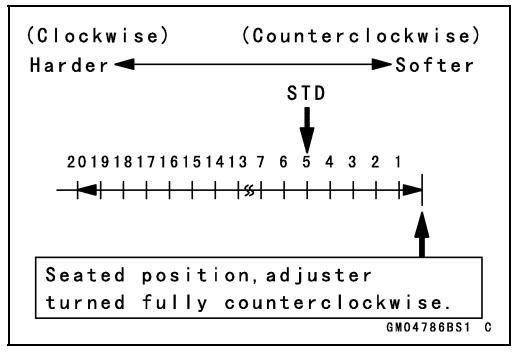
Spring Preload Adjustment



- To adjust the spring preload, turn the spring preload adjuster [A].

○The standard adjuster setting is the **5 turns in** from the fully counterclockwise position.

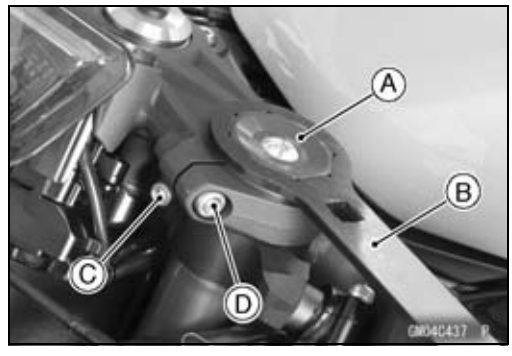
○The spring preload can be left soft for average riding. But it should be adjusted harder for high speed riding or riding with a passenger. If the spring action feels too soft or too stiff, adjust it in accordance with the following table.



Spring Action

Adjuster Position	Damping Force	Setting	Load	Road	Speed
0	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
20 turns in	Strong	Hard	Heavy	Bad	High

Front Fork Removal (Each Fork Leg)



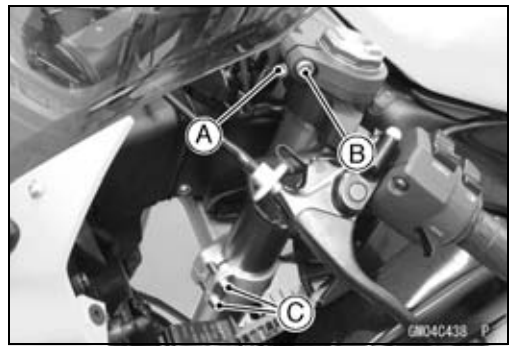
- Remove:
  Front Wheel (see Front Wheel Removal in the Wheels/Tires chapter)
  Front Fender (see Front Fender Removal in the Frame chapter)
  Inner Fairing (see Inner Fairing Removal in the Frame chapter)

★Loosen the front fork top plug [A] beforehand if the fork leg is to be disassembled.

Special Tool - Top Plug Wrench (45 mm): 57001-1741 [B]

NOTE

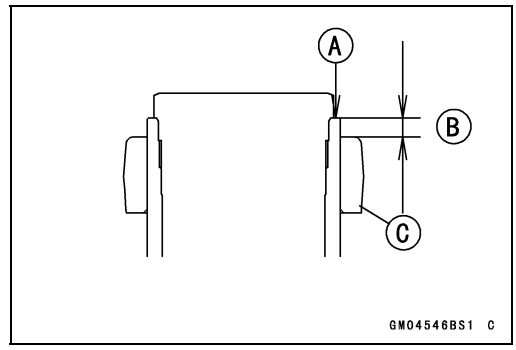
○*Loosen the top plug after loosening the handlebar clamp bolt [C] and upper front fork clamp bolt [D].*



- Loosen:
  Handlebar Clamp Bolt [A]
  Upper Front Fork Clamp Bolt [B]
  Lower Front Fork Clamp Bolts [C]
- With a twisting motion, work the fork leg down and out.

Front Fork

Front Fork Installation (Each Fork Leg)



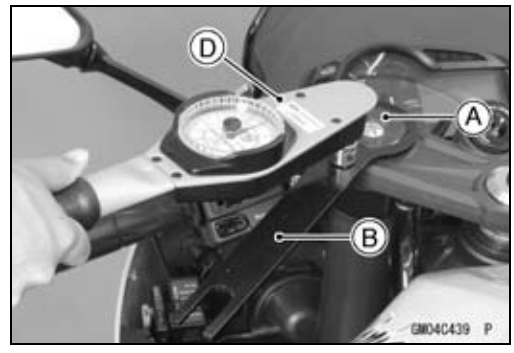
- Install the fork so that the top end [A] of the outer tube as shown.
  7 mm (0.28 in.) [B]
  Steering Stem Head [C]
- Tighten:

Torque - Lower Front Fork Clamp Bolts: 23 N·m (2.3 kgf·m, 17 ft·lb)

NOTE

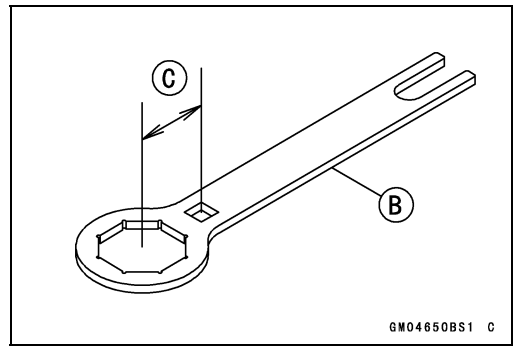
○*Tighten the two lower front fork clamp bolts alternately two times to ensure even tightening torque.*

Torque - Front Fork Top Plugs: 35 N·m (3.6 kgf·m, 26 ft·lb)



NOTE

○*Tighten the front fork top plug [A] before tightening the handlebar clamp bolt and upper front fork clamp bolt.*
○*The torque of front fork top plug is specified to 35 N·m (3.6 kgf·m, 26 ft·lb) however, when you use the top plug wrench (special tool: 57001-1741) [B], reduce the torque to 90% of the specified value [31 N·m (3.2 kgf·m, 23 ft·lb)] due to the distance [C] between the center of the square hole, where the torque wrench [D] is fitted, and that of the octagonal hole of the wrench.*
○*This torque value [31 N·m (3.2 kgf·m, 23 ft·lb)] is applicable when you use a torque wrench whose length gives leverage of approximately 310 mm (12.2 in.) between the grip point to the center of the coupling square.*
○*To obtain the correct tightening torque with your torque wrench, you need to calculate as follows.*



Formula:

a × b ÷ (b + c) = d

[a] Specified torque
[b] Length from center of square hole to grip point
[c] Offset = 44 mm
[d] Tightening torque
For an example:

35 N·m ×310 ÷ (310 + 44) = 31 N·m

- Tighten:

Torque - Upper Front Fork Clamp Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)
Handlebar Clamp Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Install the removed parts (see appropriate chapters).
- Adjust:
  Spring Preload (see Spring Preload Adjustment)
  Rebound Damping Force (see Rebound Damping Force Adjustment)
  Compression Damping Force (see Compression Damping Force Adjustment)

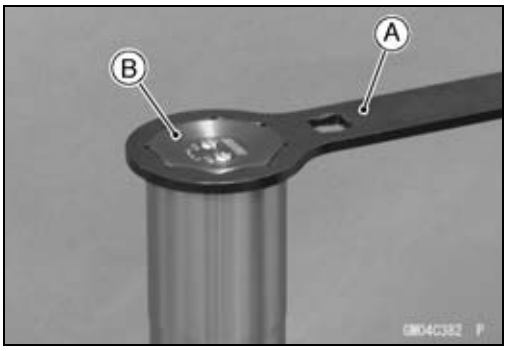
Front Fork

Front Fork Oil Change

Right Front Fork

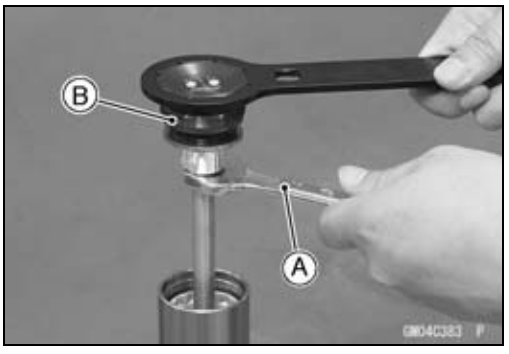
- Remove the front fork (see Front Fork Removal (Each Fork Leg)).
- Hold the inner tube lower end in a vise.
- Using the wrench [A], unscrew the top plug [B] out of the outer tube.

Special Tool - Top Plug Wrench (45 mm): 57001-1741

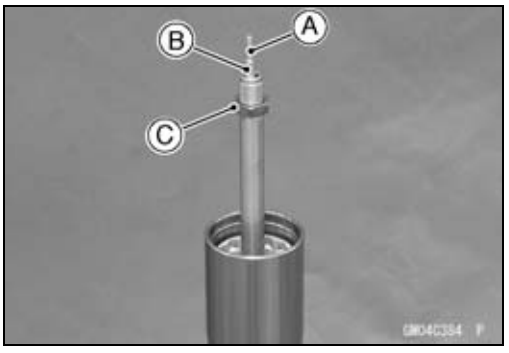


- Holding the piston rod nut with a wrench [A], remove the top plug [B] from the piston rod.

Special Tool - Top Plug Wrench (45 mm): 57001-1741

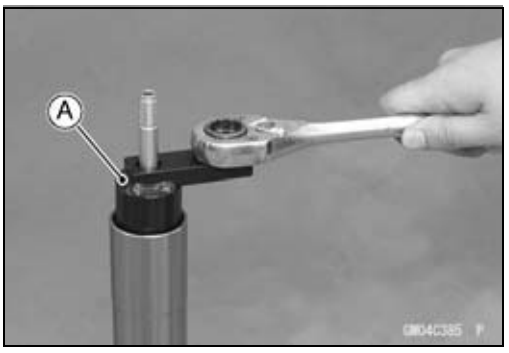


- Remove:
  Rebound Damping Adjuster Rod (Inside) [A]
  Compression Damping Adjuster Rod (Outside) [B]
  Piston Rod Nut [C]



- Using the rod guide case wrench [A], remove the piston rod guide case from the inner tube.

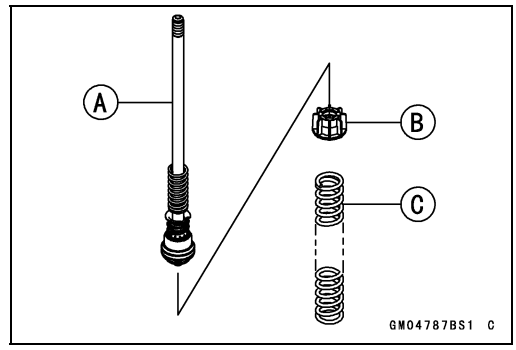
Special Tool - Rod Guide Case Wrench, 33 mm: 57001 -1744



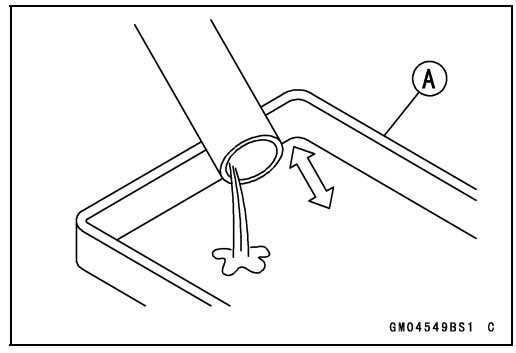
NOTICE
A socket of piston rod guide case is shallow (4 mm) and therefore be sure to check that the wrench (Special Tool: 57001-1744) is securely seated on the piston rod guide case. **When loosening the piston rod guide case, if the wrench is not securely seated on it, the piston rod guide case may break.**

Front Fork

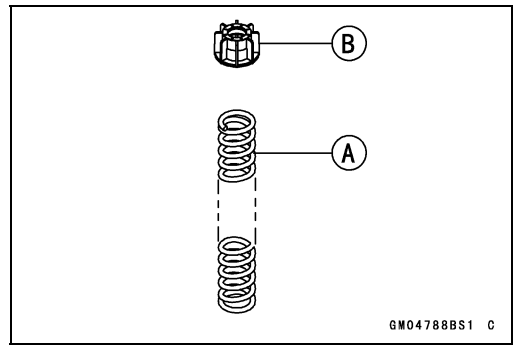
● Remove:
Piston Rod Assy [A]
Collar [B]
Fork Spring [C]



● Drain the fork oil into a suitable container [A].
○Pump the inner tube up and down at least 10 times to expel the oil from the fork.

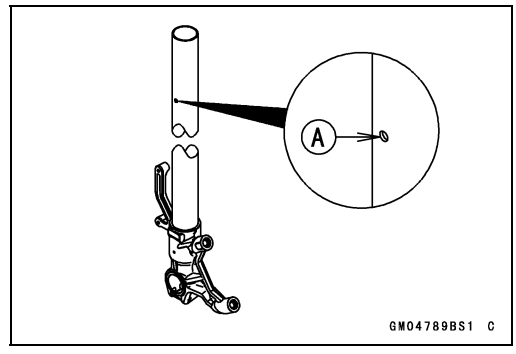


● Install:
Fork Spring [A]
● Install the collar [B] so that the large diameter side faces downward.



● Hold the fork tube upright, press the outer tube.
● Pour in the type and amount of fork oil specified.
○Pour the fork oil until the upper of the inner tube hole [A].

Suspension Oil - SS-47 (1 L): 44091-0010
Amount:
When changing oil:
Approx. 460 mL (15.6 US oz.)
After disassembly and completely dry:
538 ±2.5 mL (18.2 ±0.085 US oz.)



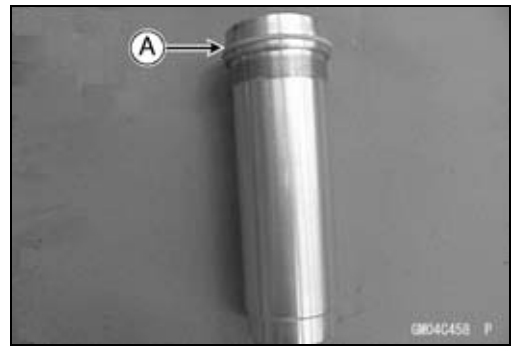
● Move the inner tube up and down more than 10 times in order to expel the air from the fork oil.

● Install the piston rod assy and piston rod guide case into the inner tube.

NOTE

○*Lifting the outer tube, and install the piston rod guide case.*

NOTICE
When inserting, be careful not to damage the piston ring [A].

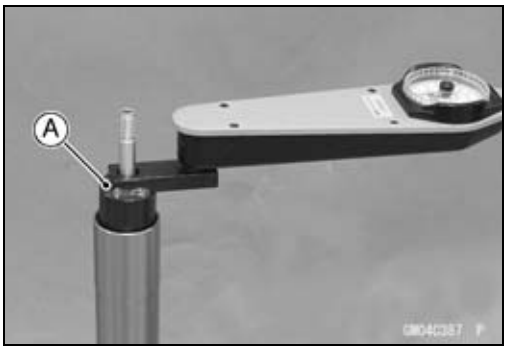


Front Fork

- Hold the inner tube bottom by a vise.
- Using the rod guide case wrench [A], tighten the piston rod guide case to the inner tube.

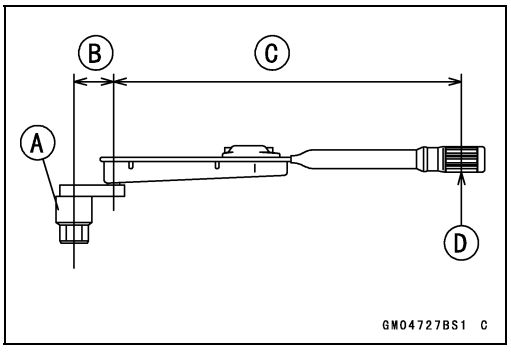
Special Tool - Rod Guide Case Wrench, 33 mm: 57001 -1744

Torque - Piston Rod Guide Case: 90 N·m (9.2 kgf·m, 66 ft·lb)



NOTE

- ○*The tightening torque of the piston rod guide case is specified to 90 N·m (9.2 kgf·m, 66 ft·lb), however in use of the rod guide case wrench (special tool: 57001-1744) [A] you reduce the torque to about 90% of the specified value [81 N·m (8.3 kgf·m, 60 ft·lb)] due to the offset [B] of the wrench square hole.*
- ○*This torque value [81 N·m (8.3 kgf·m, 60 ft·lb)] is applicable when you use a wrench whose length [C] gives leverage of approximately 450 mm (17.7 in.) between the grip point [D] to the center of the coupling square.*
- ○*To obtain the correct tightening torque with your torque wrench, you need to calculate as follows.*



Formula:

a × b ÷ (b + c) = d

[a] Specified torque
[b] Length from center of square hole to grip point
[c] Offset = 50 mm
[d] Tightening torque

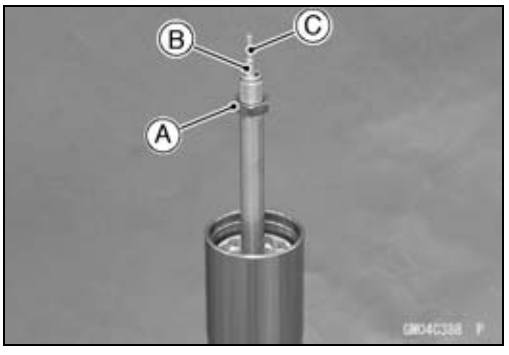
For an example:

90 N·m × 450 ÷ (450 + 50) = 81 N·m

NOTICE

A socket of piston rod guide case is shallow (4 mm) and therefore be sure to check that the wrench (Special Tool: 57001-1744) is securely seated on the piston rod guide case.
When tightening the piston rod guide case. If the wrench is not securely seated on it, the piston rod guide case may brake.

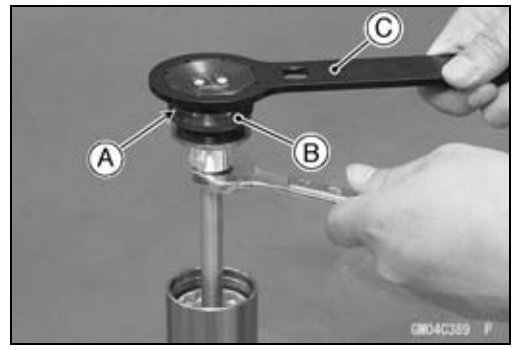
- Install the piston rod nut [A] until it is bottomed.
- Install:
  Compression Damping Adjuster Rod (Outside) [B]
  Rebound Damping Adjuster Rod (Inside) [C]



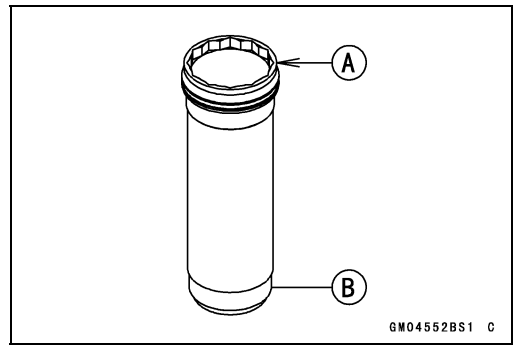
Front Fork

● Replace the O-ring [A] with a new one.
● Apply grease to the new O-ring.
● Install the top plug [B] to the piston rod.
● Holding the top plug with a wrench [C], tighten the piston rod nut against the top plug.

Special Tool - Top Plug Wrench (45 mm): 57001-1741



● Pour the fork oil of the remainder until the upper [A] of the piston rod guide case [B].
● Move the piston rod assy up and down more than 10 times in order to expel all the air from the fork oil.
● Move the outer tube up and down more than 10 times in order to expel all the air from the fork oil.



● Measure the oil level as follows.
○Hold the inner tube vertically in a vise.
○Wait until the oil level settles.
○With the fork fully compressed, insert a tape measure or rod into the piston rod guide case [A], and measure the distance [B] from the top [C] of the outer tube [D] to the oil.

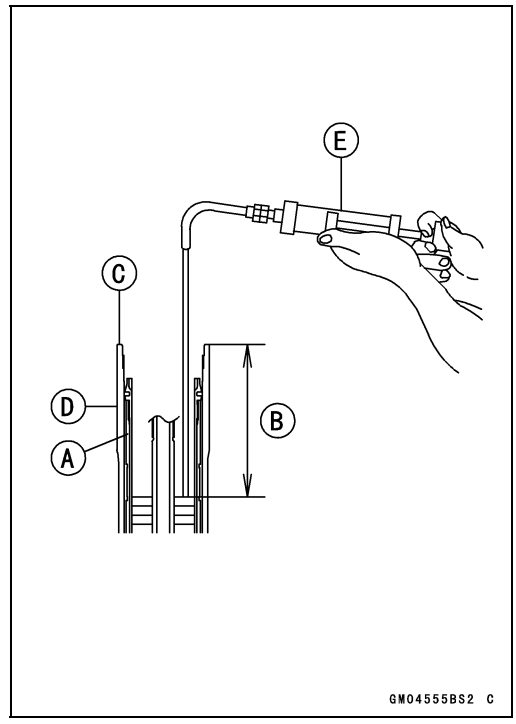
Oil Level (fully compressed)
Standard: 90 ±2 mm (3.54 ±0.08 in.)

NOTE

○*Fork oil level may also be measured using the fork oil level gauge [E].*

Special Tool - Fork Oil Level Gauge: 57001-1290

○Pull the handle slowly to pump out the excess oil until the oil no longer comes out.
★If no oil is pumped out, there is insufficient oil in the inner tube. Pour in enough oil, then pump out the excess oil as shown above.



● Lift the outer tube.
● Using the wrench, tighten the top plug temporary.

Special Tool - Top Plug Wrench (45 mm): 57001-1741

● Install the front fork (see Front Fork Installation (Each Fork Leg)).

NOTE

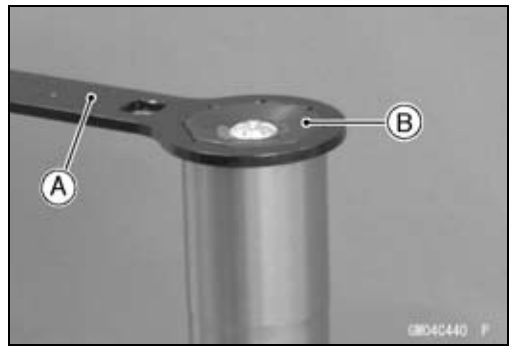
○*After installing the front fork, adjust the damping force correctly.*

Front Fork

Left Front Fork

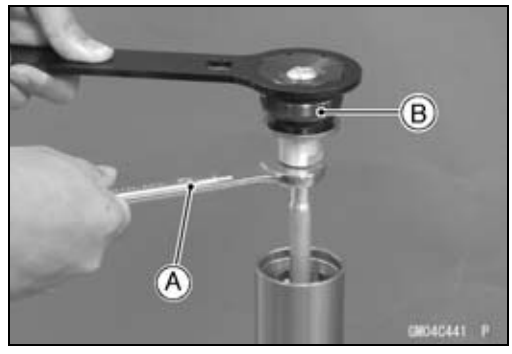
- Remove the front fork (see Front Fork Removal (Each Fork Leg)).
- Turn the spring preload adjuster fully counterclockwise for removing the piston rod assy easily.
- Hold the inner tube lower end in a vise.
- Using the wrench [A], unscrew the top plug [B] out of the outer tube.

Special Tool - Top Plug Wrench (45 mm): 57001-1741

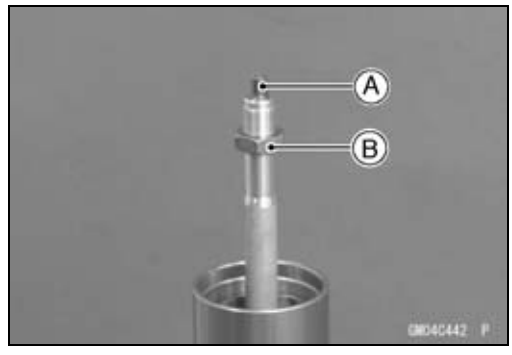


- Holding the piston rod nut with a wrench [A], remove the top plug [B] from the piston rod.

Special Tool - Top Plug Wrench (45 mm): 57001-1741



- Remove:
  Spring Preload Adjuster Rod [A]
  Piston Rod Nut [B]



- Using the rod guide case wrench [A], remove the piston rod guide case from the inner tube.

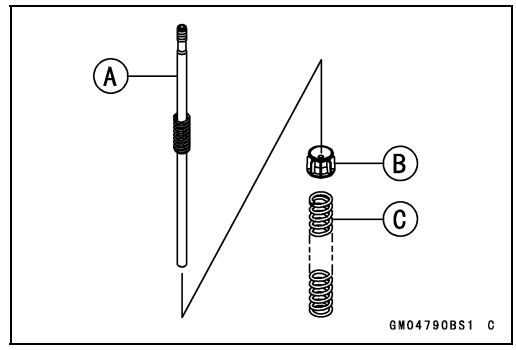
Special Tool - Rod Guide Case Wrench, 33 mm: 57001 -1744

NOTICE

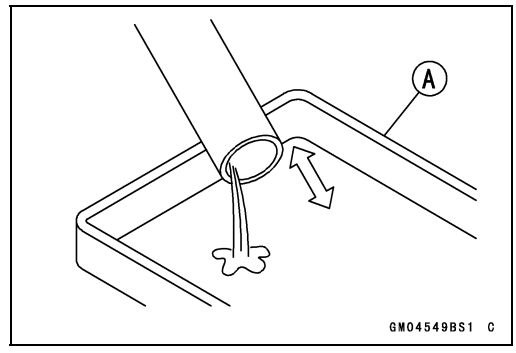
A socket of piston rod guide case is shallow (4 mm) and therefore be sure to check that the wrench (Special Tool: 57001-1744) is securely seated on the piston rod guide case.
When loosening the piston rod guide case. If the wrench is not securely seated on it, the piston rod guide case may brake.

Front Fork

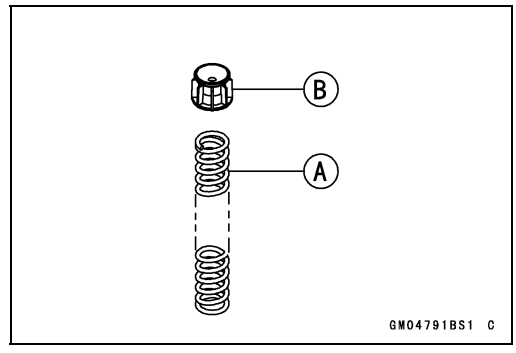
● Remove:
Piston Rod [A]
Collar [B]
Fork Spring [C]



● Drain the fork oil into a suitable container [A].
○Pump the inner tube up and down at least 10 times to expel the oil from the fork.

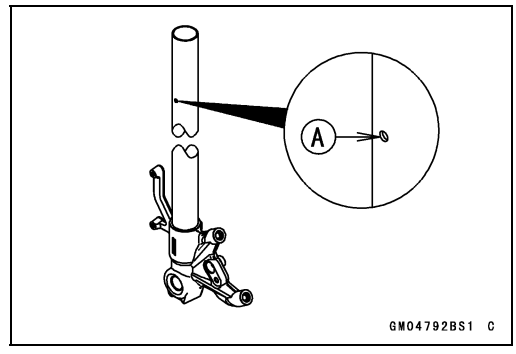


● Install:
Fork Spring [A]
● Install the collar [B] so that the large diameter side faces downward.



● Hold the fork tube upright, press the outer tube.
● Pour in the type and amount of fork oil specified.
○Pour the fork oil until the upper of the inner tube hole [A].

Suspension Oil - SS-47 (1 L): 44091-0010
Amount:
When changing oil:
Approx. 480 mL (16.2 US oz.)
After disassembly and completely dry (Total):
566 ±2.5 mL (19.1 ±0.085 US oz.)



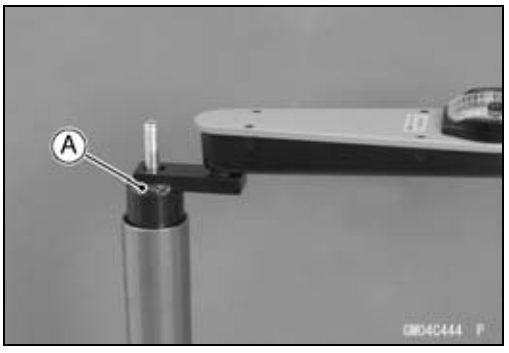
● Move the inner tube up and down more than 10 times in order to expel the air from the fork oil.

Front Fork

- Insert the piston rod into the inner tube.
- Hold the inner tube bottom by a vise.
- Using rod guide case wrench [A], tighten the piston rod guide case to the inner tube.

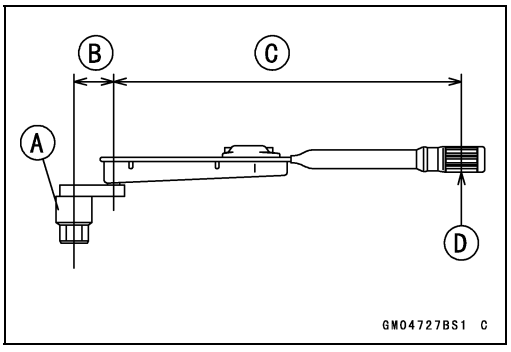
Special Tool - Rod Guide Case Wrench, 33 mm: 57001 -1744

Torque - Piston Rod Guide Case: 90 N·m (9.2 kgf·m, 66 ft·lb)



NOTE

- *The tightening torque of the piston rod guide case is specified to 90 N·m (9.2 kgf·m, 66 ft·lb), however in use of the rod guide case wrench (special tool: 57001-1744) [A] you reduce the torque to about 90% of the specified value [81 N·m (8.3 kgf·m, 60 ft·lb)] due to the offset [B] of the wrench square hole.*
- *This torque value [81 N·m (8.3 kgf·m, 60 ft·lb)] is applicable when you use a wrench whose length [C] gives leverage of approximately 450 mm (17.7 in.) between the grip point [D] to the center of the coupling square.*
- *To obtain the correct tightening torque with your torque wrench, you need to calculate as follows.*



Formula:

a × b ÷ (b + c) = d

[a] Specified torque
[b] Length from center of square hole to grip point
[c] Offset = 50 mm
[d] Tightening torque

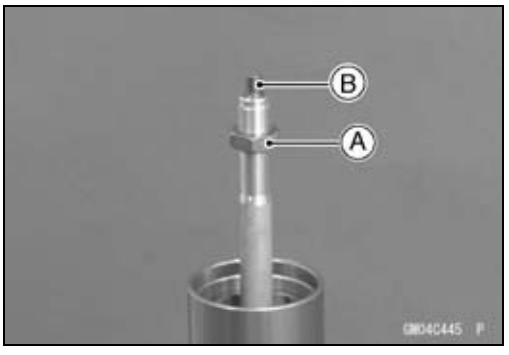
For an example:

90 N·m × 450 ÷ (450 + 50) = 81 N·m

NOTICE

A socket of piston rod guide case is shallow (4 mm) and therefore be sure to check that the wrench (Special Tool: 57001-1744) is securely seated on the piston rod guide case.
When tightening the piston rod guide case. If the wrench is not securely seated on it, the piston rod guide case may brake.

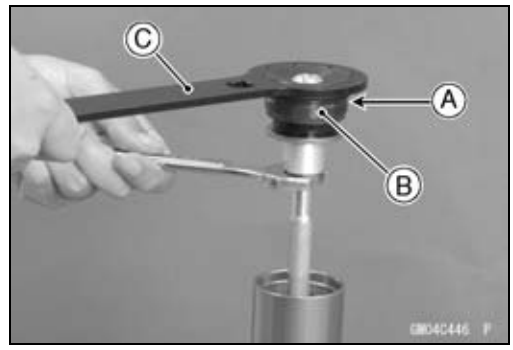
- Install the piston rod nut [A] until it is bottomed.
- Install:
  Spring Preload Adjuster Rod [B]



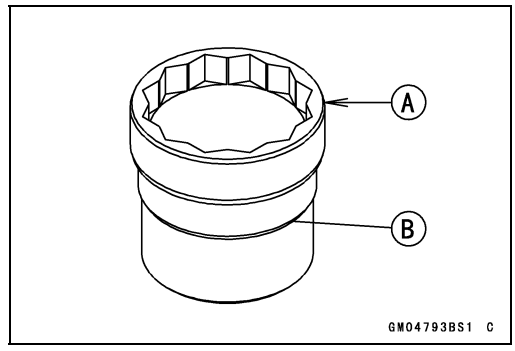
Front Fork

- Replace the O-ring [A] with a new one.
- Apply grease to the new O-ring.
- Install the top plug [B] to the piston rod.
- Holding the top plug with the wrench [C], tighten the piston rod nut against the top plug.

Special Tool - Top Plug Wrench (45 mm): 57001-1741



- Pour the fork oil of the remainder until the upper [A] of the piston rod guide case [B].
- Move the piston rod assembly up and down more than 10 times in order to expel all the air from the fork oil.
- Move the outer tube up and down more than 10 times in order to expel all the air from the fork oil.



- Measure the oil level as follows.

○Hold the inner tube vertically in a vise.
○Wait until the oil level settles.
○With the fork fully compressed, insert a tape measure or rod into the piston rod guide case [A], and measure the distance [B] from the top [C] of the outer tube [D] to the oil.

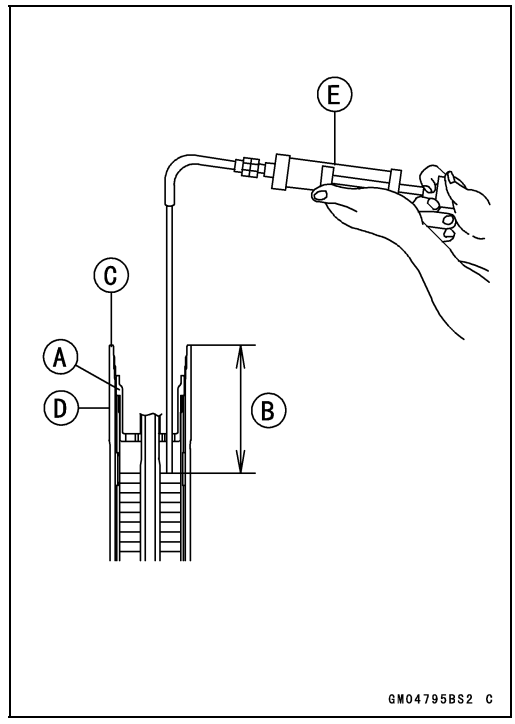
Fork Oil Level (fully compressed)
Standard: 80 ±2 mm (3.15 ±0.08 in.)

NOTE

○*Fork oil level may also be measured using the fork oil level gauge [E].*

Special Tool - Fork Oil Level Gauge: 57001-1290

○Pull the handle slowly to pump out the excess oil until the oil no longer comes out.
★If no oil is pumped out, there is insufficient oil in the inner tube. Pour in enough oil, then pump out the excess oil as shown above.



- Lift the outer tube.
- Using the wrench, tighten the top plug temporary.

Special Tool - Top Plug Wrench (45 mm): 57001-1741

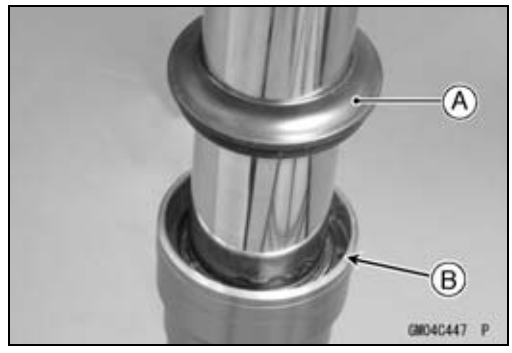
- Install the front fork (see Front Fork Installation (Each Fork Leg)).

NOTE

○*After installing the front fork, adjust the spring preload correctly.*

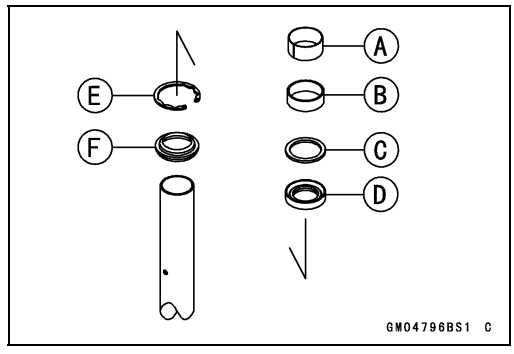
Front Fork

Front Fork Disassembly



- Remove the front fork (see Front Fork Removal (Each Fork Leg)).
- Drain the fork oil (see Front Fork Oil Change).
- Remove the dust seal [A] from the outer tube.
- Remove the circlip [B].

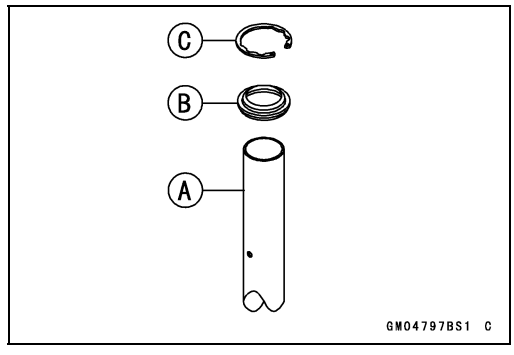
  Special Tool - Inside Circlip Pliers: 57001-143
- Separate the outer tube from the inner tube.



- Remove the following parts from the inner tube.
  Slide Bushing [A]
  Guide Bushing [B]
  Washer [C]
  Oil Seal [D]
  Circlip [E]
  Dust Seal [F]

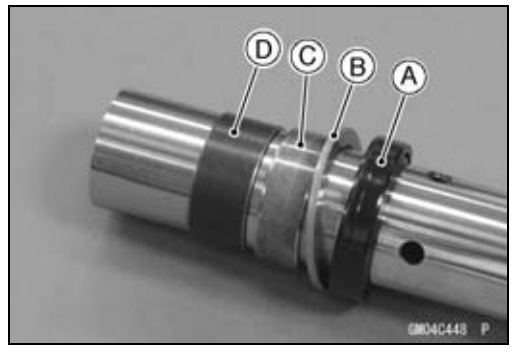
Front Fork Assembly

- Replace the following parts with new ones.
  Slide Bushing
  Guide Bushing
  Oil Seal
  Circlip



- Install the following parts to the inner tube [A].
  Dust Seal [B]
  Circlip [C]

  Special Tool - Inside Circlip Pliers: 57001-143



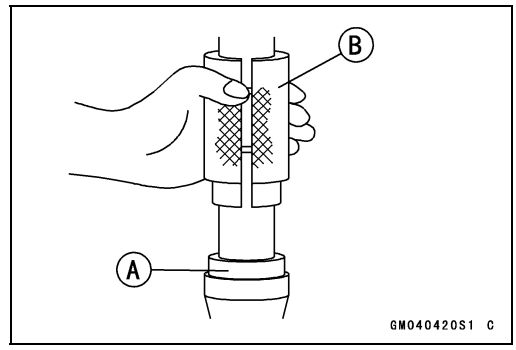
- Apply grease to the oil seal lips.
- Install the oil seal [A] so that the stamp side faces lower side.
- Install the washer [B].
- Install the guide bushing [C] so that the slit of it is positioned perpendicular to the traveling direction.
- Install the slide bushing [D] so that the slit of it is positioned perpendicular to the traveling direction.
- Apply grease to the slide and guide bushings and oil seal.

Front Fork

- Insert the inner tube to 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, ϕ41: 57001-1288

- Install the circlip and dust seal.
- Pour in the specified type of oil (see Front Fork Oil Change).

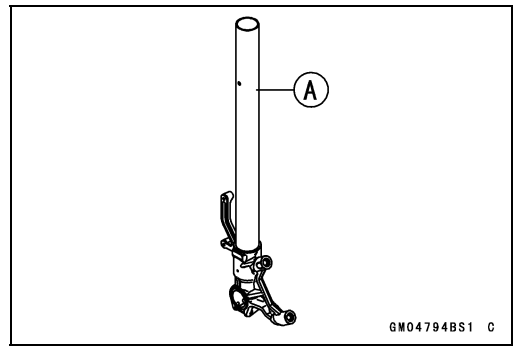


Inner Tube Inspection

- Visually inspect the inner tube [A].

★If there is any damage, replace the inner tube. Since damage to the inner tube damages the oil seal and dust seal, replace the oil seal and dust seal whenever the inner tube is replaced.

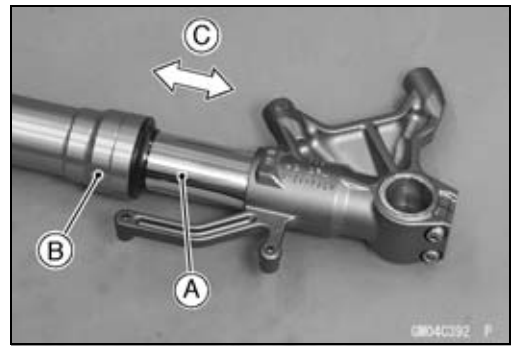
NOTICE
If the inner tube is badly bent or creased, replace it. Excessive bending, followed by subsequent straightening, can weaken the inner tube.



- Temporarily assemble the inner tube [A] and outer tube [B], and pump [C] them back and forth manually to check for smooth operation.

★If you feel binding or catching, the inner and outer tubes must be replaced.

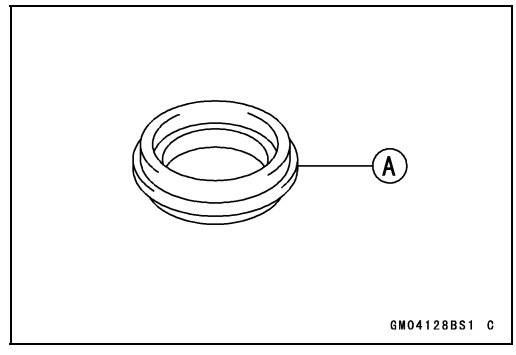
⚠ WARNING
A straightened inner or outer fork tube may fall in use, possibly causing an accident resulting in serious injury or death. Replace a badly bent or damaged inner or outer tube and inspect the other tube carefully before reusing it.



Dust Seal Inspection

- Inspect the dust seals [A] for any signs of deterioration or damage.

★Replace it if necessary.

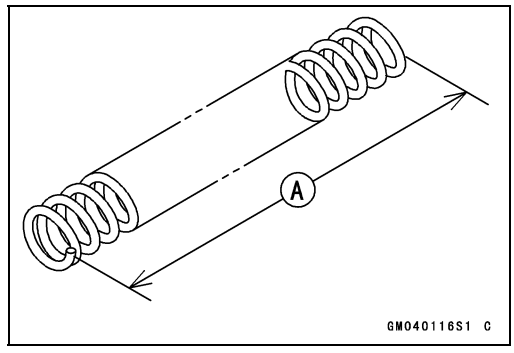


Front Fork

Spring Tension Inspection

- Since a spring becomes shorter as it weakens, check its free length [A] to determine its condition.

★If the spring of either fork leg is shorter than the service limit, it must be replaced. If the length of a replacement spring and that of the remaining spring vary greatly, the remaining spring should also be replaced in order to keep the fork legs balanced for motorcycle stability.



Spring Free Length

Standard: 256 mm (10.08 in.)

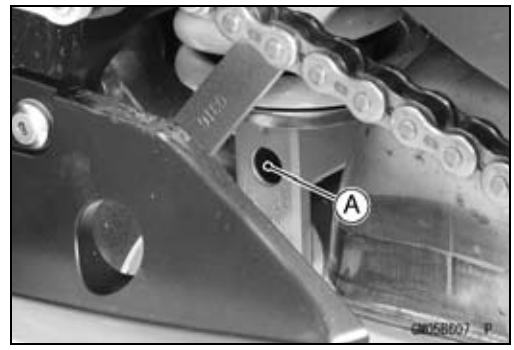
Service Limit: 251 mm (9.88 in.)

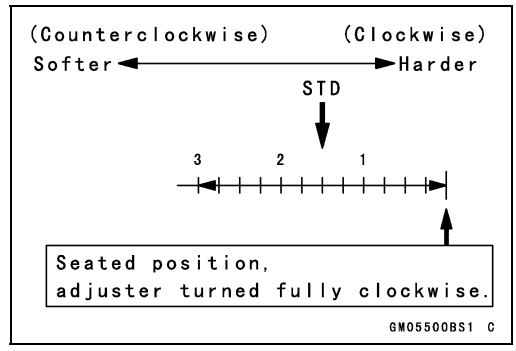
Rear Shock Absorber

Rebound Damping Force Adjustment

- To adjust the rebound damping force, turn the rebound damping adjuster [A] to the desired position.

○The standard adjuster setting is the **1 1/2 turns out** from the fully clockwise position.





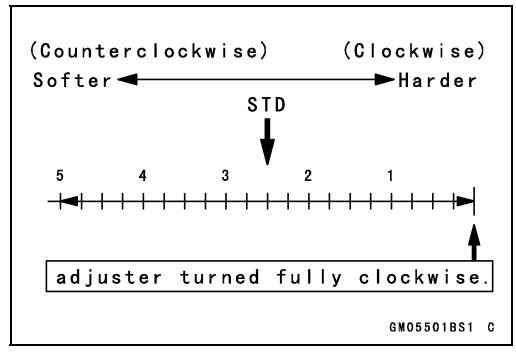
Rebound Damping Force Adjustment

Adjuster Position	Damping Force	Setting	Load	Road	Speed
3 turns out	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
0	Strong	Hard	Heavy	Bad	High

Compression Damping Force Adjustment

- To adjust the compression damping force, turn the compression damping adjuster [A] to the desired position.

○The standard adjuster setting is the **2 1/2 turns out** from the fully clockwise position.



Compression Damping Force Adjustment

Adjuster Position	Damping Force	Setting	Load	Road	Speed
5 turns out	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
0	Strong	Hard	Heavy	Bad	High

Spring Preload Adjustment

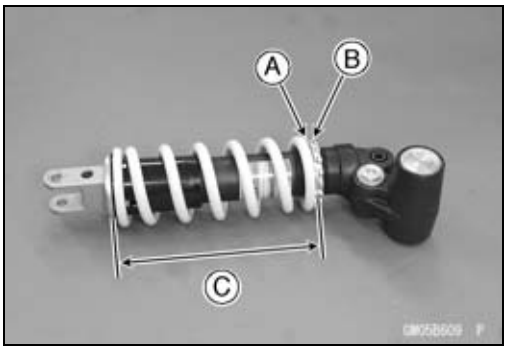
- Remove the rear shock absorber from the frame (see Rear Shock Absorber Removal).
- Loosen the locknut and turn out the adjusting nut to free the spring.

Special Tool - Hook Wrench T=3.2 R37: 57001-1539

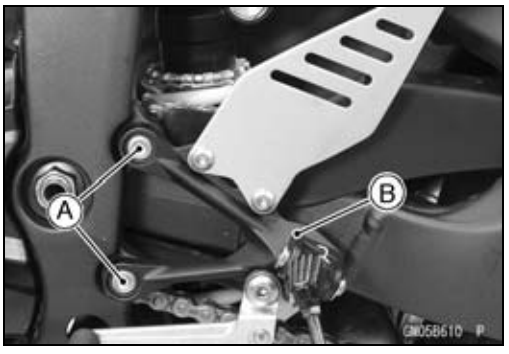
Rear Shock Absorber

● To adjust the spring preload, turn in the adjusting nut [A] to the desired position and tighten the locknut [B].
Spring Length [C]

Spring Preload Setting
Standard: Spring length 205 mm (8.07 in.)
Usable Range: Spring length 199 ~ 209 mm (7.83 ~ 8.23 in.)



● Remove:
Front Footpeg Bracket Bolts [A]
Front Footpeg Bracket [B]



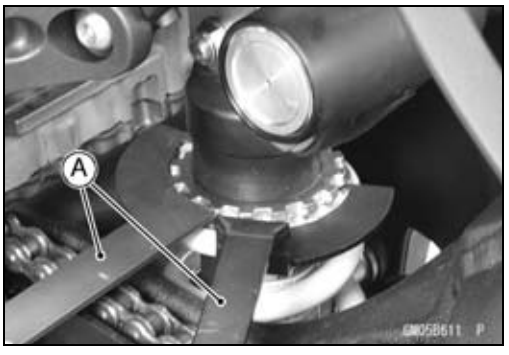
● To adjust the spring preload, turn in the adjusting nut to the desired position and tighten the locknut by using hook wrenches [A] with the rear shock absorber attached the frame.

Special Tools - Hook Wrench T=3.2 R37: 57001-1539
Hook Wrench: 57001-1641

★If the spring action feels too soft or too stiff, adjust it.

Spring Adjustment

Adjuster Position	Damping Force	Setting	Load	Road	Speed
209 mm (8.23 in.)	Weak	Soft	Light	Good	Low
↑ ↓	↑ ↓	↑ ↓	↑ ↓	↑ ↓	↑ ↓
199 mm (7.83 in.)	Strong	Hard	Heavy	Bad	High



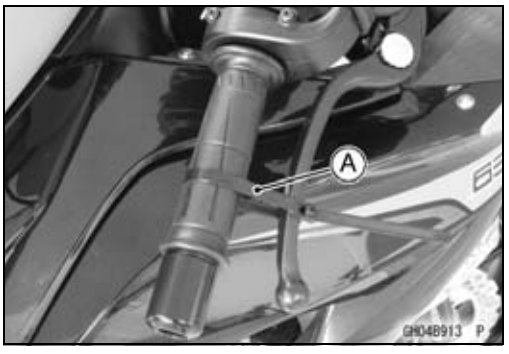
Rear Shock Absorber Removal

● Remove:
Lower Fairings (see Lower Fairing Removal in the Frame chapter)
Premuffler Chamber (see Premuffler Chamber Removal in the Engine Top End chapter)

● Squeeze the brake lever slowly and hold it with a band [A].

⚠ WARNING

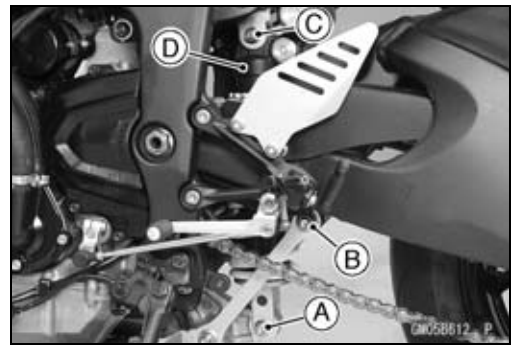
Be sure to hold the front brake when removing the shock absorber, or the motorcycle may fall over. It could cause an accident and injury.



● Raise the rear wheel off the ground with the jack.

Special Tools - Jack: 57001-1238
Jack Attachment: 57001-1608

Rear Shock Absorber

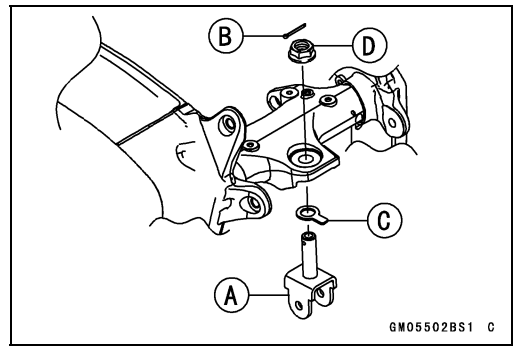


- Remove:
  Lower Rear Shock Absorber Nut [A] and Bolt
  Upper Tie-Rod Nut [B] and Bolt
  Upper Rear Shock Absorber Nut [C] and Bolt
- Remove the rear shock absorber [D] downward.

Rear Shock Absorber Installation

- Replace the following nuts with new ones.
  Rear Shock Absorber Nuts
  Tie-Rod Nut (Upper)
- Tighten:

Torque - Rear Shock Absorber Nuts: 34 N·m (3.5 kgf·m, 25 ft·lb)
Tie-Rod Nuts: 59 N·m (6.0 kgf·m, 44 ft·lb)



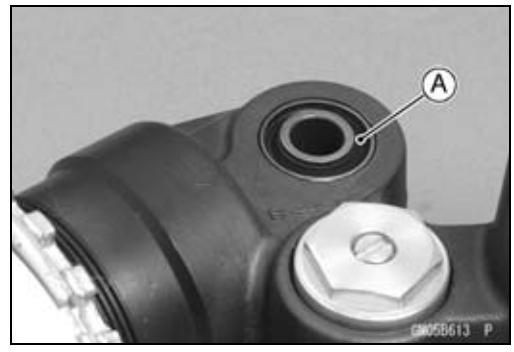
- When installing the rear shock absorber bracket [A], note the following.

○Replace the cotter pin [B] with a new one.
○Install:
  Spacer [C]
  Rear Shock Absorber Bracket
○Tighten:

Torque - Rear Shock Absorber Bracket Nut [D]: 59 N·m (6.0 kgf·m, 44 ft·lb)

○Insert the cotter pin and bend the pin ends.

Rear Shock Absorber Inspection



- Remove the rear shock absorber (see Rear Shock Absorber Removal).
- Visually inspect the following items.
  Oil Leakage
  Crack or Dent

★If there is any damage to the rear shock absorber, replace it.

- Visually inspect the rubber bushing [A].

★If it show any signs of damage, replace it.

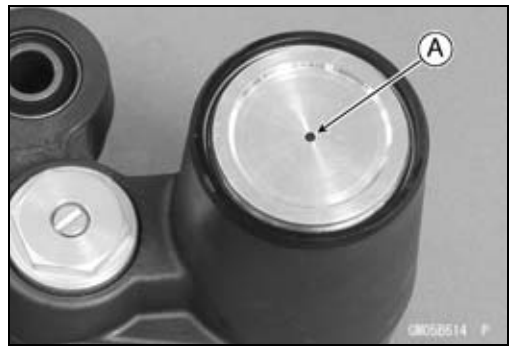
Rear Shock Absorber

Rear Shock Absorber Scrapping

⚠ WARNING

Pressurized nitrogen may explode when heated. The rear shock contains nitrogen gas. To avoid an explosion, do not incinerate the shock body without first releasing the nitrogen and removing the shraeder valve.

- Remove the rear shock absorber (see Rear Shock Absorber Removal).
- Drill the hole [A] of the reservoir tank using about 2 mm (0.08 in.) drillbit.

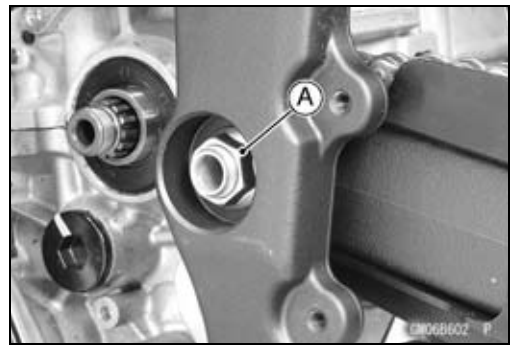


⚠ WARNING

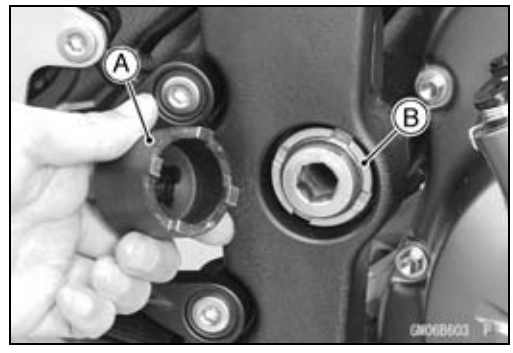
Pressurized gas can cause injury. Do not point the drill toward your face or body.

Swingarm

Swingarm Removal



● Remove:
Rear Wheel (see Rear Wheel Removal in the Wheels/Tires chapter)
Chain Cover (see Drive Chain Removal in the Final Drive chapter)
Engine Sprocket (see Engine Sprocket Removal in the Final Drive chapter)
Mud Guard (see Mud Guard Removal in the Frame chapter)
Rear Shock Absorber (see Rear Shock Absorber Removal)
Swingarm Pivot Shaft Nut [A]

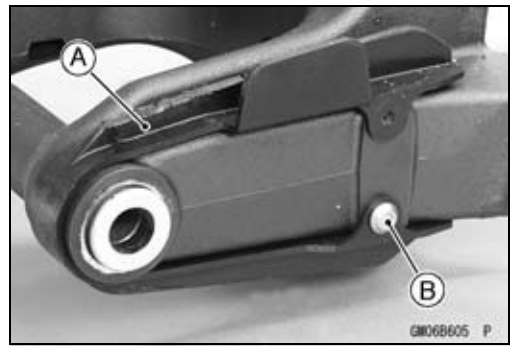


● Using the swingarm pivot nut wrench [A], loosen the swingarm pivot adjusting collar locknut [B].

Special Tool - Swingarm Pivot Nut Wrench: 57001-1597

● Turn the swingarm pivot shaft [A] counterclockwise to free the adjusting collar from the swingarm.
○Make the gap between the adjusting collar and swingarm.
● Pull out the pivot shaft to the right side and remove the swingarm.

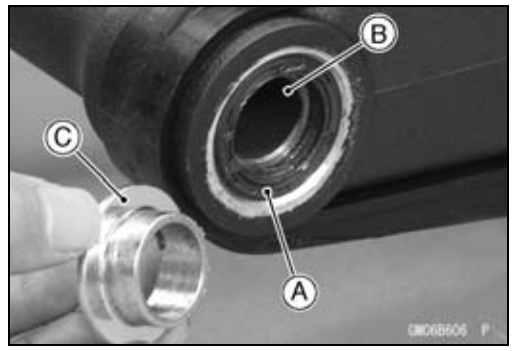
Swingarm Installation



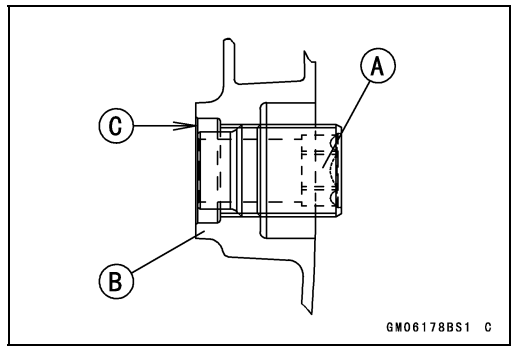
● Visually inspect the chain guide [A].
★Replace the chain guide if it shows any signs of abnormal wear or damage.
○Apply a non-permanent locking agent to the threads of the chain guide bolt [B].

Swingarm

- Apply plenty of grease to the lip of the oil seals [A].
- Be sure to install the oil seals and sleeve [B] to the swingarm.
- Fit the collar [C] on the oil seal of the left side.



- Screw the adjusting collar [A] into the frame [B] so that the collar does not project the swingarm mating surface [C].



- Insert the swingarm pivot shaft [A] into the adjusting collar [B] from the right side, and tighten the pivot shaft.

NOTE

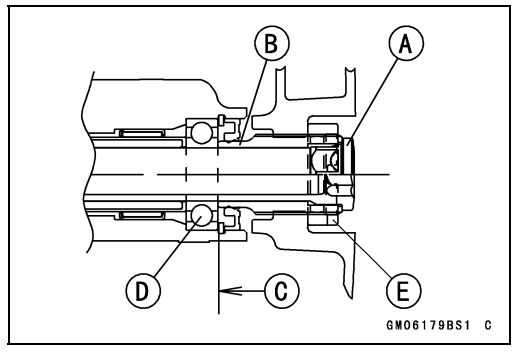
○*Tighten the swingarm pivot shaft until the clearance [C] between the ball bearing [D] and collar come to 0 mm (0 in.).*

Torque - Swingarm Pivot Shaft: 20 N·m (2.0 kgf·m, 15 ft·lb)

- Using the swingarm pivot nut wrench, tighten the swingarm pivot adjusting collar locknut [E].

Special Tool - Swingarm Pivot Nut Wrench: 57001-1597

Torque - Swingarm Pivot Adjusting Collar Locknut: 98 N·m (10.0 kgf·m, 72 ft·lb)



- Tighten the swingarm pivot shaft nut.

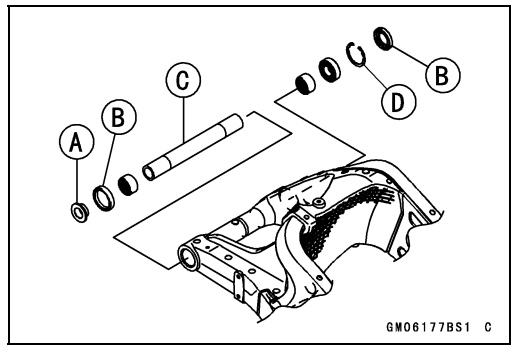
Torque - Swingarm Pivot Shaft Nut: 108 N·m (11.0 kgf·m, 79.7 ft·lb)

- Install the removed parts (see appropriate chapters).

Swingarm Bearing Removal

- Remove:
  Swingarm (see Swingarm Removal)
  Collar [A]
  Oil Seals [B]
  Sleeve [C]
  Circlip [D] (Right Side)

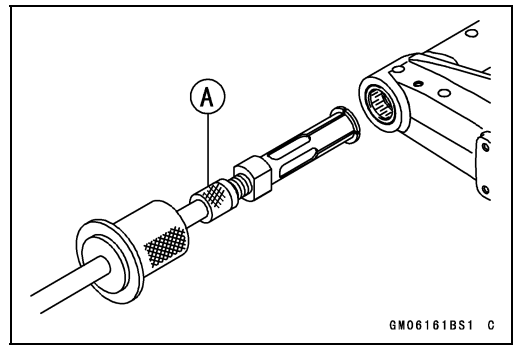
Special Tool - Inside Circlip Pliers: 57001-143



Swingarm

- Remove the ball bearing and needle bearings.

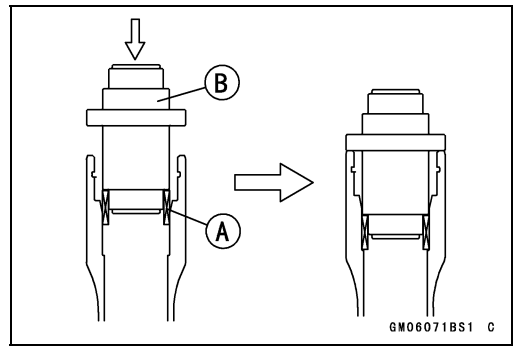
Special Tool - Oil Seal & Bearing Remover [A]: 57001-1058



Swingarm Bearing Installation

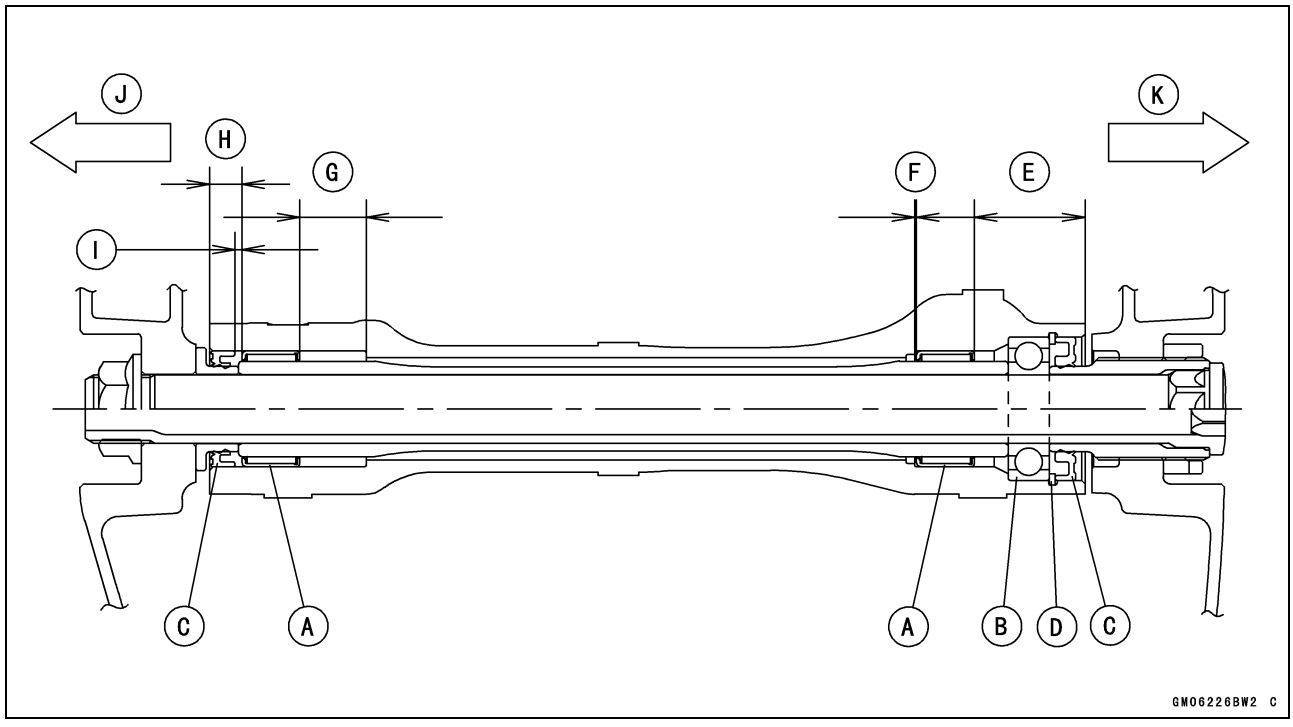
- Replace the ball and needle bearings [A] with new ones.
- Install the ball and needle bearings so that the manufacturer's marks face out.

Special Tools - Bearing Driver Set: 57001-1129
Needle Bearing Driver, ϕ28 [B]: 57001-1610
Spacer, ϕ28: 57001-1637
Needle Bearing Driver, ϕ20 & Spacer, ϕ28: 57001-1678



- Install the needle bearings [A], ball bearing [B] and oil seals [C] position as shown.

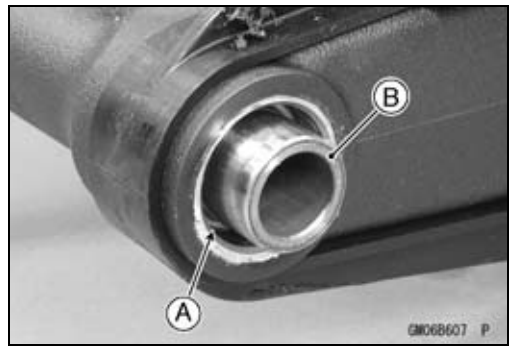
Circlip [D]
32.5 mm (1.28 in.) [E]
0.5 mm (0.02 in.) [F]
19.5 mm (0.77 in.) [G]
9.5 mm (0.37 in.) [H]
2 mm (0.08 in.) [I]
Left Side [J]
Right Side [K]



Swingarm

Swingarm Bearing, Sleeve Inspection

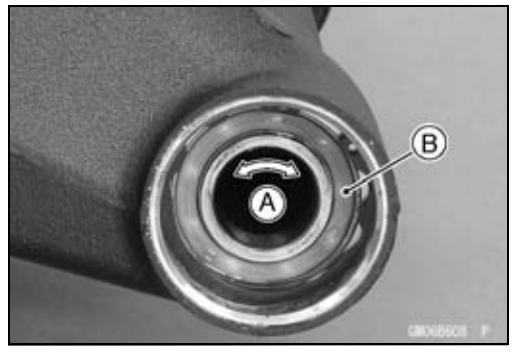
NOTICE
Do not remove the bearings for inspection. Removal may damage them.



- Inspect the needle bearings [A] and ball bearing installed in the swingarm.

○The rollers and ball in a 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 bearing, and sleeve [B] show any sings of abnormal wear, discoloration, or damage, replace them as a set.



- Turn the bearing in the swingarm 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.

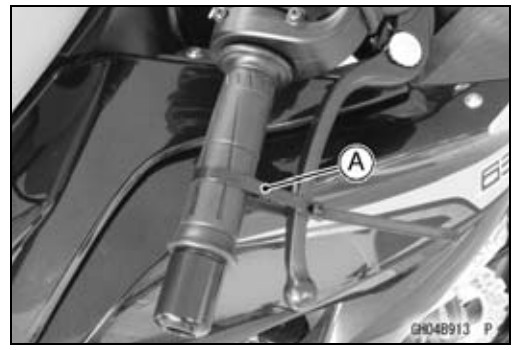
Swingarm Bearing Lubrication

NOTE

○*Since the bearing are packed with grease and sealed, lubrication is not required.*

Tie-Rod, Rocker Arm

Tie-Rod Removal



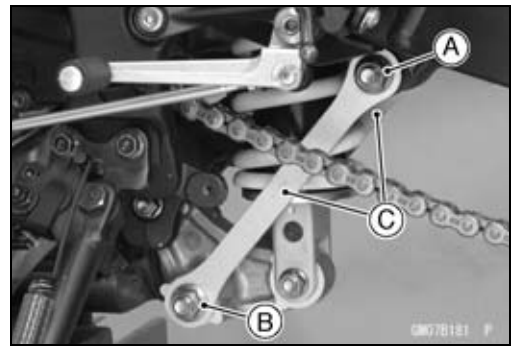
- Remove:
  Lower Fairings (see Lower Fairing Removal in the Frame chapter)
  Premuffler Chamber (see Premuffler Chamber Removal in the Engine Top End chapter)
- Squeeze the brake lever slowly and hold it with a band [A].

⚠ WARNING

Motorcycle may fall over unexpectedly resulting in an accident or injury. Be sure to hold the front brake when removing the tie-rod.

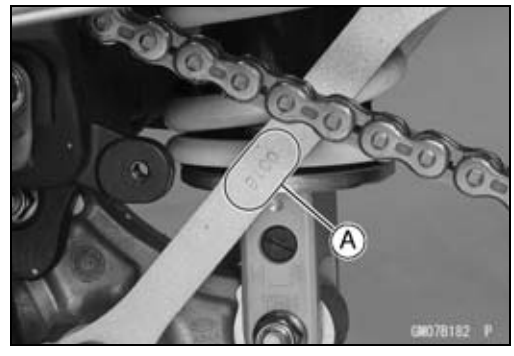
- Raise the rear wheel off the ground with the jack.

Special Tools - Jack: 57001-1238
Jack Attachment: 57001-1608



- Remove:
  Upper Tie-Rod Nut [A] and Bolt
  Lower Tie-Rod Nut [B] and Bolt
  Tie-Rods [C]

Tie-Rod Installation

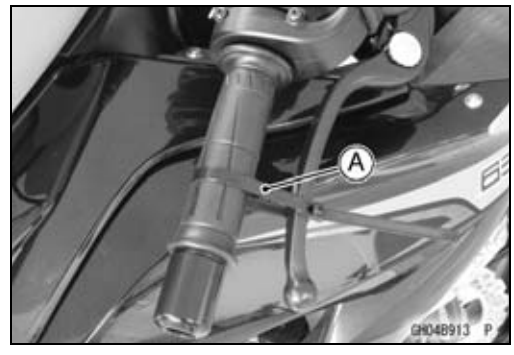


- Apply grease to the inside of the oil seals.
- Install the tie-rods so that the marked side faces [A] outside.
- Replace the tie-rod nuts with new ones.
- Tighten:

Torque - Tie-Rod Nuts: 59 N·m (6.0 kgf·m, 44 ft·lb)

- Install the removed parts (see appropriate chapters).

Rocker Arm Removal



- Remove:
  Lower Fairings (see Lower Fairing Removal in the Frame chapter)
  Premuffler Chamber (see Premuffler Chamber Removal in the Engine Top End chapter)
- Squeeze the brake lever slowly and hold it with a band [A].

⚠ WARNING

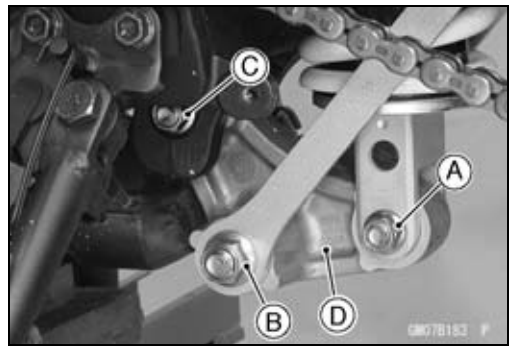
Motorcycle may fall over unexpectedly resulting in an accident or injury. Be sure to hold the front brake when removing the rocker arm.

- Raise the rear wheel off the ground with the jack.

Special Tools - Jack: 57001-1238
Jack Attachment: 57001-1608

Tie-Rod, Rocker Arm

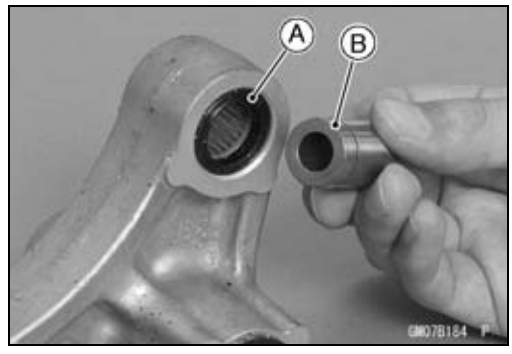
- Remove:
  Lower Rear Shock Absorber Nut [A] and Bolt
  Lower Tie-Rod Nut [B] and Bolt
  Rocker Arm Nut [C] and Bolt
  Rocker Arm [D]



Rocker Arm Installation

- Apply grease to the inside of the oil seals [A].
- Be sure to install the oil seals and sleeves [B] to the rocker arm.
- Replace the following nuts with new ones.
  Rear Shock Absorber Nut (Lower)
  Tie-Rod Nut (Lower)
  Rocker Arm Nut
- Tighten:

Torque - Rocker Arm Bolt: 34 N·m (3.5 kgf·m, 25 ft·lb)
Tie-Rod Nuts: 59 N·m (6.0 kgf·m, 44 ft·lb)
Lower Rear Shock Absorber Nut: 34 N·m (3.5 kgf·m, 25 ft·lb)

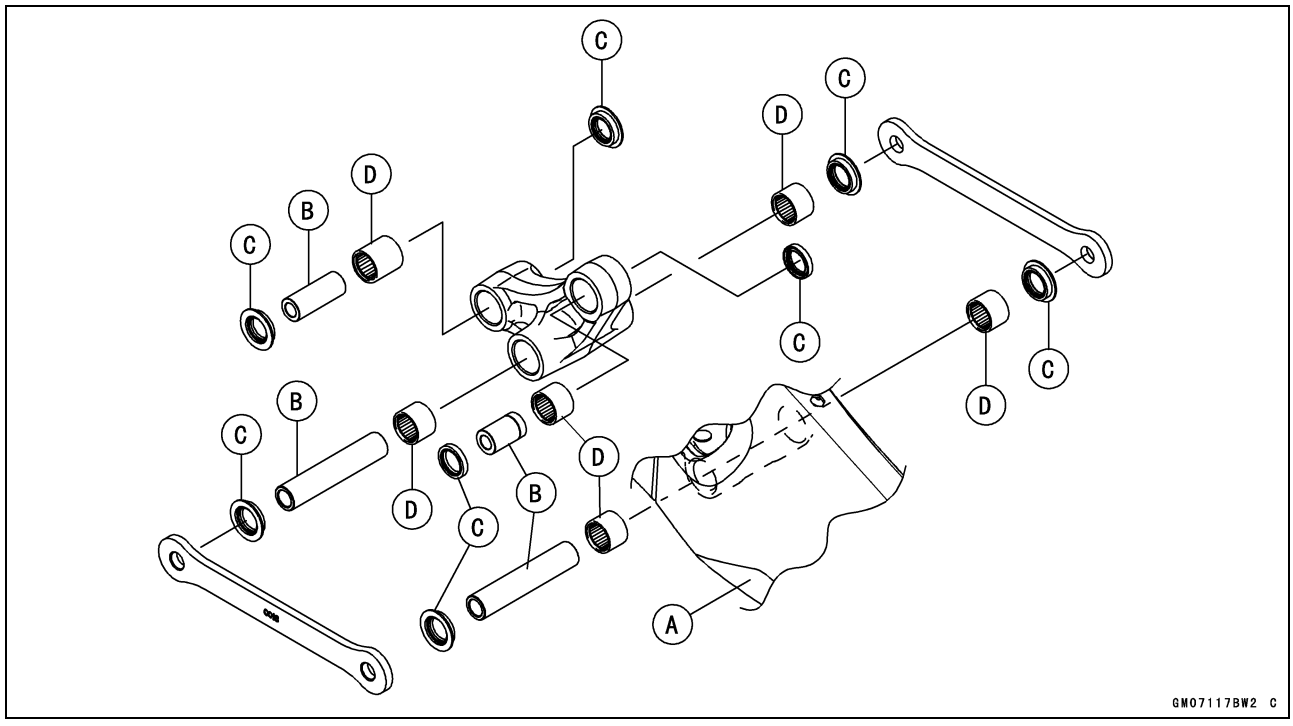


- Install the removed parts (see appropriate chapters).

Tie-Rod, Rocker Arm

Tie-Rod and Rocker Arm Bearing Removal

- Remove:
  Tie-Rods (see Tie-Rod Removal)
  Rocker Arm (see Rocker Arm Removal)
  Swingarm [A] (see Swingarm Removal)
  Sleeves [B]
  Oil Seals [C]
- Remove the needle bearings [D], using the suitable tool.



Tie-Rod and Rocker Arm Bearing Installation

- Replace the needle bearings and oil seals with new ones.
- Apply plenty of grease to the lips of the oil seals.
- Install the needle bearings and oil seals position as shown.

Tie-Rod, Rocker Arm

○Screw the needle bearing driver [A] into the driver holder [B].

NOTE

○*For a bearing of inside diameter ϕ18, select the pressing side of the needle bearing driver according to its pressing depth.*

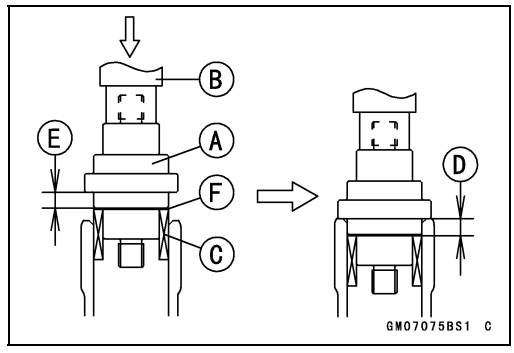
○Insert the needle bearing driver into the needle bearing [C] and press the needle bearing into the housing until the driver contacts the end surface of the housing.
Bearing Pressing Depth: 5.5 mm (0.22 in.) [D]
5.0 mm (0.20 in.) [E]
Spacer, ϕ18 [F] Thickness: 0.5 mm (0.02 in.)

NOTE

○*When pressing in the needle bearings to the 5.5 mm (0.22 in.) depth, adjust the pressing depth with the spacer.*

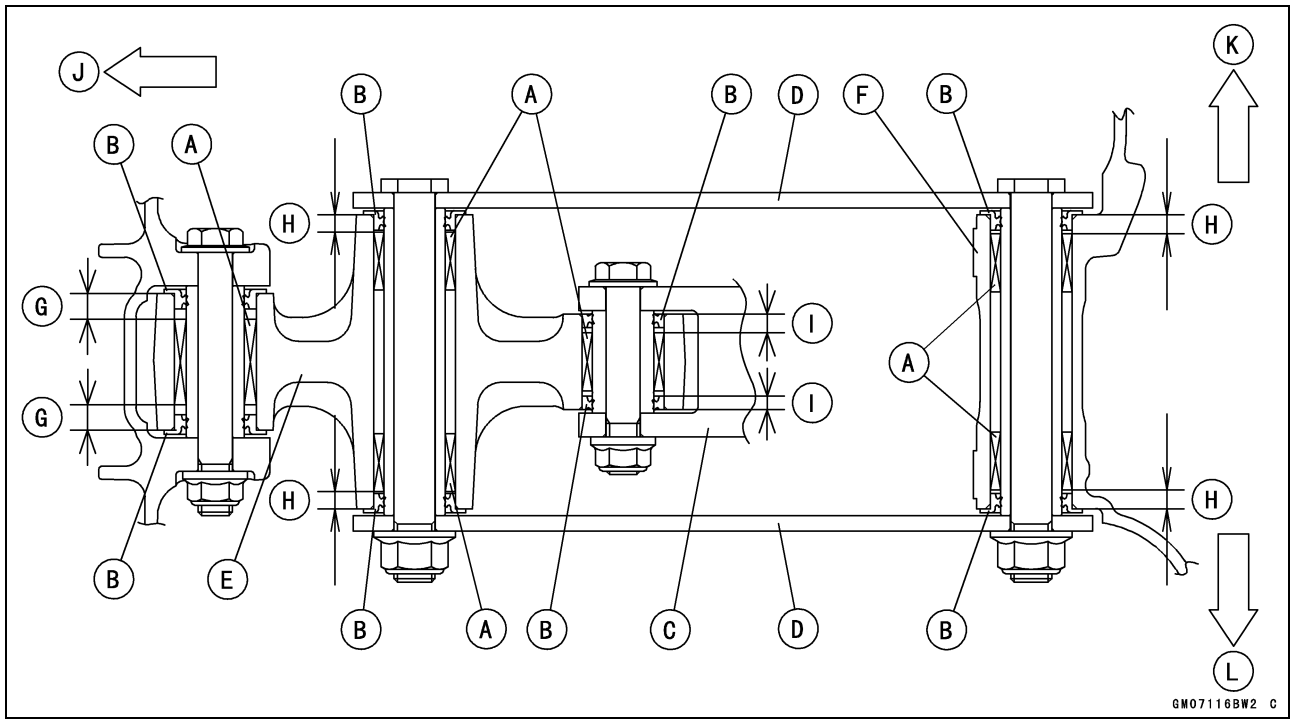
○*Install the needle bearings so that the marked side faces out.*

Special Tools - Bearing Driver Set: 57001-1129
Needle Bearing Driver, ϕ17/ϕ18: 57001-1609
Spacer, ϕ18: 57001-1636



Tie-Rod, Rocker Arm

Needle Bearings [A]
Oil Seals [B]
Rear Shock Absorber [C]
Tie-Rods [D]
Rocker Arm [E]
Swingarm [F]
7.5 mm (0.30 in.) [G]
5.0 mm (0.20 in.) [H]
5.5 mm (0.22 in.) [I]
Front [J]
Right Side [K]
Left Side [L]

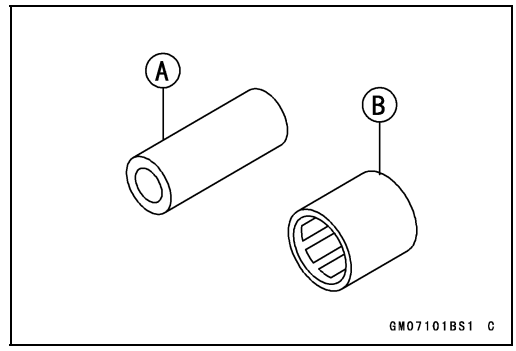


Rocker Arm/Tie-Rod Bearing, Sleeve Inspection

NOTICE
Do not remove the bearings for inspection. Removal may damage them.

- Visually inspect the rocker arm, or tie-rod sleeves [A] and needle bearings [B].
- 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.



Rocker Arm/Tie-Rod Bearing Lubrication

NOTE

○*Since the bearings are packed with grease, lubrication is not required.*

Steering

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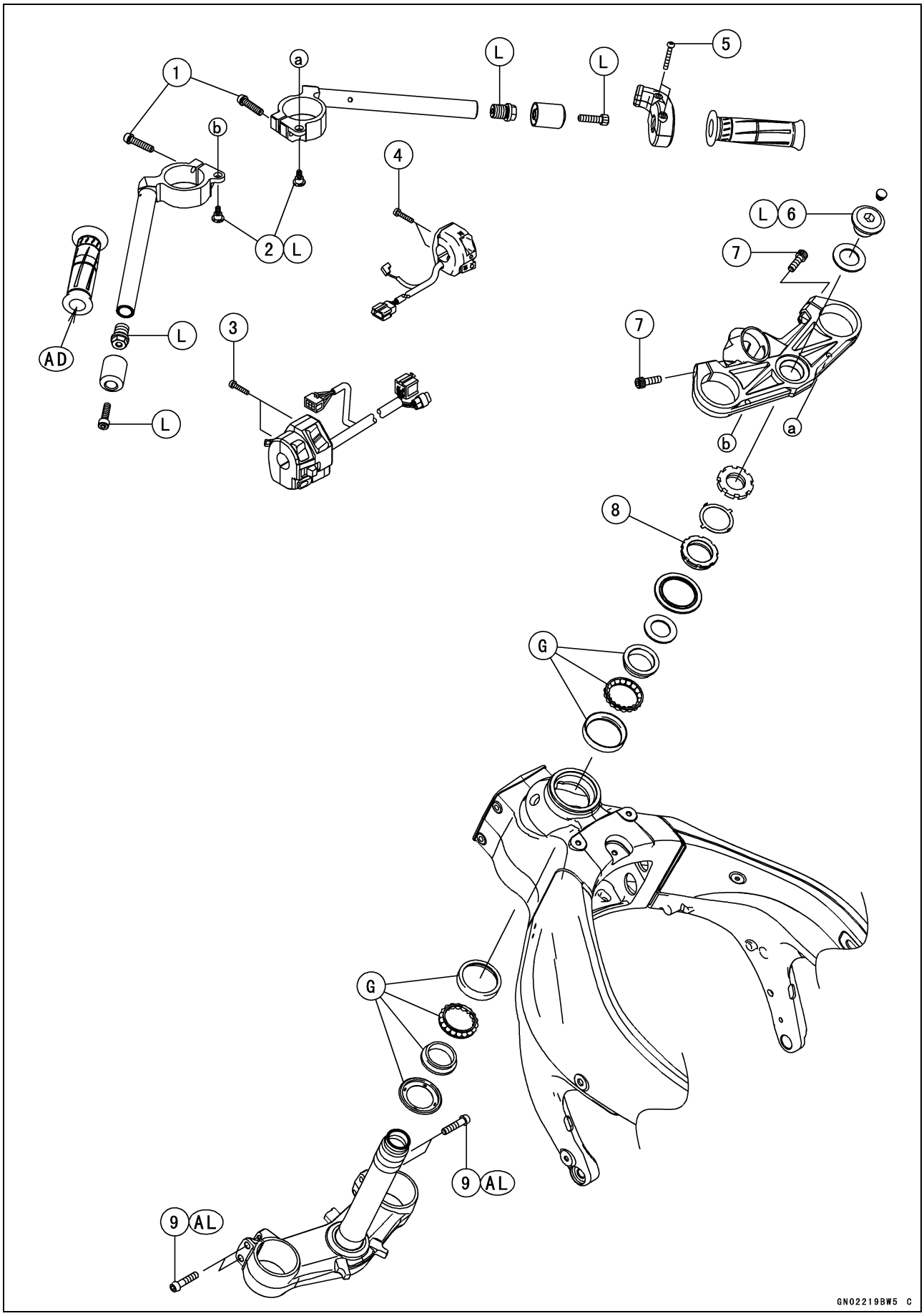
Exploded View



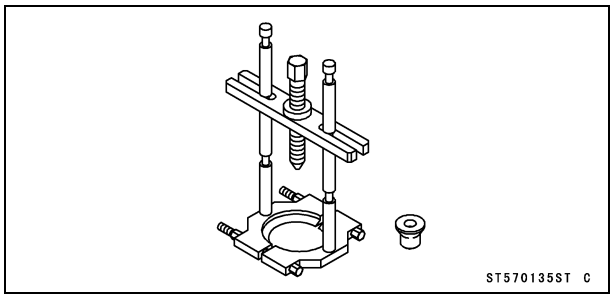
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Handlebar Clamp Bolts	25	2.5	18	
2	Handlebar Positioning Bolts	9.8	1.0	87 in·lb	L
3	Left Switch Housing Screws	3.5	0.36	31 in·lb	
4	Right Switch Housing Screws	3.5	0.36	31 in·lb	
5	Throttle Case Screws	3.5	0.36	31 in·lb	
6	Steering Stem Head Bolt	78	8.0	58	L
7	Upper Front Fork Clamp Bolts	20	2.0	15	
8	Steering Stem Nut	27	2.8	20	
9	Lower Front Fork Clamp Bolts	23	2.3	17	AL

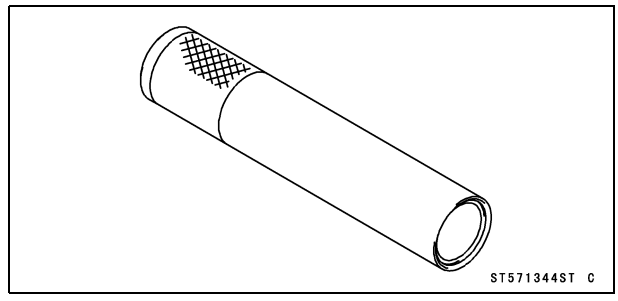
AD: Apply adhesive.
AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque.
G: Apply grease.
L: Apply a non-permanent locking agent.

Special Tools

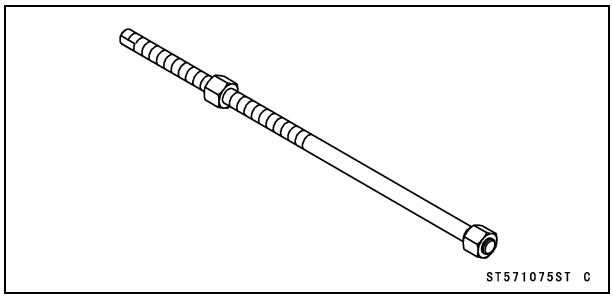
Bearing Puller:
57001-135



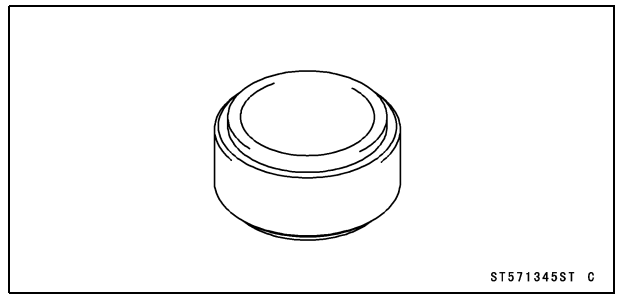
Steering Stem Bearing Driver, ϕ42.5:
57001-1344



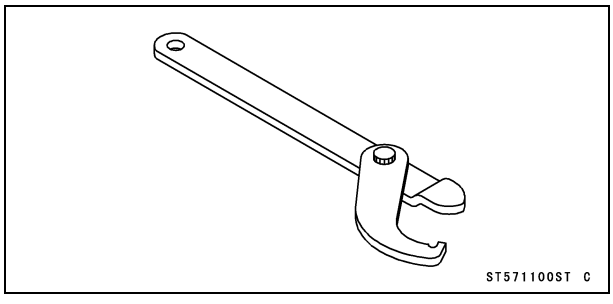
Head Pipe Outer Race Press Shaft:
57001-1075



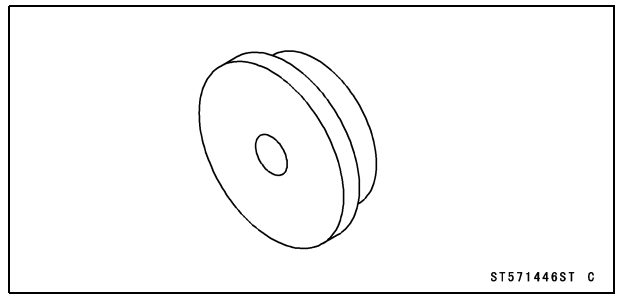
Steering Stem Bearing Driver Adapter, ϕ41.5:
57001-1345



Steering Stem Nut Wrench:
57001-1100



Head Pipe Outer Race Driver, ϕ55:
57001-1446



Steering

Steering Inspection

- Refer to the Steering Play Inspection in the Periodic Maintenance chapter.

Steering Adjustment

- Refer to the Steering Play Adjustment in the Periodic Maintenance chapter.

Steering Stem

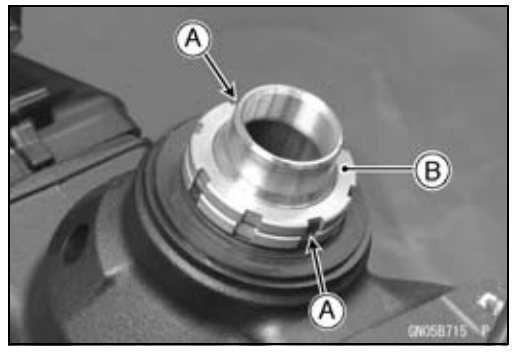
Stem, Stem Bearing Removal

- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
  Front Wheel (see Front Wheel Removal in the Wheels/Tires chapter)
  Front Fender (see Front Fender Removal in the Frame chapter)
  Steering Stem Head with Handlebars (see Handlebar Removal)
  Front Forks (see Front Fork Removal in the Suspension chapter)
- For other than ABS equipped models, remove the brake hose fitting bolt from the steering stem.

- Bend the claws [A] of the claw washer straighten.
- Remove the steering stem locknut [B].

Special Tool - Steering Stem Nut Wrench: 57001-1100

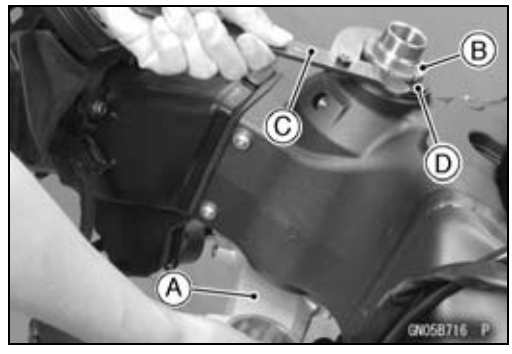
- Remove the claw washer.



- Pushing up the stem base [A], and remove the steering stem nut [B].

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

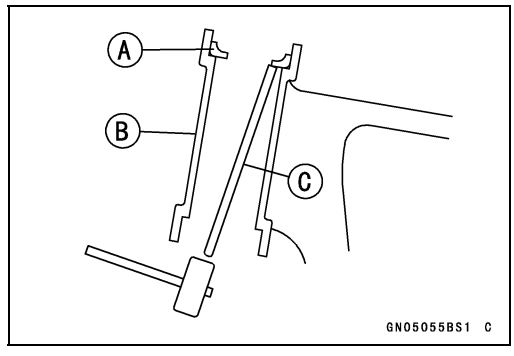
- Remove:
  Steering Stem
  Stem Cap [D]
  Washer
  Upper Ball Bearing Inner Race and Ball Bearing



- To remove the ball bearing outer races [A] pressed into the head pipe [B], insert a bar [C] into the recesses of head pipe, and applying it to both recess alternately hammer it to drive the race out.

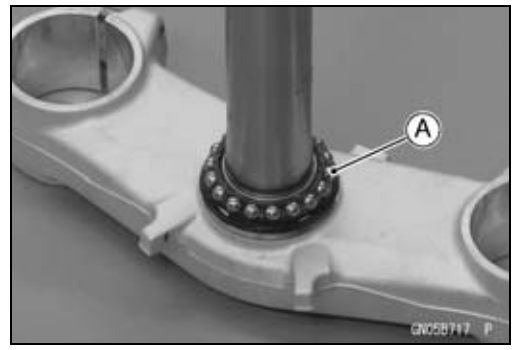
NOTE

○*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.*



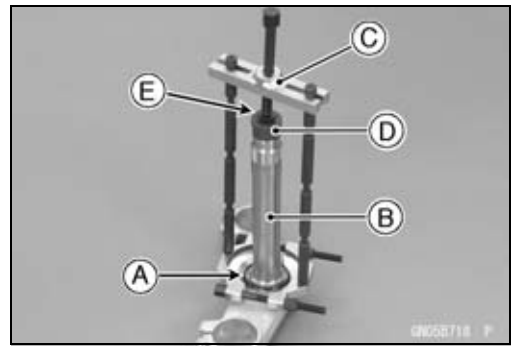
Steering Stem

● Remove the lower ball bearing [A] from the steering stem.



● Remove the lower bearing inner race (with its grease seal) [A] which is pressed onto the steering stem [B] with the bearing puller [C], suitable collar [D] and adapter [E].

Special Tool - Bearing Puller: 57001-135

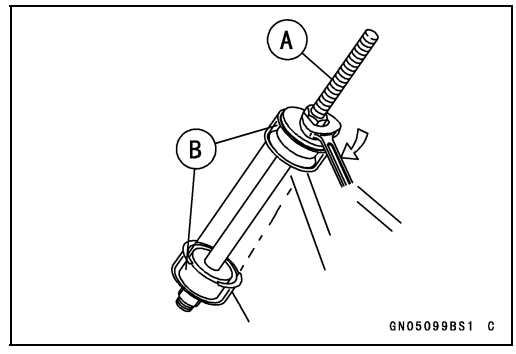


Stem, Stem Bearing Installation

● Replace the bearing outer races with new ones.
● Drive them into the head pipe at the same time.

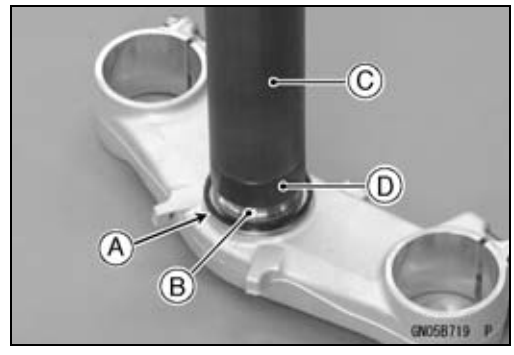
Special Tools - Head Pipe Outer Race Press Shaft [A]: 57001-1075
Head Pipe Outer Race Driver, φ55 [B]: 57001-1446

● Apply grease to the outer races.

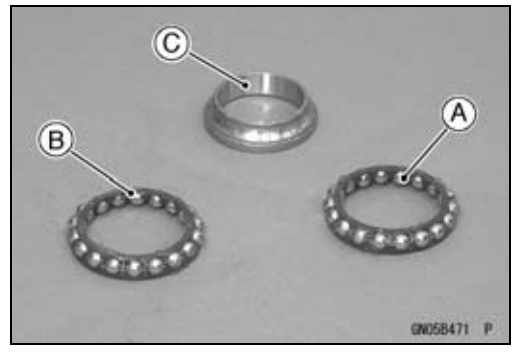


● Replace the bearing inner races and oil seal with new ones.
● Apply grease to the oil seal.
● Install the oil seal [A] on the steering stem, and drive the lower ball bearing inner race [B] applied the grease onto the stem.

Special Tools - Steering Stem Bearing Driver, φ42.5 [C]: 57001-1344
Steering Stem Bearing Driver Adapter, φ41.5 [D]: 57001-1345

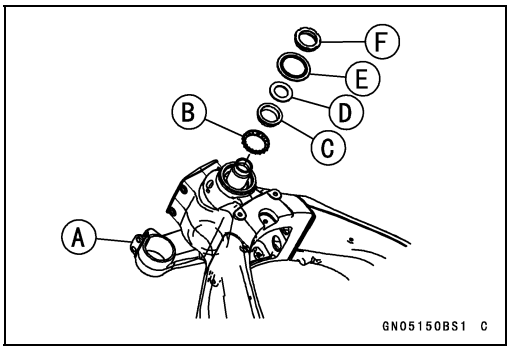


● Apply grease to the lower ball bearing [A], and install it onto the steering stem.
○The lower and upper ball bearings are identical.
● Apply grease to the upper ball bearing [B] and inner race [C].



Steering Stem

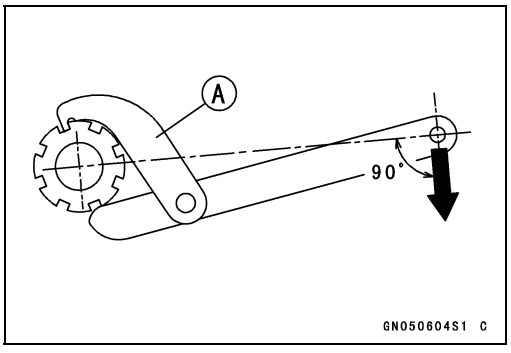
● Install the steering stem [A] through the head pipe and install the upper bearing [B] and inner race [C] on it.
● Install:
Washer [D]
Stem Cap [E]
Steering Stem Nut [F]



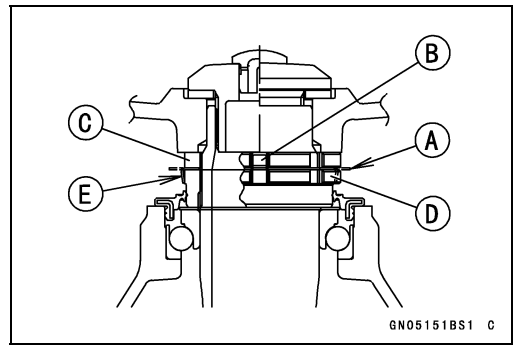
● Settle the bearings in place as follows.
○Tighten the steering stem nut with **65 N·m (6.6 kgf·m, 48 ft·lb)** of torque first, and loosen it a fraction of a turn until it turns lightly. Afterward tighten it again with specified torque using a steering stem nut wrench [A].
○Check that there is no play 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.
- Hand tighten the stem locknut clockwise until the claws are aligned with the second groove of stem nut [D], and bend the 2 claws downward [E].
- Install the stem head.
- Apply a non-permanent locking agent to the threads of the steering stem head bolt.
- Install the washer, and temporary tighten the stem head bolt.
- Install the front forks (see Front Fork Installation in the Suspension chapter).

NOTE

○*Tighten the upper front fork clamp bolts first, next the stem head bolt, last the lower front fork clamp bolts.*

○*Tighten the two lower front fork clamp bolts alternately two times to ensure even tightening torque.*

Torque - Upper Front Fork Clamp Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)
Steering Stem Head Bolt: 78 N·m (8.0 kgf·m, 58 ft·lb)
Lower Front Fork Clamp Bolts: 23 N·m (2.3 kgf·m, 17 ft·lb)
Handlebar Clamp Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

⚠ WARNING

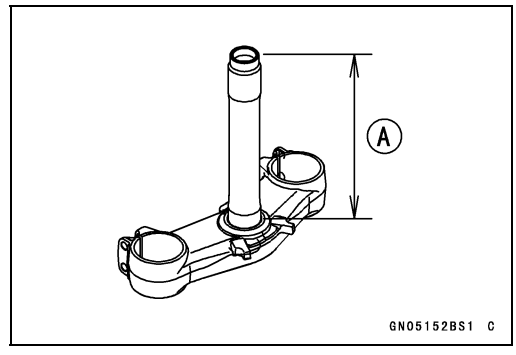
If the handlebar does not turn to the steering stop it may cause an accident resulting in injury or death. Be sure the cables, harnesses and hoses are routed properly and do not interfere with handlebar movement (see Cable, Wire, and Hose Routing section in the Appendix chapter).

- Install the removed parts (see appropriate chapters).

Steering Stem Bearing Lubrication

- Refer to the Steering Stem Bearing Lubrication in the Periodic Maintenance chapter.

Steering Stem Warp Inspection



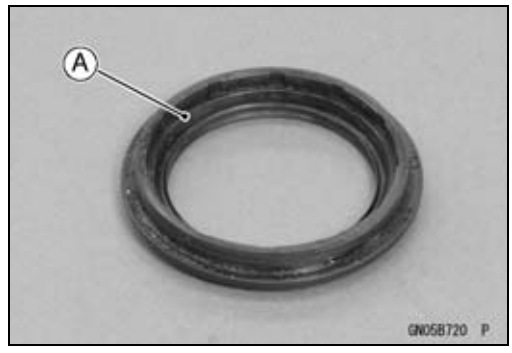
- Whenever the steering stem is removed, or if the steering can not be adjusted for smooth action, check the steering stem for straightness.

★If the steering stem [A] is bent, replace the steering stem.

Steering Stem

Stem Cap Deterioration, Damage Inspection

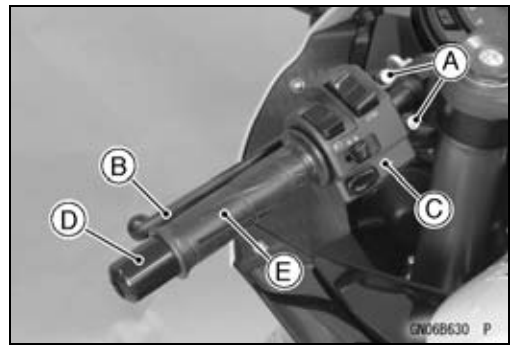
★Replace the stem cap if its seal lip [A] shows damage.



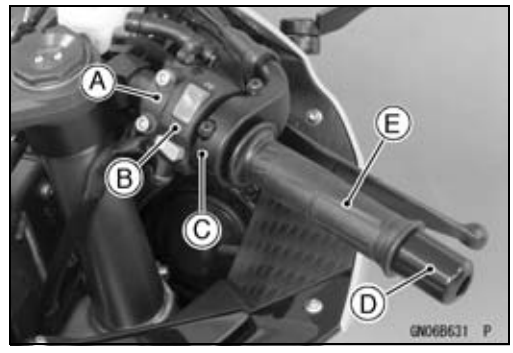
Handlebar

Handlebar Removal

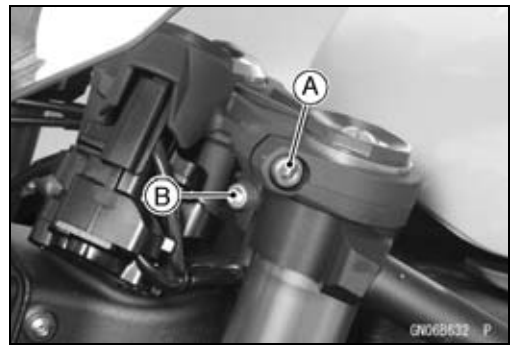
- Remove:
  Clutch Lever Holder Clamp Bolts [A]
  Clutch Lever Holder Assembly [B]
  Left Switch Housing [C]
  Handlebar Weight [D]
  Left Handlebar Grip [E]



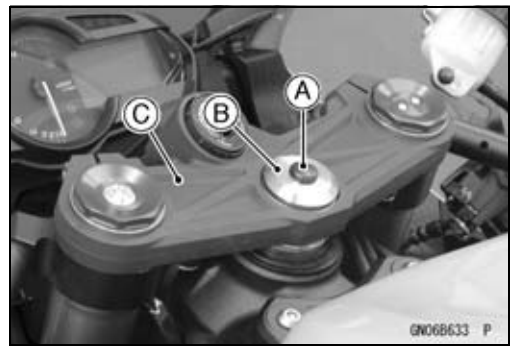
- Remove:
  Front Master Cylinder [A] (see Front Master Cylinder Removal in the Brakes chapter)
  Right Switch Housing [B]
  Throttle Case [C]
  Handlebar Weight [D]
  Throttle Grip [E]



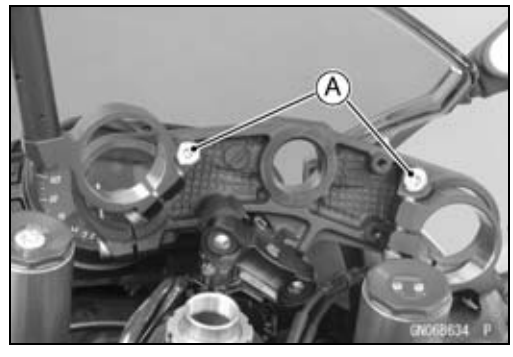
- Loosen:
  Upper Front Fork Clamp Bolt [A] (Both Sides)
  Handlebar Clamp Bolt [B] (Both Sides)



- Remove:
  Steering Stem Head Bolt Plug [A]
  Steering Stem Head Bolt [B] and Washer
  Steering Stem Head [C] with Handlebars

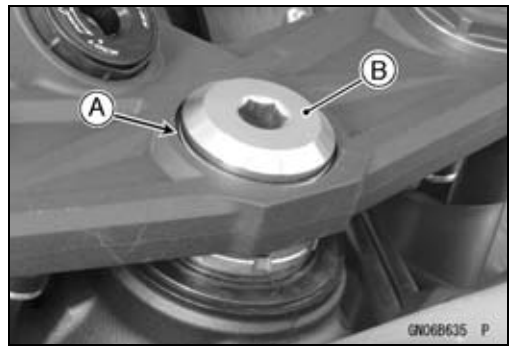


- Remove:
  Handlebar Positioning Bolts [A]
  Handlebars



Handlebar

Handlebar Installation



- Apply a non-permanent locking agent to the threads of the handlebar positioning bolts and tighten them.

Torque - Handlebar Positioning Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Install the steering stem head with handlebars.
- Apply a non-permanent locking agent to the threads of the steering stem head bolt.
- Install the washer [A] and steering stem head bolt [B].
- Tighten:

Torque - Steering Stem Head Bolt: 78 N·m (8.0 kgf·m, 58 ft·lb)
Upper Front Fork Clamp Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)
Handlebar Clamp Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

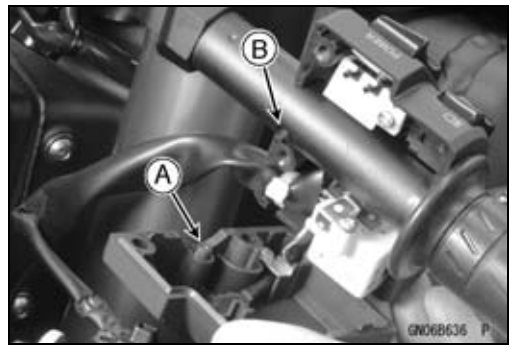
NOTE

○*Tighten the steering stem head bolt before tightening the upper front fork clamp bolts and handlebar clamp bolts.*

⚠ WARNING

If the handlebar does not turn to the steering stop it may cause an accident resulting in injury or death. Be sure the cables, harnesses and hoses are routed properly and do not interfere with handlebar movement (see Cable, Wire, and Hose Routing section in the Appendix chapter).

- Install the steering stem head bolt plug to the steering stem head bolt.
- Apply adhesive cement to the inside of the left handlebar grip.
- Install the left handlebar grip, throttle grip and left/right handlebar weight.
- Apply a non-permanent locking agent to the threads of the handlebar weight bolts, and tighten them.



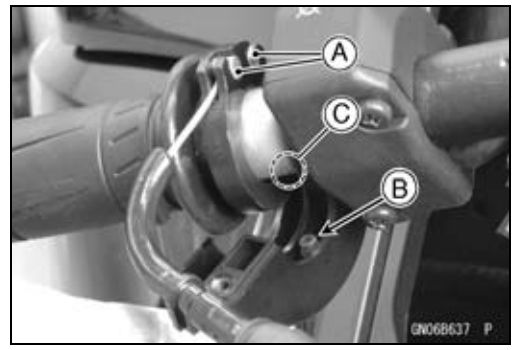
- Install the left and right switch housings.

○Fit the projection [A] into a hole [B] in the handlebar.

- Tighten:

Torque - Switch Housing Screws: 3.5 N·m (0.36 kgf·m, 31 in·lb)

Handlebar



- Install the throttle cable tips [A].
- Install the throttle case.

○Fit the projection [B] into a hole [C] in the handlebar.

- Tighten:

Torque - Throttle Case Screws: 3.5 N·m (0.36 kgf·m, 31 in·lb)

- Install:

Clutch Lever Holder Assembly (see Clutch Lever Holder Installation in the Clutch chapter)
Front Master Cylinder (see Front Master Cylinder Installation in the Brakes chapter)

Frame

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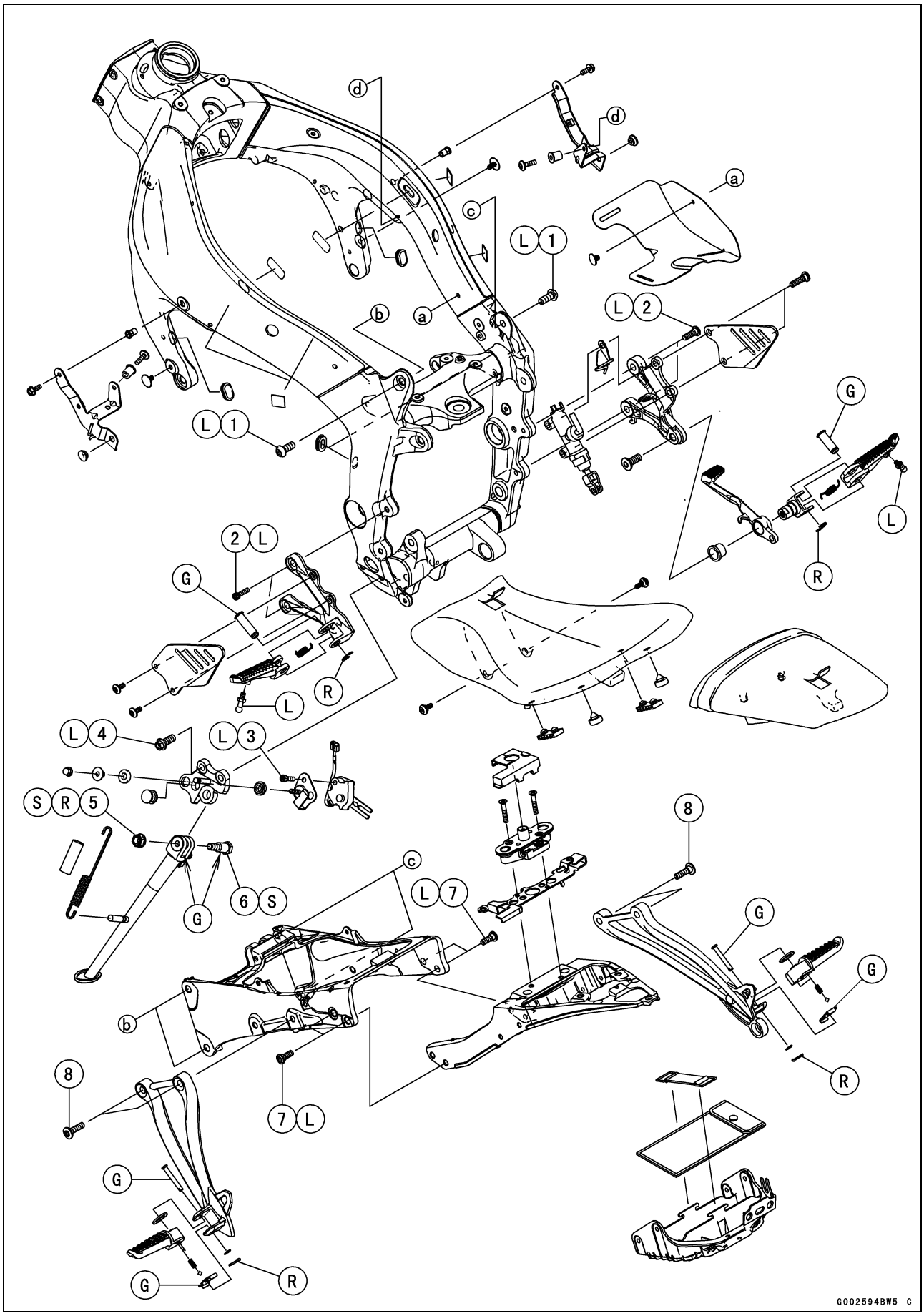
Exploded View

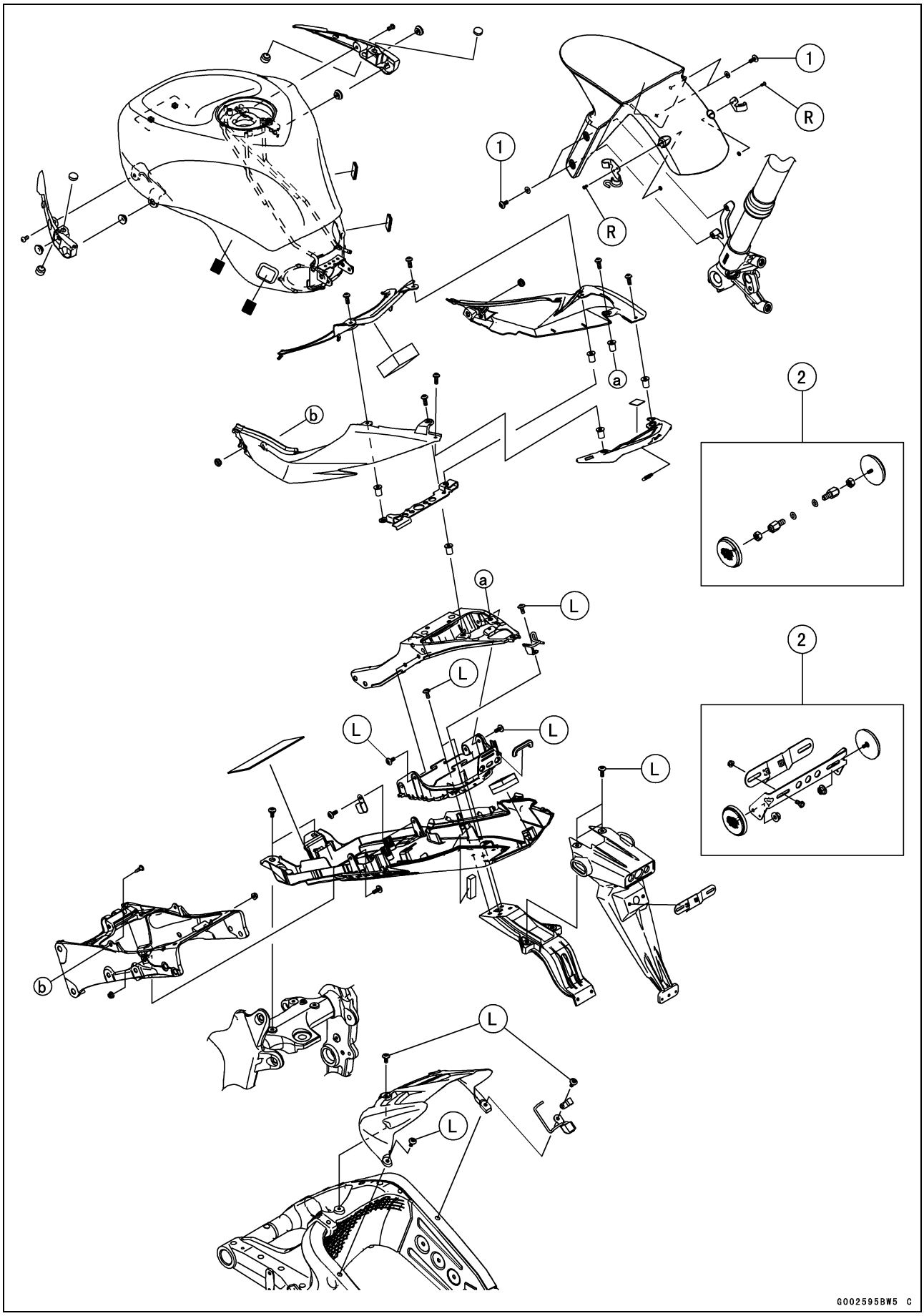


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Rear Frame Bolts (M10)	44	4.5	32	L
2	Front Footpeg Bracket Bolts	25	2.5	18	L
3	Sidestand Switch Bolt	8.8	0.90	78 in·lb	L
4	Sidestand Bracket Bolts	49	5.0	36	L
5	Sidestand Nut	44	4.5	32	R, S
6	Sidestand Bolt	29	3.0	21	S
7	Rear Frame Bolts (M8)	25	2.5	18	L
8	Rear Footpeg Bracket Bolts	25	2.5	18	

G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts
S: Follow the specified tightening sequence.

Exploded View

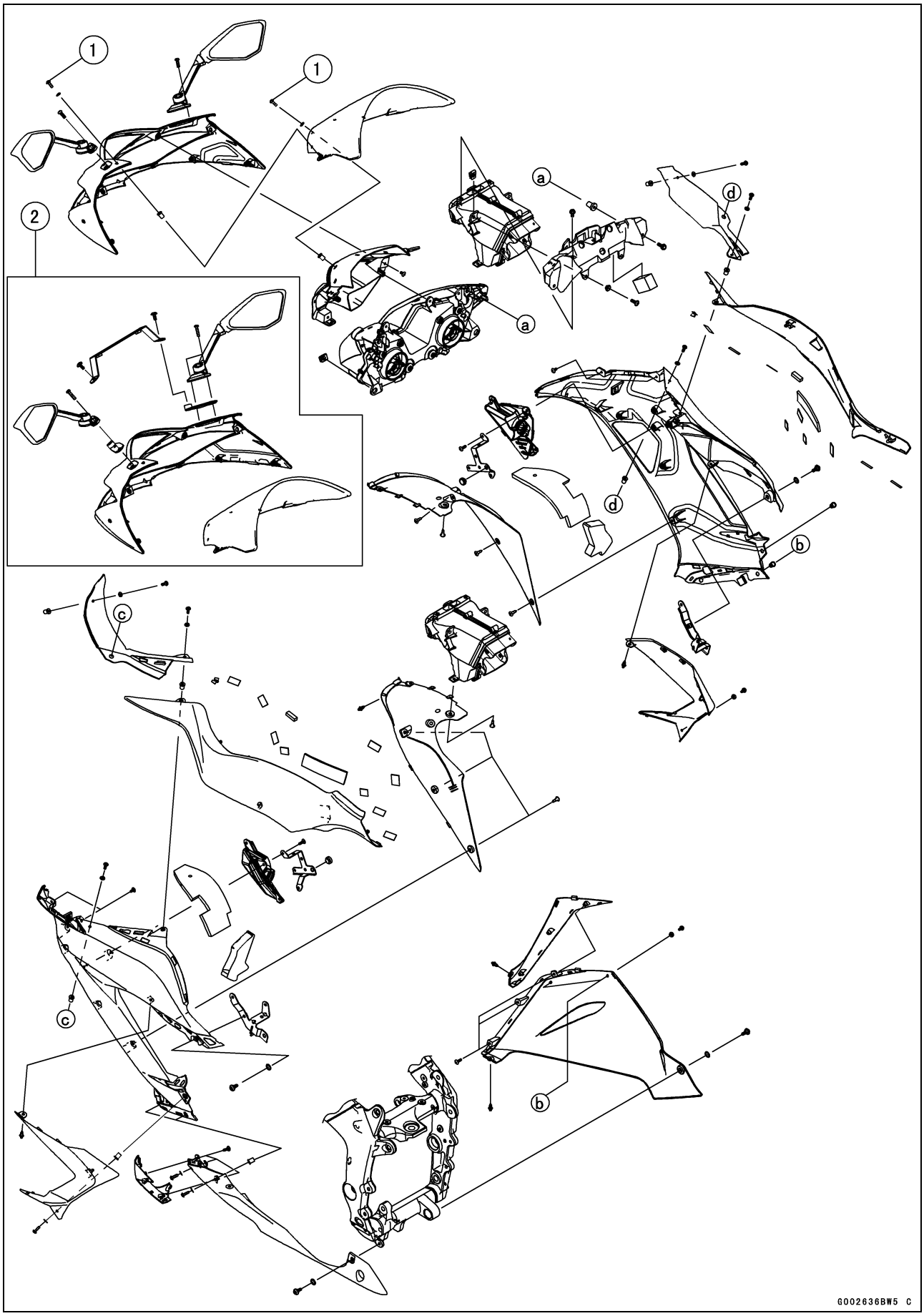


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Fender Mounting Bolts	3.9	0.40	35 in·lb	

2. US, CA and CAL Models
L: Apply a non-permanent locking agent.
R: Replacements Parts

Exploded View



Exploded View

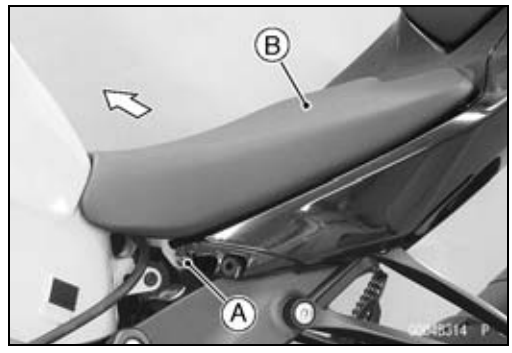
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Windshield Mounting Bolts	0.42	0.043	3.7 in·lb	

2. ID Model

Seats

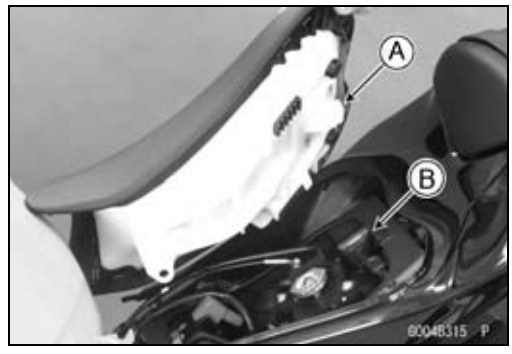
Front Seat Removal

- Remove:
  Side Covers (see Side Cover Removal)
  Bolt [A] (Both Sides)
- Remove the seat [B] forward while lifting up the front part of the seat.



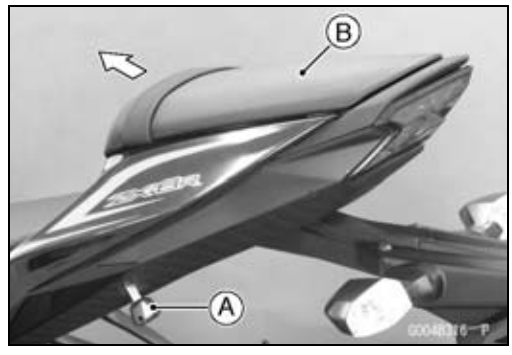
Front Seat Installation

- Slip the seat hook [A] under the rib [B] on the rear frame front.
- Tighten the bolts.



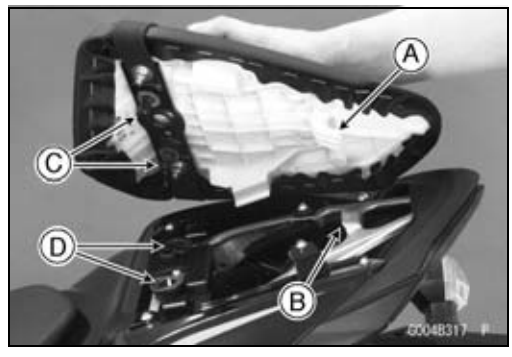
Rear Seat Removal

- Insert the ignition switch key [A] into the seat lock.
- Pull up the front part of the seat [B] upward while turning the key clockwise, and remove it forward.



Rear Seat Installation

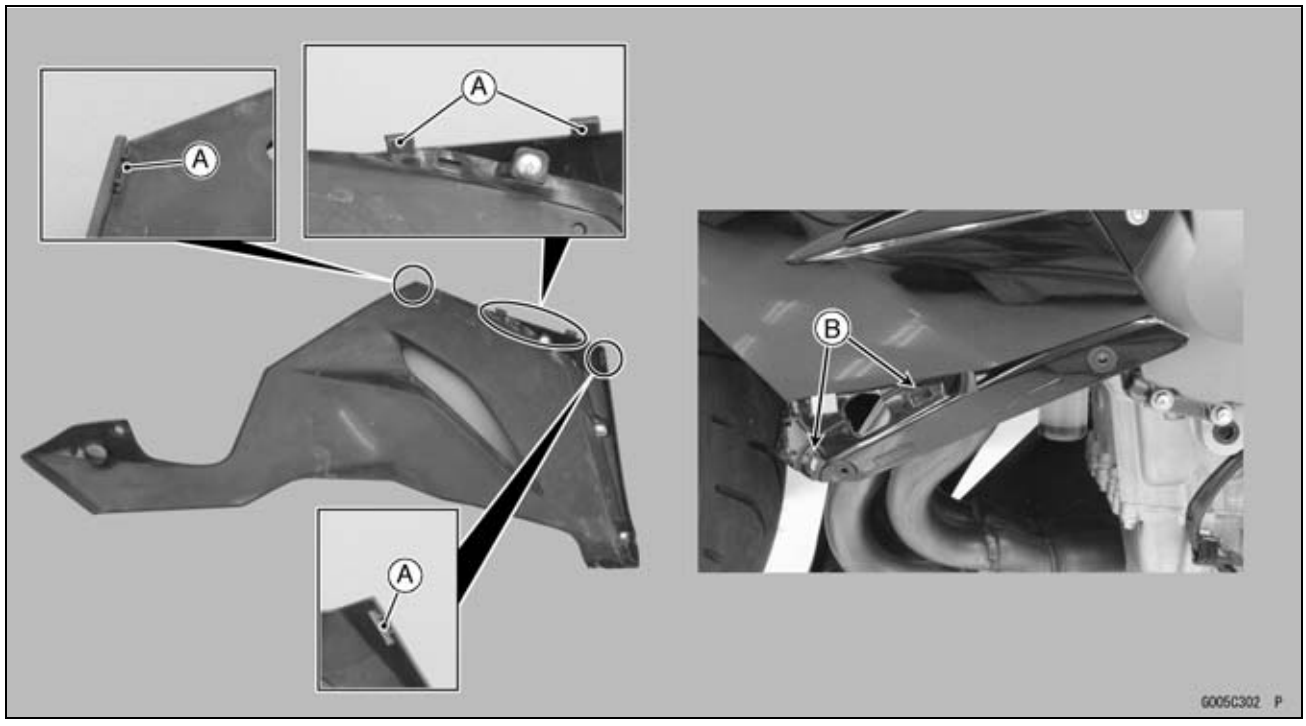
- Slip the seat hook [A] under the rib [B] on the rear frame rear.
- Insert the seat latches [C] into the latch holes [D].
- Push down the seat until the lock clicks.



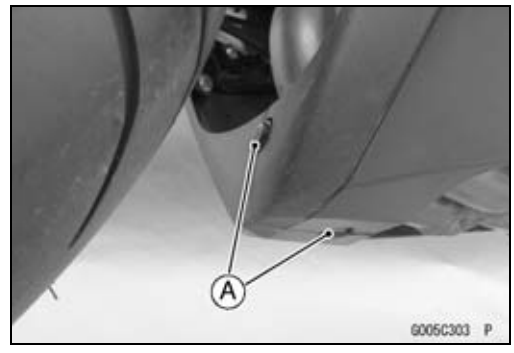
Fairings

Lower Fairing Removal

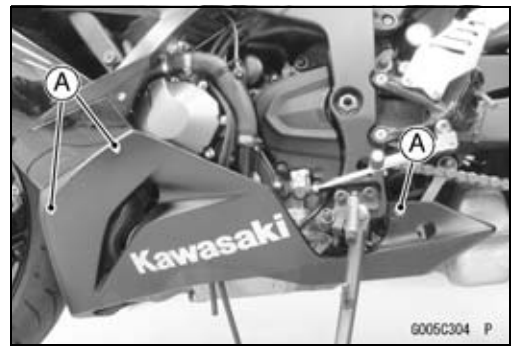
Hooks [A]
Slots [B]



● Remove the quick rivets [A].

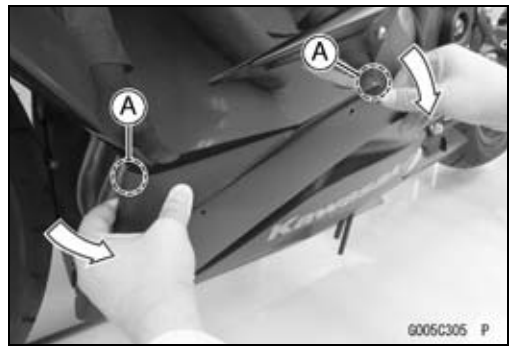


● Remove the bolts [A] and washers.



Fairings

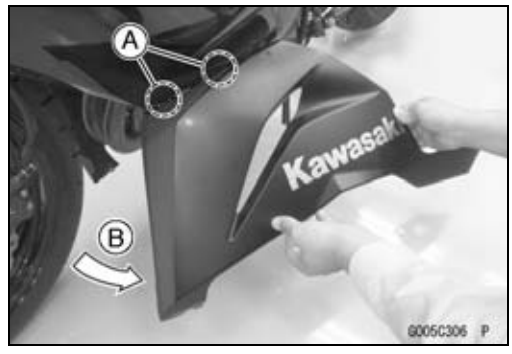
● Pull the lower fairing outward to clear the hooks [A].



● Clear the hooks [A] of the lower fairing while pulling its lower end outward [B], and remove the lower fairing.

NOTE

○*For the left lower fairing removal, raise the rear wheel off the ground with the stand if necessary (see Rear Wheel Removal in the Wheels/Tires chapter).*

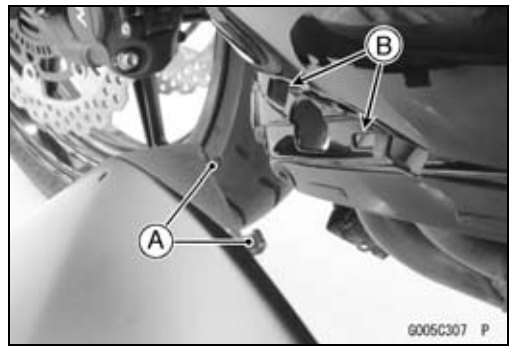


Lower Fairing Installation

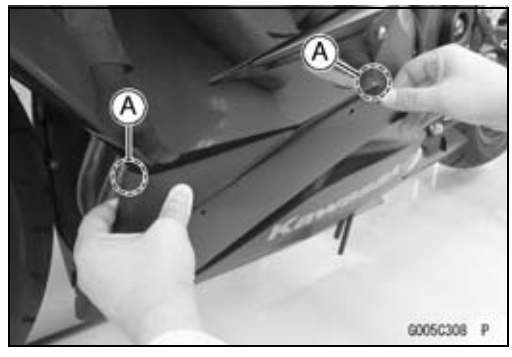
● Insert the hooks [A] into the slots [B].

NOTE

○*For the left lower fairing installation, raise the rear wheel off the ground with the stand if necessary (see Rear Wheel Removal in the Wheels/Tires chapter).*

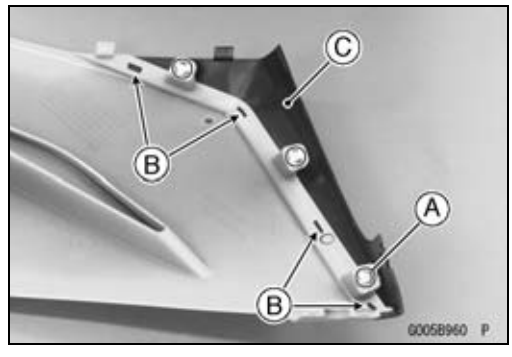


● Hook the hooks [A] to the middle fairing.
● Install the bolts, washers and quick rivets.



Lower Fairing Disassembly

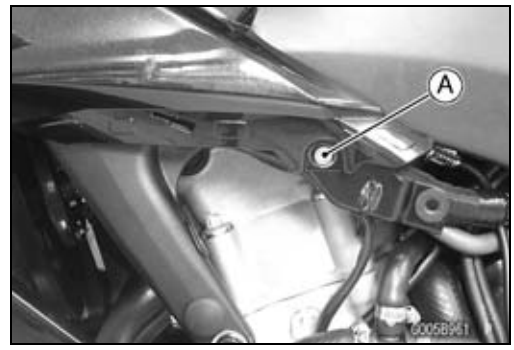
● Remove the lower fairing (see Lower Fairing Removal).
● Remove the screws [A].
● Clear the hooks [B] and remove the lower fairing cover [C].



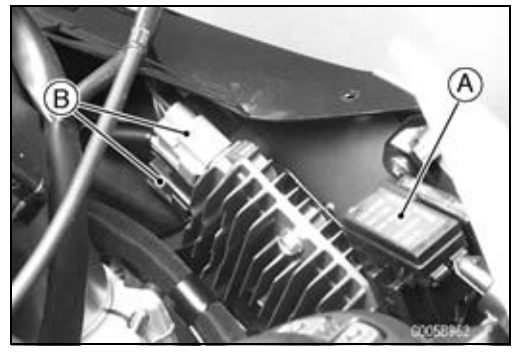
Fairings

Upper Fairing Assembly Removal

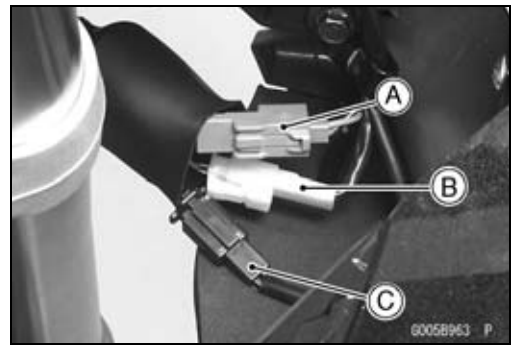
- Remove:
  Inner Cover (see Inner Cover Removal)
  Side Cover (see Side Cover Removal)
  Fairing Cover (see Fairing Cover Removal)
  Lower Fairing (see Lower Fairing Removal)
  Inner Fairing (see Inner Fairing Removal)
  Windshield (see Windshield Removal)
  Bolt [A] and Washer (Both Sides)



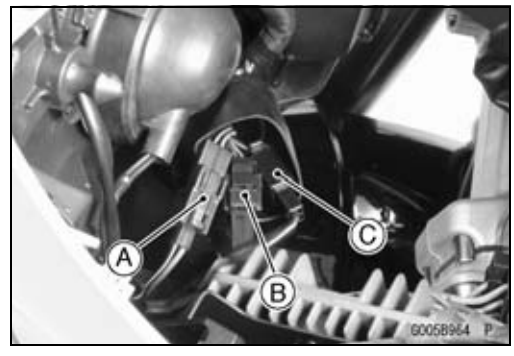
- Remove the fuse box [A].
- Disconnect the regulator/rectifier connectors [B].



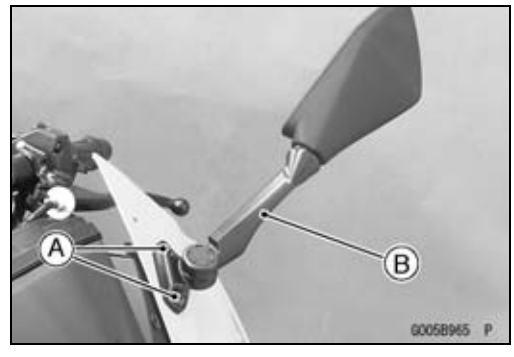
- Disconnect (Left Side):
  Front Turn Signal Light Lead Connector [A]
  Head Light Lead Connector [B]
  City Light Lead Connector [C]



- Disconnect (Right Side):
  Front Turn Signal Light Lead Connector [A]
  Head Light Lead Connector [B]
  City Light Lead Connector [C]



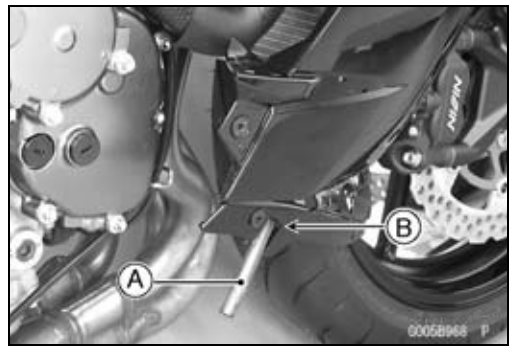
- Remove (Both Sides):
  Bolts [A]
  Rear View Mirror [B]



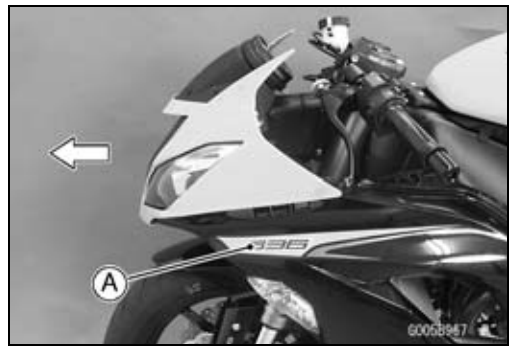
Fairings

- Remove the bolts [A].

- Clear the coolant reserve tank overflow hose [A] from the hole [B] of the middle fairing.

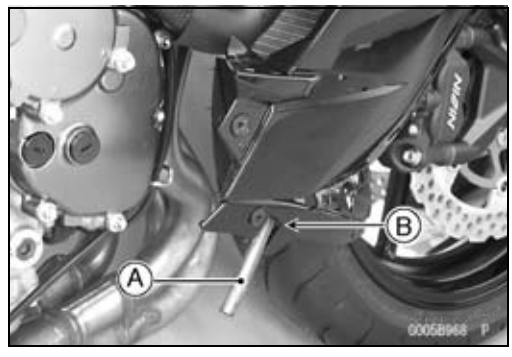


- Remove the upper fairing assembly [A] forward.



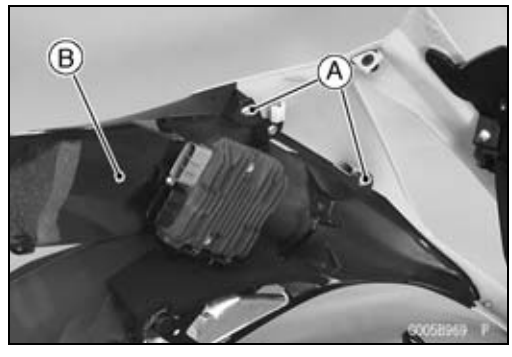
Upper Fairing Assembly Installation

- Installation is the reverse of removal.
- Run the hoses, leads and harness correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Insert the coolant reserve tank overflow hose [A] to the hole [B] of the middle fairing.



Middle Fairing Removal

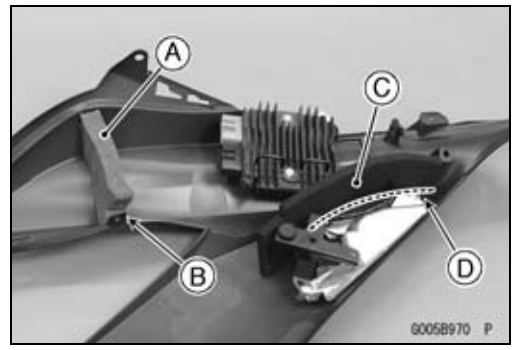
- Remove:
  Upper Fairing Assembly (see Upper Fairing Assembly Removal)
  Headlight (see Headlight Removal/Installation in the Electrical System chapter)
  Screws [A]
  Middle Fairing [B]



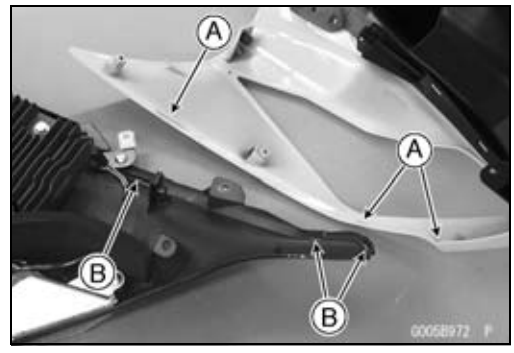
Fairings

Middle Fairing Installation

● Check that the pads are in place on the middle fairing.
○Fit the pad [A] on the rib [B] for the fairing cover.
○Align the pad [C] with the line [D] on the middle fairing.

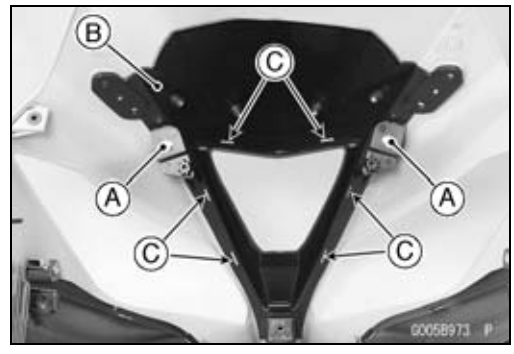


● Install the middle fairing so that the tabs [A] fit the slots [B].
● Install the screws.



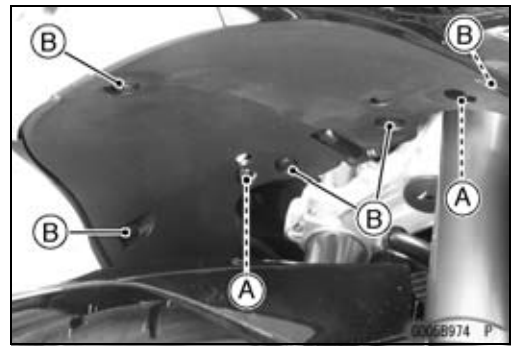
Center Fairing Removal/Installation

● Remove:
Upper Fairing Assembly (see Upper Fairing Assembly Removal)
Headlight (see Headlight Removal/Installation in the Electrical System chapter)
Screws [A]
Center Fairing [B]
● When installing the center fairing, fit the tabs [C] to the slots.



Inner Fairing Removal

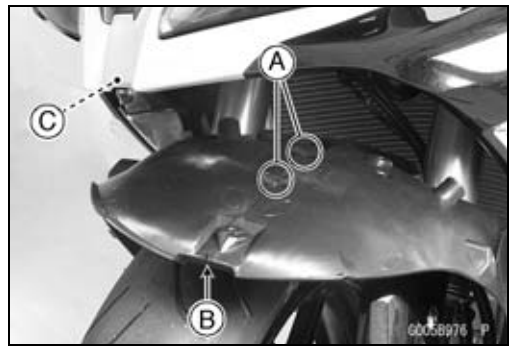
● Remove:
Clamps [A]
Quick Rivets [B]



● Remove (Both Sides):
Quick Rivets [A]
Inner Fairing [B]

Fairings

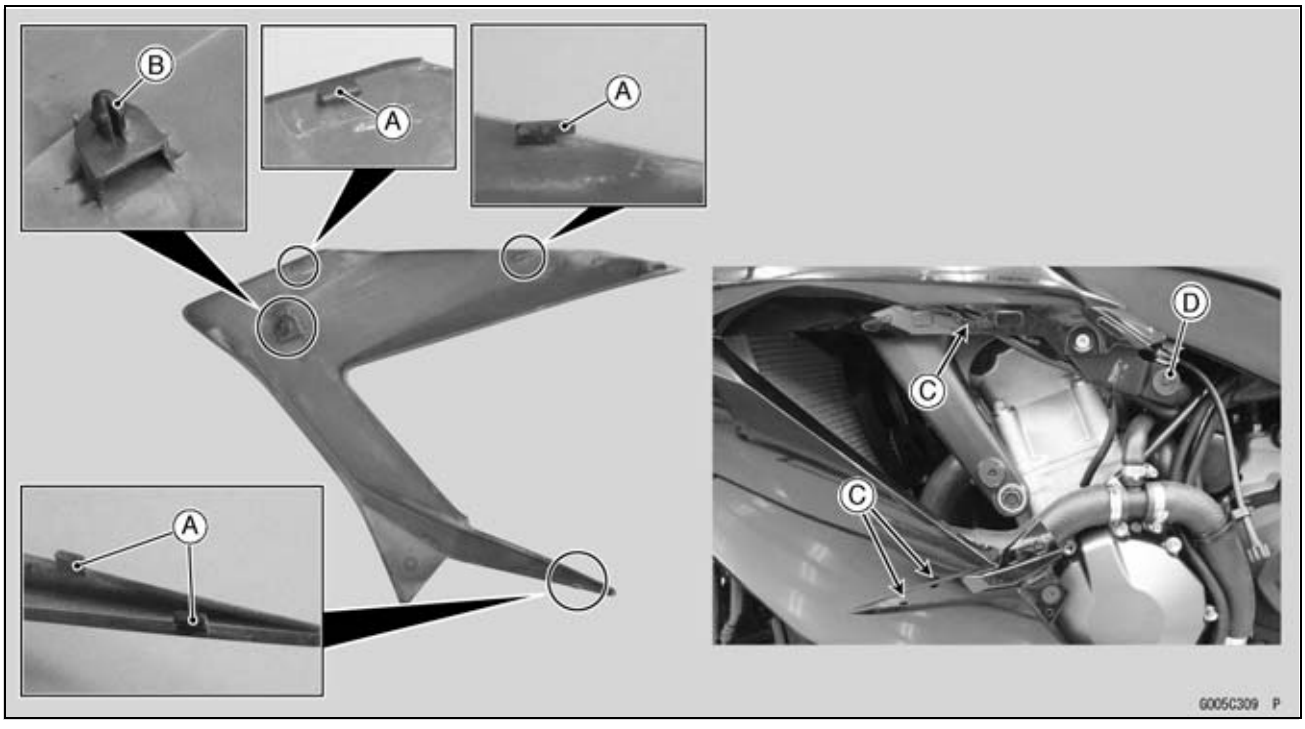
Inner Fairing Installation



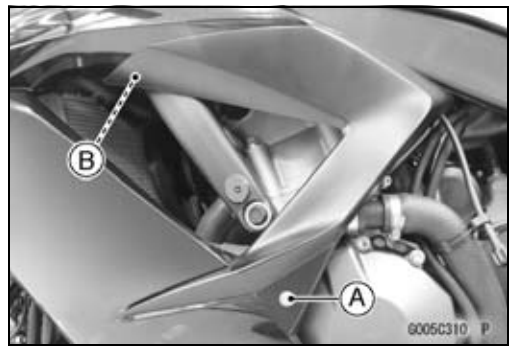
- Fit the hooks [A] of the inner fairings.
- Insert the tab [B] into the rib [C] on the upper fairing.
- Install the quick rivets and clamps.

Fairing Cover Removal

Hooks [A]
Projection [B]
Slots [C]
Grommet [D]

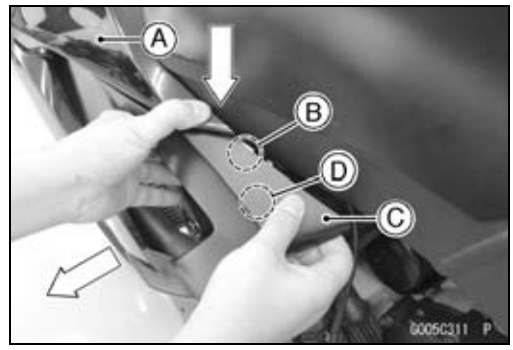


- Remove:
  Bolt [A] and Washer
  Quick Rivet [B]

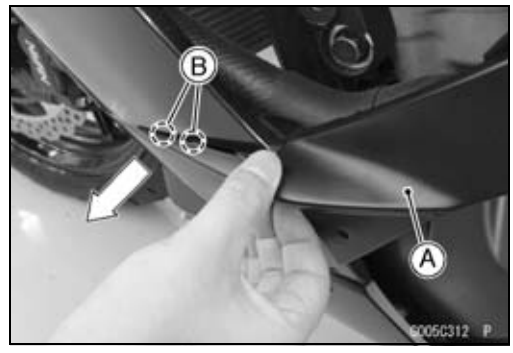


Fairings

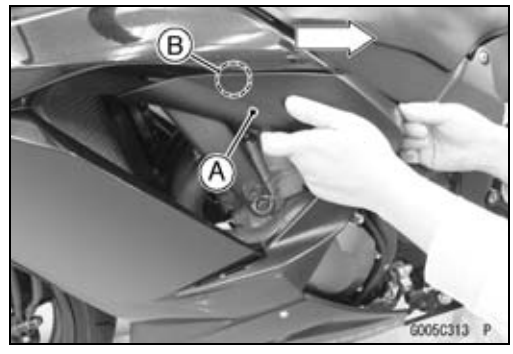
- Push down the upper fairing [A] to clear the hook [B].
- Pull the fairing cover [C] outward to clear the projection [D].



- Pull the fairing cover [A] outward to clear the hooks [B].

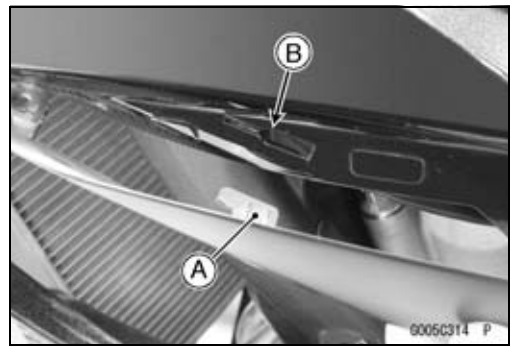


- Pull the fairing cover [A] rearward to clear the hook [B], and remove the fairing cover.

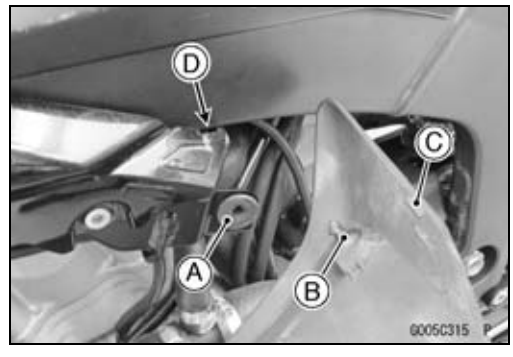


Fairing Cover Installation

- Insert the hook [A] into the slot [B].

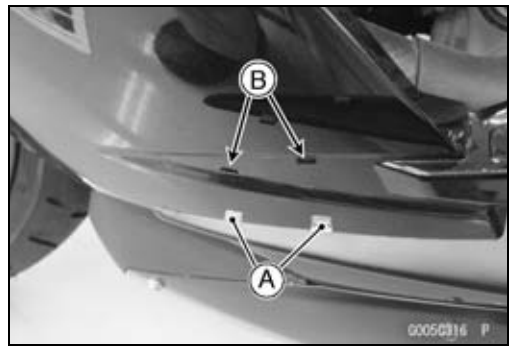


- Check the grommet [A] is in place on the bracket.
- Insert the projection [B] into the grommet.
- Fit the hook [C] of the fairing cover on the rib [D] of the middle fairing.



Fairings

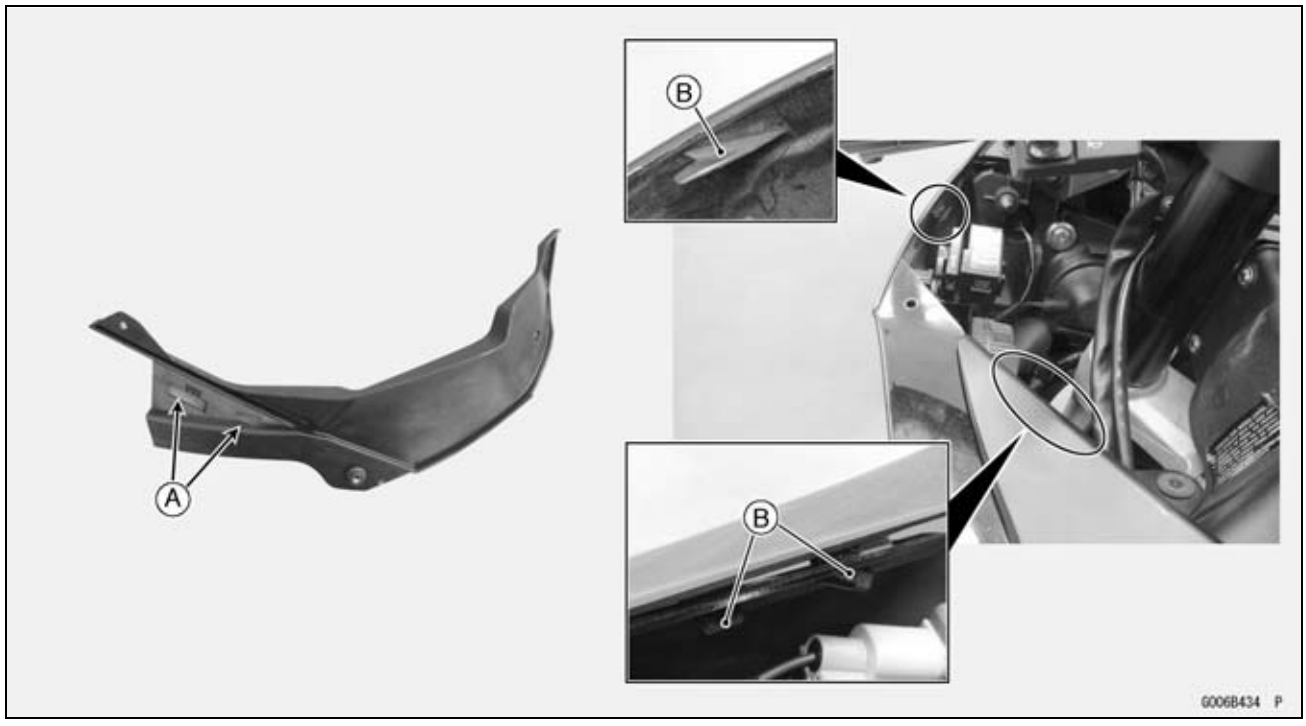
- Insert the hooks [A] into the slots [B].
- Install the quick rivet, bolt and washer.



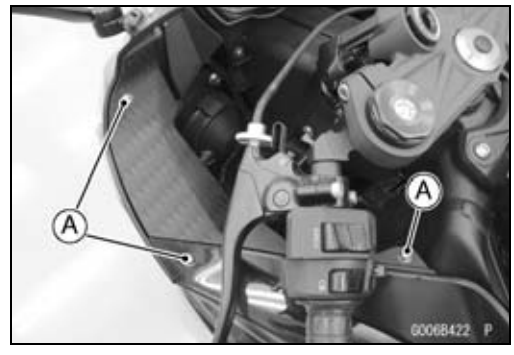
Side Covers

Inner Cover Removal

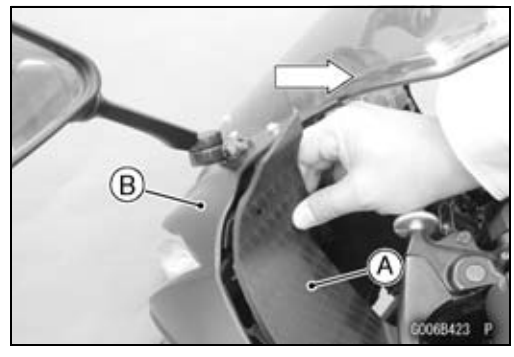
Slots [A]
Hooks [B]



- Remove the bolts [A] and washers.

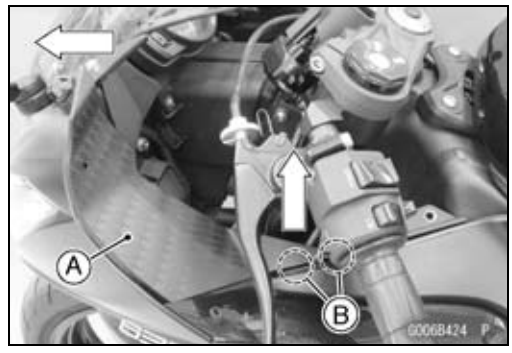


- Pull the inner cover [A] rearward to clear the inner cover from the middle fairing [B].



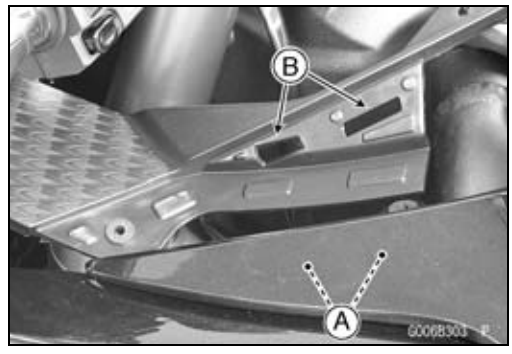
Side Covers

- Push the inner cover [A] inward to clear the hooks [B] of the side cover.
- Remove the inner cover forward.



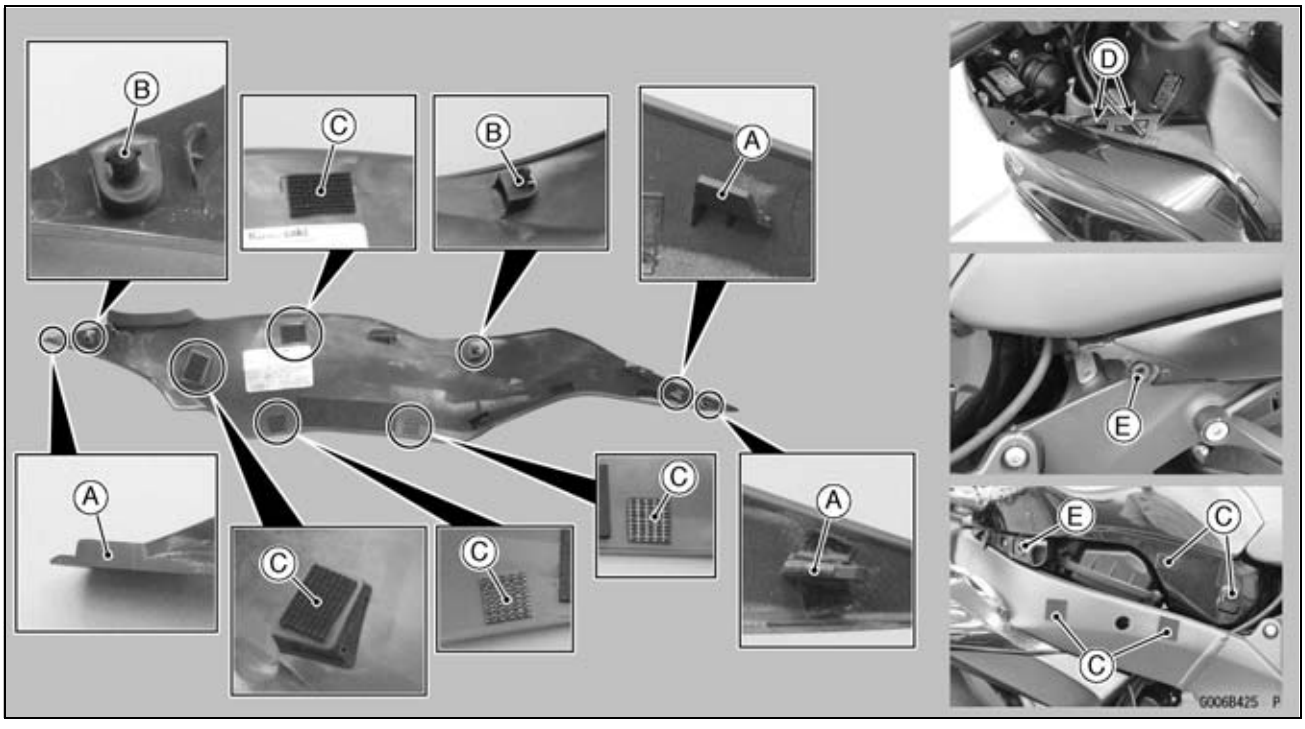
Inner Cover Installation

- Fit the hooks [A] on the side cover to the holes [B] on the inner cover.
- Install the bolts and washers.



Side Cover Removal

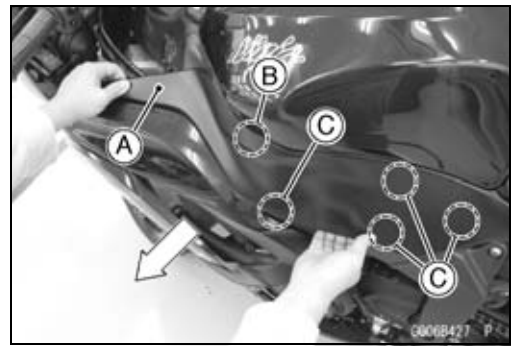
Hooks [A]
Projections [B]
Hook Fasteners [C]
Slots [D]
Grommets [E]



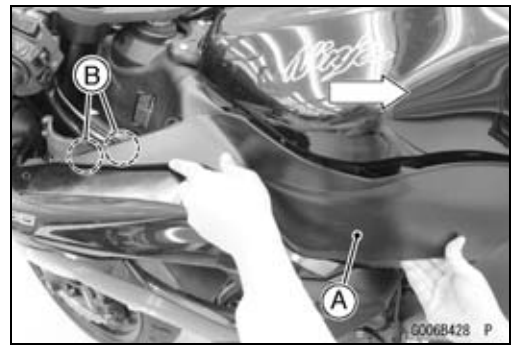
Side Covers

- Remove:
  Inner Cover (see Inner Cover Removal)
  Wellnut [A]

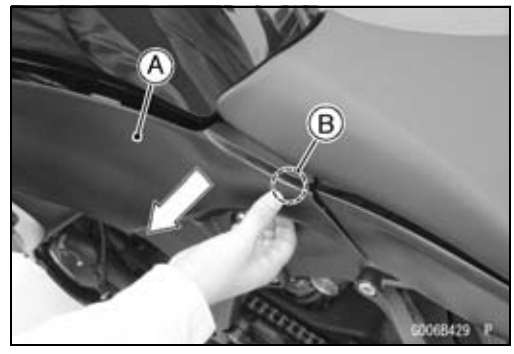
- Holding the front part of the side cover [A], and pull the side cover outward to clear the projection [B] and hook fasteners [C].



- Holding the middle part of the side cover [A], and pull the side cover rearward to clear the hooks [B] of the side cover.

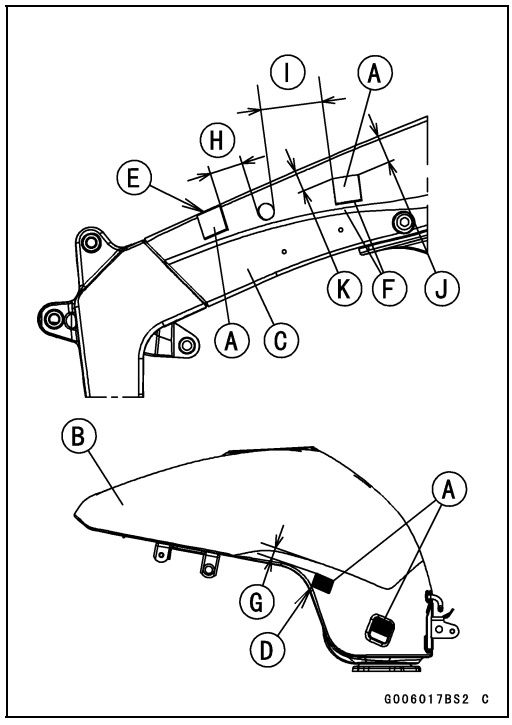


- Pull the side cover [A] outward to clear the projection [B], and remove the side cover.



Side Covers

Side Cover Installation

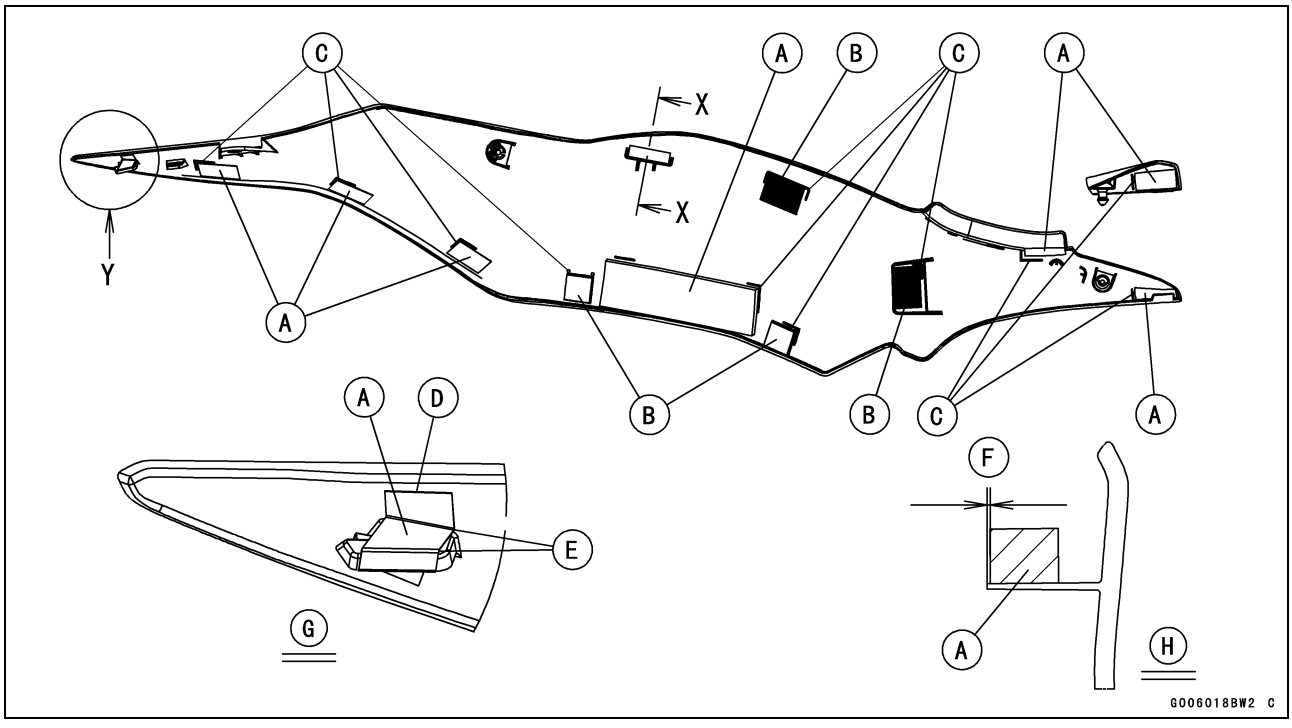


- Check that the hook fasteners [A] are in place on the fuel tank [B] and frame [C].

○Fit the hook fastener to the corner [D] on the fuel tank.
○Fit the hook fastener to the corner [E] on the frame.
○Set the hook fastener parallel to the line [F] on the frame.
16 mm (0.6 in.) [G]
40 mm (1.6 in.) [H]
73 mm (2.9 in.) [I]
35 mm (1.4 in.) [J]
27 mm (1.1 in.) [K]

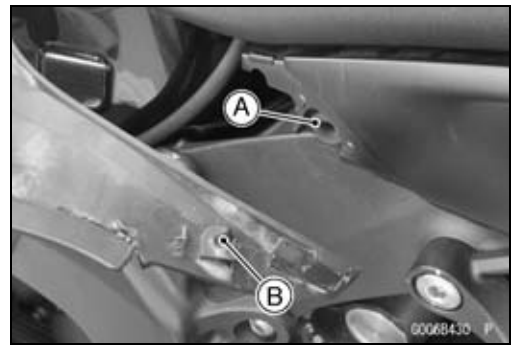
- Check that the pads [A] and hook fasteners [B] are in place on the side cover.

○Set the pad and hook fasteners to the convex [C] on the side cover.
○Fit the pad to the rim end [D].
○Fit the pad to the corner [E] on the rib.
1 mm (0.04 in.) [F]
Detail Y [G]
Section X- X [H]

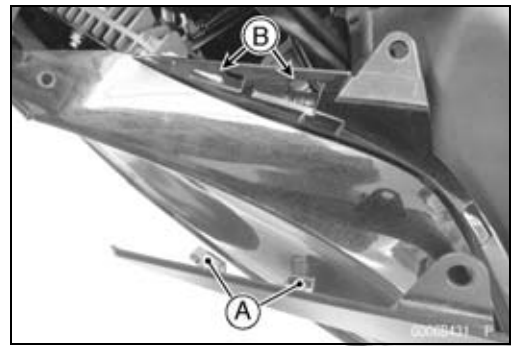


Side Covers

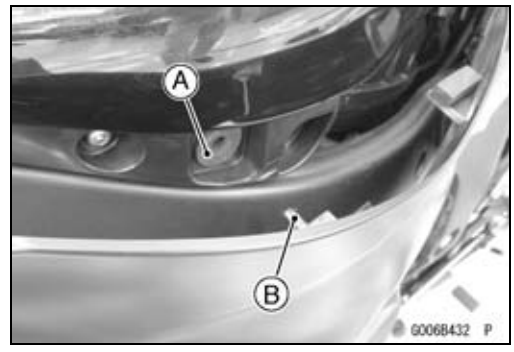
- Check the grommet [A] is in place on the seat cover.
- Insert the projection [B] into the grommet.



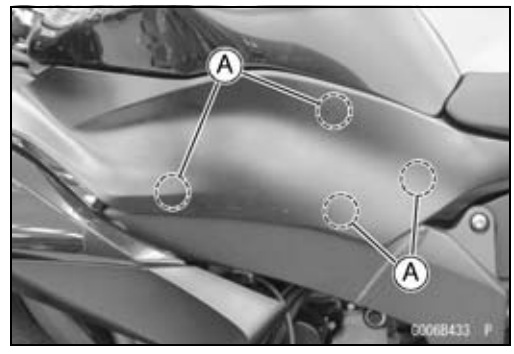
- Insert the hooks [A] into the slots [B].



- Check the grommet [A] is in place on the tank cover.
- Insert the projection [B] into the grommet.

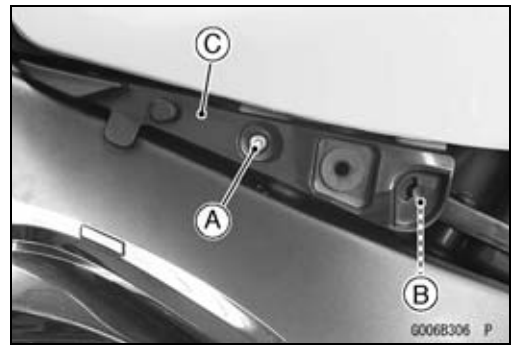


- Fit the hook fasteners [A].
- Install the wellnut.



Tank Cover Removal

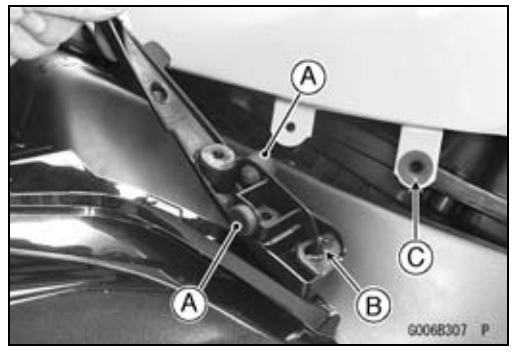
- Remove the side cover (see Side Cover Removal).
- Remove the bolt [A].
- Clear the projection [B] outward, and remove the tank cover [C].



Side Covers

Tank Cover Installation

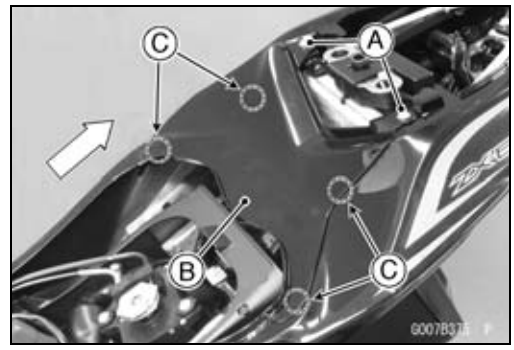
- Check that the dampers [A] are in place on the side cover.
- Insert the projection [B] into the grommet [C].
- Tighten the bolt.



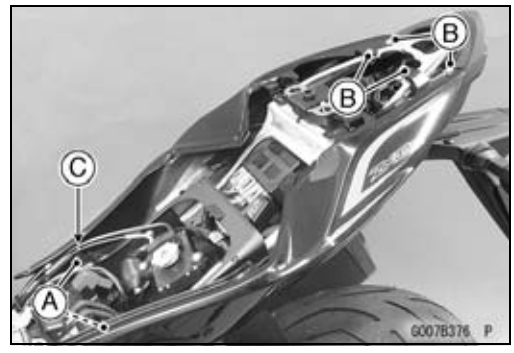
Seat Covers

Seat Cover Removal

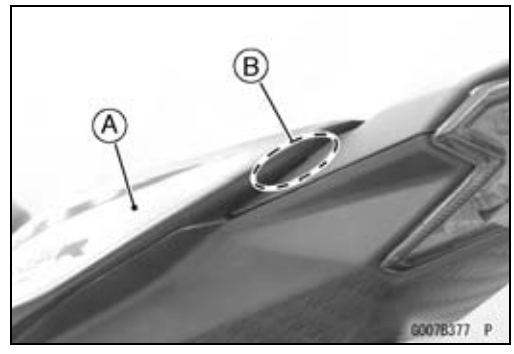
- Remove:
  Seats (see Front/Rear Seat Removal)
  Bolts [A]
- Pull the front seat cover [B] backward to clear the hooks [C], and remove the front seat cover.



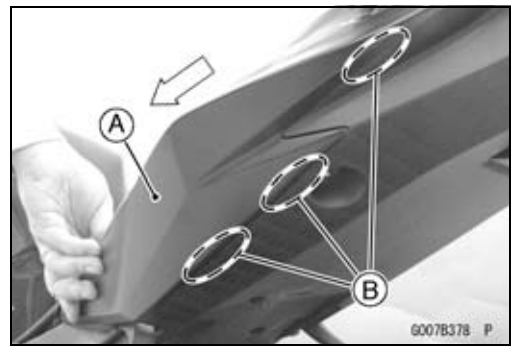
- Remove:
  Quick Rivets [A]
  Bolts [B]
- Clear the exhaust butterfly valve cables from the hook [C] on the seat cover.



- Pull the seat cover [A] outward to clear the hook [B] (both sides).

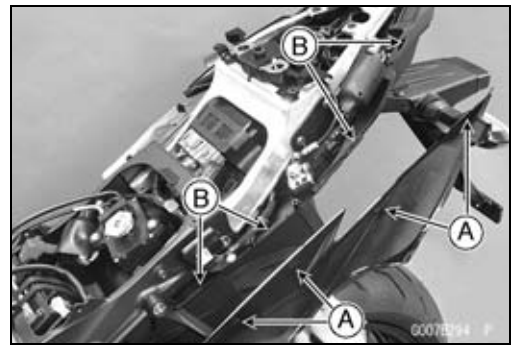


- Pull the seat cover [A] forward to clear the hooks [B], and remove the seat cover (both sides).



Seat Cover Installation

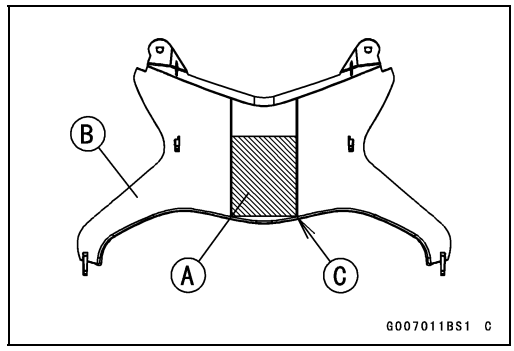
- Insert the hooks [A] into the slots [B].
- Install the bolts and quick rivets.
- Hold the exhaust butterfly valve cables to the hook on the seat cover.



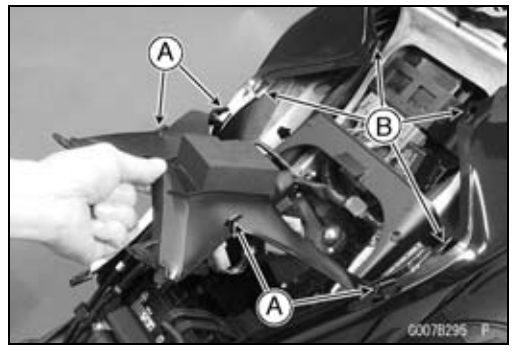
Seat Covers

- Check that the pad [A] is in place on the front seat cover [B].

○Fit the pad to the rib [C] of the front seat cover.

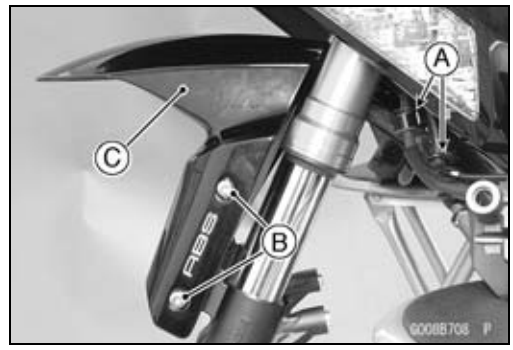


- Insert the hooks [A] on the front seat cover into the slots [B].
- Tighten the bolts.



Fenders

Front Fender Removal



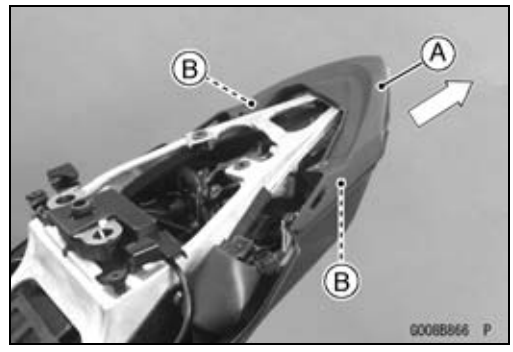
- Remove the front wheel (see Front Wheel Removal).
- Clear the brake hoses and wheel rotation sensor lead from the clamps [A] (both sides).
- Remove:
  Bolts [B] and Washers (Both Sides)
  Front Fender [C]

Front Fender Installation

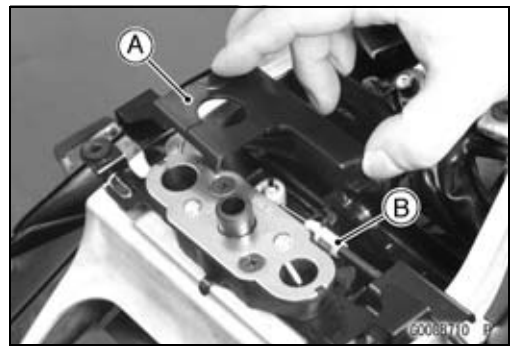
- Tighten:

Torque - Front Fender Mounting Bolts: 3.9 N·m (0.40 kgf·m, 35 in·lb)

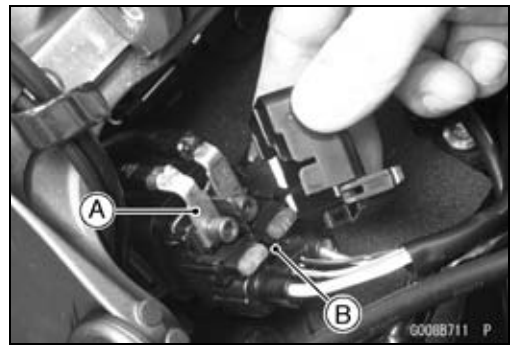
Rear Fender Removal



- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Battery (see Battery Removal in the Electrical System chapter)
  Flap (see Flap Removal).
- Pull the tail/brake light cover [A] backward to clear the hooks [B], and remove the tail/brake light cover.



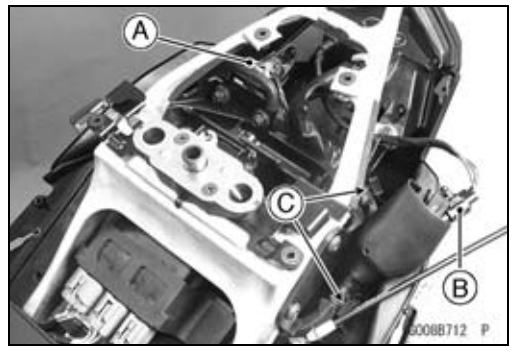
- Remove:
  Seat Lock Cover [A]
  Seat Lock Cable [B]



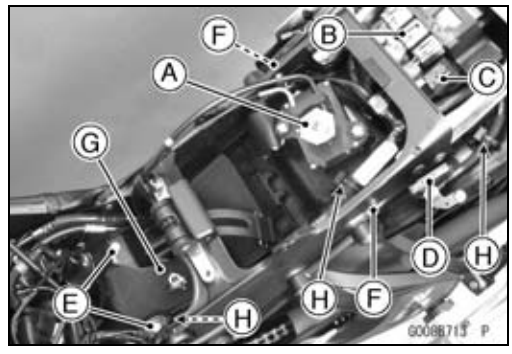
- Disconnect the starter motor cable [A] from the starter relay [B].

Fenders

- Disconnect:
  Vehicle-down Sensor Connector [A]
  Tail/Brake Light Lead Connector [B]
- Remove the clamps [C].

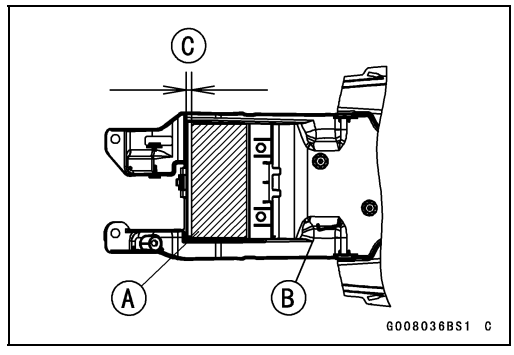


- Remove:
  Exhaust Butterfly Valve Actuator [A] (see Exhaust Butterfly Valve Actuator Removal in the Fuel System (DFI) chapter)
  ECU (with Relay Box) [B]
  Turn signal Relay [C]
  Fuse Box [D]
  Bolts [E]
  Bolts and Nuts [F]
  Pad [G]
  Clamps [H]
- Remove the rear fender backward.

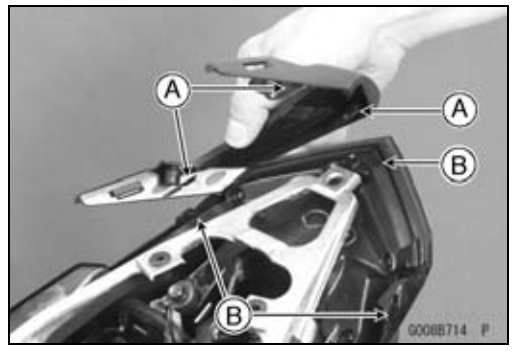


Rear Fender Installation

- Installation is the reverse of removal.
- Run the cables, leads, harness and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Check that the pad [A] in place on the rear fender [B].
  5 mm (0.20 in.) [C]

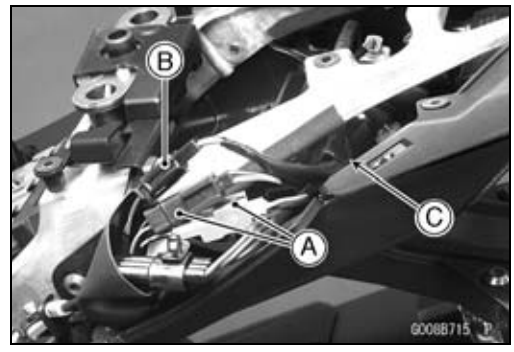


- Insert the hooks [A] on the tail/brake light cover into the slits [B] on the rear fender.

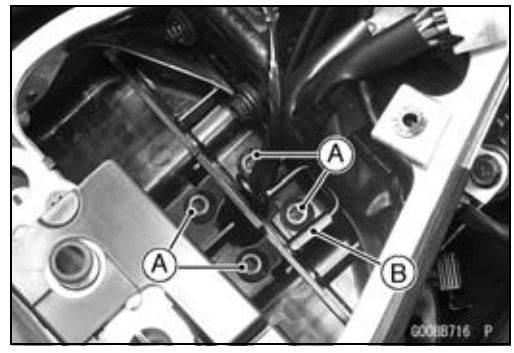


Fenders

Flap Removal



- Remove the seat cover (see Seat Cover Removal).
- Disconnect:
  Turn Signal Relay Lead Connectors [A]
  License Plate Light Lead Connector [B]
- Clear the lead from the clamp [C].



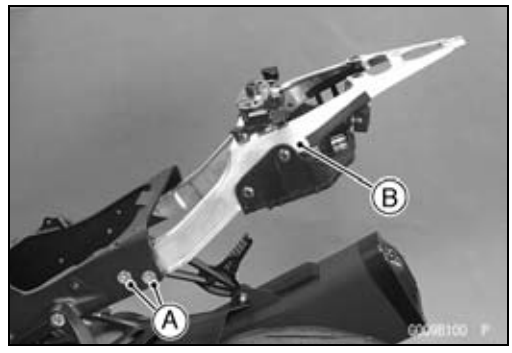
- Remove:
  Flap Mounting Bolts [A]
  Clamp [B]
  Flap

Flap Installation

- Installation is the reverse of removal.
- Run the cables, leads, harness and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Apply a non-permanent locking agent to the threads of the flap mounting bolts.

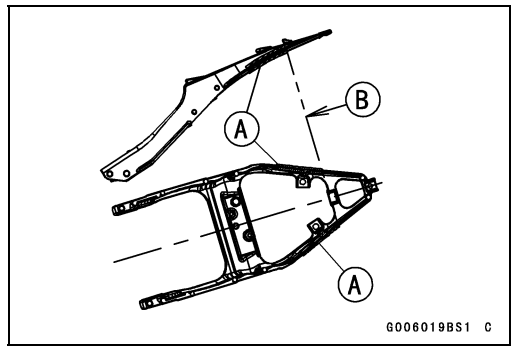
Frame

Rear Frame Rear Removal



- Remove:
  Rear Fender (see Rear Fender Removal)
  Rear Frame Bolts (M8) [A] (Both Sides)
  Rear Frame Rear [B]

Rear Frame Rear Installation



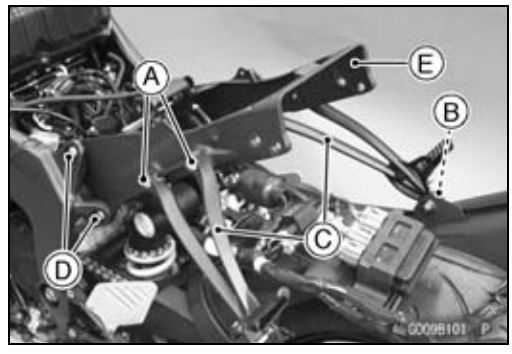
- Check that the pads [A] are in place on the rear frame rear.

○Align the pads with the line [B] on the rear frame rear.

- Apply a non-permanent locking agent to the threads of the rear frame bolts (M8) and tighten them.

Torque - Rear Frame Bolts (M8): 25 N·m (2.5 kgf·m, 18 ft·lb)

Rear Frame Front Removal



- Remove:
  Rear Frame Rear (see Rear Frame Rear Removal)
  Rear Footpeg Bracket Bolts [A] (Both Sides)
  Muffler Body Mounting Bolts [B]
  Rear Footpeg Brackets [C]
  Rear Frame Bolt (M10) [D] (Both Sides)
  Rear Frame Front [E]

Rear Frame Front Installation

- Apply a non-permanent locking agent to the threads of the rear frame bolts (M10) and tighten them.

Torque - Rear Frame Bolts (M10): 44 N·m (4.5 kgf·m, 32 ft·lb)
Rear Footpeg Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)
Muffler Body Mounting Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

Frame Inspection

- Visually inspect the frame for cracks, dents, bending, or warp.

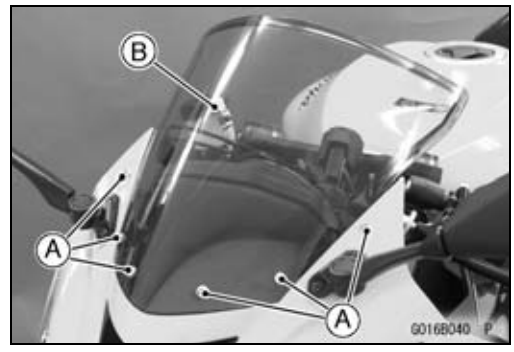
★If there is any damage to the frame, replace it.

⚠ WARNING

A repaired frame may fail in use, possibly causing an accident resulting in injury or death. If the frame is bent, dented, cracked, or warped, replace it.

Windshield

Windshield Removal



- Remove:
  Bolts with Washers [A]
  Windshield [B]

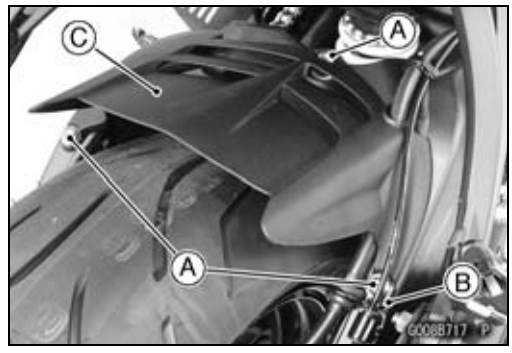
Windshield Installation

- Be sure that the wellnuts [A] are in position on the windshield.
- Tighten:

Torque - Windshield Mounting Bolts: 0.42 N·m (0.043 kgf·m, 3.7 in·lb)

Guard

Mud Guard Removal



- Remove:
  Mud Guard Mounting Bolts [A]
  Brake Hose Clamp [B]
  Mud Guard [C]

Mud Guard Installation

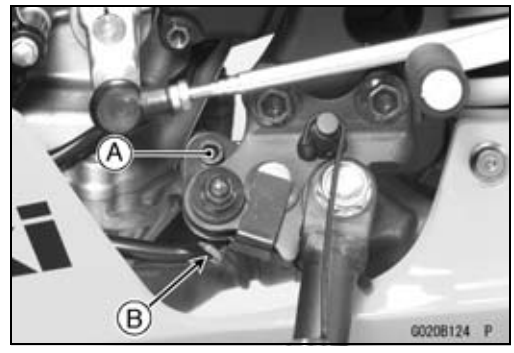
- Installation is the reverse of removal.
- Apply a non-permanent locking agent to the threads of the mud guard mounting bolts, and tighten them securely.

Sidestand

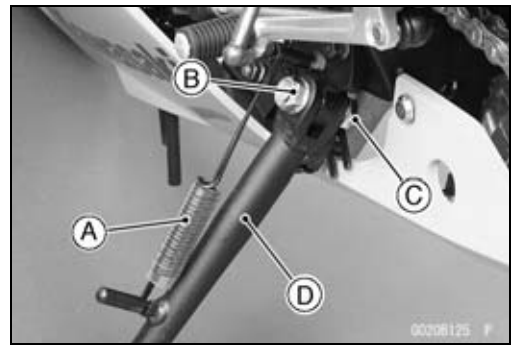
Sidestand Removal

- Raise the rear wheel off the ground with the stand [A].

- Remove:
  Sidestand Switch Bolt [A]
  Sidestand Switch [B]



- Remove:
  Spring [A]
  Sidestand Nut [B]
  Sidestand Bolt [C]
  Sidestand [D]



Sidestand Installation

- Apply grease to the sliding area [A] of the sidestand [B].
- Replace the sidestand nut [C] with a new one.
- Tighten the sidestand bolt [D], and then lock it with the sidestand nut.

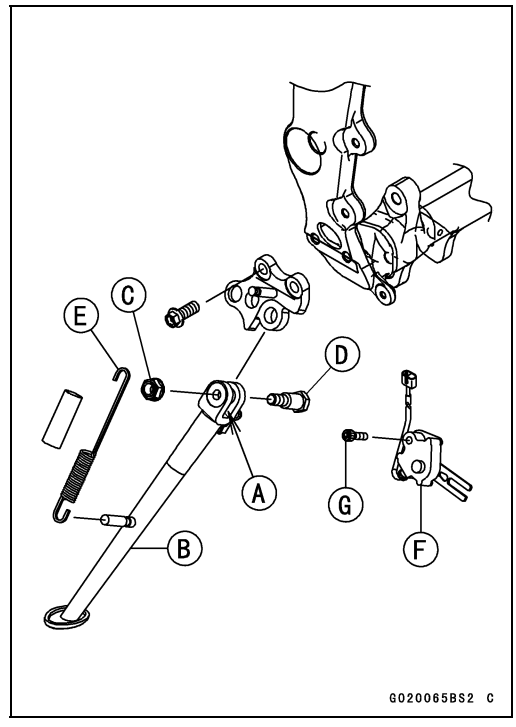
Torque - Sidestand Bolt: 29 N·m (3.0 kgf·m, 21 ft·lb)
Sidestand Nut: 44 N·m (4.5 kgf·m, 32 ft·lb)

- Hook the spring [E] so that the long spring end faces upward.

○Install the spring hook direction as shown.

- Install the sidestand switch [F].
- Apply a non-permanent locking agent to the threads of the sidestand switch bolt [G], and tighten it.

Torque - Sidestand Switch Bolt: 8.8 N·m (0.90 kgf·m, 78 in·lb)



Electrical System

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Exploded View

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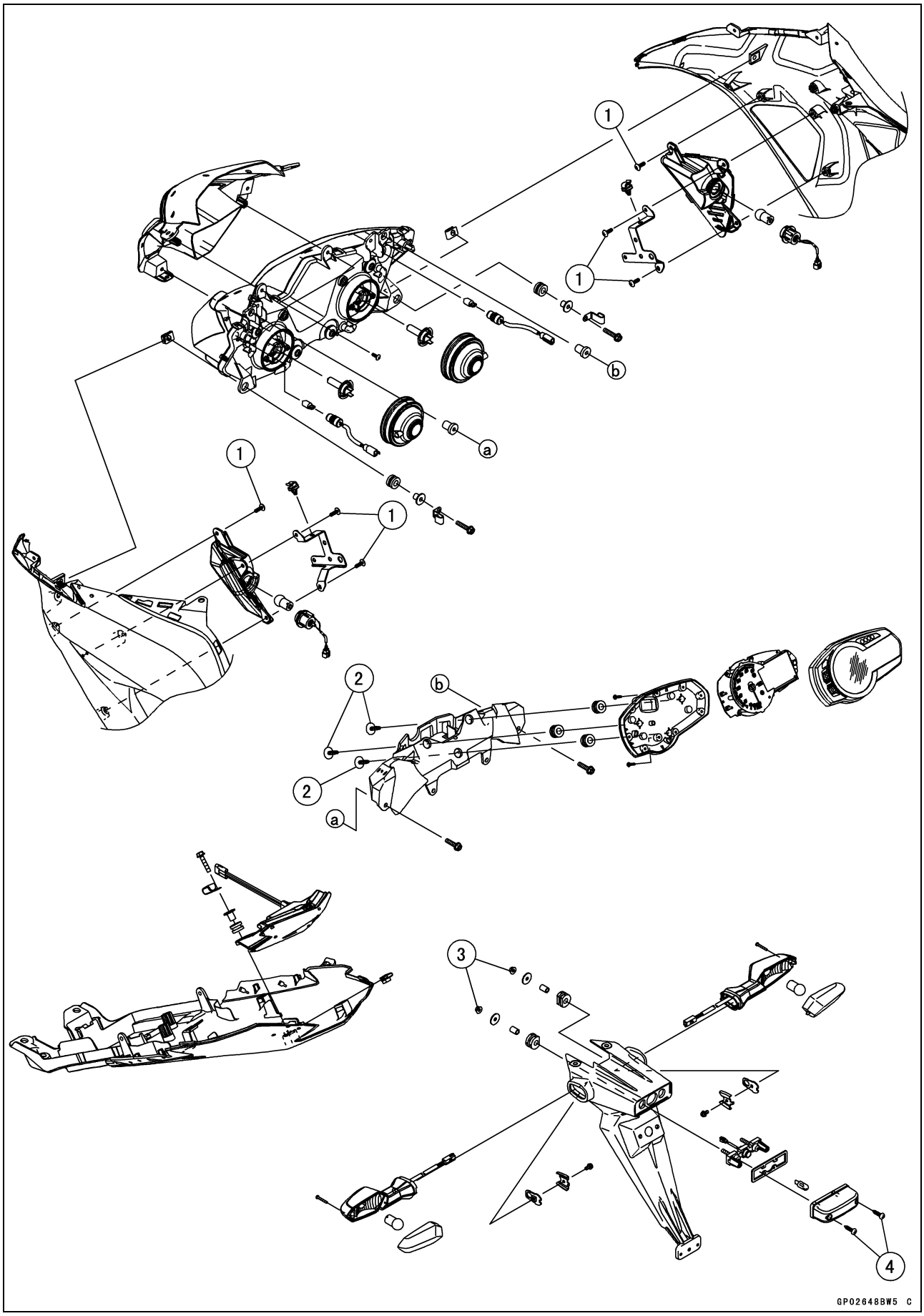
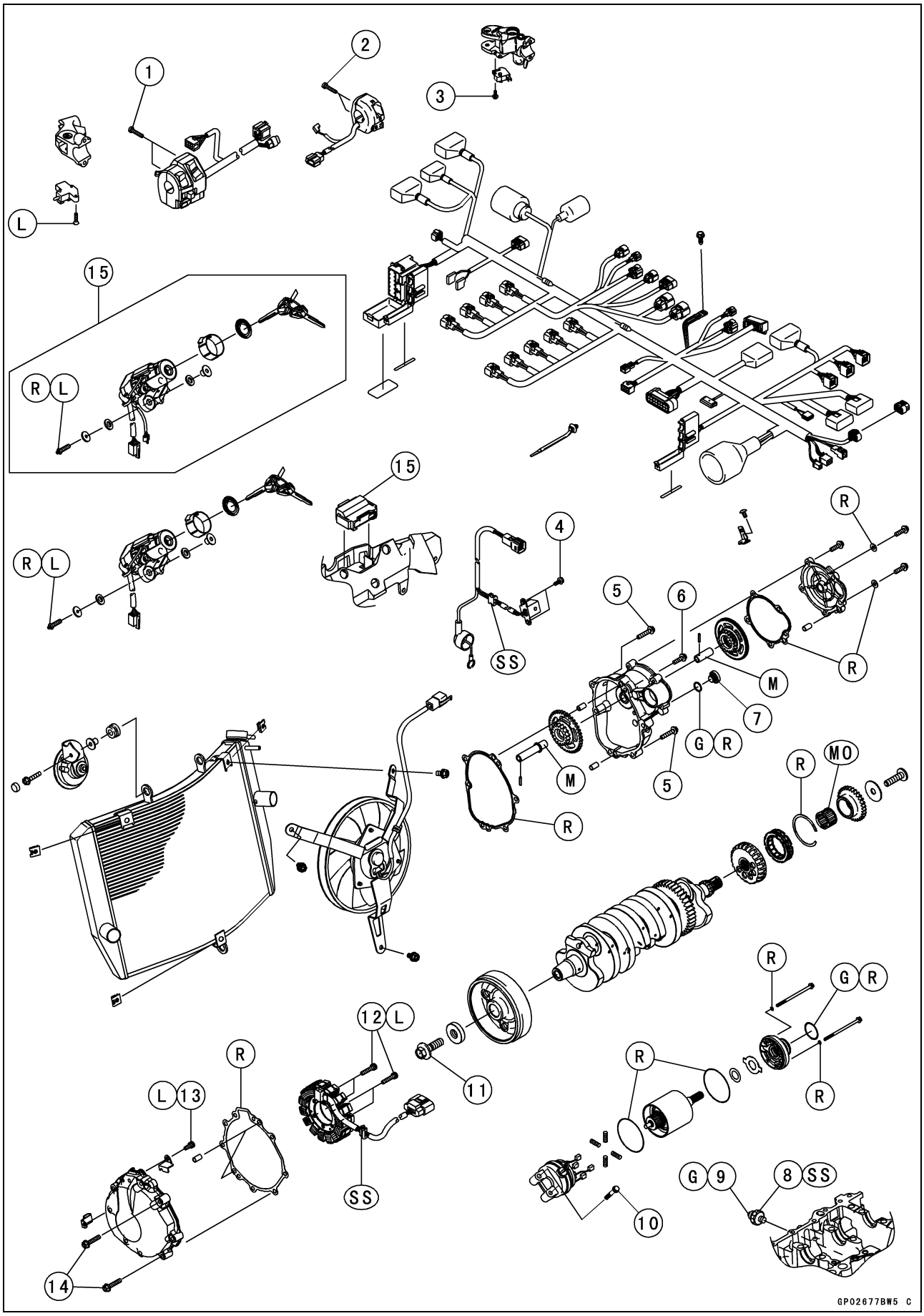
Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Turn Signal Light Mounting Screw	1.2	0.12	11 in·lb	
2	Meter Unit Mounting Screws	1.2	0.12	11 in·lb	
3	License Plate Light Mounting Nuts	3.5	0.36	31 in·lb	
4	License Plate Light Cover Screws	1.0	0.10	8.9 in·lb	

Exploded View

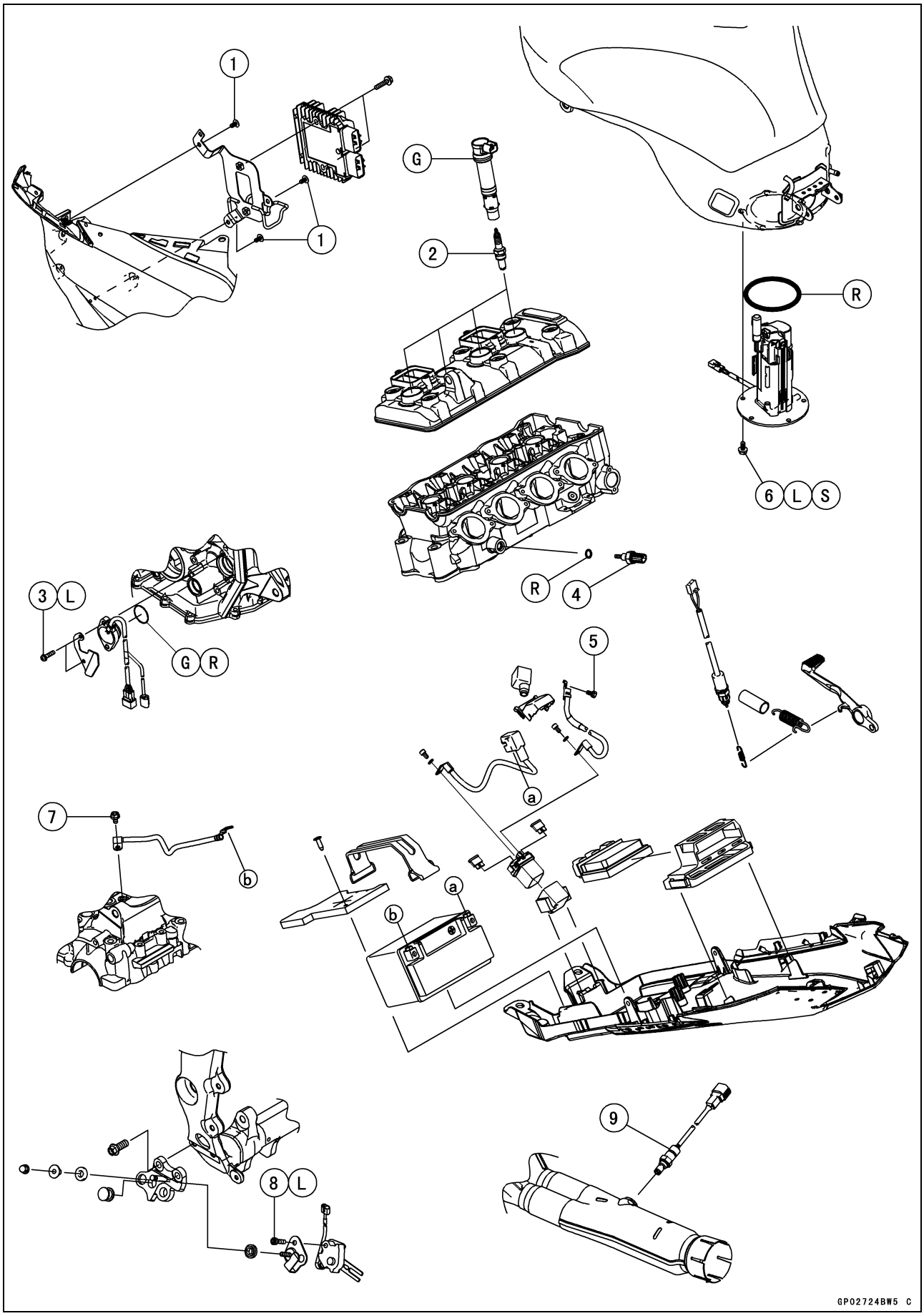


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Left Switch Housing Screws	3.5	0.36	31 in·lb	
2	Right Switch Housing Screws	3.5	0.36	31 in·lb	
3	Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
4	Crankshaft Sensor Bolts	5.9	0.60	52 in·lb	
5	Starter Clutch Cover Bolts (L = 30 mm)	9.8	1.0	87 in·lb	
6	Starter Clutch Cover Bolt (L = 20 mm)	9.8	1.0	87 in·lb	
7	Starter Clutch Bolt Cap	2.9	0.30	26 in·lb	
8	Oil Pressure Switch	15	1.5	11	SS
9	Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	G
10	Starter Motor Mounting Bolts	9.8	1.0	87 in·lb	
11	Alternator Rotor Bolt	155	15.8	114	
12	Stator Coil Bolts	12	1.2	106 in·lb	L
13	Alternator Lead Holding Plate Bolt	9.8	1.0	87 in·lb	L
14	Alternator Cover Bolts	9.8	1.0	87 in·lb	

15. Immobilizer System Equipped Models
G: Apply grease.
L: Apply a non-permanent locking agent.
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
SS: Apply silicone sealant.

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Regulator/Rectifier Bracket Screws	1.2	0.12	11 in·lb	
2	Spark Plugs	13	1.3	115 in·lb	
3	Gear Position Switch Screws	2.9	0.30	26 in·lb	L
4	Water Temperature Sensor	12	1.2	106 in·lb	
5	Starter Motor Cable Terminal Bolt	2.9	0.30	26 in·lb	
6	Fuel Pump Bolts	9.8	1.0	87 in·lb	L, S
7	Engine Ground Cable Terminal Bolt	9.8	1.0	87 in·lb	
8	Sidestand Switch Bolt	8.8	0.90	78 in·lb	L
9	Oxygen Sensor (Equipped Models)	25	2.5	18	

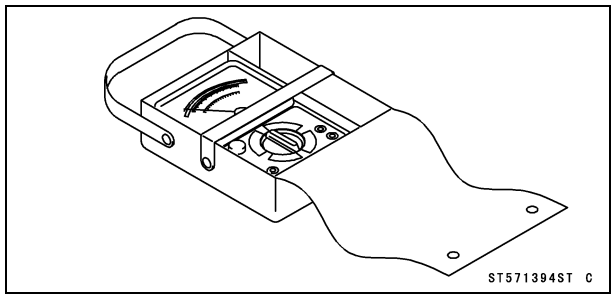
G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts
S: Follow the specified tightening sequence.

Specifications

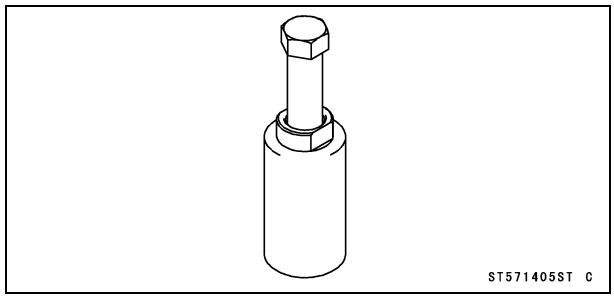
Item	Standard
Battery	
Type	Sealed Battery
Model Name	YTX9-BS
Capacity	12 V 8 Ah (10 HR)
Voltage	12.8 V or more
Gross Weight	3.1 kg (6.8 lb)
Electrolyte Volume	0.40 L (24 cu in.)
Charging System	
Type	Three-phase AC
Alternator Output Voltage	46.4 V or more @4 000 r/min (rpm)
Stator Coil Resistance	0.11 ~ 0.17 Ω @20°C (68°F)
Charging Voltage (Regulator/Rectifier Output Voltage)	14.3 ~ 14.7 V
Ignition System	
Crankshaft Sensor:	
Resistance	368 ~ 552 Ω
Peak Voltage	2.6 V or more
Stick Coil:	
Primary Winding Resistance	0.85 ~ 1.15 Ω
Secondary Winding Resistance	5.0 ~ 6.8 kΩ
Primary Peak Voltage	120 V or more
Spark Plug:	
Type	NGK CR9E
Gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)
Electric Starter System	
Starter Motor:	
Brush Length	7 mm (0.28 in.) (Service Limit: 5 mm (0.20 in.))
Commutator Diameter	24 mm (0.94 in.) (Service Limit: 23 mm (0.91 in.))
Air Switching Valve	
Resistance	20 ~ 24 Ω @20°C (68°F)
Meter Unit	
CAN Communication Line Resistance	122 ~ 126 Ω at meter connector
Switches and Sensors	
Rear Brake Light Switch Timing	ON after about 10 mm (0.39 in.) of pedal travel
Oil Pressure Switch Connections	When engine is stopped: ON When engine is running: OFF
Water Temperature Sensor Resistance	in the text
Gear Position Switch Resistance	in the text

Special Tools and Sealant

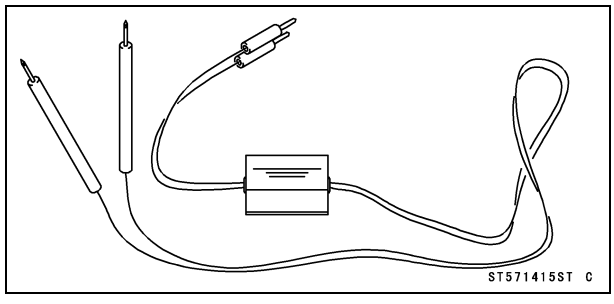
Hand Tester:
57001-1394



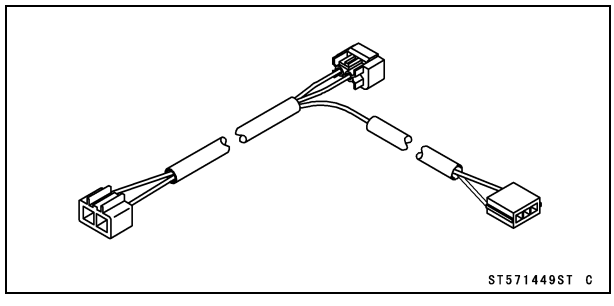
Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5:
57001-1405



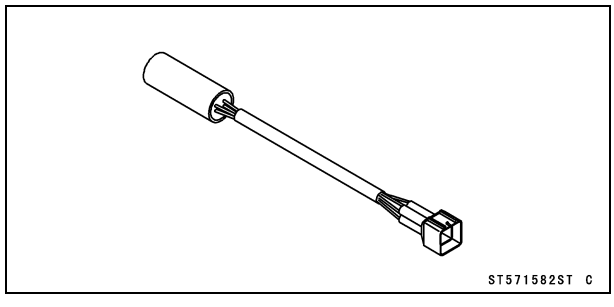
Peak Voltage Adapter:
57001-1415



Lead Wire - Peak Voltage Adapter:
57001-1449



Key Registration Unit:
57001-1582



Grip:
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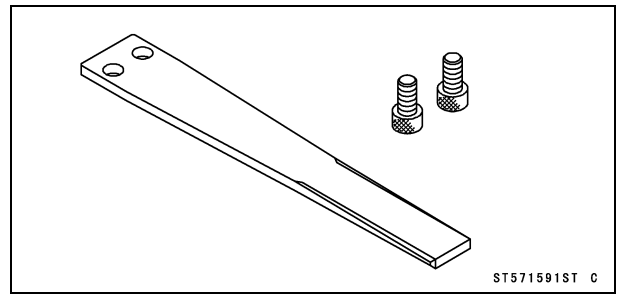
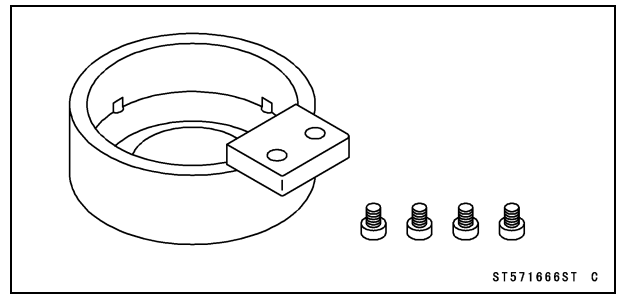
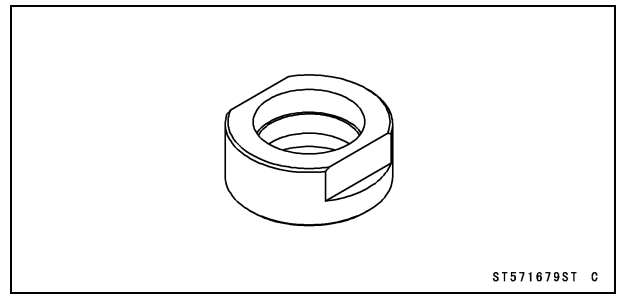


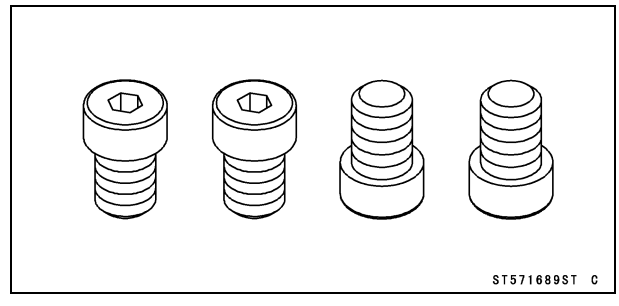
Rotor Holder:
57001-1666



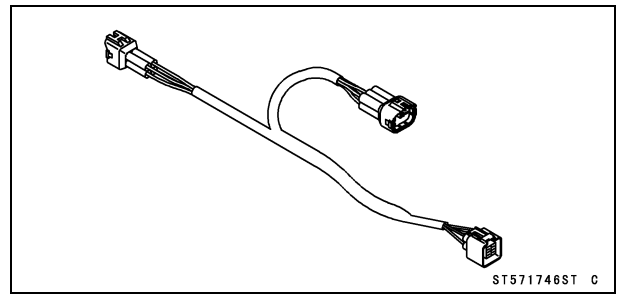
Stopper:
57001-1679



Rotor Holder Attachment:
57001-1689

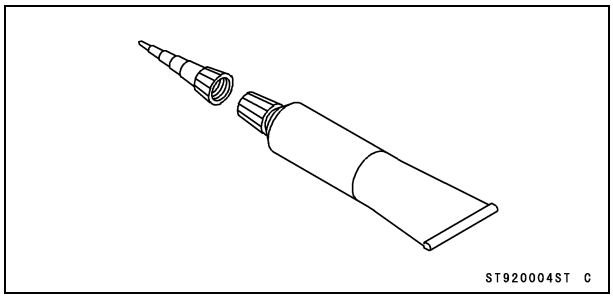


Key Registration Adapter:
57001-1746



Special Tools and Sealant

Liquid Gasket, TB1211F:
92104-0004



Parts Location

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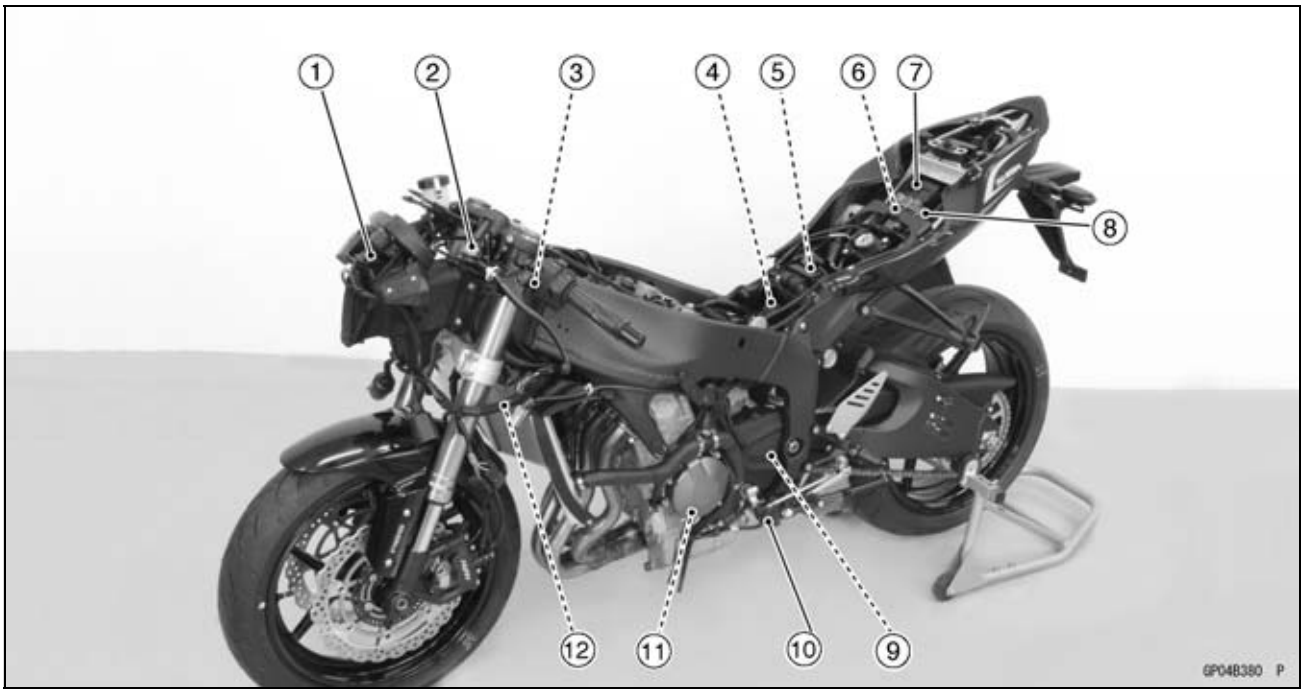
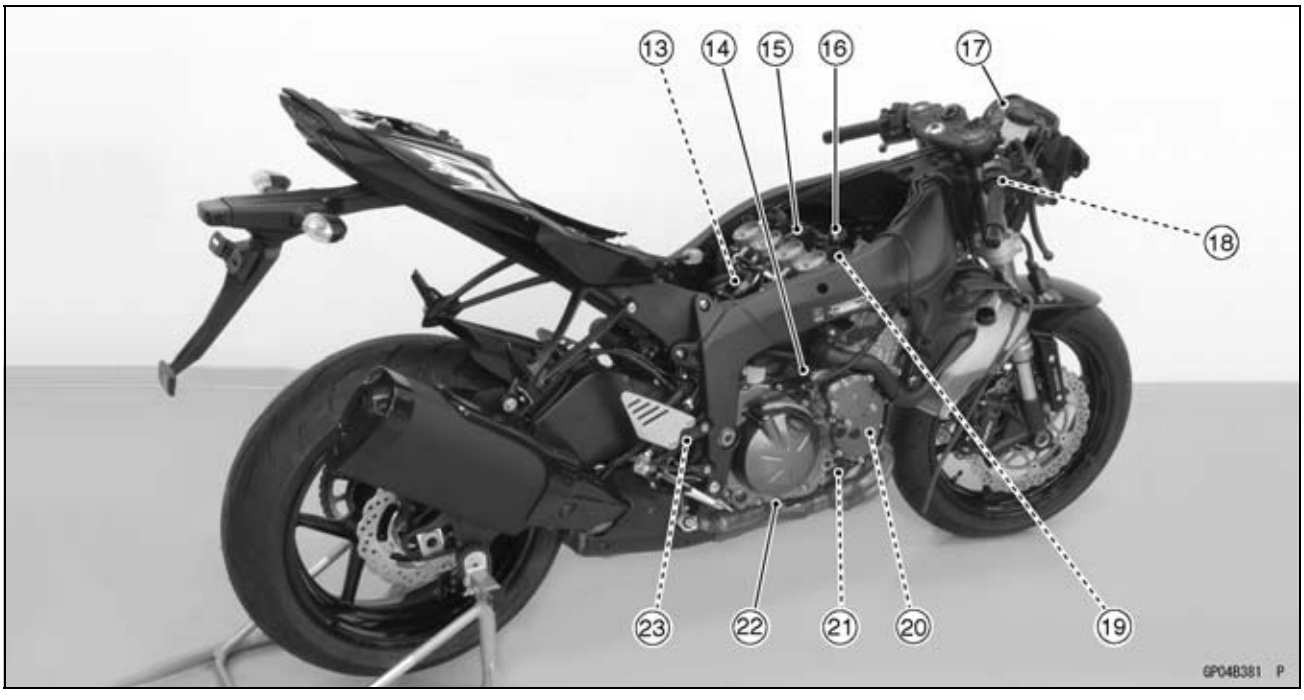
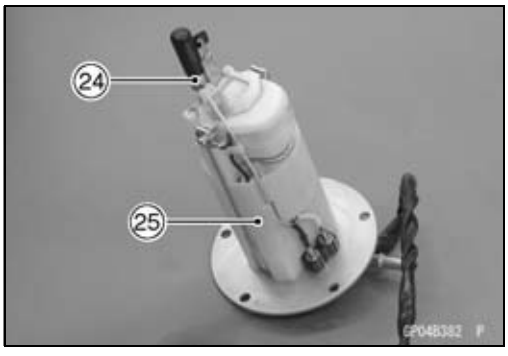
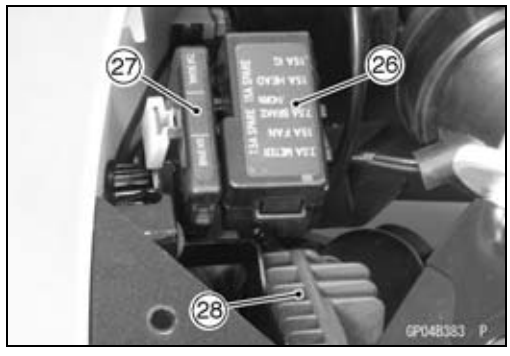
Parts Location





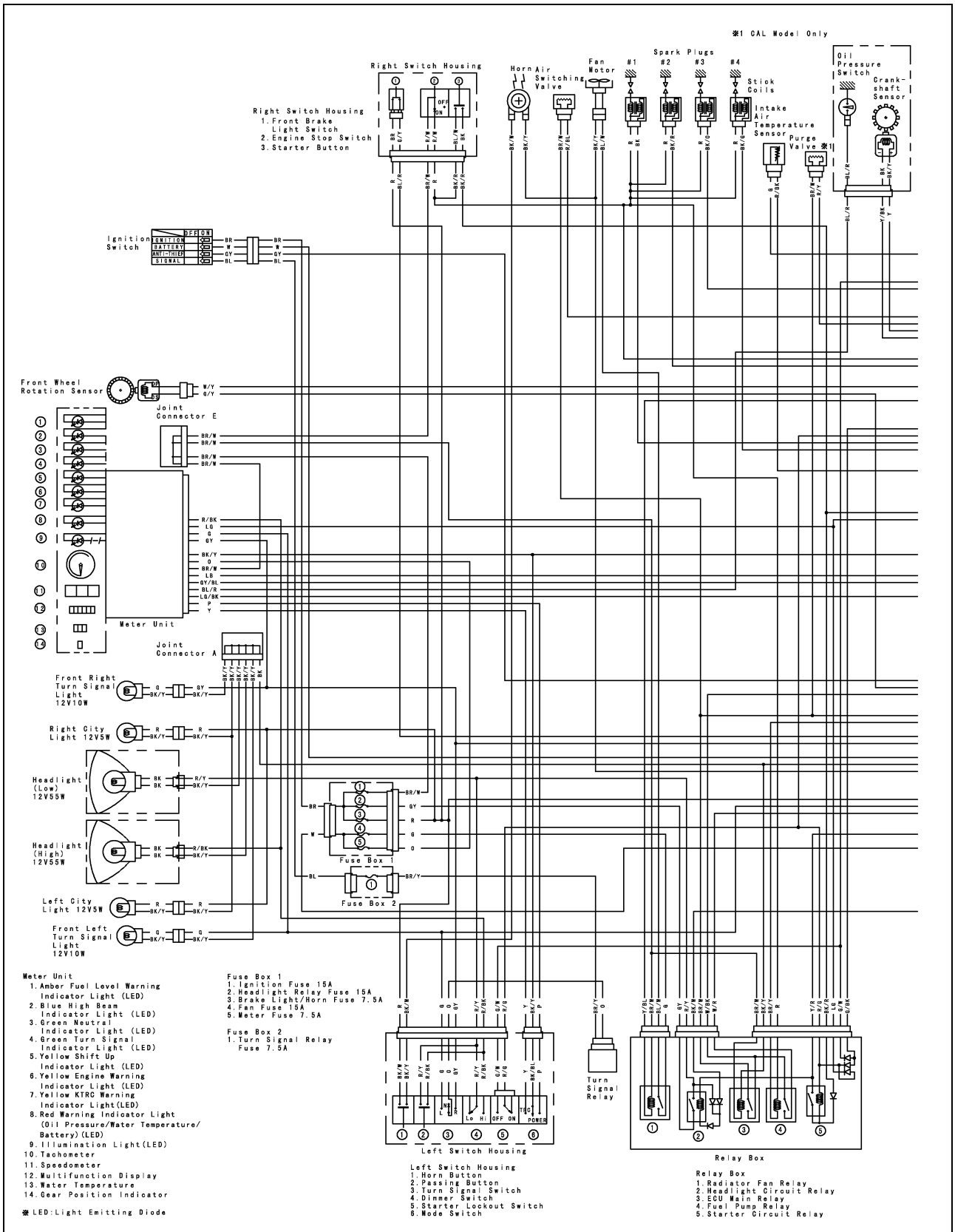




Parts Location

1. Immobilizer Amplifier (Equipped Models)
2. Ignition Switch
   (Immobilizer Equipped Models: Including Immobilizer Antenna)
3. Starter Lockout Switch
4. Starter Relay
5. Battery 12 V 8 Ah
6. ECU
7. Relay Box
8. Turn Signal Relay
9. Gear Position Switch
10. Sidestand Switch
11. Alternator
12. Fan Motor
13. Water Temperature Sensor
14. Starter Motor
15. Stick Coils
16. Air Switching Valve
17. Meter Unit
18. Front Brake Light Switch
19. Spark Plugs
20. Crankshaft Sensor
21. Oil Pressure Switch
22. Oxygen Sensor (Equipped Models)
23. Rear Brake Light Switch
24. Fuel Reserve Switch
25. Fuel Pump
26. Fuse Box 1
27. Fuse Box 2
28. Regulator/Rectifier

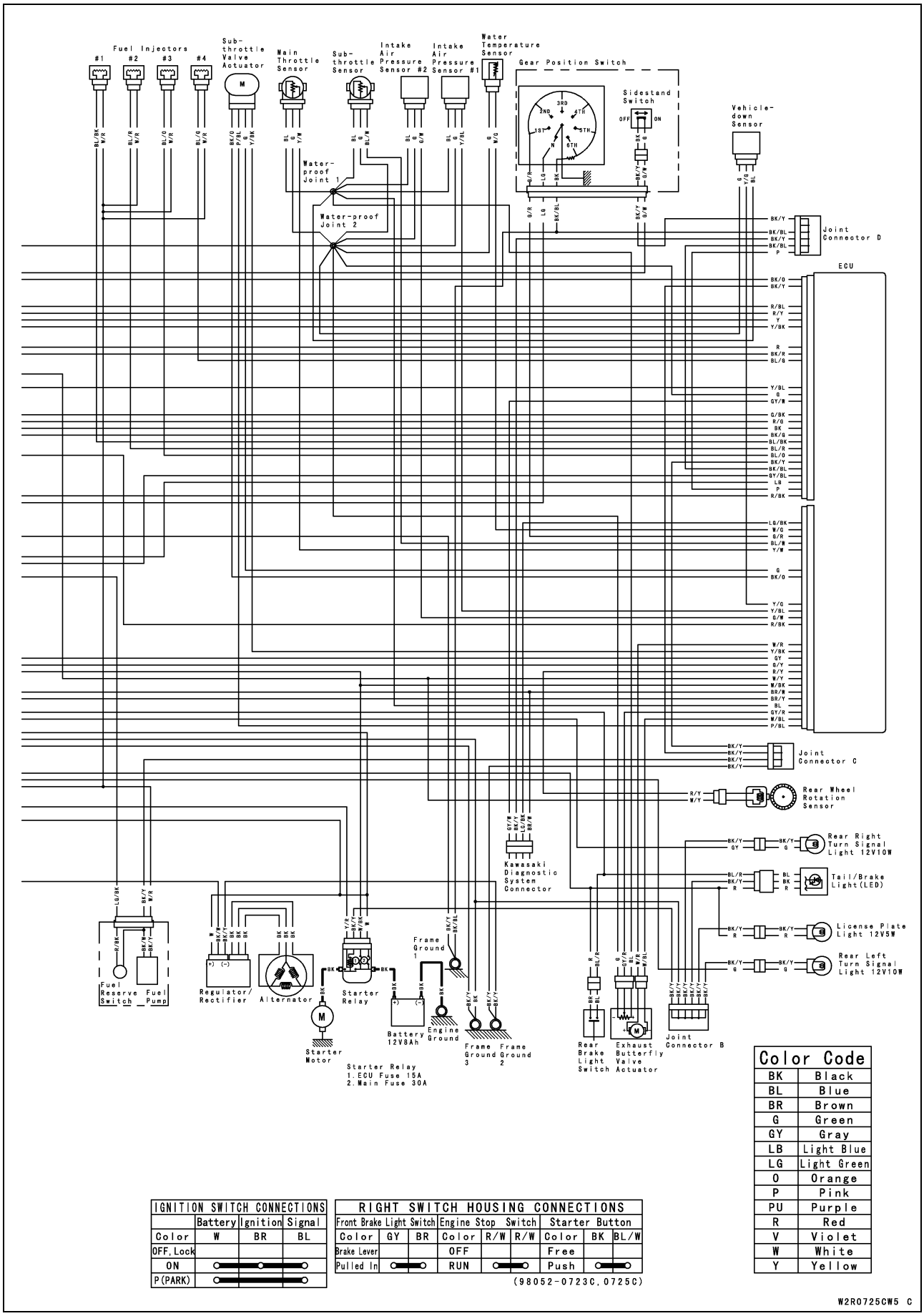
Wiring Diagram (US, CA and CAL Models)



LEFT SWITCH HOUSING CONNECTIONS

Horn Button			Turn Signal Switch				Dimmer Switch			Starter Lockout Switch			Mode Switch				Passing Button		
Color	BK/W	BK/Y	Color	G	O	GY	Color	R/Y	R/BK	Color	G/W	R/G	Color	P	BK/BL	Y	Color	R/Y	R/BK
			L	○			HI		○	Clutch Lever			Power	○					
Push	○		OFF (Push)							Released			KTRC		○		Push	○	
Released			R		○		LO			Pulled In	○								

Wiring Diagram (US, CA and CAL Models)



IGNITION SWITCH CONNECTIONS			
	Battery	Ignition	Signal
Color	W	BR	BL
OFF, Lock			
ON		○	○
P(PARK)	○	○	○

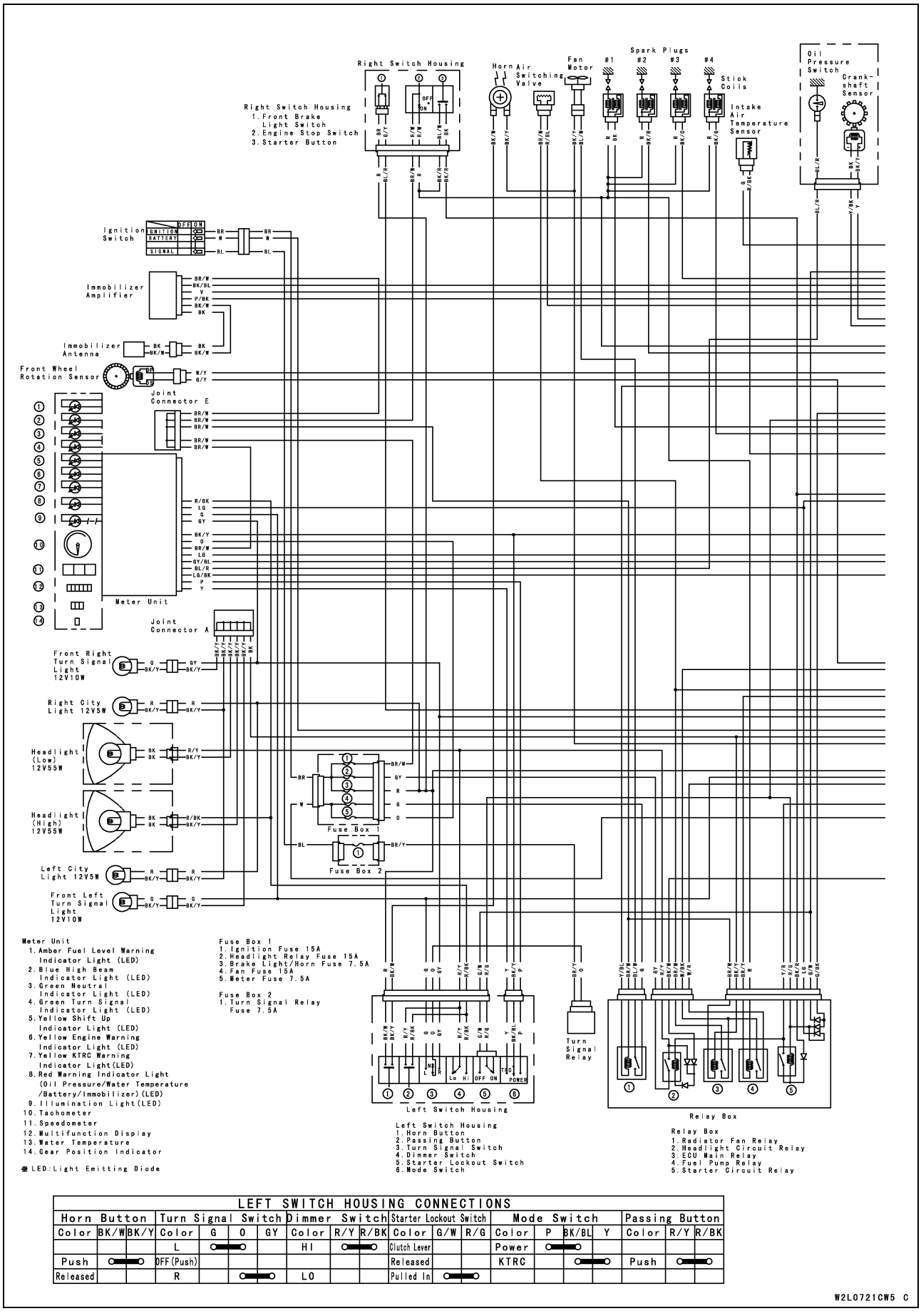
RIGHT SWITCH HOUSING CONNECTIONS								
Front Brake Light Switch			Engine Stop Switch			Starter Button		
Color	GY	BR	Color	R/W	R/W	Color	BK	BL/W
Brake Lever			OFF			Free		
Pulled In	○	○	RUN	○	○	Push	○	○

(98052-0723C, 0725C)

Color Code	
BK	Black
BL	Blue
BR	Brown
G	Green
GY	Gray
LB	Light Blue
LG	Light Green
O	Orange
P	Pink
PU	Purple
R	Red
V	Violet
W	White
Y	Yellow

W2R0725CW5 C

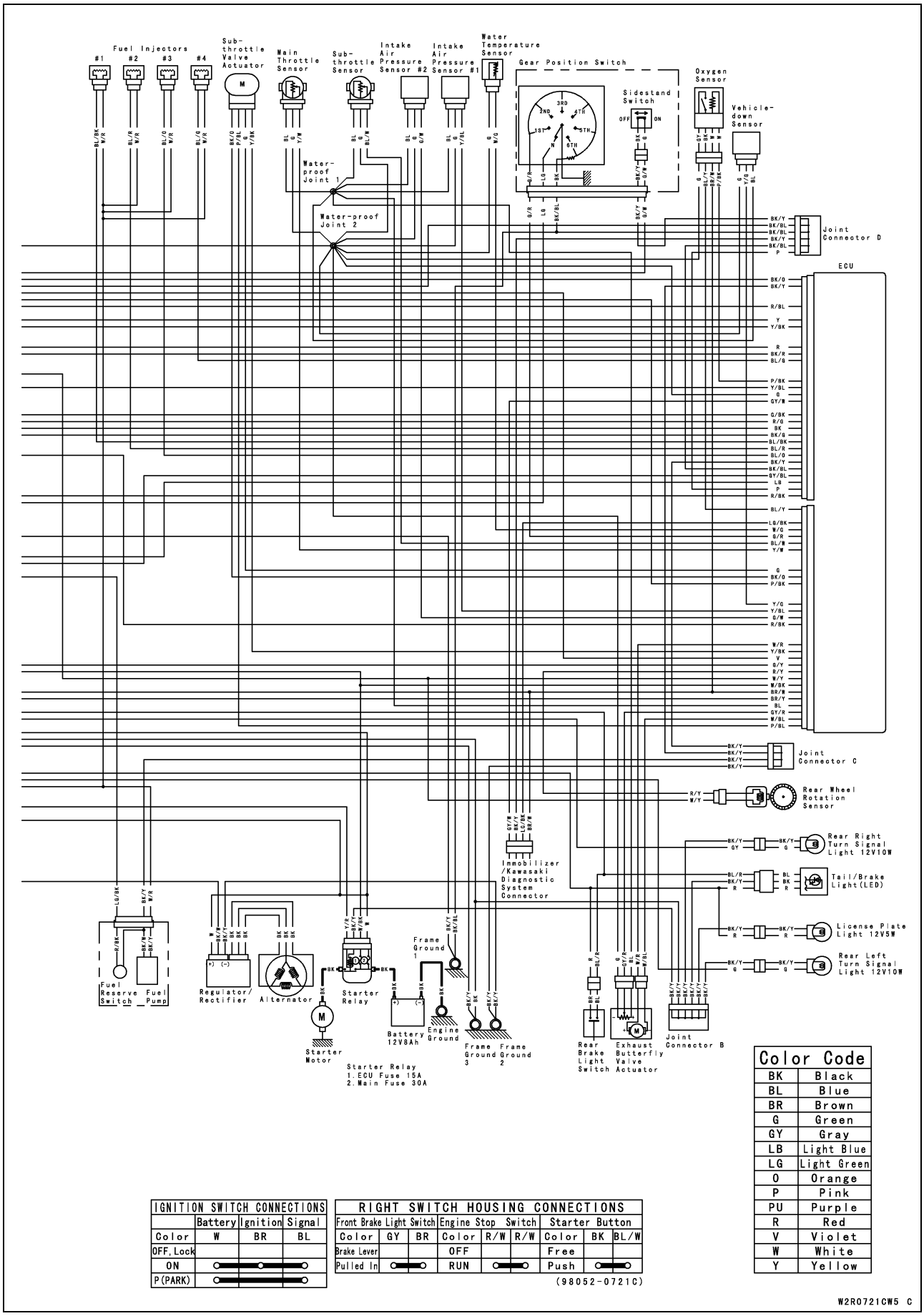
Wiring Diagram (Other than US, CA and CAL Models)



LEFT SWITCH HOUSING CONNECTIONS

Horn Button			Turn Signal Switch				Dimmer Switch			Starter Lockout Switch			Mode Switch				Passing Button		
Color	BK/W	BK/Y	Color	G	O	GY	Color	R/Y	R/BK	Color	G/W	R/G	Color	P	BK/BL	Y	Color	R/Y	R/BK
			L	○			HI	○		Clutch Lever			Power	○					
Push	○		OFF(Push)							Released			KTRC		○		Push	○	
Released			R		○		LO			Pulled In	○								

Wiring Diagram (Other than US, CA and CAL Models)



IGNITION SWITCH CONNECTIONS			
	Battery	Ignition	Signal
Color	W	BR	BL
OFF, Lock			
ON	○	○	○
P(PARK)	○		○

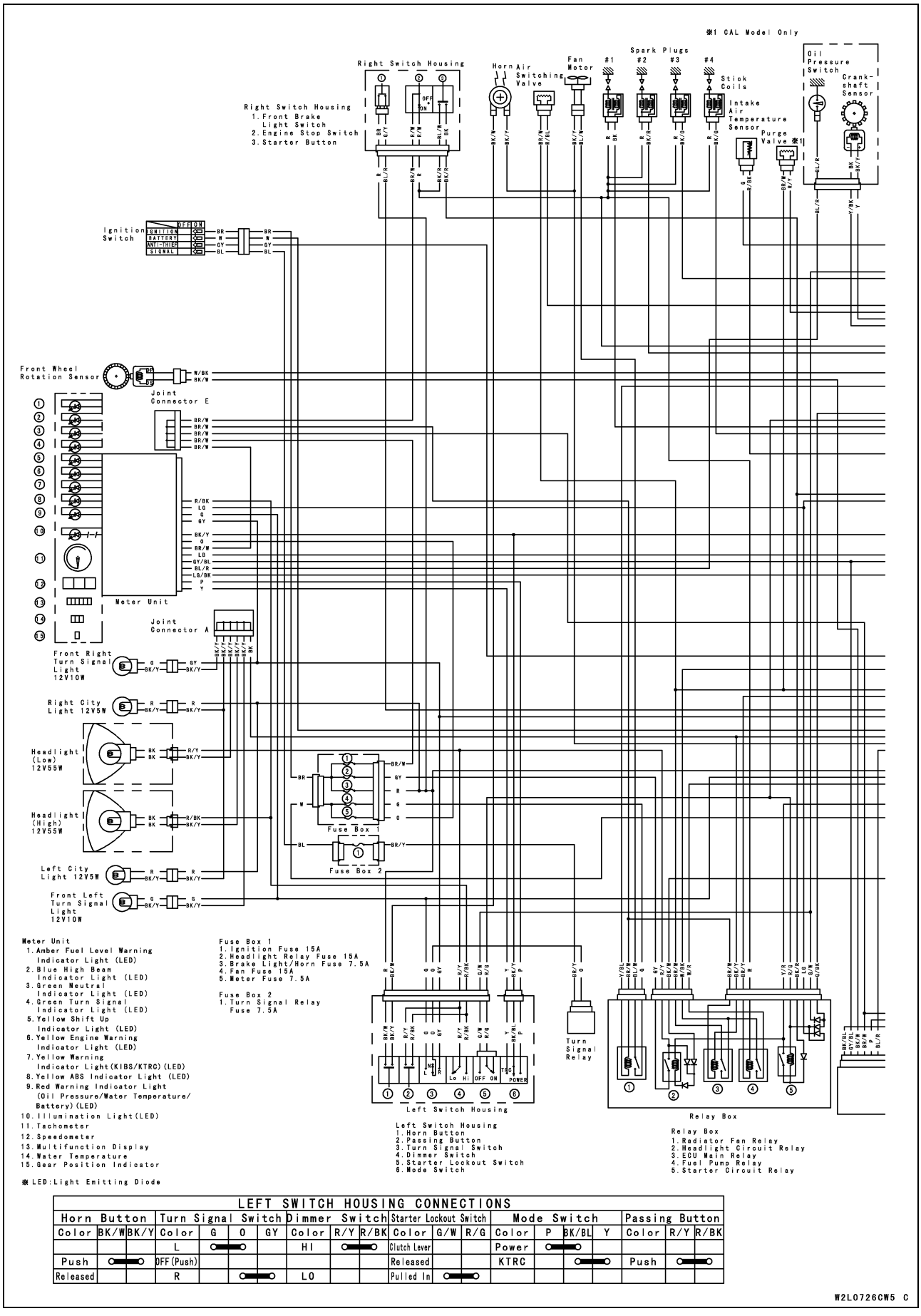
RIGHT SWITCH HOUSING CONNECTIONS								
Front Brake Light Switch			Engine Stop Switch			Starter Button		
Color	GY	BR	Color	R/W	R/W	Color	BK	BL/W
Brake Lever			OFF			Free		
Pulled In	○	○	RUN	○	○	Push	○	○

(98052-0721C)

Color Code	
BK	Black
BL	Blue
BR	Brown
G	Green
GY	Gray
LB	Light Blue
LG	Light Green
O	Orange
P	Pink
PU	Purple
R	Red
V	Violet
W	White
Y	Yellow

W2R0721CW5 C

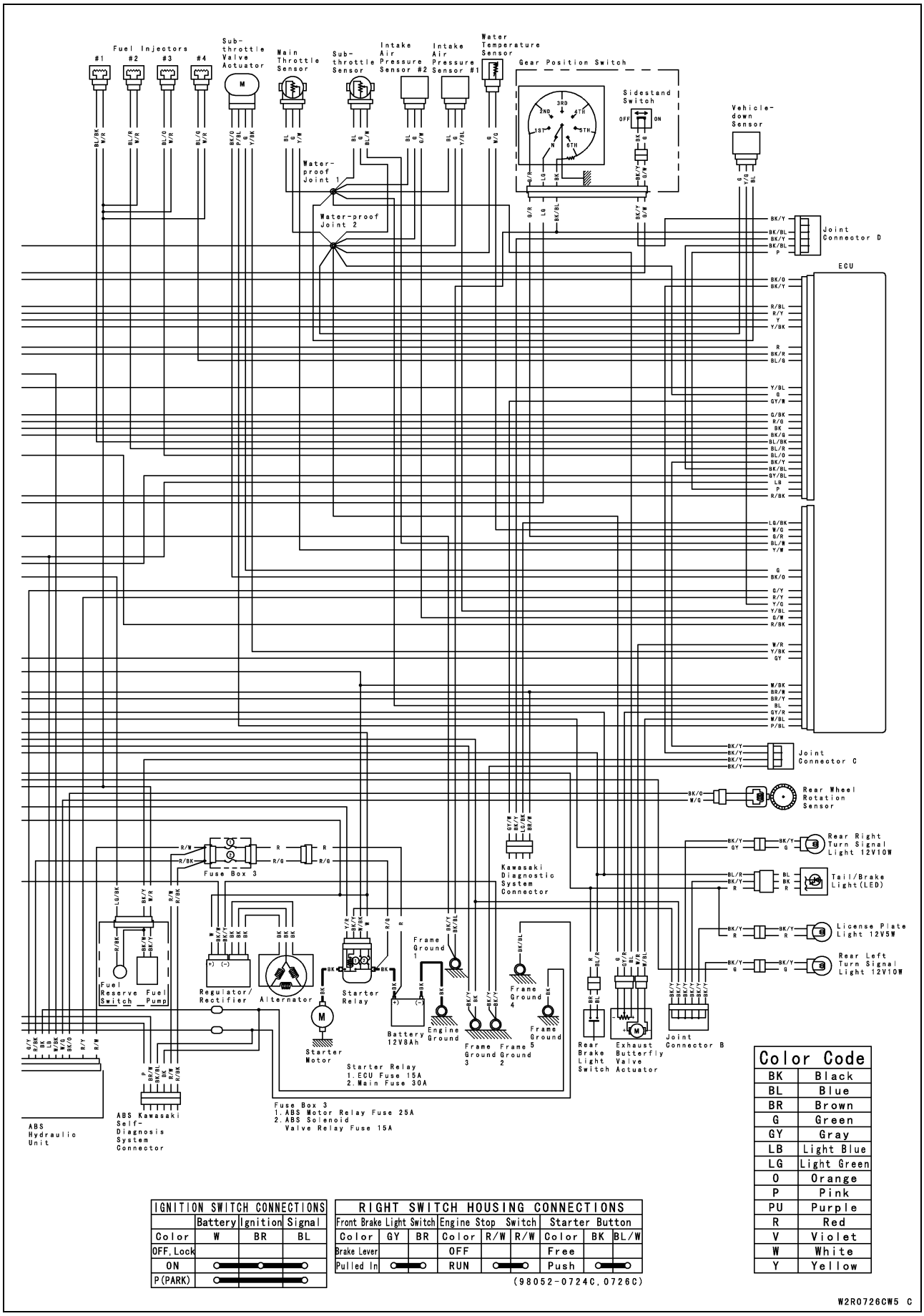
Wiring Diagram (ABS Equipped Models: US, CA and CAL Models)



LEFT SWITCH HOUSING CONNECTIONS

Horn Button			Turn Signal Switch				Dimmer Switch			Starter Lockout Switch			Mode Switch				Passing Button		
Color	BK/W	BK/Y	Color	G	O	GY	Color	R/Y	R/BK	Color	G/W	R/G	Color	P	BK/BL	Y	Color	R/Y	R/BK
			L	○			HI	○		Clutch Lever			Power	○					
Push	○		OFF(Push)							Released			KTRC		○		Push	○	
Released			R		○		LO			Pulled In	○								

Wiring Diagram (ABS Equipped Models: US, CA and CAL Models)



IGNITION SWITCH CONNECTIONS			
	Battery	Ignition	Signal
Color	W	BR	BL
OFF, Lock			
ON			
P(PARK)			

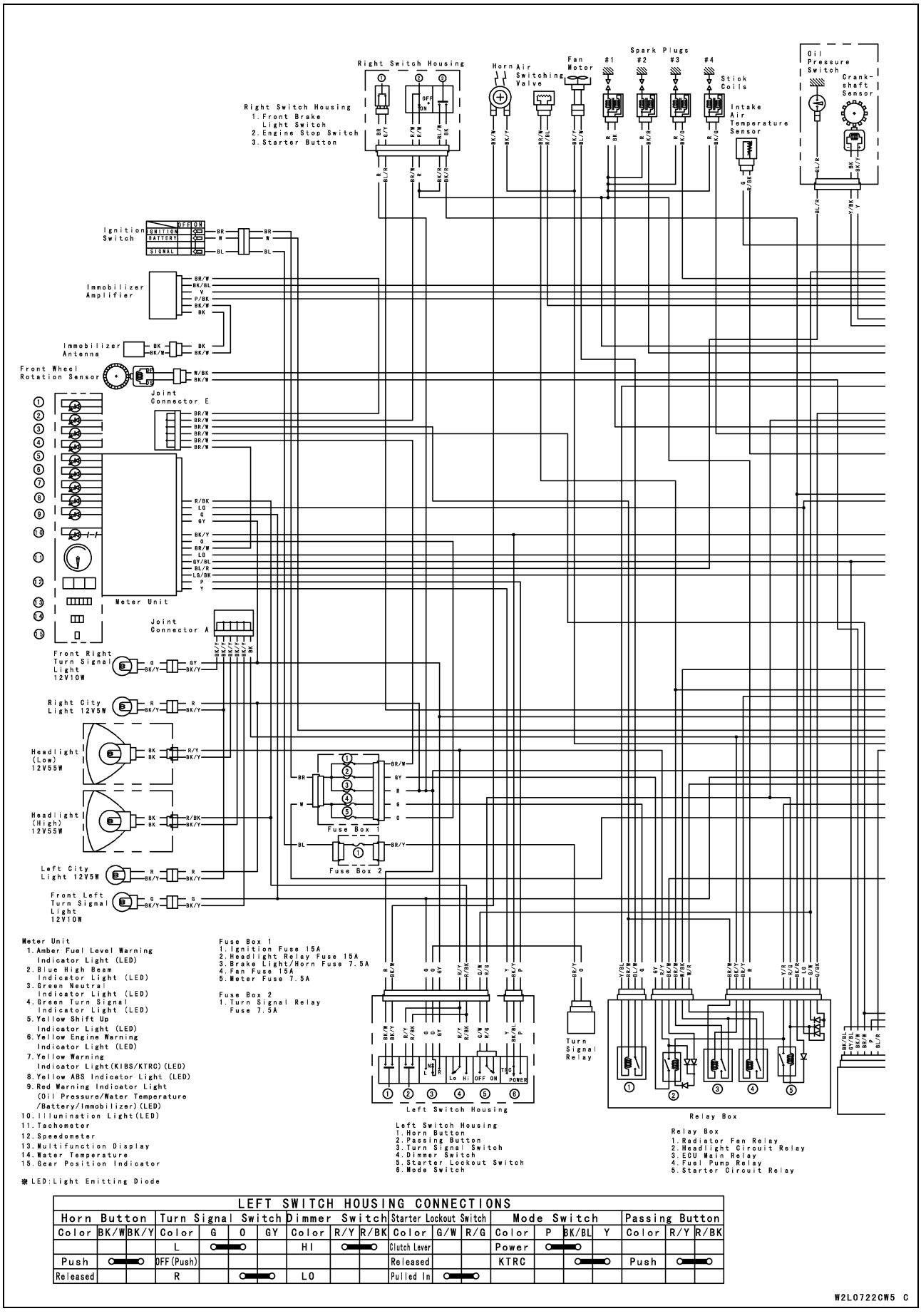
RIGHT SWITCH HOUSING CONNECTIONS								
Front Brake Light Switch			Engine Stop Switch			Starter Button		
Color	GY	BR	Color	R/W	R/W	Color	BK	BL/W
Brake Lever			OFF			Free		
Pulled In			RUN			Push		

(98052-0724C, 0726C)

Color Code	
BK	Black
BL	Blue
BR	Brown
G	Green
GY	Gray
LB	Light Blue
LG	Light Green
O	Orange
P	Pink
PU	Purple
R	Red
V	Violet
W	White
Y	Yellow

W2R0726CW5 C

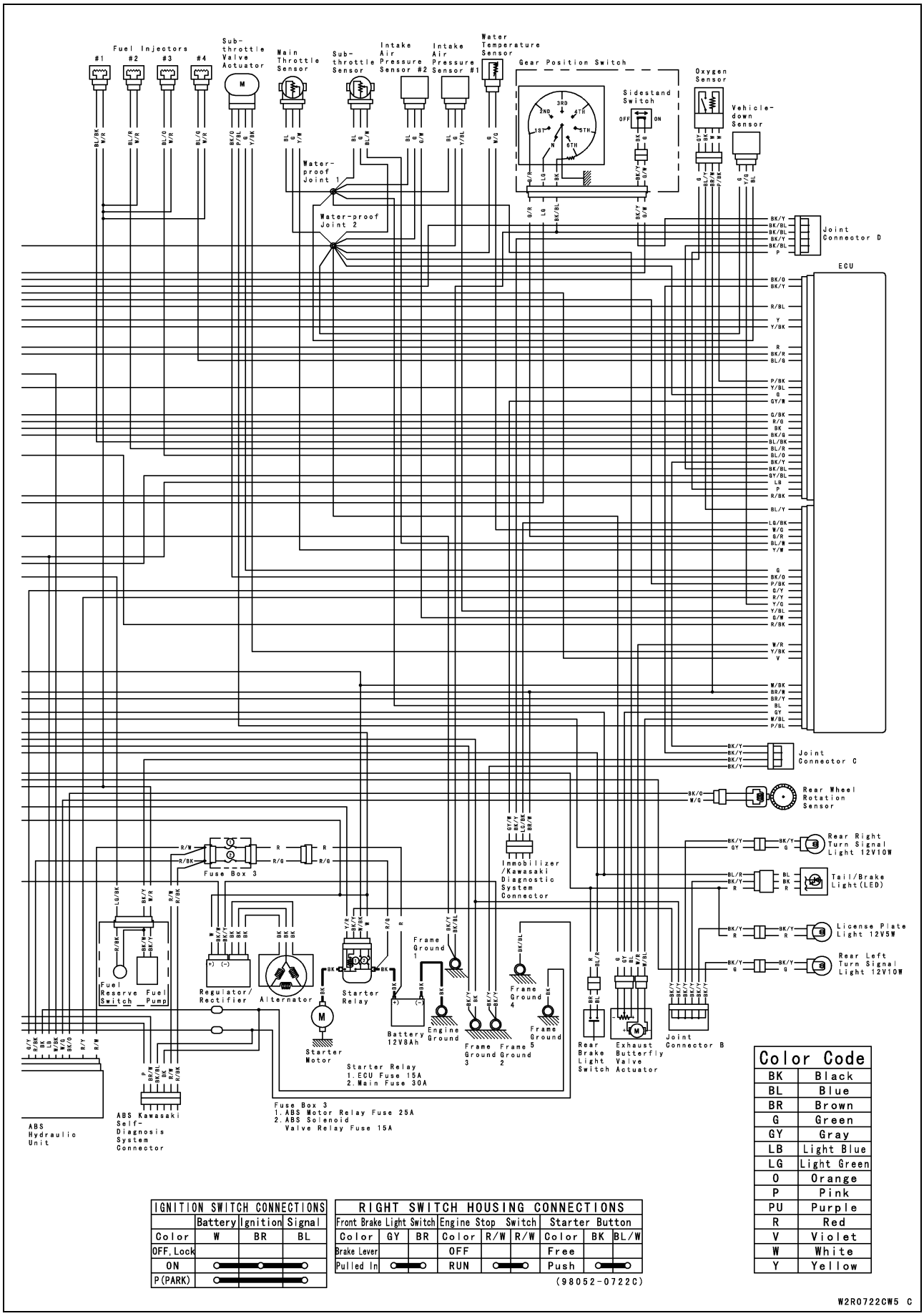
Wiring Diagram (ABS Equipped Models: Other than US, CA and CAL Models)



LEFT SWITCH HOUSING CONNECTIONS

Horn Button			Turn Signal Switch				Dimmer Switch			Starter Lockout Switch			Mode Switch				Passing Button		
Color	BK/W	BK/Y	Color	G	O	GY	Color	R/Y	R/BK	Color	G/W	R/G	Color	P	BK/BL	Y	Color	R/Y	R/BK
			L	○			HI	○		Clutch Lever			Power	○					
Push	○		OFF(Push)							Released			KTRC		○		Push	○	
Released			R		○		LO			Pulled In	○								

Wiring Diagram (ABS Equipped Models: Other than US, CA and CAL Models)



IGNITION SWITCH CONNECTIONS			
	Battery	Ignition	Signal
Color	W	BR	BL
OFF, Lock			
ON		○	○
P (PARK)	○	○	

RIGHT SWITCH HOUSING CONNECTIONS								
Front Brake Light Switch			Engine Stop Switch			Starter Button		
Color	GY	BR	Color	R/W	R/W	Color	BK	BL/W
Brake Lever			OFF			Free		
Pulled In	○	○	RUN	○	○	Push	○	○

(98052-0722C)

Color Code	
BK	Black
BL	Blue
BR	Brown
G	Green
GY	Gray
LB	Light Blue
LG	Light Green
O	Orange
P	Pink
PU	Purple
R	Red
V	Violet
W	White
Y	Yellow

W2R0722CW5 C

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 cable 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 cables 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 cables 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 leads for signs of burning, fraying, etc. Poor leads and bad connections will affect electrical system operation.
- Measure coil and winding resistance when the part is cold (at room temperature).

Electrical Wiring

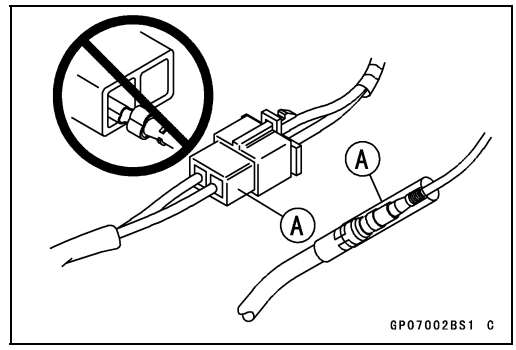
Wiring Inspection

- 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.

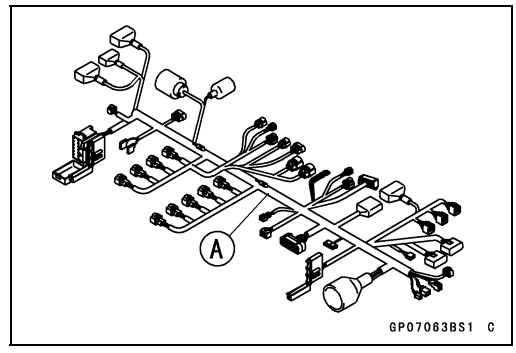


- Check the wiring for continuity.

○Use the wiring diagram to find the ends of the lead which is suspected of being a problem.

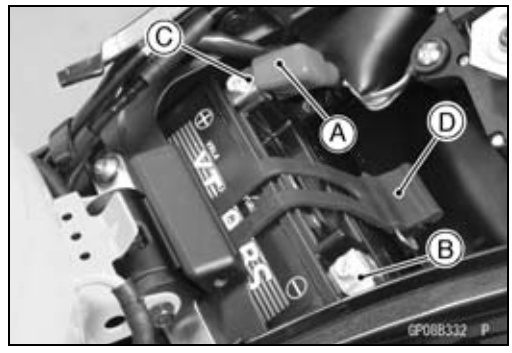
○Connect a digital meter between the ends of the leads.

★If the digital meter does not read about 0 Ω, the lead is defective. Replace the lead or the wiring harness [A] if necessary.



Battery

Battery Removal

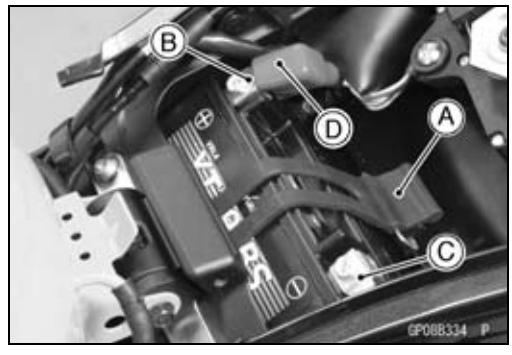


- Turn off the ignition switch.
- Remove the front seat (see Front Seat Removal in the Frame chapter).
- Slide the red cap [A].
- Disconnect the negative (–) cable [B] and then positive (+) cable [C].

NOTICE
Be sure to disconnect the negative (–) cable first.

- Remove the band [D].
- Remove the battery [A] from the rear fender.

Battery Installation



- Visually inspect the surface of the battery container.

★If any signs of cracking or electrolyte leakage from the sides of the battery.

- Put the battery into the rear fender so that the positive (+) terminal faces right side of the motorcycle.
- Install the band [A].
- Connect the positive (+) cable [B] (red cap) to the positive (+) terminal first, and then the negative (–) cable [C] to the negative (–) terminal.
- Apply a light coat of grease on the terminals to prevent corrosion.
- Cover the positive (+) terminal with the red cap [D].

NOTICE
If each battery cable is not correctly disconnected or connected, sparks can arise at electrical connections, causing damage to electrical and DFI parts.

Battery

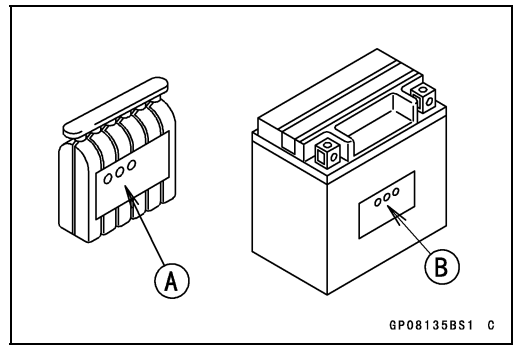
Battery Activation

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

ZX636E/F: YTX9-BS

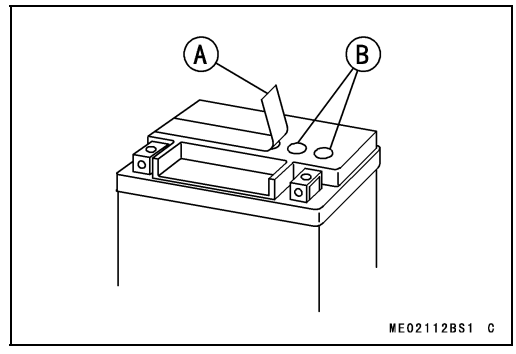


NOTICE

Each battery comes with its own specific electrolyte container; using the wrong container may overfill the battery with incorrect electrolyte, which can shorten battery life and deteriorate battery performance. 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.

NOTICE

Do not remove the aluminum sealing sheet [A] from the filler ports [B] until just prior to use. Be sure to use the dedicated electrolyte container for correct electrolyte volume.



⚠ DANGER

Sulfuric acid in battery electrolyte can cause severe burns. To prevent burns, wear protective clothing and safety glasses when handling electrolyte. If the electrolyte comes in contact with your skin or eyes, wash the area with liberal amounts of water and seek medical attention for more severe burns.

- Place the battery on a level surface.
- Check to see that the sealing sheet has no peeling, tears, or holes in it.
- Remove the sealing sheet.

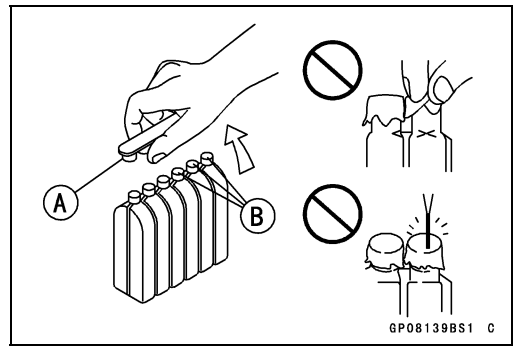
NOTE

○*The battery is vacuum sealed. If the sealing sheet has leaked air into the battery, it may require a longer initial charge.*

- Remove the electrolyte container from the vinyl bag.
- Detach the strip of caps [A] from the container and set aside, these will be used later to seal the battery.

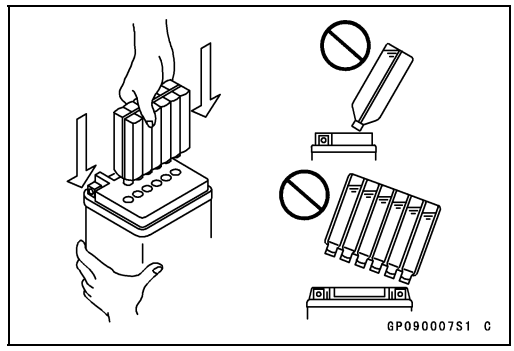
NOTE

○*Do not pierce or otherwise open the sealed cells [B] of the electrolyte container. Do not attempt to separate individual cells.*



Battery

● Place the electrolyte container upside down with the six sealed cells into the filler ports of the battery. Hold the container level, push down to break the seals of all six cells. You will see air bubbles rising into each cell as the ports fill.

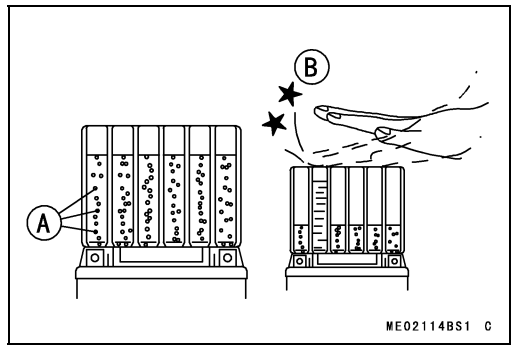


NOTE

○*Do not tilt the electrolyte container.*

● Check the electrolyte flow.

★If no air bubbles [A] are coming up from the filler ports, or if the container cells have not emptied completely, tap the container [B] a few times.



NOTE

○*Be careful not to have the battery fall down.*

● Keep the container in place. Don't remove the container from the battery, the battery requires all the electrolyte from the container for proper operation.

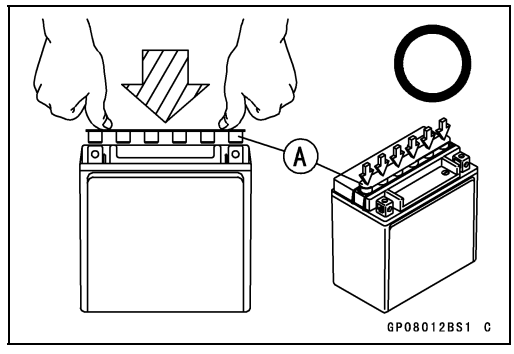
NOTICE

Removal of the container before it is completely empty can shorten the service life of the battery. Do not remove the container until it is completely empty.

● After filling, let the battery sit for 20 ~ 60 minutes with the electrolyte container kept in place, which is required for the electrolyte to fully permeate into the plates.

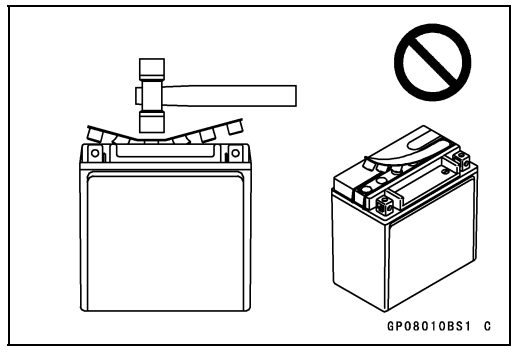
● Make sure that the container cells have emptied completely, and remove the container from the battery.

● Place the strip of caps [A] loosely over the filler ports, press down firmly with both hands to seat the strip of caps into the battery (don't pound or hammer). When properly installed, the strip of caps will be level with the top of the battery.



NOTICE

Once the strip of caps is installed onto the battery, never remove the caps, nor add water or electrolyte to the battery.



NOTE

○*Charging the battery immediately after filling can shorten service life.*

Battery

Initial Charge

● Newly activated sealed batteries require an initial charge.

Standard Charge: 0.9 A × 5 ~ 10 hours

★If using a recommended battery charger, follow the charger's instructions for newly activated sealed battery.

Kawasaki-recommended chargers:
Battery Mate 150-9
OptiMate PRO 4-S/PRO S/PRO2
Yuasa MB-2040/2060
Christie C10122S

★If the above chargers are not available, use equivalent one.

● Let battery sit 30 minutes after initial charge, then check voltage using a voltmeter. (Voltage immediately after charging becomes temporarily high. For accurate measuring, let the battery sit for given time.)

NOTE

○*Charging rates will vary depending on how long the battery has been stored, temperature, and the type of charger used. If voltage is not at least 12.8 V, repeat charging cycle.*

○*To ensure maximum battery life and customer satisfaction, it is recommended the battery be load tested at three times its amp-hour rating for 15 seconds.*
Re-check voltage and if less than 12.8 V repeat the charging cycle and load test. If still below 12.8 V the battery is defective.

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 seal 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 Refreshing Charge).
When a fast charge is inevitably required, do it following precisely the maximum charge current and time conditions indicated on the battery.

NOTICE

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 cap 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).

Battery

⚠ DANGER

Batteries produce an explosive gas mixture of hydrogen and oxygen that can cause serious injury and burns if ignited. Keep the battery away from sparks and open flames during charging. 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. 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 and seek medical attention for more severe burns.

Interchange

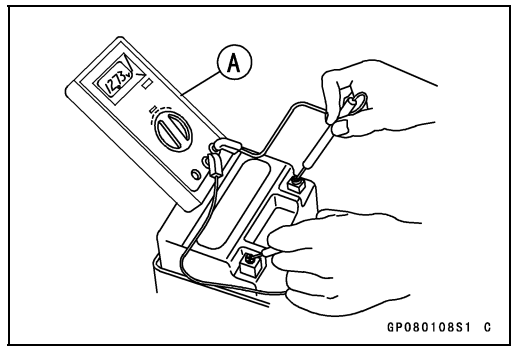
A sealed battery can fully display its performance only when combined with a proper vehicle electric system. Therefore, replace a sealed battery only on a motorcycle which was originally equipped with a sealed battery.

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 a digital voltmeter [A].

- Remove the battery (see Battery Removal).
- Measure the battery terminal voltage.



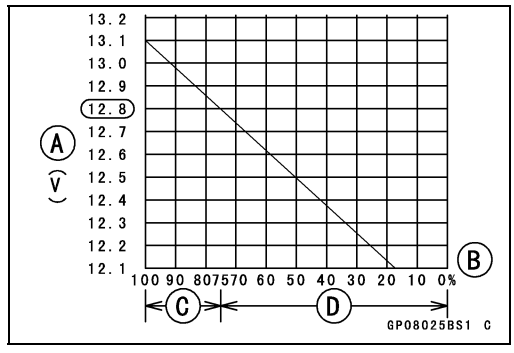
NOTE

○*Measure with a digital voltmeter which can be read one decimal place voltage.*

★If the reading is 12.8 V or more, no refresh charge is required, however, if the read is below the specified, refresh charge is required.

Battery Terminal Voltage

Standard: 12.8 V or more



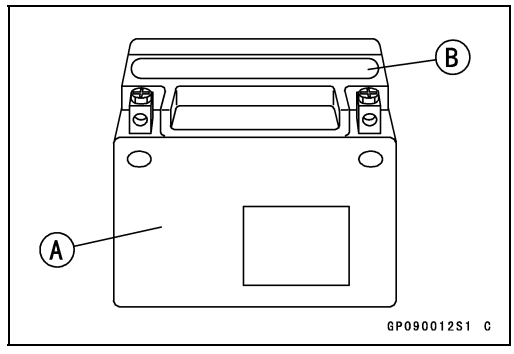
Terminal Voltage (V) [A]
Battery Charge Rate (%) [B]
Good [C]
Refresh charge is required [D]

Refreshing Charge

- Remove the battery [A] (see Battery Removal).
- Do refresh charge by following method according to the battery terminal voltage.

⚠ WARNING

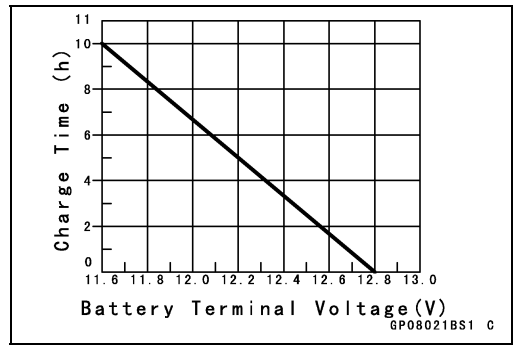
This battery is sealed type. Never remove sealing cap [B] even at charging. Never add water. Charge with current and time as stated below.



Battery

Terminal Voltage: 11.5 ~ less than 12.8 V
Standard Charge 0.9 A × 5 ~ 10 h (see following chart)
Quick Charge 4 A × 1 h

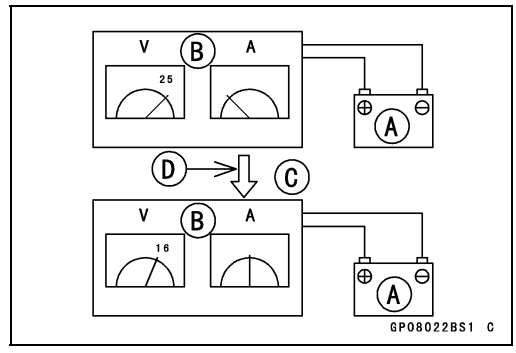
NOTICE
If possible, do not quick charge. If quick charge is done unavoidably, do standard charge later on.



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.*



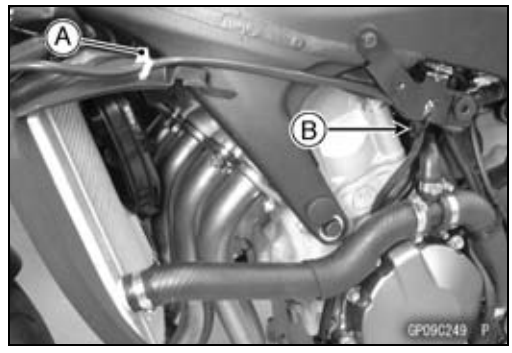
Battery [A]
Battery Charger [B]
Standard Value [C]
Current starts to flow [D]

● Determine the battery condition after refresh charge.
○Determine the condition of the battery left for 30 minutes after completion of the charge by measuring the terminal voltage according to the table below.

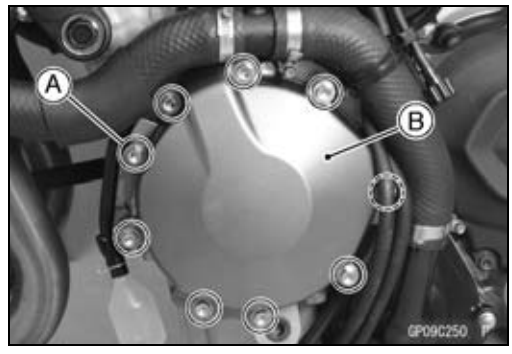
Criteria	Judgement
12.8 V or higher	Good
12.0 ~ lower than 12.8 V	Charge insufficient → Recharge
lower than 12.0 V	Unserviceable → Replace

Charging System

Alternator Cover Removal

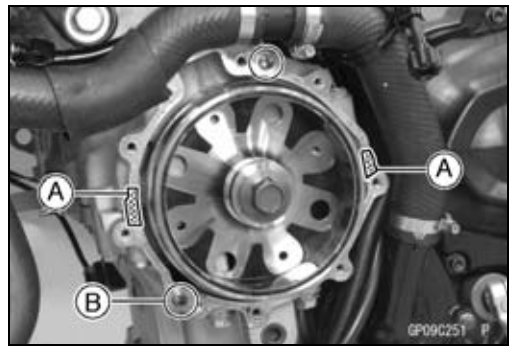


- Remove:
  Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
- Free the lead from the clamp [A] and hook [B].



- Remove:
  Alternator Cover Bolts [A]
  Alternator Cover [B]

Alternator Cover Installation

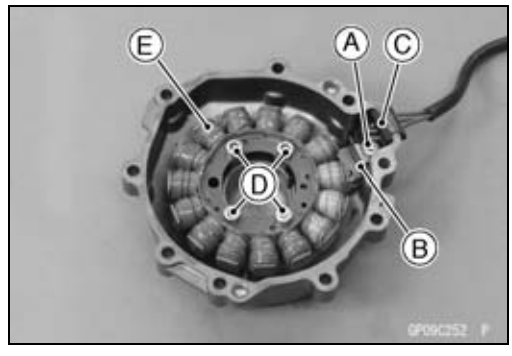


- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the alternator lead grommet and crankcase halves mating surface [A] on the front and rear sides of the cover mount.

  Sealant - Liquid Gasket, TB1211F: 92104-0004
- Check that dowel pins [B] are in place on the crankcase.
- Replace the alternator cover gasket with a new one.
- Tighten:

  Torque - Alternator Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)
- Run the lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

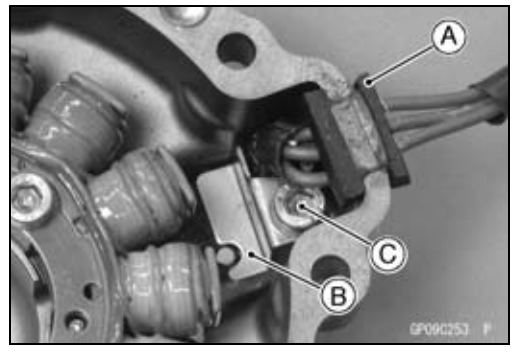
Stator Coil Removal



- Remove:
  Alternator Cover (see Alternator Cover Removal)
  Alternator Lead Holding Plate Bolt [A] and Plate [B]
  Alternator Lead Grommet [C]
  Stator Coil Bolts [D]
- Remove the stator coil [E] 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: 12 N·m (1.2 kgf·m, 106 in·lb)

- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the circumference of the alternator lead grommet [A], and fit the grommet into the notch of the cover securely.

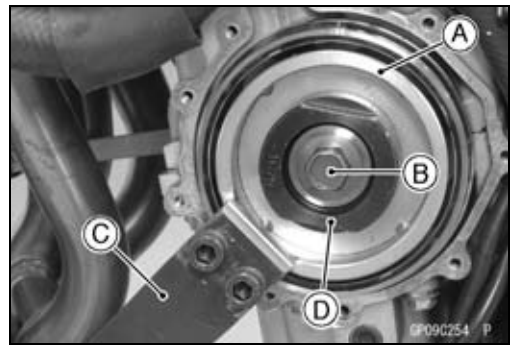
  Sealant - Liquid Gasket, TB1211F: 92104-0004

- Secure the alternator lead with a holding plate [B], and apply a non-permanent locking agent to the threads of the plate bolt [C] and tighten it.

  Torque - Alternator Lead Holding Plate Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

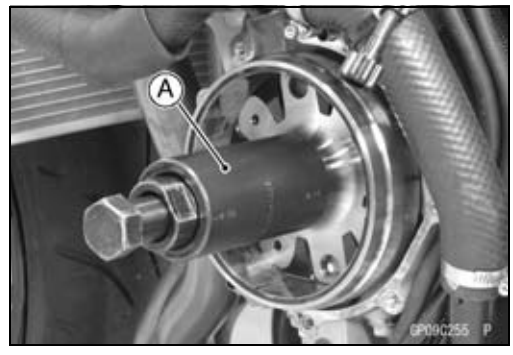
- Install the alternator cover (see Alternator Cover Installation).

Alternator Rotor Removal



- Remove the alternator cover (see Alternator Cover Removal).
- Clean off the oil from 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 Tools - Grip [C]: 57001-1591
  Rotor Holder: 57001-1666
  Stopper [D]: 57001-1679
  Rotor Holder Attachment: 57001-1689

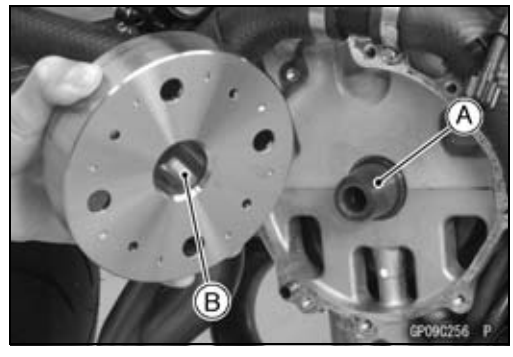


- Using the flywheel puller [A], remove the alternator rotor from the crankshaft.

  Special Tool - Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5: 57001-1405

NOTICE
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]
- Install the alternator rotor.

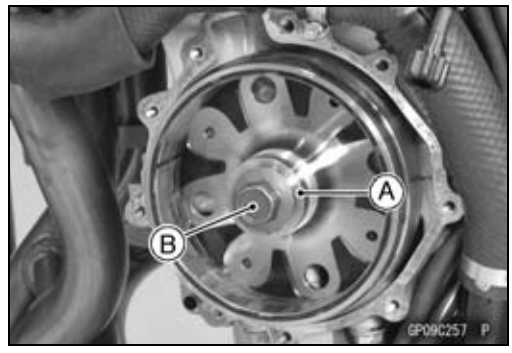
Charging System

- Using a cleaning fluid, clean off any oil or dirt on the washer [A] and dry it with a clean cloth.
- Install the washer.

NOTE

○*Confirm the alternator rotor fit or not to the crankshaft before tightening it with specified torque.*

- Install the rotor bolt [B] and tighten it with 70 N·m (7.0 kgf·m, 52 ft·lb) of torque.

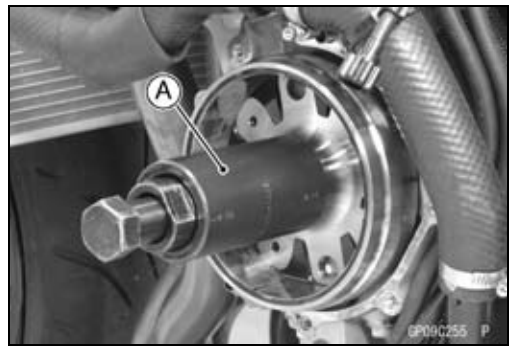


- Remove the rotor bolt and washer.
- Check the tightening torque with flywheel puller [A].

Special Tool - Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5: 57001-1405

★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.

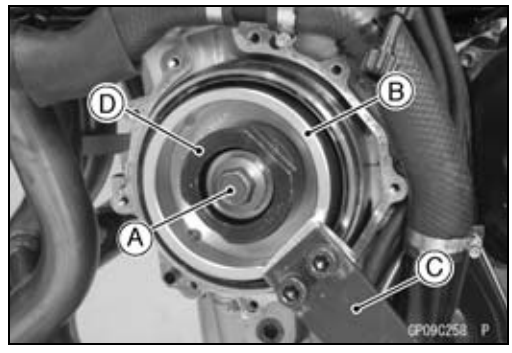
★If the rotor is pulled out with under 20 N·m (2.0 kgf·m, 15 ft·lb) of drawing torque, clean off any oil dirt or flaw of the crankshaft and rotor tapered portion, and dry them with a clean cloth. Then, confirm that it is not pulled out with above torque.



- Install the washer and rotor bolt.
- Tighten the alternator rotor bolt [A] while holding the alternator rotor steadily with the holder [B].

Special Tools - Grip [C]: 57001-1591
Rotor Holder: 57001-1666
Stopper [D]: 57001-1679
Rotor Holder Attachment: 57001-1689

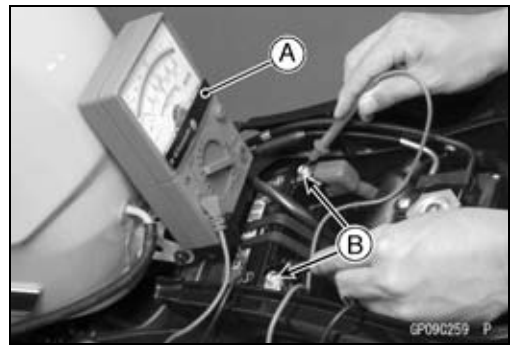
Torque - Alternator Rotor Bolt: 155 N·m (15.8 kgf·m, 114 ft·lb)



- Install the alternator cover (see Alternator Cover Installation).

Charging System

Charging Voltage Inspection



- Check the battery condition (see Charging Condition Inspection).
- Warm up the engine to obtain actual alternator operating conditions.
- Remove the front seat (see Front Seat Removal in the Frame chapter).
- Check that the ignition switch is turned off, and connect a tester [A] to the battery terminals [B].
- Start the engine, and note the voltage readings at various engine speeds (except idling engine speed) with the headlight turned on and then turned off (To turn off the headlight, disconnect the headlight connector.). 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

Connections		Reading
Tester (+) to	Tester (–) to	
Battery (+)	Battery (–)	DC 14.3 ~ 14.7 V

- Turn off the ignition switch to stop the engine, and disconnect the tester.

★If the charging voltage is kept between the values given in the table, the charging system is considered to be working normally.

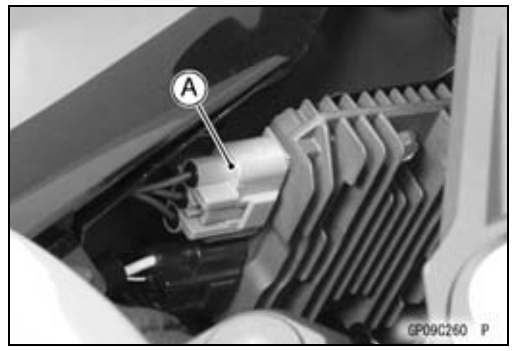
★If the charging voltage is much higher than the values specified in the table, the regulator/rectifier is defective or the regulator/rectifier leads are loose or open.

★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.

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.

Charging System



● To check the alternator output voltage, do the following procedures.
○Turn the ignition switch off.
○Remove the left inner cover (see Inner Cover Removal in the Frame chapter).
○Disconnect the alternator lead connector [A].
○Connect a 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 at 4 000 r/min (rpm)

Connections		Reading
Tester (+) to	Tester (–) to	
One BK lead	Another BK lead	AC 46.4 V or more

★If the output voltage shows the value in the table, the alternator operates properly. The regulator/rectifier is damaged.
★If the output voltage shows a much lower reading than that given in the table, stop the engine and inspect the stator coil resistance.
● Check the stator coil resistance as follows.
○Stop the engine.
○Connect the tester as shown in the table 2.
○Note the readings (total 3 measurements).

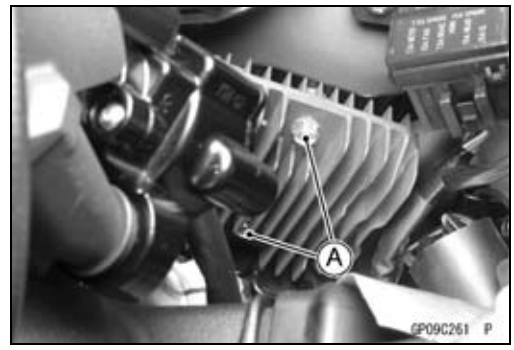
Table 2 Stator Coil Resistance at 20°C (68°F)

Connections		Reading
Tester (+) to	Tester (–) to	
One BK lead	Another BK lead	0.11 ~ 0.17 Ω

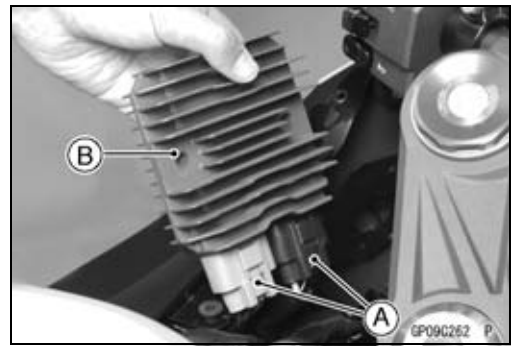
When measuring the resistance, use a tester that can measure the standard value.
★If there is more resistance than shown in the table, or no tester reading (infinity) for any two leads, the stator has an open lead and must be replaced. Much less than this resistance means the stator is shorted, and must be replaced.
● Using the highest resistance range of the tester, measure the resistance between each of the black leads and chassis ground.
★Any tester reading less than infinity (∞) indicates a short, necessitating stator replacement.
★If the stator coil has 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.

Charging System

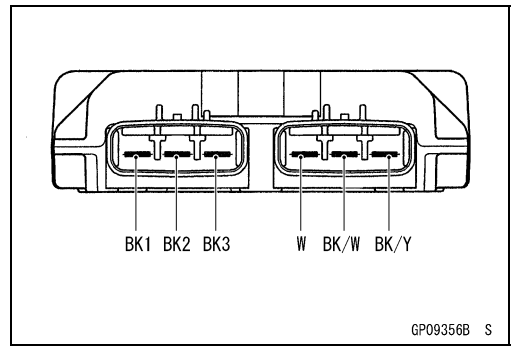
Regulator/Rectifier Inspection



- Remove:
  Left Inner Cover (see Inner Cover Removal in the Frame chapter)
  Bolts [A]



- Disconnect the connectors [A].
- Remove:
  Regulator/Rectifier [B]



- Set the hand tester to the × 1 kΩ range and make the measurements shown in the table.

  Special Tool - Hand Tester: 57001-1394

- Connect the hand tester to the regulator/rectifier.

★If the tester readings are not as specified, replace the regulator/rectifier.

NOTICE
Use only Kawasaki Hand Tester 57001-1394 for this test. A tester other than the Kawasaki Hand Tester may show different readings. **If a megger or a meter with a large capacity battery is used, the regulator/rectifier will be damaged.**

Regulator/Rectifier Resistance **(Unit: kΩ)**

		Tester (+) Lead Connection					
	Terminal	BK1	BK2	BK3	W	BK/W	BK/Y
(–)*	BK1	–	2.5 ~ 7.5	2.5 ~ 7.5	3.0 ~ 9.0	2.5 ~ 7.5	1.5 ~ 4.5
	BK2	2.5 ~ 7.5	–	2.5 ~ 7.5	3.0 ~ 9.0	2.5 ~ 7.5	1.5 ~ 4.5
	BK3	2.5 ~ 7.5	2.5 ~ 7.5	–	3.0 ~ 9.0	0	1.5 ~ 4.5
	W	∞	∞	∞	–	∞	∞
	BK/W	2.5 ~ 7.5	2.5 ~ 7.5	0	3.0 ~ 9.0	–	1.5 ~ 4.5
	BK/Y	1.5 ~ 4.5	1.5 ~ 4.5	1.5 ~ 4.5	3.5 ~ 10.5	1.5 ~ 4.5	–

(–)*: Tester (–) Lead Connection

Charging System

Charging System Troubleshooting

- Before inspection, remove all accessories that consume electrical power.

NOTE

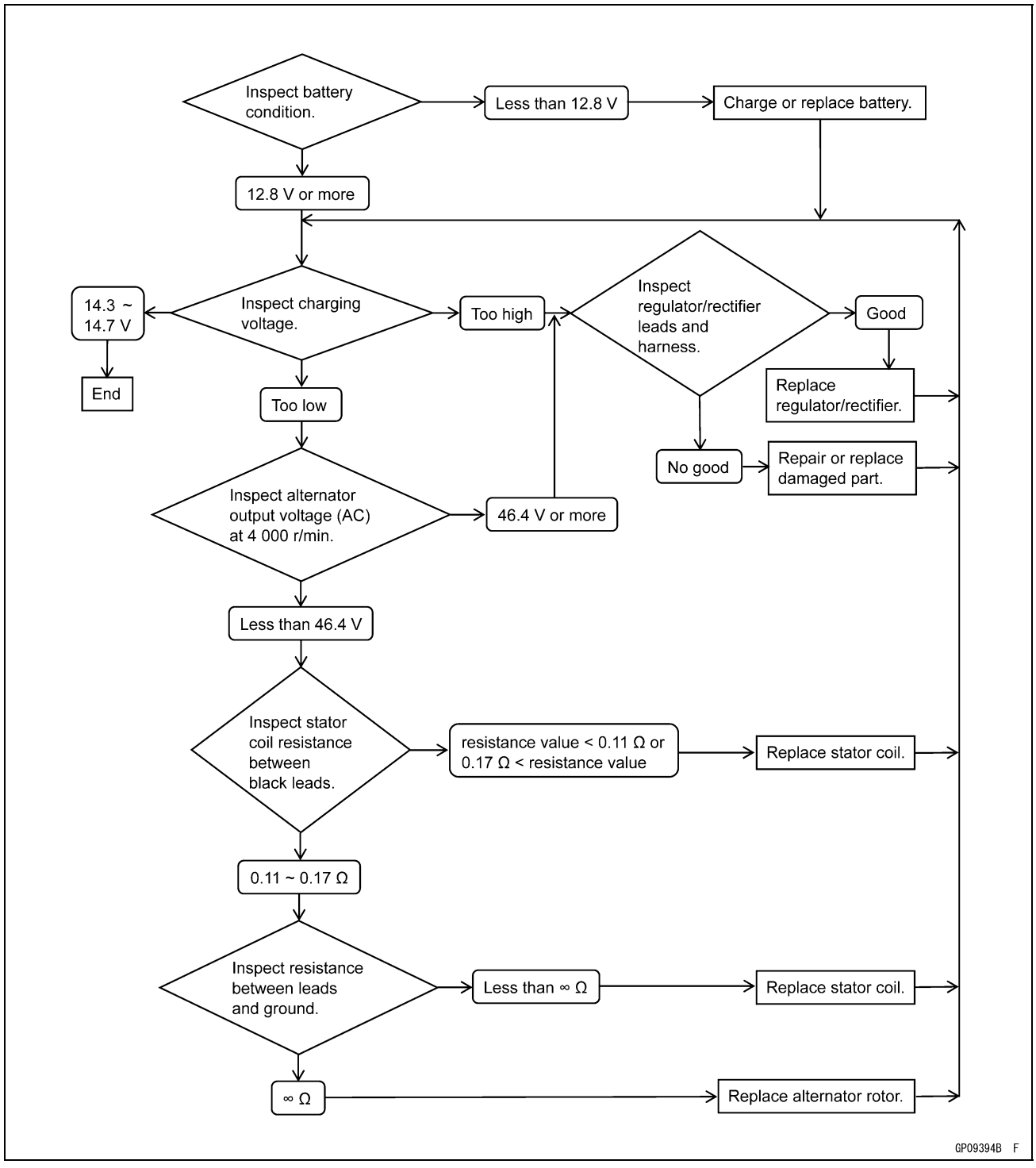
○*Even when the charging system is working properly, the battery may discharge if the motorcycle is equipped with too many accessories.*

- Pay attention to riding conditions and the customer's riding habits which could affect the charging system such as:

Frequent use at low engine speed
Frequent and unnecessary brake pedal dragging
→ Battery Discharged

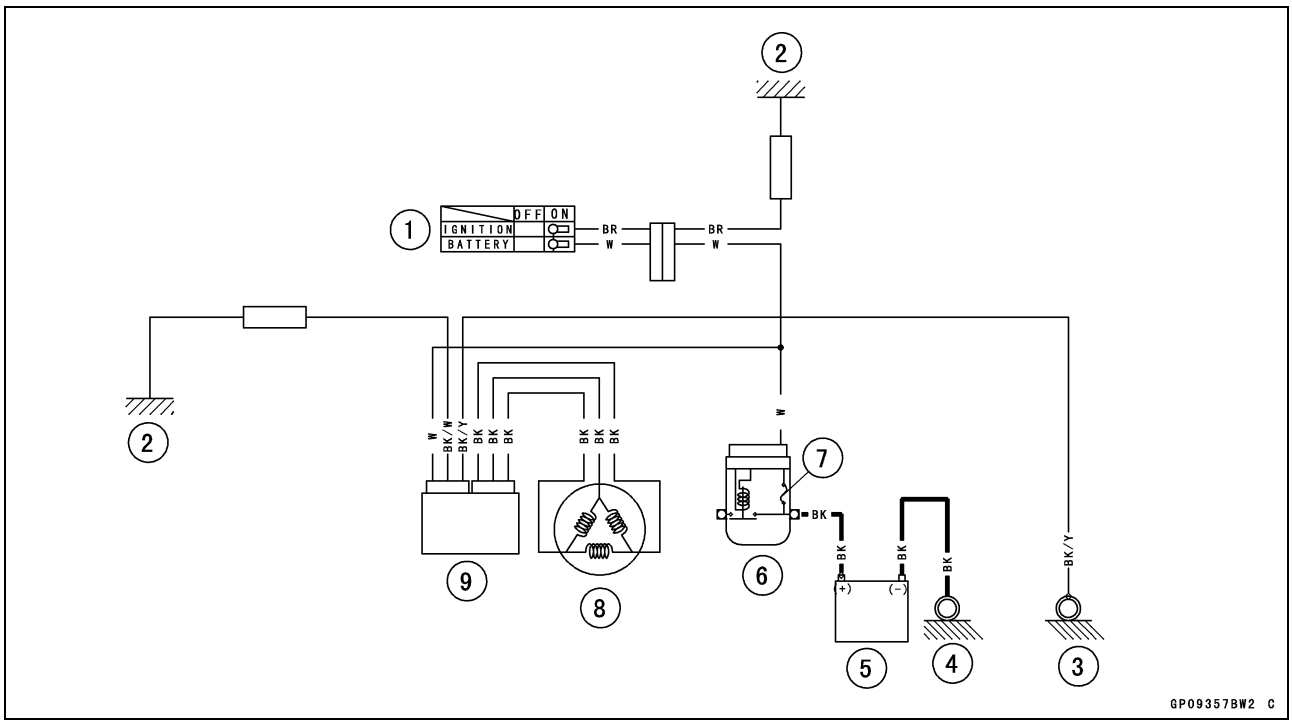
- Recharge the battery if it is discharged.

Charging System



Charging System

Charging System Circuit



1. Ignition Switch
2. Load
3. Frame Ground 2
4. Engine Ground
5. Battery 12 V 8 Ah
6. Starter Relay
7. Main Fuse 30 A
8. Alternator
9. Regulator/Rectifier

Ignition System

⚠ WARNING

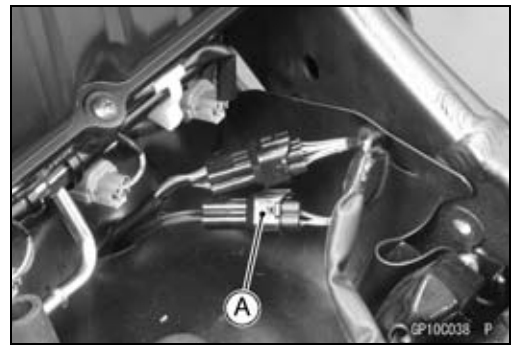
The ignition system produces extremely high voltage. Do not touch the spark plug, ignition coil or ignition coil lead while the engine is running, or you could receive a severe electrical shock.

NOTICE

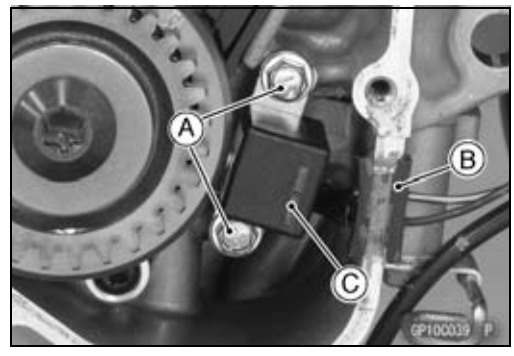
Do not disconnect the battery cables or any other electrical connections when the ignition switch is on, or while the engine is running. This is to prevent ECU damage.
Do not install the battery backwards. The negative side is grounded. This is to prevent damage to the ECU.

Crankshaft Sensor Removal

- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
- Disconnect the crankshaft sensor lead connector [A].



- Remove:
  Idle Gear (Starter Clutch Side) (see Starter Idle Gear Removal in the Crankshaft/Transmission chapter)
  Bolts [A]
  Crankshaft Sensor Lead Grommet [B]
  Crankshaft Sensor [C]



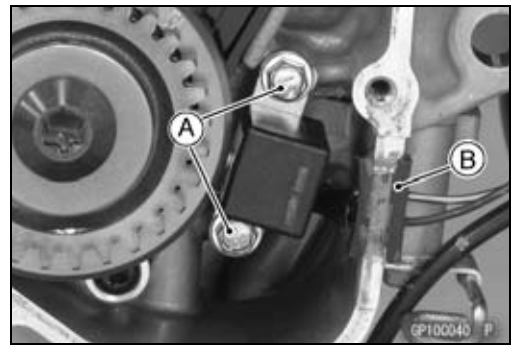
Crankshaft Sensor Installation

- Install the crankshaft sensor.

○When installing the sensor which is fastened by bolts, tighten the bolts after placing the sensor on the bottom surface completely.

- Tighten:

Torque - Crankshaft Sensor Bolts [A]: 5.9 N·m (0.60 kgf·m, 52 in·lb)

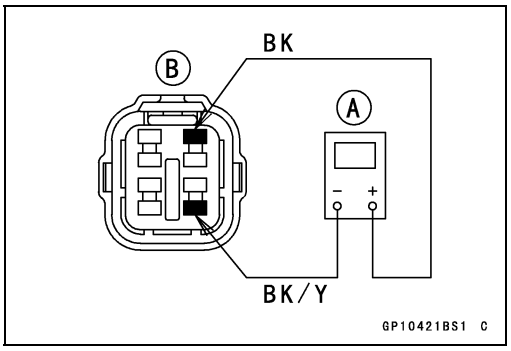


- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the circumference of the crankshaft sensor lead grommet [B], and fit the grommet into the notch of the crankcase securely.

Sealant - Liquid Gasket, TB1211F: 92104-0004

- Run the crankshaft sensor lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

Crankshaft Sensor Inspection



- Disconnect the crankshaft sensor lead connector (see Crankshaft Sensor Removal).
- Connect a tester [A] to the crankshaft sensor lead connector [B].

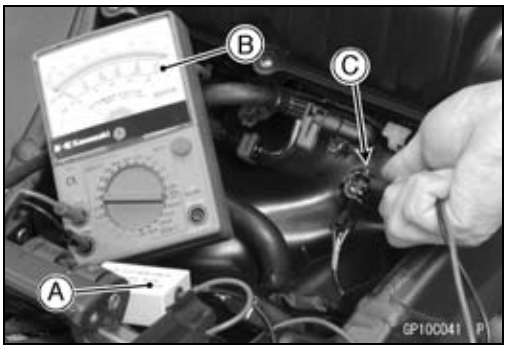
Crankshaft Sensor Resistance
Connections:
Meter (+) → BK/Y lead
Meter (–) → BK lead
Standard: 368 ~ 552 Ω

★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.

- 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.

Crankshaft Sensor Peak Voltage Inspection



NOTE

○*Be sure the battery is fully charged.*
○*Using the peak voltage adapter [A] is more reliable way to determine the condition of the crankshaft sensor than crankshaft sensor internal resistance measurements.*

- Disconnect the crankshaft sensor lead connector (see Crankshaft Sensor Removal).
- Connect a tester [B] to the peak voltage adapter.

Special Tool - Peak Voltage Adapter: 57001-1415
Type: KEK-54-9-B

- Connect the adapter to the terminals of the crankshaft sensor lead connector [C].

Connections:

Crankshaft Sensor Lead Connector		Peak Voltage Adapter		Tester
BK/Y lead	←	R lead	→	(+)
BK lead	←	BK lead	→	(–)

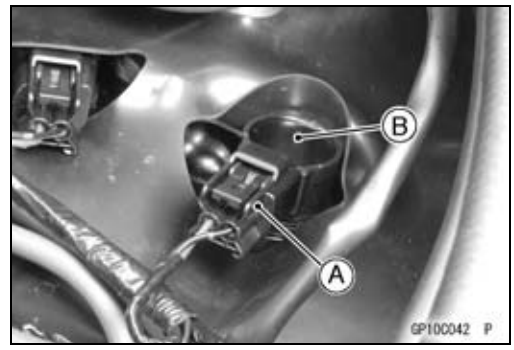
- Turn the engine stop switch to run position.
- Turn the ignition switch on.
- Pushing the starter button, turn the engine 4 ~ 5 seconds with the transmission in neutral to measure the crankshaft sensor peak voltage.
- Repeat the measurements 5 or more times.

Crankshaft Sensor Peak Voltage
Standard: 2.6 V or more

★If the reading is less than the standard, inspect the crankshaft sensor (see Crankshaft Sensor Inspection).

Ignition System

Stick Coil Removal

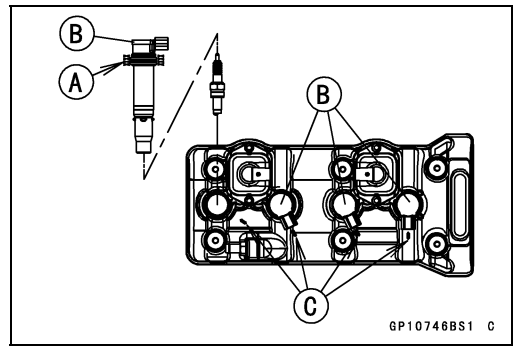


- Remove the air cleaner housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter).
- Disconnect the stick coil connectors [A].
- Pull out the stick coils [B] upward.

○First, turn the stick coil by 90 degrees, and then pull it out by twisting the coil head to the left and right while holding it securely by hand.

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

Stick Coil Installation

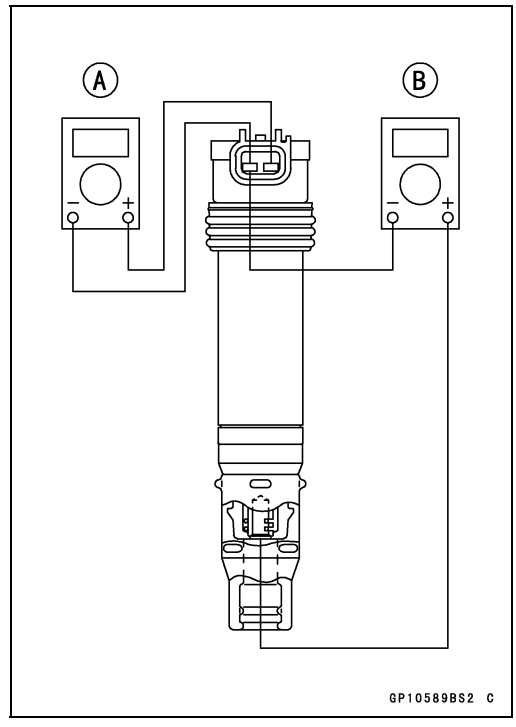


- Apply a thin coat of grease [A] to the stick coils for easy installation.
- Insert the stick coils [B] so that the coil heads align with the lines [C] on the cylinder head cover.

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

- After installation, be sure the stick coils are installed securely by pulling up them lightly.
- Run the leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

Stick Coil Inspection



- Remove the stick coils (see Stick Coil Removal).
- Measure the primary winding resistance [A] as follows.

○Connect a tester between the coil terminals.

- Measure the secondary winding resistance [B] as follows.

○Connect the tester between the plug terminal and (–) coil terminal.

Stick Coil Winding Resistance

Primary Windings:	**0.85 ~ 1.15 Ω**
Secondary Windings:	**5.0 ~ 6.8 kΩ**

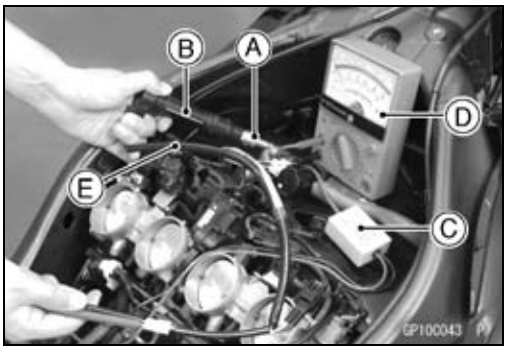
★If the tester does not read as specified, replace the coil.

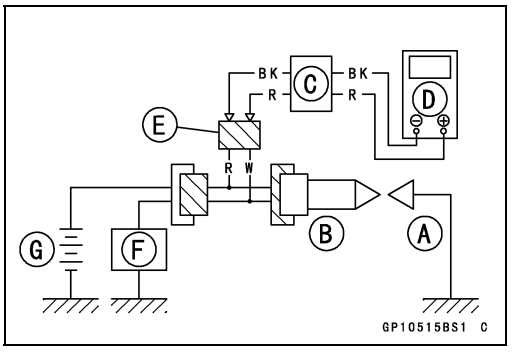
Stick Coil Primary Peak Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

● Remove the stick coils (see Stick Coil Removal).
○Do not remove the spark plugs.
● Measure the primary peak voltage as follows.
○Install the new spark plug [A] into each stick coil [B], and ground them onto the engine.
○Connect the peak voltage adapter [C] into a tester [D].
○Connect the adapter to the lead wire-peak voltage adapter [E] which is connected between the stick coil connector and stick coil.
ECU [F]
Battery [G]





Special Tools - Peak Voltage Adapter: 57001-1415
Type: KEK-54-9-B
Lead Wire-Peak Voltage Adapter: 57001 -1449

Connections:
Adapter (R, +) → Lead Wire-Peak Voltage Adapter (W)
Adapter (BK, –) → Lead Wire-Peak Voltage Adapter (R)

⚠ WARNING

To avoid extremely high voltage shocks, do not touch the spark plugs or tester connections.

● Turn the engine stop switch to run position.
● Turn the ignition 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: 120 V or more

● Repeat the test for the other stick coils.
★If the reading is less than the specified value, check the following.
Stick Coils (see Stick Coil Inspection)
Crankshaft Sensor (see Crankshaft Sensor Inspection)
ECU (see ECU Power Supply Inspection in the Fuel System (DFI) chapter)

Spark Plug Removal

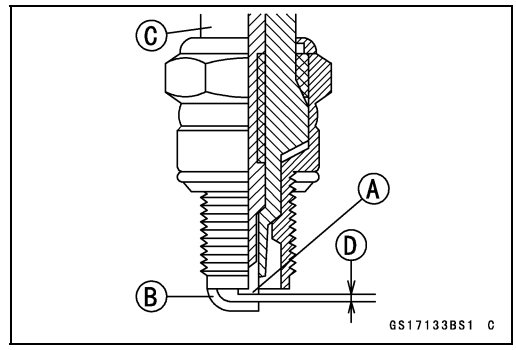
● Refer to the Spark Plug Replacement in the Periodic Maintenance chapter.

Spark Plug Installation

● Refer to the Spark Plug Replacement in the Periodic Maintenance chapter.

Ignition System

Spark Plug Condition Inspection



- Remove the spark plugs (see Spark Plug Replacement in the Periodic Maintenance chapter).
- Visually inspect the spark plugs.

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

★If the spark plug is dirtied or the carbon is accumulated, replace the spark plug.

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

★If the gap is incorrect, replace the spark plug.

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

- Use the standard spark plug or its equivalent.

Standard Spark Plug
Type: NGK CR9E

Interlock Operation Inspection

- Raise the rear wheel off the ground with the stand [A].

1st Check

- Start the engine to the following conditions.

Condition:
Transmission Gear → 1st Position
Clutch Lever → Release
Sidestand → Down or Up

○Turn the ignition switch on and push the starter button.
○Then the starter motor should not turn when the starter system circuit is normality.

★If the engine is started, inspect the starter lockout switch, gear position switch and relay box.

2nd Check

- Start the engine to the following conditions.

Condition:
Transmission Gear → 1st Position
Clutch Lever → Pulled in
Sidestand → Up

○Turn the ignition switch on and push the starter button.
○Then the starter motor should turn when the starter system circuit is normality.

★If the starter motor does not turn, inspect the starter lockout switch, sidestand switch, relay box and starter relay.

Ignition System

3rd Check

- 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

Sidestand → Up

- Set the sidestand on the ground, then the engine will stop.

★If the engine may not be stopped, inspect the gear position switch, sidestand switch and relay box.

★If their parts are normality, replace the ECU.

IC Igniter Inspection

○The IC igniter is built in the ECU [A].

- Refer to the following items.

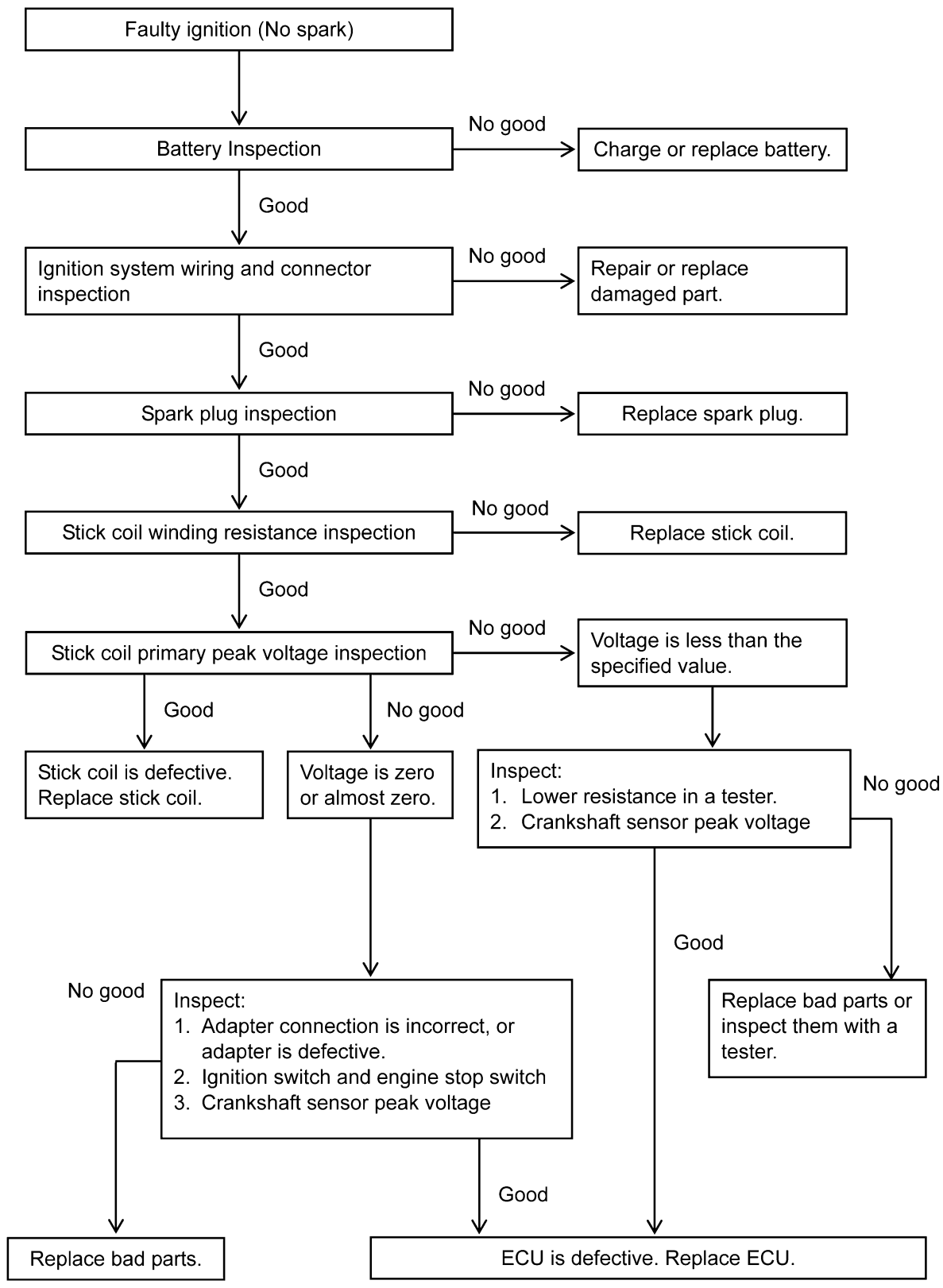
Interlock Operation Inspection (see Interlock Operation Inspection)

Ignition System Troubleshooting (see Ignition System section)

ECU Power Supply Inspection (see ECU Power Supply Inspection in the Fuel System (DFI) chapter)

Ignition System

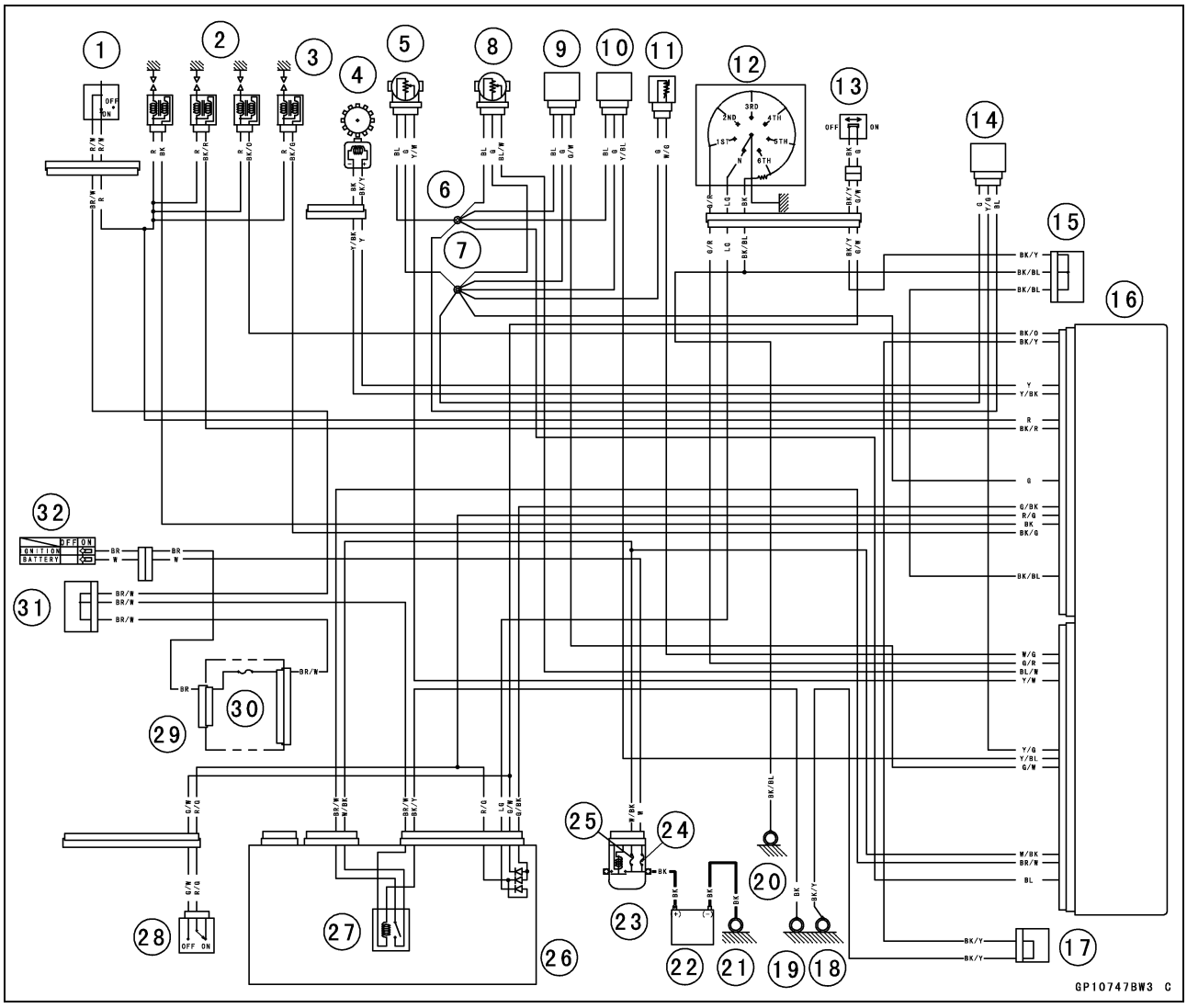
Ignition System Troubleshooting



GP10802B F

Ignition System

Ignition System Circuit



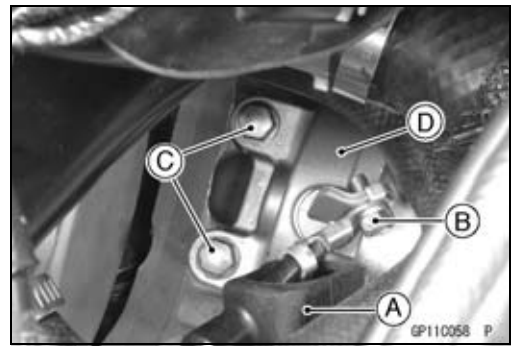
1. Engine Stop Switch
2. Spark Plugs
3. Stick Coils
4. Crankshaft Sensor
5. Main Throttle Sensor
6. Water-proof Joint 1
7. Water-proof Joint 2
8. Subthrottle Sensor
9. Intake Air Pressure Sensor #2
10. Intake Air Pressure Sensor #1
11. Water Temperature Sensor
12. Gear Position Switch
13. Sidestand Switch
14. Vehicle-down Sensor
15. Joint Connector D
16. ECU
17. Joint Connector C
18. Frame Ground 2
19. Frame Ground 3
20. Frame Ground 1
21. Engine Ground
22. Battery 12 V 8 Ah
23. Starter Relay
24. Main Fuse 30 A
25. ECU Fuse 15 A
26. Relay Box
27. ECU Main Relay
28. Starter Lockout Switch
29. Fuse Box 1
30. Ignition Fuse 15 A
31. Joint Connector E
32. Ignition Switch

Electric Starter System

Starter Motor Removal

- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Starter Clutch Cover (see Starter Idle Gear Removal in the Crankshaft/Transmission chapter)
- For ABS equipped models, remove the ABS hydraulic unit (see ABS Hydraulic Unit Removal in the Brakes chapter).

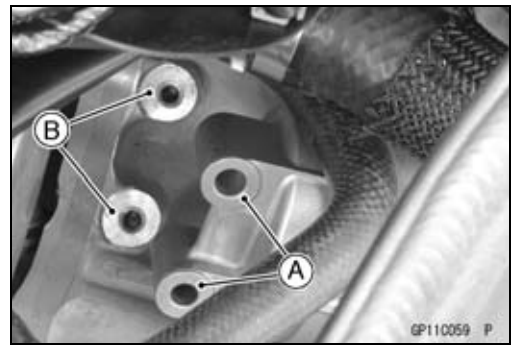
- Slide out the rubber cap [A].
- Remove the starter motor cable terminal bolt [B].
- Remove the starter motor mounting bolts [C].
- Remove the starter motor [D] from the right side of the motorcycle.



Starter Motor Installation

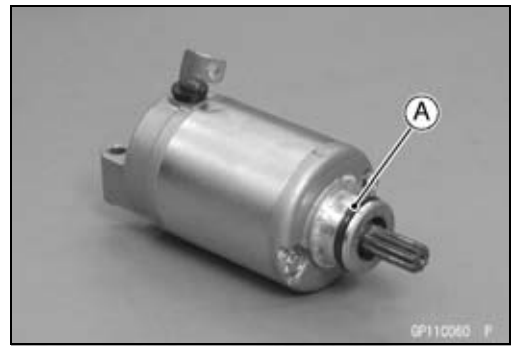
NOTICE
Do not tap the starter motor shaft or body. Tapping the shaft or body could damage the motor.

- Clean the starter motor legs [A] and crankcase [B] where the starter motor is ground.



- Replace the O-ring [A] with a new one.
- Apply grease to the new O-ring.
- Tighten the starter motor mounting bolts temporarily.
- Install the starter clutch cover (see Starter Idle Gear Installation in the Crankshaft/Transmission chapter).
- Tighten:

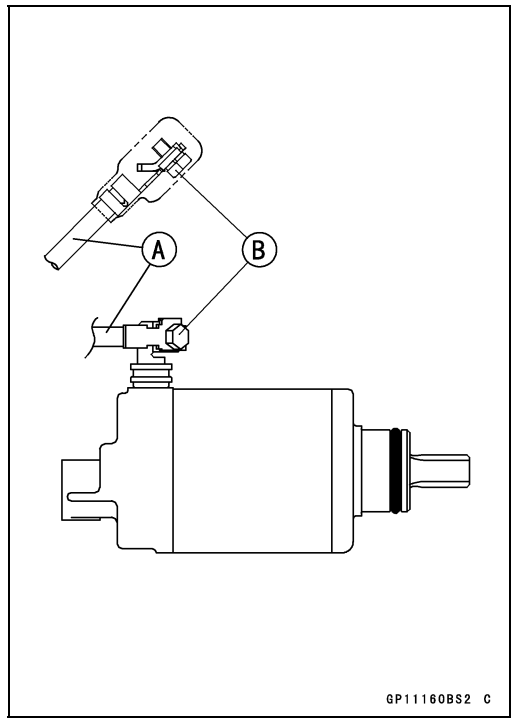
Torque - Starter Motor Mounting Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)



- Install the starter motor cable [A] as shown.
- Tighten:

Torque - Starter Motor Cable Terminal Bolt [B]: 2.9 N·m (0.30 kgf·m, 26 in·lb)

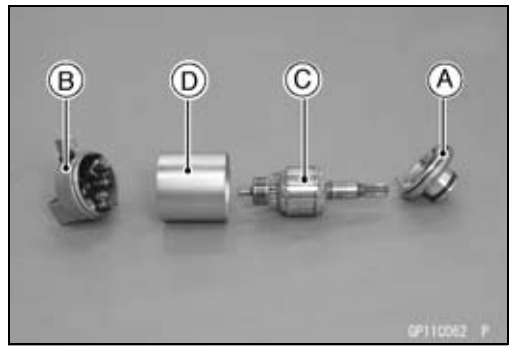
- Slide back the rubber cap to the original position.
- Install the removed parts (see appropriate chapters).



Starter Motor Disassembly

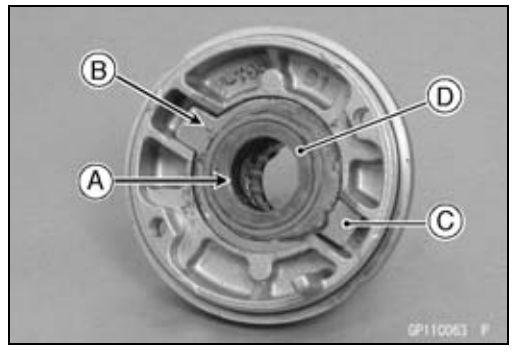
- Remove:
  Starter Motor (see Starter Motor Removal)
  Starter Motor Through Bolts [A]

- Remove:
  Right-hand End Cover [A]
  Left-hand End Cover [B]
  Armature [C]
  Yoke [D]



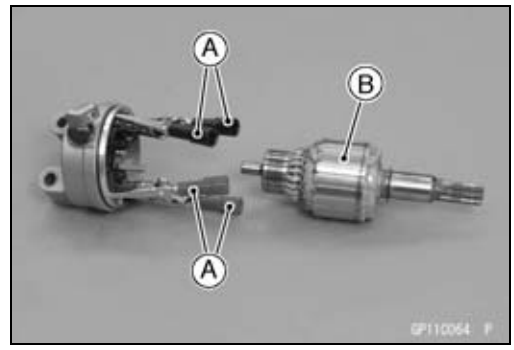
Starter Motor Assembly

- Apply a thin coat of grease to the oil seal [A].
- Fit the dent [B] of the toothed washer [C] on the projection right-hand end cover.
- Install the washer [D].

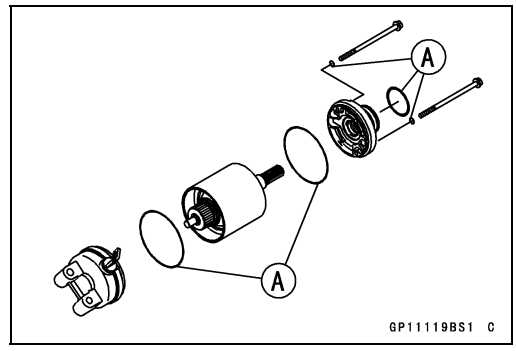


Electric Starter System

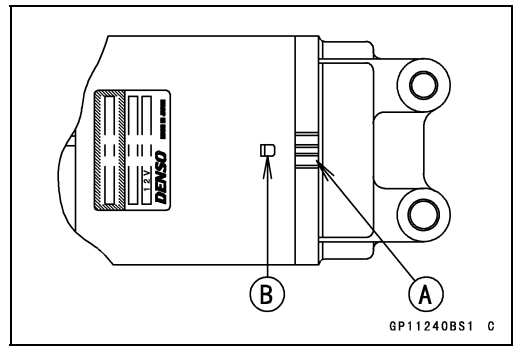
- Press the springs holding the brush leads with suitable clips [A] as shown.
- Put the armature [B] among the brushes.



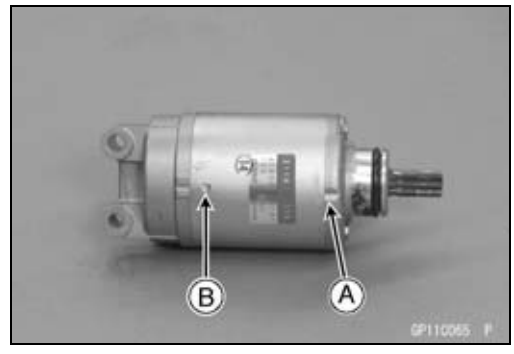
- Install the new O-rings [A] as shown.



- Align the groove [A] in the left-hand end cover and the hollow mark [B] on the yoke.



- Align the hollow mark [A] on the right-hand end cover and the hollow mark [B] on the yoke.



Brush Inspection

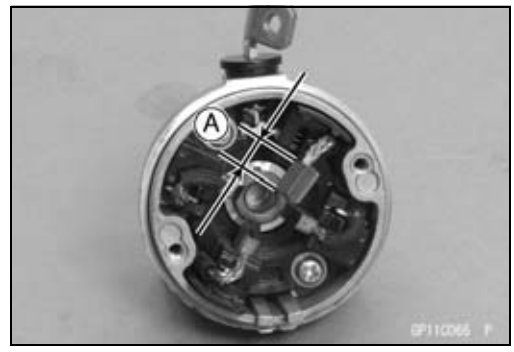
- Measure the length [A] of each brush.

★If any is worn down to the service limit, replace the left -hand end cover assembly.

Starter Motor Brush Length

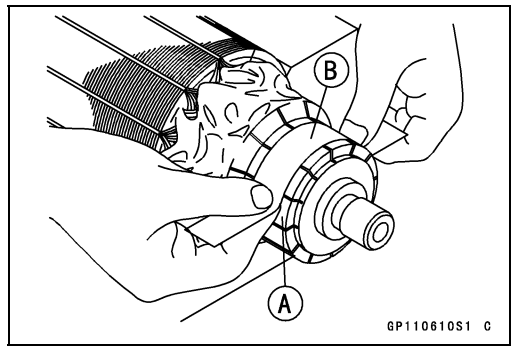
Standard: 7 mm (0.28 in.)

Service Limit: 5 mm (0.20 in.)



Commutator Cleaning and Inspection

● Smooth the commutator surface [A] if necessary with fine emery cloth [B], and clean out the grooves.



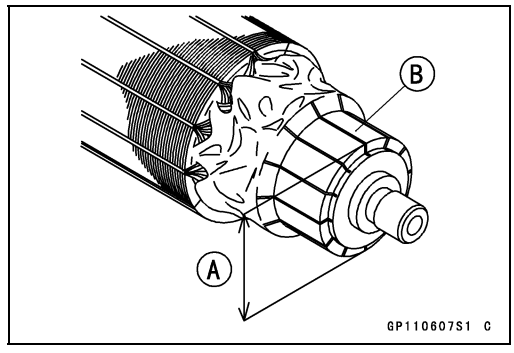
● Measure the diameter [A] of the commutator [B].

★If the commutator diameter is less than the service limit, replace the starter motor with a new one .

Commutator Diameter

Standard: 24 mm (0.94 in.)

Service Limit: 23 mm (0.91 in.)



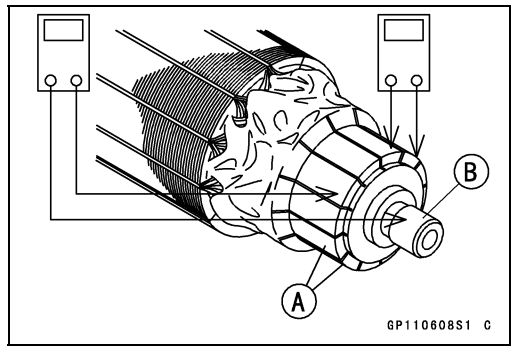
Armature Inspection

● Using a tester measure the resistance between any two commutator segments [A].

★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 tester, 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.



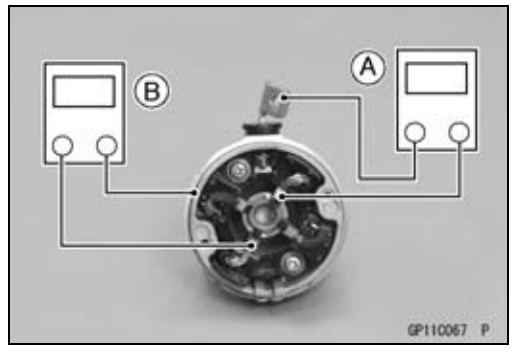
NOTE

○*Even if the foregoing checks show the armature to be good, it may be defective in some manner not readily detectable with the 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 a tester, measure the resistance as shown.
Terminal and Positive Brush [A]
Left-hand End Cover and Negative Brush [B]

★If there is not close to zero ohms, the brush lead has an open. Replace the left-hand end cover assembly.

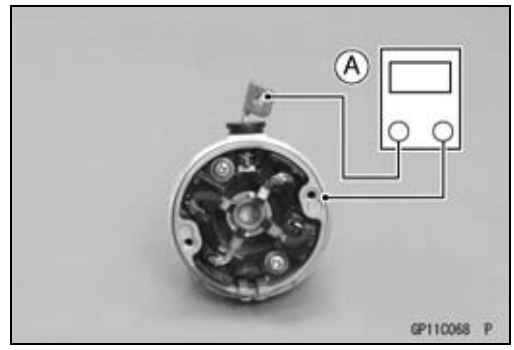


Electric Starter System

Left-hand End Cover Assembly Inspection

- Using a tester, measure the resistance as shown.
  Terminal and Left-hand End Cover [A]

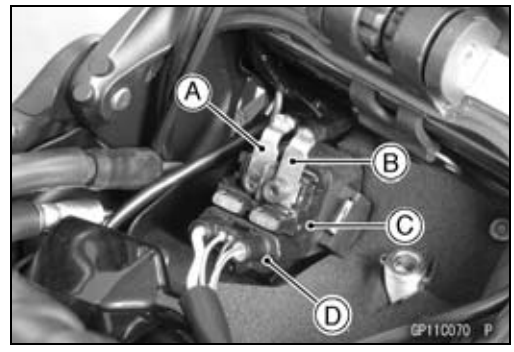
★If there is any reading, the left-hand end cover assembly have a short. Replace the left-hand end cover assembly.



Starter Relay Inspection

- Remove the battery negative (–) cable from the battery negative (–) terminal (see Battery Removal).
- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Remove the starter relay cover [A].

- Disconnect the starter motor cable [A] and battery positive (+) cable [B].
- Remove the starter relay [C] from the rear fender.
- Disconnect the connector [D].

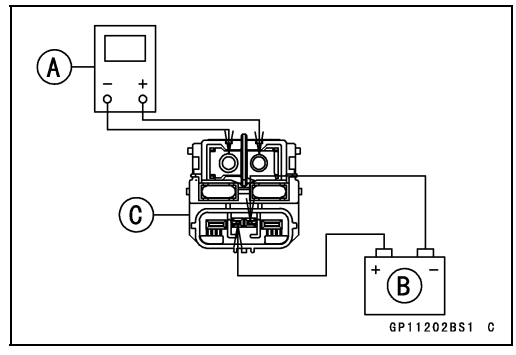


- Connect a tester [A] and 12 V battery [B] to the starter relay [C] as shown.

★If the relay does not work as specified, the relay is defective. Replace the relay.

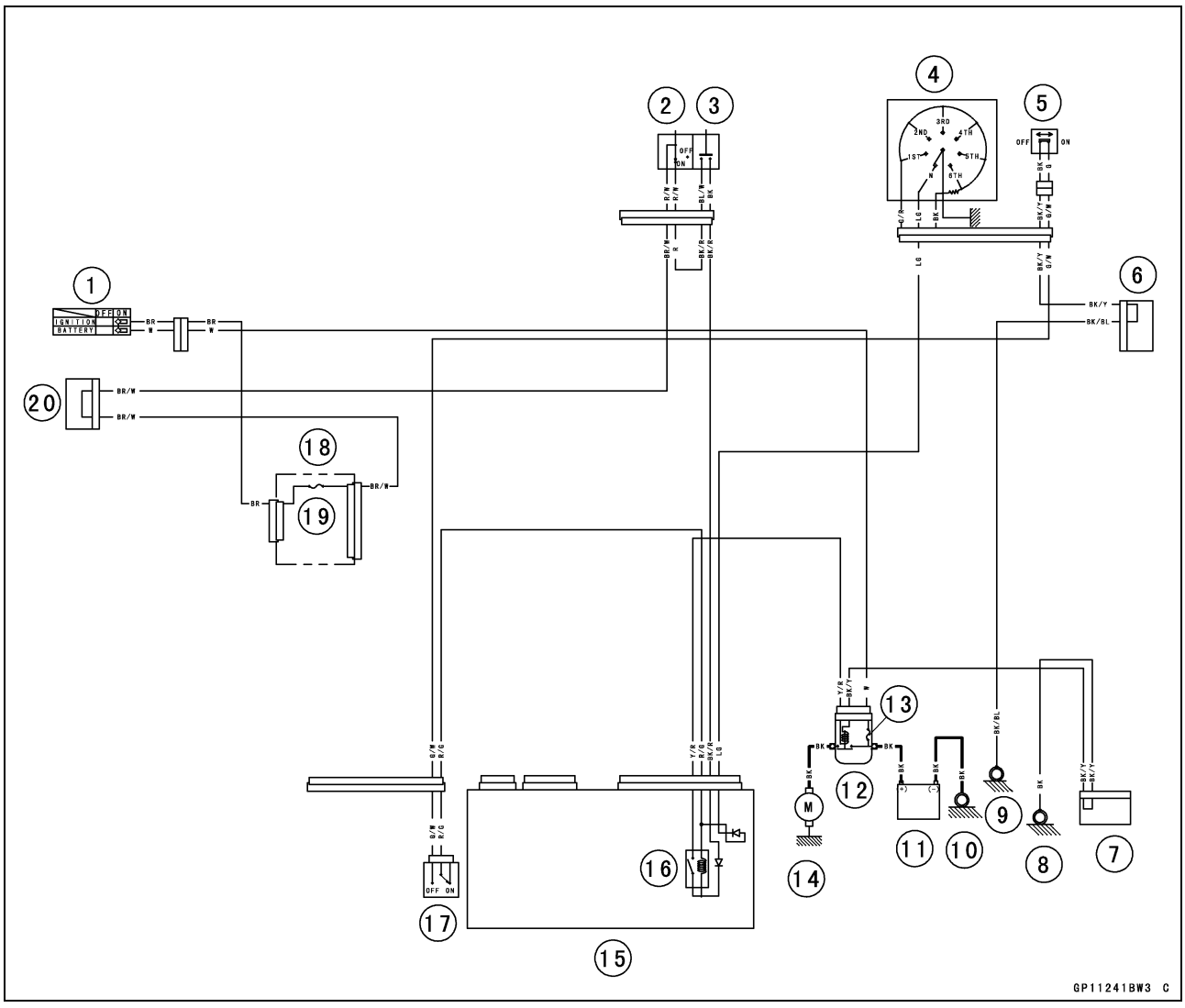
Testing Relay

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



Electric Starter System

Electric Starter Circuit



1. Ignition Switch
2. Engine Stop Switch
3. Starter Button
4. Gear Position Switch
5. Sidestand Switch
6. Joint Connector D
7. Joint Connector B
8. Frame Ground 3
9. Frame Ground 1
10. Engine Ground
11. Battery 12 V 8 Ah
12. Starter Relay
13. Main Fuse 30 A
14. Starter Motor
15. Relay Box
16. Starter Circuit Relay
17. Starter Lockout Switch
18. Fuse Box 1
19. Ignition Fuse 15 A
20. Joint Connector E

Lighting System

This motorcycle adopt the daylight system and have a headlight relay in the relay box. 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

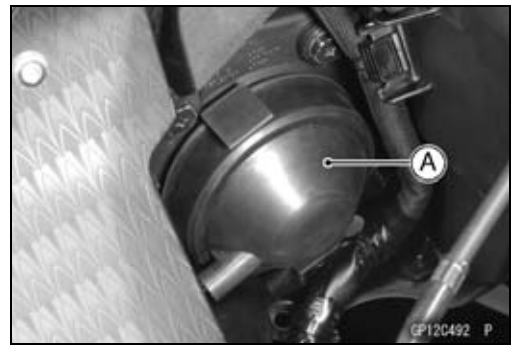
- Refer to the Headlight Aiming Inspection in the Periodic Maintenance chapter.

Headlight Beam Vertical Adjustment

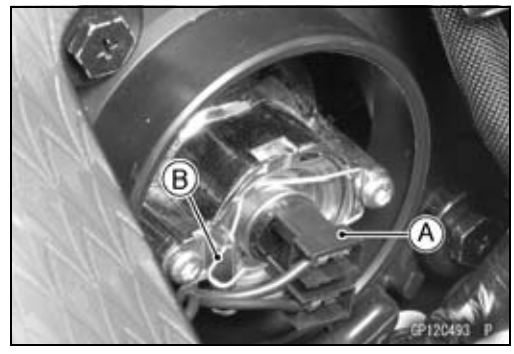
- Refer to the Headlight Aiming Inspection in the Periodic Maintenance chapter.

Headlight Bulb Replacement

- Disconnect:
  Dust Cover [A]



- Disconnect:
  Headlight Connector [A]
  Hook [B]
- Remove:
  Headlight Bulb



NOTICE

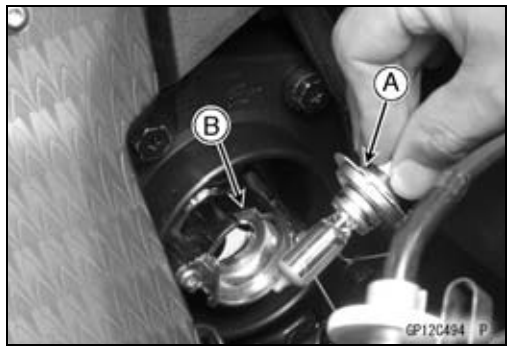
When handling the quartz-halogen bulb, never touch the glass portion with bare hands. Always use a clean cloth. Oil contamination from hands or dirty rags can reduce bulb life or cause the bulb to explode. Use the correct type of headlight bulb with specified voltage and wattage only.

NOTE

○*Clean off any contamination that inadvertently gets on the bulb with alcohol or soap and water solution.*

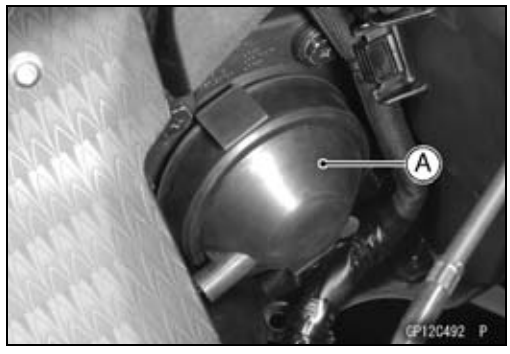
Lighting System

- Replace the headlight bulb with a new one.
- Fit the projection [A] of the bulb in the hollow [B] of the headlight.
- Install the hook.



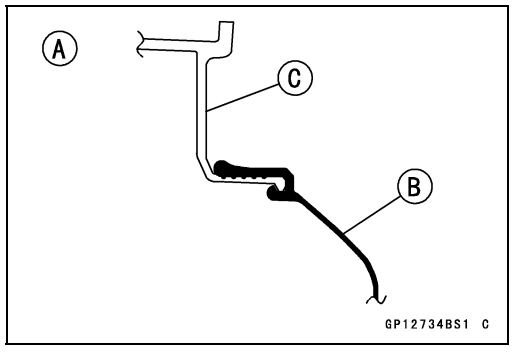
- Connect the headlight connector.
- Fit the dust cover [A] onto the headlight housing.

○Press the outer circumference of the dust cover a few places with finger to make sure it is fitted securely. If you find any looseness, remove the dust cover and install again.

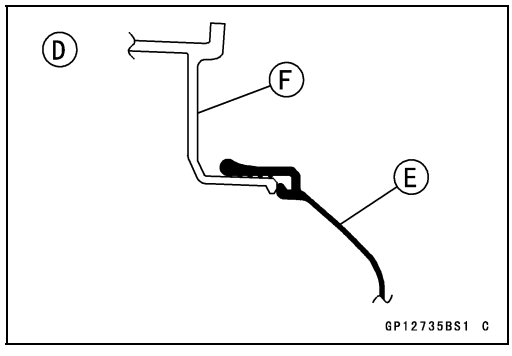


NOTICE
If the dust cover is not securely fitted, the water enters the headlight housing, it can lead to the corrosions in the housing or damage to the electrical system.

Correct [A]: The dust cover [B] fitted correctly with NO gap.
Headlight Housing [C]



Wrong [D]: The dust cover [E] fitted incorrectly with gaps.
Headlight Housing [F]



- After installation, adjust the headlight aim (see Headlight Aiming Inspection in the Periodic Maintenance chapter).

○Other Bulb: Repeat the above steps.

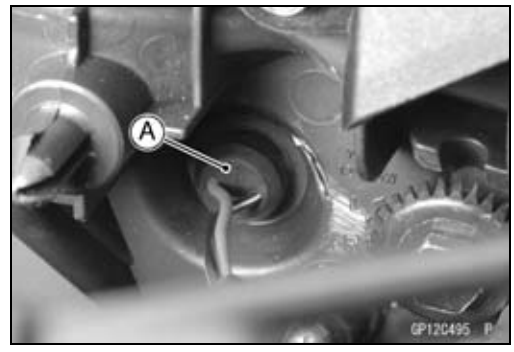
○Press the outer circumference of the dust cover a few places with finger to make sure it fitted securely. If you find any looseness, remove the dust cover and install again.

NOTICE
If the dust cover is not securely fitted, the water enters the headlight housing, it can lead to the corrosions in the housing or damage to the electrical system.

Lighting System

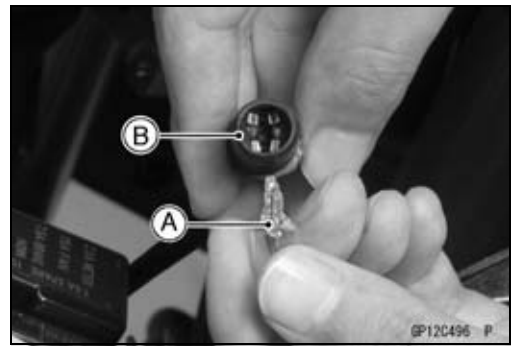
City Light Bulb Replacement

- Remove the inner cover (see Inner Cover Removal in the Frame chapter).
- Pull out the socket [A] together with the bulb.



- Pull the bulb [A] out of the socket [B].

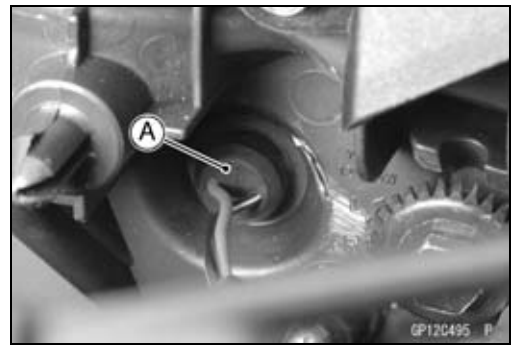
NOTICE
Do not turn the bulb. Pull the bulb out to prevent damage to the bulb. Do not use bulb rated for greater wattage than the specified value.



- Replace the bulb with a new one.

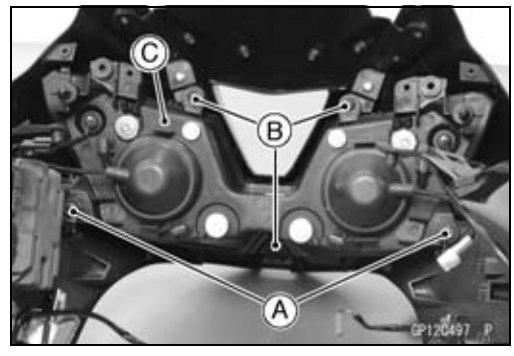
- Insert the socket [A] to the headlight.

○Other Bulb: Repeat the above steps.



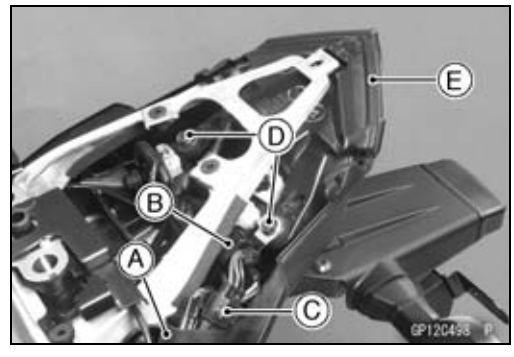
Headlight Removal/Installation

- Remove:
  Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
  Bolts [A] and Clamps
  Screws [B]
  Headlight [C]
- Installation is the reverse of removal.



Tail/Brake Light (LED) Removal/Installation

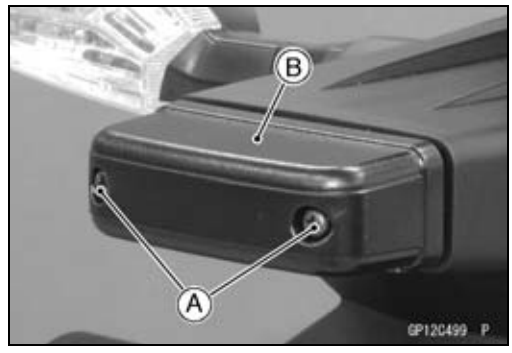
- Remove:
  Tail/Brake Light Cover (see Rear Fender Removal in the Frame chapter)
- Slide the dust cover [A].
- Open the clamp [B].
- Disconnect the tail/brake light lead connector [C].
- Remove:
  Bolts [D] and Clamp
  Tail/Brake Light (LED) [E]



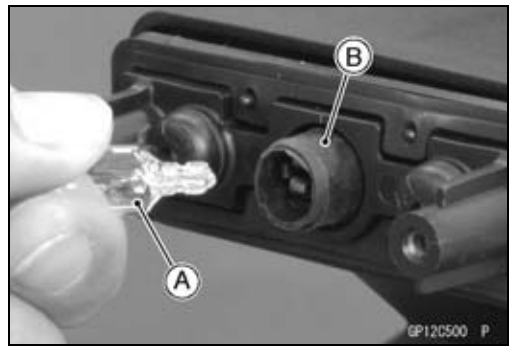
- Installation is the reverse of removal.
- Run the lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Lighting System

License Plate Light Bulb Replacement



- Remove:
  License Plate Light Cover Screws [A]
  License Plate Light Cover [B]



- Pull the bulb [A] out of the socket [B].

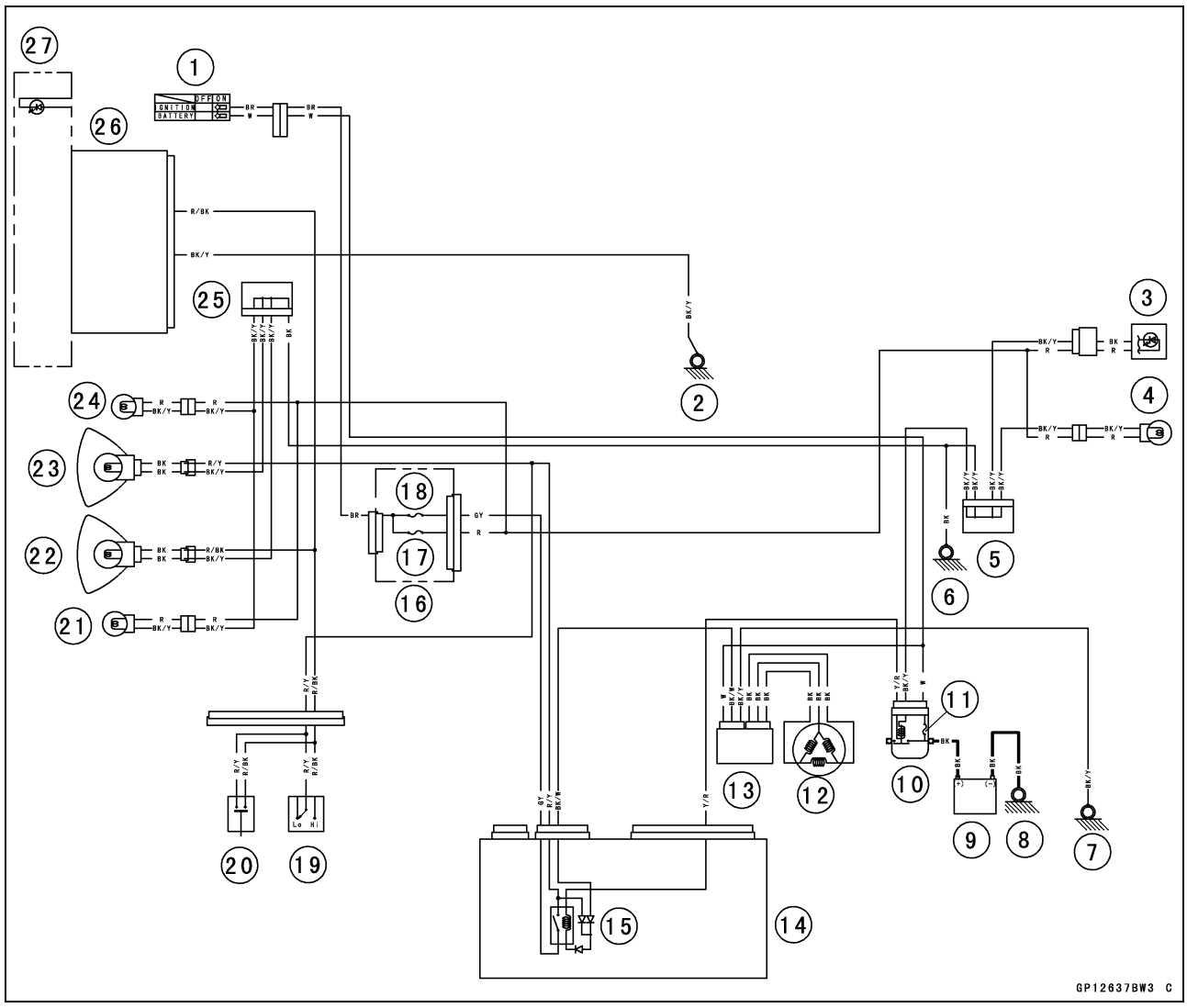
NOTICE
Do not turn the bulb. Pull the bulb out to prevent damage to the bulb. Do not use bulb rated for greater wattage than the specified value.

- Replace the bulb with a new one.
- Tighten:

Torque - License Plate Light Cover Screws: 1.0 N·m (0.10 kgf·m, 8.9 in·lb)

Lighting System

Headlight/Tail Light Circuit



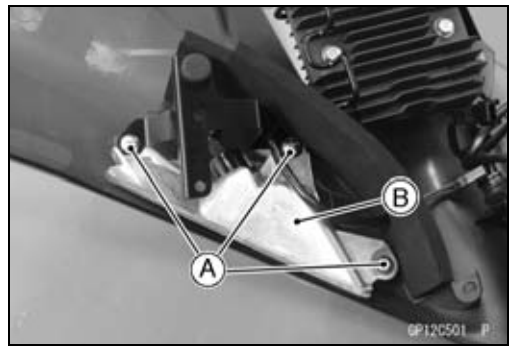
1. Ignition Switch
2. Frame Ground 1
3. Tail/Brake Light (LED)
4. License Plate Light 12 V 5 W
5. Joint Connector B
6. Frame Ground 3
7. Frame Ground 2
8. Engine Ground
9. Battery 12 V 8 Ah
10. Starter Relay
11. Main Fuse 30 A
12. Alternator
13. Regulator/Rectifier
14. Relay Box
15. Headlight Circuit Relay
16. Fuse Box 1
17. Brake Light/Horn Fuse 7.5 A
18. Ignition Fuse 15 A
19. Dimmer Switch
20. Passing Button
21. Left City Light 12 V 5 W
22. Headlight (HI) 12 V 55 W
23. Headlight (LO) 12 V 55 W
24. Right City Light 12 V 5 W
25. Joint Connector A
26. Meter Unit
27. Blue High Beam Indicator Light (LED)

Lighting System

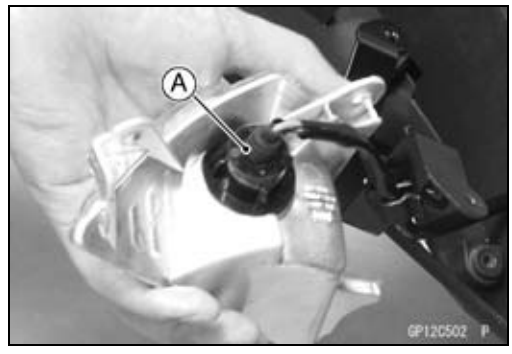
Turn Signal Light Bulb Replacement

Front Turn Signal Light

- Remove:
  Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
  Front Turn Signal Light Screws [A]
  Front Turn Signal Light [B]



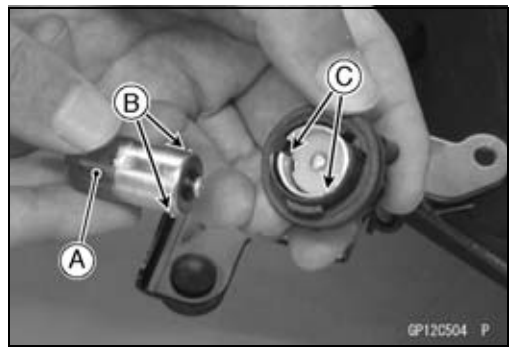
- Turn the socket [A] counterclockwise and pull out the socket together with the bulb.



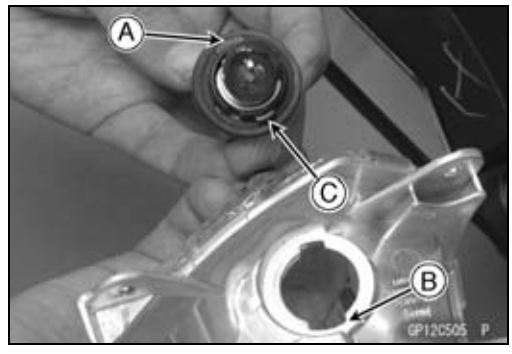
- Push and turn the front turn signal light bulb [A] counterclockwise and remove it.
- Replace the bulb with a new one.

- Insert the new bulb [A] by aligning its left and right pins [B] with the left and right grooves [C] in the socket, and turn the bulb clockwise.

○Turn the bulb about 15°.



- Fit the large projection [A] of the socket into the large groove [B] of the turn signal light.
  Small Projection [C]
- Turn the front turn signal light bulb clockwise.

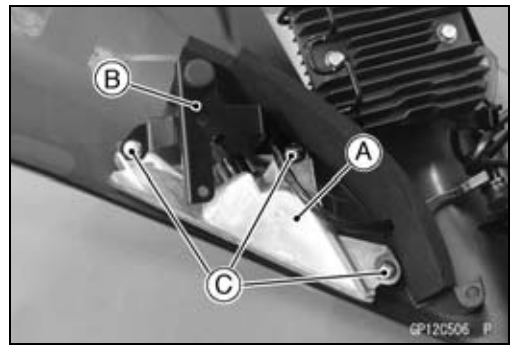


Lighting System

● Install:
Front Turn Signal Light [A]
Bracket [B]
● Tighten:

Torque - Front Turn Signal Light Mounting Screws [C]: 1.2 N·m (0.12 kgf·m, 11 in·lb)

○Other Bulb: Repeat the above steps.

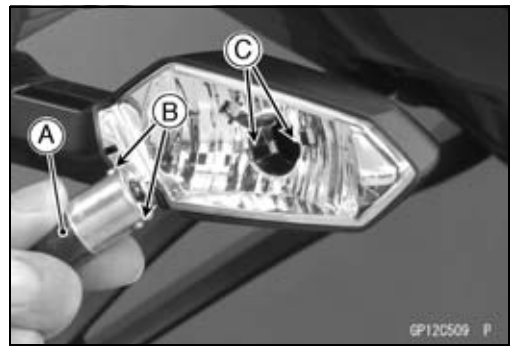


Rear Turn Signal Light

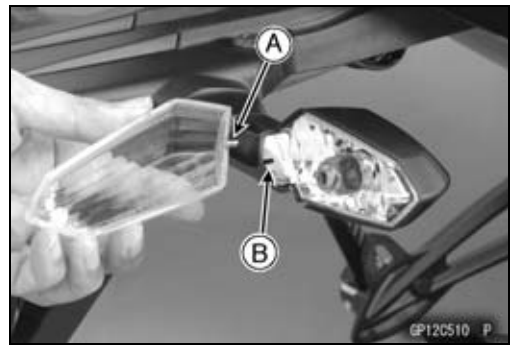
● Remove:
Screw [A]
Rear Turn Signal Light Lens

● Push and turn the rear turn signal light bulb [A] counter-clockwise and remove it.
● Replace the bulb with a new one.

● Insert the new bulb [A] by aligning its left and right pins [B] with the left and right grooves [C] in the socket, and turn the bulb clockwise.
○Turn the bulb about 15°.



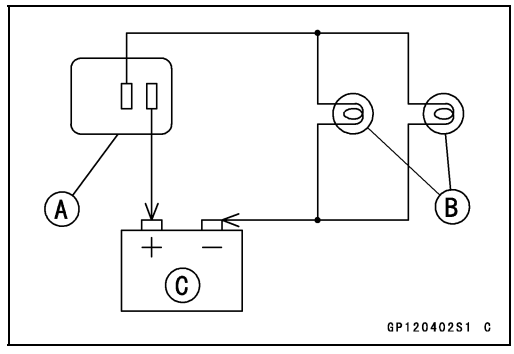
● Fit the projection [A] of the lens into the groove [B] of the turn signal light.
● Tighten the screw.
○Other Bulb: Repeat the above steps.



Lighting System

Turn Signal Relay Inspection

- Remove the front seat cover (see Seat Cover Removal in the Frame chapter).
- Pull out the turn signal relay [A] backward, and remove it from the rear fender.
- Disconnect the connector.



- Connect one 12 V battery and turn signal lights as indicated, and count how many times the lights blink for one minute.
  Turn Signal Relay [A]
  Turn Signal Lights [B]
  12 V Battery [C]

★If the lights do not blink as specified, replace the turn signal relay.

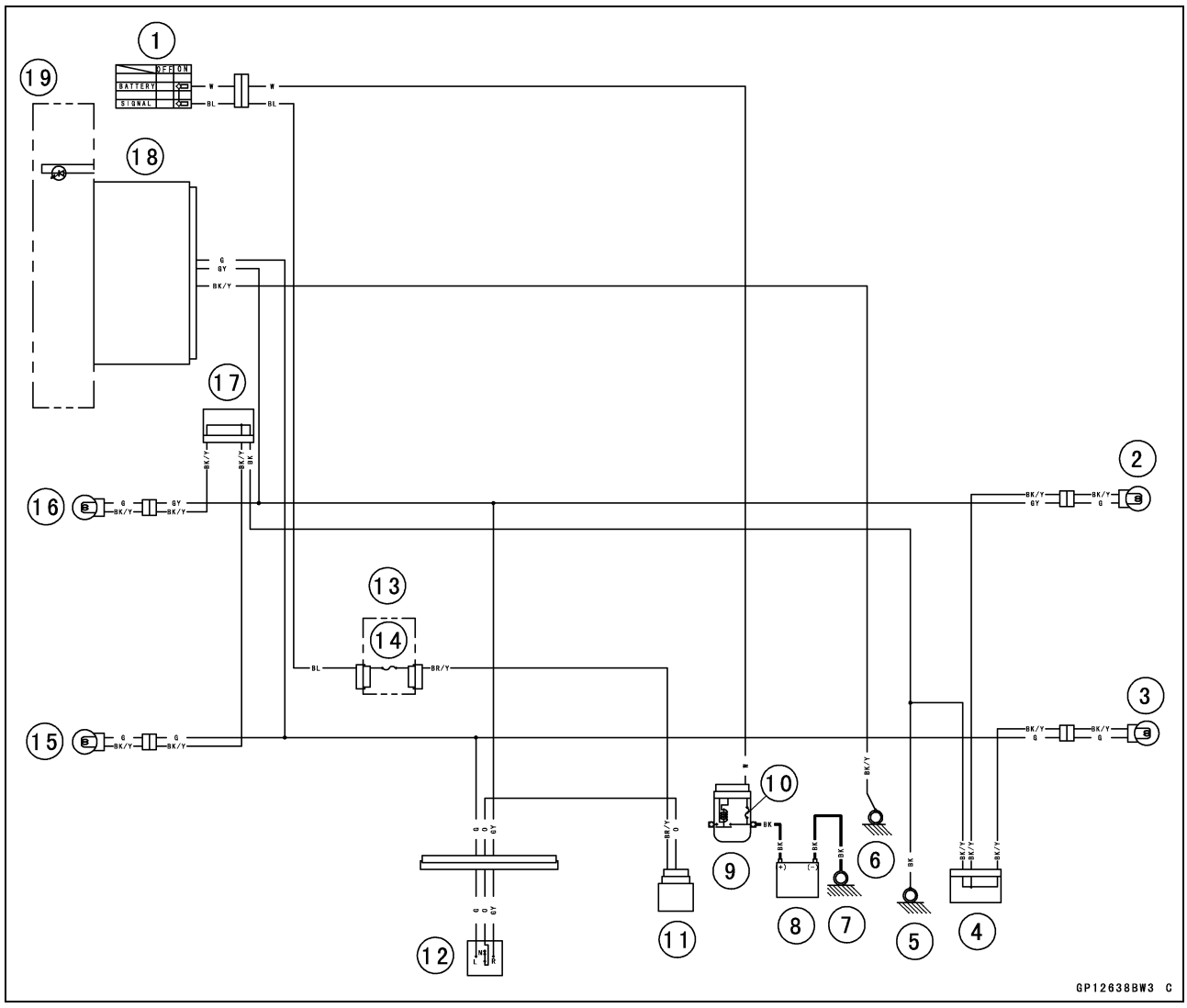
Testing Turn Signal Relay

Load		Blinking Times (c/m*)
The Number of Turn Signal Lights	Wattage (W)	
1**	10	140 ~ 250
2	20	75 ~ 95

(*): Cycle(s) per minute
(**): Corrected to “one light burned out”.

Lighting System

Turn Signal Light Circuit



1. Ignition Switch
2. Rear Right Turn Signal Light 12 V 10 W
3. Rear Left Turn Signal Light 12 V 10 W
4. Joint Connector B
5. Frame Ground 3
6. Frame Ground 1
7. Engine Ground
8. Battery 12 V 8 Ah
9. Starter Relay
10. Main Fuse 30 A
11. Turn Signal Relay
12. Turn Signal Switch
13. Fuse Box 2
14. Turn Signal Relay Fuse 7.5 A
15. Front Left Turn Signal Light 12 V 10 W
16. Front Right Turn Signal Light 12 V 10 W
17. Joint Connector A
18. Meter Unit
19. Green Turn Signal Indicator Light (LED)

Air Switching Valve

Air Switching Valve Operation Test

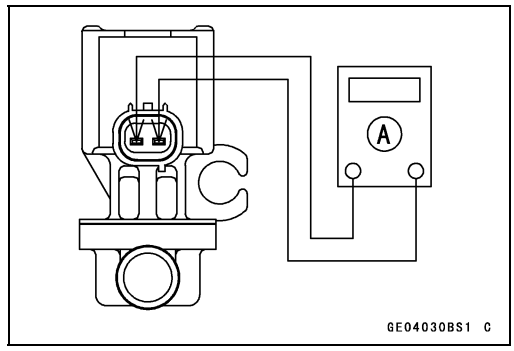
- Refer to the Air Suction System Damage Inspection in the Periodic Maintenance chapter.

Air Switching Valve Unit Test

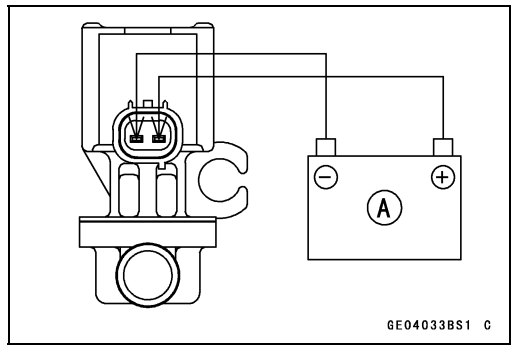
- Remove the air switching valve (see Air Switching Valve Removal in the Engine Top End chapter).
- Connect a digital meter [A] to the air switching valve terminals as shown.

Air Switching Valve Resistance
Standard: 20 ~ 24 Ω @20°C (68°F)

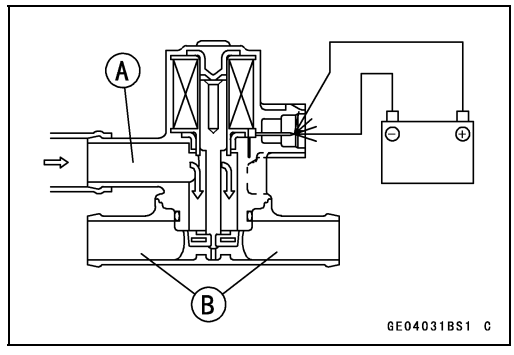
★If the resistance reading is out of the specified value, replace it with a new one.



- Connect the 12 V battery [A] to the air switching valve terminals as shown.



- Blow the air to the intake air duct [A], and make sure does not flow the blown air from the outlet air ducts [B].

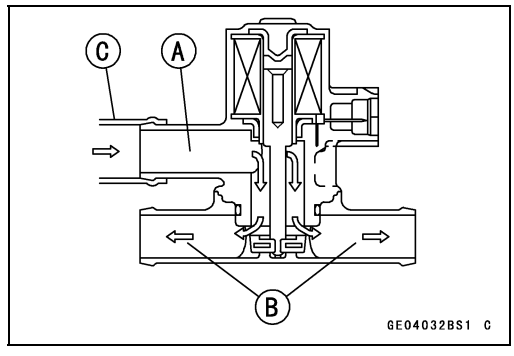


- Disconnect the 12 V battery.
- Blow the air to the intake air duct [A] again, and make sure flow the blown air from the outlet air ducts [B].

★If the air switching valve dose not operate as described, replace it with a new one.

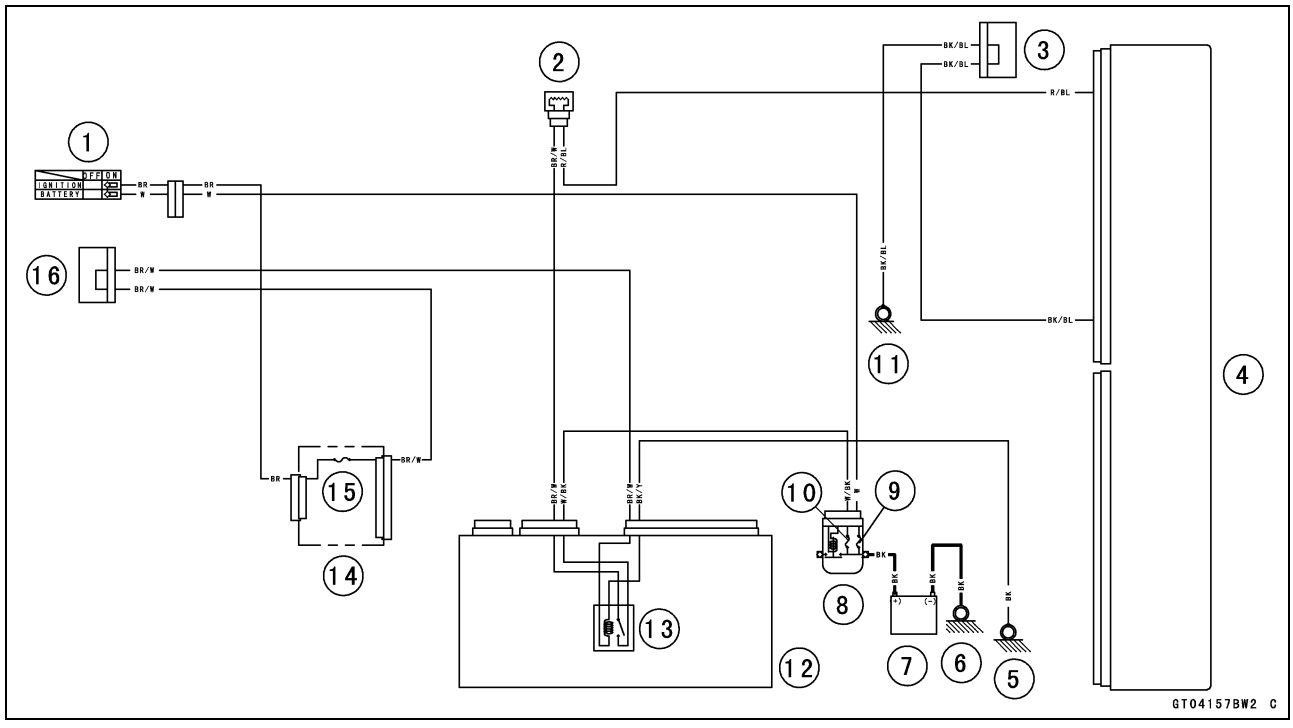
NOTE

○*To check air flow through the air switching valve, just blow through the air switching valve hose (intake side) [C].*



Air Switching Valve

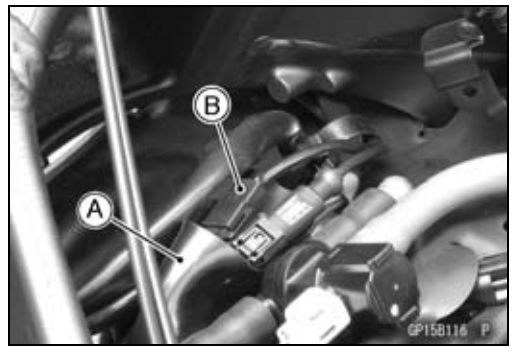
Air Switching Valve Circuit



1. Ignition Switch
2. Air Switching Valve
3. Joint Connector D
4. ECU
5. Frame Ground 3
6. Engine Ground
7. Battery 12 V 8 Ah
8. Starter Relay
9. Main Fuse 30 A
10. ECU Fuse 15 A
11. Frame Ground 1
12. Relay Box
13. ECU Main Relay
14. Fuse Box 1
15. Ignition Fuse 15 A
16. Joint Connector E

Radiator Fan System

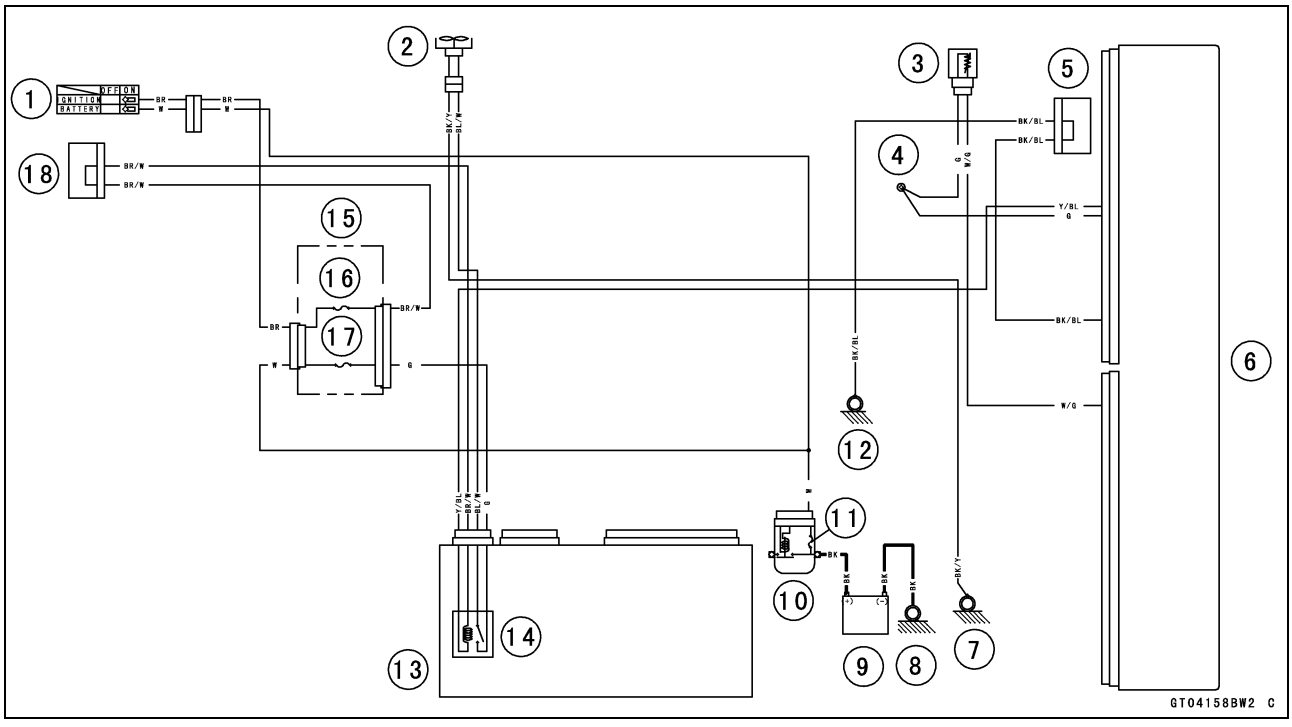
Fan Motor Inspection



- Remove the air cleaner housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter).
- Slide the dust cover [A].
- Disconnect the connector [B].
- Using an auxiliary leads, supply battery power to the fan motor.

★If the fan does not rotate, the fan motor is defective and must be replaced.

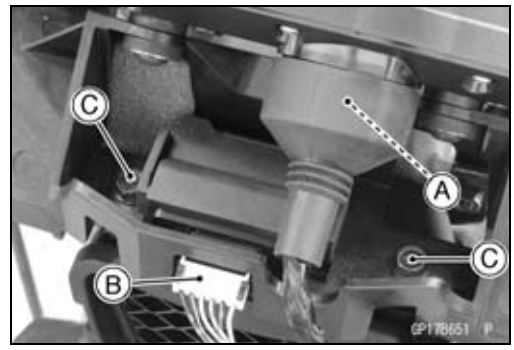
Radiator Fan Circuit



1. Ignition Switch
2. Fan Motor
3. Water Temperature Sensor
4. Water-proof Joint 2
5. Joint Connector D
6. ECU
7. Frame Ground 3
8. Engine Ground
9. Battery 12 V 8 Ah
10. Starter Relay
11. Main Fuse 30 A
12. Frame Ground 1
13. Relay Box
14. Radiator Fan Relay
15. Fuse Box 1
16. Ignition Fuse 15 A
17. Fan Fuse 15 A
18. Joint Connector E

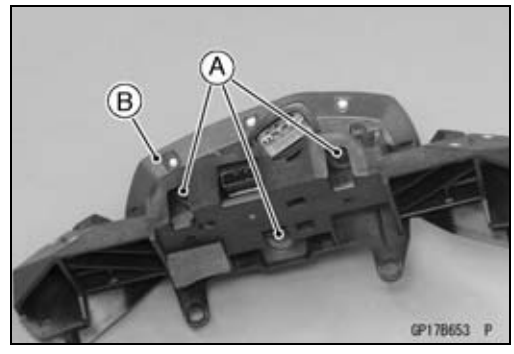
Meter, Gauge, Indicator Unit

Meter Unit Removal/Installation



- Remove:
  Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
- Disconnect:
  Meter Unit Connector [A]
  Immobilizer Amplifier Connector [B] (Equipped Models)
- Remove the bolts [C].

- Remove:
  Bolts [A]
  Collar
  Meter Bracket with Meter Unit [B]



- Remove:
  Meter Unit Mounting Screws [A]
  Meter Unit [B]

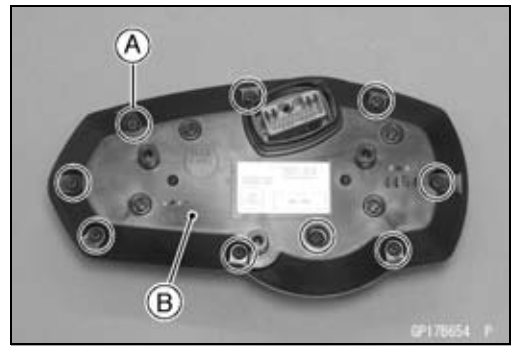
NOTICE
Place the meter unit so that the face is up. If a meter unit is left upside down or sideways for any length of time, it will malfunction.

- Installation is the reverse of removal.
- Tighten:

Torque - Meter Unit Mounting Screws: 1.2 N·m (0.12 kgf·m, 11 in·lb)

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

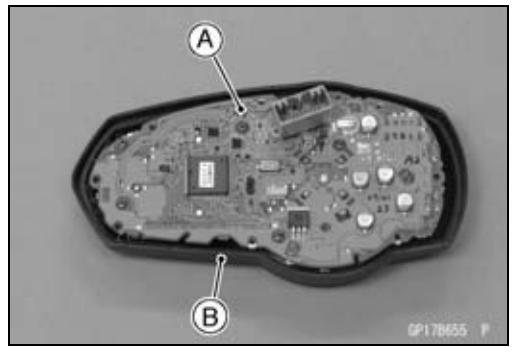
Meter Unit Disassembly



- Remove:
  Meter Unit (see Meter Unit Removal/Installation)
  Screws [A]
  Lower Meter Cover [B]

Meter, Gauge, Indicator Unit

● Separate the meter assembly [A] and upper meter cover [B].



Meter Operation Inspection

Check 1-1: Switching Inspection

● Turn the ignition switch on.

● Check that the following.

ZX636E Model [A]

ZX636F Model [B]

○The following Indicator lights (LED) go on for 1 second.

Yellow Shift Up Indicator Light (LED) [C]

Yellow Engine Warning Indicator Light (LED) [D]

Amber Fuel Level Warning Indicator Light (LED) [E]

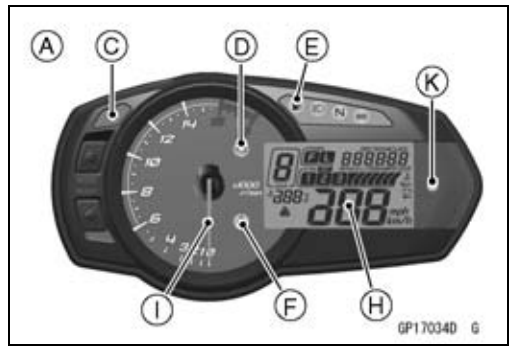
Yellow KTRC Warning Indicator Light (LED) [F]

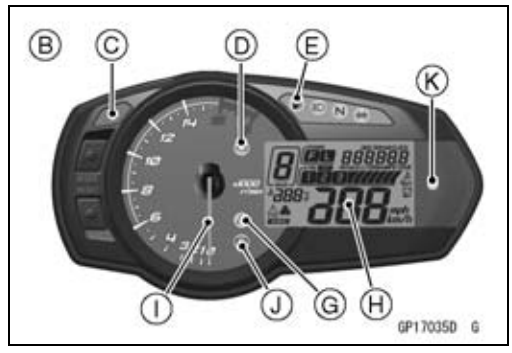
Yellow Warning Indicator Light (LED) [G]

○The all LCD segments [H] appear for 3 seconds.

○The tachometer needle [I] momentarily points their last readings and back to the minimum position.

○The yellow ABS indicator light [J] and the red warning indicator light [K] go on.

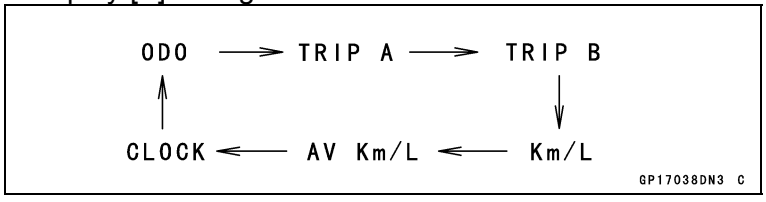




★If the meter unit does not work, replace the meter unit.

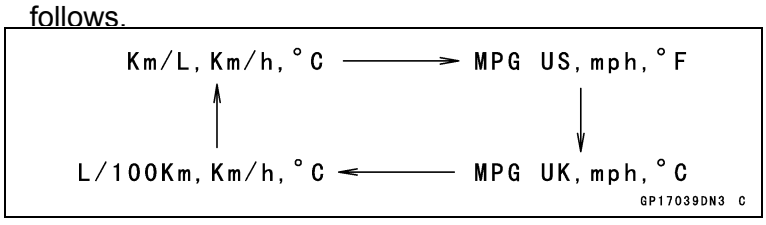
● Refer to the Meter Unit Inspection for other indicator lights (LED) inspection.

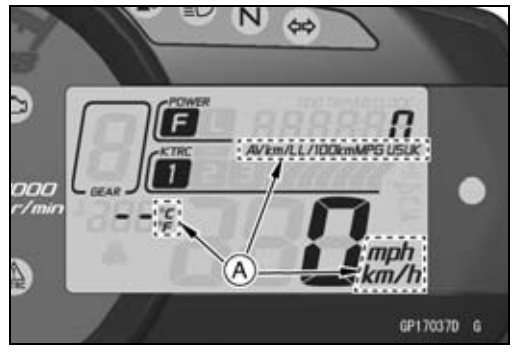
● By pushing the MODE button each time, check that the display [A] changes as follows.



Meter, Gauge, Indicator Unit

● Indicate the ODO mode.
● By pushing the RESET button each time while the MODE button pushed in, check that the display [A] changes as follows.



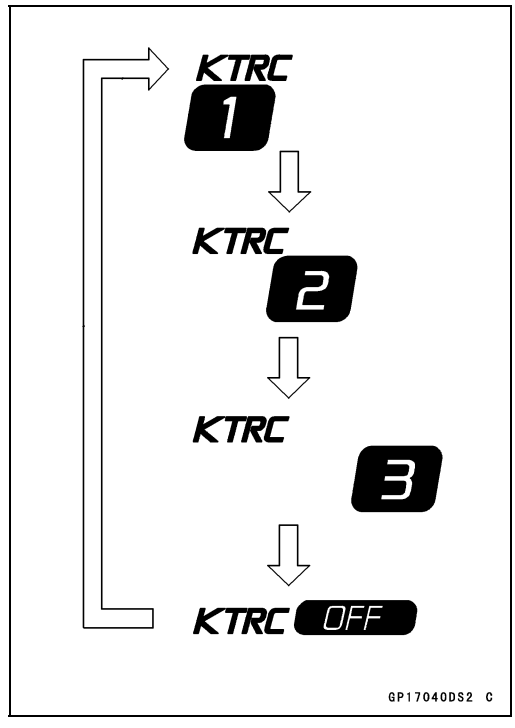


NOTE

○*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, replace the meter unit.

● By pushing (0.3 ~ 0.4 seconds) the KTRC button [A] at the left handlebar switch housing each time, check that the KTRC indicator symbol changes to going on.
★If the indicator symbol does not work, check the following parts.
KTRC Button (see Switch Inspection)
Wiring (see Meter Unit Circuit)
★If the above parts are good, replace the meter unit and/or ECU.

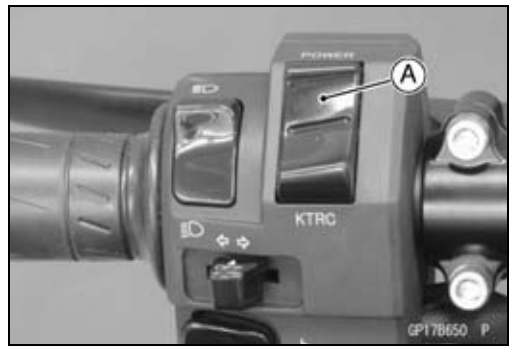


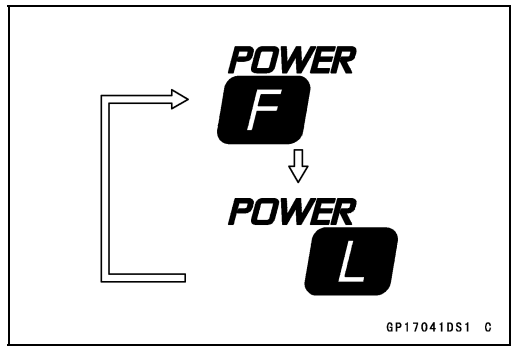
Meter, Gauge, Indicator Unit

- By pushing (0.3 ~ 0.4 seconds) the power mode button [A] at the left handlebar switch housing each time, check that the power mode symbol changes to going on.

★If the display function does not work, check the following parts.
Power Mode Button (see Switch Inspection)
Wiring (see Meter Unit Circuit)

★If the above parts are good, replace the meter unit and/or ECU.





Check 1-2: Gear Position Indication Inspection

- Turn the ignition switch on.

○The green neutral indicator light (LED) [A] goes on when the transmission gear is neutral position.

- Set the low gear position, and check that the display changes to 1 mark [A] and the green neutral indicator light (LED) goes off.
- Using the suitable stand, raise the rear wheel off the ground.
- Rotate the rear wheel by hand or start the engine, and change the gear position.
- Check that the display corresponding to each gear position (1, 2, 3, 4, 5 or 6) appears.

★If the display function does not work, check the following parts.
Gear Position Switch (see Gear Position Switch Inspection)
Wiring (see Meter Unit Circuit)

★If the above parts are good, replace the meter unit and/or ECU.

Meter, Gauge, Indicator Unit

Meter System Inspection

Check 2-1: Speedometer Inspection

- Using the suitable stand, raise the rear wheel off the ground.
- Rotate the rear wheel by hand or start the engine.
- Check that the display changes speedometer.

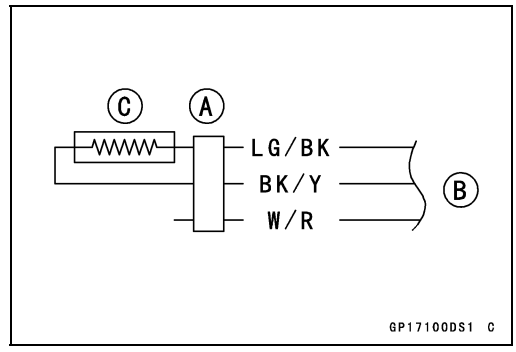
★If the display function does not work, check the following parts.

Rear Wheel Rotation Sensor (see Wheel Rotation Sensor Inspection in the Brakes chapter)
ECU (ECU Power Supply Inspection in the Fuel System (DFI) chapter)
Wiring (see Meter Unit Circuit)

★If the above parts are good, replace the meter unit.

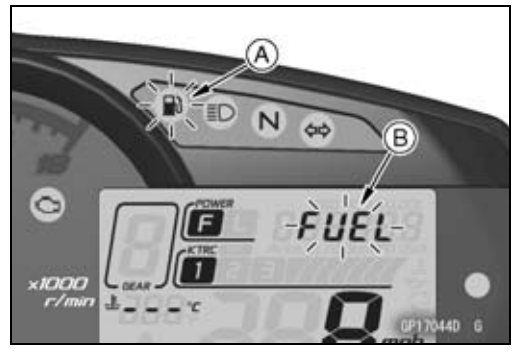
Check 2-2: Fuel Level Warning Inspection

- Disconnect the fuel pump lead connector [A] (see Fuel Tank Removal in the Fuel System (DFI) chapter).
  Main Harness [B]
- Connect the resistor [C] (about 100 Ω) to the fuel pump lead connector terminal as shown in the figure.



- Turn the ignition switch on.
- After about 5 seconds, amber fuel level warning indicator light (LED) [A] goes on and “FUEL” [B] blinks.

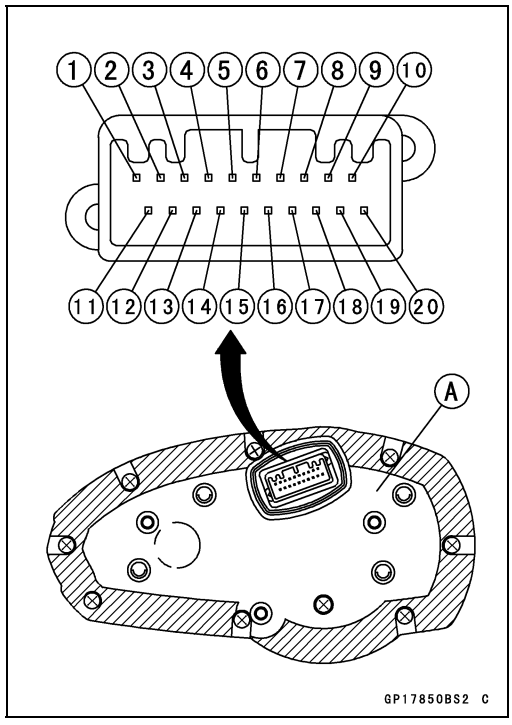
★If the display and indicator light (LED) function does not work, replace the meter unit.



Meter, Gauge, Indicator Unit

Meter Unit Inspection

- Remove the meter unit (see Meter Unit Removal).



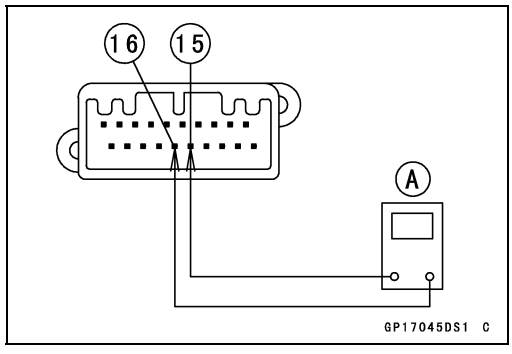
[1] Unused
[2] Unused
[3] Unused
[4] Unused
[5] Unused
[6] Unused
[7] Blue High Beam Indicator Light (LED) (+)
[8] Green Neutral Indicator Light (LED) (–)
[9] Green Turn Signal Indicator Light (LED) (+) for Left
[10] Green Turn Signal Indicator Light (LED) (+) for Right
[11] Unused
[12] Ground (–)
[13] Battery (+)
[14] Ignition
[15] CAN Communication Line (Low)
[16] CAN Communication Line (High)
[17] Oil Pressure Sensor Switch (–)
[18] Fuel Reserve Switch
[19] Power Mode Button
[20] KTRC Button

NOTICE

Do not drop the meter unit. Place the meter unit so that it faces upward. If the meter assembly is left upside down or sideways for a long time or dropped, it will malfunction. Do not short each terminals.

Check 3-1: CAN Communication Line Resistance Inspection

- Connect a digital meter [A] to the terminal [15] and [16] in the meter unit.



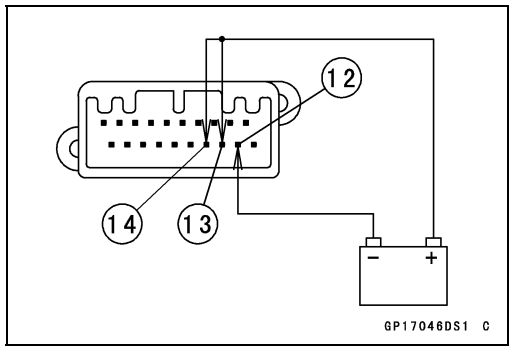
CAN Communication Line Resistance (at Meter Unit)
Standard: 122 ~ 126 Ω

★If the digital meter reading is not specified, replace the meter unit.

Check 3-2: Meter Unit Power Supply Check

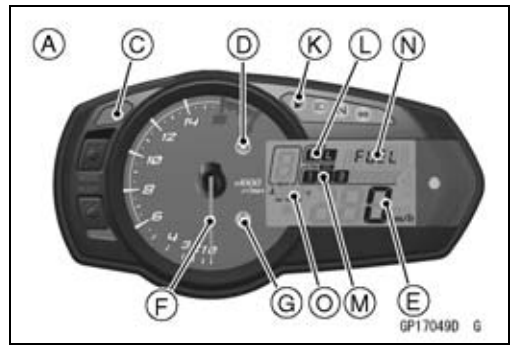
- Using the auxiliary leads, the 12 V battery to the meter unit connector as follows.

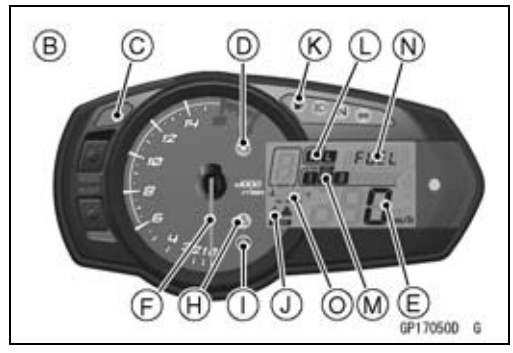
○Connect the battery positive (+) terminal to the terminal [13] [14].
○Connect the battery negative (–) terminal to the terminal [12].



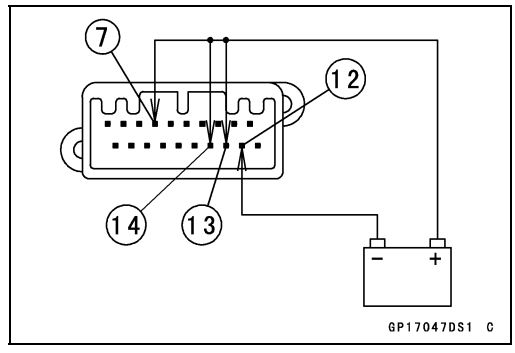
Meter, Gauge, Indicator Unit

● Check that the following.
ZX636E Model [A]
ZX636F Model [B]
○The following Indicator lights (LED) go on for 1 second.
Yellow Shift Up Indicator Light (LED) [C]
Yellow Engine Warning Indicator Light (LED) [D]
○The all LCD segment [E] appear for 3 seconds.
○The tachometer needle [F] momentarily points their last readings and back to the minimum position.
○The following Indicator lights (LED) go on.
Yellow KTRC Warning Indicator Light (LED) [G]
Yellow Warning Indicator Light (LED) [H]
Yellow ABS Indicator Light (LED) [I]
KTRC Warning Symbol [J]
○The following Item blinks.
Amber Fuel Level Warning Indicator Light (LED) [K]
Power Mode Indicator [L]
KTRC Mode Indicator [M]
"FUEL" Segment [N]
"_ _ _" Segment (Water Temperature) [O]
★If the meter unit does not work, replace the meter unit.



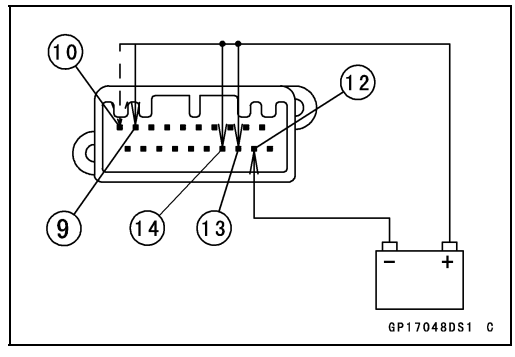


Check 3-3: Blue High Beam Indicator Light (LED) Inspection
● Connect the leads in the same circuit as Check 3-2.
● Connect the terminal [7] to the battery (+) terminal.



● Check that the blue high beam indicator light (LED) [A] goes on.
★If the indicator light does not go on, replace the meter unit.

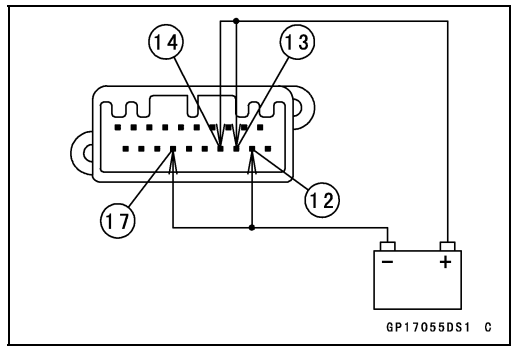
Check 3-4: Green Turn Signal Indicator Light (LED) Inspection
● Connect the leads in the same circuit as Check 3-2.
● Connect the terminal [9] to the battery (+) terminal.
● Connect the terminal [10] to the battery (+) terminal.



Meter, Gauge, Indicator Unit

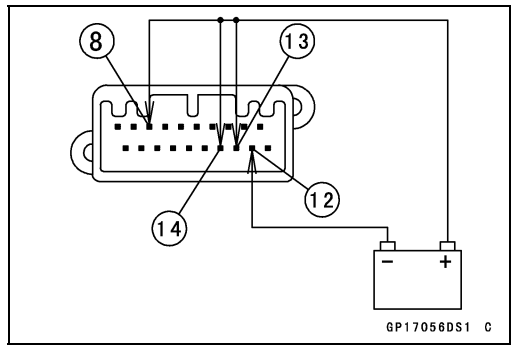
● Check that the green turn signal indicator light (LED) [A] goes on.
★If the indicator light does not go on, replace the meter unit.

Check 3-5: Red Warning Indicator Light (LED) (Oil Pressure Warning) Inspection
● Connect the leads in the same circuit as Check 3-2.
● Connect the terminal [17] to the battery (–) terminal.



● Check that the oil pressure warning symbol [A] and the red warning indicator light (LED) [B] go on.
★If the indicator light does not go on, replace the meter unit.

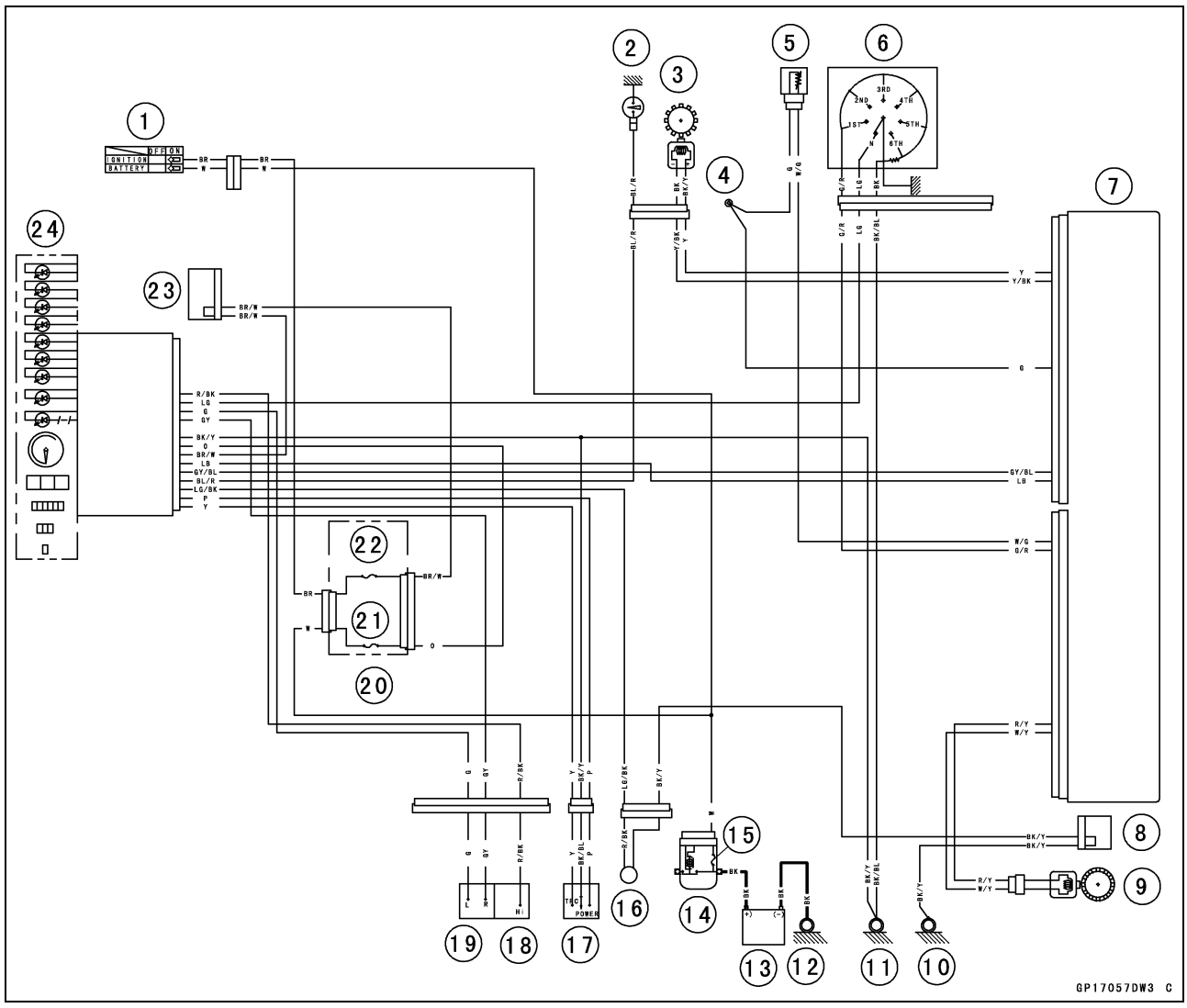
Check 3-6: Green Neutral Indicator Light (LED) Inspection
● Connect the leads in the same circuit as Check 3-2.
● Connect the terminal [8] to the battery (–) terminal.



● Check that the green neutral indicator light (LED) [A] goes on.
★If the indicator light does not go on, replace the meter unit.

Meter, Gauge, Indicator Unit

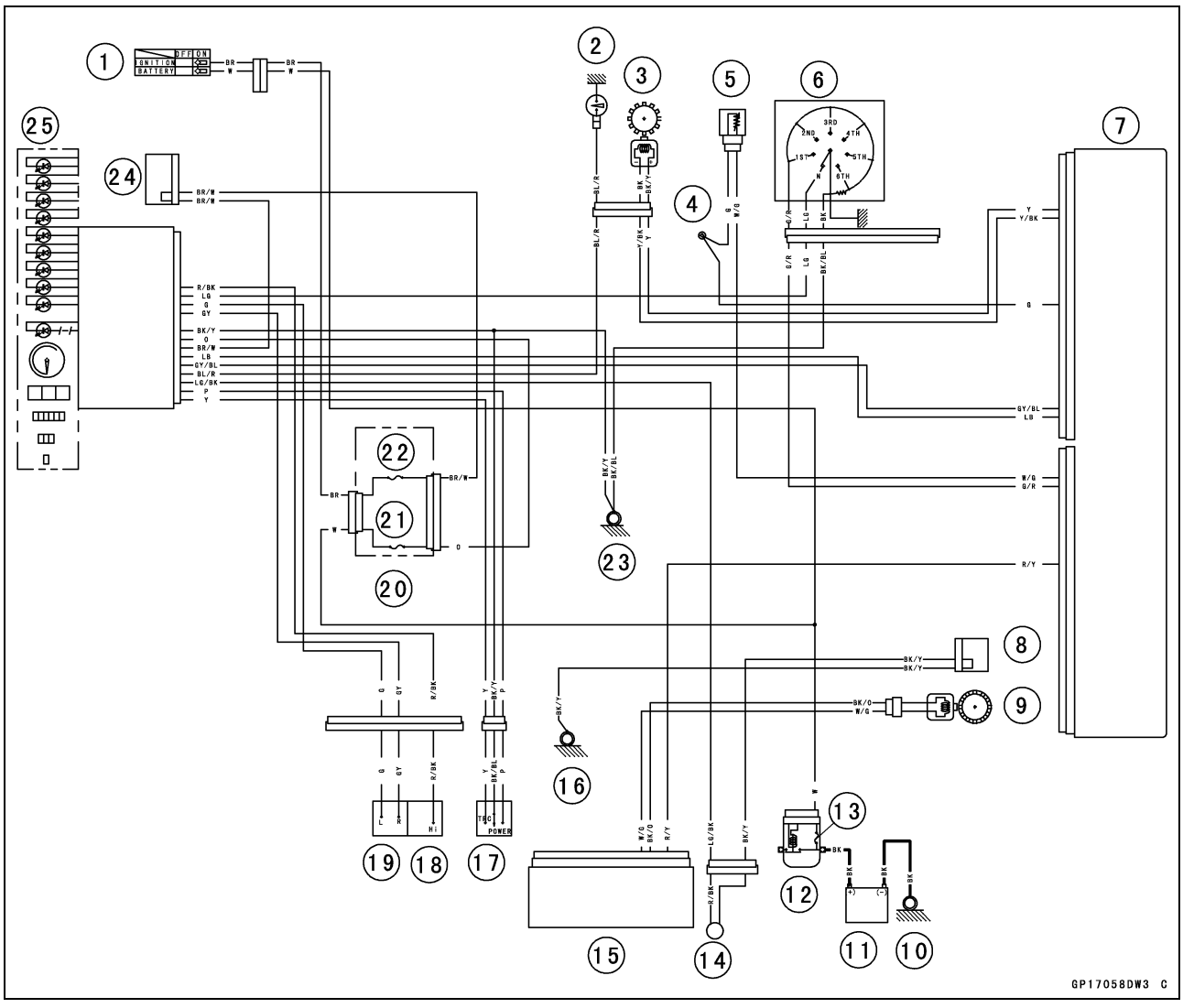
Meter Unit Circuit (ZX636E Model)



1. Ignition Switch
2. Oil Pressure Switch
3. Crankshaft Sensor
4. Water-proof Joint 2
5. Water Temperature Sensor
6. Gear Position Switch
7. ECU
8. Joint Connector C
9. Rear Wheel Rotation Sensor
10. Frame Ground 2
11. Frame Ground 1
12. Engine Ground
13. Battery 12 V 8 Ah
14. Starter Relay
15. Main Fuse 30 A
16. Fuel Reserve Switch
17. Mode Switch
18. Dimmer Switch
19. Turn Signal Switch
20. Fuse Box 1
21. Meter Fuse 7.5 A
22. Ignition Fuse 15 A
23. Joint Connector E
24. Meter Unit

Meter, Gauge, Indicator Unit

Meter Unit Circuit (ZX636F Model)



1. Ignition Switch
2. Oil Pressure Switch
3. Crankshaft Sensor
4. Water-proof Joint 2
5. Water Temperature Sensor
6. Gear Position Switch
7. ECU
8. Joint Connector C
9. Rear Wheel Rotation Sensor
10. Engine Ground
11. Battery 12 V 8 Ah
12. Starter Relay
13. Main Fuse 30 A
14. Fuel Reserve Switch
15. ABS Hydraulic Unit
16. Frame Ground 2
17. Mode Switch
18. Dimmer Switch
19. Turn Signal Switch
20. Fuse Box 1
21. Meter Fuse 7.5 A
22. Ignition Fuse 15 A
23. Frame Ground 1
24. Joint Connector E
25. Meter Unit

Immobilizer System (Equipped Models)

This motorcycle is equipped with an immobilizer system to protect the motorcycle from theft. This system provides a theft proof device by means of matching a code between the inbuilt key transponder and ECU. If the code does not match, ignition system, injectors, subthrottle valve actuator and exhaust butterfly valve actuator will not operate and the engine will not start.

Abstract

- Do not keep more than one immobilizer key of any system on a key ring. Jamming of the key code signal may occur and the operation of the system may be affected.
- The red warning indicator light (LED) will blink for a period of 24 hours once the ignition switch has been switched off and the key removed. This blinking can be set to on or off as desired by holding the MODE and RESET buttons down for 2 seconds within 20 seconds of switching the ignition off.
- If all coded keys are lost the ECU and ignition switch will have to be replaced.
- The immobilizer system can not function until the ignition key code is registered in the ECU.
- A total of five keys can be registered in the ECU at any one time.

Operational Cautions

1. Do not put two keys of any immobilizer system on the same key ring.
2. Do not submerge any key in water.
3. Do not expose any key to excessively high temperature.
4. Do not place any key close to magnet.
5. Do not place a heavy item on any key.
6. Do not grind any key or alter its shape.
7. Do not disassemble the plastic part of any key.
8. Do not drop the key and/or apply any shocks to the key.
9. When a ignition key is lost, the user should go to his dealer to invalidate the lost key registration in the ECU.
10. When the all ignition keys are lost, the user should go to his dealer and have a new ECU installed and register the ignition keys.

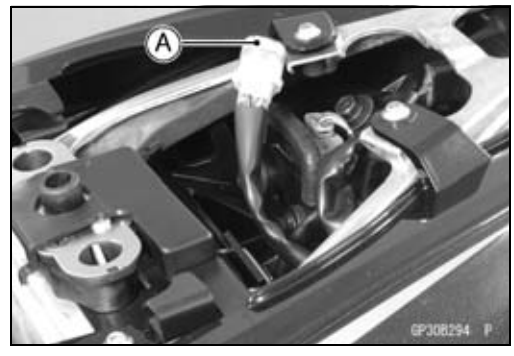
NOTE

○*No.9 and 10 are strongly recommended to the customer to ensure security of the motorcycle.*

Key Registration

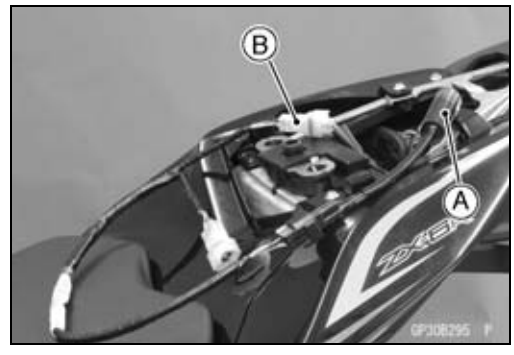
Case 1: When the ignition key has been lost or additional spare ignition key is required.

- Prepare a new spare ignition key.
- Cut the key in accordance with the shape of the current ignition key.
- Remove the rear seat (see Rear Seat Removal in the Frame chapter).
- Remove the immobilizer/Kawasaki diagnostic system connector cap [A].



- Connect the key registration unit [A] and key registration adapter [B] as shown.

Special Tools - Key Registration Unit: 57001-1582
Key Registration Adapter: 57001-1746

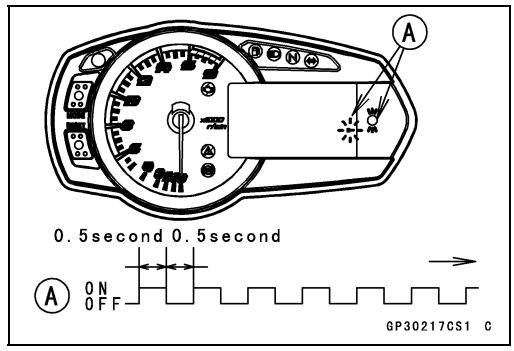


Immobilizer System (Equipped Models)

● Insert the registered ignition key to the ignition switch and turn it to “ON.”

Verified

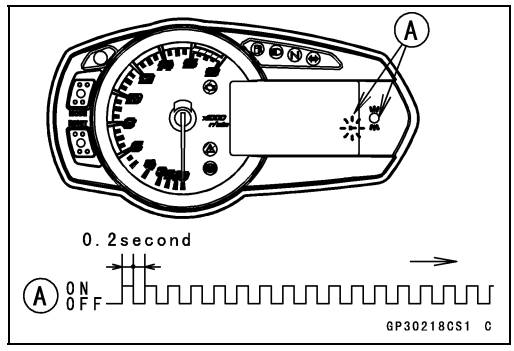
○The red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the registration mode (go to the next step).



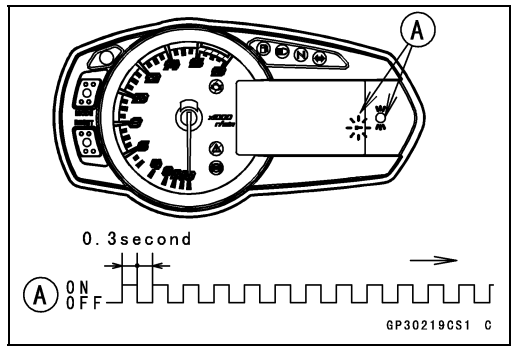
Not Verified

○The red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the collation error (refer to the following failure illustrations).

Immobilizer Amplifier Failure



Registered Ignition Key Collation Error



● Turn the registered ignition key to “OFF” and remove the registered ignition key.

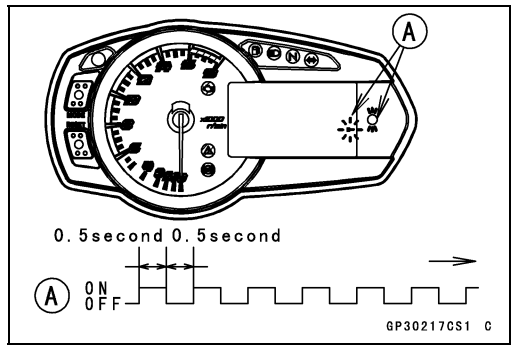
★If there are other registered ignition keys, they should all do the procedure above.

○The red warning indicator light (LED) and immobilizer symbol [A] blink continuously to display that the ECU is in the registration mode for 15 seconds.

NOTE

○*Insert next key and turn it to “ON” within 15 seconds after previous key is turned to “OFF” and removed otherwise registration mode will be ended and the red warning indicator light (LED) and immobilizer symbol stops blinking.*

○*To return to the registration mode start the registered ignition key(s) verification procedure. This applies to all ignition key registration.*



● Insert the ignition key 1 to the ignition switch and turn it to “ON.”

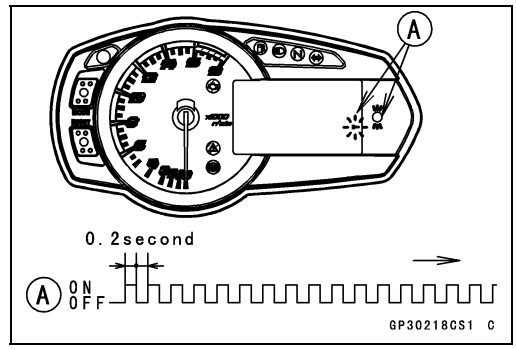
NOTE

○*Keep the other ignition key away from the immobilizer antenna.*

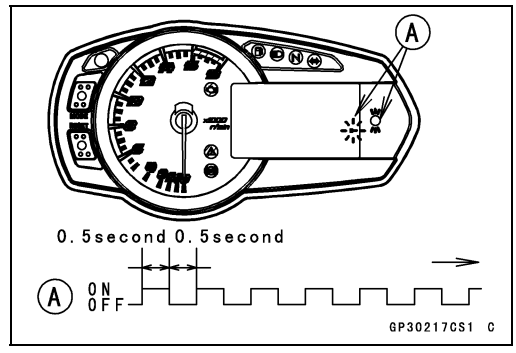
Immobilizer System (Equipped Models)

○If there is any problem in the registration, the red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the collation error.

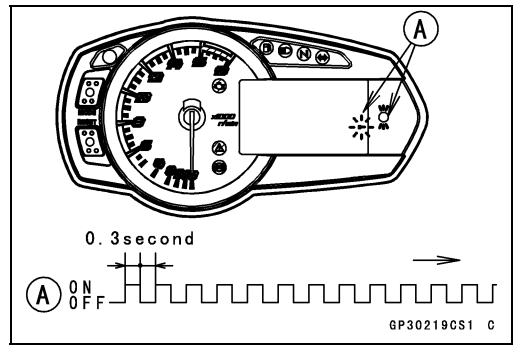
Immobilizer Amplifier Failure



When Registered Ignition Key is Inserted.

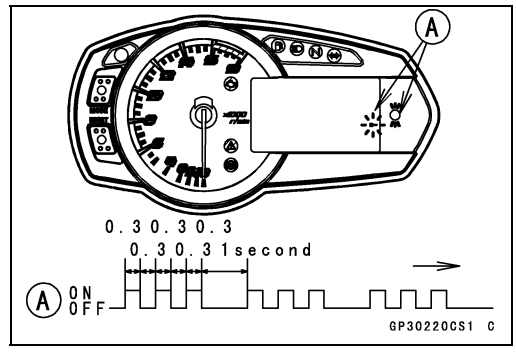


Ignition Key Collation Error



● The ignition key 1 is successfully registered in the ECU.

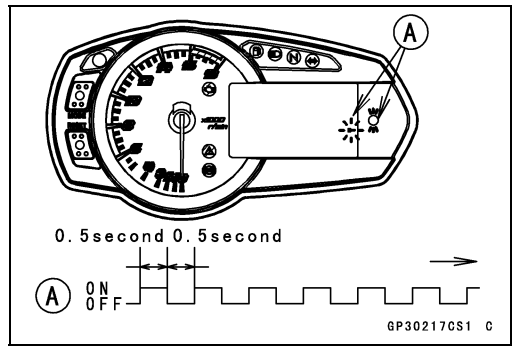
○The red warning indicator light (LED) and immobilizer warning symbol [A] blink 3 times and stops for 1 second and then repeats this cycle.



Immobilizer System (Equipped Models)

● Turn the ignition key 1 to “OFF” and remove the ignition key 1.

○The red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the registration mode.



NOTE

○*Turn to “OFF” the ignition switch and wait for the period of 15 seconds or more. The registration mode automatically finishes and the red warning indicator light (LED) and immobilizer warning symbol will switch off.*

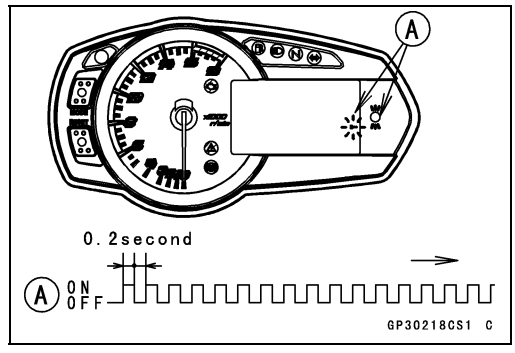
○*This procedure registered the registered ignition key and one ignition key.*

○*Continue with the procedure to register the second and later keys before the 15 seconds period has elapsed.*

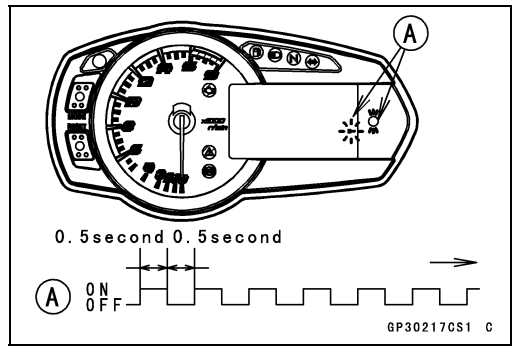
● Insert the ignition key 2 to the ignition switch and turn it to “ON.”

○If there is any problem in the registration, the red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the collation error.

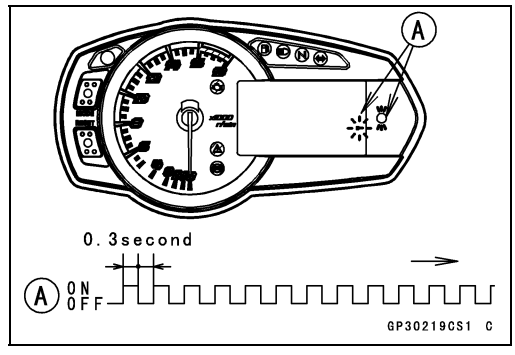
Immobilizer Amplifier Failure



When Registered Ignition Key is Inserted.

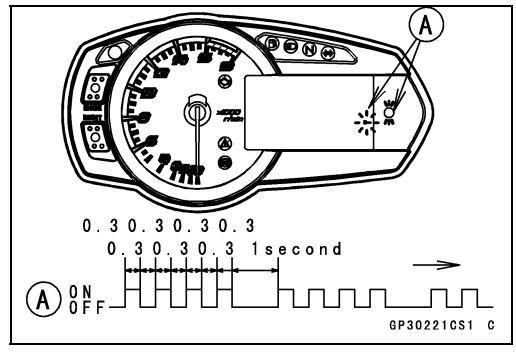


Ignition Key Collation Error



Immobilizer System (Equipped Models)

- The ignition key 2 is registered in the ECU.
- ○The red warning indicator light (LED) and immobilizer warning symbol [A] blink 4 times and stops for 1 second and then repeats this cycle.
- ○This procedure has registered the 2 ignition keys.
- Continue with the procedure to register an additional one ignition key.



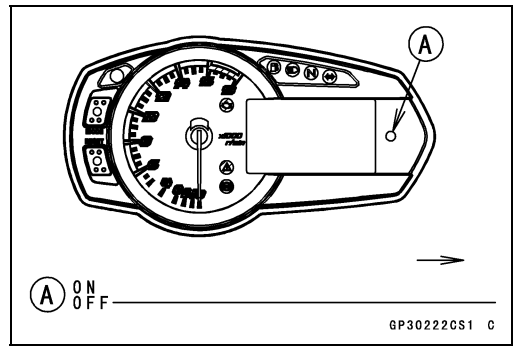
NOTE

○*The ECU can store up the five key codes.*

Red Warning Indicator Light (LED) and Symbol Blink

	Indicator Light and Symbol Blinks	Indicator Light and Symbol Stop	Remarks
Ignition Key 3	5 times	1 second	Repeat

- Turn to “OFF” the ignition switch and wait for period of more than 15 seconds.
- The registration mode automatically ends.
- The red warning indicator light (LED) goes off [A].



- Remove the key registration unit, key registration adapter and install the immobilizer/Kawasaki diagnostic system connector cap.

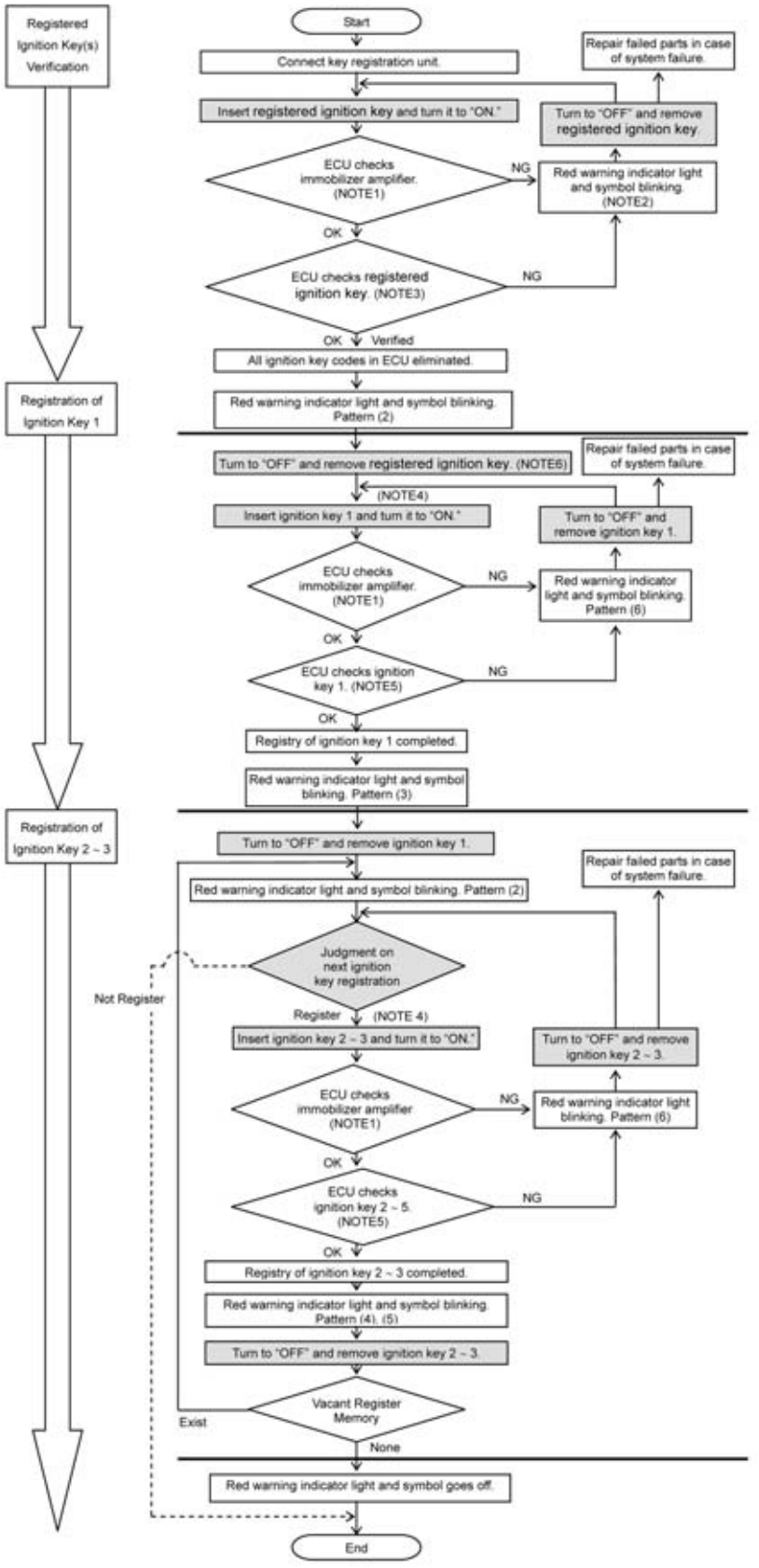
NOTE

○*Turn the ignition switch to “ON” with the registered ignition key.*

○*Check that the engine can be started using all registered ignition keys.*

Immobilizer System (Equipped Models)

Spare Ignition Key Registration Flow Chart



NOTE

1. ECU confirms the following.
   - O Power Supply of Amplifier
   - O Connection of Amplifier
   - O Time of Transmitting and Receiving Signals
2. ECU confirms the following.
   - O Immobilizer Amplifier Failure Pattern (1)
   - O Registered Ignition Key Collation Error Pattern (6)
3. ECU confirms the following.
   - O Registered Ignition Key Code.
   - O Matching Unique Code
4. Key Registration Waiting Time.
   Insert next key and turn it to "ON" within 15 seconds after previous key is turned to "OFF."
5. ECU confirms the following.
   - O Matching Unique Code
   - O Not Registered Ignition Key
   - O Ignition Key or not
6. Perform the same procedure for other registered ignition key(s).

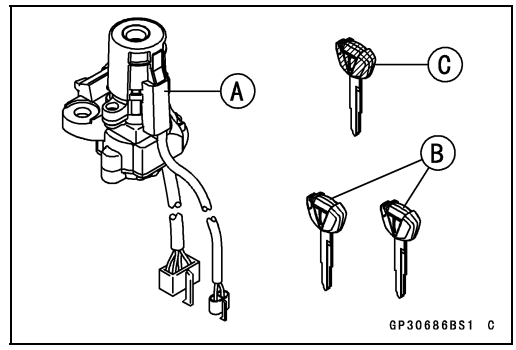
GP30213C F

Immobilizer System (Equipped Models)

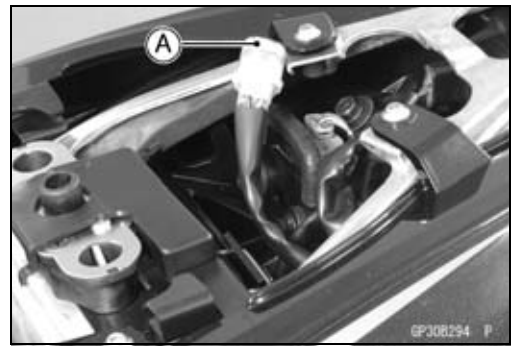
Case 2: When the ignition switch is faulty and to be replaced.

- Prepare a new ignition switch [A] and two new ignition keys [B].

○These parts are available as a set. Prepare the current registered ignition key [C].

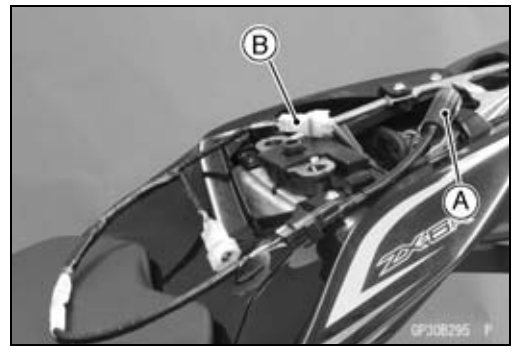


- Remove:
  Ignition Switch and Immobilizer Antenna (see Immobilizer System Parts Replacement)
  Rear Seat (see Rear Seat Removal in the Frame chapter)
- Remove the immobilizer/Kawasaki diagnostic system connector cap [A].



- Connect the key registration unit [A] and key registration adapter [B] as shown.

Special Tools - Key Registration Unit: 57001-1582
Key Registration Adapter: 57001-1746

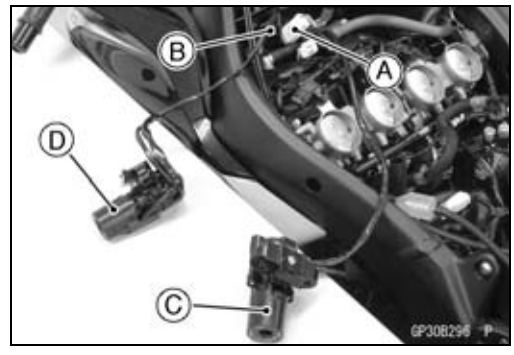


- Connect:
  New Ignition Switch Lead Connector [A]
  Current Immobilizer Antenna Lead Connector [B]

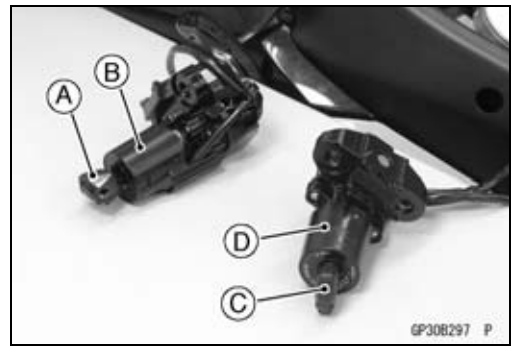
NOTE

○*Keep the ignition switches more than 15 cm (5.9 in.).*

New Ignition Switch [C]
Current Ignition Switch [D]

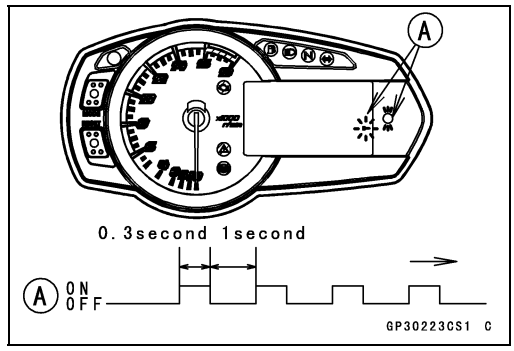


- Insert the current registered ignition key [A] at the current ignition switch [B].
- Insert the new ignition key 1 [C] to the new ignition switch [D] and turn it to “ON.”



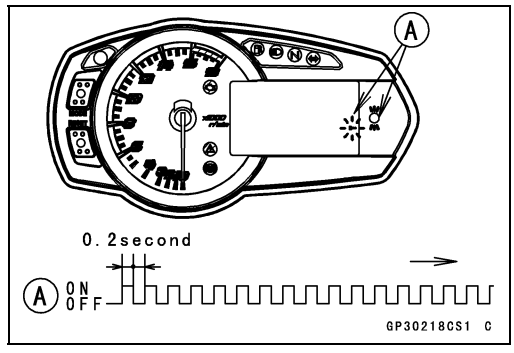
Immobilizer System (Equipped Models)

○The red warning indicator light (LED) and immobilizer warning symbol [A] blink 1 time and stops for 1 second and repeats this cycle.

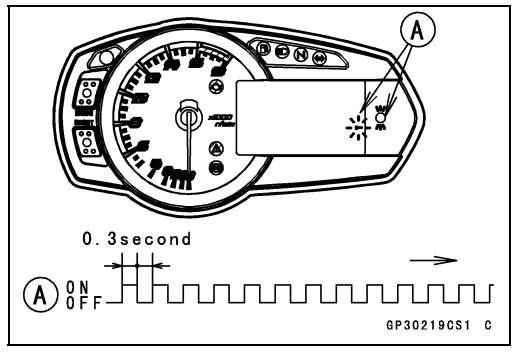


Not Verified

○The red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the collation error.
Immobilizer Amplifier Failure



Registered Ignition Key Collation Error



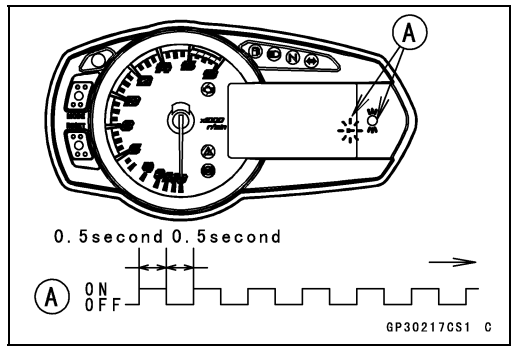
● Turn to “OFF” and remove the new ignition key 1.

NOTE

○*Insert the next key and turn it to “ON” within 15 seconds after previous key is turned to “OFF” and removed otherwise registration mode will be ended and the red warning indicator light (LED) and immobilizer warning symbol stops blinking.*

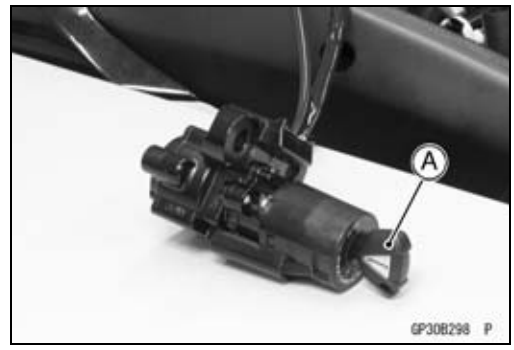
Verified

○The red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the ECU is in the registration mode (go to the next step).



Immobilizer System (Equipped Models)

- Disconnect the immobilizer antenna connector, then connect the antenna connector of the new ignition switch.
- Insert the ignition key 1 [A] again into the new ignition switch and turn it to “ON.”

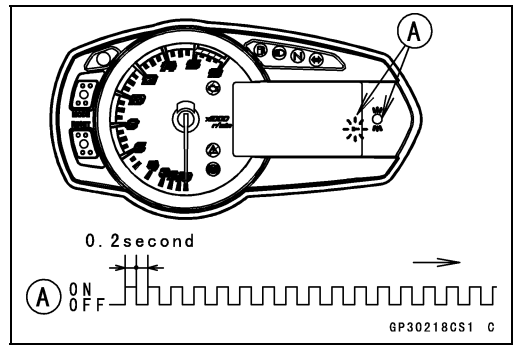


NOTE

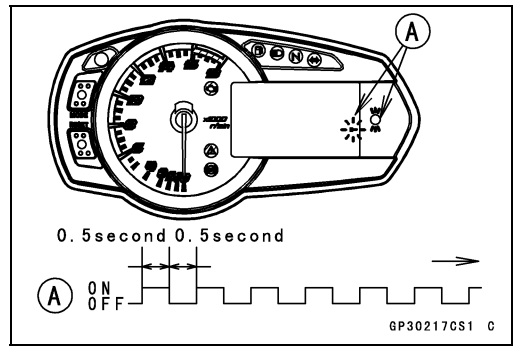
- ○*Insert the next key and turn it to “ON” within 15 seconds after previous key is turned to “OFF” and removed otherwise registration mode will be ended and the red warning indicator light (LED) and immobilizer warning symbol stops blinking.*
- ○*To return to the registration mode start the registered ignition key verification procedure. This applies to all ignition key registration.*
- ○*Keep other ignition keys away from the ignition switch.*

○If there is any problem in the registration, the red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the collation error.

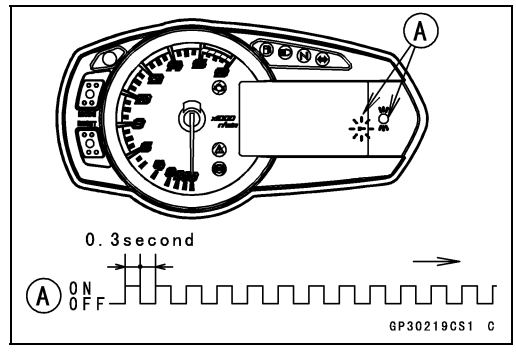
Immobilizer Amplifier Failure



When Registered Ignition Key is Inserted.

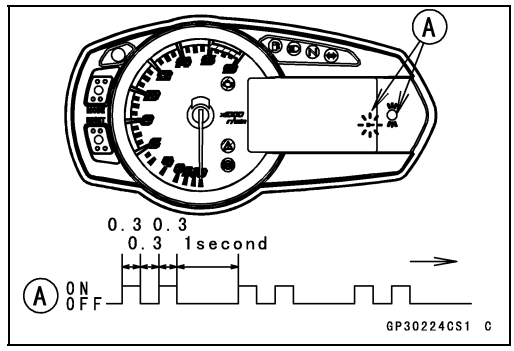


Ignition Key Collation Error



Immobilizer System (Equipped Models)

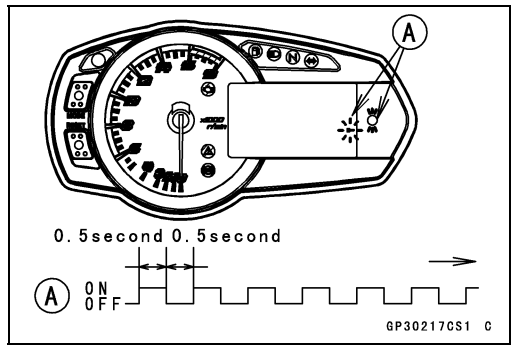
● The ignition key 1 is successfully registered in the ECU.
○The red warning indicator light (LED) and immobilizer warning symbol [A] blink 2 times and stops for 1 second and then repeats this cycle to indicate successful registering of ignition key 1.



● Turn to “OFF” and remove ignition key 1.
○The red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the registration mode.

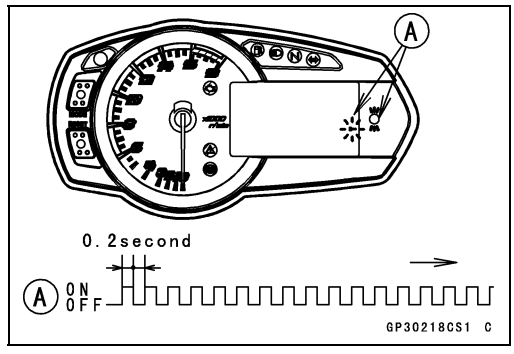
NOTE

○*Turn to “OFF” the ignition switch and wait for the period more than 15 seconds. The registration mode automatically ends and red warning indicator light (LED) goes off.*
○*This procedure has , registered the registered ignition key and one ignition key.*
○*Continue the procedure to program the second and later keys.*

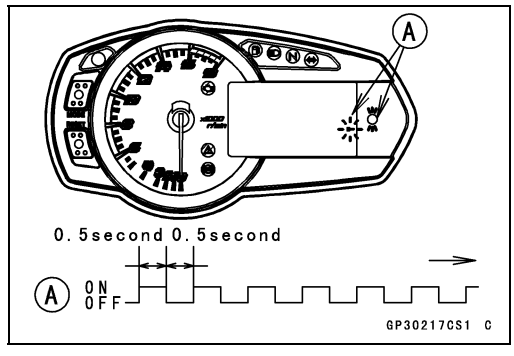


● Insert the ignition key 2 to the ignition switch and turn it to “ON.”

○If there is any problem in the registration, the red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the collation error.
Immobilizer Amplifier Failure

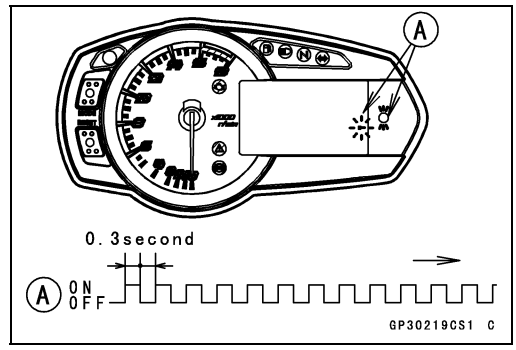


When Registered Ignition Key is Inserted.



Immobilizer System (Equipped Models)

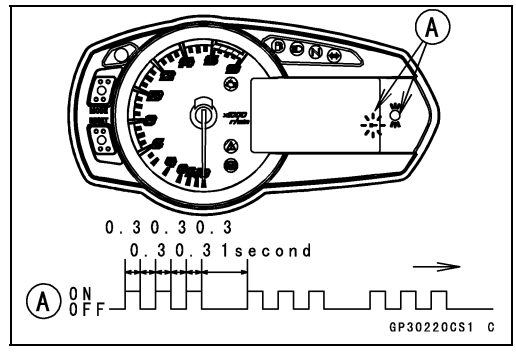
Ignition Key Collation Error



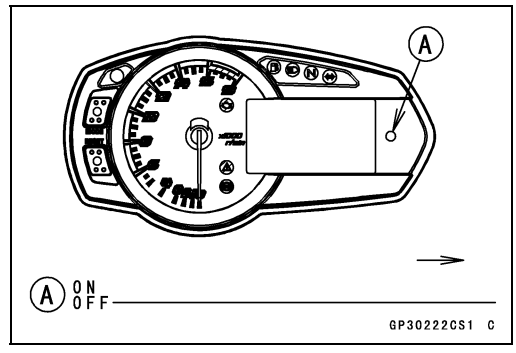
- The ignition key 2 is successfully registered in the ECU.

○The red warning indicator light (LED) and immobilizer warning symbol [A] blink 3 times and stops for 1 second and then repeat this cycle to indicate successful programming of ignition key 2.

- Turn to “OFF” the ignition switch and wait for period more than 15 seconds.
- The registration mode automatically ends.



- The red warning indicator light (LED) goes off [A].



- Remove the key registration unit, key registration adapter and install the immobilizer/Kawasaki diagnostic system connector cap.

NOTE

○*Turn the ignition switch to “ON” with the registered ignition key.*

○*Check that the engine can be started using all registered ignition keys.*

- Install the new ignition switch (see Immobilizer System Parts Replacement).

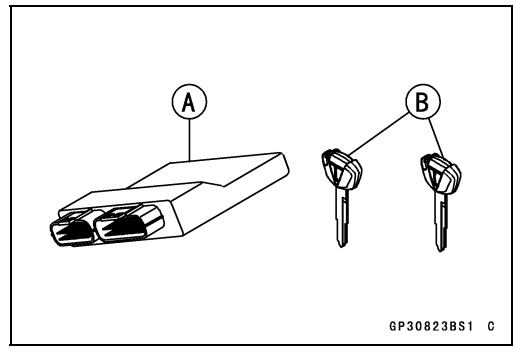
Case 3: When the ECU is faulty and has to be replaced.

- Prepare a new ECU [A] and current registered ignition key(s) [B].

NOTE

○*The key registration unit is not required.*

○*After replacing the ECU, be sure to register the 2 ignition keys. If the 2 keys are not registered, the engine can not be started.*

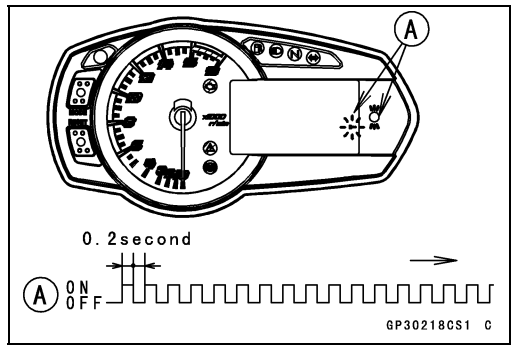


Immobilizer System (Equipped Models)

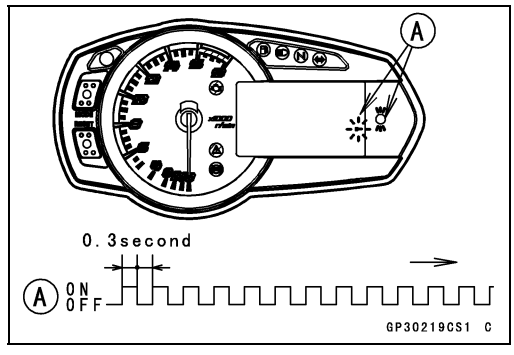
● Replace the ECU [A] (see ECU Removal/Installation in the Fuel System (DFI) chapter).

● Insert the current registered ignition key into the ignition switch and turn it to “ON.”

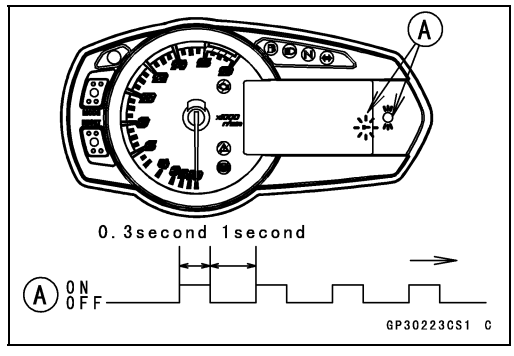
○If there is any problem in the registration, the red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the collation error.
Immobilizer Amplifier Failure



Registered Ignition Key Collation Error

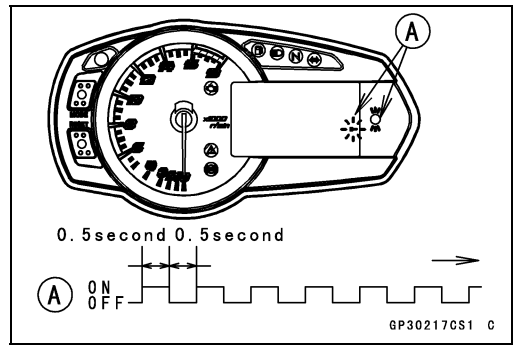


● The registered ignition key is registered in the ECU.
○The red warning indicator light (LED) and immobilizer warning symbol [A] blink 1 time and stops for 1 second and the repeats this cycle to indicate successful registration of the registered ignition key.



Immobilizer System (Equipped Models)

● Turn to “OFF” the registered ignition key and remove it.
○The red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the registration mode.



NOTE

○*Insert next key and turn it to “ON” within 15 seconds after previous key is turned to “OFF” and removed otherwise registration mode will be ended and the red warning indicator light (LED) goes off.*
○*To return to the registration mode start the registered ignition key verification procedure. This applies to all ignition key registration.*

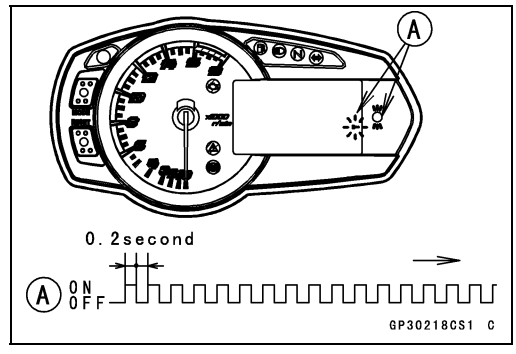
● Insert the other remaining registered ignition key to the ignition switch and turn it to “ON.”

NOTE

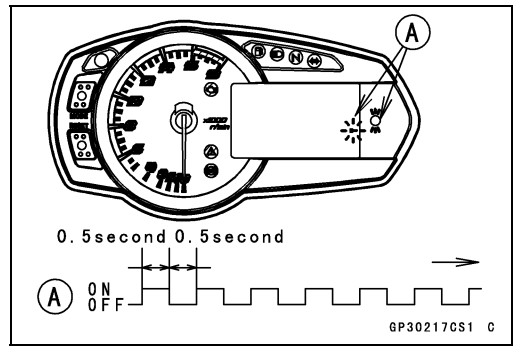
○*Keep the other ignition keys away from the immobilizer antenna.*

○If there is any problem in the registration, the red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the collation error.

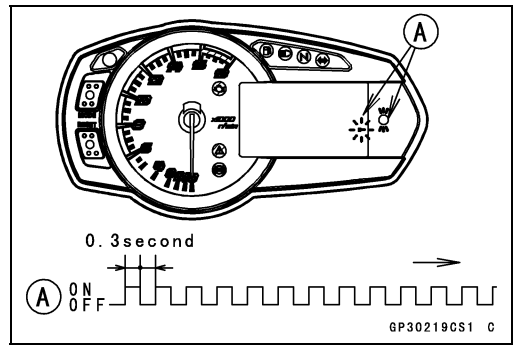
Immobilizer Amplifier Failure



When Registered Ignition Key is Inserted.

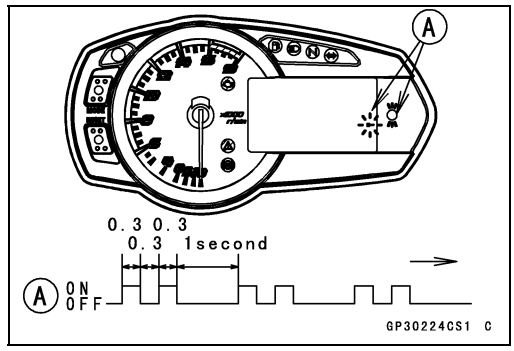


Ignition Key Collation Error

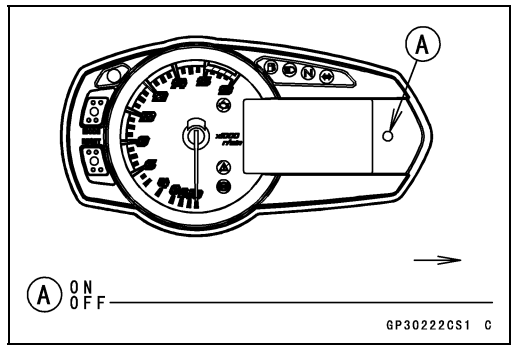


Immobilizer System (Equipped Models)

● The other remaining ignition key is registered in the ECU.
○The red warning indicator light (LED) and immobilizer warning symbol [A] blink 2 times and stops for 1 second and then repeats this cycle to indicate successful registration of ignition key.



● Turn to “OFF” the ignition switch and wait for period more than 15 seconds.
● The registration mode automatically ends.
● The red warning indicator light (LED) goes off [A].



NOTE

○*Turn the ignition switch to “ON” with the registered ignition key.*
○*Check that the engine can be started using all registered ignition keys.*

Case 4: When all registered ignition keys are faulty or lost.

The all registered ignition keys replacement is considered very rare case. However if it is required, the following is necessary.

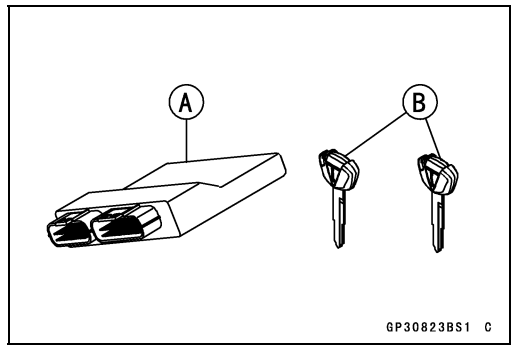
NOTE

○*The ECU must be replaced with a new one because the registered ignition key code that is registered in the current ECU can not be rewritten.*

● Prepare a new ECU [A] and 2 new ignition keys [B].

NOTE

○*The key registration unit is not required.*
○*The key registration process is same as the electric control unit replacement.*

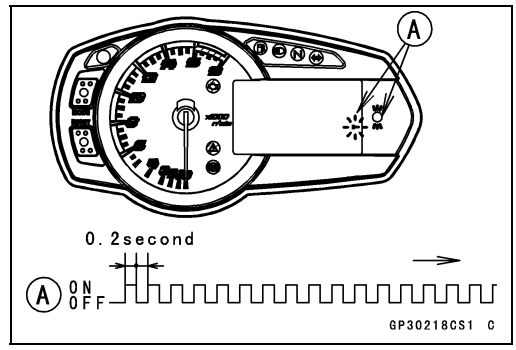


● Insert the first ignition key into the ignition switch and turn it to “ON.”

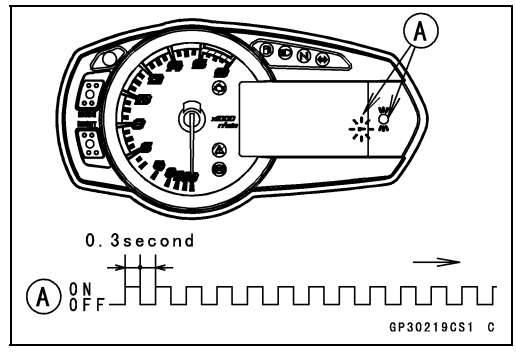
Immobilizer System (Equipped Models)

○If there is any problem in the registration, the red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the collation error.

Immobilizer Amplifier Failure

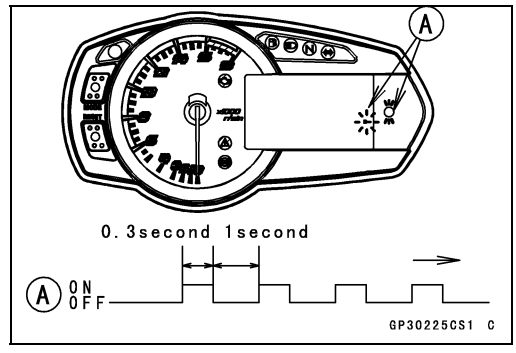


Ignition Key Collation Error



● The first ignition key is registered in the ECU.

○The red warning indicator light (LED) and immobilizer warning symbol [A] blink 1 time and stops for 1 second and the repeats this cycle to indicate successful registration of the first ignition key.



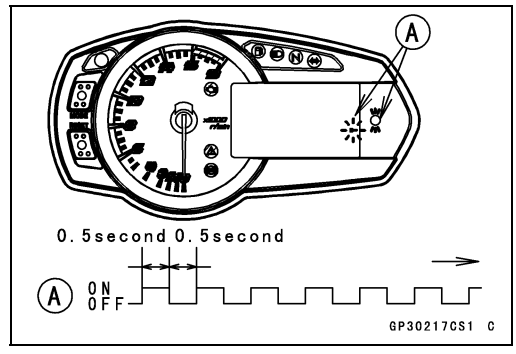
● Turn to “OFF” the first ignition key and remove it.

● The red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the registration mode.

NOTE

○*Insert next key and turn it to “ON” within 15 seconds after previous key is turned to “OFF” and removed otherwise registration mode will be ended and the red warning indicator light (LED) goes off.*

○*To return to the registration mode start the registered ignition key verification procedure. This applies to all ignition key registration.*



● Insert the second ignition key to the ignition switch and turn it to “ON.”

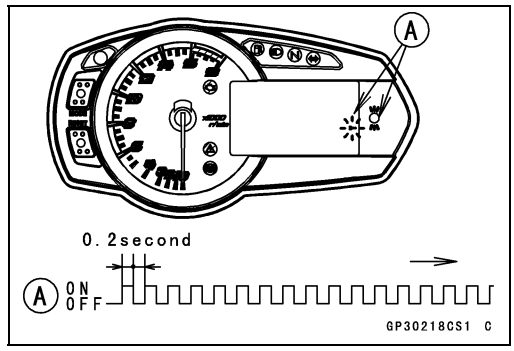
NOTE

○*Keep the other ignition keys away from the immobilizer antenna.*

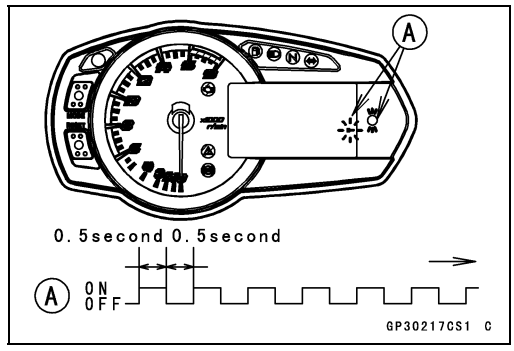
Immobilizer System (Equipped Models)

○If there is any problem in the registration, the red warning indicator light (LED) and immobilizer warning symbol [A] blink to display the collation error.

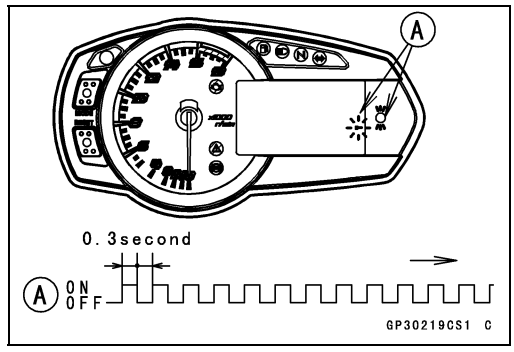
Immobilizer Amplifier Failure



When Registered Ignition Key is Inserted



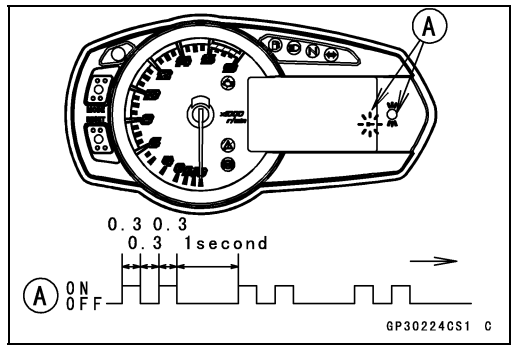
Ignition Key Collation Error



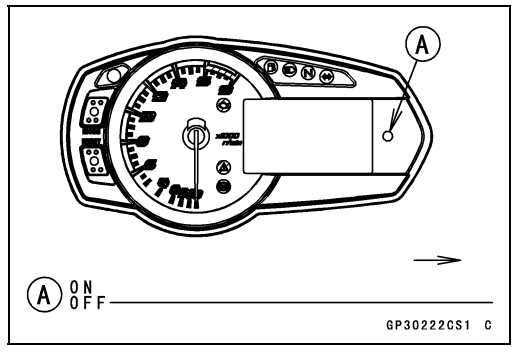
- The second ignition key is registered in the ECU.

○The red warning indicator light (LED) and immobilizer warning symbol [A] blink 2 times and stops for 1 second and then repeats this cycle to indicate successful registration of second ignition key.

- Turn to “OFF” the ignition switch and wait for period more than 15 seconds.
- The registration mode automatically ends.



- Red warning indicator light (LED) [A] goes off.



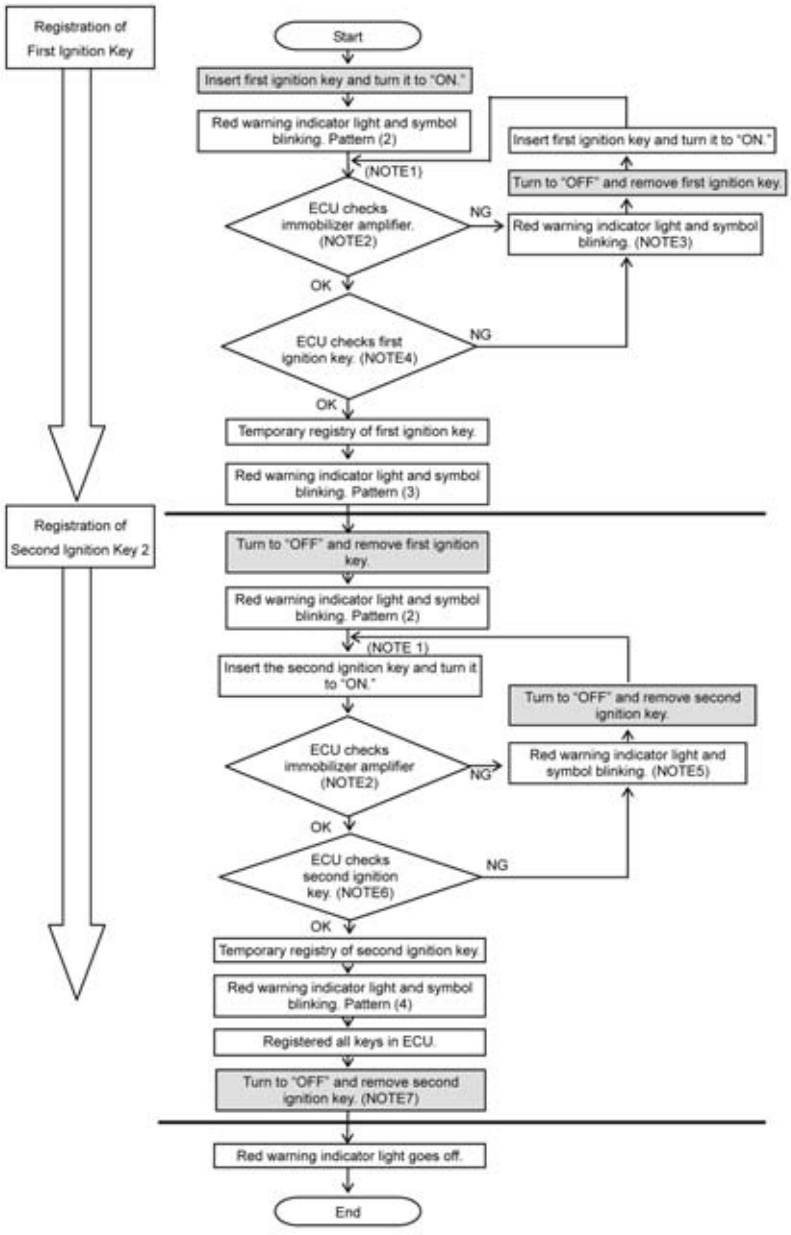
Immobilizer System (Equipped Models)

NOTE

- *Turn the ignition switch to “ON” with the registered ignition key.*
- *Check that the engine can be started using all registered ignition keys.*

Immobilizer System (Equipped Models)

All Keys Initial Registration Flow Chart



NOTE

1. Key Substitute Time
   Insert next key and turn it to "ON" within 15 seconds after previous key is turned to "OFF."
2. ECU confirms the following.
   - O Power Supply of Amplifier
   - O Connection of Amplifier
   - O Time of Transmitting and Receiving Messages.
3. ECU confirms the following.
   - O Immobilizer Amplifier Failure Pattern (1)
   - O Ignition Key Collation Error Pattern (5)
4. ECU confirms the following.
   - O Ignition Key or Not
   - O Match the Unique Code
5. ECU confirms the following.
   - O Immobilizer Amplifier Failure Pattern (1)
   - O Second Ignition Key Collation Error Pattern (5)
   - O Registered Ignition Key is Inserted Pattern (2)
6. ECU confirms the following.
   - O Ignition Key or Not.
   - O Match the Unique Code
   - O Not Registered Ignition Key
7. When the ECU-registered key is turned to "OFF", ECU keeps the power on for two seconds.
   And then, in two seconds after the key is turned to "OFF", ECU turns the power off.

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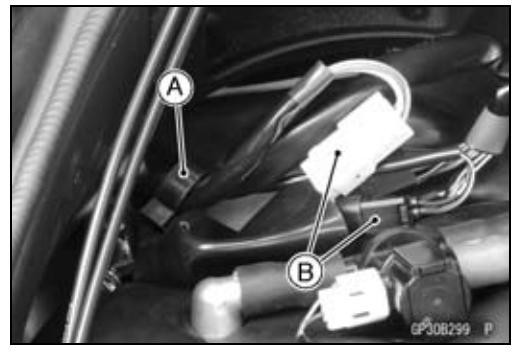
Immobilizer System (Equipped Models)

Immobilizer System Parts Replacement

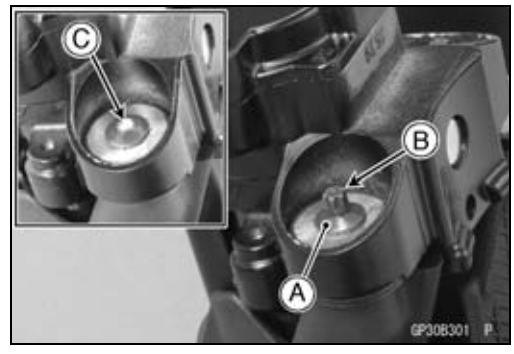
Ignition Switch Replacement

- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter)
- Open the clamp [A].
- Disconnect the lead connectors [B].



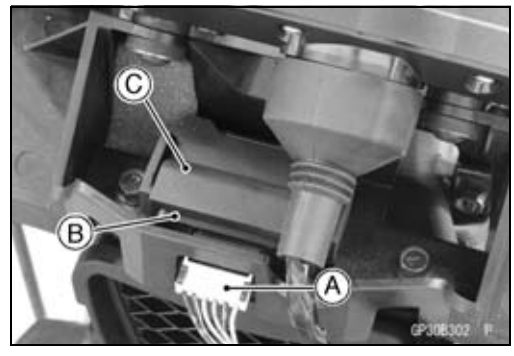
- Remove:
  Steering Stem Head and Handlebars (see Handlebar Removal in the Steering chapter)
- Using a small chisel or punch [A], turn out the Torx bolts.
- Pull out the ignition switch from the steering stem head.

- Register the more than two ignition keys (see Key Registration).
- Tighten a new Torx bolt [A] until the bolt head [B] is broken [C].
- Run the leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).



Immobilizer Amplifier Replacement

- Remove the upper fairing assembly (see Upper Fairing Assembly Removal in the Frame chapter).
- Disconnect the connector [A].
- Pull out the immobilizer amplifier [B] together with the rubber protector [C] from the meter bracket.



ECU Replacement

- Refer to the ECU Removal/Installation in the Fuel System (DFI) chapter.

Immobilizer System (Equipped Models)

Immobilizer Relational Parts Replacement Chart

		Failed or Lost Part			
		Ignition Key	Ignition Switch	Amplifier	ECU
*	Ignition Key	●	○		
	Ignition Switch		●		
	Amplifier			●	
	ECU	○			●

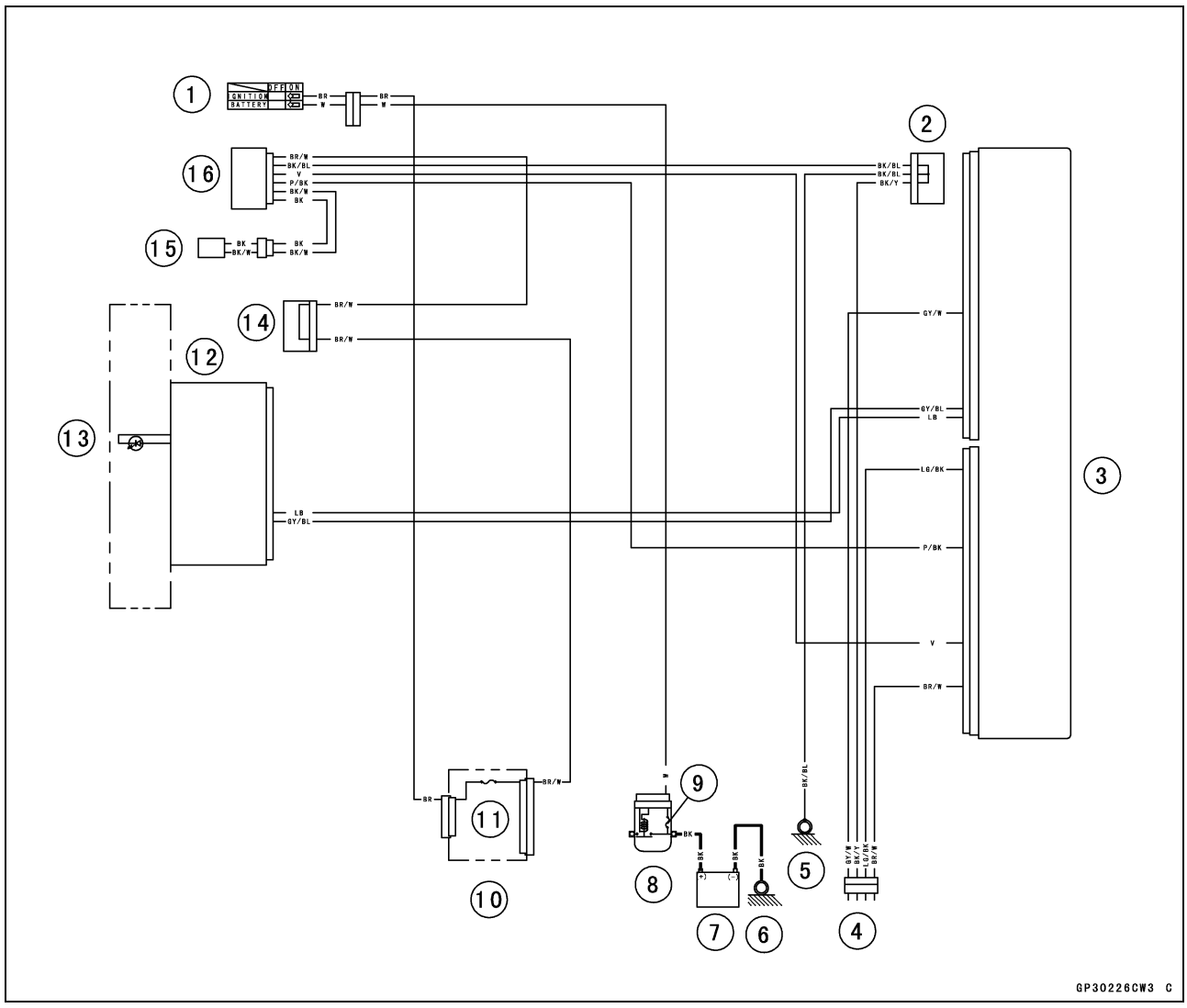
*	Replacement Part
●	Main Replacement Part
○	Additional Replacement Part

Immobilizer System Inspection

- Refer to the Immobilizer Amplifier and Blank Key Detection section in the Fuel System (DFI) chapter.

Immobilizer System (Equipped Models)

Immobilizer System Circuit



1. Ignition Switch
2. Joint Connector D
3. ECU
4. Immobilizer/Kawasaki Diagnostic System Connector
5. Frame Ground 1
6. Engine Ground
7. Battery 12 V 8 Ah
8. Starter Relay
9. Main Fuse 30 A
10. Fuse Box 1
11. Ignition Fuse 15 A
12. Meter Unit
13. Red Warning Indicator Light (LED)
14. Joint Connector E
15. Immobilizer Antenna
16. Immobilizer Amplifier

Switches and Sensors

Brake Light Timing Inspection

● Refer to the Brake Light Switch Operation Inspection in the Periodic Maintenance chapter.

Brake Light Timing Adjustment

● Refer to the Brake Light Switch Operation Inspection in the Periodic Maintenance chapter.

Switch Inspection

● Using a digital meter, check to see that only the connections shown in the table have continuity.

○For the switch housings 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.

Rear Brake Light Switch Connections

Rear Brake Light Switch Connections		
Color	BR	BL
When brake pedal is pushed down	○——○	
When brake pedal is released		

Sidestand Switch Connections

Sidestand Switch Connections		
Color	BK	G
When sidestand is down		
When sidestand is up	○——○	

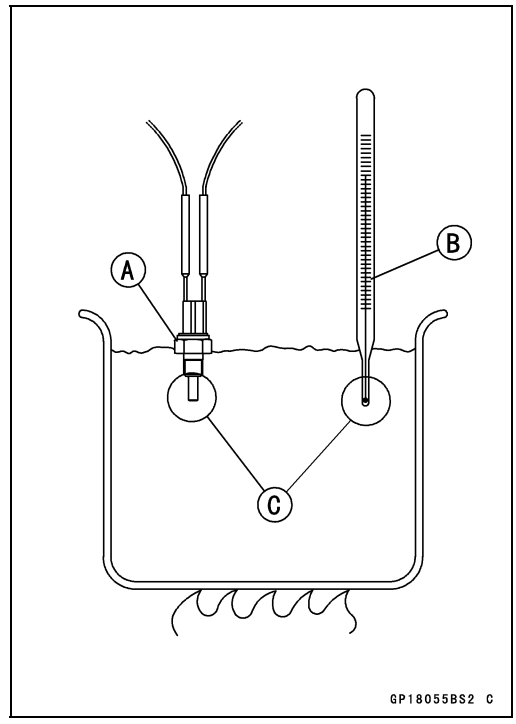
Oil Pressure Switch Connections*

Oil Pressure Switch Connections *		
Color	SW. Terminal	Ground
When engine is stopped	○——○	
When engine is running		

*: Engine lubrication system is in good condition.

Switches and Sensors

Water Temperature Sensor Inspection



- Remove the water temperature sensor (see Water Temperature Sensor Removal/Installation in the Self-Diagnosis System chapter).
- Suspend the sensor [A] in a container of coolant so that the temperature-sensing projection [C] is submerged.
- Suspend an accurate thermometer [B] with temperature -sensing projection 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 coolant while stirring the coolant gently.
- Using a digital meter, measure the internal resistance of the sensor.

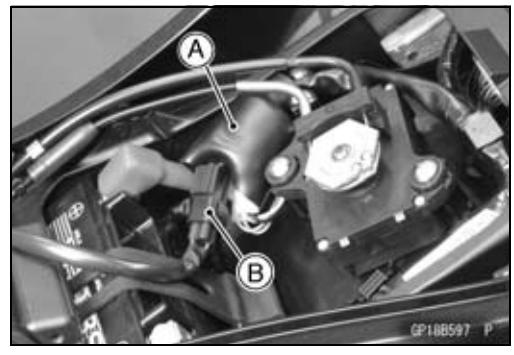
★If the digital meter does not show the specified values, replace the sensor.

Water Temperature Sensor Resistance

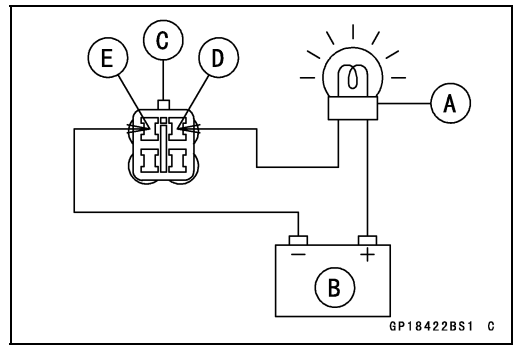
Temperature	Resistance (kΩ)
–20°C (–4°F)	*18.80 ±2.37
0°C (32°F)	*(about 6.544)
40°C (104°F)	1.136 ±0.095
100°C (212°F)	0.1553 ±0.0070

*: Reference Information

Fuel Reserve Switch Inspection



- Fill the fuel tank with fuel and close the fuel tank cap.
- Remove the front seat (see Front Seat Removal in the Frame chapter).
- Open the clamps.
- Slide the dust cover [A].
- Disconnect the fuel pump lead connector [B].



- Connect the test light [A] (12 V 3.4 W bulb in a socket with leads) and the 12 V battery [B] to the fuel pump lead connector [C].

Connections:

Battery (+) → 12 V 3.4 W Bulb (One Side)

12 V 3.4 W Bulb (Other Side) → R/BK lead [D]

Battery (–) → BK/W lead [E]

★If the test light turn on, the reserve switch is defective. Replace the fuel pump.

- Draw the fuel out from the fuel tank with a commercially available pump (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Connect the test light (12 V 3.4 W bulb in a socket with leads) and the 12 V battery to the fuel pump lead connector in the same way again.

Connections:
Battery (+) → 12 V 3.4 W Bulb (One Side)
12 V 3.4 W Bulb (Other Side) → R/BK lead
Battery (–) → BK/W lead

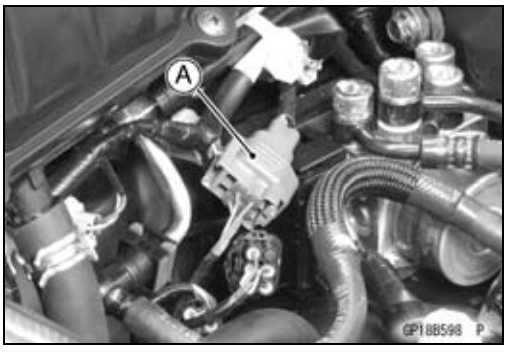
★If the test light does not light, replace the fuel pump.

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 is drawn. Leave the fuel pump lead connector with leads for inspection connected for few minutes.*

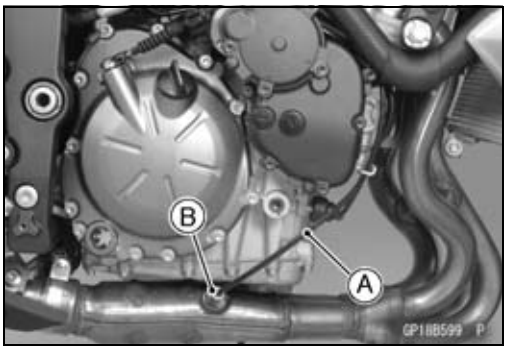
Oxygen Sensor Removal (Equipped Models)

- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
- Disconnect the oxygen sensor lead connector [A].



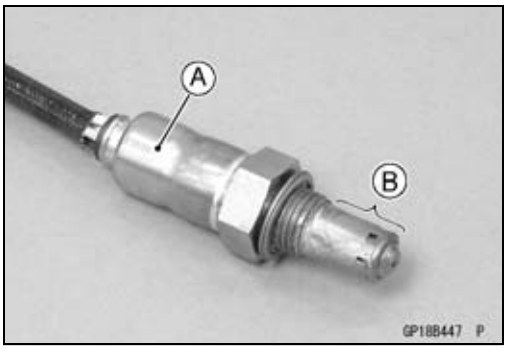
NOTICE
Do not pull strongly, twist, or bend the oxygen sensor lead. This may cause the wiring open.

- Free the lead [A] from the clamp.
- Remove the oxygen sensor [B].



Oxygen Sensor Installation (Equipped Models)

NOTICE
Never drop the oxygen sensor [A] especially on a hard surface. Such a shock to the unit can damage it. Do not touch the sensing part [B] to prevent oil contact. Oil contamination from hands can reduce sensor performance.



- Tighten:

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

- Run the oxygen sensor lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Oxygen Sensor Inspection (Equipped Models)

- Refer to the Oxygen Sensor Inspection in the Self -Diagnosis System chapter.

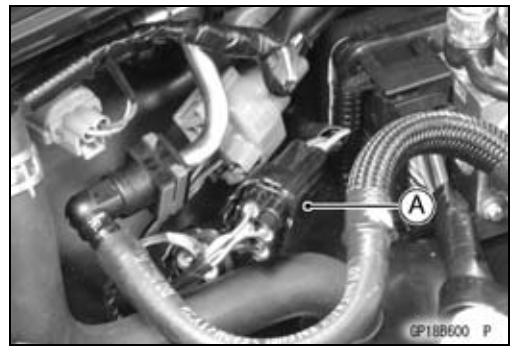
Switches and Sensors

Oxygen Sensor Heater Inspection (Equipped Models)

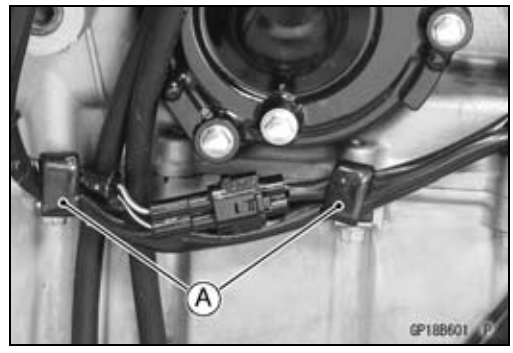
- Refer to the Oxygen Sensor Heater Resistance Inspection in the Self-Diagnosis System chapter.

Gear Position Switch Removal

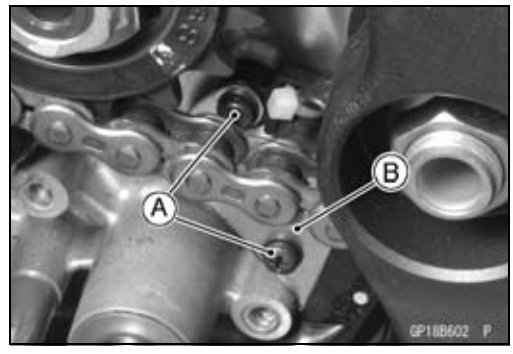
- Remove:
  Engine Sprocket Cover (see Engine Sprocket Removal in the Final Drive chapter)
  Left Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
- Disconnect the connector [A].



- Open the clamps [A].



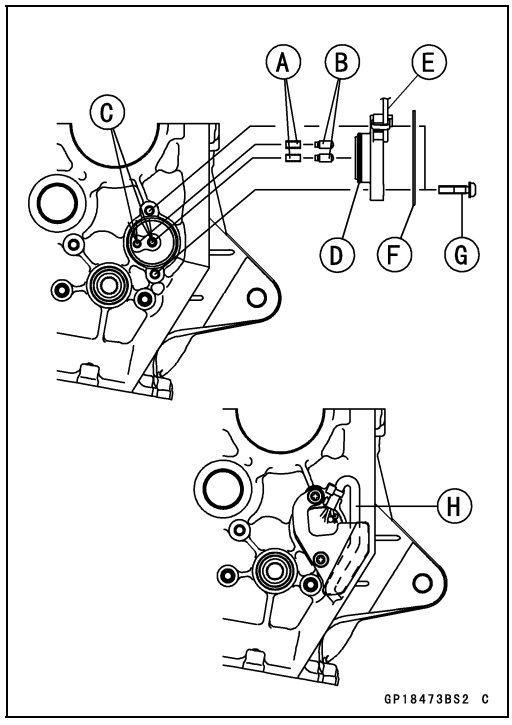
- Remove:
  Gear Position Switch Screws [A]
  Holding Plate [B]
  Gear Position Switch



- Remove the pins [A] and springs from the shift drum.

Switches and Sensors

Gear Position Switch Installation



- Securely place the springs [A] and pins [B] into the holes [C] of the shift drum.
- Apply grease to the new O-ring [D].
- Install the gear position switch [E] and holding plate [F].

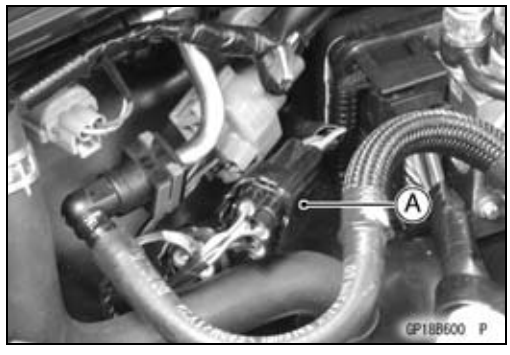
○When installing the switch which is fastened by screws, tighten the screws after placing the switch on the bottom surface completely.

- Apply a non-permanent locking agent to the threads of the gear position switch screws [G].
- Tighten:

Torque - Gear Position Switch Screws: 2.9 N·m (0.30 kgf·m, 26 in·lb)

- Run the lead [H] correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

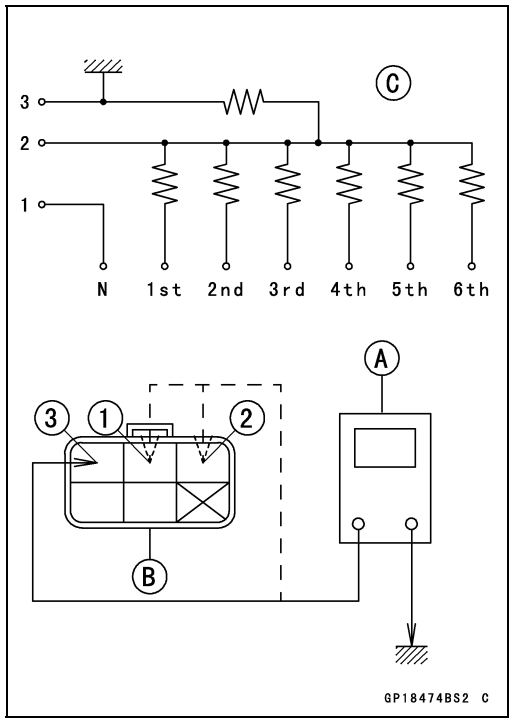
Gear Position Switch Inspection



NOTE

○*Be sure the transmission and external shift mechanism are good condition.*

- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Disconnect the connector [A].



- Connect a digital meter [A] to the terminals in the connector [B] and ground.

○When changing the gear position from lower gear to higher gear, raise the rear wheel off the ground with the stand and rotate the rear wheel by hand.

Internal Circuit [C]
[1] LG Lead
[2] G/R Lead
[3] BK Lead

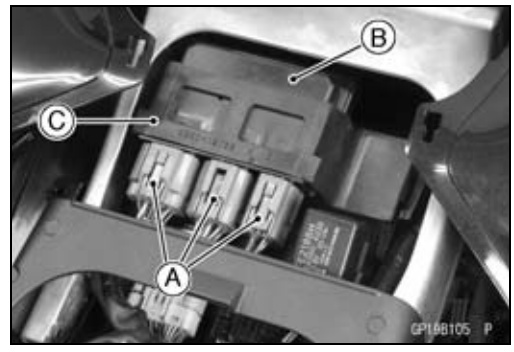
Gear Position Switch Resistance **(Unit: kΩ)**

	Connections		
Gear Position	[1]-Ground	[2]-Ground	[3]-Ground
Neutral	about 0	8.64 ~ 9.54	about 0
1st	–	2.22 ~ 2.46	about 0
2nd	–	1.42 ~ 1.58	about 0
3rd	–	0.955 ~ 1.055	about 0
4th	–	0.644 ~ 0.711	about 0
5th	–	0.410 ~ 0.453	about 0
6th	–	0.241 ~ 0.266	about 0

★If the digital meter reading is not as specified, replace the gear position switch with a new one.

Relay Box

Relay Box Removal



- Remove the front seat cover (see Seat Cover Removal in the Frame chapter).
- Disconnect the connectors [A].
- Pull out the relay box [B] from the rubber protector [C].

NOTE

○*The relay box has relays and diodes. The relays and diodes can not be removed.*

Relay Circuit Inspection

- Remove the relay box (see Relay Box Removal).
- Check conductivity of the following numbered terminals by connecting a tester and one 12 V battery to the relay box as shown (see Relay Box Internal Circuit in this section).

★If the tester does not read as specified, replace the relay box.

Relay Circuit Inspection (with the battery disconnected)

	Tester Connection	Tester Reading (Ω)
Headlight Circuit Relay	1-3	∞
ECU Main Relay	7-6	∞
	4-5	Not ∞*
Fuel Pump Relay	7-8	∞
	9-10	Not ∞*
Starter Circuit Relay	11-16	∞
	11-12	∞
Fan Relay	17-20	∞
	18-19	Not ∞*

*: The actual reading varies with the tester used.

Relay Circuit Inspection (with the battery connected)

	Battery Connection (+) (–)	Tester Connection	Tester Reading (Ω)
ECU Main Relay	2-11	1-3	0
	4-5	7-6	0
Fuel Pump Relay	9-10	7-8	0
Fan Relay	18-19	17-20	0

	Battery Connection (+) (–)	Tester Connection DC 25 V Range (+) (–)	Tester Reading (V)
Starter Circuit Relay	16-12	11-12	Battery Voltage

(+): Apply positive lead.
(–): Apply negative lead.

Relay Box

Diode Circuit Inspection

- Remove the relay box (see Relay Box Removal).
- Check conductivity of the following pairs of terminals (see Relay Box Internal Circuit in this section).

Diode Circuit Inspection

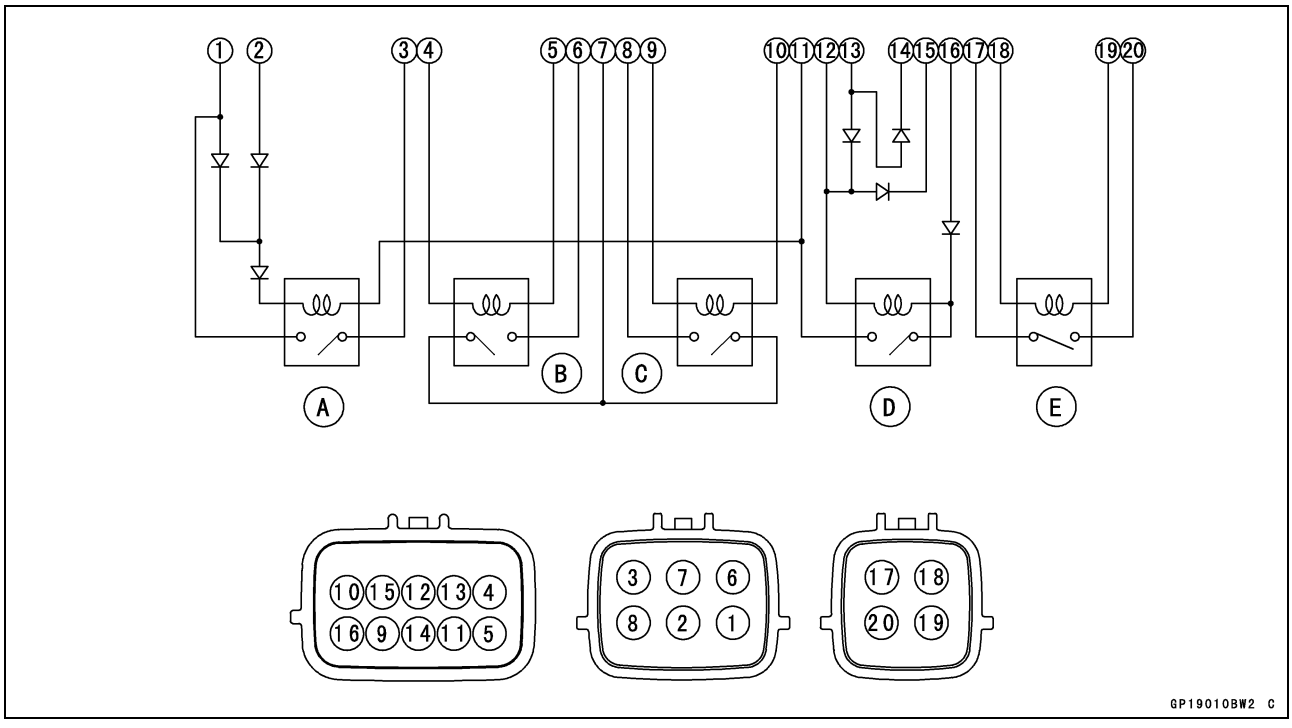
Tester Connection	1-11, 2-11, 12-13, 12-15, 12-16, 13-14, 13-15

★The resistance should be low in one direction and more than 10 times as much in the other direction. If any diode shows low or high in both directions, the diode is defective and the relay box must be replaced.

NOTE

○*The actual meter reading varies with the meter or tester used and the individual diodes, but generally speaking, the lower reading should be from zero to one half the scale.*

Relay Box Internal Circuit



A: Headlight Circuit Relay
B: ECU Main Relay
C: Fuel Pump Relay
D: Starter Circuit Relay
E: Fan Relay

Fuse

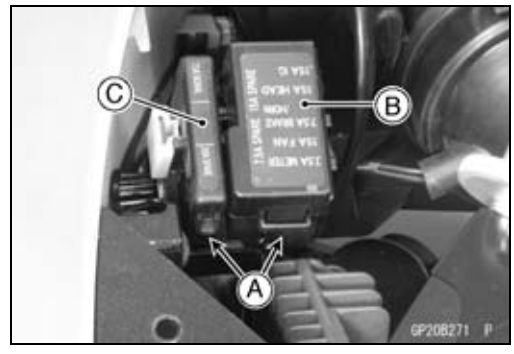
30 A Main/15 A ECU Fuse Removal

- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Starter Relay Cover [A]

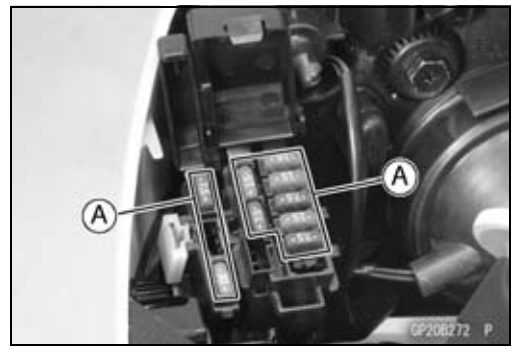
- Pull out the fuses [A] from the starter relay with needle nose pliers.

Fuse Box Fuse Removal

- Remove the left inner cover (see Inner Cover Removal in the Frame chapter).
- Unlock the hook [A] to lift up the lid.
  Fuse Box 1 [B]
  Fuse Box 2 [C]



- Pull the fuses [A] straight out of the fuse 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 fuse box fuses on the original position as specified on the lid.

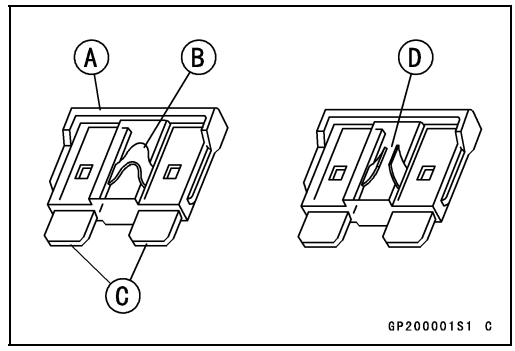
Fuse

Fuse Inspection

- Remove the fuse (see 30 A Main/Fuse Box/10 A ECU 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]



NOTICE

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.

Self-Diagnosis System

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Specifications

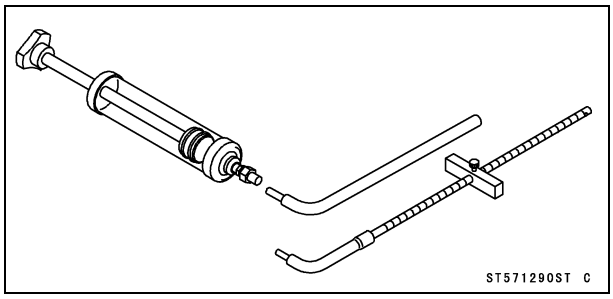
Item	Standard
Digital Fuel Injection System	
Main Throttle Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	DC 1.02 ~ 1.06 V at idle throttle opening DC 4.30 ~ 4.34 V at full throttle opening (for reference)
Resistance	4 ~ 6 kΩ
Intake Air Pressure Sensor #1/#2:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	DC 3.80 ~ 4.20 V at standard atmospheric pressure (see this text for details)
Intake Air Temperature Sensor:	
Output Voltage	About DC 2.25 ~ 2.50 V @20°C (68°F)
Resistance	5.4 ~ 6.6 kΩ @0°C (32°F) 0.29 ~ 0.39 kΩ @80°C (176°F)
Water Temperature Sensor:	
Output Voltage	About DC 2.80 ~ 2.97 V @20°C (68°F)
Vehicle-down Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	with sensor tilted 60 ~ 70° or more right or left: DC 0.65 ~ 1.35 V with sensor arrow mark pointed up: DC 3.55 ~ 4.45 V
Subthrottle Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	DC 1.08 ~ 1.12 V at subthrottle valve full close position DC 4.48 ~ 4.52 V at subthrottle valve full open position (for reference)
Resistance	4 ~ 6 kΩ
Subthrottle Valve Actuator:	
Resistance	About 5.2 ~ 7.8 Ω
Input Voltage	About DC 8.5 ~ 10.5 V and then 0 V or About DC 8.5 ~ 10.5 V
Oxygen Sensor (Equipped Models):	
Output Voltage (Rich)	DC 0.8 V or more
Output Voltage (Lean)	DC 0.24 V or less
Heater Resistance	6.7 ~ 10.5 Ω @20°C (68°F)
Exhaust Butterfly Valve Actuator Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	DC 3.46 ~ 3.76 V at pulley original position
Resistance	4 ~ 6 kΩ
Immobilizer Antenna (Equipped Models):	
Resistance	About 3.0 ~ 4.6 Ω
Exhaust Butterfly Valve Actuator:	
Resistance	5 ~ 200 Ω (for reference)

Specifications

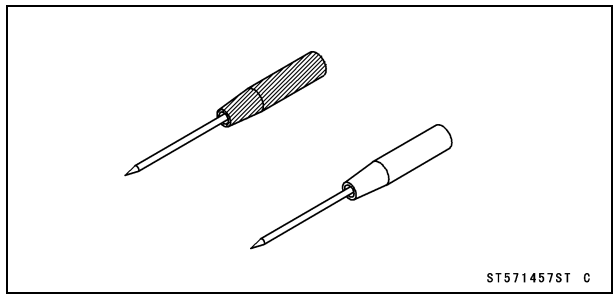
Item	Standard
Purge Valve:	
Resistance	30 ~ 34 Ω @20°C (68°F)
ABS System (Equipped Models)	
ABS Hydraulic Unit Make	BOSCH
Wheel Rotation Sensor Air Gap:	
Front	0.4 ~ 1.6 mm (0.02 ~ 0.06 in.)
Rear	0.4 ~ 1.6 mm (0.02 ~ 0.06 in.)
CAN Communication Line Resistance	30 ~ 70 Ω
CAN Communication Line/Ground Resistance	5 ~ 30 kΩ

Special Tools

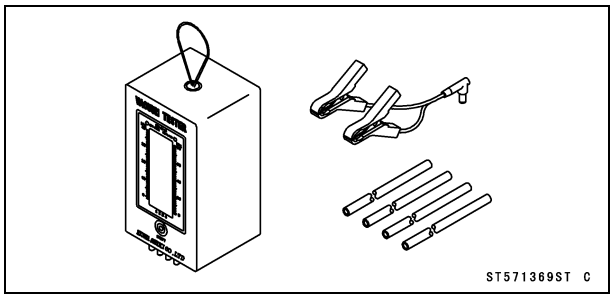
Fork Oil Level Gauge:
57001-1290



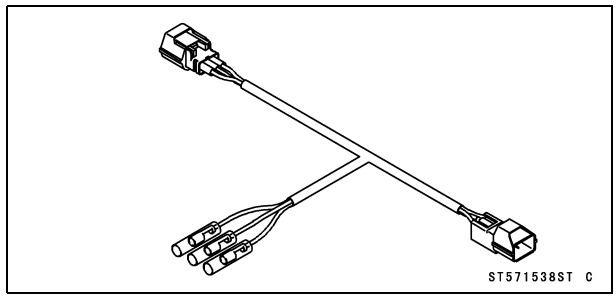
Needle Adapter Set:
57001-1457



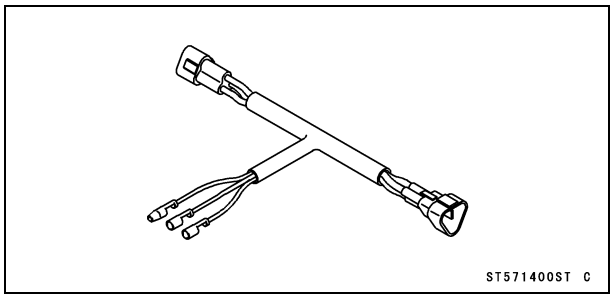
Vacuum Gauge:
57001-1369



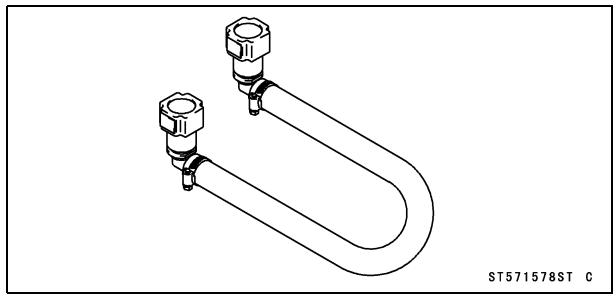
Throttle Sensor Setting Adapter:
57001-1538



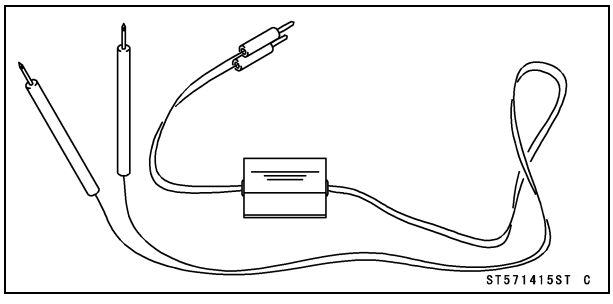
Throttle Sensor Setting Adapter #1:
57001-1400



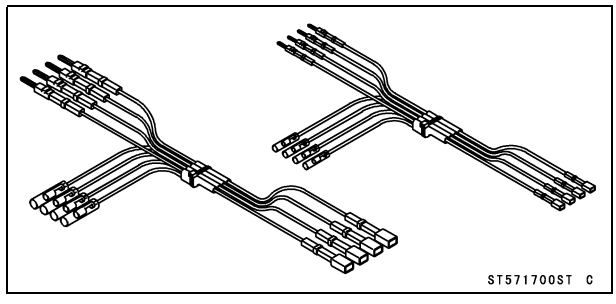
Extension Tube:
57001-1578



Peak Voltage Adapter:
57001-1415



Measuring Adapter:
57001-1700



Self-Diagnosis

Self-Diagnosis Outline

The self-diagnosis system is monitoring the following mechanisms.

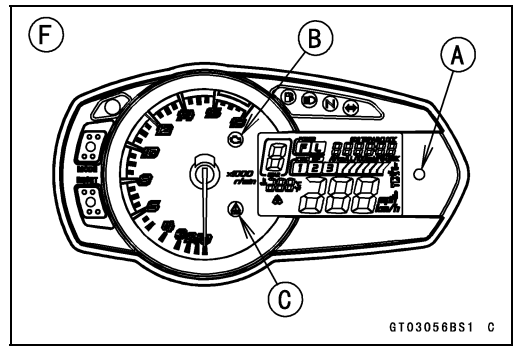
DFI System and Ignition System
KTRC System
Immobilizer System (Equipped Models)
KIBS and ABS (Equipped Models)

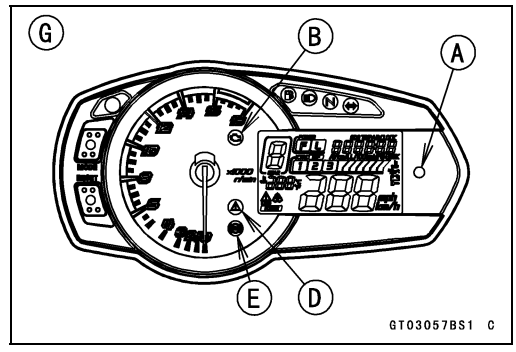
The following indicator lights (LED) are used for symbols of below table.

LED Color	Indicator Symbols
Red [A]	Oil Pressure Battery Immobilizer (Equipped Models)
Yellow [B]	FI
Yellow [C]	KTRC
Yellow [D]	KTRC KIBS (Equipped Models)
Yellow [E]	ABS (Equipped Models)

ZX636E Model [F]
ZX636F Model [G]

The self-diagnosis system has two modes and can be switched to another mode by operating the meter unit.

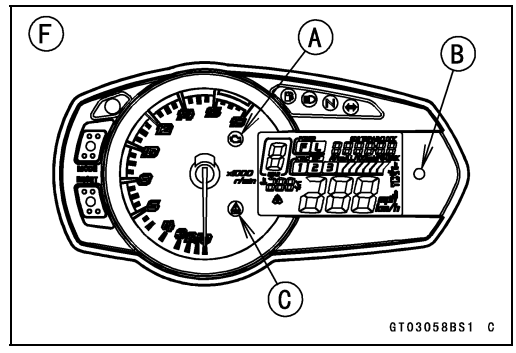


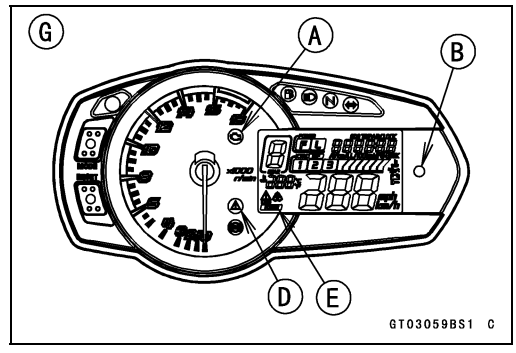


User Mode

The ECU notifies the rider of troubles in DFI system, ignition system, KTRC system and immobilizer system (equipped models) by lighting or blinking the yellow engine warning indicator light (LED) [A], red warning indicator light (LED) [B], yellow KTRC warning indicator light (LED) [C], yellow warning indicator light [D] and warning symbols [E] when DFI, ignition, KTRC and immobilizer system parts are faulty, and initiates fail-safe function. In case of serious troubles, ECU stops the injection and ignition operations.

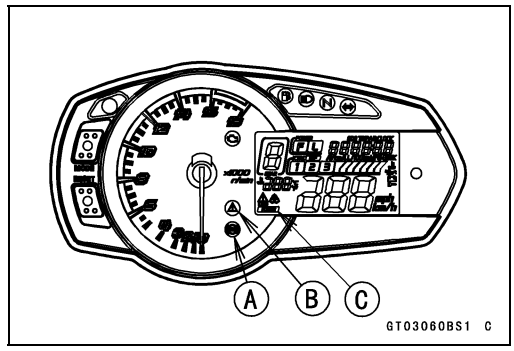
ZX636E Model [F]
ZX636F Model [G]





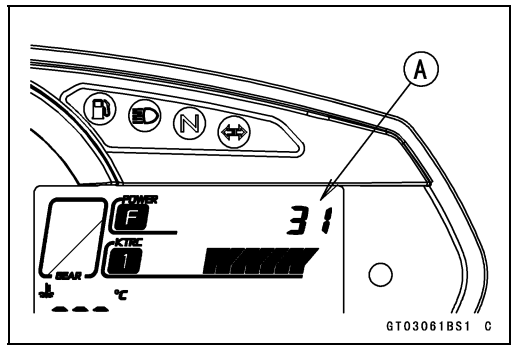
Self-Diagnosis

For KIBS and ABS system (equipped models), the ABS hydraulic unit notifies the rider of troubles in KIBS and ABS system by lighting or blinking the yellow ABS indicator light (LED) [A], yellow warning indicator light (LED) [B] and KIBS warning symbol [C] when KIBS and ABS parts are faulty, and initiates fail-safe function.



Dealer Mode

The LCD (Liquid Crystal Display) displays the service code(s) [A] to show the problem(s) which the above system has at the moment of diagnosis.



Self-Diagnosis Procedures

NOTE

○*Use a fully charged battery when conducting self-diagnosis. Otherwise, the light (LED) and symbol do not light or blink.*

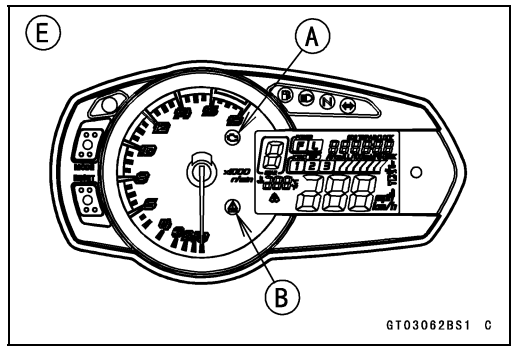
● Turn the ignition switch on.

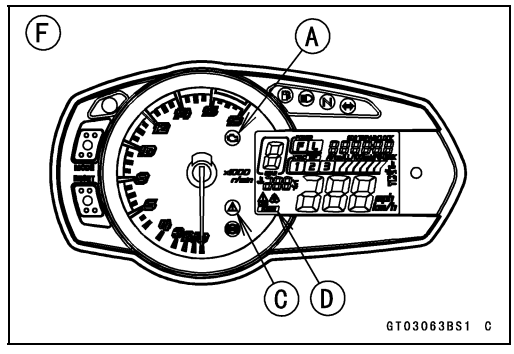
○When a problem occurs with DFI system and ignition system, the yellow engine warning indicator light (LED) [A] goes on to alert the rider.

○For models equipped with KTRC system, the yellow engine warning indicator light (LED), yellow KTRC warning indicator light (LED) [B], yellow warning indicator light (LED) [C] and KTRC warning symbol [D] go on, when a problem occurs in the system.

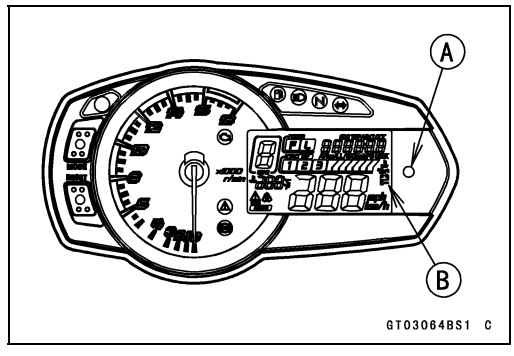
ZX636E Model [E]

ZX636F Model [F]



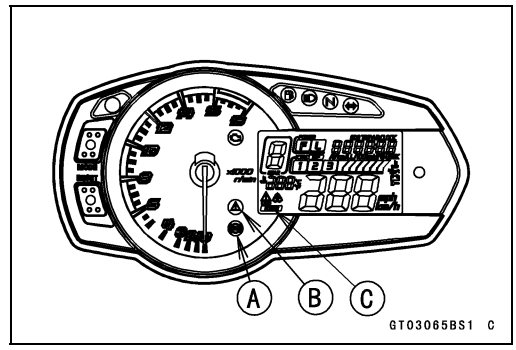


○When a problem occurs with immobilizer system (equipped models), the red warning indicator light (LED) [A] and immobilizer warning symbol [B] blink.

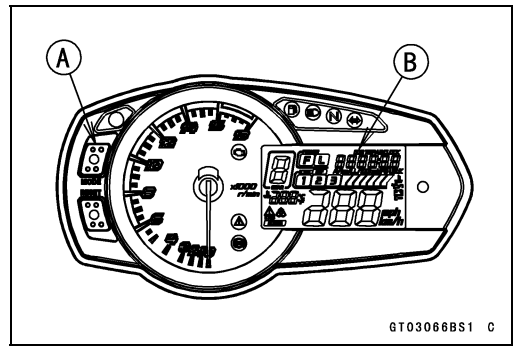


Self-Diagnosis

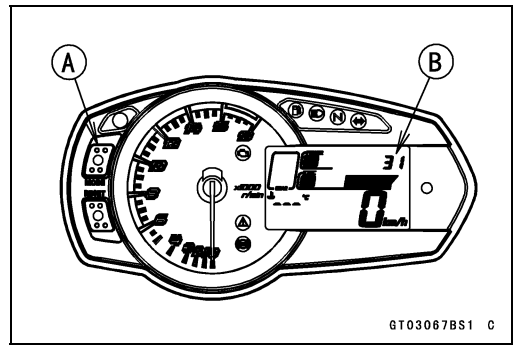
○For models equipped with ABS system (equipped models), the yellow ABS indicator light (LED) [A] goes on, when a problem occurs in the system. However, when the yellow ABS indicator light (LED) goes off after the motorcycle runs at approx. 5 km/h (3.1 mph) or above, the ABS is normal.
○For models equipped with ABS system (equipped models), the yellow warning indicator light (LED) [B] and KIBS warning symbol [C] go on, when a problem occurs in the system.



● Push the MODE button [A] to display the odometer [B].



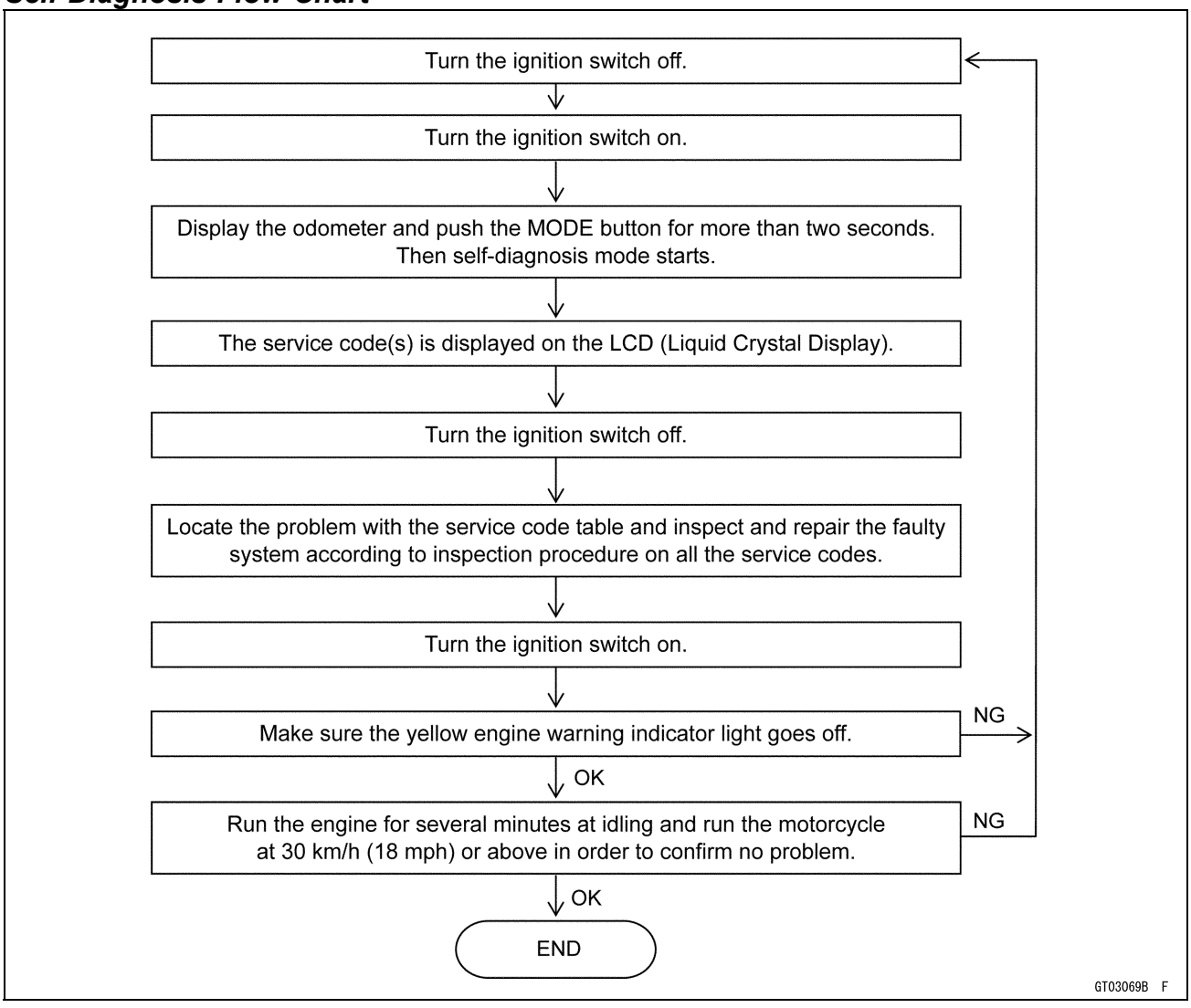
● Push the MODE button [A] for more than two seconds.
● The service code [B] is displayed on the LCD by the number of two digits (The service code of the KIBS and ABS adds “b" at the left side of the code.).



● Any of the following procedures ends self-diagnosis.
○When the service code is displayed on the LCD, push the MODE button for more than two seconds. The display will return to the odometer.
○When the ignition switch is turned off.

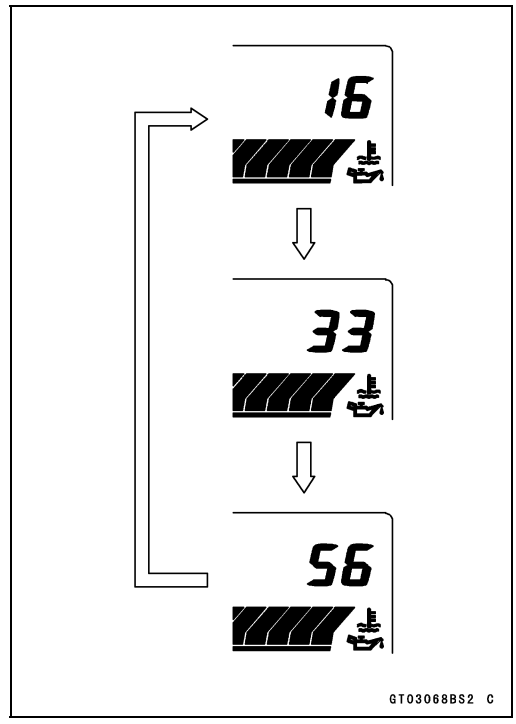
Self-Diagnosis

Self-Diagnosis Flow Chart



Self-Diagnosis

Service Code Reading



- ○The service code(s) is displayed on the LCD by the number of two digits. (The service code of the KIBS and ABS adds “b" at the left side of the code.)
- ○When there are a number of problems, all the service codes can be stored and the display will begin starting from the lowest number service code in the numerical order.
- ○Then after completing all codes, the display is repeated until the ignition switch is turned off or MODE button is pushed for more than two seconds.
- ○The order of the system’s appearing is the order of DFI System, Immobilizer System (equipped models), KTRC System, KIBS and ABS (equipped models).
- ○For example, if three problems occurred in the order of 56, 16, 33, the service codes are displayed (each two seconds) from the lowest number in the order listed as shown below.

  (16 → 33 → 56) → (16 → 33 → 56) → → ····· (repeated)
- ○If the no problem or when the repair has been done, yellow engine warning indicator light (LED) goes off and service code is not displayed.

Service Code Erasing

- ○When repair has been done, yellow engine warning indicator light (LED) goes off and service code is not displayed.
- ★The service codes stored in memory of the ECU can be erased using Kawasaki Diagnostic System (KDS Ver.3).

Service Code Table

- ○The service codes of the immobilizer and ABS systems appear to each system equipped models.

Service Code	System	Problems
11	FI/KTRC	Main throttle sensor malfunction, wiring open or short
12	FI/KTRC	Intake air pressure sensor #1 malfunction, wiring open or short
13	FI	Intake air temperature sensor malfunction, wiring open or short
14	FI	Water temperature sensor malfunction, wiring open or short
16	FI/KTRC	Intake air pressure sensor #2 malfunction, wiring open or short
21	FI/KTRC	Crankshaft sensor malfunction, wiring open or short
24	FI/KTRC	Rear wheel rotation sensor signal abnormal (sensor or rotor missing, too large clearance, rotor tooth worn or missing, wiring open)
25	FI/KTRC	Gear position switch malfunction, wiring open or short
27	FI/KTRC	Front wheel rotation sensor signal abnormal (sensor or rotor missing, too large clearance, rotor tooth worn or missing, wiring open)
31	FI	Vehicle-down sensor malfunction, wiring open or short
32	FI/KTRC	Subthrottle sensor malfunction, wiring open or short
33	FI	Oxygen sensor inactivation, wiring open or short (Equipped Models)
34	FI	Exhaust butterfly valve actuator sensor malfunction, wiring open or short
35	Immobilizer	Immobilizer amplifier malfunction (Equipped Models)
36	Immobilizer	Blank key detection (Equipped Models)
39	FI/KTRC	ECU communication error
51	FI/KTRC	Stick coil #1 malfunction, wiring open or short

Self-Diagnosis

Service Code	System	Problems
52	FI/KTRC	Stick coil #2 malfunction, wiring open or short
53	FI/KTRC	Stick coil #3 malfunction, wiring open or short
54	FI/KTRC	Stick coil #4 malfunction, wiring open or short
56	FI	Radiator fan relay malfunction, wiring open or short
62	FI/KTRC	Subthrottle valve actuator malfunction, wiring open or short
63	FI	Exhaust butterfly valve actuator malfunction, wiring open or short
64	FI	Air switching valve malfunction, wiring open or short
67	FI	Oxygen sensor heater malfunction, wiring open or short (Equipped Models)
94	FI	Oxygen sensor malfunction, wiring open or short (Equipped models)
1b	ABS	ABS hydraulic unit communication error (Equipped Models)
3A	FI	Purge valve malfunction, wiring open or short (CAL model)
b 13	ABS	Rear intake solenoid valve trouble (open, temperature abnormal)
b 14	ABS	Rear outlet solenoid valve trouble (open, temperature abnormal)
b 17	ABS	Front intake solenoid valve trouble (open, temperature abnormal)
b 18	ABS	Front outlet solenoid valve trouble (open, temperature abnormal)
b 19	ABS	ABS solenoid valve relay trouble (wiring shorted or open, stuck relay (ON or OFF) or dropout)
b 25	ABS	Front, rear wheel rotation difference abnormal (substandard tire, sensor rotor teeth number wrong)
b 35	ABS	ABS motor relay trouble [wiring shorted or open, stuck relay (ON or OFF)]
b 42	ABS	Front wheel rotation sensor signal abnormal (sensor or rotor missing, too large clearance, rotor tooth worn or missing)
b 43	ABS	Front wheel rotation sensor wiring (wiring shorted or open, connector bad connection)
b 44	ABS	Rear wheel rotation sensor signal abnormal (sensor or rotor missing, too large clearance, rotor tooth worn or missing)
b 45	ABS	Rear wheel rotation sensor wiring (wiring shorted or open, connector bad connection)
b 52	ABS	Power supply voltage abnormal (under-voltage)
b 53	ABS	Power supply voltage abnormal (over-voltage)
b 55	ABS	ECU trouble (ECU operation abnormal)
b 57	ABS	CAN communication (transmission)/CAN bus monitor malfunction
b 58	ABS	CAN communication (reception) monitor malfunction
b 83	ABS	Output fluid pressure sensor (front brake) trouble (voltage abnormal, wiring shorted or open)
b 84	ABS	Output fluid pressure sensor (front brake) trouble (offset abnormal)
b 89	ABS	Fluid pressure sensor supply voltage abnormal

Notes:

- ○The ECU may be involved in these problems. If all the 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.
- ○When no service code is displayed, the electrical parts of the DFI system has no fault, and the mechanical parts of the DFI system and the engine are suspect.

Self-Diagnosis

Backups

○The ECU takes the following measures to prevent engine damage when the DFI, ignition, KTRC or immobilizer system parts have troubles.

Service Codes	Parts or Function	Output Signal Usable Range or Criteria	Backups by ECU
11	Main Throttle Sensor	Output Voltage 0.2 ~ 4.8 V	If the main throttle sensor system fails (the output voltage is out of the usable range, wiring short or open), the ECU locks ignition timing into the ignition timing at closed throttle position and sets the DFI in the D-J method (1).
12	Intake Air Pressure Sensor #1	Intake Air Pressure (Absolute) Pv = 57 ~ 890 mmHg	If the intake air pressure sensor #1 system fails (the signal is out of the usable range, wiring short or open), the ECU sets the DFI in the α-N method (2).
13	Intake Air Temperature Sensor	Intake Air Temperature Ta = – 47 ~ + 178°C	If the intake air temperature sensor system fails (the signal is out of the usable range, wiring short or open), the ECU sets Ta at 30°C.
14	Water Temperature Sensor	Water Temperature Tw = – 30 ~ + 120°C	If the water temperature sensor system fails (the signal is out of the usable range, wiring short or open), the ECU sets Tw at 80°C and the radiator fan operates.
16	Intake Air Pressure Sensor #2	Atmospheric Pressure (Absolute) Pa = 57 ~ 890 mmHg	If the intake air pressure sensor #2 system fails (the signal is out of the usable range, wiring short or open), the ECU sets Pa at 760 mmHg (the standard atmospheric pressure).
21	Crankshaft Sensor	Crankshaft sensor must send 22 signals to the ECU at the 1 cranking.	If the crankshaft sensor fails, the engine stops by itself.
24	Rear Wheel Rotation Sensor	Rear wheel rotation sensor must send 50 signals to the ECU at the 1 rotation of the wheel.	If the rear wheel rotation sensor system fails (the signal is missing, wiring open), the ECU stops the KTRC control.
25	Gear Position Switch	Output Voltage 0.51 ~ 4.73 V	If the gear position switch system fails (no signal, wiring short or open), the ECU set the top (6th) gear position.
27	Front Wheel Rotation Sensor Signal	Front wheel rotation sensor must send 48 signals to the ECU at the 1 rotation of the wheel.	If the front wheel rotation sensor system fails (the signal is missing, wiring open), the ECU stops the KTRC control.
31	Vehicle -down Sensor	Output Voltage 0.10 ~ 4.84 V	If the vehicle-down sensor system has failures (the output voltage is out of the usable range, wiring short or open), the ECU shuts off the fuel pump relay, the fuel injectors and the ignition system.
32	Subthrottle Sensor	Output Voltage 0.15 ~ 4.85 V	If the subthrottle sensor system fails (the output voltage is out of the usable range, wiring short or open), the ECU drive the subthrottle valve to the full closed position, and it stops the current to the subthrottle valve actuator.

Self-Diagnosis

Service Codes	Parts or Function	Output Signal Usable Range or Criteria	Backups by ECU
33	Oxygen Sensor (Equipped Models)	The oxygen sensor is active and sensor must send signals (output voltage) continuously to the ECU.	If the oxygen sensor is not activated, the ECU stops the feedback mode of the oxygen sensor.
34	Exhaust Butterfly Valve Actuator Sensor	Output Voltage 0.1 ~ 4.8 V	If the exhaust butterfly valve sensor system fails (the output voltage is out of the usable range, wiring short or open), the ECU locks the exhaust butterfly valve at full open position near, and it stops the current to the exhaust butterfly valve actuator.
35	Immobilizer Amplifier (Equipped Models)	–	If the immobilizer system fails (no signal, wiring short or open), the vehicle is no start and run.
36	Ignition Key	The ignition key must use register key.	If the blank key or broken key is used, the vehicle is no start and run.
39	ECU	The ECU sends the data to the meter unit through the CAN communication line.	–
51	Stick Coil #1*	The ECU sends signals (output voltage) continuously to the stick coil.	If the stick coil #1 primary winding has failures (no signal, wiring short or open), the ECU shuts off the injector #1 to stop fuel to the cylinder #1, though the engine keeps running.
52	Stick Coil #2*	The ECU sends signals (output voltage) continuously to the stick coil.	If the stick coil #2 primary winding has failures (no signal, wiring short or open), the ECU shuts off the injector #2 to stop fuel to the cylinder #2, though the engine keeps running.
53	Stick Coil #3*	The ECU sends signals (output voltage) continuously to the stick coil.	If the stick coil #3 primary winding has failures (no signal, wiring short or open), the ECU shuts off the injector #3 to stop fuel to the cylinder #3, though the engine keeps running.
54	Stick Coil #4*	The ECU sends signals (output voltage) continuously to the stick coil.	If the stick coil #4 primary winding has failures (no signal, wiring short or open), the ECU shuts off the injector #4 to stop fuel to the cylinder #4, though the engine keeps running.
56	Radiator Fan Relay	When the radiator fan relay is OFF, the relay is opened.	–
62	Subthrottle Valve Actuator	The actuator operates open and close of the subthrottle valve by the pulse signal from the ECU.	If the subthrottle valve actuator fails (the signal is out to the usable range, wiring short or open), the ECU stops the current to the actuator.
63	Exhaust Butterfly Valve Actuator	The actuator operates open and close of the exhaust butterfly valve by the pulse signal from the ECU.	If the exhaust butterfly valve actuator fails (the signal is out to the usable range, wiring short or open), the ECU stops the current to the actuator.

Self-Diagnosis

Service Codes	Parts or Function	Output Signal Usable Range or Criteria	Backups by ECU
64	Air Switching Valve	The air switching valve controls the flow of the secondary air by opening and shutting the solenoid valve.	–
67	Oxygen Sensor Heater (Equipped Models)	The oxygen sensor heater raises temperature of the sensor for its earlier activation.	If the oxygen sensor heater fails (wiring short or open), the ECU stops the current to the heater, and it stops the feedback mode of the oxygen sensor.
94	Oxygen Sensor (Equipped Models)	The oxygen sensor must send signals (output voltage) continuously to the ECU	If the oxygen sensor output voltage is incorrect, the ECU stops oxygen sensor feed back mode.
1b	ABS	The ABS hydraulic unit sends the data (for status of ABS hydraulic unit) to the meter unit and ECU through the CAN communication line.	If the communication data is not sent, the ECU stops the KTRC control.
3A	Purge Valve (CAL Model)	The purge valve controls the flow of the secondary air by opening and shutting the solenoid valve.	–

Note:

(1): D-J Method: When the engine load is light like at idling or low speed, the ECU determines the injection quantity by calculating from the throttle vacuum (vacuum sensor output voltage) and engine speed (crankshaft sensor output voltage). This method is called D-J method.

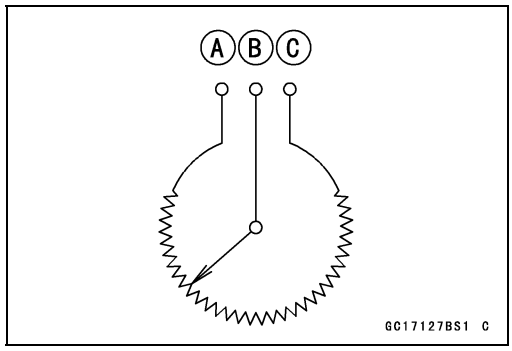
(2): α-N Method: As the engine speed increases, and the engine load turns middle to heavy, the ECU determines the injection quantity by calculating from the throttle opening (throttle sensor output voltage) and the engine speed. This method is called α-N method.

*: This depends on the number of stopped cylinders.

Main Throttle Sensor (Service Code 11)

The main throttle sensor is a rotating variable resistor that change output voltage according to throttle operating. The ECU senses this voltage change and determines fuel injection quantity, and ignition timing according to engine rpm, and throttle opening.

Input Terminal [A]: BL
Output Terminal [B]: Y/W
Ground Terminal [C]: G



Main Throttle Sensor Removal/Adjustment

NOTICE

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 throttle body assy especially on a hard surface. Such a shock to the main throttle sensor can damage it.

Main Throttle Sensor Input Voltage Inspection

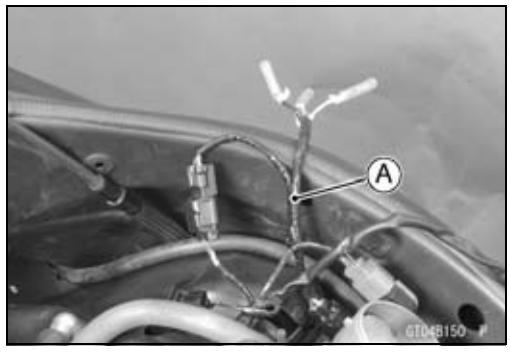
NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the air cleaner housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter).
- Disconnect the main throttle sensor connector [A].

- Connect the setting adapter [A] between the harness connector and main throttle sensor connector.

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538



- Connect a digital meter to the setting adapter leads.

Main Throttle Sensor Input Voltage
Connections to Adapter:
Digital Meter (+) → W (sensor BL) lead
Digital Meter (–) → BK (sensor G) lead

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

Input Voltage
Standard: DC 4.75 ~ 5.25 V

- Turn the ignition switch off.

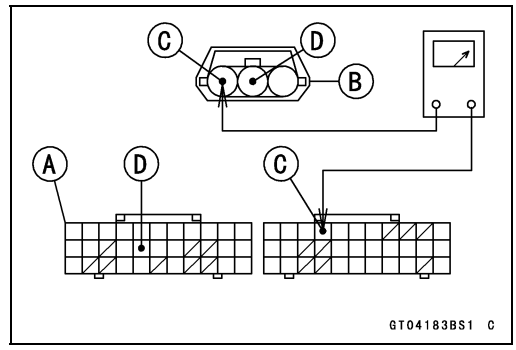
★If the reading is within the standard, check the main throttle sensor resistance (see Main Throttle Sensor Resistance Inspection).

Main Throttle Sensor (Service Code 11)

★If the reading is out of the standard, remove the ECU and check the wiring for continuity between harness connectors.

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Main Throttle Sensor Connector [B]
BL lead (ECU terminal 4) [C]
G lead (ECU terminal 49) [D]



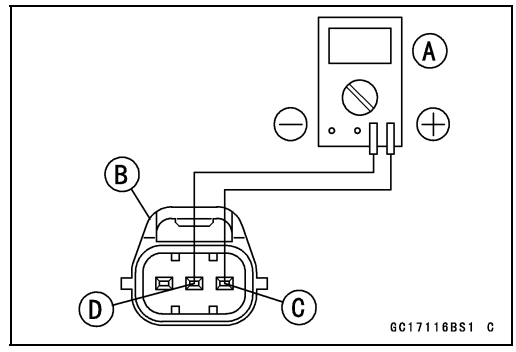
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Main Throttle Sensor 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] ← → G lead [D]
Standard: 4 ~ 6 kΩ



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

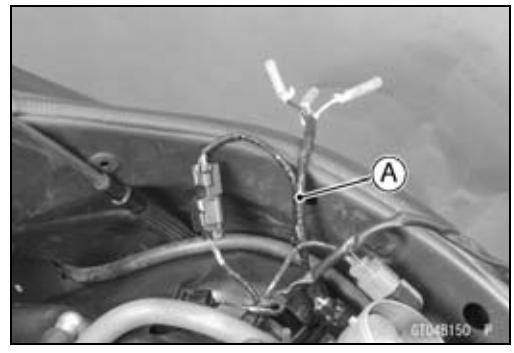
★If the reading is within the standard, check the output voltage (see Main Throttle Sensor Output Voltage Inspection).

Main Throttle Sensor 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 connector and connect the setting adapter [A] between these connectors.

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538



Main Throttle Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → R (sensor Y/W) lead
Digital Meter (–) → BK (sensor G) lead

○Install the following parts temporarily.
Air Cleaner Housing (see Air Cleaner Housing Installation in the Fuel System (DFI) chapter)
Fuel Tank (see Fuel Tank Installation in the Fuel System (DFI) chapter)

Main Throttle Sensor (Service Code 11)

- Start the engine and warm it up thoroughly.
- Check idle speed to ensure the throttle opening is correct (see Idle Speed Inspection in the Periodic Maintenance chapter).

Idle Speed
Standard: 1 300 ±50 r/min (rpm)

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

Output Voltage
Standard: DC 1.02 ~ 1.06 V at idle throttle opening
DC 4.30 ~ 4.34 V at full throttle opening (for reference)

NOTE

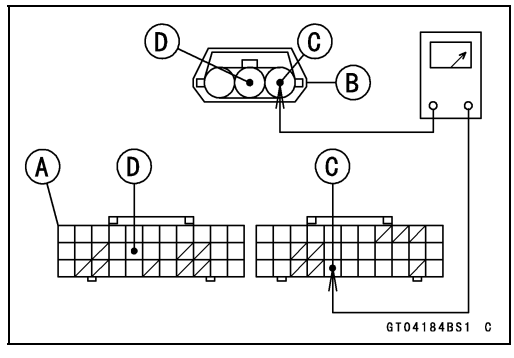
○*Open the throttle, confirm the output voltage will be raise.*
○*The standard voltage refers to the value when the voltage reading at the Input Voltage Inspection shows 5 V exactly.*
○*When the input voltage reading shows other than 5 V, derive a voltage range as follows.*
Example:
In the case of a input voltage of 4.75 V.
1.02 × 4.75 ÷ 5.00 = 0.969 V
1.06 × 4.75 ÷ 5.00 = 1.007 V
Thus, the valid range is 0.969 ~ 1.007 V

- Turn the ignition switch off.

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

★If the reading is within the standard, remove the ECU and check the wiring for continuity between harness connectors.
○Disconnect the ECU and sensor connectors.

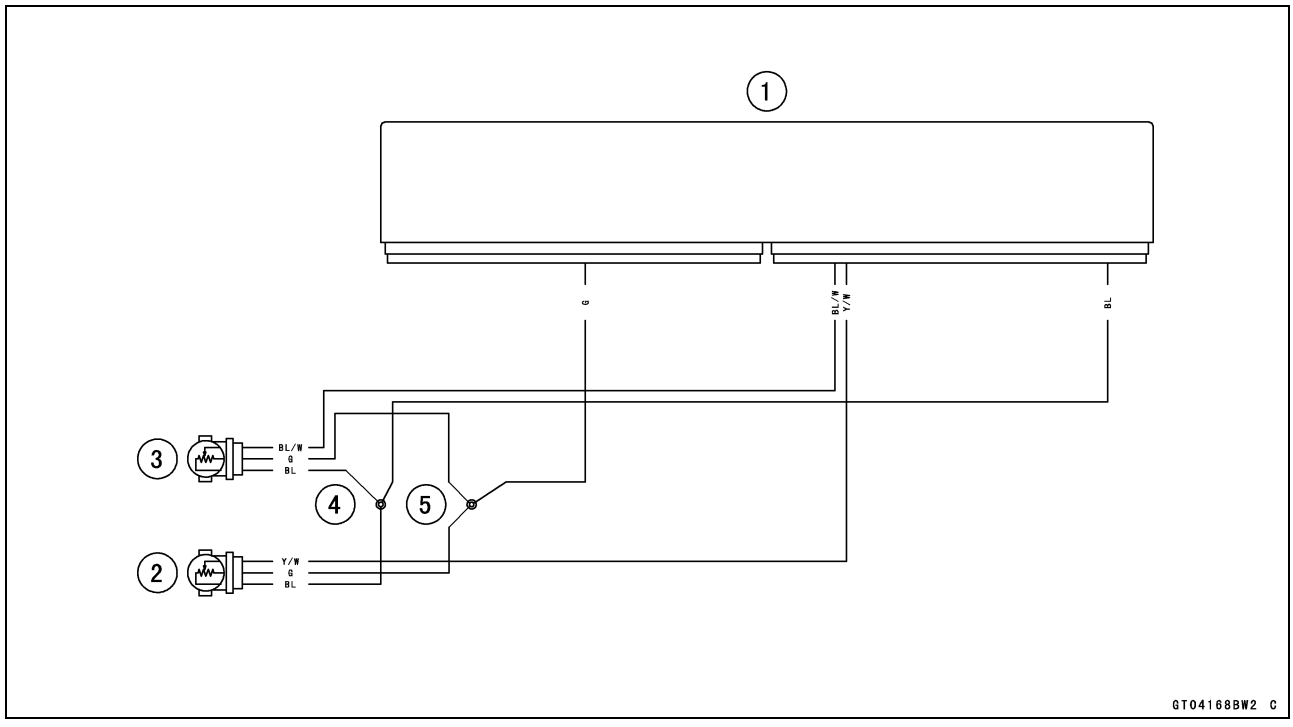
Wiring Continuity Inspection
ECU Connector [A] ←→
Main Throttle Sensor Connector [B]
Y/W lead (ECU terminal 27) [C]
G lead (ECU terminal 49) [D]



★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Main Throttle Sensor (Service Code 11)

Main Throttle Sensor Circuit

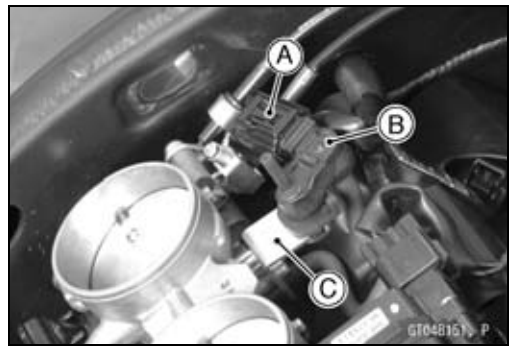


1. ECU
2. Main Throttle Sensor
3. Subthrottle Sensor
4. Water-proof Joint 1
5. Water-proof Joint 2

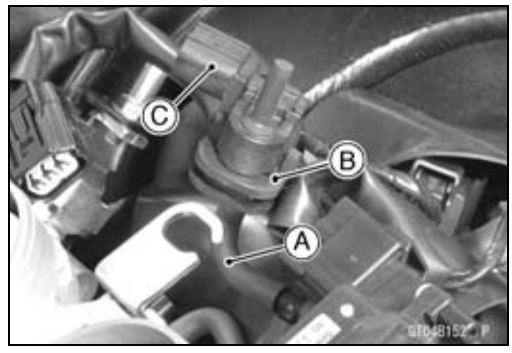
Intake Air Pressure Sensor #1 (Service Code 12)

Intake Air Pressure Sensor #1 Removal

NOTICE
Never drop the intake air pressure sensor #1 especially on a hard surface. Such a shock to the sensor can damage it.



- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter)
- Disconnect:
  Intake Air Pressure Sensor #1 Connector [A]
- Disconnect the intake air pressure sensor #1 [B] from the bracket [C].

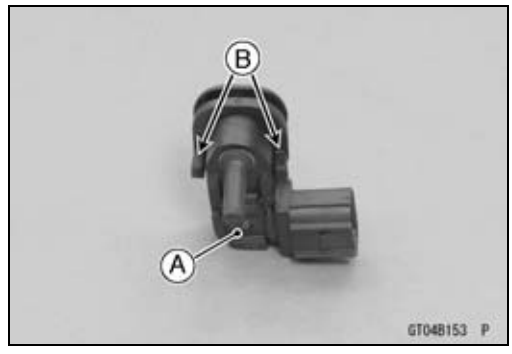


- Disconnect the vacuum hose [A].
- Remove the rubber damper [B] from the intake air pressure sensor #1 [C].

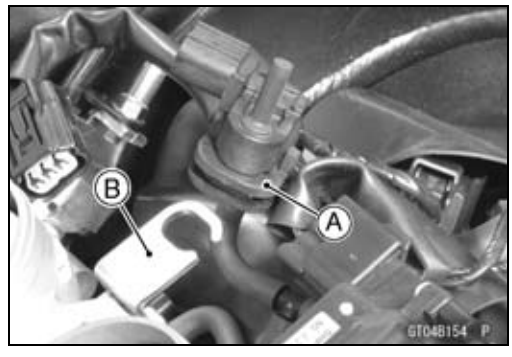
Intake Air Pressure Sensor #1 Installation

NOTE

○*The intake air pressure sensor #1 is the same part as the intake air pressure sensor #2.*



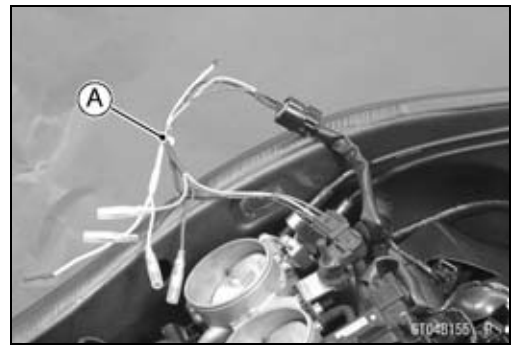
- Installation is basically the reverse of removal.
- Position the intake air pressure sensor #1 [A] between the projections [B] on the rubber damper.



- Install the rubber damper [A] on the bracket [B].

Intake Air Pressure Sensor #1 (Service Code 12)

Intake Air Pressure Sensor #1 Input Voltage Inspection



NOTE

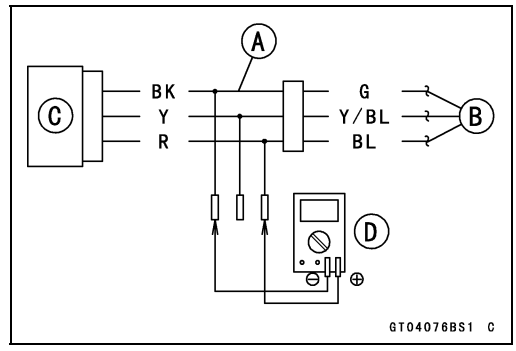
○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the air cleaner housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter).
- Disconnect the intake air pressure sensor #1 connector and connect the measuring adapter [A] between these connectors.
  [B] Main Harness
  [C] Intake Air Pressure Sensor #1

Special Tool - Measuring Adapter: 57001-1700

- Connect a digital meter [D] to the measuring adapter leads.

Intake Air Pressure Sensor #1 Input Voltage
Connections to Adapter:
Digital Meter (+) → R (sensor BL) lead
Digital Meter (–) → BK (sensor G) lead



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

Input Voltage
Standard: DC 4.75 ~ 5.25 V

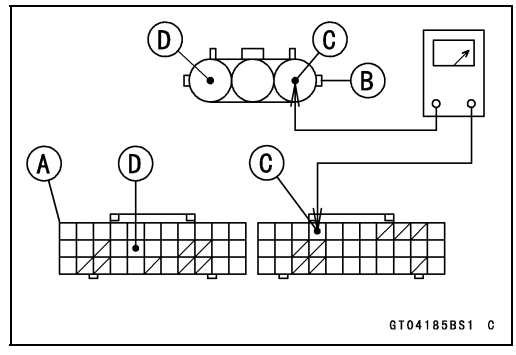
- Turn the ignition switch off.

★If the reading is within the standard, check the output voltage (see Intake Air Pressure Sensor #1 Output Voltage Inspection).

★If the reading is out of the standard, remove the ECU and check the wiring for continuity between main harness connectors.

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Intake Air Pressure Sensor #1 Connector [B]
BL lead (ECU terminal 4) [C]
G lead (ECU terminal 49) [D]

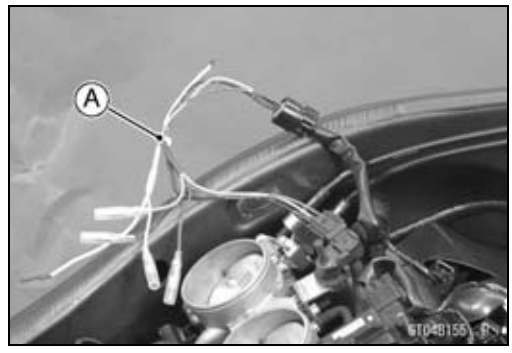


★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Intake Air Pressure Sensor #1 (Service Code 12)

Intake Air Pressure Sensor #1 Output Voltage Inspection

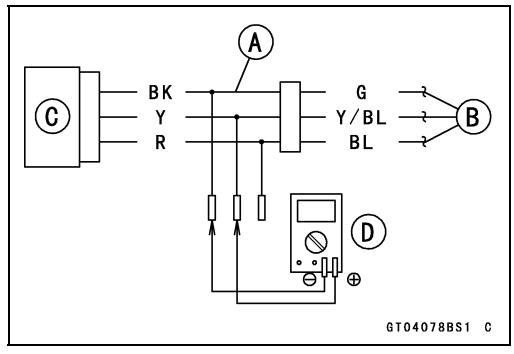


● Measure the output voltage at the intake air pressure sensor #1 in the same way as input voltage inspection, note the following.

○Disconnect the intake air pressure sensor #1 connector and connect the measuring adapter [A] between these connectors.

[B] Main Harness
[C] Intake Air Pressure Sensor #1
[D] Digital Meter

Special Tool - Measuring Adapter: 57001-1700



Intake Air Pressure Sensor #1 Output Voltage
Connections to Adapter:
Digital Meter (+) → Y (sensor Y/BL) lead
Digital Meter (–) → BK (sensor G) lead

● Measure the output voltage with the engine stopped and with the connector joined.

● Turn the ignition switch on.

Output Voltage
Usable Range: DC 3.80 ~ 4.20 V at standard atmospheric pressure (101.32 kPa, 76 cmHg)

NOTE

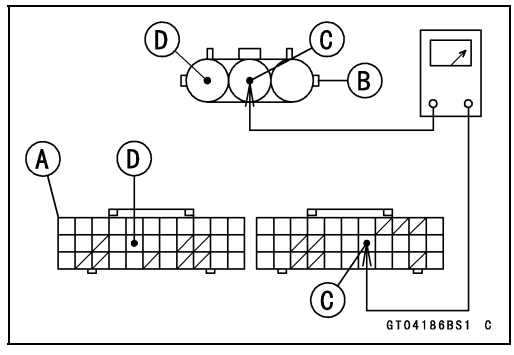
○*The output voltage changes according to local atmospheric pressure.*

● Turn the ignition switch off.

★If the reading is out of the usable range, replace the sensor.

★If the reading is within the usable range, remove the ECU and check the wiring for continuity between main harness connector.

○Disconnect the ECU and sensor connectors.



Wiring Continuity Inspection
ECU Connector [A] ←→
Intake Air Pressure Sensor #1 Connector [B]
Y/BL lead (ECU terminal 18) [C]
G lead (ECU terminal 49) [D]

Intake Air Pressure Sensor #1 (Service Code 12)

★If the wiring is good, check the sensor for various vacuum.
● Remove the intake air pressure sensor #1 [A] and disconnect the vacuum hose from the sensor.
● Connect an auxiliary hose [B] to the intake air pressure sensor #1.
● Temporarily install the intake air pressure sensor #1.
○Connect a digital meter [C], vacuum gauge [D], the fork oil level gauge [E] and the measuring adapter to the intake air pressure sensor #1.

Special Tools - Fork Oil Level Gauge: 57001-1290
Vacuum Gauge: 57001-1369
Measuring Adapter: 57001-1700

Intake Air Pressure Sensor #1 Output Voltage
Connections to Adapter:
Digital Meter (+) → Y (sensor Y/BL) lead
Digital Meter (–) → BK (sensor G) lead

○Turn the ignition switch on.
○Measure the intake air pressure sensor #1 output voltage from various vacuum readings, while pulling the handle of the fork oil level gauge.
○Check the intake air pressure sensor #1 output voltage, using the following formula and chart.

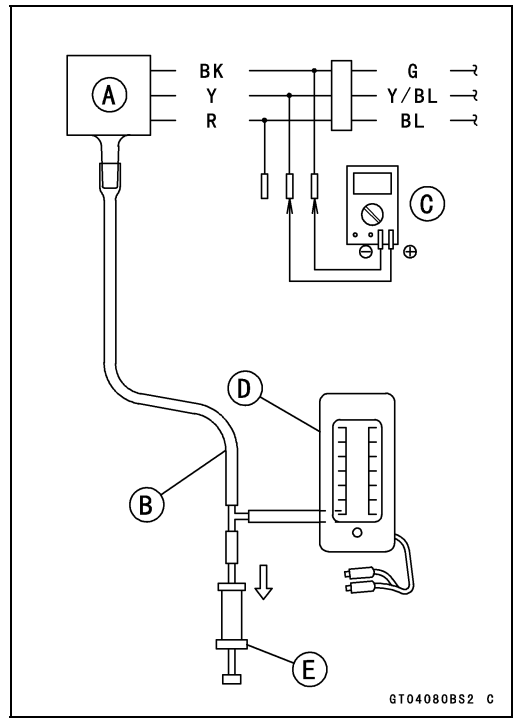
Suppose:
Pg: Vacuum Pressure (Gauge) of Throttle Body
Pl: Local Atmospheric Pressure (Absolute) measured by a barometer
Pv: Vacuum Pressure (Absolute) of Throttle Body
Vv: Sensor Output Voltage (V)

then
Pv = Pl + Pg

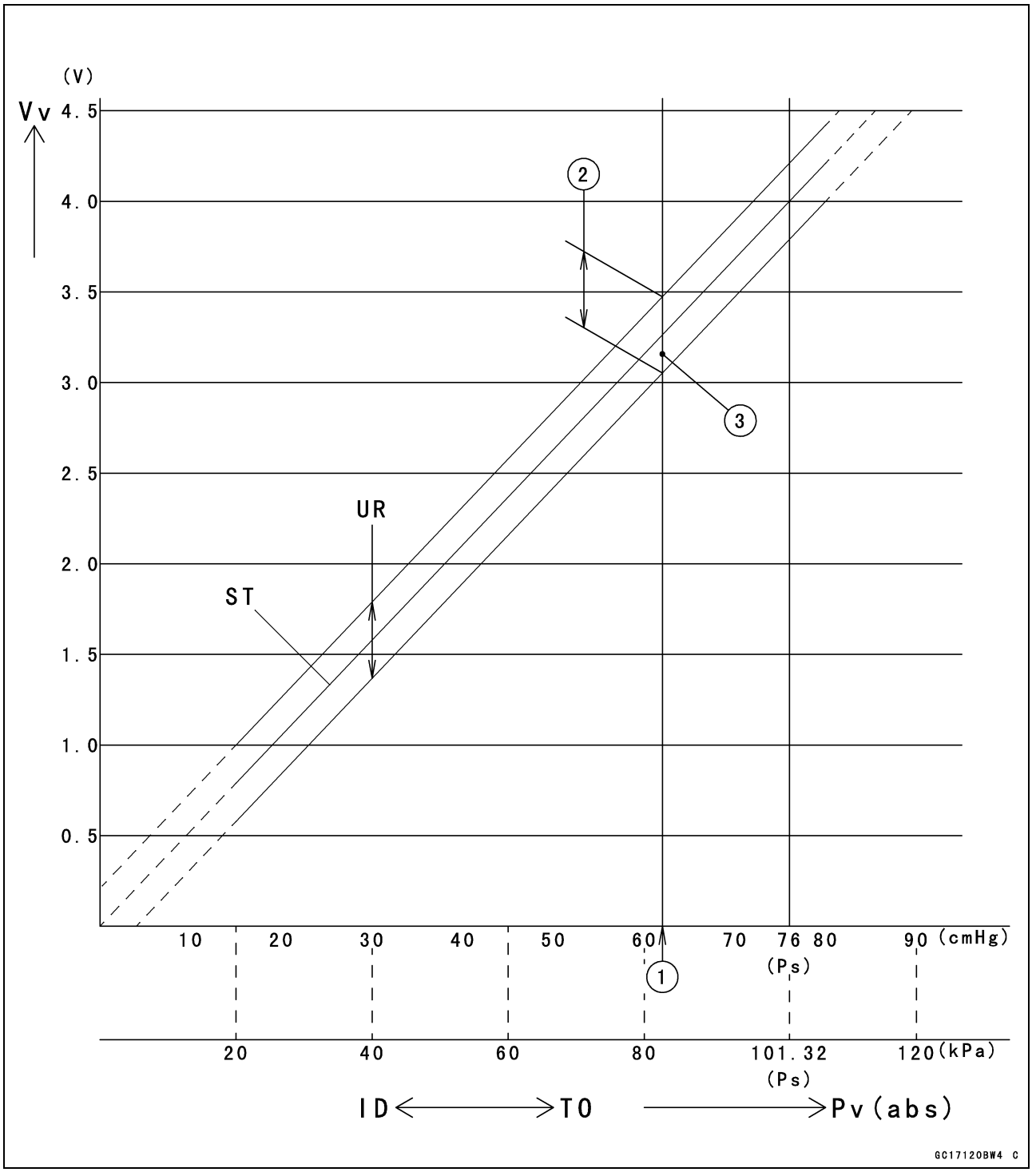
For example, suppose the following data is obtained:
Pg = –8 cmHg (Vacuum Gauge Reading)
Pl = 70 cmHg (Barometer Reading)
Vv = 3.2 V (Digital Meter Reading)

then
Pv = 70 + (–8) = 62 cmHg (Absolute)

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 = 3.08 ~ 3.48 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.
★If the reading is out of the usable range, replace the sensor.
★If the reading is within the usable range, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).



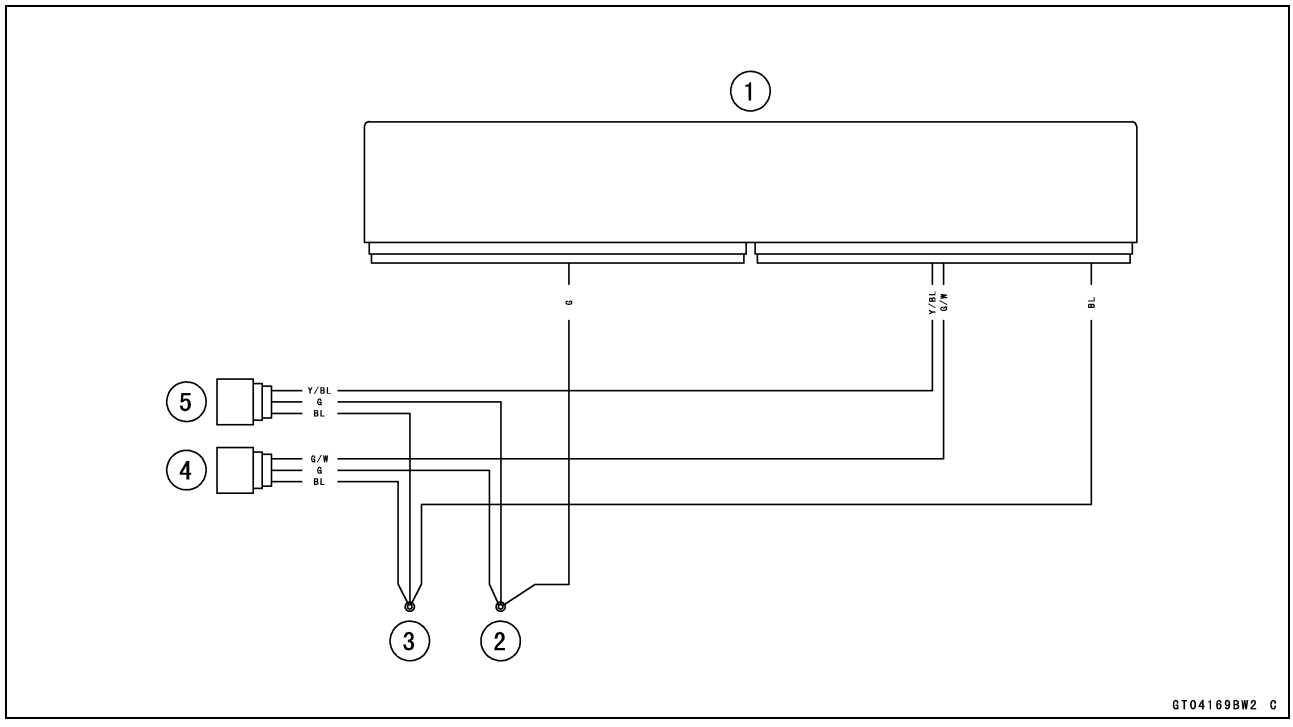
Intake Air Pressure Sensor #1 (Service Code 12)



ID: Idling
Ps: Standard Atmospheric Pressure (Absolute)
Pv: Throttle Vacuum Pressure (Absolute)
ST: Standard of Sensor Output Voltage (V)
TO: Throttle Full Open
UR: Usable Range of Sensor Output Voltage (V)
Vv: Intake Air Pressure Sensor #1 Output Voltage (V) (Digital Meter Reading)

Intake Air Pressure Sensor #1 (Service Code 12)

Intake Air Pressure Sensor #1 Circuit

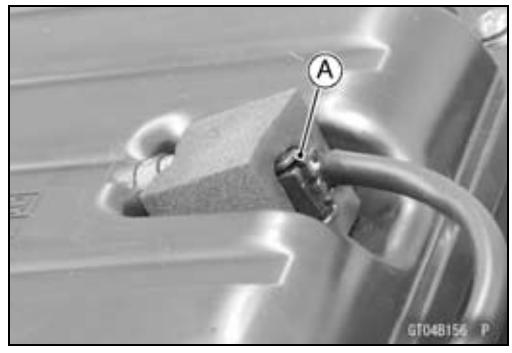


1. ECU
2. Water-proof Joint 2
3. Water-proof Joint 1
4. Intake Air Pressure Sensor #2
5. Intake Air Pressure Sensor #1

Intake Air Temperature Sensor (Service Code 13)

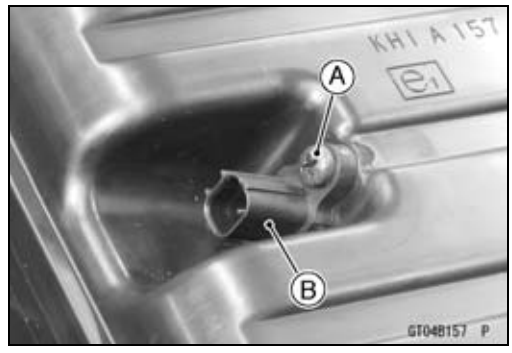
Intake Air Temperature Sensor Removal

NOTICE
Never drop the intake air temperature sensor especially on a hard surface. Such a shock to the sensor can damage it.



- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Disconnect the connector [A] from the intake air temperature sensor.

- Remove:
  Screw [A]
  Intake Air Temperature Sensor [B]



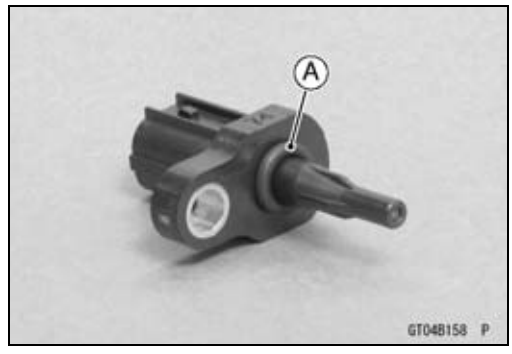
Intake Air Temperature Sensor Installation

- Be sure to install the O-ring [A].
- Install the intake air temperature sensor.

○When installing the sensor which is fastened by screw, tighten the screw after placing the sensor on the bottom surface completely.

- Tighten:

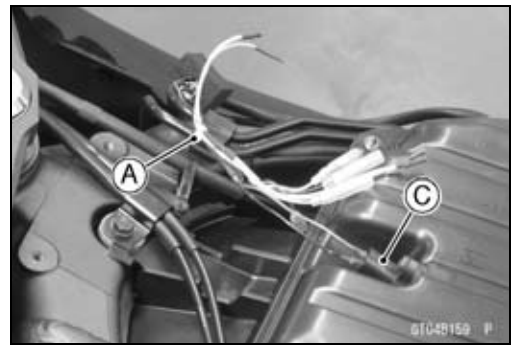
Torque - Intake Air Temperature Sensor Screw: 1.2 N·m (0.12 kgf·m, 11 in·lb)



- Connect the intake air temperature sensor lead connector.

Intake Air Temperature Sensor (Service Code 13)

Intake Air Temperature Sensor Output Voltage Inspection



NOTE

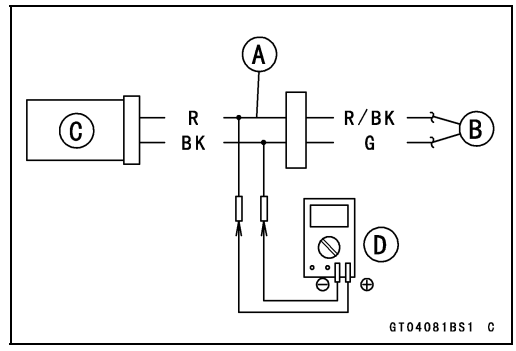
○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Disconnect the intake air temperature sensor connector and connect the measuring adapter [A] between these connectors as shown.
  Main Harness [B]
  Intake Air Temperature Sensor [C]

Special Tool - Measuring Adapter: 57001-1700

- Connect a digital meter [D] to the harness adapter leads.

Intake Air Temperature Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → R (sensor R/BK) lead
Digital Meter (–) → BK (sensor G) lead



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

Output Voltage
Standard: About DC 2.25 ~ 2.50 V @20°C (68°F)

NOTE

○*The output voltage changes according to the intake air temperature.*

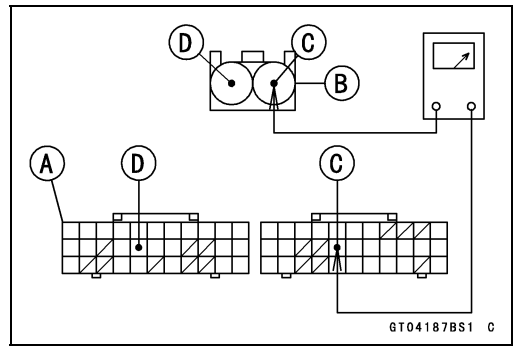
- Turn the ignition switch off.

★If the reading is within the standard, check the ECU for its ground, and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

★If the reading is out of the standard, remove the ECU and check the wiring for continuity between main harness connectors.

○Disconnect the ECU and sensor connectors.

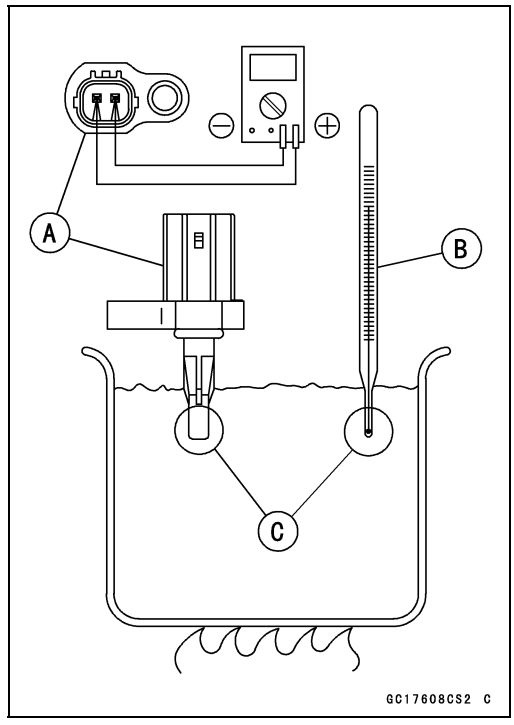


Wiring Inspection
ECU Connector [A] ←→
Intake Air Temperature Sensor Connector [B]
R/BK lead (ECU terminal 16) [C]
G lead (ECU terminal 49) [D]

★If the wiring is good, check the intake air temperature sensor resistance (see Intake Air Temperature Sensor Resistance Inspection).

Intake Air Temperature Sensor (Service Code 13)

Intake Air Temperature Sensor Resistance Inspection



- Remove the intake air temperature sensor (see Intake Air Temperature Sensor Removal).
- 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

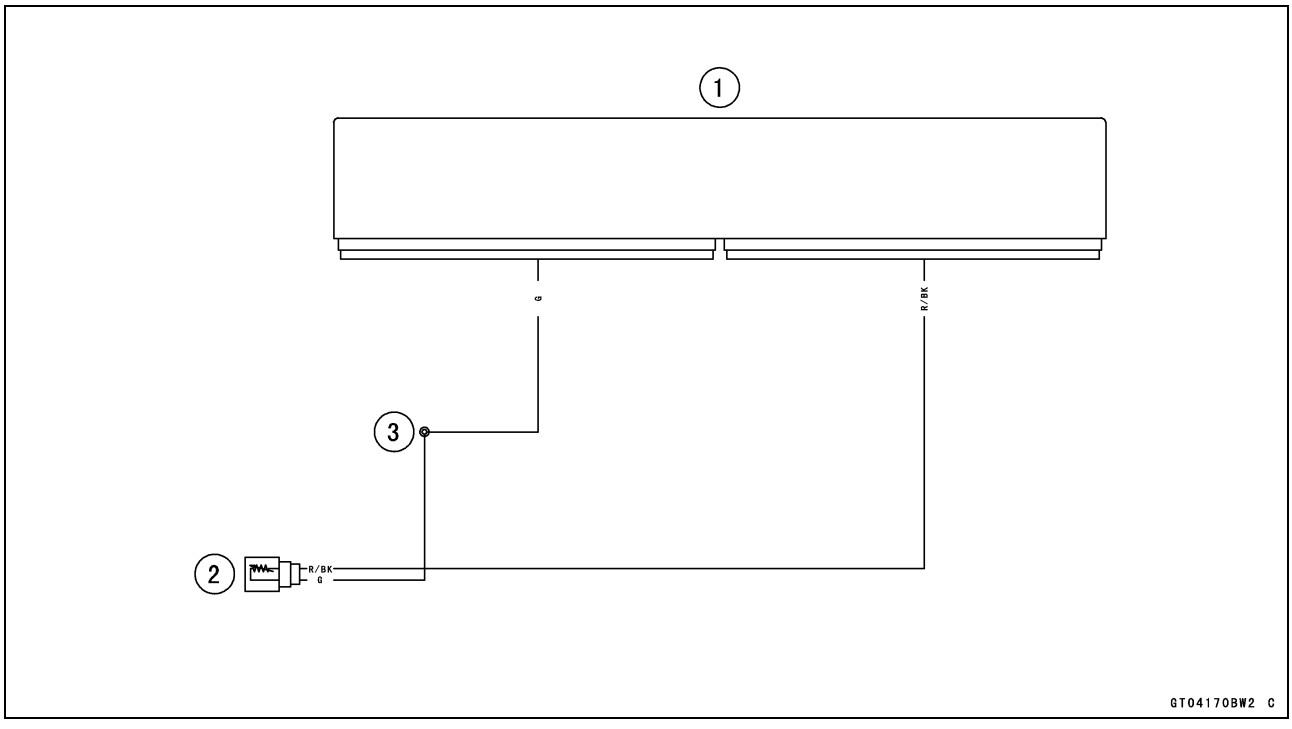
○*The sensor and thermometer must not touch the container side or bottom.*

- 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 following.

Intake Air Temperature Sensor Resistance
Standard: 5.4 ~ 6.6 kΩ @0°C (32°F)
0.29 ~ 0.39 kΩ @80°C (176°F)

★If the reading is out of the standard, replace the sensor.
★If the reading is within the standard, but the problem still exists, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Intake Air Temperature Sensor Circuit



1. ECU
2. Water-proof Joint 2
3. Intake Air Temperature Sensor

Water Temperature Sensor (Service Code 14)

Water Temperature Sensor Removal/Installation

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

- Remove the throttle body assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter).
- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Disconnect the water temperature sensor lead connector.
- Remove:
  Water Temperature Sensor [A] with O-ring
- Replace the O-ring with a new one.
- Tighten:

Torque - Water Temperature Sensor: 12 N·m (1.2 kgf·m, 106 in·lb)

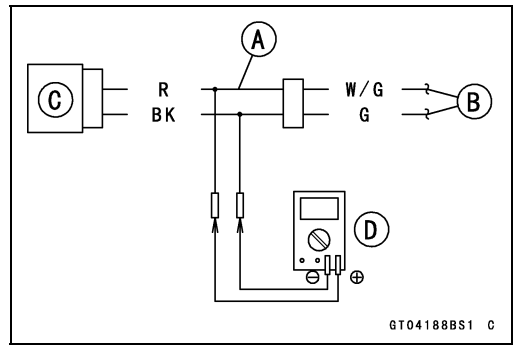
- Fill the engine with coolant and bleed the air from the cooling system (see Coolant Change in the Periodic Maintenance chapter).

Water Temperature Sensor Output 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 in the Fuel System (DFI) chapter).

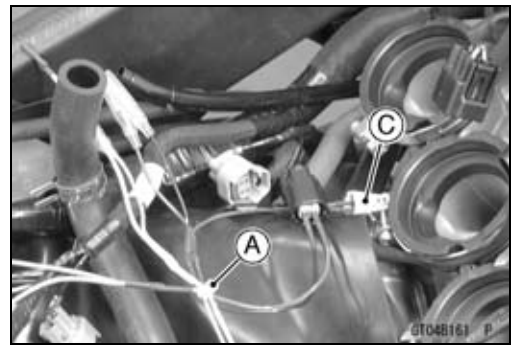


- Disconnect the water temperature sensor connector and connect the measuring adapter [A] between these connectors as shown.
  Main Harness [B]
  Water Temperature Sensor [C]

Special Tool - Measuring Adapter: 57001-1700

- Connect a digital meter [D] to the measuring adapter leads.

Water Temperature Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → R (sensor W/G) lead
Digital Meter (–) → BK (sensor G) lead



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

Output Voltage
Standard: About DC 2.80 ~ 2.97 V @20°C (68°F)

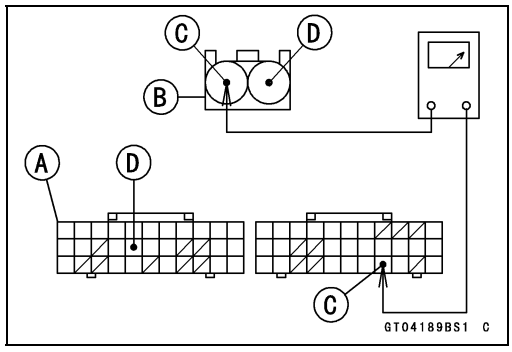
NOTE

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

Water Temperature Sensor (Service Code 14)

● Turn the ignition switch off.
★If the reading is within the standard, check the ECU for its ground, and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

★If the reading is out of the standard, remove the ECU and check the wiring for continuity between harness connectors.
○Disconnect the ECU and sensor connectors.



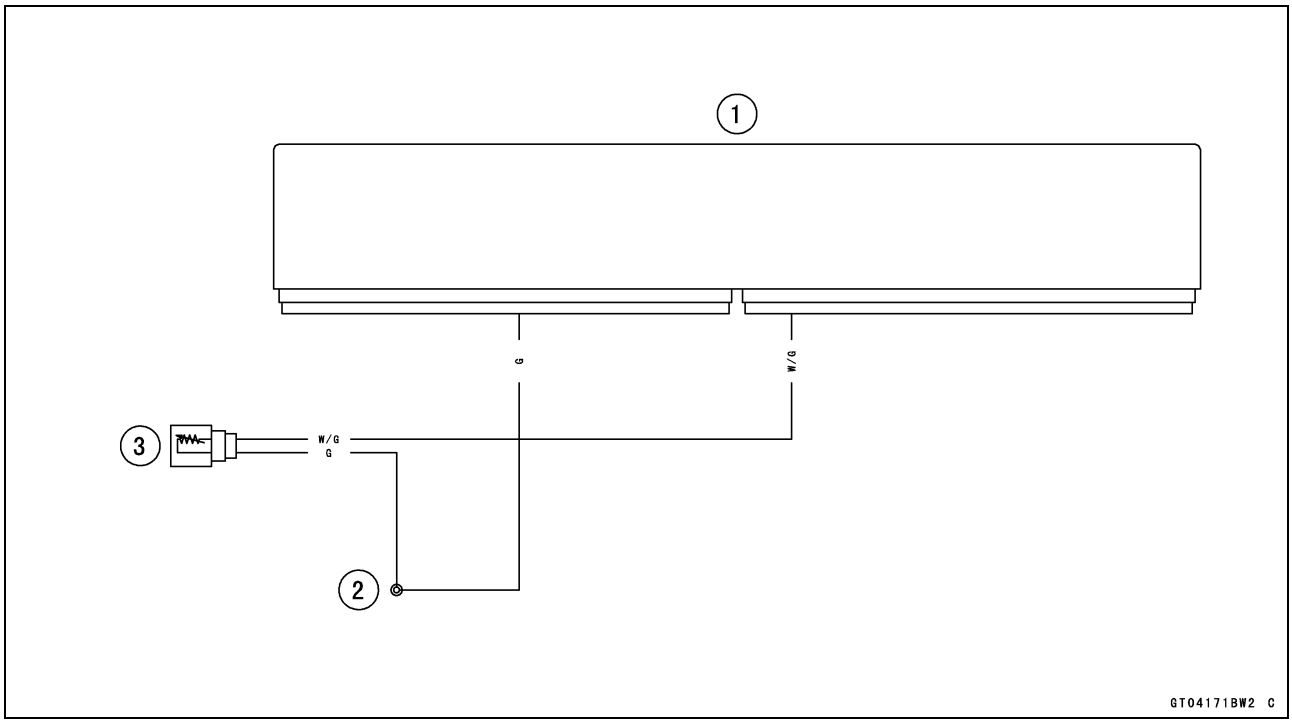
Wiring Continuity Inspection
ECU Connector [A] ←→
Water Temperature Sensor Connector [B]
W/G lead (ECU terminal 30) [C]
G lead (ECU terminal 49) [D]

★If the wiring is good, check the water temperature sensor resistance (see Water Temperature Sensor Resistance Inspection).

Water Temperature Sensor Resistance Inspection

● Refer to the Water Temperature Sensor Inspection in the Electrical System chapter.
★If the reading is within the standard, but the problem still exists, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Water Temperature Sensor Circuit

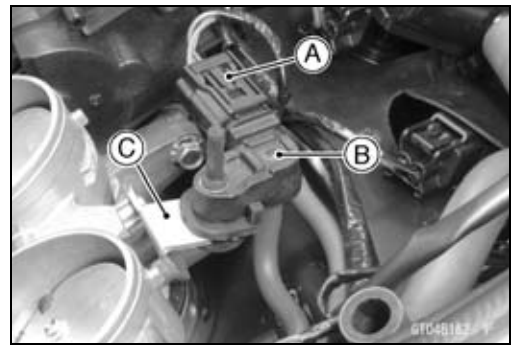


1. ECU
2. Water-proof Joint 2
3. Water Temperature Sensor

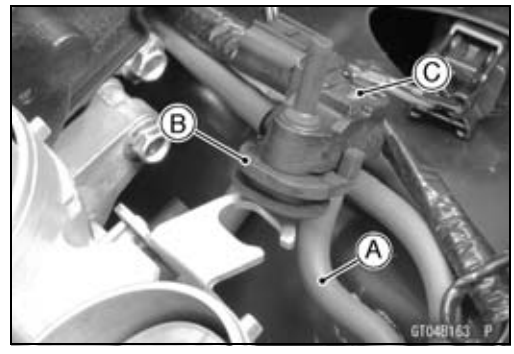
Intake Air Pressure Sensor #2 (Service Code 16)

Intake Air Pressure Sensor #2 Removal

NOTICE
Never drop the intake air pressure sensor #2 especially on a hard surface. Such a shock to the sensor can damage it.



- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter)
- Disconnect:
  Intake Air Pressure Sensor #2 Connector [A]
- Disconnect the intake air pressure sensor #2 [B] from the bracket [C].

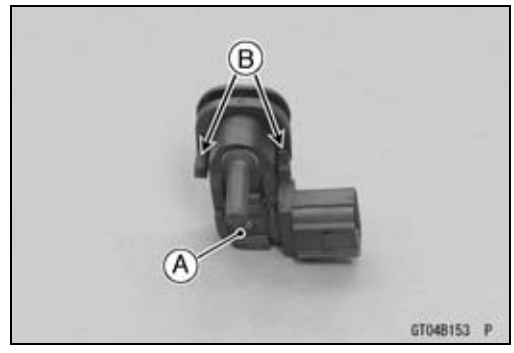


- Disconnect the vacuum hose [A].
- Remove the rubber damper [B] from the intake air pressure sensor #2 [C].

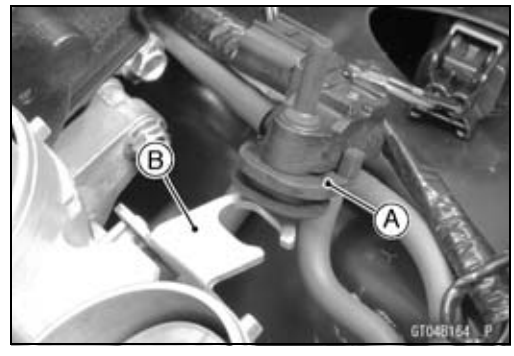
Intake Air Pressure Sensor #2 Installation

NOTE

○*The intake air pressure sensor #2 is the same part as the intake air pressure sensor #1.*



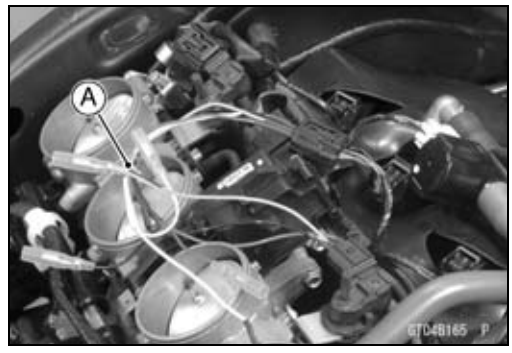
- Installation is basically the reverse of removal.
- Position the intake air pressure sensor #2 [A] between the projections [B] on the rubber damper.



- Install the rubber damper [A] on the bracket [B].

Intake Air Pressure Sensor #2 (Service Code 16)

Intake Air Pressure Sensor #2 Input Voltage Inspection



NOTE

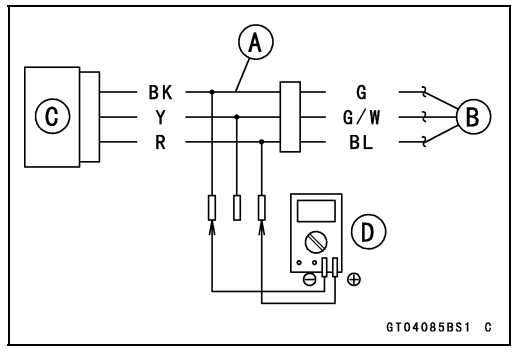
○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the air cleaner housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter).
- Disconnect the intake air pressure sensor #2 connector and connect the measuring adapter [A] between these connectors.
  [B] Main Harness
  [C] Intake Air Pressure Sensor #2

Special Tool - Measuring Adapter: 57001-1700

- Connect a digital meter [D] to the measuring adapter leads.

Intake Air Pressure Sensor #2 Input Voltage
Connections to Adapter:
Digital Meter (+) → R (sensor BL) lead
Digital Meter (–) → BK (sensor G) lead



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

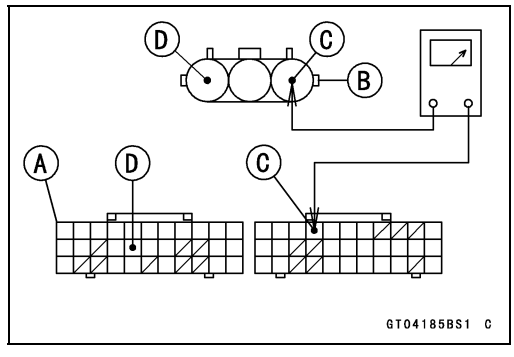
Input Voltage
Standard: DC 4.75 ~ 5.25 V

- Turn the ignition switch off.

★If the reading is within the standard, check the output voltage (see Intake Air Pressure Sensor #2 Output Voltage Inspection).

★If the reading is out of the standard, remove the ECU and check the wiring for continuity between main harness connectors.

○Disconnect the ECU and sensor connectors.



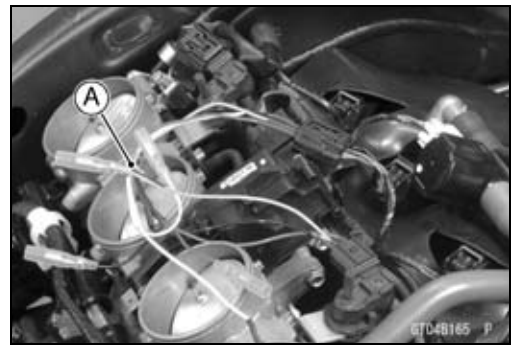
Wiring Continuity Inspection
ECU Connector [A] ←→
Intake Air Pressure Sensor #2 Connector [B]
BL lead (ECU terminal 4) [C]
G lead (ECU terminal 49) [D]

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Intake Air Pressure Sensor #2 (Service Code 16)

Intake Air Pressure Sensor #2 Output Voltage Inspection

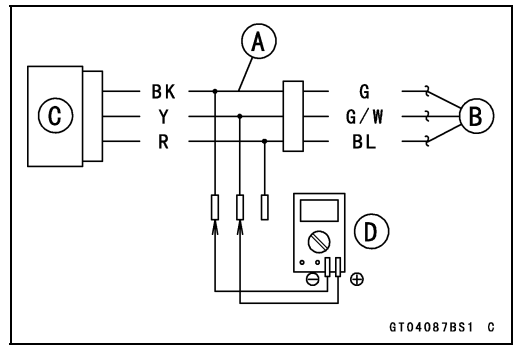


● Measure the output voltage at the intake air pressure sensor #2 in the same way as input voltage inspection, note the following.

○Disconnect the intake air pressure sensor #2 connector and connect the measuring adapter [A] between these connectors.

[B] Main Harness
[C] Intake Air Pressure Sensor #2
[D] Digital Meter

Special Tool - Measuring Adapter: 57001-1700



Intake Air Pressure Sensor #2 Output Voltage
Connections to Adapter:
Digital Meter (+) → Y (sensor G/W) lead
Digital Meter (–) → BK (sensor G) lead

● Measure the output voltage with the engine stopped and with the connector joined.

● Turn the ignition switch on.

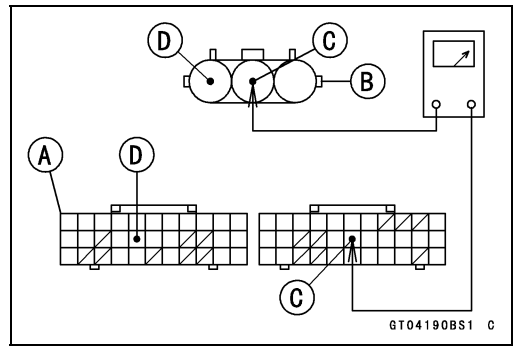
Output Voltage
Usable Range: DC 3.80 ~ 4.20 V at standard atmospheric pressure (101.32 kPa, 76 cmHg absolute)

NOTE

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

● Turn the ignition switch off.

★If the reading is out of the usable range, replace the sensor.



★If the reading is within the usable range, remove the ECU and check the wiring for continuity between main harness connector.

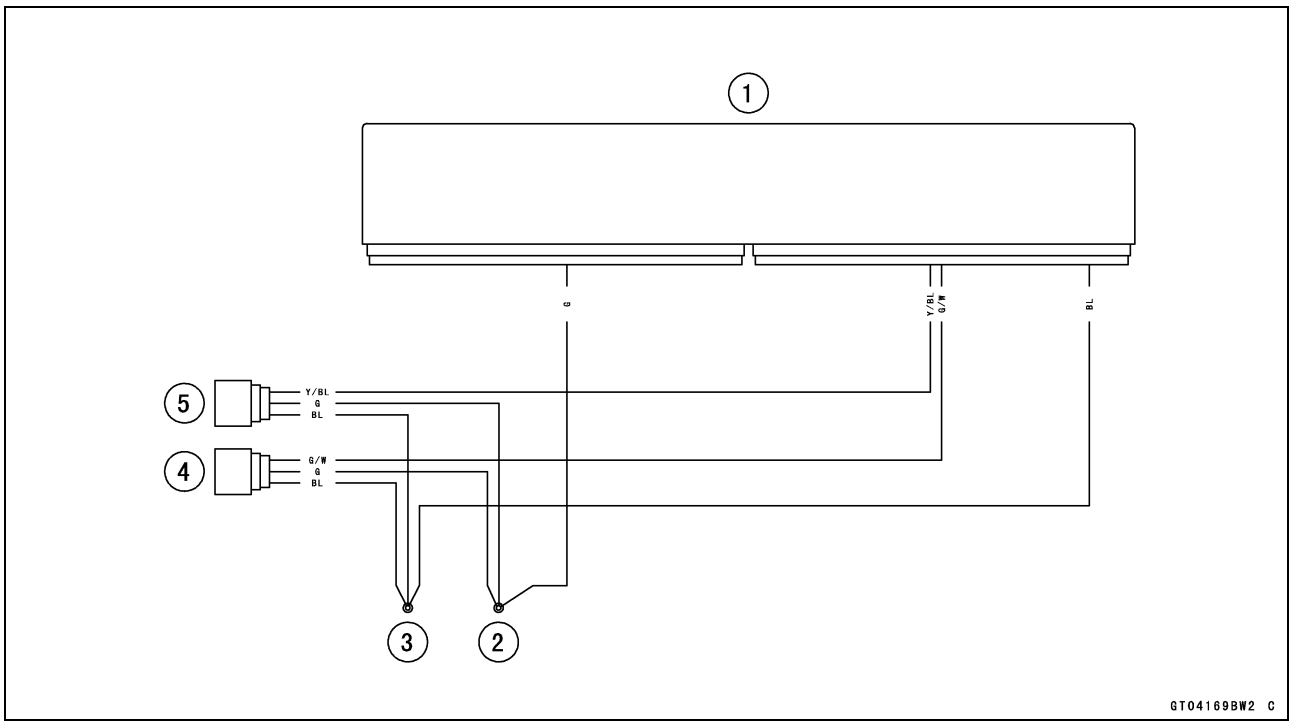
○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Intake Air Pressure Sensor #2 Connector [B]
G/W lead (ECU terminal 17) [C]
G lead (ECU terminal 49) [D]

★If the wiring is good, check the sensor for various vacuum (see Intake Air Pressure Sensor #1 Output Voltage Inspection).

Intake Air Pressure Sensor #2 (Service Code 16)

Intake Air Pressure Sensor #2 Circuit



1. ECU
2. Water-proof Joint 2
3. Water-proof Joint 1
4. Intake Air Pressure Sensor #2
5. Intake Air Pressure Sensor #1

Crankshaft Sensor (Service Code 21)

The crankshaft sensor has no power source, and when the engine stops, the crankshaft sensor generates no signals.

Crankshaft Sensor Removal/Installation

● Refer to the Crankshaft Sensor Removal/Installation in the Electrical System chapter.

Crankshaft Sensor Resistance Inspection

● Refer to the Crankshaft Sensor Inspection in the Electrical System chapter.

★If the reading is within the standard, check the peak voltage (see Crankshaft Sensor Peak Voltage Inspection).

Crankshaft Sensor Peak Voltage Inspection

● Refer to the Crankshaft Sensor Peak Voltage Inspection in the Electrical System chapter.

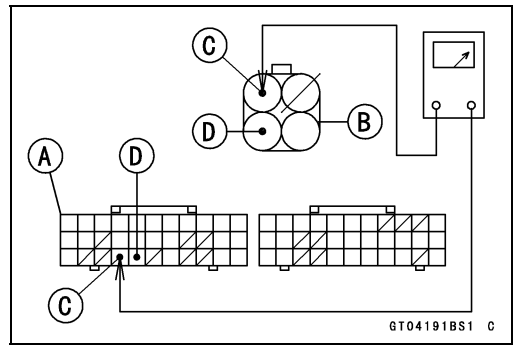
★If the reading is within the standard, remove the ECU and check the wiring for continuity between harness connectors.

○Disconnect the ECU and sensor connectors.

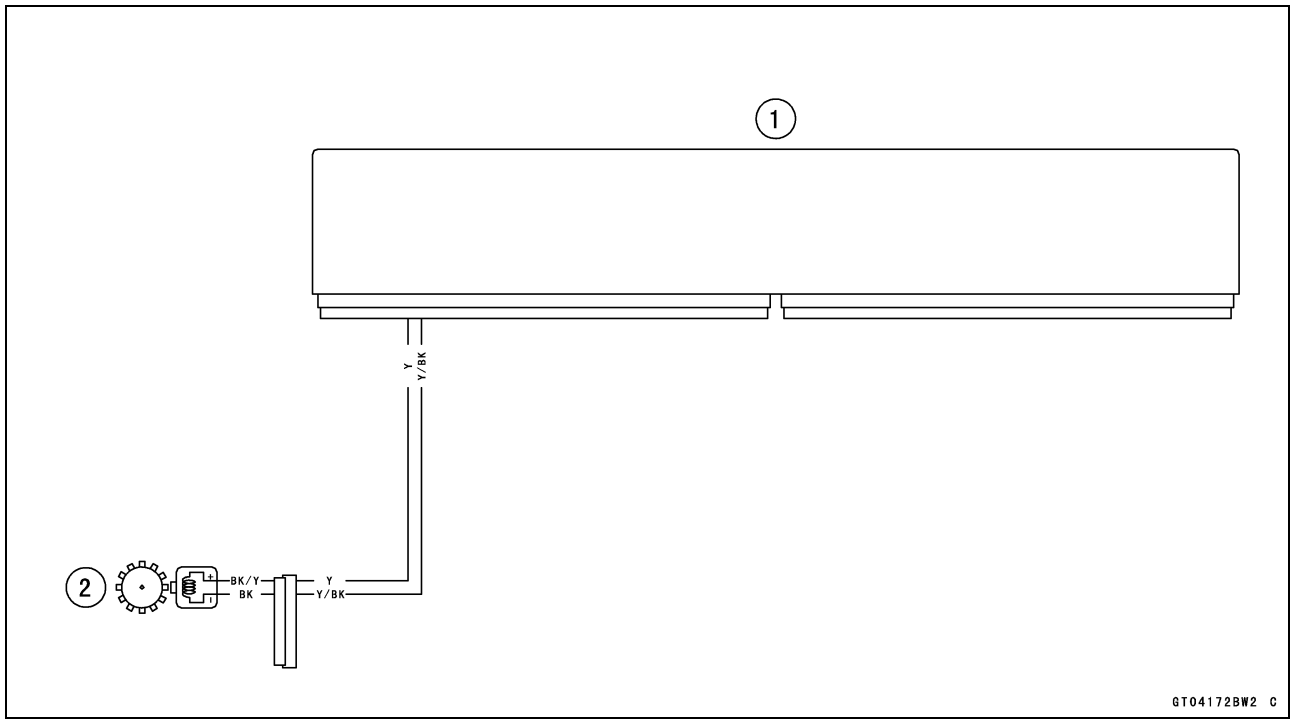
Wiring Continuity Inspection
ECU Connector [A] ←→
Crankshaft Sensor Connector [B]
Y/BK lead (ECU terminal 59) [C]
Y lead (ECU terminal 60) [D]

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).



Crankshaft Sensor Circuit



1. ECU
2. Crankshaft Sensor

Rear Wheel Rotation Sensor Signal (Service Code 24)

Rear Wheel Rotation Sensor Signal Inspection

○The rear wheel rotation sensor sends the signal to the ECU through the ABS hydraulic unit (ABS equipped models). For other than ABS equipped models, the signal is sent directly to the ECU.

○The ECU uses the rear wheel rotation sensor signal for motorcycle speed and KTRC control.

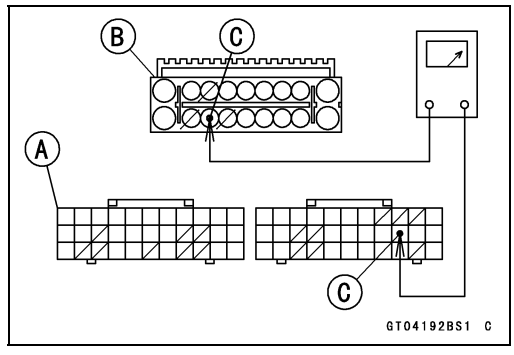
○The service code 24 is detected with the ECU.

- Inspect the wheel rotation sensor air gap (see Wheel Rotation Sensor Air Gap Inspection in the Brakes chapter).
- Inspect the wheel rotation sensor rotor (see Wheel Rotation Sensor Rotor Inspection in the Brakes chapter).
- When the service code 24 and following service codes (for ABS) are displayed at the same time, inspect the rear wheel rotation sensor.
  Service Code b 44 (see Rear Wheel Rotation Sensor Signal Abnormal)
  Service Code b 45 (see Rear Wheel Rotation Sensor Wiring Inspection)

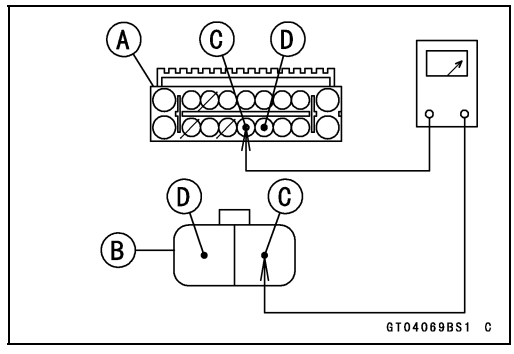
- When only service code 24 is displayed, do the following inspection procedures.
- Disconnect:
  ECU Connectors (see ECU Removal in the Fuel System (DFI) chapter)
  Rear Wheel Rotation Sensor Lead Connector
  ABS Hydraulic Unit Connector (see ABS Hydraulic Unit Removal in the Brakes chapter)

- For ABS equipped models, check the wiring for continuity between harness connectors.

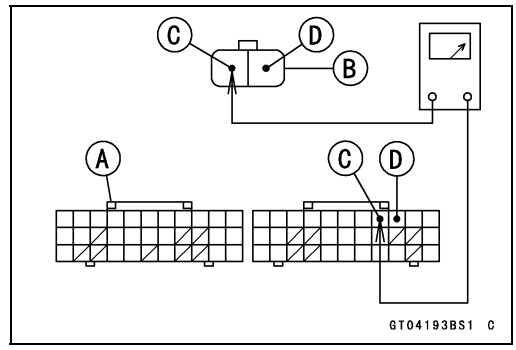
Wiring Continuity Inspection
ECU Connector [A] ← →
ABS Hydraulic Unit Connector [B]
R/Y lead (ECU terminal 20, ABS Hydraulic Unit terminal 16) [C]



Wiring Continuity Inspection
ABS Hydraulic Unit Connector [A] ← →
Rear Wheel Rotation Sensor Connector [B]
BK/O lead (ABS Hydraulic Unit Connector terminal 14) [C]
W/G lead (ABS Hydraulic Unit Connector terminal 13) [D]



Rear Wheel Rotation Sensor Signal (Service Code 24)

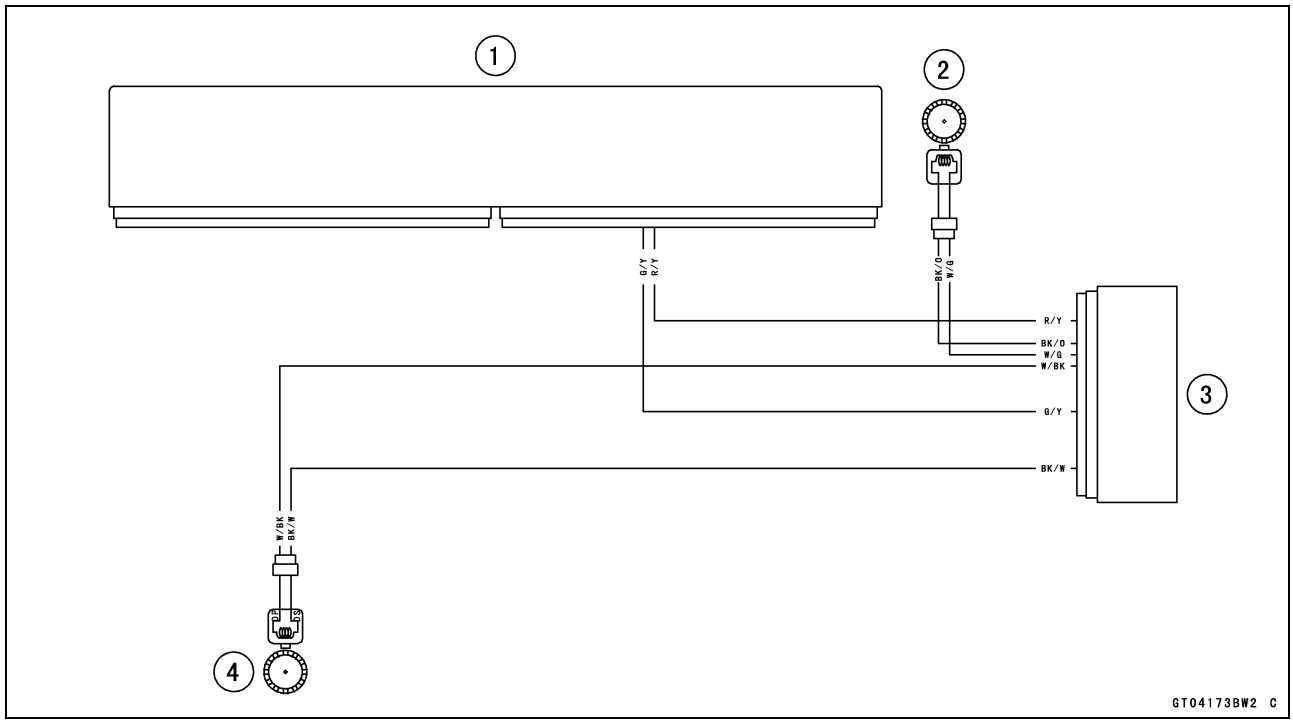


● For other than ABS equipped models, check the wiring for continuity between harness connectors.

Wiring Continuity Inspection
ECU Connector [A] ← →
Rear Wheel Rotation Sensor Connector [B]
W/Y lead (ECU terminal 8) [C]
R/Y lead (ECU terminal 9) [D]

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

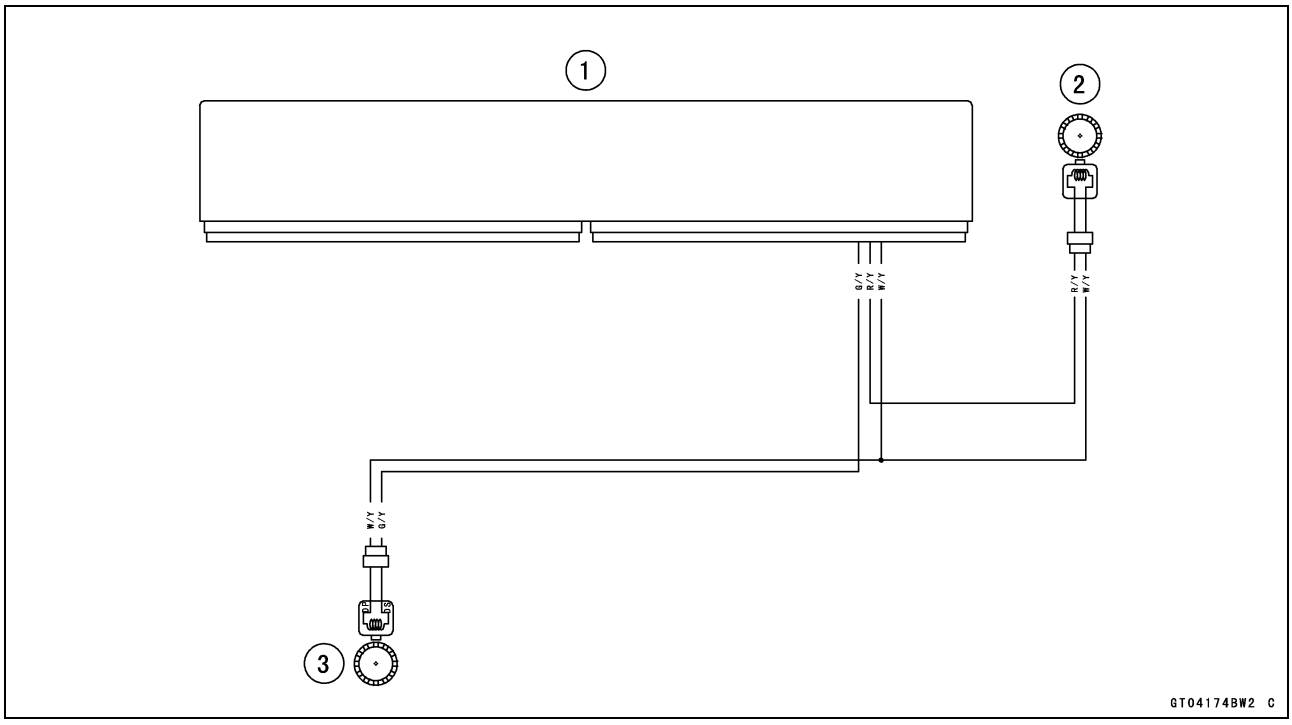
Wheel Rotation Sensor Circuit (ABS Equipped Models)



1. ECU
2. Rear Wheel Rotation Sensor
3. ABS Hydraulic Unit
4. Front Wheel Rotation Sensor

Rear Wheel Rotation Sensor Signal (Service Code 24)

Wheel Rotation Sensor Circuit (other than ABS Equipped Models)



1. ECU
2. Rear Wheel Rotation Sensor
3. Front Wheel Rotation Sensor

Gear Position Switch (Service Code 25)

Gear Position Switch Removal/Installation

● Refer to the Gear Position Switch Removal/Installation in the Electrical System chapter.

Gear Position Switch Resistance Inspection

● Refer to the Gear Position Switch Inspection in the Electrical System chapter.

★If the reading is as the specified, check the output voltage (see Gear Position Switch Output Voltage Inspection).

Gear Position Switch Output Voltage Inspection

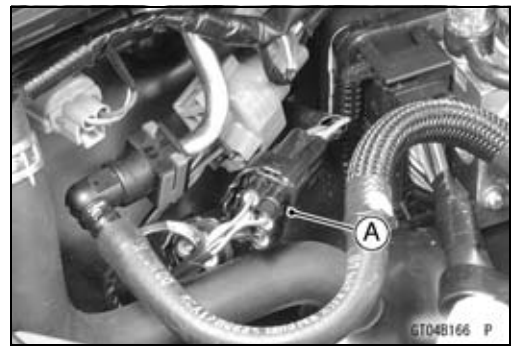
NOTE

○*Be sure the battery is fully charged.*

● Turn the ignition switch off.

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

● Disconnect the sidestand switch/gear position switch lead connector [A].



● Connect the measuring adapter [A] between the main harness connector and sidestand switch/gear position switch lead connector as shown.

Main Harness [B]
To Gear Position Switch [C]
To Sidestand Switch [D]

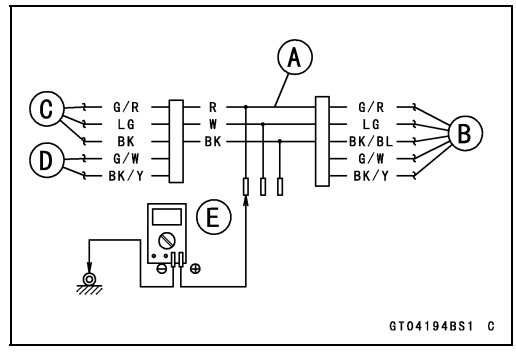
Special Tool - Measuring Adapter: 57001-1700

● Connect a digital meter [E] to the measuring adapter lead.

Gear Position Switch Output Voltage
Connections to Adapter:

Digital Meter (+) → R (sensor G/R) lead

Digital Meter (–) → Frame Ground terminal



● Measure the switch input voltage with the engine stopped and with the connector joined.

● Turn the ignition switch on.

○When changing the gear position from lower gear to higher gear, raise the rear wheel off the ground with a suitable stand and rotate the rear wheel by hand.

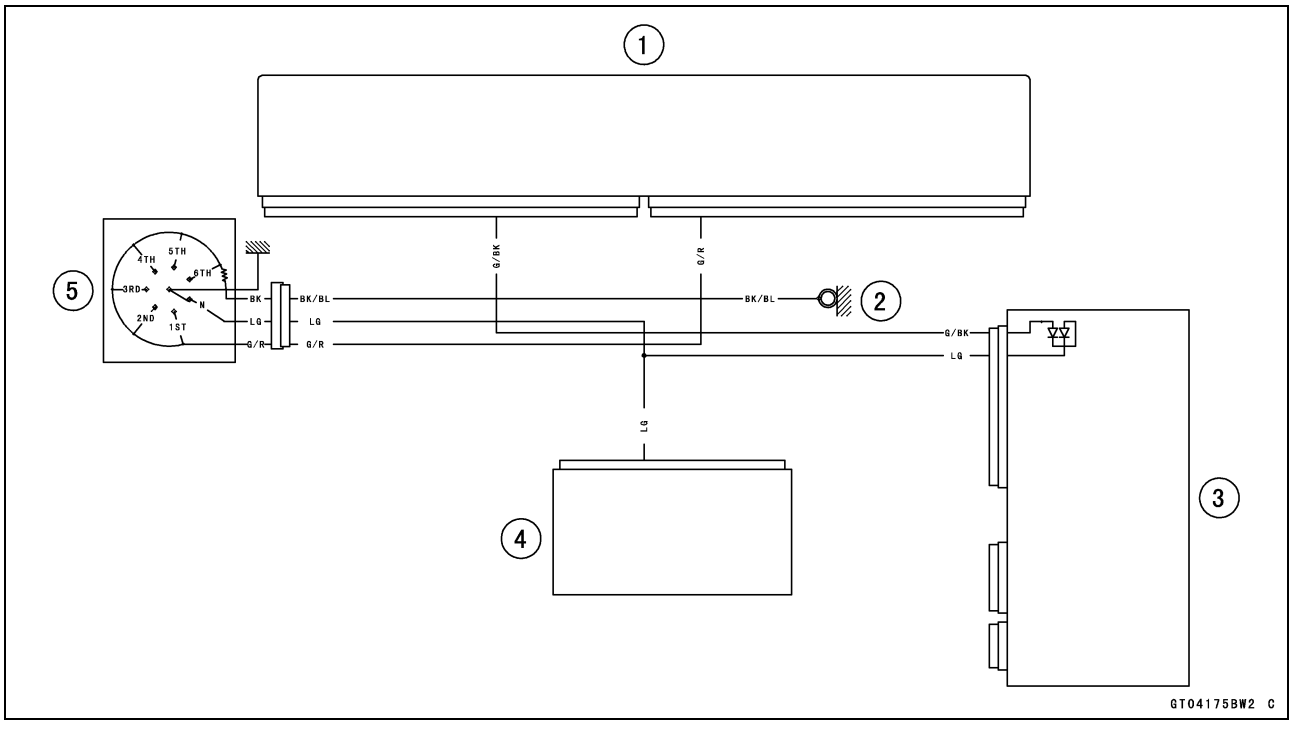
Output Voltage at 1 ~ 6 Gear Positions
Standard:

1st	**About DC 3.0 V**
2nd	**About DC 2.5 V**
3rd	**About DC 2.0 V**
4th	**About DC 1.5 V**
5th	**About DC 1.1 V**
6th	**About DC 0.7 V**

Gear Position Switch (Service Code 25)

● Turn the ignition switch off.
★If the reading is out of the standard, check the wiring for continuity, using the wiring diagram in this section.
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Gear Position Switch Circuit



1. ECU
2. Frame Ground 1
3. Relay Box
4. Meter Unit
5. Gear Position Switch

Front Wheel Rotation Sensor Signal (Service Code 27)

Front Wheel Rotation Sensor Signal Inspection

○The front wheel rotation sensor sends the signal to the ECU through the ABS hydraulic unit (ABS equipped models). For other than ABS equipped models, the signal is sent directly to the ECU.

○The ECU uses the wheel rotation sensor signal for KTRC control.

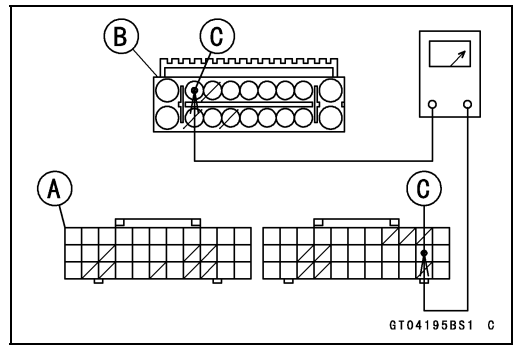
○The service code 27 is detected with the ECU.

- Inspect the wheel rotation sensor air gap (see Wheel Rotation Sensor Air Gap Inspection in the Brakes chapter).
- Inspect the wheel rotation sensor rotor (see Wheel Rotation Sensor Rotor Inspection in the Brakes chapter).
- When the service code 27 and following service codes (for ABS) are displayed at the same time, inspect the front wheel rotation sensor.
  Service Code b 42 (see Front Wheel Rotation Sensor Signal Abnormal)
  Service Code b 43 (see Front Wheel Rotation Sensor Wiring Inspection)

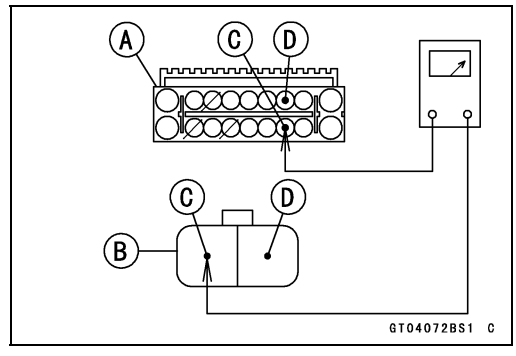
- When only service code 27 is displayed, do the following inspection procedures.
- Disconnect:
  ECU Connectors (see ECU Removal in the Fuel System (DFI) chapter)
  Front Wheel Rotation Sensor Lead Connector
  ABS Hydraulic Unit Connector (see ABS Hydraulic Unit Removal in the Brakes chapter)

- For ABS equipped models, check the wiring for continuity between harness connectors.

Wiring Continuity Inspection
ECU Connector [A] ← →
ABS Hydraulic Unit Connector [B]
G/Y lead (ECU terminal 21, ABS Hydraulic Unit terminal 8) [C]



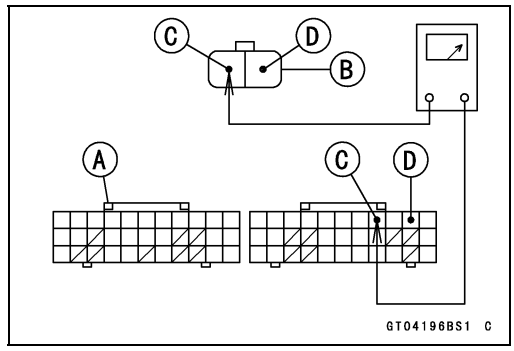
Wiring Continuity Inspection
ABS Hydraulic Unit Connector [A] ← →
Front Wheel Rotation Sensor Connector [B]
W/BK lead (ABS Hydraulic Unit Connector terminal 12) [C]
BK/W lead (ABS Hydraulic Unit Connector terminal 3) [D]



Front Wheel Rotation Sensor Signal (Service Code 27)

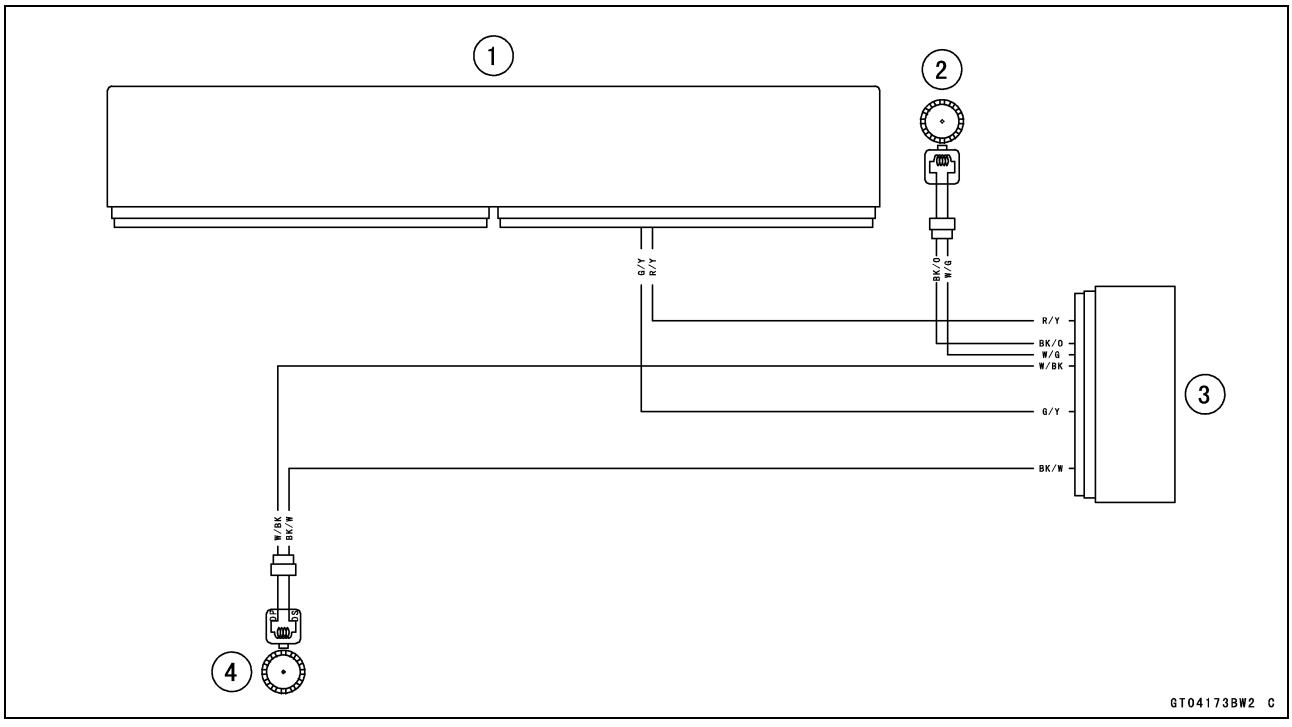
● For other than ABS equipped models, check the wiring for continuity between harness connectors.

Wiring Continuity Inspection
ECU Connector [A] ← →
Front Wheel Rotation Sensor Connector [B]
W/Y lead (ECU terminal 8) [C]
G/Y lead (ECU terminal 10) [D]



★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

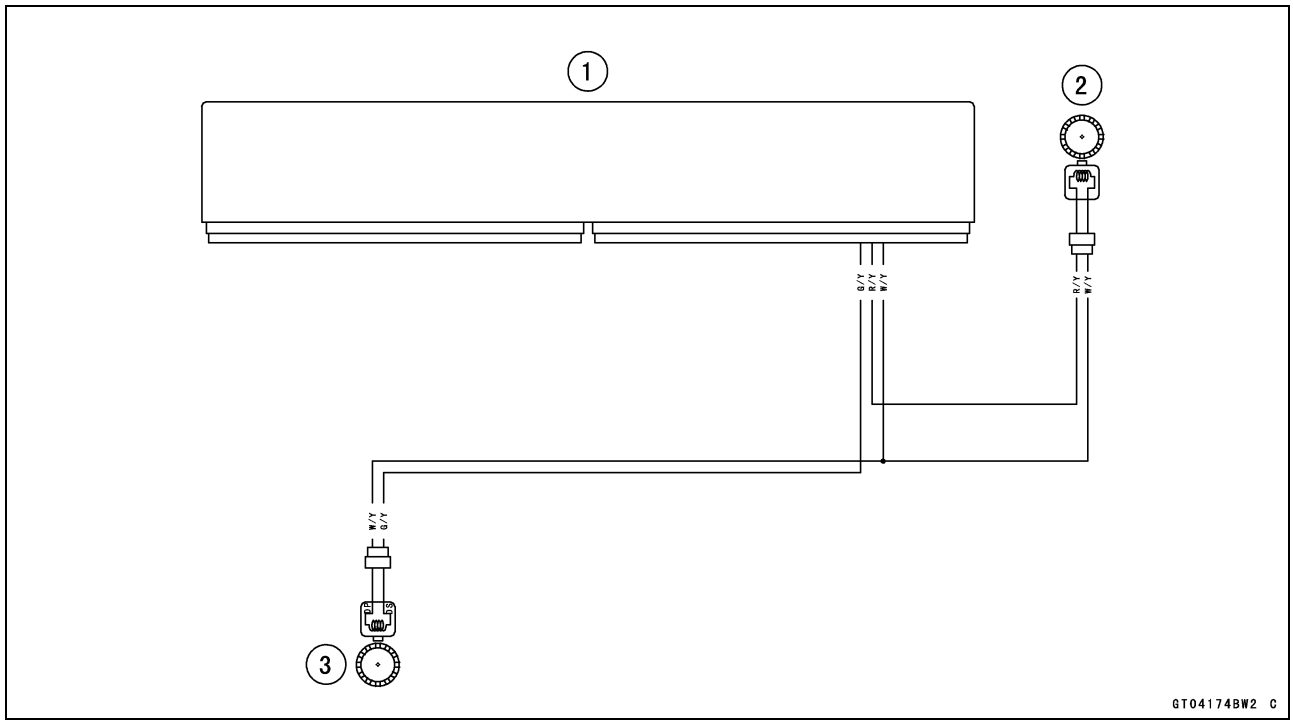
Wheel Rotation Sensor Circuit (ABS Equipped Models)



1. ECU
2. Rear Wheel Rotation Sensor
3. ABS Hydraulic Unit
4. Front Wheel Rotation Sensor

Front Wheel Rotation Sensor Signal (Service Code 27)

Wheel Rotation Sensor Circuit (other than ABS Equipped Models)



1. ECU
2. Rear Wheel Rotation Sensor
3. Front Wheel Rotation Sensor

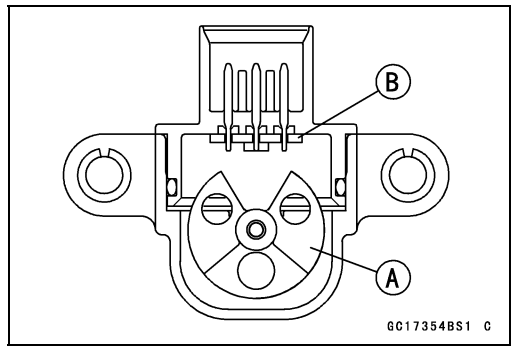
Vehicle-down Sensor (Service Code 31)

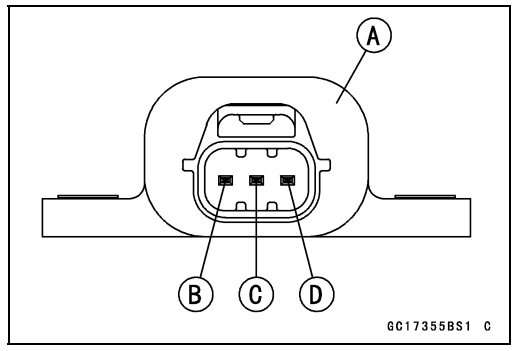
This sensor has a weight [A] with two magnets inside, and sends a signal to the ECU. But when the motorcycle banks 60 ~ 70° or more to either side (in fact falls down), the weight turns and the signal changes. The ECU senses this change, and stops the fuel pump relay, the fuel injectors and the ignition system.

Hall IC [B]

When the motorcycle is down, the ignition switch is left ON. If the starter button is pushed, the electric starter turns but the engine does not start. To start the engine again, raise the motorcycle, turn the ignition switch off, and then turn it on.

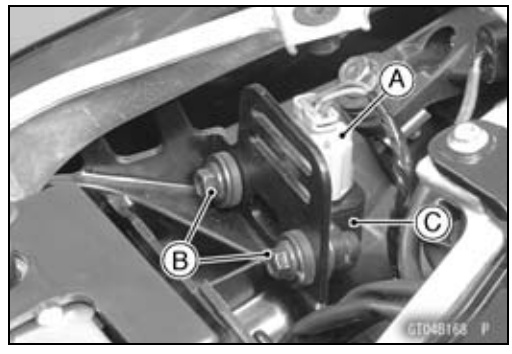
Vehicle-down Sensor [A]
Ground Terminal [B]: G
Output Terminal [C]: Y/G
Input Terminal [D]: BL





Vehicle-down Sensor Removal

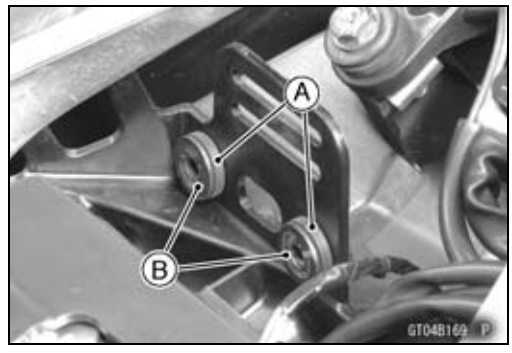
NOTICE
Never drop the vehicle-down sensor especially on a hard surface. Such a shock to the sensor can damage it.



- Remove:
  Right Seat Cover (see Seat Cover Removal in the Frame chapter)
- Disconnect the connector [A].
- Remove:
  Bolts and Nuts [B]
  Vehicle-down Sensor [C]

Vehicle-down Sensor Installation

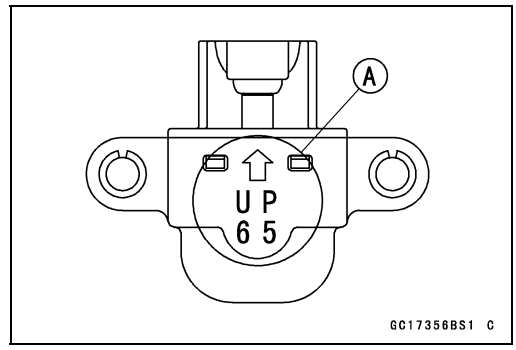
- Be sure to install the rubber dampers [A] and collars [B] on the bracket.



Vehicle-down Sensor (Service Code 31)

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

Torque - Vehicle-down Sensor Bolts: 5.9 N·m (0.60 kgf·m, 52 in·lb)



⚠ WARNING

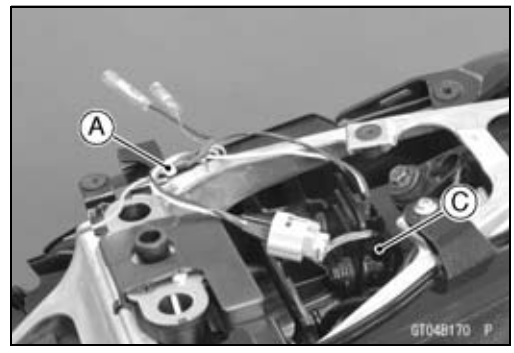
Incorrect installation of the vehicle-down sensor could cause sudden loss of engine power. The rider could lose balance during certain riding situations for an accident resulting in injury or death. Ensure that the vehicle-down sensor is held in place by the sensor bracket.

Vehicle-down Sensor Input Voltage Inspection

NOTE

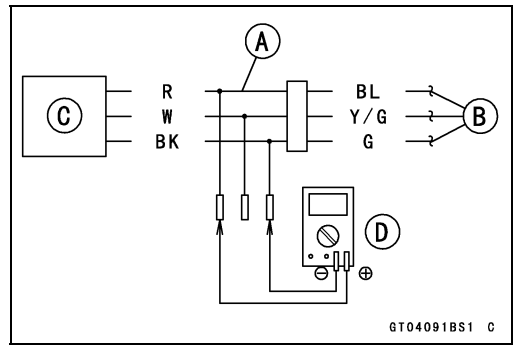
○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Disconnect the vehicle-down sensor connector and connect the measuring adapter [A] between these connectors as shown.
  Main Harness [B]
  Vehicle-down Sensor [C]



Special Tool - Measuring Adapter: 57001-1700

- Connect a digital meter [D] to the measuring adapter leads.



Vehicle-down Sensor Input Voltage
Connections to Adapter:
Digital Meter (+) → R (sensor BL) lead
Digital Meter (–) → BK (sensor G) lead

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

Input Voltage
Standard: DC 4.75 ~ 5.25 V

- Turn the ignition switch off.

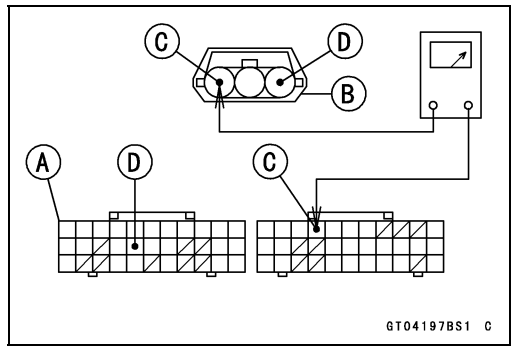
★If the reading is within the standard, check the output voltage (see Vehicle-down Sensor Output Voltage Inspection).

Vehicle-down Sensor (Service Code 31)

★If the reading is out of the standard, remove the ECU and check the wiring for continuity between main harness connectors.

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Vehicle-down Sensor Connector [B]
BL lead (ECU terminal 4) [C]
G lead (ECU terminal 49) [D]



★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

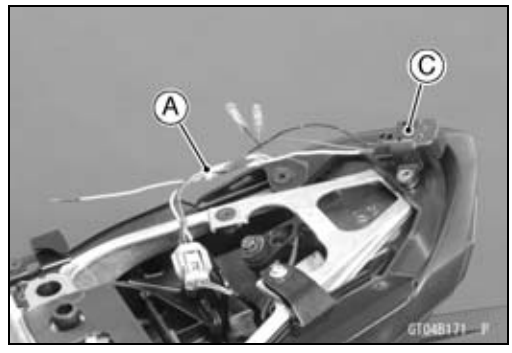
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Vehicle-down Sensor Output Voltage Inspection

- Remove the vehicle-down sensor.
- Connect the measuring adapter [A] to the vehicle-down sensor connectors as shown.

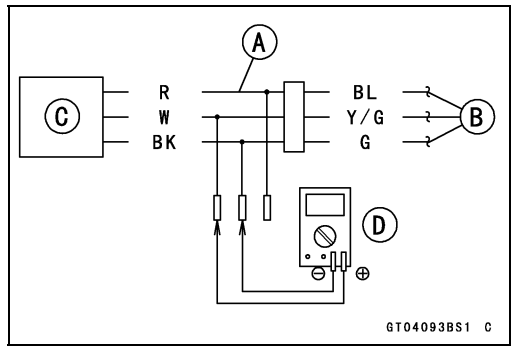
Special Tool - Measuring Adapter: 57001-1700

Main Harness [B]
Vehicle-down Sensor [C]



- Connect a digital meter [D] to the measuring adapter leads.

Vehicle-down Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → W (sensor Y/G) lead
Digital Meter (–) → BK (sensor G) lead



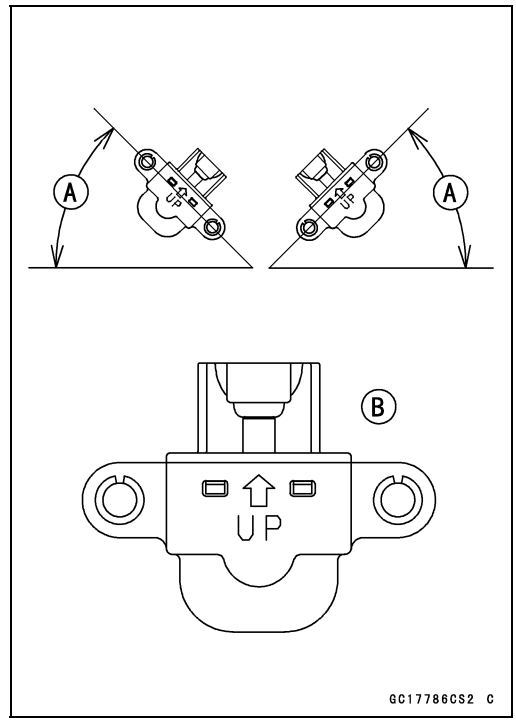
Vehicle-down Sensor (Service Code 31)

- Hold the sensor vertically.
- Measure the output voltage with the engine stopped, and with the connector joined.
- Turn the ignition switch on.
- Tilt the sensor 60 ~ 70° or more [A] right or left, then hold the sensor almost vertical with the arrow mark pointed up [B], and measure the output voltage.

Output Voltage
Standard: With sensor tilted 60 ~ 70° or more right or left: DC 0.65 ~ 1.35 V
With sensor arrow mark pointed up: DC 3.55 ~ 4.45 V

- Turn the ignition switch off.

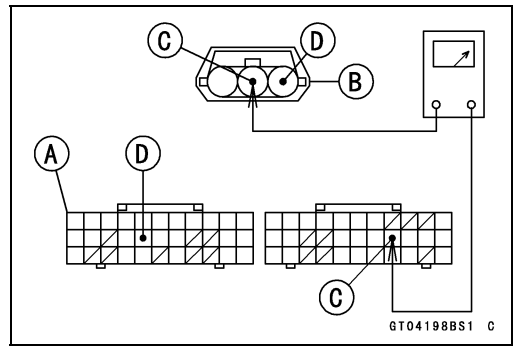
★If the reading is out of the standard, replace the sensor.



★If the reading is within the standard, remove the ECU and check the wiring for continuity between main harness connectors.

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Vehicle-down Sensor Connector [B]
Y/G lead (ECU terminal 19) [C]
G lead (ECU terminal 49) [D]

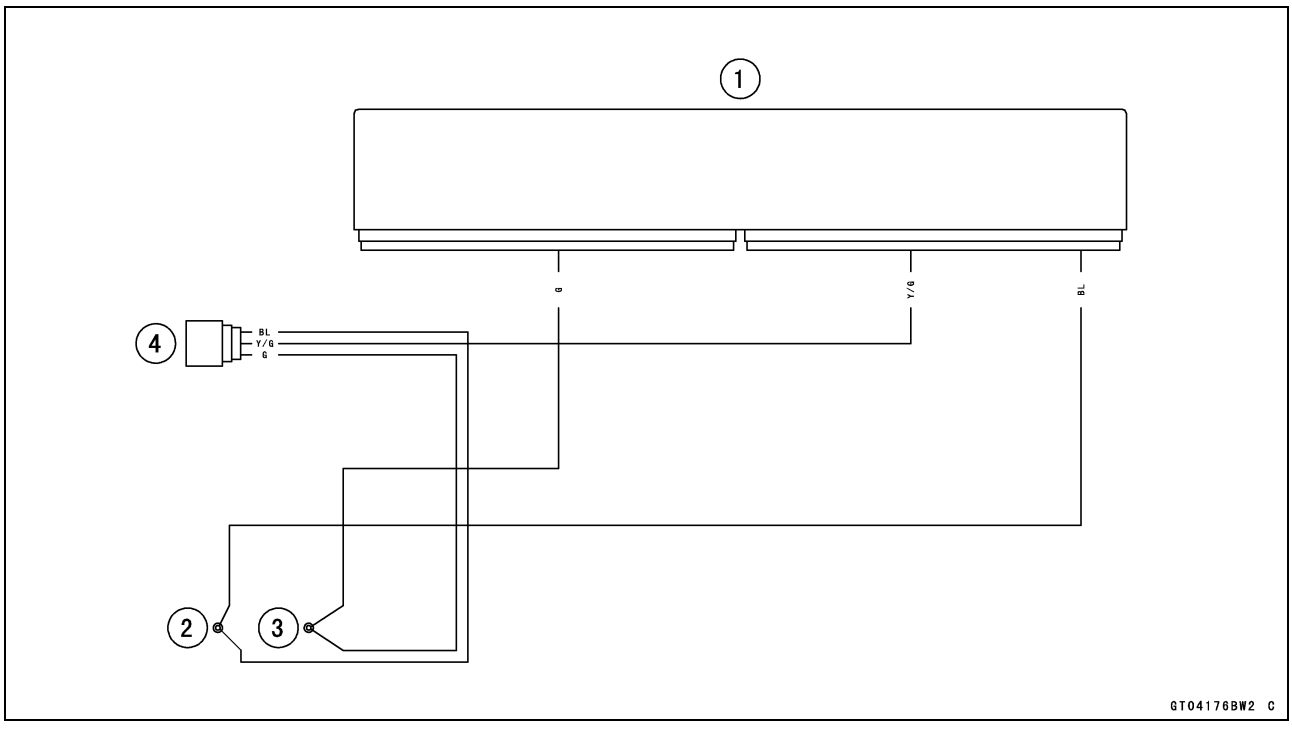


★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Vehicle-down Sensor (Service Code 31)

Vehicle-down Sensor Circuit

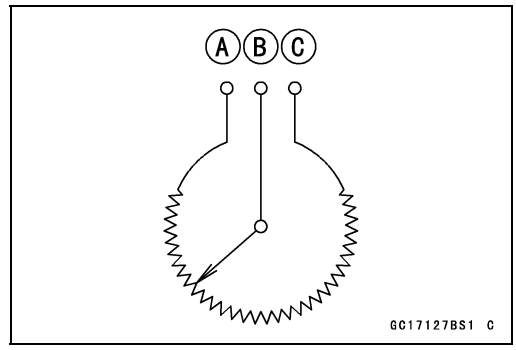


1. ECU
2. Water-proof Joint 1
3. Water-proof Joint 2
4. Vehicle-down Sensor

Subthrottle Sensor (Service Code 32)

The subthrottle sensor is a rotating variable resistor that change output voltage according to throttle operating. The ECU senses this voltage change and determines fuel injection quantity, and ignition timing according to engine rpm, and throttle opening.

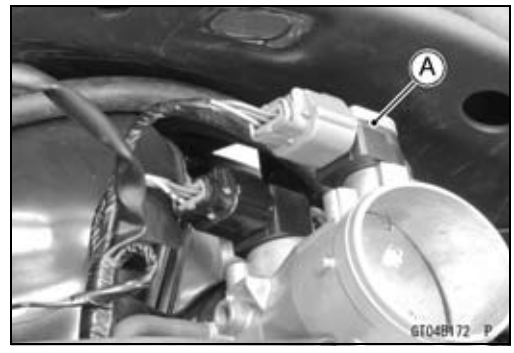
Input Terminal [A]: BL
Output Terminal [B]: BL/W
Ground Terminal [C]: G



Subthrottle Sensor Removal/Adjustment

NOTICE

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



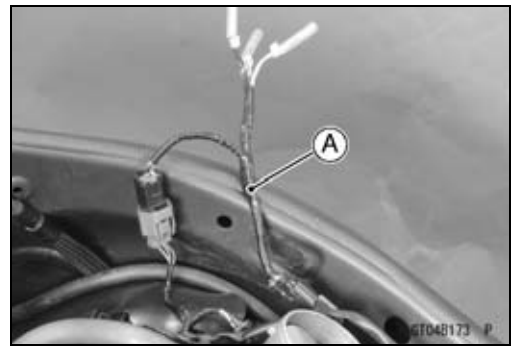
Subthrottle Sensor Input Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the air cleaner housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter).
- Disconnect the subthrottle sensor connector and connect the harness adapter [A] between these connectors.

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538



- Connect a digital meter to the harness adapter leads.

Subthrottle Sensor Input Voltage
Connections to Adapter:
Digital Meter (+) → W (sensor BL) lead
Digital Meter (–) → BK (sensor G) lead

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

Input Voltage
Standard: DC 4.75 ~ 5.25 V

- Turn the ignition switch off.

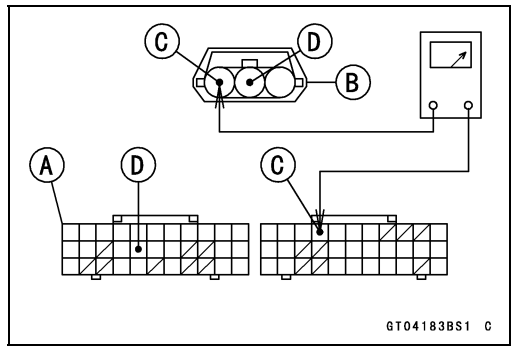
★If the reading is within the standard, check the output voltage (see Subthrottle Sensor Output Voltage Inspection).

Subthrottle Sensor (Service Code 32)

★If the reading is out of the standard, remove the ECU and check the wiring for continuity between harness connectors.

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Subthrottle Sensor Connector [B]
BL lead (ECU terminal 4) [C]
G lead (ECU terminal 49) [D]



★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

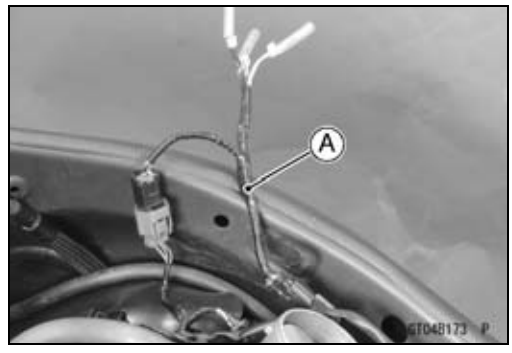
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Subthrottle Sensor Output Voltage Inspection

● Measure the output voltage at the subthrottle sensor in the same way as input voltage inspection, note the following.

○Disconnect the subthrottle sensor connector and connect the setting adapter [A] between these connectors.

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538



Subthrottle Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → R (sensor BL/W) lead
Digital Meter (–) → BK (sensor G) lead

● Disconnect the subthrottle valve actuator connector [A].

Subthrottle Sensor (Service Code 32)

- Measure the output voltage with the engine stopped with the connector joined.
- Turn the ignition switch on.
- Measure the output voltage when the subthrottle valves are fully opened by hand.

Output Voltage
Standard: DC 1.08 ~ 1.12 V at subthrottle valve full close position
DC 4.48 ~ 4.52 V at subthrottle valve full open position (for reference)

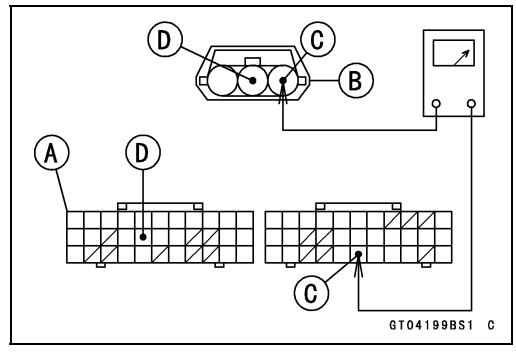
NOTE

○*Open the subthrottle valves, confirm the output voltage will be raise.*
○*The standard voltage refers to the value when the voltage reading at the Input Voltage Inspection shows 5 V exactly.*
○*When the input voltage reading shows other than 5 V, derive a voltage range as follows.*
Example:
In the case of a input voltage of 4.75 V.
1.08 × 4.75 ÷ 5.00 = 1.026 V
1.12 × 4.75 ÷ 5.00 = 1.064 V
Thus, the valid range is 1.026 ~ 1.064 V

- Turn the ignition switch off.

★If the reading is out of the standard, check the subthrottle sensor resistance (see Subthrottle Sensor Resistance Inspection).

★If the reading is within the standard, remove the ECU and check the wiring for continuity between harness connectors.
○Disconnect the ECU and sensor connectors.

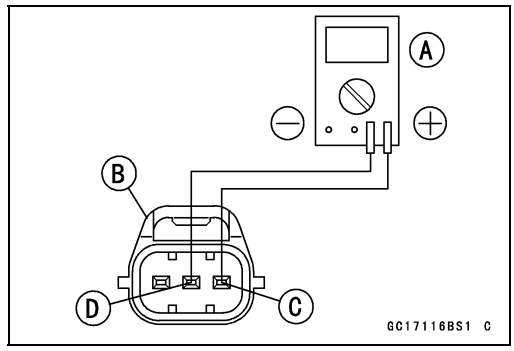


Wiring Continuity Inspection
ECU Connector [A] ←→
Subthrottle Sensor Connector [B]
BL/W lead (ECU terminal 28) [C]
G lead (ECU terminal 49) [D]

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Subthrottle Sensor (Service Code 32)

Subthrottle Sensor Resistance Inspection



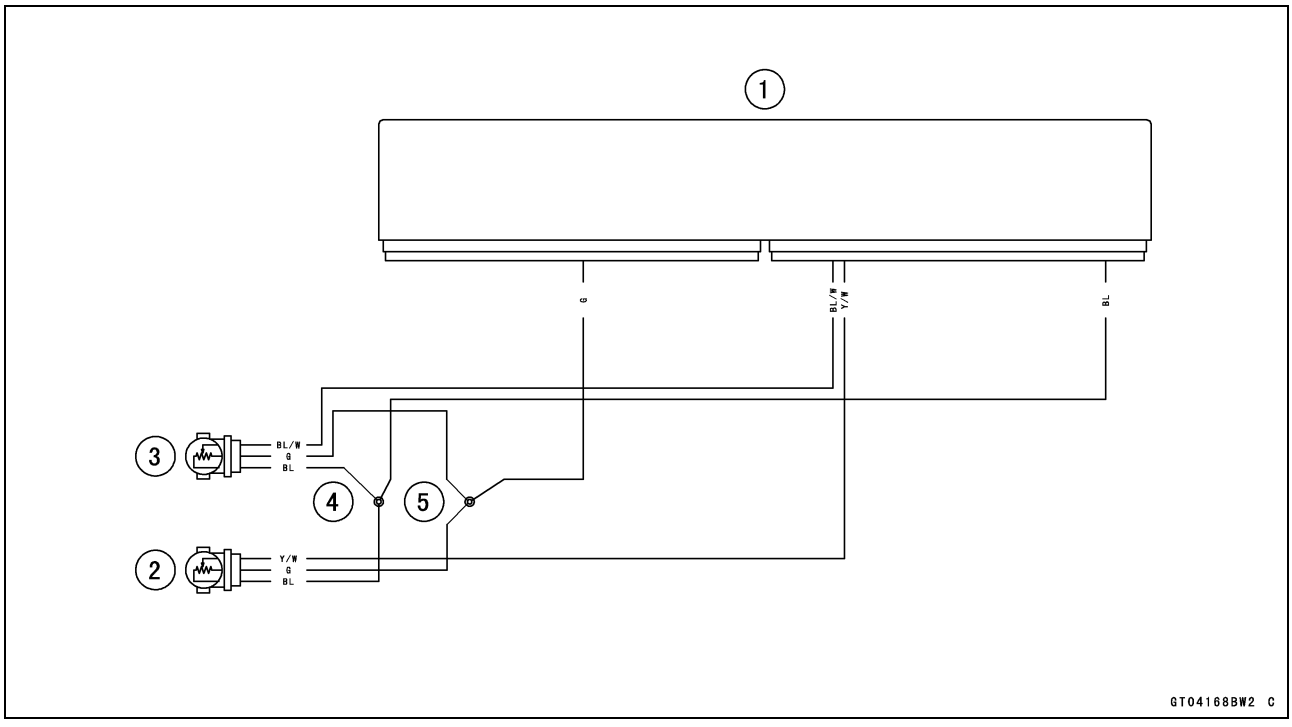
- Turn the ignition switch off.
- Disconnect the subthrottle sensor connector.
- Connect a digital meter [A] to the subthrottle sensor connector [B].
- Measure the subthrottle sensor resistance.

Subthrottle Sensor Resistance
Connections: BL lead [C] ←→ G lead [D]
Standard: 4 ~ 6 kΩ

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

★If the reading is within the standard, but the problem still exists, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Subthrottle Sensor Circuit



1. ECU
2. Main Throttle Sensor
3. Subthrottle Sensor
4. Water-proof Joint 1
5. Water-proof Joint 2

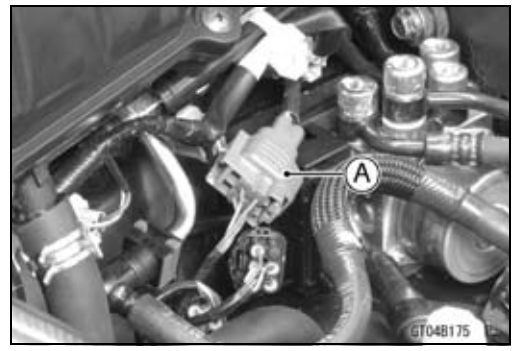
Oxygen Sensor - not activated (Service Code 33, Equipped Models)

Oxygen Sensor Removal/Installation

● Refer to the Oxygen Sensor Removal/Installation (Equipped Models) in the Electrical System chapter.

Oxygen Sensor Inspection

● Remove:
Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
● Disconnect:
Oxygen Sensor Lead Connector [A]

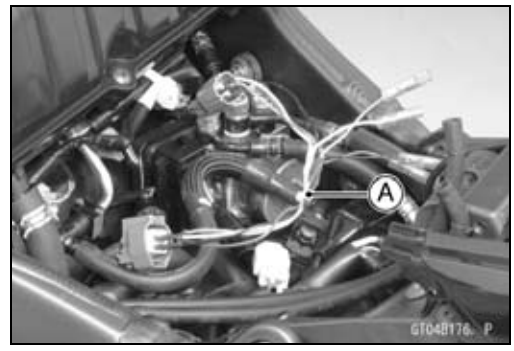


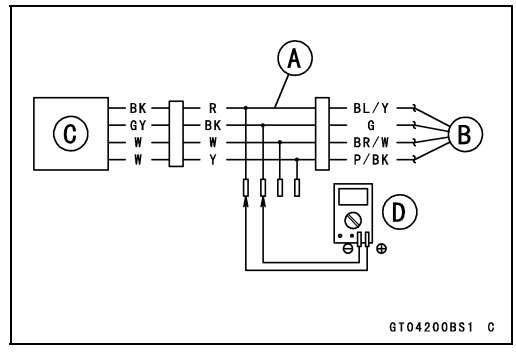
● Connect the measuring adapter [A] between the harness connector and oxygen sensor lead connector.
Main Harness [B]
Oxygen Sensor [C]

Special Tool - Measuring Adapter: 57001-1700

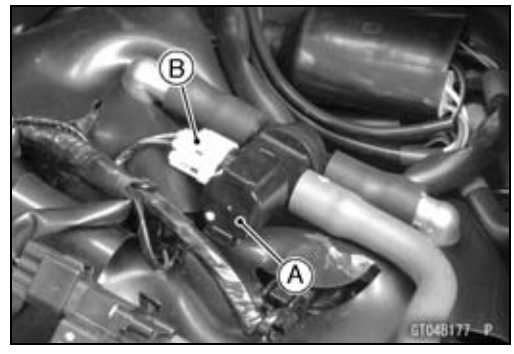
● Connect a digital meter [D] to the measuring adapter leads.

Oxygen Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → R (sensor BK) lead
Digital Meter (–) → BK (sensor GY) lead



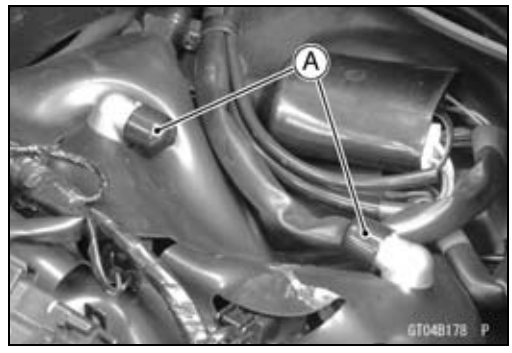


● Remove the air switching valve [A] (see Air Switching Valve Removal in the Engine Top End chapter).
○Do not disconnect the air switching valve connector [B].



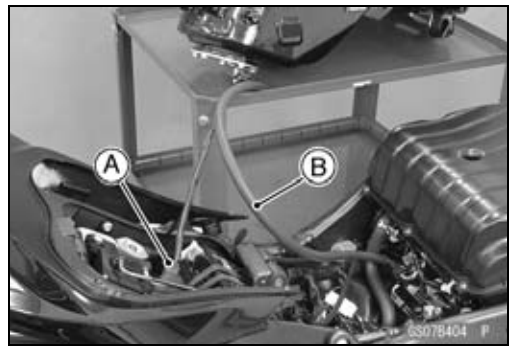
Oxygen Sensor - not activated (Service Code 33, Equipped Models)

- Install the suitable plugs [A] on the fitting of the air suction valve covers, and shut off the secondary air.



- Connect the following parts temporarily.
  Fuel Pump Lead Connector [A]
  Extension Tube [B]
  Air Cleaner Housing (see Air Cleaner Housing Installation)

  Special Tool - Extension Tube: 57001-1578



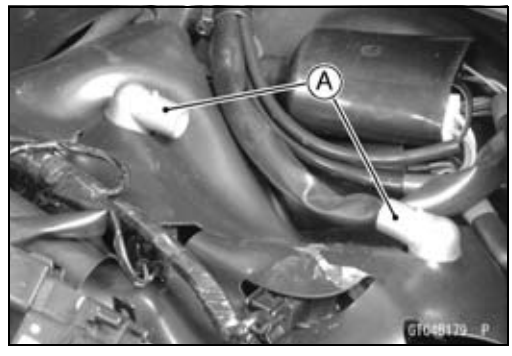
- Warm up the engine thoroughly until the radiator fan starts.
- Measure the output voltage with the connector joined.

  Output Voltage (with Plugs, Rich)
  Standard: DC 0.8 V or more

- Turn the ignition switch off.
- Remove the air cleaner housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter).
- Remove the plugs from the fittings [A].

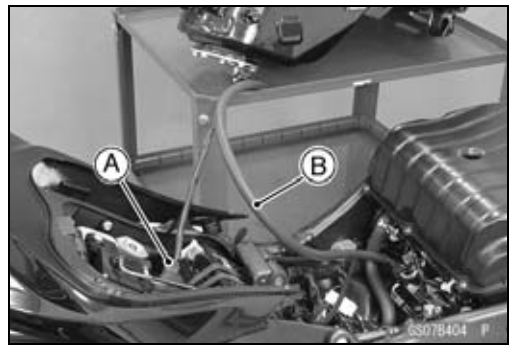
⚠ WARNING

The engine gets extremely hot during normal operation and can cause serious burns. Never touch a hot engine.



- Connect the following parts temporarily.
  Fuel Pump Lead Connector [A]
  Extension Tube [B]
  Air Cleaner Housing (see Air Cleaner Housing Installation)

  Special Tool - Extension Tube: 57001-1578



- Start the engine, and let it idle.
- Measure the output voltage with the connector joined.

  Output Voltage (without Plugs, Lean)
  Standard: DC 0.24 V or less

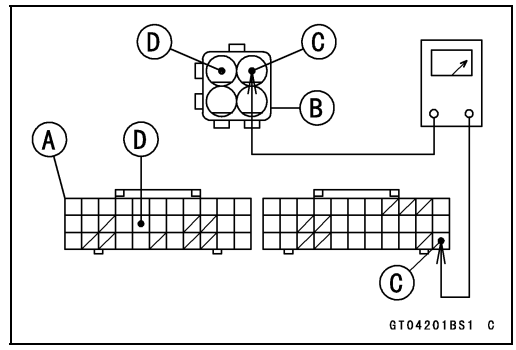
- Turn the ignition switch off.

Oxygen Sensor - not activated (Service Code 33, Equipped Models)

★If the reading is out of the standard (with plugs: 0.8 V or more, without plugs: 0.24 V or less), remove the ECU and check the wiring for continuity between harness connectors.

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Oxygen Sensor Connector [B]
BL/Y lead (ECU terminal 33) [C]
G lead (ECU terminal 49) [D]

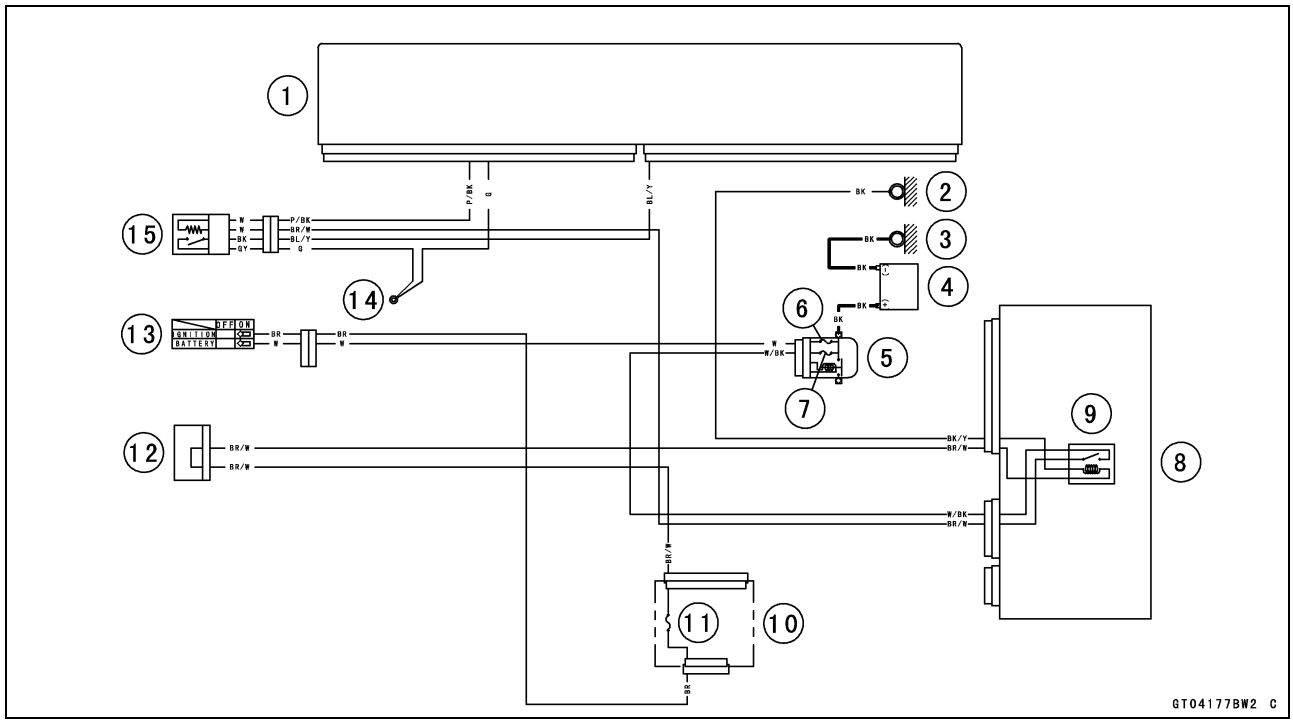


★If the wiring is good, replace the sensor.

★If the reading is within the standard (with plugs: 0.8 V or more, without plugs: 0.24 V or less), check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Oxygen Sensor Circuit



1. ECU
2. Frame Ground 3
3. Engine Ground
4. Battery 12 V 8 Ah
5. Starter Relay
6. Main Fuse 30 A
7. ECU Fuse 15 A
8. Relay Box
9. ECU Main Relay
10. Fuse Box 1
11. Ignition Fuse 15 A
12. Joint Connector E
13. Ignition Switch
14. Water-proof Joint 2
15. Oxygen Sensor

Exhaust Butterfly Valve Actuator Sensor (Service Code 34)

Exhaust Butterfly Valve Actuator Sensor Removal/Installation

The exhaust butterfly valve actuator sensor is built in the exhaust butterfly valve actuator. So, the sensor itself can not be removed. Remove the exhaust butterfly valve actuator (see Exhaust Butterfly Valve Actuator Removal).

Exhaust Butterfly Valve Actuator Sensor Input Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the front seat (see Front Seat Removal in the Frame chapter).
- Disconnect the exhaust butterfly valve actuator sensor lead connector (3 pins connector) and connect the harness adapter [A] between these connector.

Special Tool - Throttle Sensor Setting Adapter #1: 57001 -1400

- Connect a digital meter to the harness adapter leads.

Exhaust Butterfly Valve Actuator Sensor Input Voltage
Connections to Adapter:
Digital Meter (+) → Y/W (actuator W) lead
Digital Meter (−) → BK/BL (actuator BK) lead

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

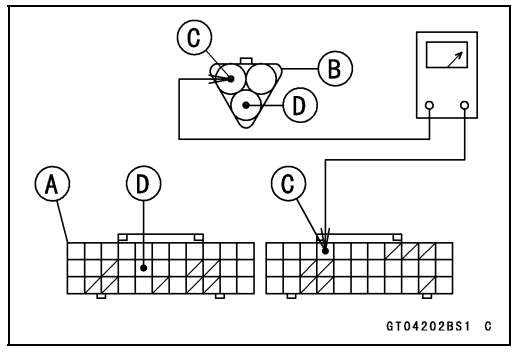
Input Voltage
Standard: DC 4.75 ~ 5.25 V

- Turn the ignition switch off.

★If the reading is within the standard, check the output voltage (see Exhaust Butterfly Valve Actuator Sensor Output Voltage Inspection).

★If the reading is out of the standard, remove the ECU and check the wiring for continuity between main harness connectors.

○Disconnect the ECU and sensor connectors.



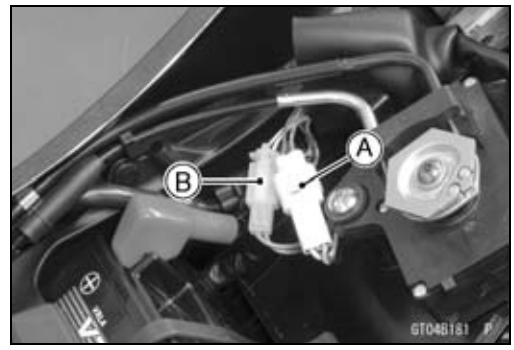
Wiring Inspection
ECU Connector [A] ←→
Exhaust Butterfly Valve Actuator Sensor Connector [B]
BL lead (ECU terminal 4) [C]
G lead (ECU terminal 49) [D]

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Exhaust Butterfly Valve Actuator Sensor (Service Code 34)

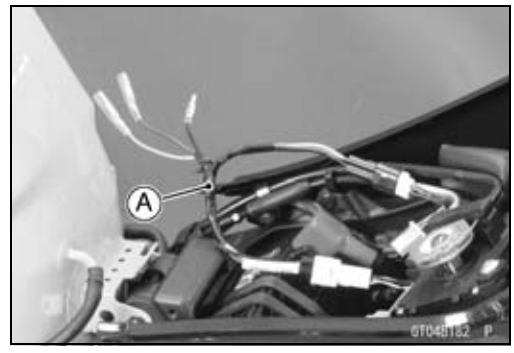
Exhaust Butterfly Valve Actuator Sensor Output Voltage Inspection



NOTE

○*Before this inspection, confirm the pulley is original position (see Exhaust Butterfly Valve Actuator Installation).*

- Disconnect:
  3 Pins Connector [A]
  2 Pins Connector [B]



- Connect the harness adapter [A] between the 3 pins connectors.

Special Tool - Throttle Sensor Setting Adapter #1: 57001 -1400

- Connect a digital meter to the harness adapter leads.

Exhaust Butterfly Valve Actuator Sensor Output Voltage Connections to Adapter:

Digital Meter (+) → BL (actuator Y) lead

Digital Meter (−) → BK/BL (actuator BK) lead

- Measure the output voltage at the 3 pins connector of the exhaust butterfly valve actuator when the pulley is original position.
- Turn the ignition switch on.

Output Voltage

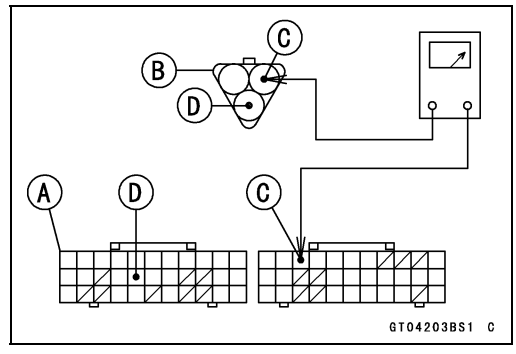
Standard: DC 3.46 ~ 3.76 V at pulley original position

- Turn the ignition switch off.

★If the reading is out of the standard, check the exhaust butterfly valve actuator sensor resistance (see Exhaust Butterfly Valve Actuator Sensor Resistance Inspection).

★If the reading is within the standard, remove the ECU and check the wiring for continuity between main harness connectors.

○Disconnect the ECU and sensor connectors.



Wiring Inspection

ECU Connector [A] ←→

Exhaust Butterfly Valve Actuator Sensor Connector [B]

GY lead (ECU terminal 3) [C]

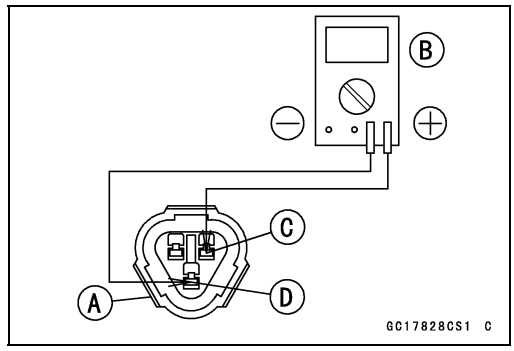
G lead (ECU terminal 49) [D]

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Exhaust Butterfly Valve Actuator Sensor (Service Code 34)

Exhaust Butterfly Valve Actuator Sensor Resistance Inspection



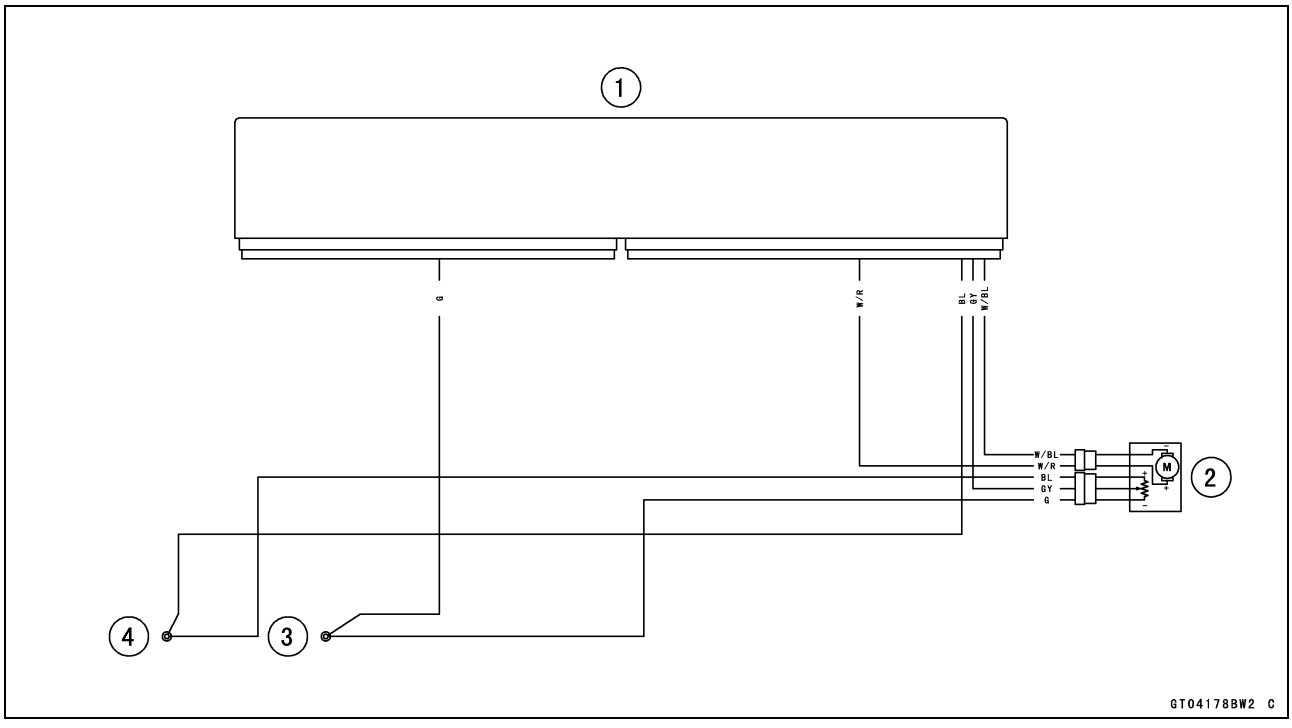
- Turn the ignition switch off.
- Disconnect the exhaust butterfly valve actuator sensor connector (3 pins connector) [A] (see Exhaust Butterfly Valve Actuator Sensor Input Voltage Inspection).
- Connect a digital meter [B] to the exhaust butterfly valve actuator sensor connector.
- Measure the exhaust butterfly valve actuator sensor resistance.

Exhaust Butterfly Valve Actuator Sensor Resistance
Connections: W lead [C] ←→ BK lead [D]
Standard: 4 ~ 6 kΩ

★If the reading is out of the standard, replace the exhaust butterfly valve actuator.

★If the reading within the standard, but the problem still exists, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Exhaust Butterfly Valve Actuator Sensor Circuit

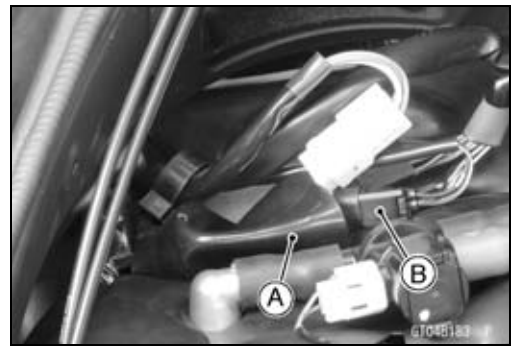


1. ECU
2. Exhaust Butterfly Valve Actuator
3. Water-proof Joint 2
4. Water-proof Joint 1

Immobilizer Amplifier (Service Code 35, Equipped Models)

Antenna Resistance Inspection

- Turn the ignition switch off.
- Remove the air cleaner housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter).



- Slide the dust cover [A].
- Disconnect the antenna lead connector [B].
- Measure the antenna resistance.

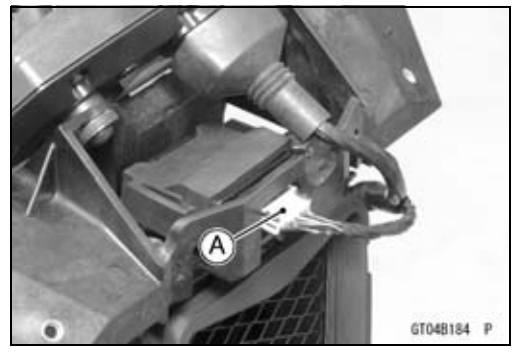
Antenna Resistance
Connections: BK lead ←→ BK/W lead
Standard: About 3.0 ~ 4.6 Ω

★If the reading is out of the standard, replace the ignition switch (see Immobilizer System Parts Replacement in the Electrical System chapter).
★If the reading is within the standard, check the wiring to the amplifier (see Immobilizer System Circuit).
★If the wiring is good, check the input voltage of the amplifier (see Amplifier Input Voltage Inspection).

Amplifier Input Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*



- Turn the ignition switch off.
- Remove the upper fairing assembly (see Upper Fairing Assembly Removal in the Frame chapter).

○Do not disconnect the connectors.

- Connect a digital meter to the amplifier connector [A] with needle adapter set.

Special Tool - Needle Adapter Set: 57001-1457

Amplifier Input Voltage
Connections to Amplifier Connector:
Digital Meter (+) → BR/W lead
Digital Meter (–) → BK/BL lead

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

Input Voltage
Standard: Battery Voltage

- Turn the ignition switch off.

★If the reading is out of the standard, check the wiring (see Immobilizer System Circuit).
★If the reading is within the standard, check the wiring to ECU (see Immobilizer System Circuit).
★If the wiring is good, replace the amplifier (see Immobilizer System Parts Replacement in the Electrical System chapter).

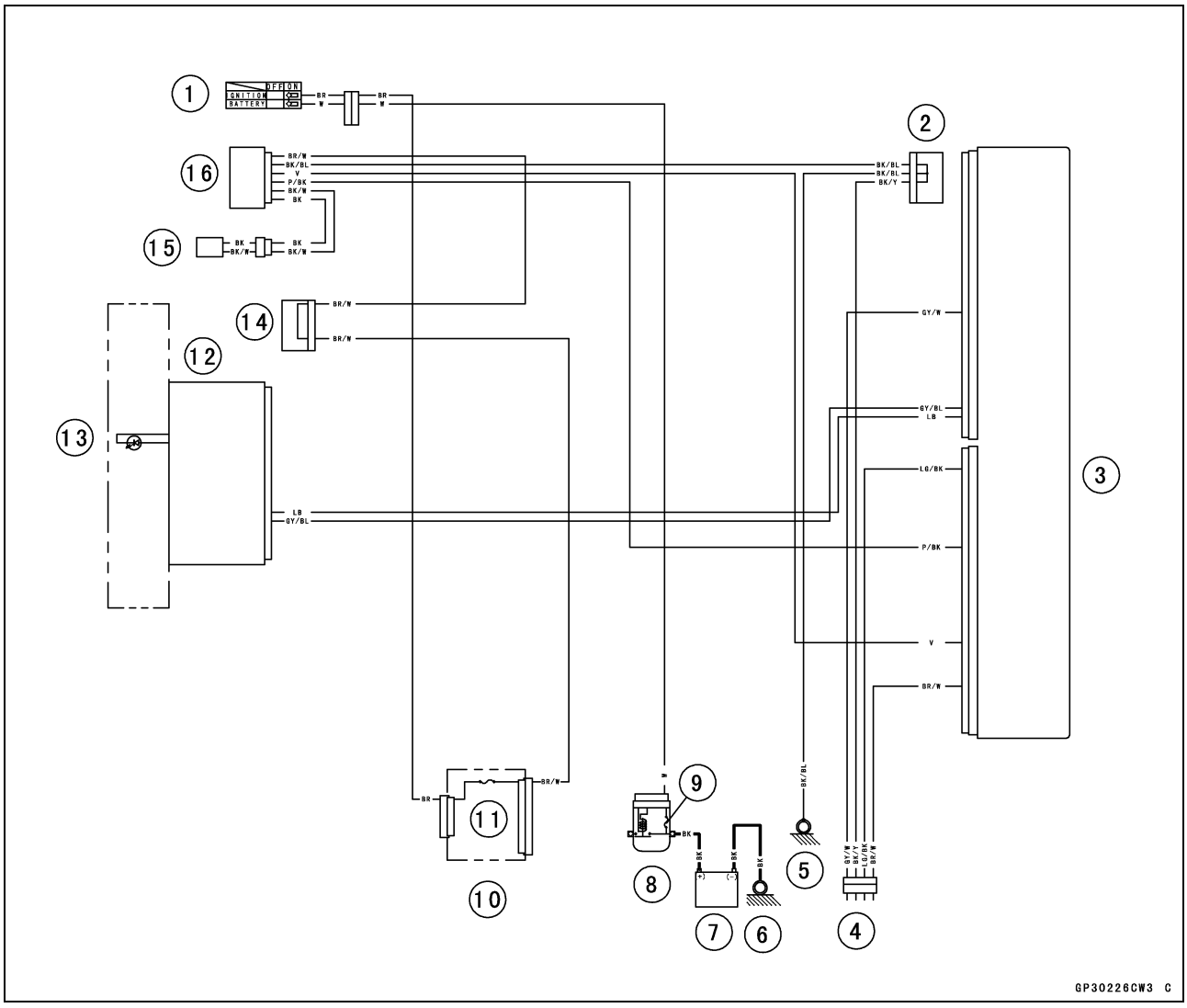
Blank Key Detection (Service Code 36, Equipped Models)

- This code appears in the following conditions.
○The transponder [A] in the ignition key is malfunction.
○When the spare key of unregistration is used.
○When the ignition key is registered in the registered ECU.
- Therefore, the service code 36 will disappear when the above issue is solved.

Ignition Key Inspection

- Register the ignition key correctly (see Key Registration in the Electrical System chapter).
★If the service code 36 appears again, the transponder in the key is malfunction, replace it.

Immobilizer System Circuit



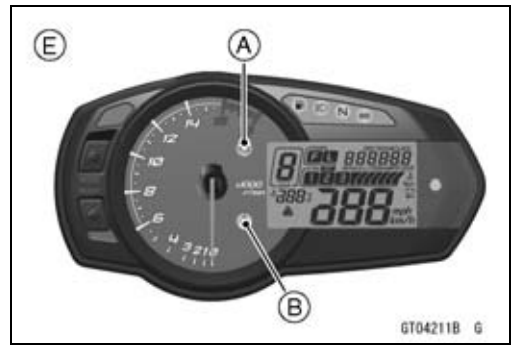
1. Ignition Switch
2. Joint Connector D
3. ECU
4. Immobilizer/Kawasaki Diagnostic System Connector
5. Frame Ground 1
6. Engine Ground
7. Battery 12 V 8 Ah
8. Starter Relay
9. Main Fuse 30 A
10. Fuse Box 1
11. Ignition Fuse 15 A
12. Meter Unit
13. Red Warning Indicator Light (LED)
14. Joint Connector E
15. Immobilizer Antenna
16. Immobilizer Amplifier

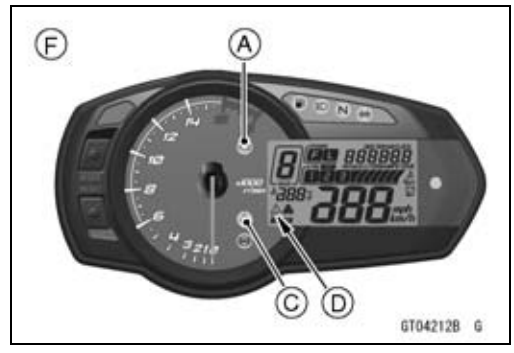
ECU Communication Error (Service Code 39)

ECU Communication Line Inspection

○When the data is not sent from the ECU to the meter unit for more than about 5 seconds, the service code 39 is displayed.
○The data is sent through the CAN communication line.
○The service code 39 is detected with the meter unit.

○When the user mode, this communication error goes on the following items.
Yellow Engine Warning Indicator Light (LED) [A]
Yellow KTRC Warning Indicator Light (LED) [B]
Yellow Warning Indicator Light (LED) [C]
KTRC Warning Symbol [D]
ZX636E [E]
ZX636F [F]

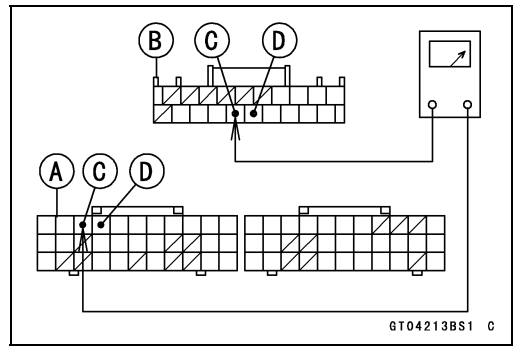




● Inspect the CAN communication line resistance (see CAN Communication Line Resistance Inspection in the Fuel System (DFI) chapter).
★If the CAN communication line resistance is normal, check the wiring according following procedure.

● Remove the ECU and meter unit, check the wiring for continuity between main harness connector.
○Disconnect the ECU and meter unit connectors.

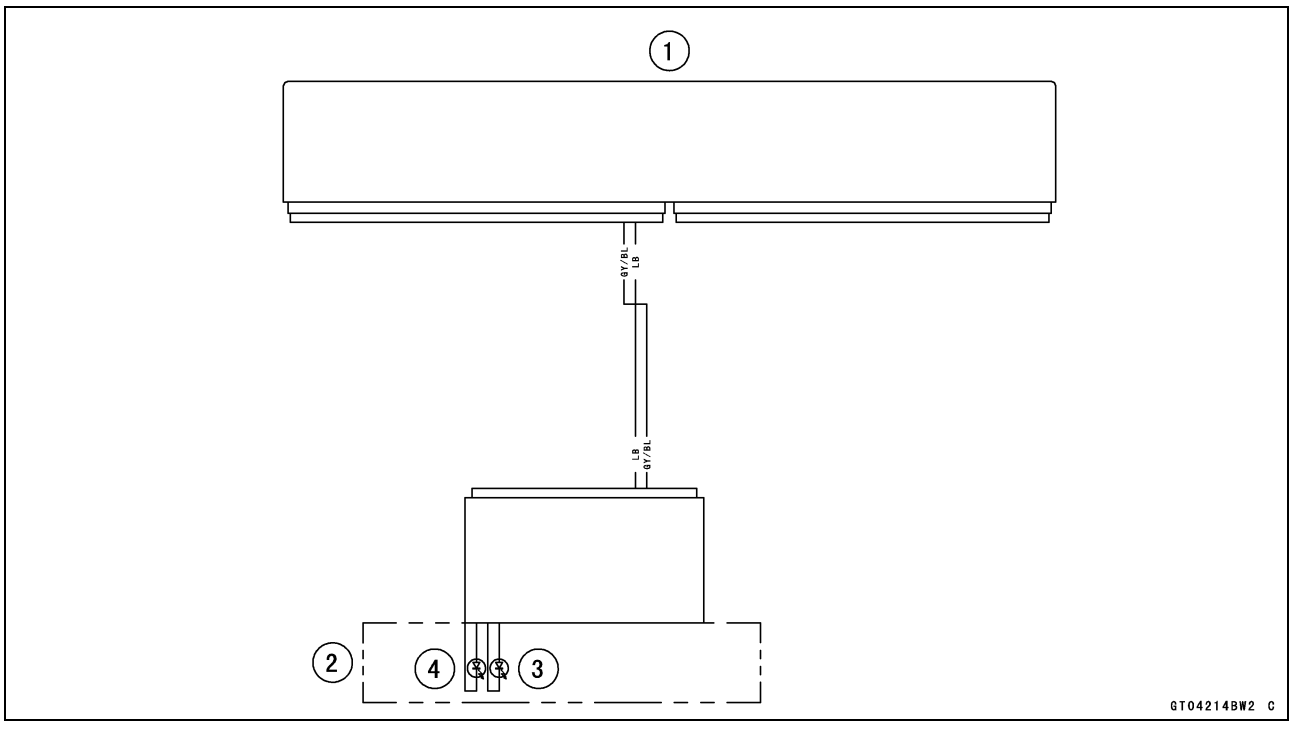
Wiring Inspection
ECU Connector [A] ←→ Meter Unit Connector [B]
LB lead (ECU terminal 36) [C]
GY/BL lead (ECU terminal 37) [D]



★If the wiring is good, check the meter unit (see Meter Unit Inspection in the Electrical System chapter).
★If the meter unit is normal, replace the ECU (see ECU Removal/Installation).

ECU Communication Error (Service Code 39)

ECU Communication Line Circuit



1. ECU
2. Meter Unit
3. Yellow KTRC Warning Indicator Light (LED) (ZX636E)
   Yellow Warning Indicator Light (LED) (ZX636F)
4. Yellow Engine Warning Indicator Light (LED)

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

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

Stick Coil Removal/Installation

- Refer to the Stick Coil Removal/Installation in the Electrical System chapter.

Stick Coil Primary Winding Resistance Inspection

- Refer to the Stick Coil Inspection in the Electrical System chapter.

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

Stick Coil Input Voltage Inspection

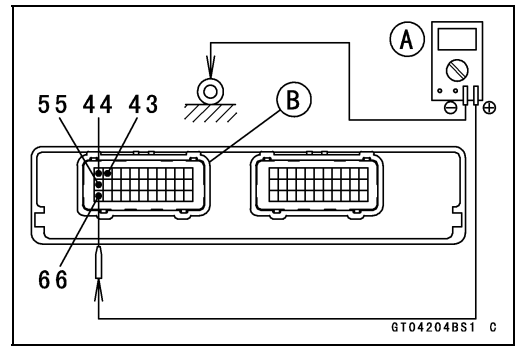
NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the ECU (see ECU Removal in the Fuel System (DFI) chapter).

○Do not disconnect the ECU connectors.

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



Special Tool - Needle Adapter Set: 57001-1457

Stick Coil Input Voltage
Connections to ECU Connector:
For Stick Coil #1
Digital Meter (+) → BK lead (terminal 44)
Digital Meter (–) → Frame Ground terminal
For Stick Coil #2
Digital Meter (+) → BK/R lead (terminal 55)
Digital Meter (–) → Frame Ground terminal
For Stick Coil #3
Digital Meter (+) → BK/O lead (terminal 66)
Digital Meter (–) → Frame Ground terminal
For Stick Coil #4
Digital Meter (+) → BK/G lead (terminal 43)
Digital Meter (–) → Frame Ground terminal

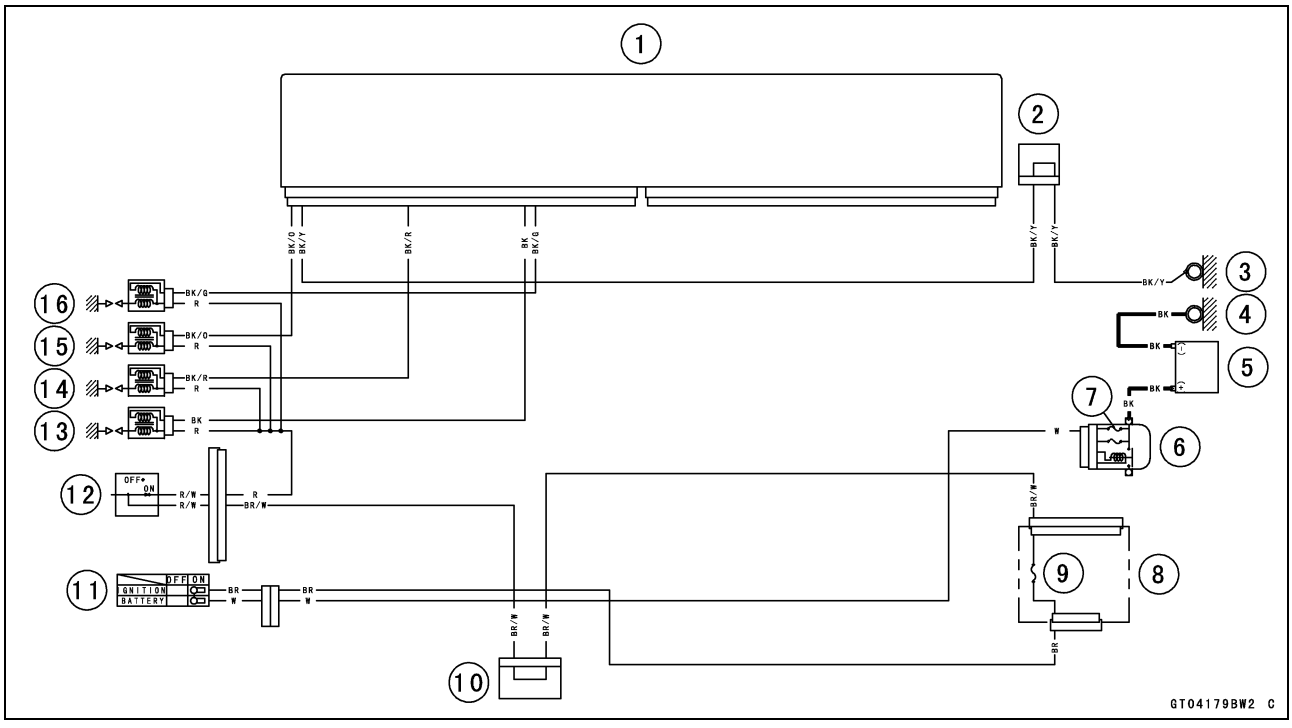
- Measure the input voltage to each primary winding of the stick coils with the engine stopped, and with the connectors joined.
- Turn the engine stop switch to run position.
- Turn the ignition switch on.

Input Voltage
Standard: Battery Voltage

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

● Turn the ignition switch off.
★If the input voltage is out of the standard, check the wiring for continuity (see Stick Coil Circuit).
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).
★If the input voltage is within the standard, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

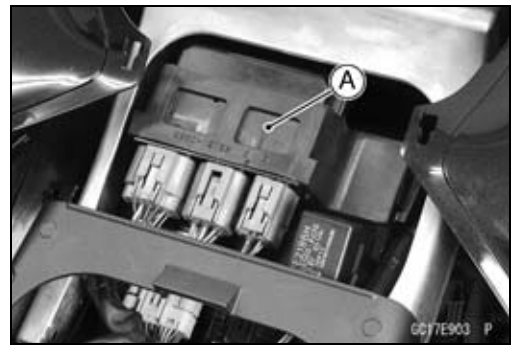
Stick Coil Circuit



1. ECU
2. Joint Connector C
3. Frame Ground 2
4. Engine Ground
5. Battery 12 V 8 Ah
6. Starter Relay
7. Main Fuse 30 A
8. Fuse Box 1
9. Ignition Fuse 15 A
10. Joint Connector E
11. Ignition Switch
12. Engine Stop Switch
13. Stick Coil #1
14. Stick Coil #2
15. Stick Coil #3
16. Stick Coil #4

Radiator Fan Relay (Service Code 56)

Radiator Fan Relay Removal/Installation



○The radiator fan relay is built in the relay box [A].

● Refer to the Relay Box Removal in the Electrical System chapter.

Radiator Fan Relay Inspection

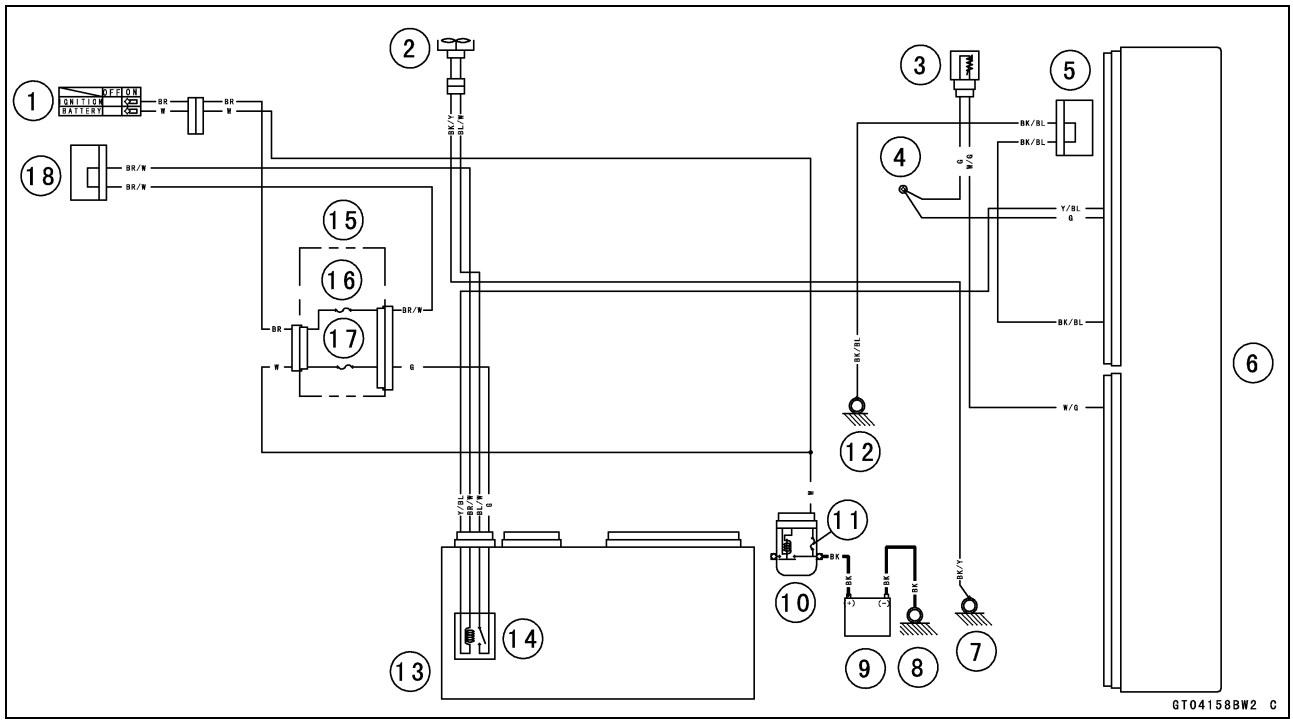
● Refer to the Relay Circuit Inspection in the Electrical System chapter.

★If the radiator fan relay is normal, check the wiring for continuity, using the wiring diagram in this section.

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Radiator Fan Circuit

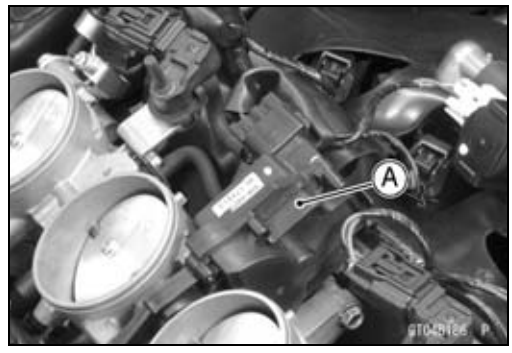


1. Ignition Switch
2. Fan Motor
3. Water Temperature Sensor
4. Water-proof Joint 2
5. Joint Connector D
6. ECU
7. Frame Ground 3
8. Engine Ground
9. Battery 12 V 8 Ah
10. Starter Relay
11. Main Fuse 30 A
12. Frame Ground 1
13. Relay Box
14. Radiator Fan Relay
15. Fuse Box 1
16. Ignition Fuse 15 A
17. Fan Fuse 15 A
18. Joint Connector E

Subthrottle Valve Actuator (Service Code 62)

Subthrottle Valve Actuator Removal

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



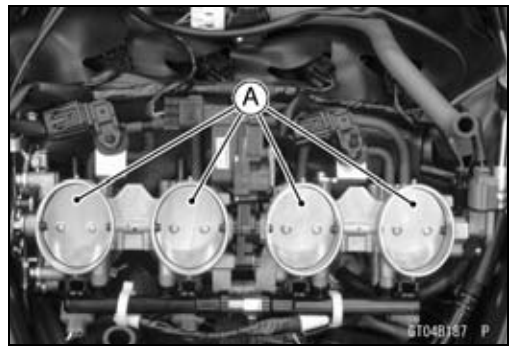
Subthrottle Valve Actuator Inspection

NOTE

○*Be sure the battery is fully charged.*

- Remove the air cleaner housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter).
- Turn the ignition switch on.
- Check to see that all the subthrottle valves [A] open and close smoothly.
- Turn the ignition switch off.

★If the subthrottle valves do not operate, check the subthrottle valve actuator resistance (see Subthrottle Valve Actuator Resistance Inspection).



Subthrottle Valve Actuator Resistance Inspection

- Turn the ignition switch off.
- Remove the air cleaner housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter).
- Disconnect the subthrottle valve actuator connector [A].

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

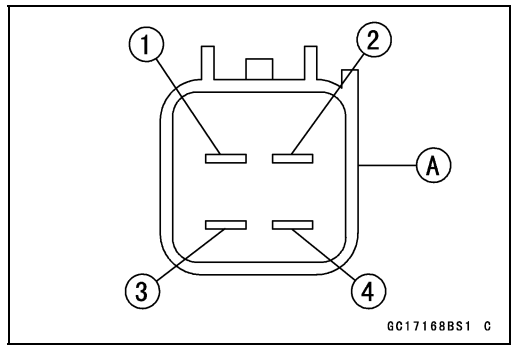
Subthrottle Valve Actuator Resistance

Connections: **Y/BK lead [1] ←→ P/BL lead [2]**
G lead [3] ←→ BK/O lead [4]

Standard: **About 5.2 ~ 7.8 Ω**

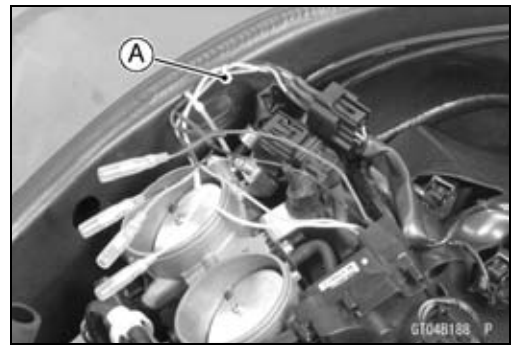
★If the reading is out of the standard, replace the throttle body assy.

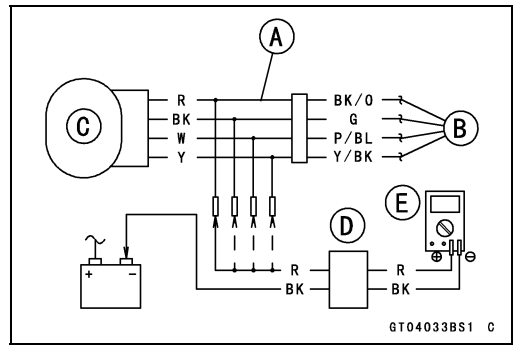
★If the reading is within the standard, check the input voltage (see Subthrottle Valve Actuator Input Voltage Inspection).



Subthrottle Valve Actuator (Service Code 62)

Subthrottle Valve Actuator Input Voltage Inspection





NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch to OFF.
- Disconnect the subthrottle valve actuator connector and connect the measuring adapter [A] between these connectors as shown.
  Main Harness [B]
  Subthrottle Valve Actuator [C]

Special Tool - Measuring Adapter: 57001-1700

- Connect the peak voltage adapter [D] and a digital meter [E] to the measuring adapter leads.

Special Tool - Peak Voltage Adapter: 57001-1415
Type: KEK-54-9-B

Subthrottle Valve Actuator Input Voltage
Connections to Adapter:

(I) Digital Meter (+) → R (actuator BK/O) lead
Digital Meter (–) → Battery (–) terminal
(II) Digital Meter (+) → BK (actuator G) lead
Digital Meter (–) → Battery (–) terminal
(III) Digital Meter (+) → W (actuator P/BL) lead
Digital Meter (–) → Battery (–) terminal
(IV) Digital Meter (+) → Y (actuator Y/BK) lead
Digital Meter (–) → Battery (–) terminal

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

Input Voltage
Standard: About DC 8.5 ~ 10.5 V and then 0 V or
About DC 8.5 ~ 10.5 V

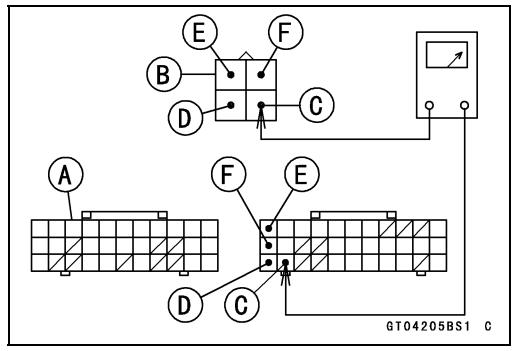
- Turn the ignition switch off.

★If the reading is in specification, but the actuator does not operate, replace the throttle body assy.

Subthrottle Valve Actuator (Service Code 62)

★If the reading is out of the specification, remove the ECU and check the wiring for continuity between main harness connector.

○Disconnect the ECU and actuator connectors.



Wiring Continuity Inspection

ECU Connector [A] ←→

Subthrottle Valve Actuator Connector [B]

G lead (ECU terminal 24) [C]

BK/O lead (ECU terminal 23) [D]

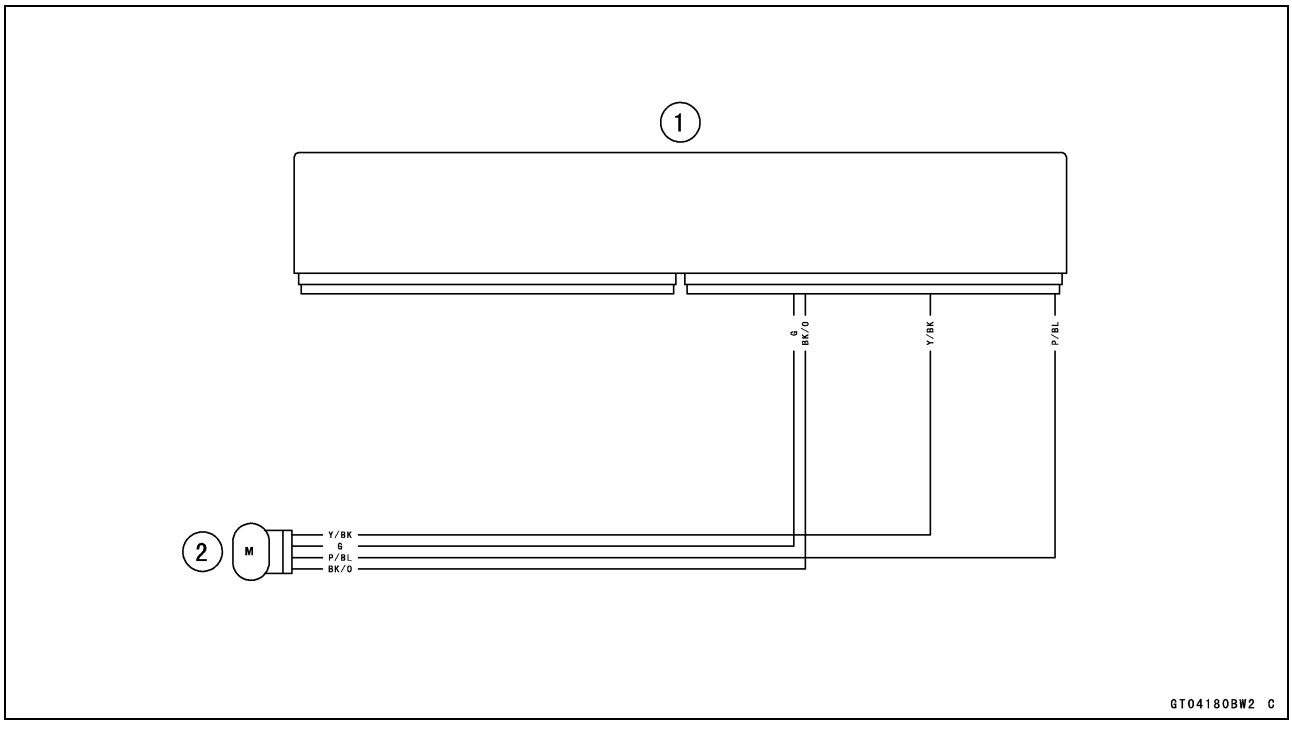
P/BL lead (ECU terminal 1) [E]

Y/BK lead (ECU terminal 12) [F]

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Subthrottle Valve Actuator Circuit



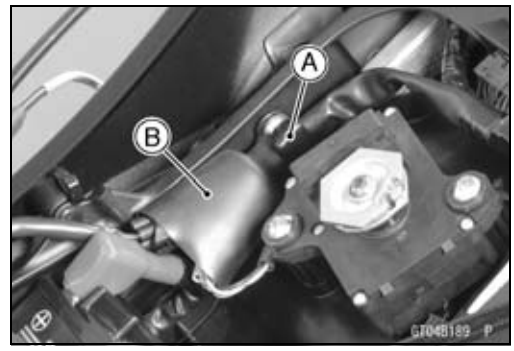
1. ECU
2. Subthrottle Valve Actuator

Exhaust Butterfly Valve Actuator (Service Code 63)

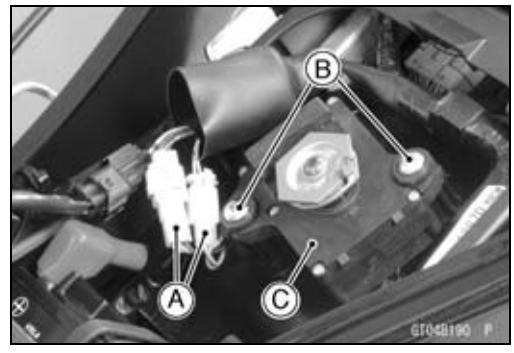
Exhaust Butterfly Valve Actuator Removal

NOTICE
Never drop the exhaust butterfly valve actuator especially on a hard surface. Such a shock to the actuator can damage it.

- Disconnect the exhaust butterfly valve cable upper ends (see Exhaust Butterfly Cable Removal in the Engine Top End chapter).
- Open the clamp [A].
- Slide the dust cover [B].



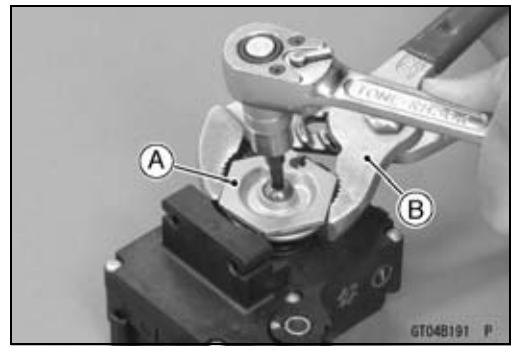
- Disconnect the connectors [A].
- Remove:
  Screws [B] and Washers
  Exhaust Butterfly Valve Actuator [C]



- Remove the pulley bolt while holding the pulley [A] with a suitable tool [B].

NOTICE
If the pulley bolt is removed without holding, the actuator damage will occur.

- Remove the pulley from the actuator.

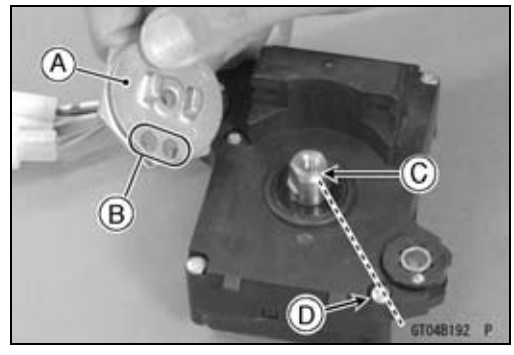


Exhaust Butterfly Valve Actuator Installation

- Install the pulley [A] on the actuator so that the hole side [B] align with the groove [C] on the shaft.

○Make sure that the groove on the shaft is pointing toward the center of the screw [D].

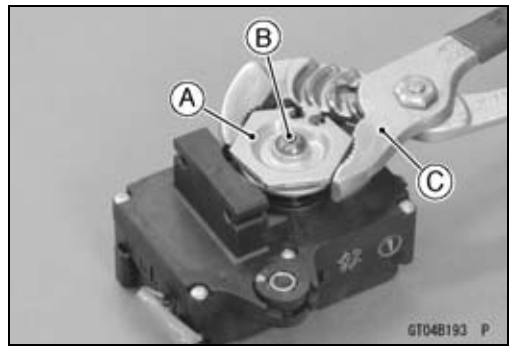
○If the shaft position is incorrect, refer to the following NOTE and procedures to electrically adjust the shaft position.



Exhaust Butterfly Valve Actuator (Service Code 63)

● Install the pulley [A] on the actuator as shown.
● Tighten the pulley bolt [B] while holding the pulley with the suitable tool [C].

Torque - Exhaust Butterfly Valve Actuator Pulley Bolt: 4.9 N·m (0.50 kgf·m, 43 in·lb)



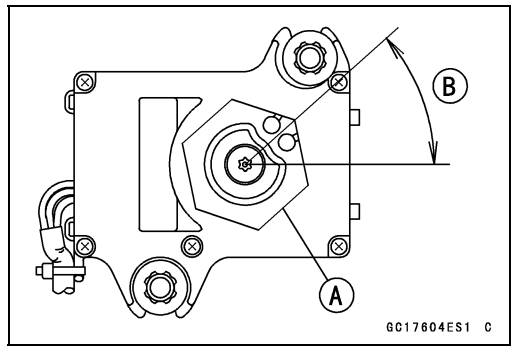
NOTICE
If the pulley bolt is tightened without holding, the actuator damage will occur.

● After tightening the pulley bolt, confirm whether pulley [A] is an angle as shown.
41.7° ±7° [B]

○This position is original position of the pulley.

NOTE

○*Correct the position electrically after confirming the use is discontinued and there is no damage when differing from the angle as shown.*



NOTICE
Do not correct the pulley position with the tool, forcibly. The actuator damage will occur.

★If the pulley angle is wrong, adjust the angle as follows.

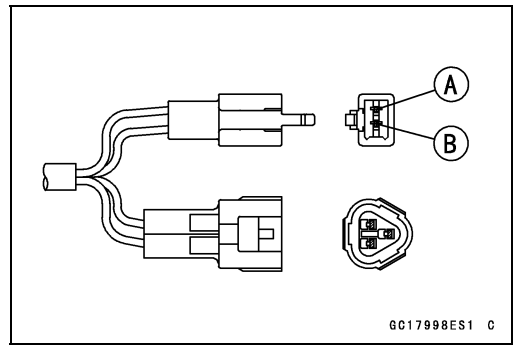
○Connect:
2 pins Connector
3 pins Connector

○Turn the ignition switch on.

○Confirm the pulley turns clockwise or counterclockwise then it stops at the original position.

Exhaust Butterfly Valve Actuator (Service Code 63)

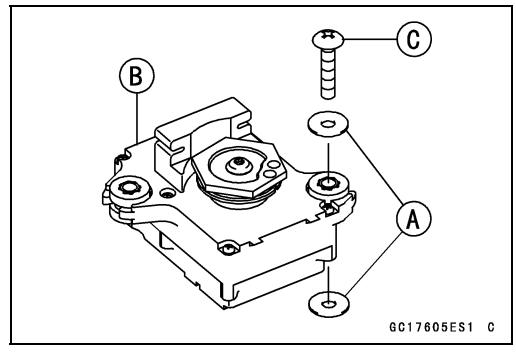
★If the pulley position has not been returned to the original position, electrically adjust the shaft position as follows.
○Disconnect:
2 pins Connector
3 pins Connector
○Turn the pulley to the original position by turning it clockwise or counterclockwise by connecting the battery to the 2 pin connector terminals. To turn the pulley gradually, intermittently connect the battery positive (+) terminal to the 2 pin connector terminal while connecting the battery negative (–) terminal to the connector.
Pink (–) lead terminal [A]
Gray (+) lead terminal [B]
Clockwise:
Pink (–) lead terminal to battery (–) terminal
Gray (+) lead terminal to battery (+) terminal
Counterclockwise:
Pink (–) lead terminal to battery (+) terminal
Gray (+) lead terminal to battery (–) terminal
○Reconnect the 2 pins connector and 3 pins connector, and turn the ignition switch on.
○Make sure that the pulley turns clockwise and then counterclockwise.
○The pulley should returns to the original position.
○Turn the ignition switch off.
★If the pulley does not return to the original position, check the exhaust butterfly valve actuator resistance (see Exhaust Butterfly Valve Actuator Resistance Inspection).



● Be sure to install the washers [A] on the exhaust butterfly valve actuator [B].
● Tighten:

Torque - Exhaust Butterfly Valve Actuator Mounting Screws [C]: 4.3 N ·m (0.44 kgf ·m, 38 in·lb)

● Install the upper ends of the exhaust butterfly valve cables (see Exhaust Butterfly Valve Cable Installation in the Engine Top End chapter).

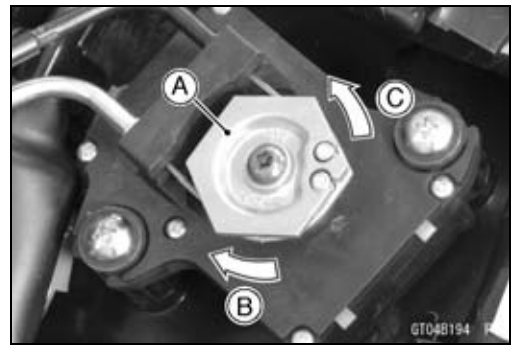


Exhaust Butterfly Valve Actuator Inspection

NOTE

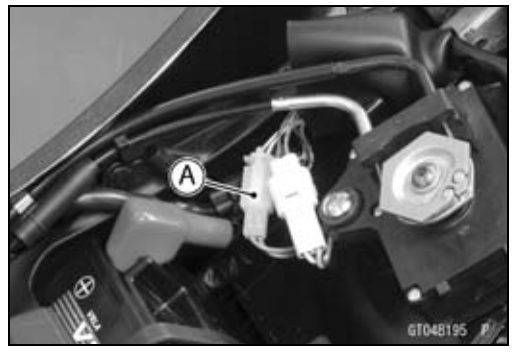
○*Be sure the battery is fully charged*

● Remove the front seat (see Front Seat Removal in the Frame chapter).
● Turn the ignition switch on.
● In the left side view of the motorcycle, check to see the pulley [A] clockwise [B] and counterclockwise [C] smoothly.
○The pulley turns clockwise and then counterclockwise, and clockwise again.
● Turn the ignition switch off.
★If the pulley does not operate, check the exhaust butterfly valve actuator resistance (see Exhaust Butterfly Valve Actuator Inspection Resistance Inspection).



Exhaust Butterfly Valve Actuator (Service Code 63)

Exhaust Butterfly Valve Actuator Resistance Inspection



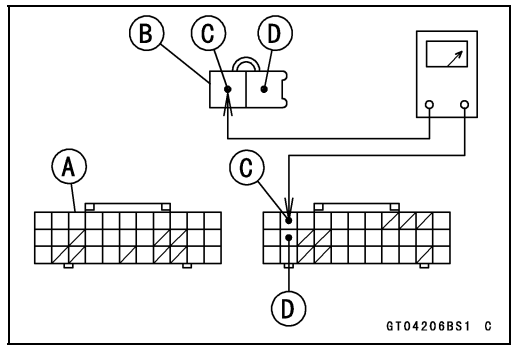
- Turn the ignition switch off.
- Disconnect the exhaust butterfly valve actuator lead connector (2 pins connector) [A].
- Connect a tester to the exhaust butterfly valve actuator connector.
- Measure the exhaust butterfly valve actuator resistance.

Exhaust Butterfly Valve Actuator Resistance
Connections: P lead ←→ GY lead
Standard: 5 ~ 200 Ω (for reference)

★If the reading is 0 or infinity (∞) Ω, replace the exhaust butterfly valve actuator.

★If the reading is in specification, remove the ECU and check the wiring for continuity between main harness connectors.

○Disconnect the ECU and actuator connectors.

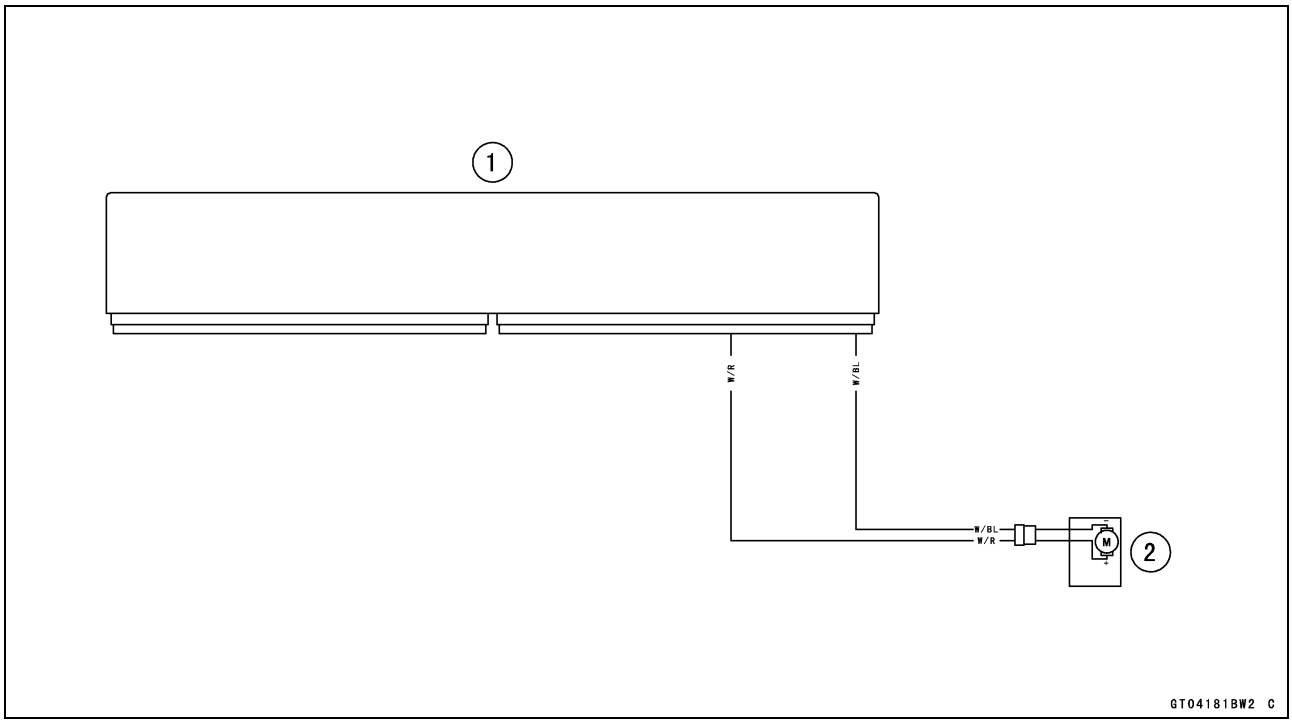


Wiring Inspection
ECU Connector [A] ←→
Exhaust Butterfly Valve Actuator Connector [B]
W/BL lead (ECU terminal 2) [C]
W/R lead (ECU terminal 13) [D]

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Exhaust Butterfly Valve Actuator Circuit



1. ECU
2. Exhaust Butterfly Valve Actuator

Air Switching Valve (Service Code 64)

Air Switching Valve Removal/Installation

● Refer to the Air Switching Valve Removal/Installation in the Engine Top End chapter.

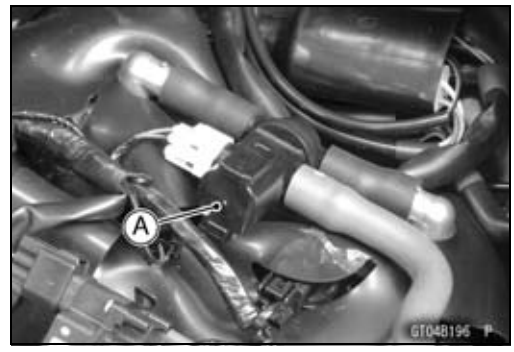
Air Switching Valve Inspection

● Refer to the Air Switching Valve Unit Test in the Electrical System chapter.

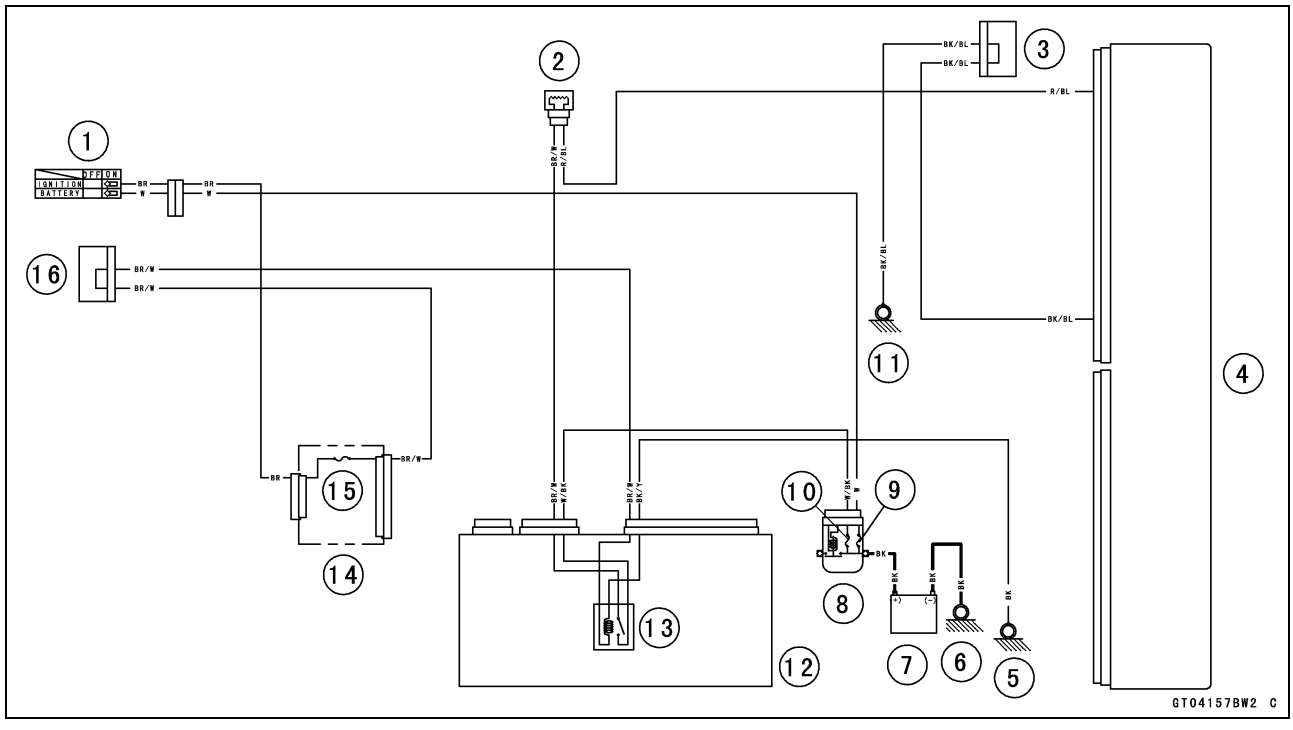
★If the air switching valve [A] is normal, check the wiring for continuity (see Air Switching Valve Circuit).

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).



Air Switching Valve Circuit



1. Ignition Switch
2. Air Switching Valve
3. Joint Connector D
4. ECU
5. Frame Ground 3
6. Engine Ground
7. Battery 12 V 8 Ah
8. Starter Relay
9. Main Fuse 30 A
10. ECU Fuse 15 A
11. Frame Ground 1
12. Relay Box
13. ECU Main Relay
14. Fuse Box 1
15. Ignition Fuse 15 A
16. Joint Connector E

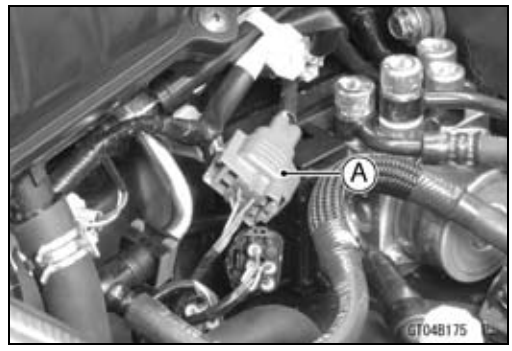
Oxygen Sensor Heater (Service Code 67, Equipped Models)

Oxygen Sensor Heater Removal/Installation

The oxygen sensor heater is built in the oxygen sensor. So, the heater itself can not be removed. Remove the oxygen sensor (see Oxygen Sensor Removal (Equipped Models) in the Electrical System chapter).

Oxygen Sensor Heater Resistance Inspection

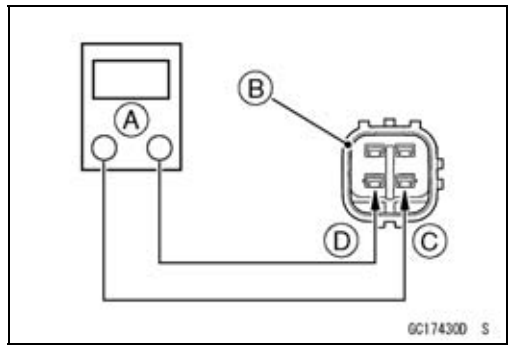
- Turn the ignition switch off.
- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Disconnect the oxygen sensor lead connector [A].



- Connect a digital meter [A] to the terminals in the oxygen sensor lead connector [B].
- Measure the oxygen sensor heater resistance.

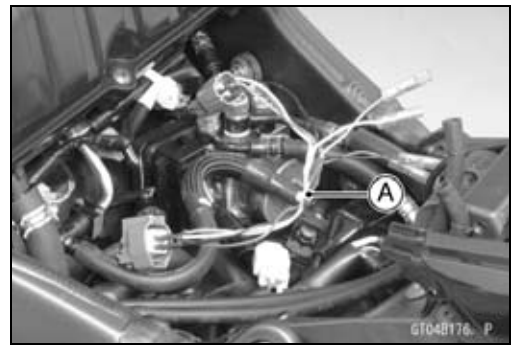
Oxygen Sensor Heater Resistance
Connections: W lead [C] ←→ W lead [D]
Standard: 6.7 ~ 10.5 Ω @20° (68°F)

★If the reading is out of the standard, replace the sensor.
★If the reading is within the standard, check the power source voltage (see Oxygen Sensor Heater Power Source Voltage Inspection).



Oxygen Sensor Heater (Service Code 67, Equipped Models)

Oxygen Sensor Heater Power Source Voltage Inspection



NOTE

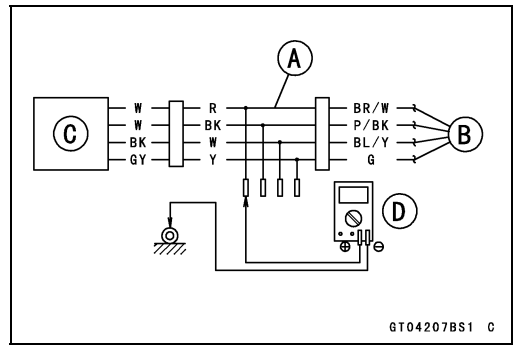
○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Disconnect the oxygen sensor lead connector and connect the measuring adapter [A] between these connectors as shown.
  Main Harness [B]
  Oxygen Sensor [C]

Special Tool - Measuring Adapter: 57001-1700

- Connect a digital meter [D] to the measuring adapter lead.

Oxygen Sensor Heater Power Source Voltage
Connections to Adapter:
Digital Meter (+) → R (main harness BR/W) lead
Digital Meter (–) → Frame Ground terminal



- Measure the power source voltage with the engine stopped and with the connector joined.
- Turn the ignition switch on

Power Source Voltage
Standard: Battery Voltage

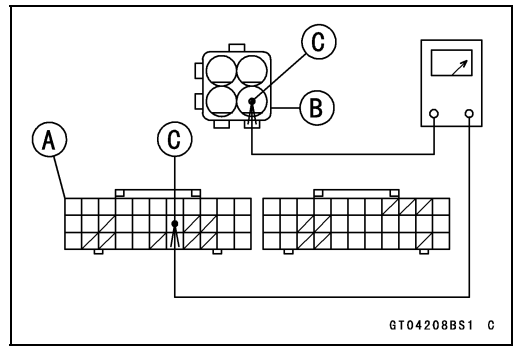
- Turn the ignition switch off.

★If the reading is in specification, but the problem still exists, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

★If the reading is out of the standard, check the following.
ECU Fuse 15 A (see Fuse Inspection in the Electrical System chapter)
Power Source Wiring (see Oxygen Sensor Circuit)

★If the fuse and wiring are good, remove the ECU and check the wiring for continuity between harness connectors.

○Disconnect the ECU and sensor connectors.



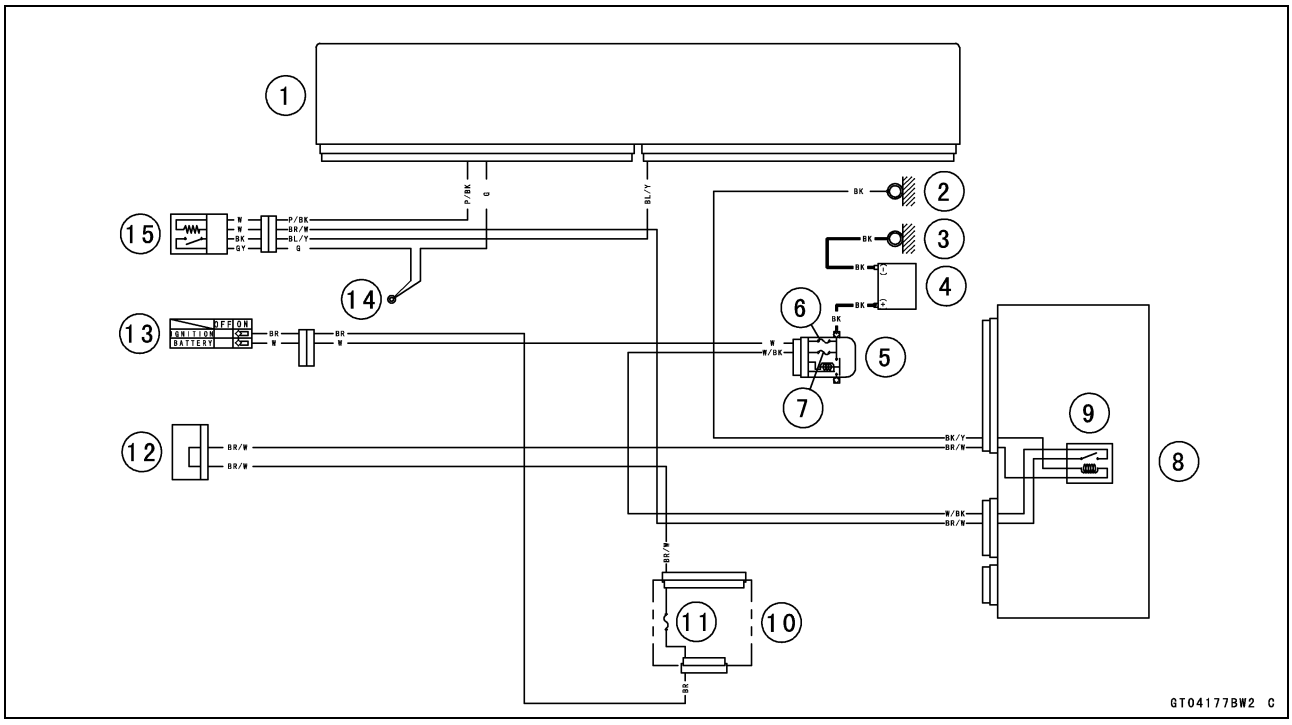
Wiring Continuity Inspection
ECU Connector [A] ←→
Oxygen Sensor Connectors [B]
P/BK lead (ECU terminal 51) [C]

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Oxygen Sensor Heater (Service Code 67, Equipped Models)

Oxygen Sensor Circuit



1. ECU
2. Frame Ground 3
3. Engine Ground
4. Battery 12 V 8 Ah
5. Starter Relay
6. Main Fuse 30 A
7. ECU Fuse 15 A
8. Relay Box
9. ECU Main Relay
10. Fuse Box 1
11. Ignition Fuse 15 A
12. Joint Connector E
13. Ignition Switch
14. Water-proof Joint 2
15. Oxygen Sensor

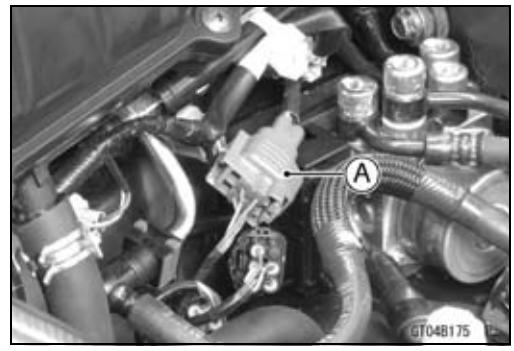
Oxygen Sensor - Incorrect Output Voltage (Service Code 94 (Equipped Models))

Oxygen Sensor Removal/Installation

- Refer to the Oxygen Sensor Removal/Installation (Equipped Models) in the Electrical System chapter.

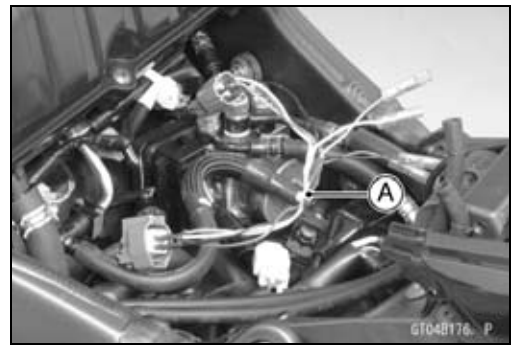
Oxygen Sensor Inspection

- Warm up the engine thoroughly until the radiator fan starts.
- Turn the ignition switch off.
- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
- Disconnect:
  Oxygen Sensor Lead Connector [A]



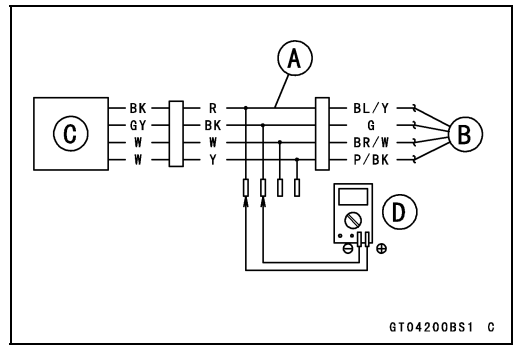
- Connect the measuring adapter [A] between the main harness connector and oxygen sensor lead connector as shown.
  Main Harness [B]
  Oxygen Sensor [C]

  Special Tool - Measuring Adapter: 57001-1700



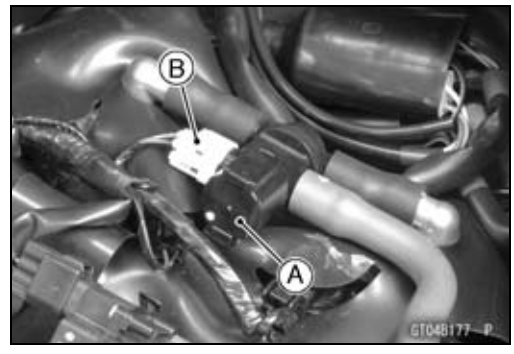
- Connect a digital meter [D] to the measuring adapter leads.

  Oxygen Sensor Output Voltage
  Connections to Adapter:
  Digital Meter (+) → R (sensor BK) lead
  Digital Meter (−) → BK (sensor GY) lead



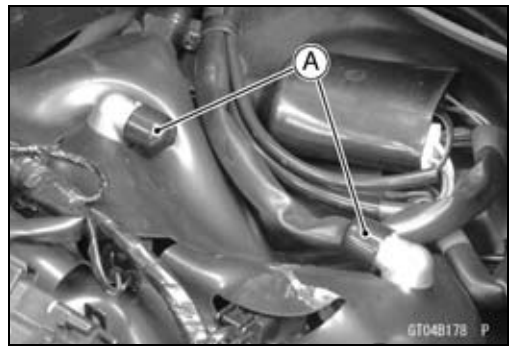
- Remove the air switching valve [A] (see Air Switching Valve Removal in the Engine Top End chapter).

○Do not disconnect the air switching valve connector [B].



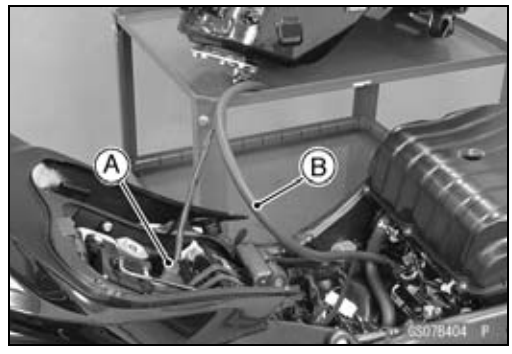
Oxygen Sensor - Incorrect Output Voltage (Service Code 94 (Equipped Models))

● Install the suitable plugs [A] on the fitting of the air suction valve covers, and shut off the secondary air.



● Connect the following parts temporarily.
Fuel Pump Lead Connector [A]
Extension Tube [B]
Air Cleaner Housing (see Air Cleaner Housing Installation)

Special Tool - Extension Tube: 57001-1578

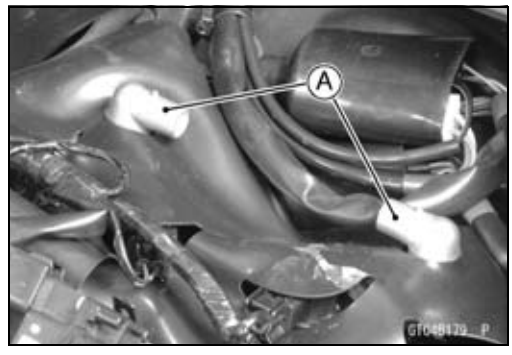


● Start the engine, and let it idle.
● Measure the output voltage with the connector joined.

Output Voltage (with Plugs)
Standard: DC 0.8 V or more

● Next, remove the plugs from the fittings [A] with idling.
● Measure the output voltage with the connector joined.

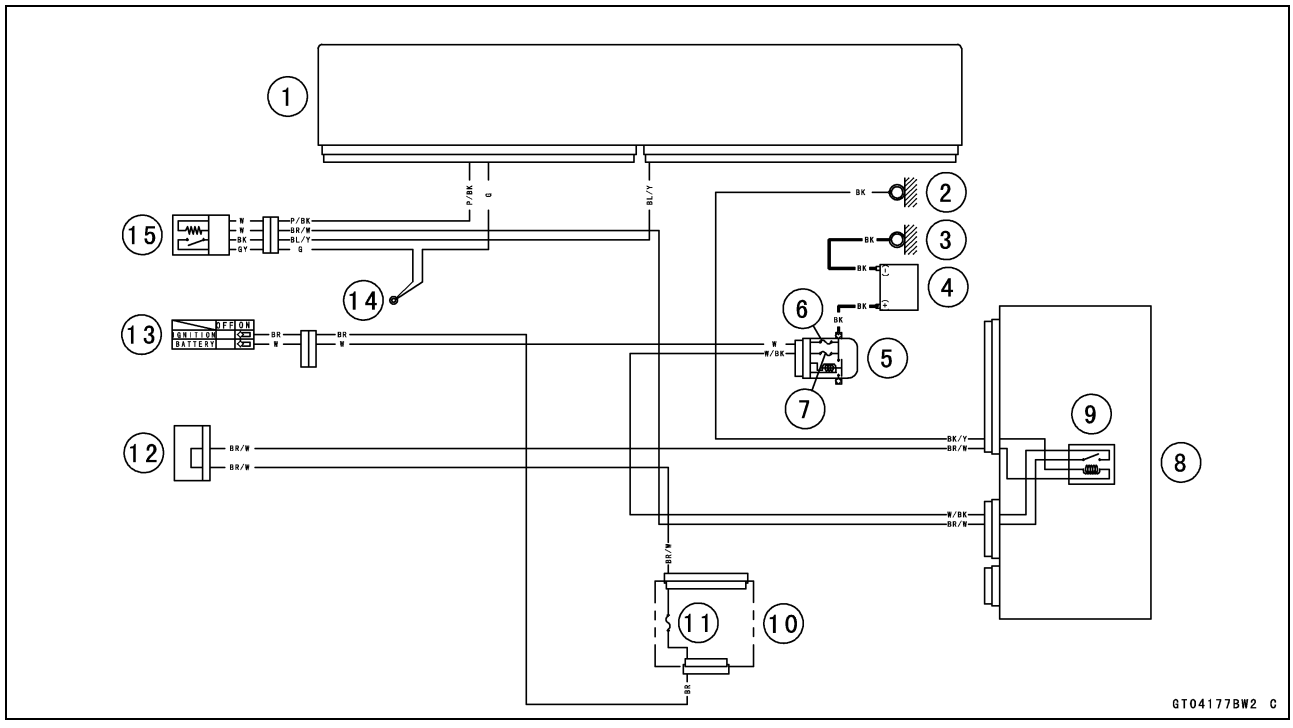
Output Voltage (without Plugs)
Standard: DC 0.24 V or less



● Turn the ignition switch off.
★If the reading is out of the standard (with plugs: DC 0.8 V or more, without plugs: DC 0.24 V or less), check the following.
Fuel Pressure (see Fuel Pressure Inspection in the Fuel System (DFI) chapter)
Fuel Injector (see Fuel Injector section)
★If the fuel pressure and fuel injectors are good, replace the sensor.
★If the reading is within the standard (with plugs: DC 0.8 V or more, without plugs: DC 0.24 V or less), check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Oxygen Sensor - Incorrect Output Voltage (Service Code 94 (Equipped Models))

Oxygen Sensor Circuit



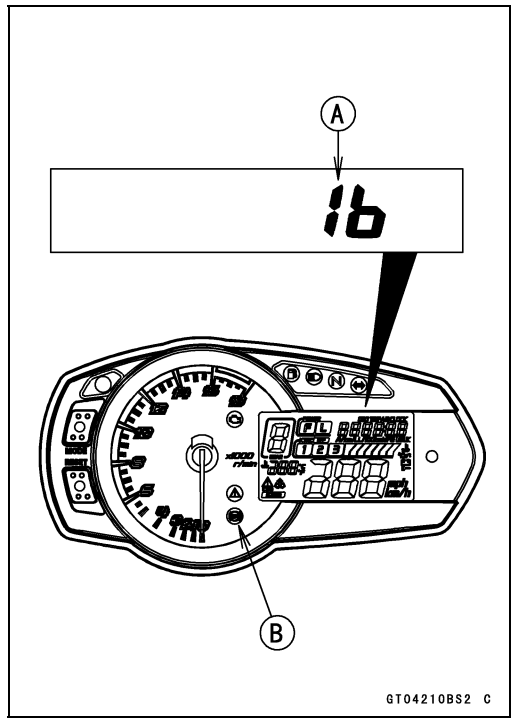
1. ECU
2. Frame Ground 3
3. Engine Ground
4. Battery 12 V 8 Ah
5. Starter Relay
6. Main Fuse 30 A
7. ECU Fuse 15 A
8. Relay Box
9. ECU Main Relay
10. Fuse Box 1
11. Ignition Fuse 15 A
12. Joint Connector E
13. Ignition Switch
14. Water-proof Joint 2
15. Oxygen Sensor

ABS Hydraulic Unit Communication Error (Service Code 1b, ABS Equipped Models)

ABS Hydraulic Unit Communication Line Inspection

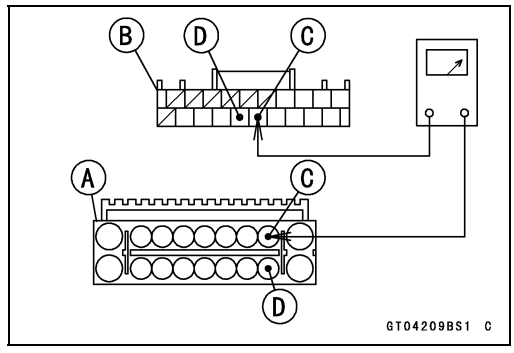
○When the data (for status of ABS hydraulic unit) is not sent from the ABS hydraulic unit to the meter unit and ECU, the service code 1b is displayed.
○The data is sent through the CAN communication line.
○The service code 1b is detected with the meter unit.
○The FI symbol does not appear in this error code.

○When the service code 1b [A] is detected, the yellow ABS indicator light (LED) [B] goes on and the code of 1b displayed on the LCD.



● Check the wiring for continuity between main harness connector.
● Disconnect:
ABS Hydraulic Unit Connector (see ABS Hydraulic Unit Removal in the Brakes chapter)
Meter Unit Connector (see Meter Unit Removal in the Electrical System chapter)

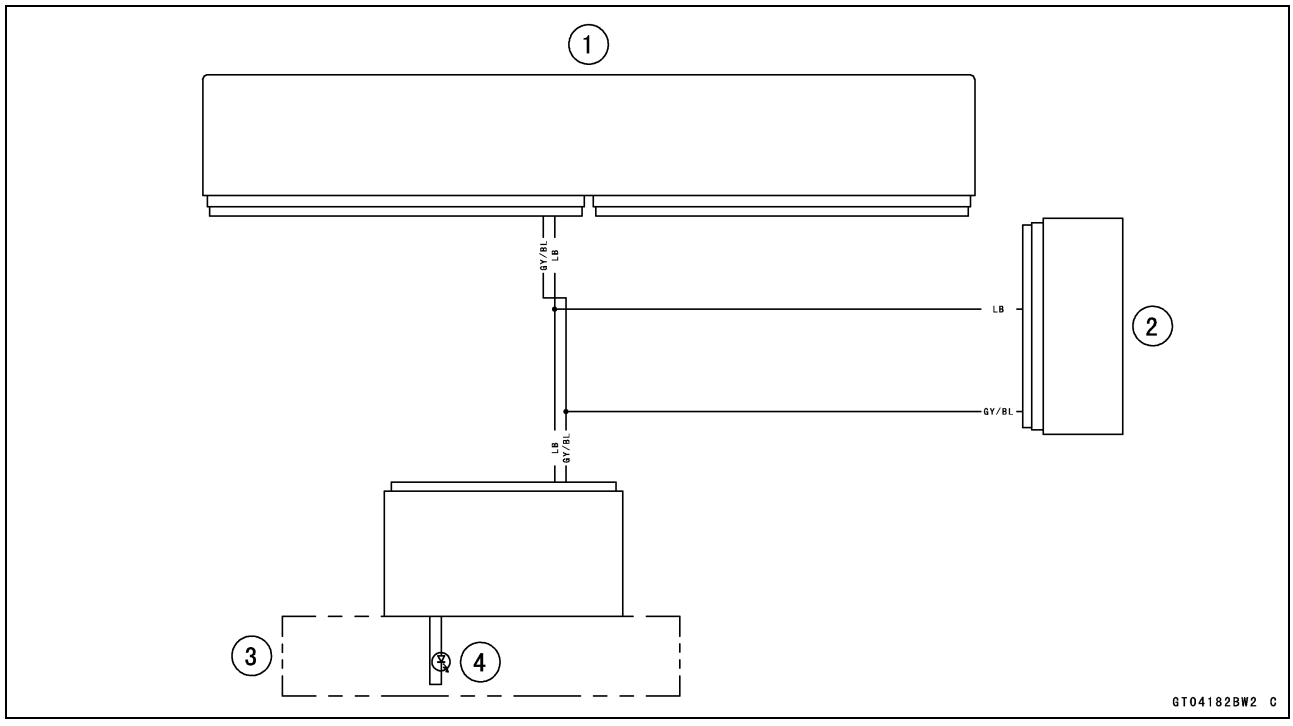
Wiring Inspection
ABS Hydraulic Unit Connector [A] ←→
Meter Unit Connector [B]
GY/BL lead (ABS Hydraulic Unit terminal 2) [C]
LB lead (ABS Hydraulic Unit terminal 11) [D]



★If the wiring is good, replace the ABS hydraulic unit (see ABS Hydraulic Unit Removal/Installation in the Brakes chapter).

ABS Hydraulic Unit Communication Error (Service Code 1b, ABS Equipped Models)

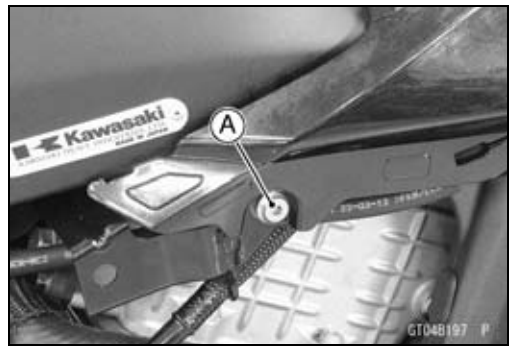
ABS Hydraulic Unit Communication Line Circuit



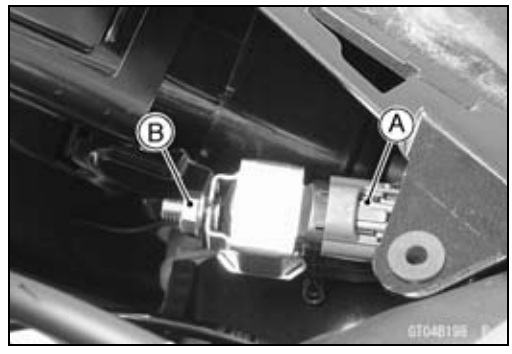
1. ECU
2. ABS Hydraulic Unit
3. Meter Unit
4. Yellow ABS Indicator Light (LED)

Purge Valve (Service Code 3A) (CAL Model)

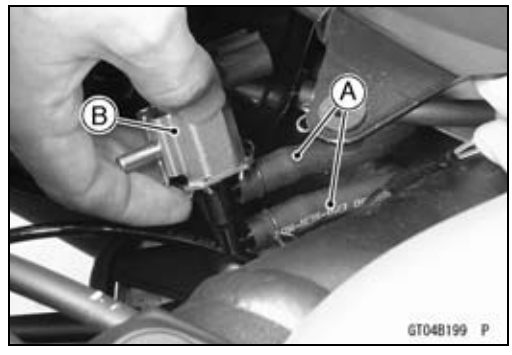
Purge Valve Removal/Installation



- Remove:
  Right Fairing Cover (see Fairing Cover Removal in the Frame chapter)
  Right Side Cover (see Side Cover Removal in the Frame chapter)
  Bolt [A] and Washer



- Disconnect the connector [A].
- Remove the nut [B].

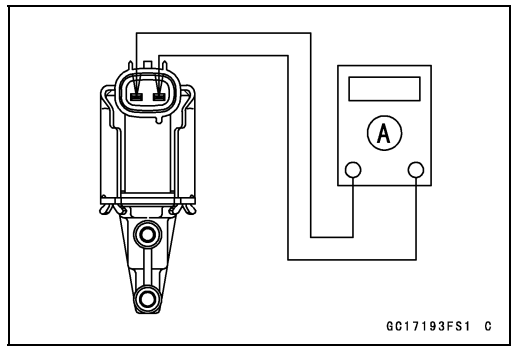


- Disconnect the tubes [A].
- Remove the purge valve [B].

- Installation is the reverse of removal.

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

Purge Valve Inspection



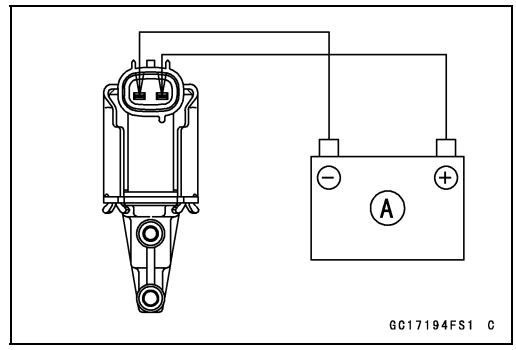
- Remove the purge valve (see Purge Valve Removal/Installation).
- Connect a digital meter [A] to the purge valve terminals as shown.

Purge Valve Resistance
Standard: 30 ~ 34 Ω @20°C (68°F)

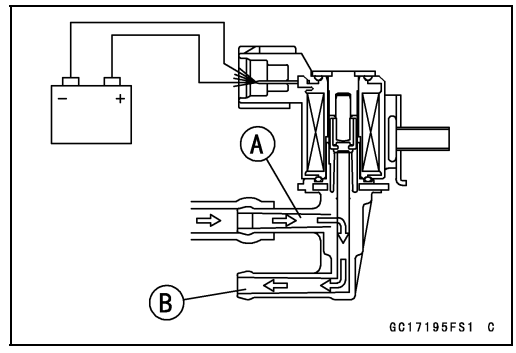
★If the resistance reading is out of the specified value, replace it with a new one.

Purge Valve (Service Code 3A) (CAL Model)

- Connect the 12 V battery [A] to the purge valve terminals as shown.

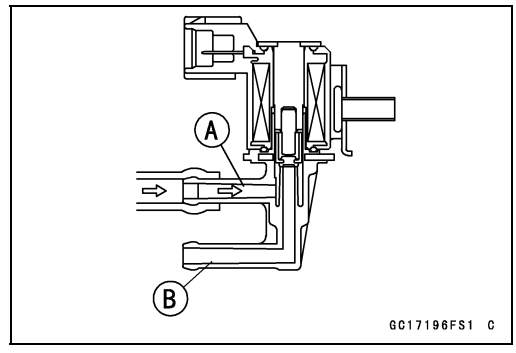


- Blow the air to the intake air duct [A], and make sure that the air flows from the outlet air duct [B].



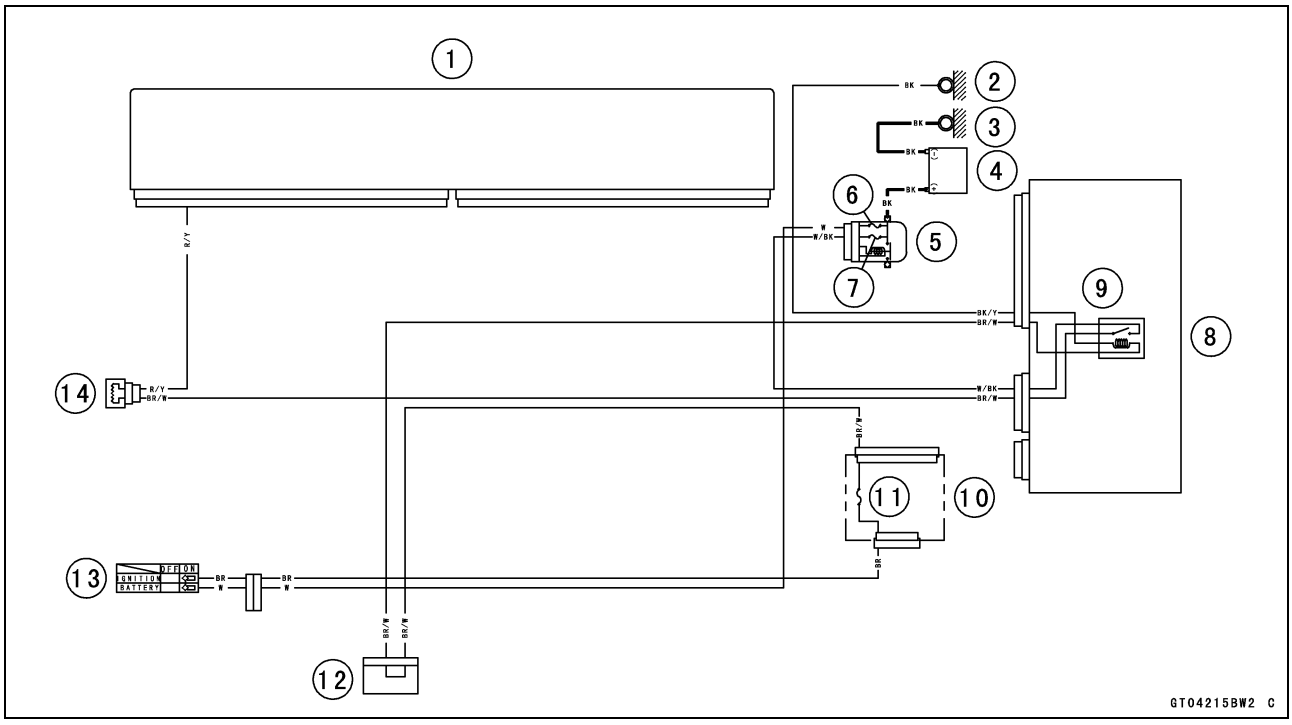
- Disconnect the 12 V battery.
- Blow the air to the intake air duct [A] again, and make sure that the air does not flow from the outlet air duct [B].

★If the purge valve dose not operate as described, replace it with a new one.



Purge Valve (Service Code 3A) (CAL Model)

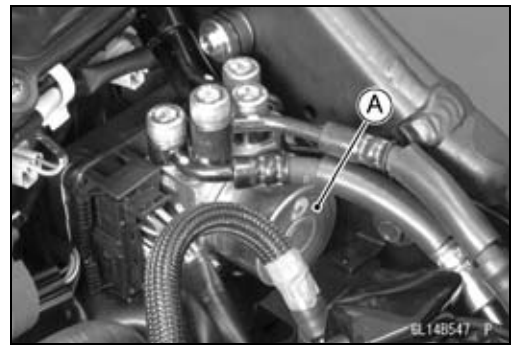
Purge Valve Circuit



1. ECU
2. Frame Ground 3
3. Engine Ground
4. Battery 12 V 8 Ah
5. Starter Relay
6. Main Fuse 30 A
7. ECU Fuse 15 A
8. Relay Box
9. ECU Main Relay
10. Fuse Box 1
11. Ignition Fuse 15 A
12. Joint Connector E
13. Ignition Switch
14. Purge Valve

ABS Service Codes (ABS Equipped Models)

Solenoid Valve Inspection (Service Code b 13, b 14, b 17, b 18)



○The solenoid valve is built in the ABS Hydraulic Unit [A]. Therefore the solenoid valve cannot be checked directly.
● Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).
★If any of these service codes appears even if all checks are ended, replace the ABS hydraulic unit.
★If the service code does not appear, the ABS system normal (temporary failure).

ABS Solenoid Valve Relay Inspection (Service Code b 19)

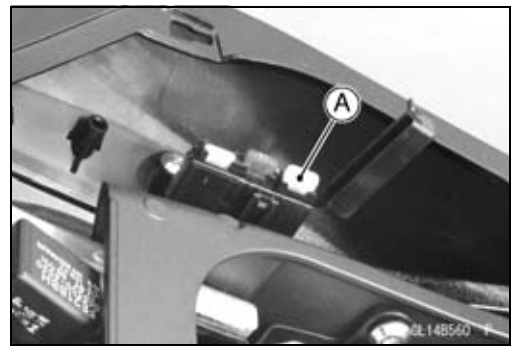
○The ABS solenoid valve relay is built in the ABS Hydraulic Unit. Therefore the relay cannot be checked directly.
● Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).
★If this service code appears even if all checks are ended, replace the ABS hydraulic unit.
★If the service code does not appear, the ABS system normal (temporary failure).

Front, Rear Wheel Rotation Difference Abnormal Inspection (Service Code b 25)

● Check the following and correct the faulty part.
Incorrect Tire Pressure
Tires not recommended for the motorcycle were installed (incorrect tire size).
Deformation of Wheel or Tire
Missing Teeth or Clogging with Foreign Matter of Sensor Rotor (see Wheel Rotation Sensor Rotor Inspection in the Brakes chapter)
★If the all parts corrected, go to next step.

● Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).
★If this service code appears even if all checks are ended, replace the ABS hydraulic unit.
★If the service code does not appear, the ABS system normal (temporary failure).

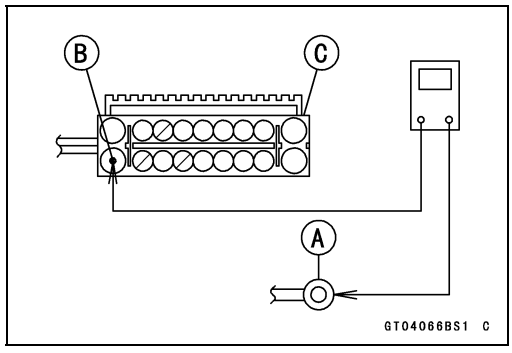
ABS Motor Relay Inspection (Service Code b 35)



● Check the ABS motor relay fuse (25 A) [A] (see Fuse Inspection in the Electrical System chapter)
★If the fuse is good, check the wiring continuity as follows.
○Disconnect:
Battery Positive Cable (see Battery Removal in the Electrical System chapter)
ABS Hydraulic Unit Lead Connector (see ABS Hydraulic Unit Removal in the Brakes chapter)

ABS Service Codes (ABS Equipped Models)

○Check the wiring continuity between the positive cable terminal [A] of the battery and R/W lead terminal [B] in the ABS Hydraulic Unit Lead Connector [C].
★If the wiring is open, replace or repair the harness (see ABS System Circuit in the Brakes chapter).
★If the wiring is good, go to next step.

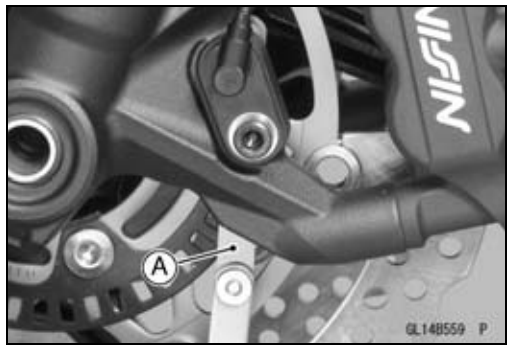


○The ABS motor relay is built in the ABS Hydraulic Unit. Therefore the relay cannot be checked directly.
● Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).
★If this service code appears even if all checks are ended, replace the ABS hydraulic unit.
★If the service code does not appear, the ABS system normal (temporary failure).

Front Wheel Rotation Sensor Signal Abnormal (Service Code b 42)

● Measure the air gap between the front wheel rotation sensor and sensor rotor.
Thickness Gauge [A]

Air Gap
Standard: 0.4 ~ 1.6 mm (0.02 ~ 0.06 in.)

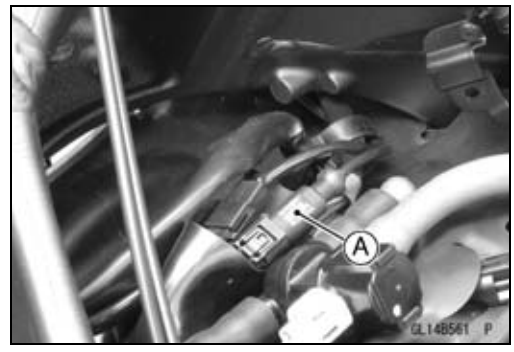


★If the measurement is not the standard, check each part for deformation and looseness and correct accordingly.
★If the measurement is the standard, go to next step.

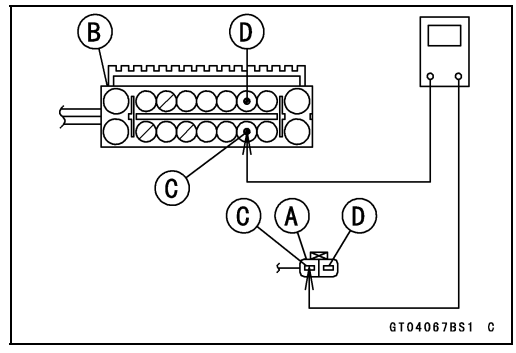
● Check that there is iron or other magnetic deposits between the sensor and sensor rotor, and the sensor rotor slots for obstructions.
● Check the installation condition of the sensor for looseness.
● Check the sensor and sensor rotor tip for deformation or damage (e.g., chipped sensor rotor teeth).
★If the sensor and sensor rotor in bad condition, remove the any deposits. Install the proper part or replace faulty part.
★If the all items are good, go to next step.
● Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).
★If this service code appears even if all checks are ended, replace the ABS hydraulic unit.
★If the service code does not appear, the ABS system normal (temporary failure).

ABS Service Codes (ABS Equipped Models)

Front Wheel Rotation Sensor Wiring Inspection (Service Code b 43)



- Disconnect the front wheel rotation sensor lead connector [A] (see Front Wheel Rotation Sensor Removal in the Brakes chapter).



- Disconnect the ABS hydraulic unit lead connector (see ABS Hydraulic Unit Removal in the Brakes chapter).
- Check the wiring continuity of the W lead and Y lead.
  Front Wheel Rotation Sensor Lead Connector [A]
  ABS Hydraulic Unit Lead Connector [B]
  W Lead Terminals [C]
  Y Lead terminals [D]

★If the wiring is open, replace or repair the harness (see ABS System Circuit in the Brakes chapter).
★If the wiring is good, go to next step.

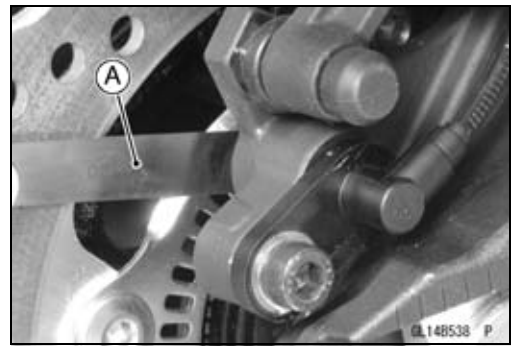
- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the front wheel rotation sensor (see Front Wheel Rotation Sensor Removal in the Brakes chapter).

- Still, when it is not good, replace the ABS hydraulic unit.

★If the service code does not appear, the ABS system normal (temporary failure).

Rear Wheel Rotation Sensor Signal Abnormal (Service Code b 44)



- Measure the air gap between the rear wheel rotation sensor and sensor rotor.
  Thickness Gauge [A]

Air Gap
Standard: 0.4 ~ 1.6 mm (0.02 ~ 0.06 in.)

★If the measurement is not the standard, check each part for deformation and looseness and correct accordingly.
★If the measurement is the standard, go to next step.

- Check that there is iron or other magnetic deposits between the sensor and sensor rotor, and the sensor rotor slots for obstructions.
- Check the installation condition of the sensor for looseness.
- Check the sensor and sensor rotor tip for deformation or damage (e.g., chipped sensor rotor teeth).

★If the sensor and sensor rotor in bad condition, remove the any deposits. Install the proper part or replace faulty part.
★If the all items are good, go to next step.

ABS Service Codes (ABS Equipped Models)

- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the ABS hydraulic unit.

★If the service code does not appear, the ABS system normal (temporary failure).

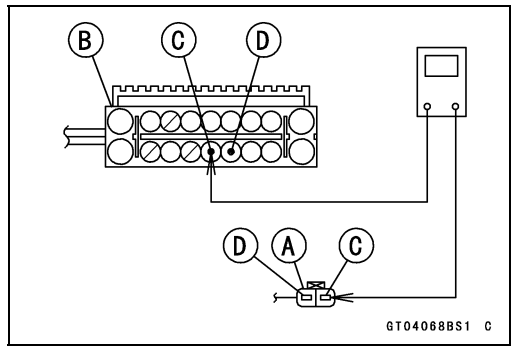
Rear Wheel Rotation Sensor Wiring Inspection (Service Code b 45)

- Disconnect the rear wheel rotation sensor lead connector [A] (see Rear Wheel Rotation Sensor Removal in the Brakes chapter).

- Disconnect the ABS hydraulic unit lead connector (see ABS Hydraulic Unit Removal in the Brakes chapter).
- Check the wiring continuity of the G lead and R lead.
  Rear Wheel Rotation Sensor Lead Connector [A]
  ABS Hydraulic Unit Lead Connector [B]
  G Lead Terminals [C]
  R Lead terminals [D]

★If the wiring is open, replace or repair the harness (see ABS System Circuit in the Brakes chapter).

★If the wiring is good, go to next step.



- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the rear wheel rotation sensor (see Rear Wheel Rotation Sensor Removal in the Brakes chapter).

- Still, when it is not good, replace the ABS hydraulic unit.

★If the service code does not appear, the ABS system normal (temporary failure).

Power Supply Voltage Inspection (Low-Voltage) (Service Code b 52)

- Check the battery condition (see Charging Condition Inspection in the Electrical System chapter).

★If the battery is good condition, perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the ABS hydraulic unit.

★If the service code does not appear, the ABS system normal (temporary failure).

ABS Service Codes (ABS Equipped Models)

Power Supply Voltage Inspection (Over-Voltage) (Service Code b 53)

- Check the charging voltage (see Charging Voltage Inspection in the Electrical System chapter).

★If the charging voltage is good, perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the ABS hydraulic unit.

★If the service code does not appear, the ABS system normal (temporary failure).

ECU Inspection (Service Code b 55)

○This ECU is built in the ABS Hydraulic Unit. Therefore the ECU cannot be checked directly.

- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the ABS hydraulic unit.

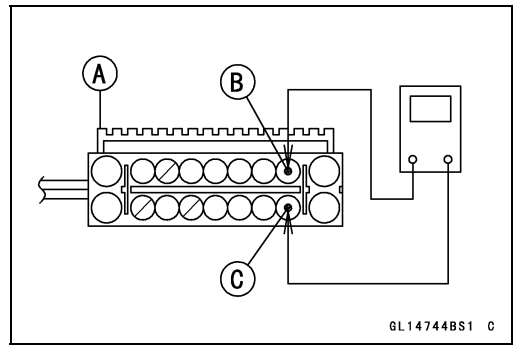
★If the service code does not appear, the ABS system normal (temporary failure).

CAN Communication (Transmission)/CAN Bus OFF Monitor Inspection (Service Code b 57)
CAN Communication (Reception) Monitor Inspection (Service Code b 58)

- Disconnect the ABS hydraulic unit lead connector (see ABS Hydraulic Unit Removal in the Brakes chapter).

- Measure the CAN communication line resistance.
  ABS Hydraulic Unit Lead Connector [A]
  GY/BL Lead Terminal [B]
  LB Lead Terminal [C]

CAN Communication Line Resistance
Standard: 30 ~ 70 Ω



★If the reading is out of the standard, go to Check 1.

★If the reading is the standard, go to Check 2.

Check 1

- Check the CAN communication line resistance of following parts.
  Meter Unit (see Meter Unit Inspection in the Electrical System chapter)
  ECU (see CAN Communication Line Resistance Inspection in the Fuel System (DFI) chapter)

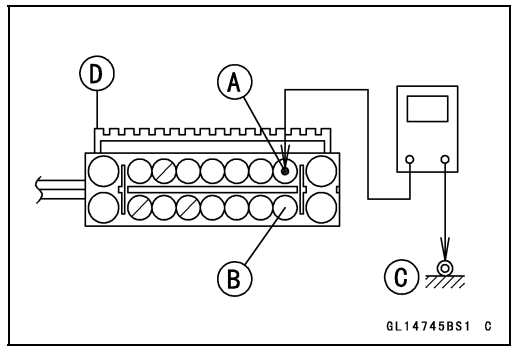
ABS Service Codes (ABS Equipped Models)

Check 2

- Measure the resistance between the GY/BL [A] or LB [B] terminal and ground [C].
  ABS Hydraulic Unit Lead Connector [D]

CAN Communication Line/Ground Resistance
Standard: 5 ~ 30 kΩ

★If the reading is out of the standard, replace or repair the main harness.
★If the reading is the standard, go to next step.



- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the ABS hydraulic unit.
★If the service code does not appear, the ABS system normal (temporary failure).

Output Fluid Pressure Sensor (Front Brake) Wiring Inspection (Service Code b 83)

○The Output Fluid Pressure Sensor is built in the ABS Hydraulic Unit. Therefore the sensor cannot be checked directly.

- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the ABS hydraulic unit.

Output Fluid Pressure Sensor (Front Brake) Offset Abnormal (Service Code b 84)

○The Output Fluid Pressure Sensor is built in the ABS Hydraulic Unit. Therefore the sensor cannot be checked directly.

- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

★If this service code appears even if all checks are ended, replace the ABS hydraulic unit.
★If the service code does not appear, the ABS system normal (temporary failure).

Fluid Pressure Sensor Supply Voltage Inspection (Service Code b 89)

○The Fluid Pressure Sensors are built in the ABS Hydraulic Unit. Therefore the voltage cannot be checked directly.

- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).

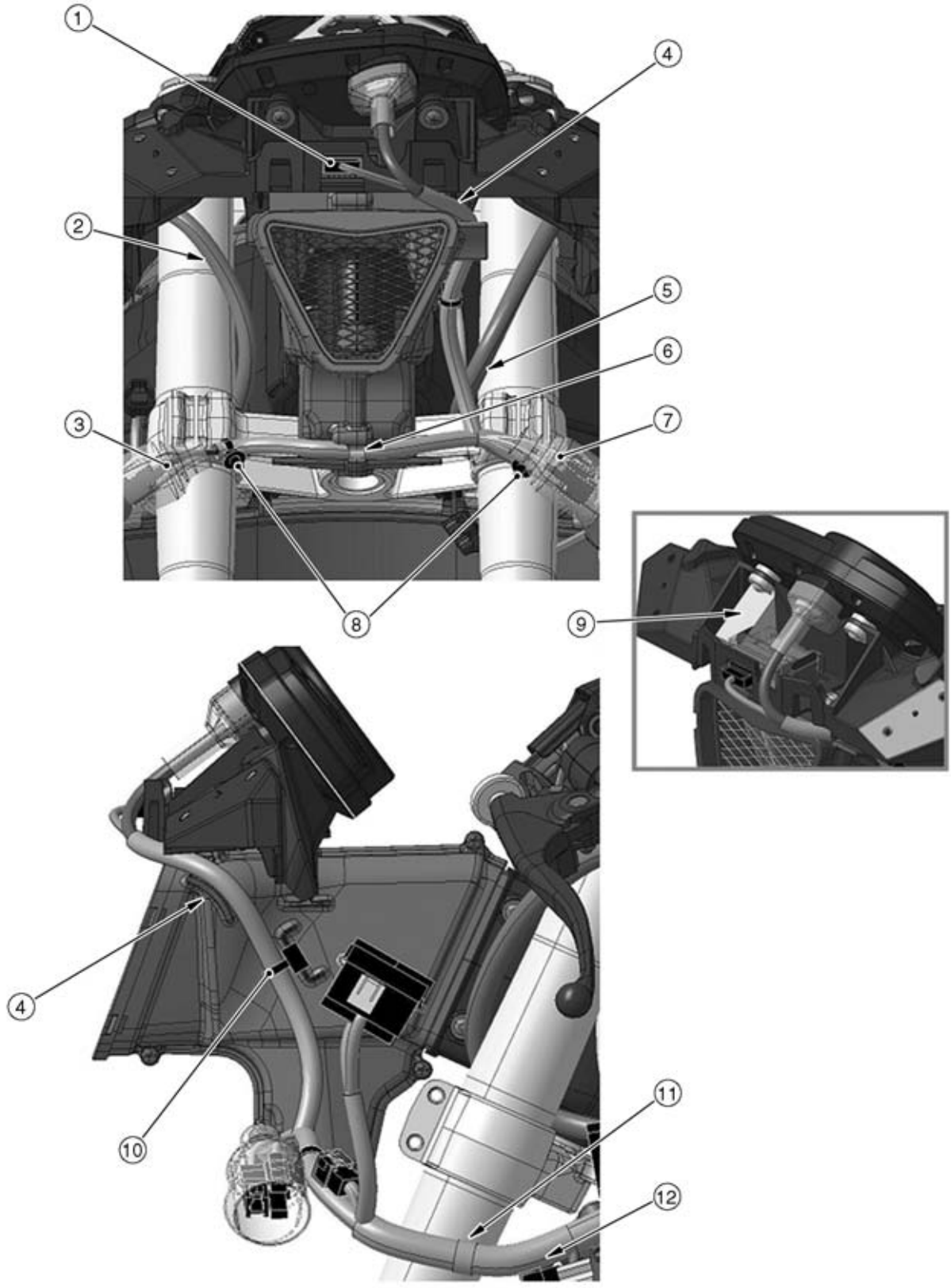
★If this service code appears even if all checks are ended, replace the ABS hydraulic unit.
★If the service code does not appear, the ABS system normal (temporary failure).

Appendix

Table of Contents

Cable, Wire, and Hose Routing 18-2
Troubleshooting Guide 18-47

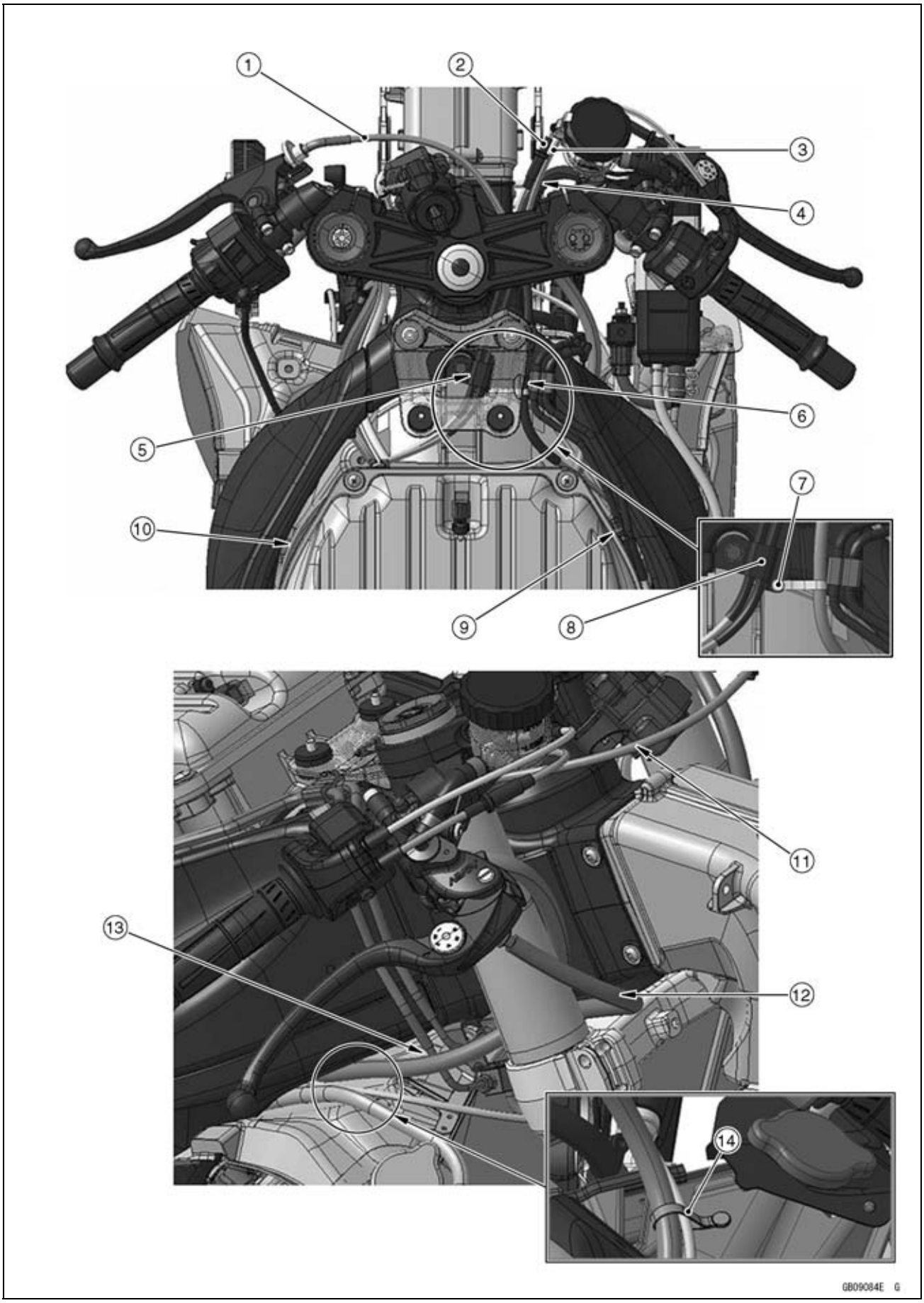
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Immobilizer Amplifier Connector (Equipped Models)
2. Run the right switch housing lead to the inside of the front fork. Run the right switch housing lead to the upside of the steering stem.
3. Cover the right turn signal light lead connector, headlight lead connector and city light lead connector with the rubber cover.
4. Run the meter lead and immobilizer amplifier lead (equipped models) to the upside of the rib of the air intake duct.
5. Run the left switch housing lead to the inside of the front fork. Run the left switch housing lead to the upside of the steering stem.
6. Hold the harness at the white tape position of the harness to the hook of the air intake duct.
7. Cover the left turn signal light lead connector, headlight lead connector and city light lead connector with the rubber cover.
8. Hold the harness with the clamp, and insert the projections of the clamp into the inner fairing.
9. Install the pad so that there is no space between the pad and bracket.
10. Hold the meter lead with the clamp, and install the clamp to the air intake duct.
11. Run the main harness to the outside of the front fork.
12. Check that the main harness does not swing.

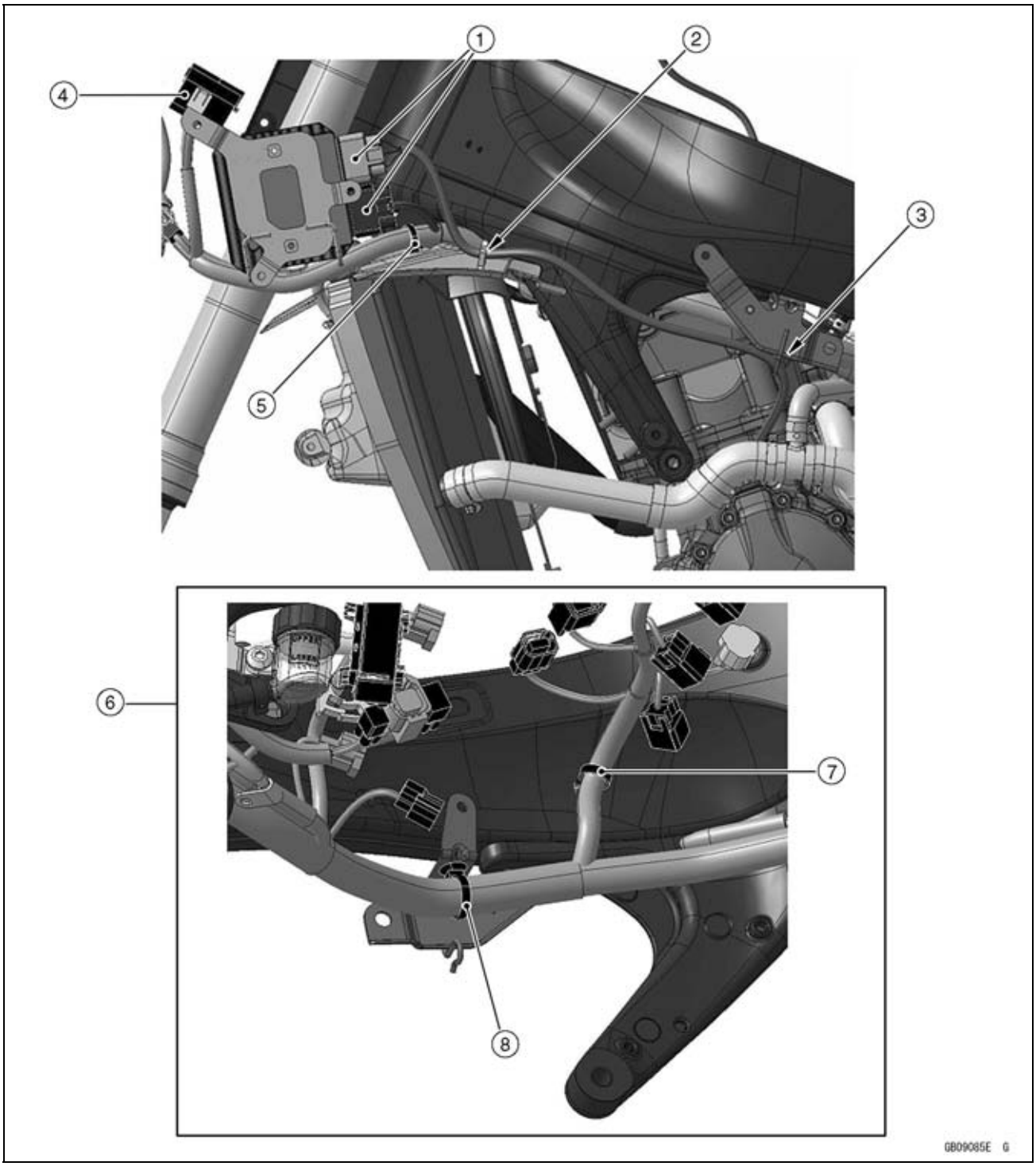
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

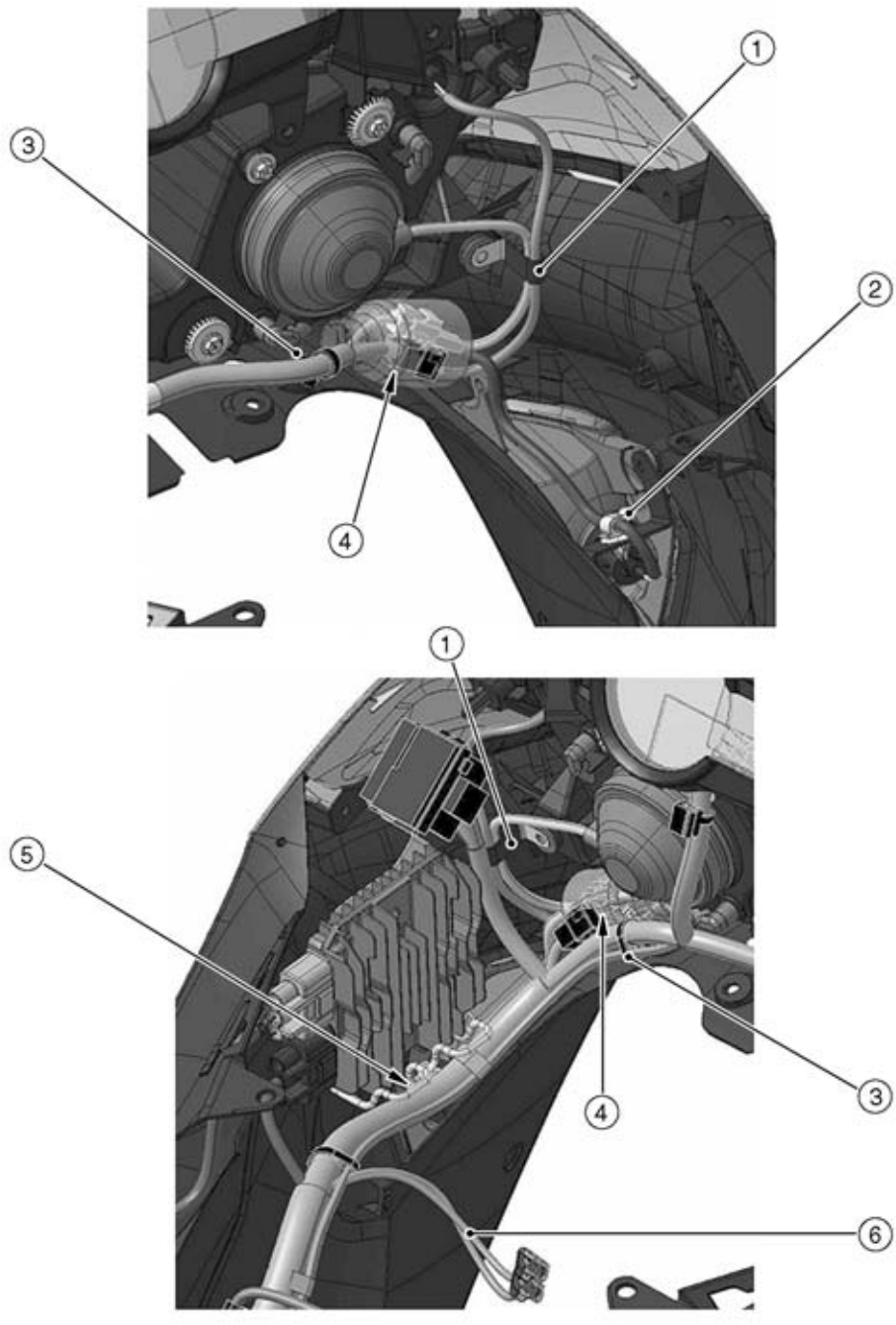
1. Clutch Cable
2. Throttle Cable (Accelerator)
3. Throttle Cable (Decelerator)
4. Run the throttle cables between the steering stem head and clutch cable.
5. Align the white character on the accelerator cable with the clamp.
6. Align the clutch cable with the tab on the fuel tank bracket.
7. Clamp (Hold the clutch cable at the blue tape position.)
8. Clamp (Hold the throttle cables.)
9. Run the brake pipes between the frame and air cleaner housing (ABS equipped models).
10. Run the throttle cables between the frame and air cleaner housing.
11. Run the clutch cable under the throttle cables.
12. Run the brake hose to the inside of the right switch housing lead. Run the brake hose to the upside of the steering stem.
13. Run the right switch housing lead to the outside of the brake pipes (ABS equipped models).
14. Clamp (Hold the right switch housing lead and front wheel rotation sensor lead.)

Cable, Wire, and Hose Routing



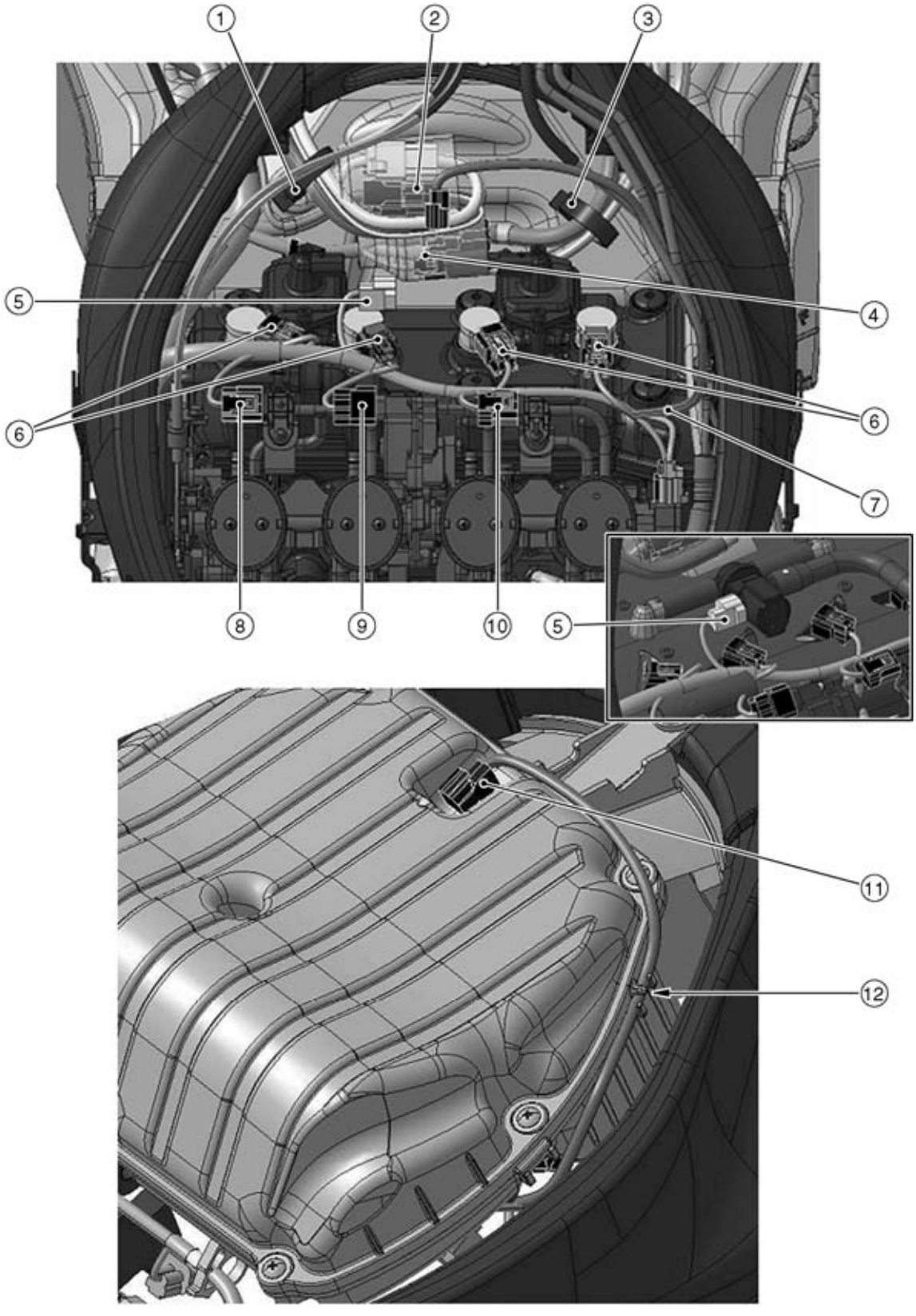
1. Regulator/Rectifier Connectors
2. Clamp (Hold the alternator lead.)
3. Run the alternator lead through the clamp of the bracket.
4. Fuse Box
5. Hold the main harness with the clamp, and insert the projection of the clamp into the inner fairing.
6. Inside of Left Fame
7. Hold the main harness with the clamp, and insert the projection of the clamp into the frame.
8. Hold the main harness with the clamp, and insert the projection of the clamp into the bracket.

Cable, Wire, and Hose Routing



1. Clamp (Hold the city light lead and head light lead.)
2. Clamp (Hold the right turn signal light lead, and face the open side of the clamp to the outside. Hold the left side lead in the same way.)
3. Hold the harness with the clamp, and insert the projections of the clamp into the inner fairing.
4. Shove the rubber cover under the headlight.
5. Run the main harness under the regulator/rectifier bracket.
6. Hone Lead

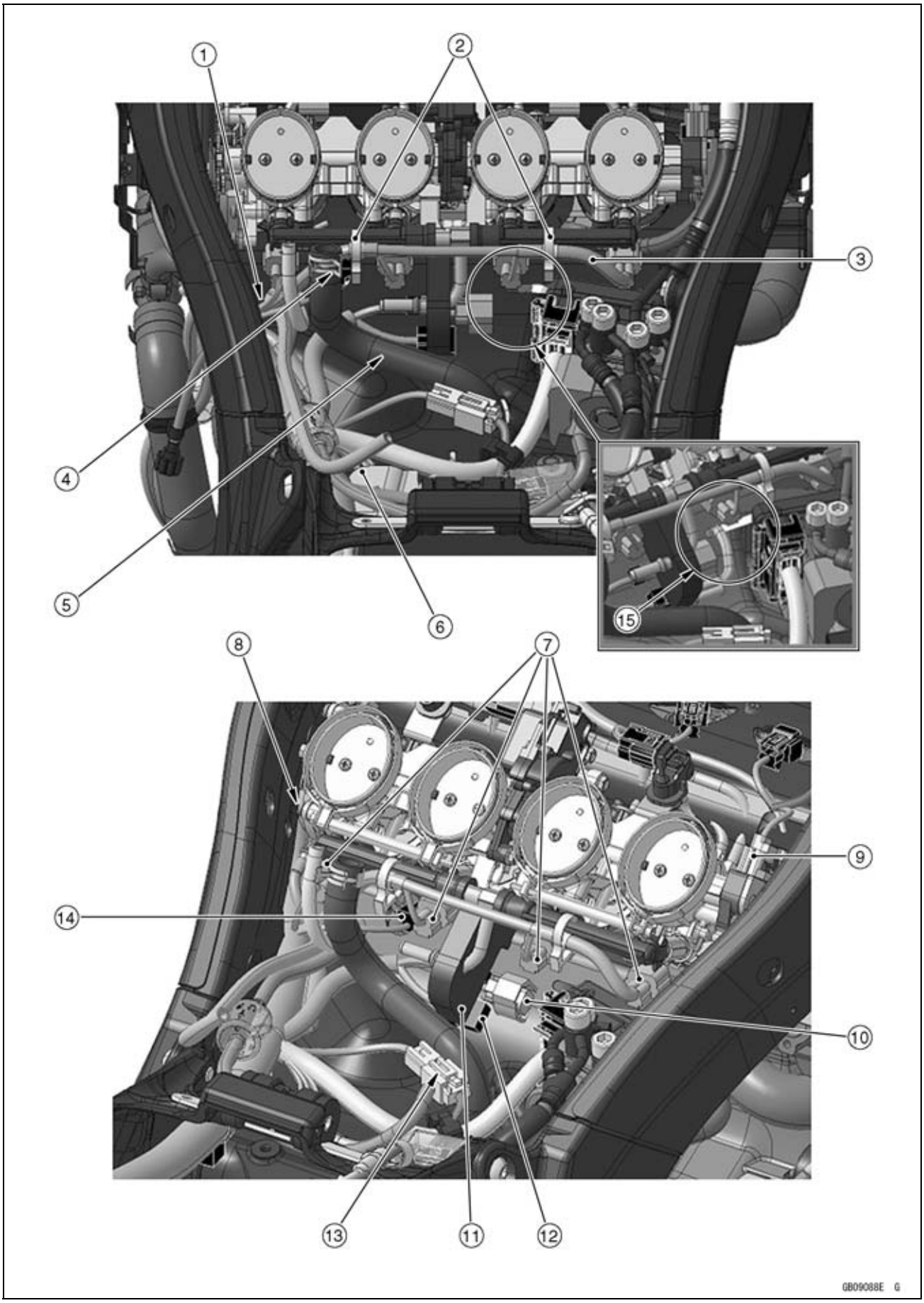
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Clamp (Hold the left switch housing lead, immobilizer antenna lead (equipped models) and ignition switch lead, and face the open side of the clamp to the left side.)
2. Cover the left switch housing lead connector, immobilizer antenna lead connector (equipped modes) and ignition switch lead connector with the rubber cover.
3. Clamp (Hold the right switch housing lead, radiator fan lead and front wheel rotation sensor lead, and face the open side of the clamp to the left side.)
4. Cover the right switch housing lead connector, radiator fan lead connector and front wheel rotation sensor lead connector with the rubber cover.
5. Air Switching Valve Connector
6. Stick Coil Connectors
7. Intake Air Temperature Sensor Lead
8. Intake Air Pressure Sensor #1 Connector
9. Subthrottle Valve Actuator Connector
10. Intake Air Pressure Sensor #2 Connector
11. Intake Air Temperature Sensor Connector
12. Clamp (Hold the intake air temperature sensor lead.)

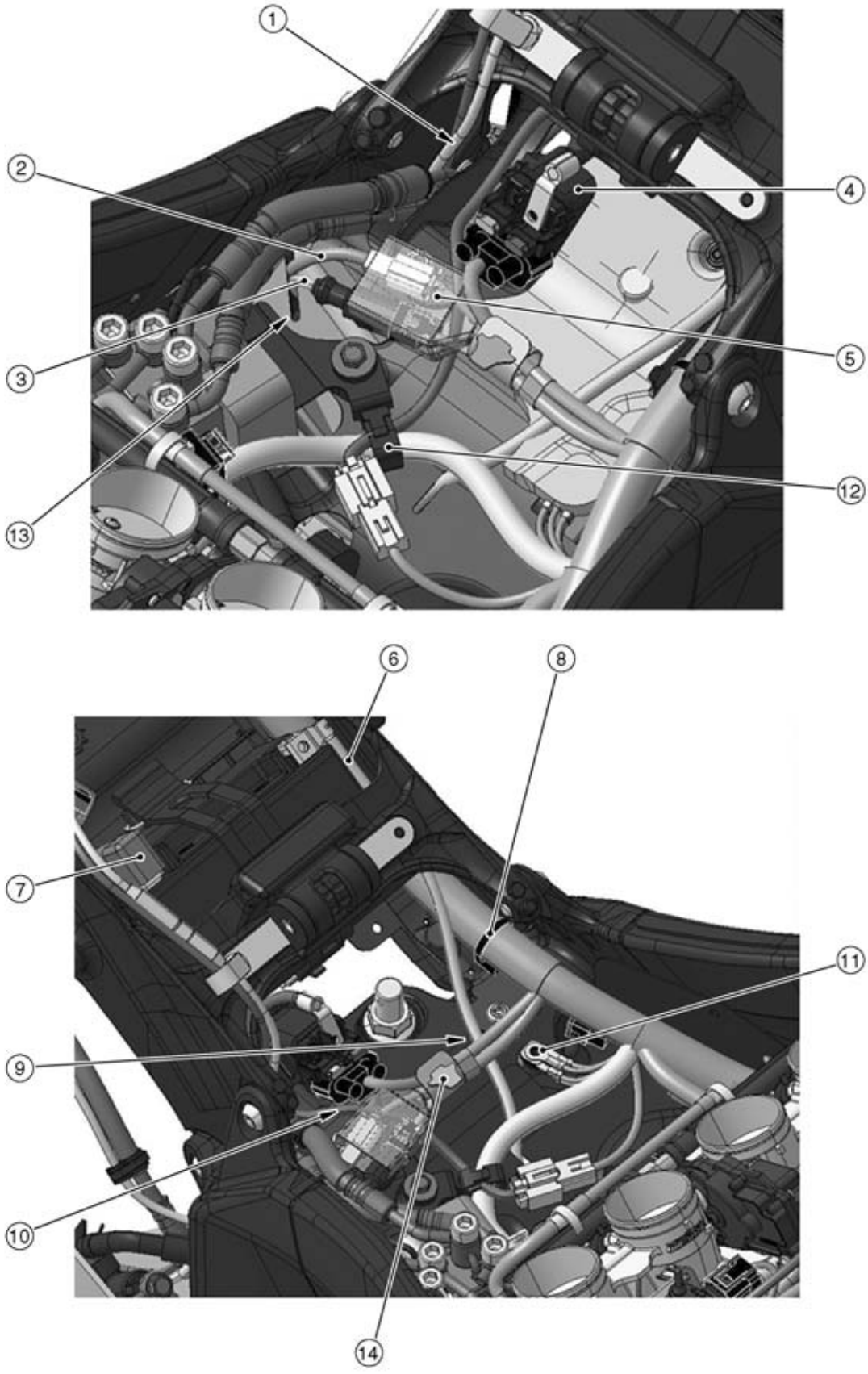
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Run the fuel injector lead under the fuel injector #1. Run the fuel injector lead to the upside of the fuel injector #2.
2. Clamps (Hold the delivery pipe and fuel injector lead at the white tape position of the fuel injector lead, and face the open side of the clamp downward.)
3. Fuel Injector Lead
4. Face the clamp to the backward.
5. Run the breather hose to the upside of the main harness.
6. Cover the frame ground terminal with the heat insulation rubber plate.
7. Fuel Injector Connectors
8. Do not pinch the main harness at the left side of the throttle body assy.
9. Throttle Position Sensor Connector
10. Oxygen Sensor lead Connector (Equipped Models)
11. Insert the fuel pipe into the pad. Install the pad to the upside of the oxygen sensor connector (equipped models) and crankshaft sensor connector.
12. Crankshaft Senor Connector
13. Run the battery positive lead connector to the upside of the other leads and hoses.
14. Water Temperature Sensor Connector
15. Run the gear position sensor lead into the slit of the heat insulation rubber plate.

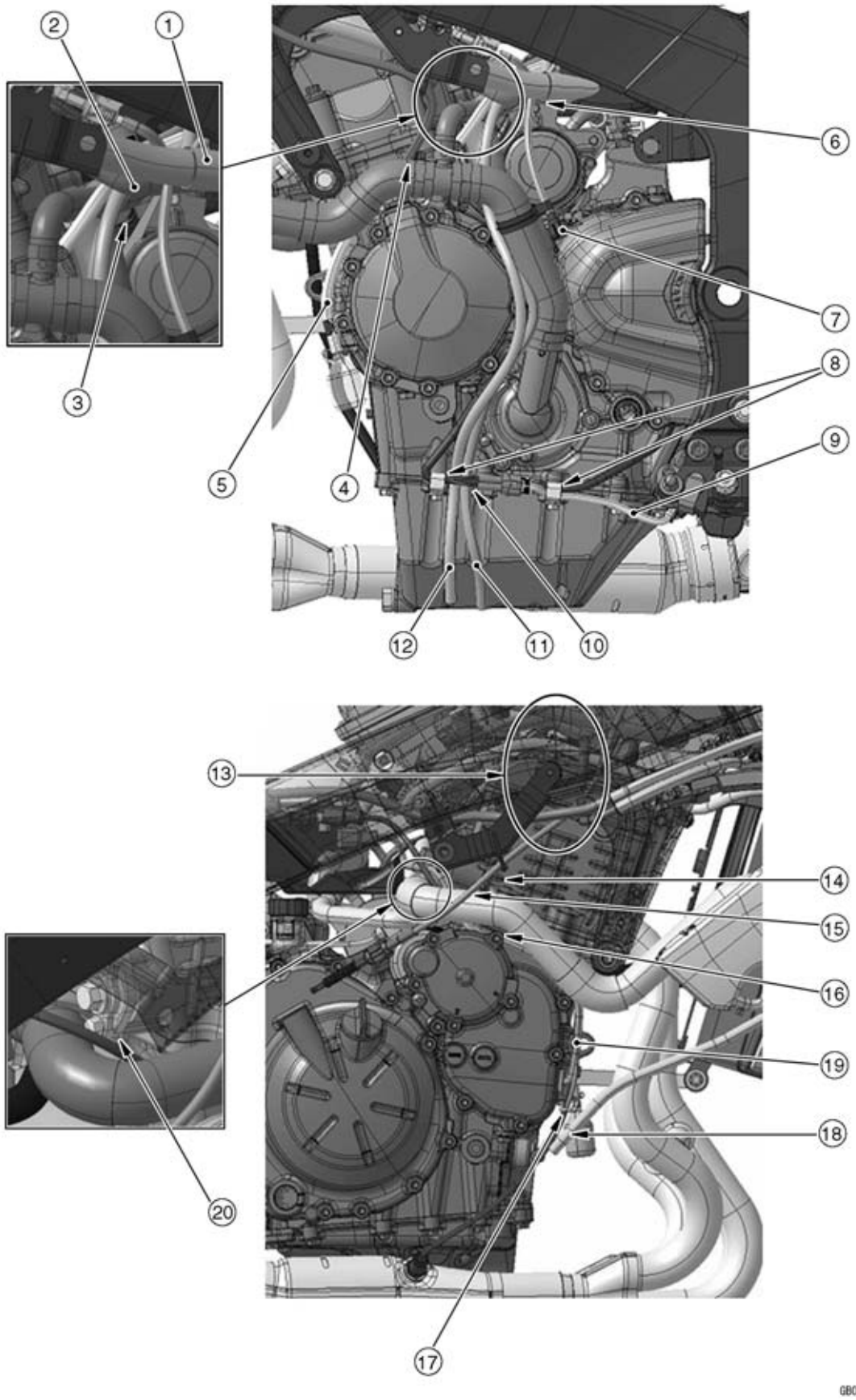
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Run the ABS brake pipes (ABS equipped models) and battery cable to the inside of the exhaust butterfly cables.
2. Rear Brake Light Switch Lead
3. Rear Wheel Rotation Sensor Lead
4. Starter Relay
5. Cover the rear wheel rotation sensor lead connector and rear brake light switch lead connector with the rubber cover.
6. Battery Negative Cable
7. Battery Positive Cable
8. Hold the main harness with the clamp, and install the clamp to the rear fender.
9. Run the battery negative cable under the other leads.
10. Run the battery positive lead under the rubber cover.
11. Face the frame ground terminal to the front.
12. Clamp [Hold the battery positive lead and ABS hydraulic unit lead (ABS equipped models).]
13. Run the rear brake light switch lead and rear wheel rotation sensor lead into the slit of the ABS hydraulic unit rubber cover (ABS equipped models).
14. Band (Hold the rear wheel rotation sensor lead, rear brake light switch lead and starter relay lead near the starter relay connector.)

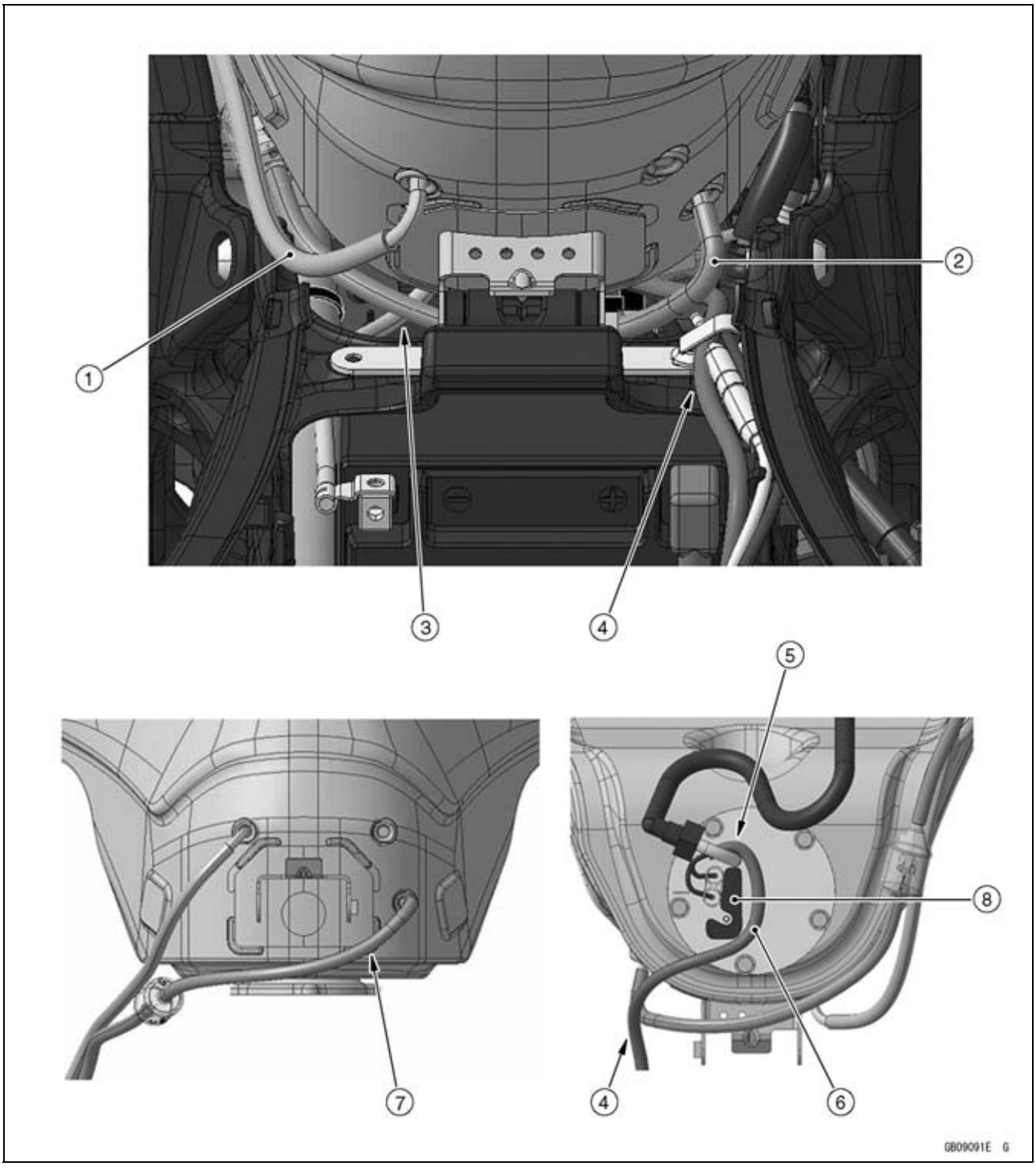
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

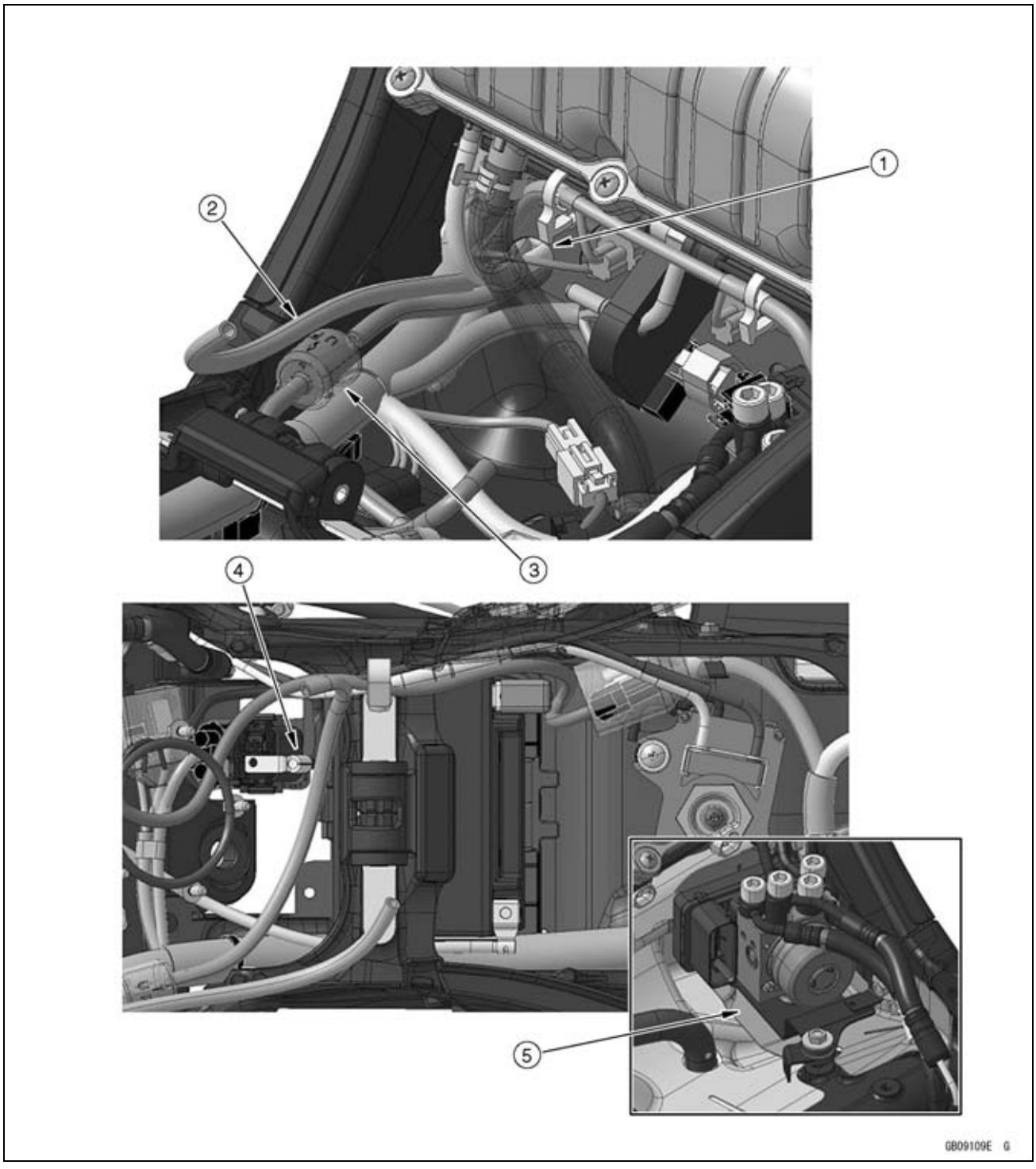
1. Main Harness
2. Breather Hose
3. Run the air cleaner drain hose, fuel tank breather hose and fuel tank drain hose to the inside of the breather hose and idle adjusting cable. Run the main harness to the outside of the breather hose and idle adjusting cable.
4. Run the air cleaner drain hose to the inside of the water hose. Run the air cleaner drain hose to the outside of the alternator lead.
5. Air Cleaner Drain Hose
6. Run the idle adjusting cable to the inside of the main harness.
7. Idle Adjusting Screw
8. Clamps (Hold the gear position switch lead and sidestand switch lead.)
9. Sidestand Switch Lead
10. Run the fuel tank drain hose and fuel tank breather hose to the inside of the gear position switch lead.
11. Fuel Tank Breather Hose
12. Fuel Tank Drain Hose
13. Run the green painted hose (CAL model), clutch cable and blue painted hose (CAL model) in order from the inside.
14. Run the clutch cable through the clamp of the bracket.
15. Run the clutch cable to the outside of the water hose.
16. Run the oxygen sensor lead (equipped models) and crankshaft sensor lead to the inside of the water hose. Do not slack the crankshaft sensor lead to the front side.
17. Run the oil pressure switch lead and oxygen sensor lead (equipped models) through the clamp of the engine.
18. Run the coolant reserve tank over flow hose through the hole of the left middle fairing.
19. Crankshaft Sensor Lead
20. Run the crankshaft sensor lead under the camshaft chain tensioner.

Cable, Wire, and Hose Routing



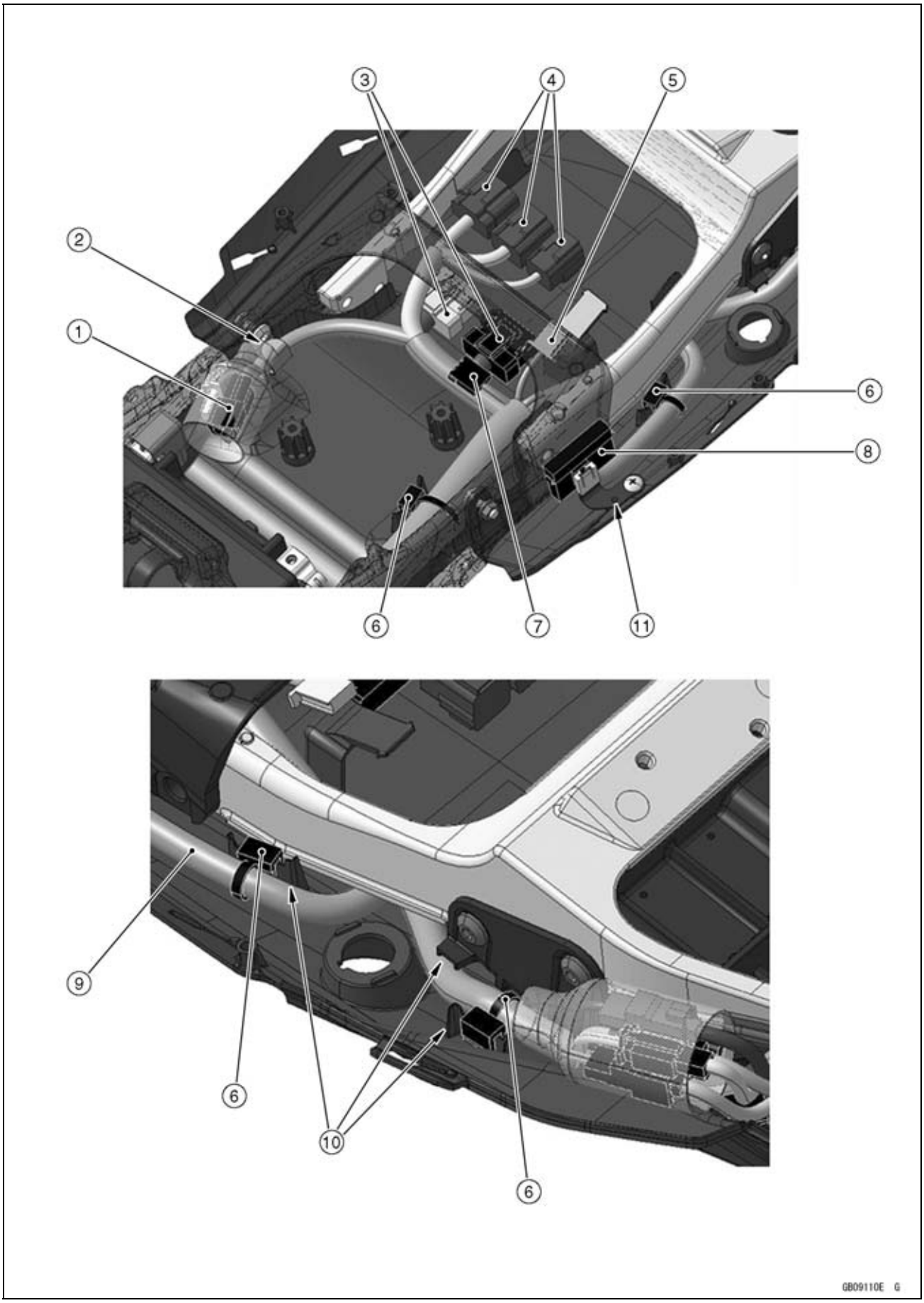
1. Fuel Tank Drain Hose
2. Fuel Tank Breather Hose
3. Run the fuel tank breather hose under the fuel tank bracket.
4. Run the fuel pump lead under the fuel tank breather hose.
5. Run the fuel pump lead to the front of the fuel pump pipe. Run the fuel pump lead between the fuel tank and fuel hose.
6. Fuel Pump Lead
7. Turn the fuel tank breather hose to the bottom left.
8. Pad

Cable, Wire, and Hose Routing



1. Run the air cleaner drain hose, fuel tank drain hose and fuel tank breather hose into the hole of the heat insulation rubber plate.
2. Run the main harness, fuel tank breather hose and fuel tank drain hose in order from the bottom.
3. Check that the hole of the catch tank of the fuel tank breather hose does not face downward.
4. Run the starter motor lead into the hole of the rear fender.
5. Install the heat insulation rubber plate under the other parts.

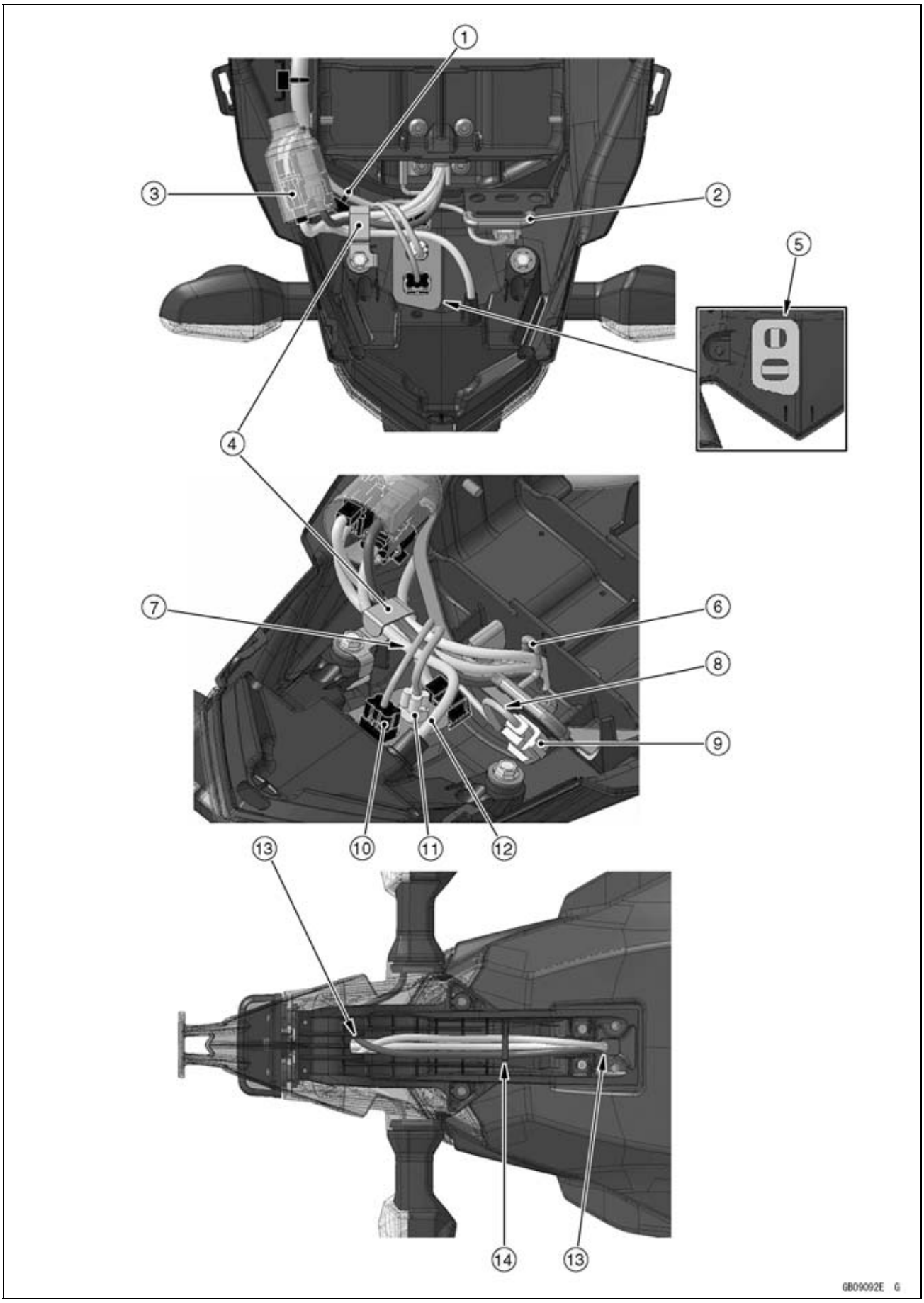
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Cover the fuel pump lead connector and exhaust butterfly valve actuator lead connector with the rubber cover.
2. Clamp (Hold the end of rubber cover.)
3. ECU Connectors
4. Relay Box Connectors
5. Turn Signal Relay Connector
6. Hold the main harness with the clamp, and install the clamp to rear fender.
7. Joint Connector (with the harness tape)
8. Fuse Box (ABS Equipped Models)
9. Main Harness
10. Run the main harness to the side of the ribs of the rear fender and fender bracket, and shove the main harness. Take care not to pinch the main harness.
11. Align the hole of the fuse bracket with the projection of the rear fender.

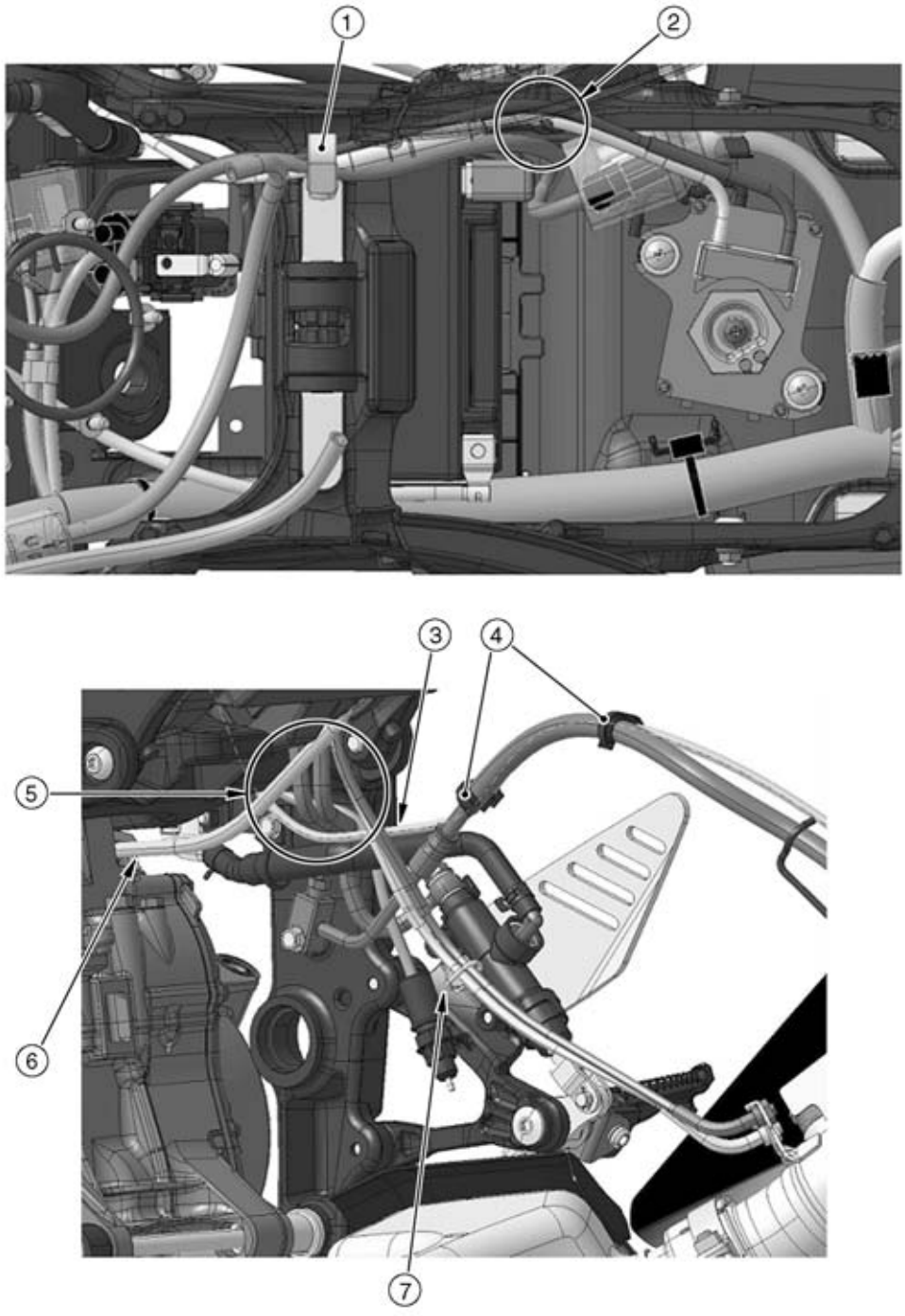
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

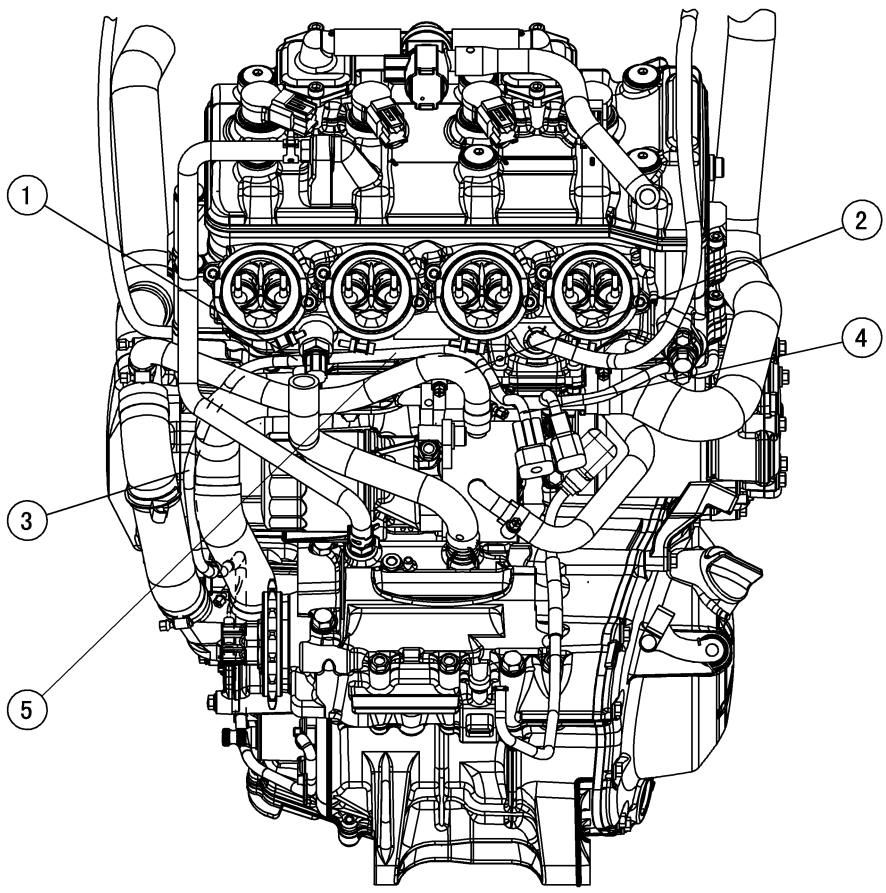
1. Hold the main harness with the clamp, and install the clamp to rear fender.
2. Install the trim.
3. Cover the left turn signal light lead connector, right turn signal light lead connector, license plate light lead connector and tail/brake light lead connector with rubber cover. Place the rubber cover between the rear frame rear and rear fender.
4. Clamp (Hold the left turn signal light lead, right turn signal light lead, license plate light lead and tail/brake light lead.)
5. Install the pad so that the pad aligns with the line of the center on the rear fender and line of the corner on the rear fender.
6. Run the left turn signal light lead, right turn signal light lead and license plate light lead through the clamp.
7. Run the diagnosis system leads to the upside of the other leads.
8. Run the vehicle-down sensor lead under the other lead.
9. Vehicle-down Sensor Connector
10. ABS Self-Diagnosis System Connector (Equipped Models)
11. Kawasaki Diagnostic System Connector
12. Tail/Brake Light Lead
13. Run the left turn signal light lead, right turn signal light lead and license plate light lead into the hole.
14. Hold the left turn signal light lead, right turn signal light lead and license plate light lead.

Cable, Wire, and Hose Routing



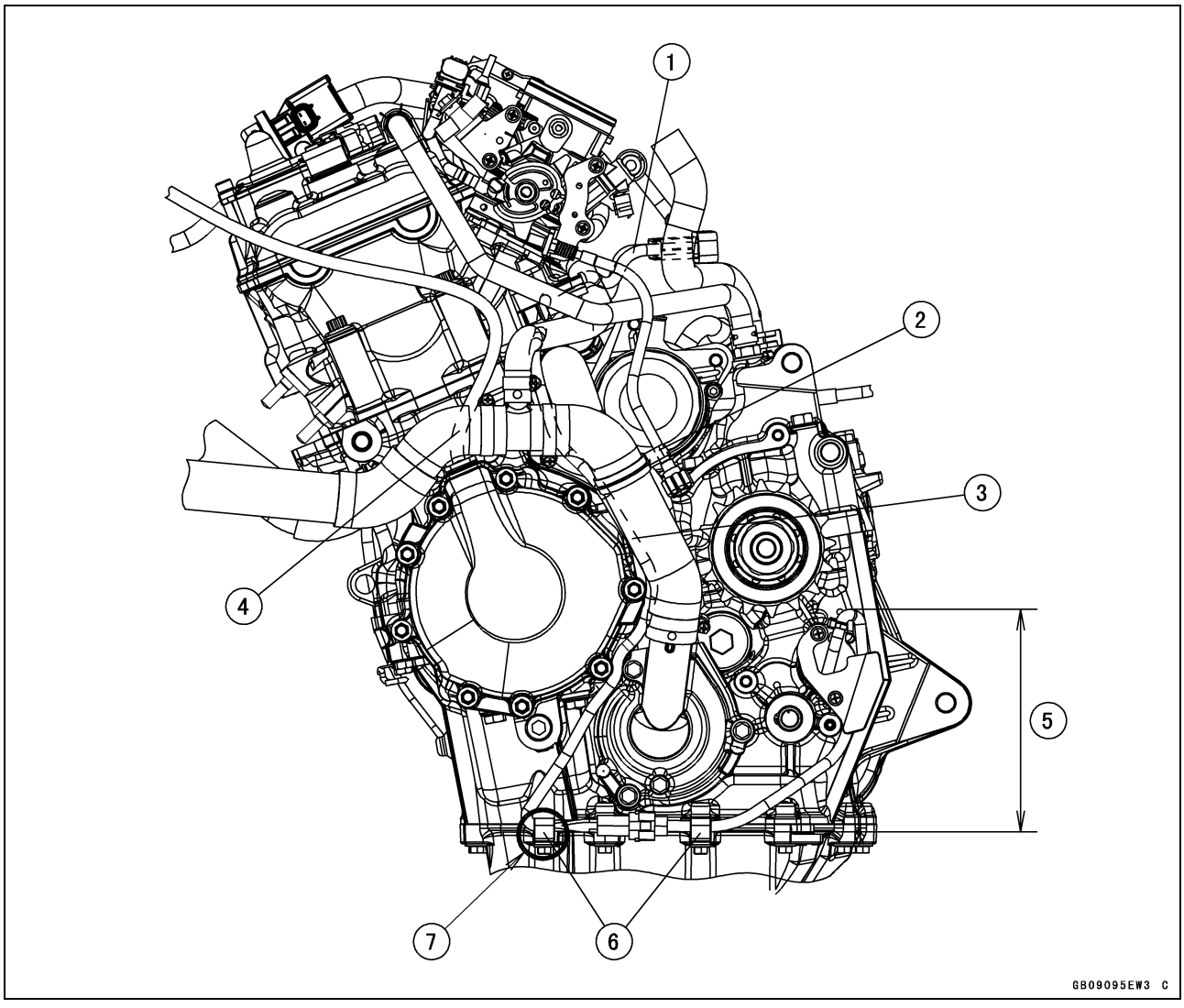
1. Clamp (Hold the fuel pump lead and exhaust butterfly valve cables so that the exhaust butterfly valve cables are lined up side by side.)
2. Hold the exhaust butterfly valve cables with the hook of the seat cover.
3. Run the rear wheel rotation sensor lead to the outside of the exhaust butterfly valve cables. Run the rear wheel rotation sensor lead to inside of the ABS brake pipes (ABS equipped models).
4. Clamps (Hold the rear wheel rotation sensor lead and brake hose so that the rear wheel rotation sensor lead is outside.)
5. Run the exhaust butterfly valve cables between the frame and ABS brake pipes (ABS equipped models), and shove the exhaust butterfly valve cables to the front.
6. Run the starter motor lead to the inside of the brake hoses and lead.
7. Run the exhaust butterfly valve cables through the clamp of the bracket.

Cable, Wire, and Hose Routing



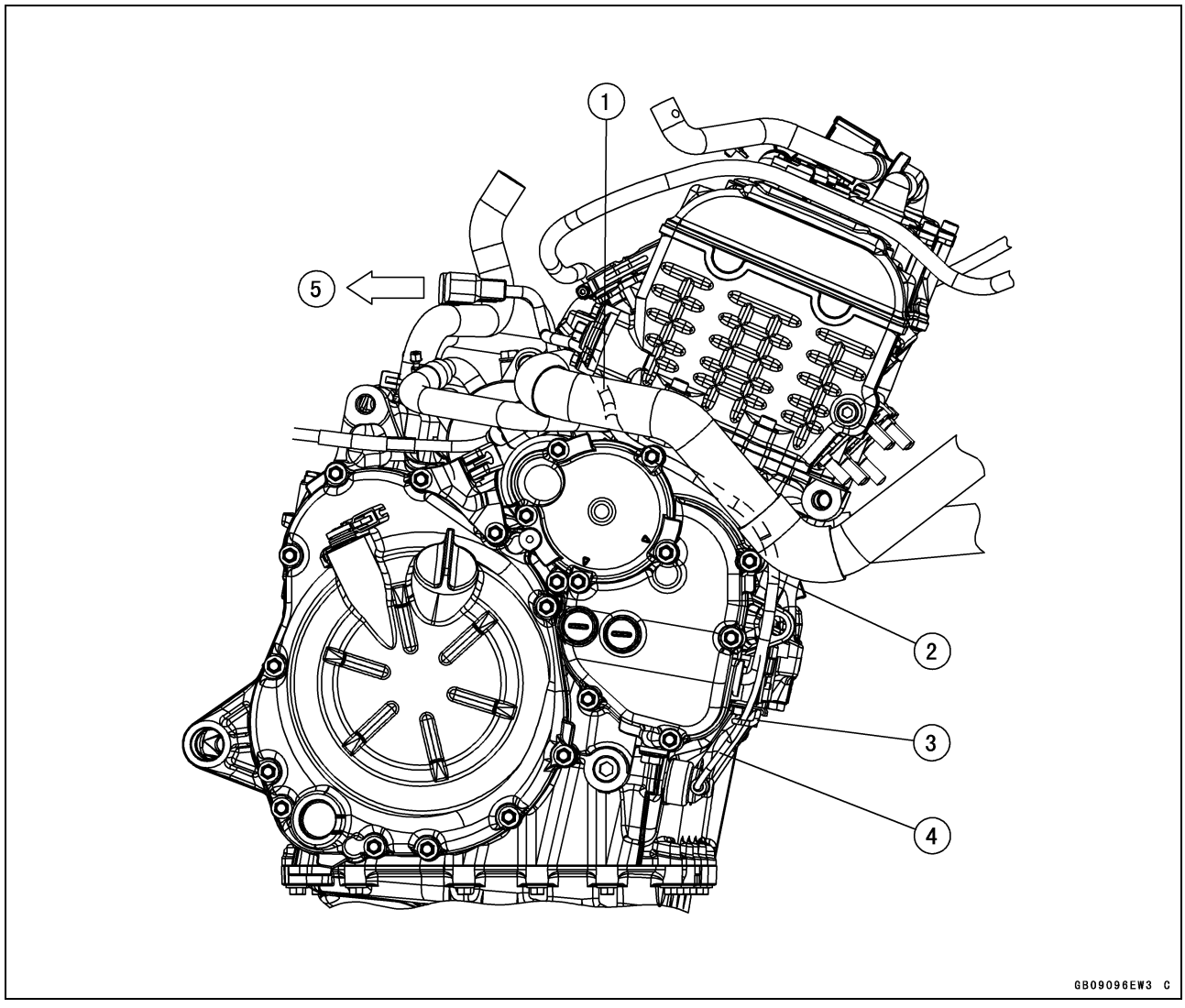
1. Run the gear position switch lead between the water temperature sensor and water hose connected to the thermostat.
2. Water hose (to Oil Cooler)
3. Gear Position Switch Lead
4. Run the gear position switch lead to the right side of the water hose connected to the oil cooler.
5. Run the gear position switch lead between the thermostat housing and water hose connected to the oil cooler.

Cable, Wire, and Hose Routing



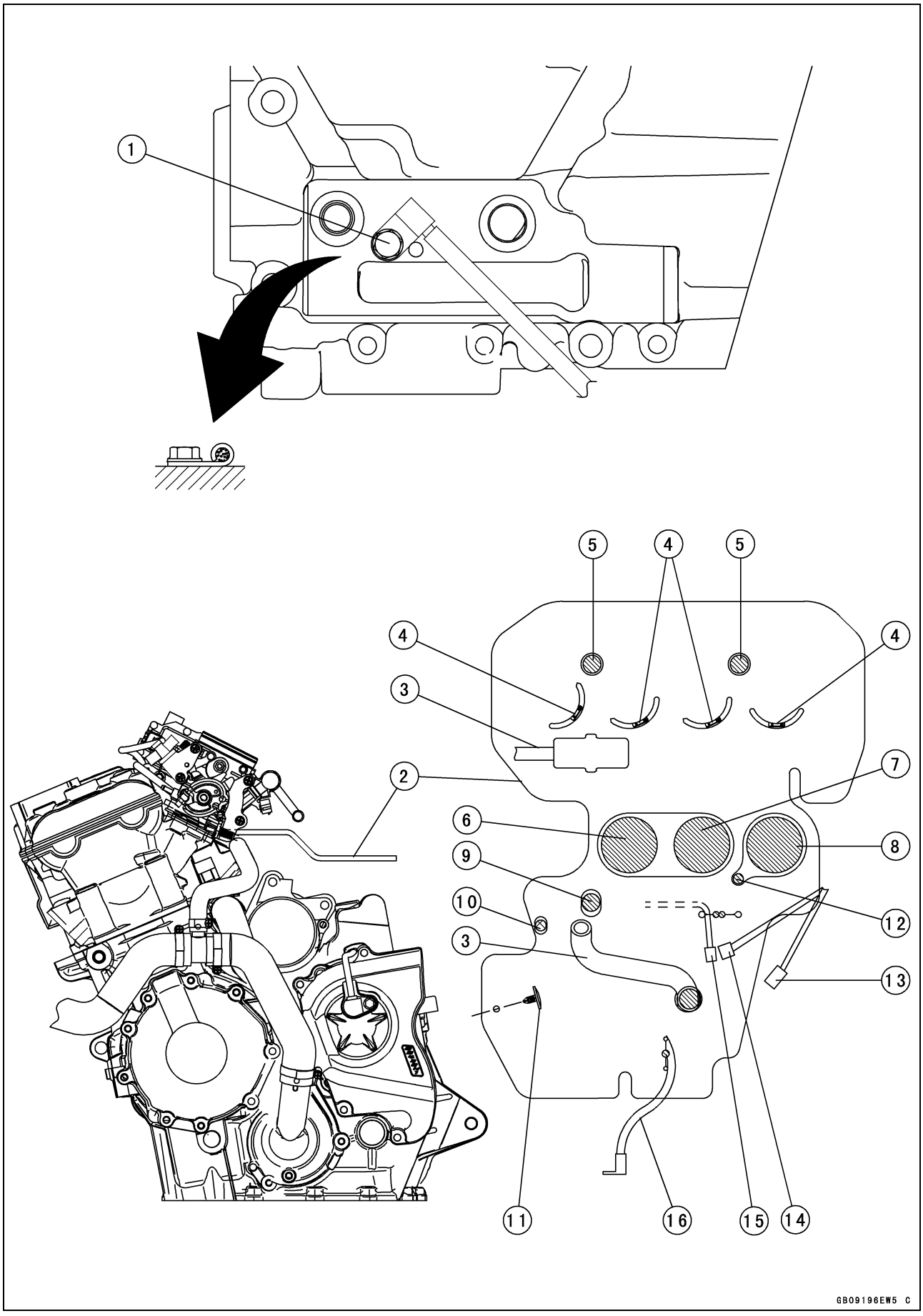
1. Gear Position Switch Lead
2. Hold the idle adjusting screw cable end and water hose with the clamp.
3. Run the gear position switch lead between the water hoses.
4. Run the alternator lead under the water hose.
5. Do not slack the gear position switch lead in this position.
6. Clamps (Hold the gear position switch lead.)
7. Hold the lead at the PVC tube portion.

Cable, Wire, and Hose Routing



1. Run the oil pressure switch lead and crankshaft sensor lead to the inside of the water hose.
2. Crankshaft Sensor Lead
3. Run the oil pressure switch lead through the clamp.
4. Oil Pressure Switch Lead
5. To Heat Insulation Rubber Plate

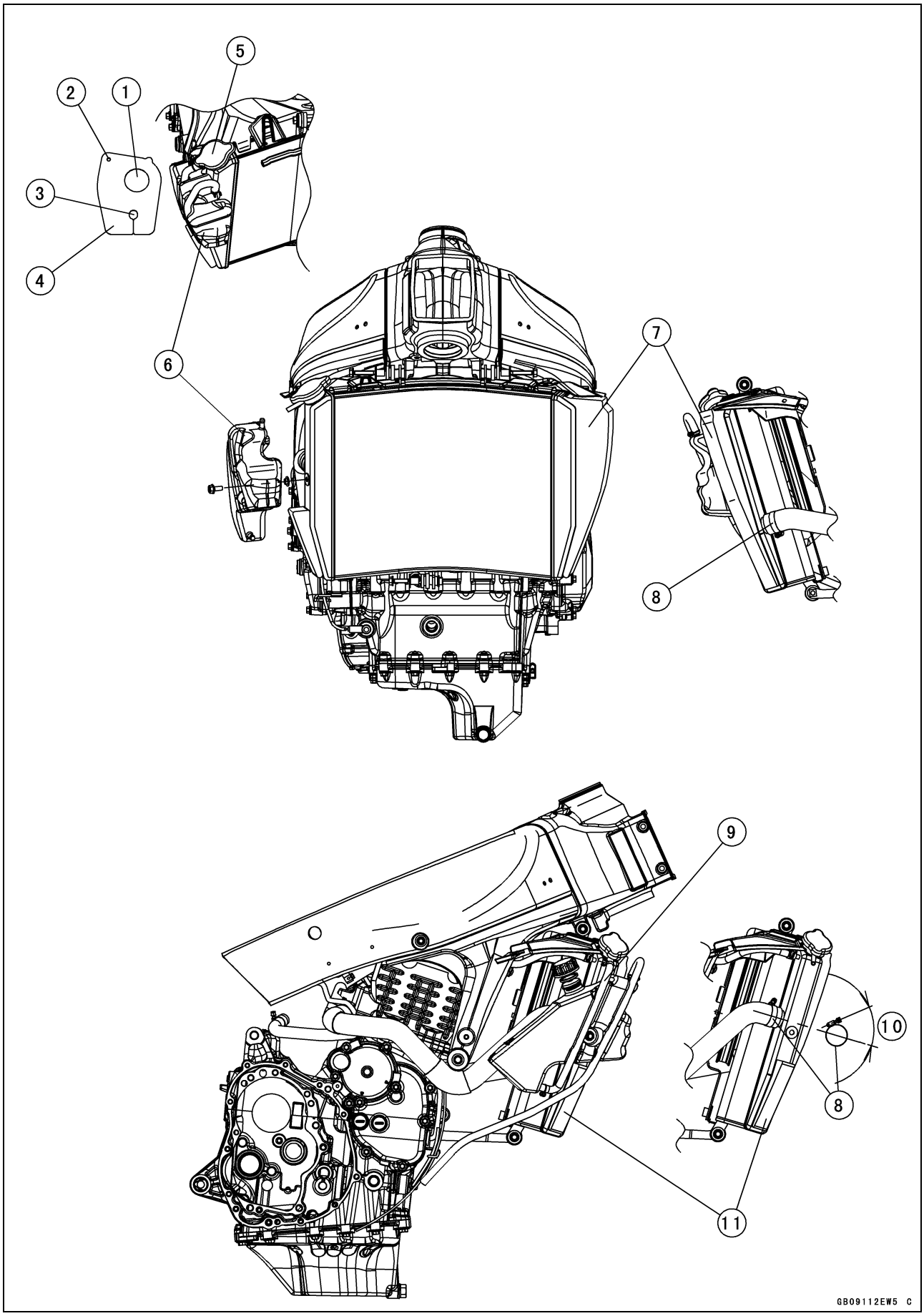
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Install the engine ground terminal so that it touches to the stoppers.
2. Heat Insulation Rubber Plate
3. Breather Hoses
4. Stick Coil Connectors
5. Air Suction Valve Cover
6. Throttle Body Assy Holder #2
7. Throttle Body Assy Holder #3
8. Throttle Body Assy Holder #4
9. Water Temperature Sensor
10. Air Cleaner Drain Hose
11. Rivet
12. Air Bleed Hose (Thermostat Housing)
13. Oxygen Sensor Lead Connector (Equipped Models)
14. Crankshaft Sensor Lead Connector (Run the crankshaft sensor lead to the upside of the heat insulation rubber plate.)
15. Gear Position Switch Lead Connector
16. Battery Negative (–) Cable

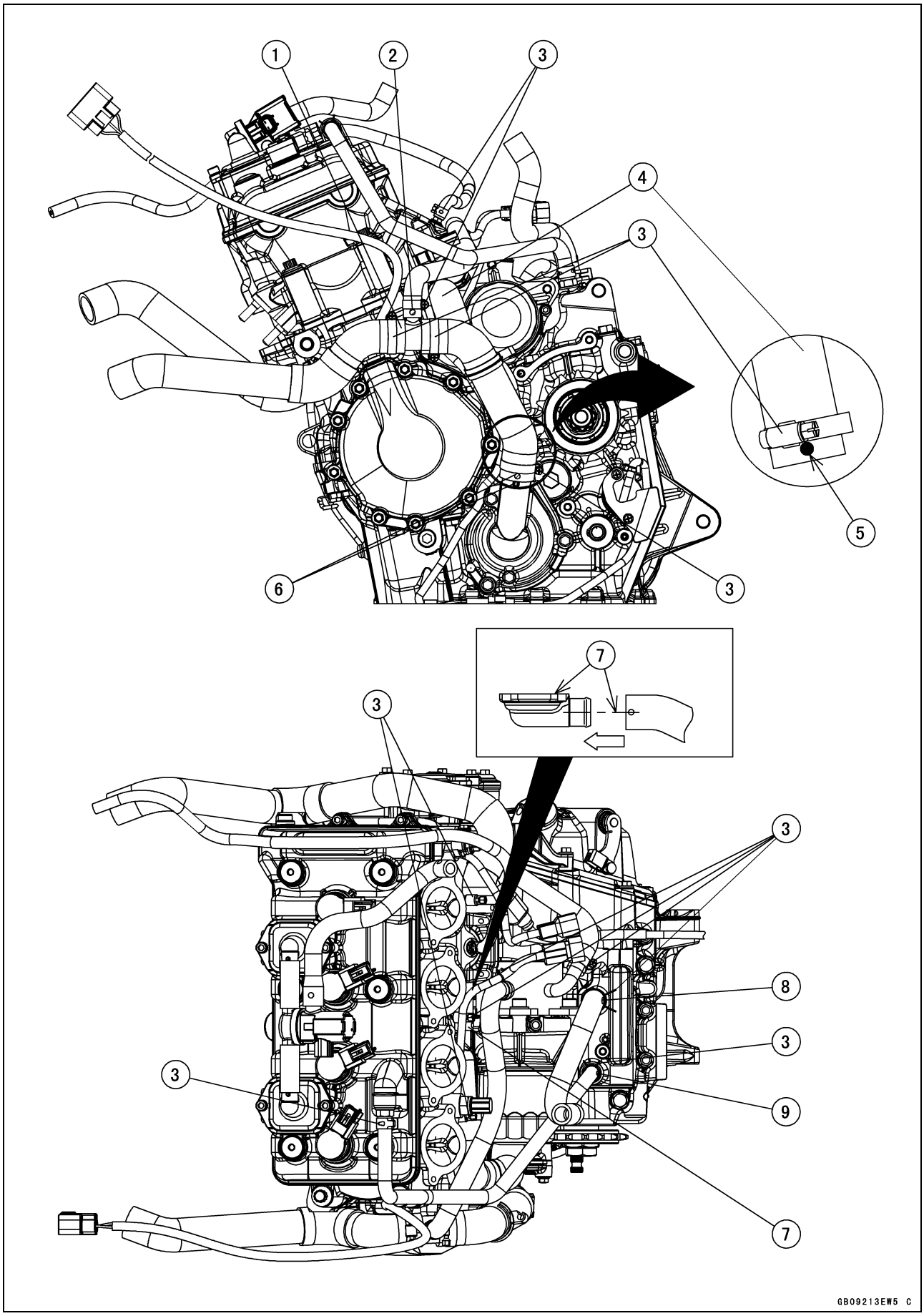
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Install the rubber cover onto the radiator cap.
2. Install the hole of the rubber cover on the projection of the heat insulation rubber plate.
3. Run the reserve tank overflow hose into the cover.
4. Rubber Cover
5. Radiator Cap
6. Coolant Reserve Tank
7. Pad (Left Side)
8. Clamps
9. Install the reserve tank overflow hose so that the 60° bending side of the hose is upside (radiator cap side).
10. 40° or more
11. Pad (Right Side)

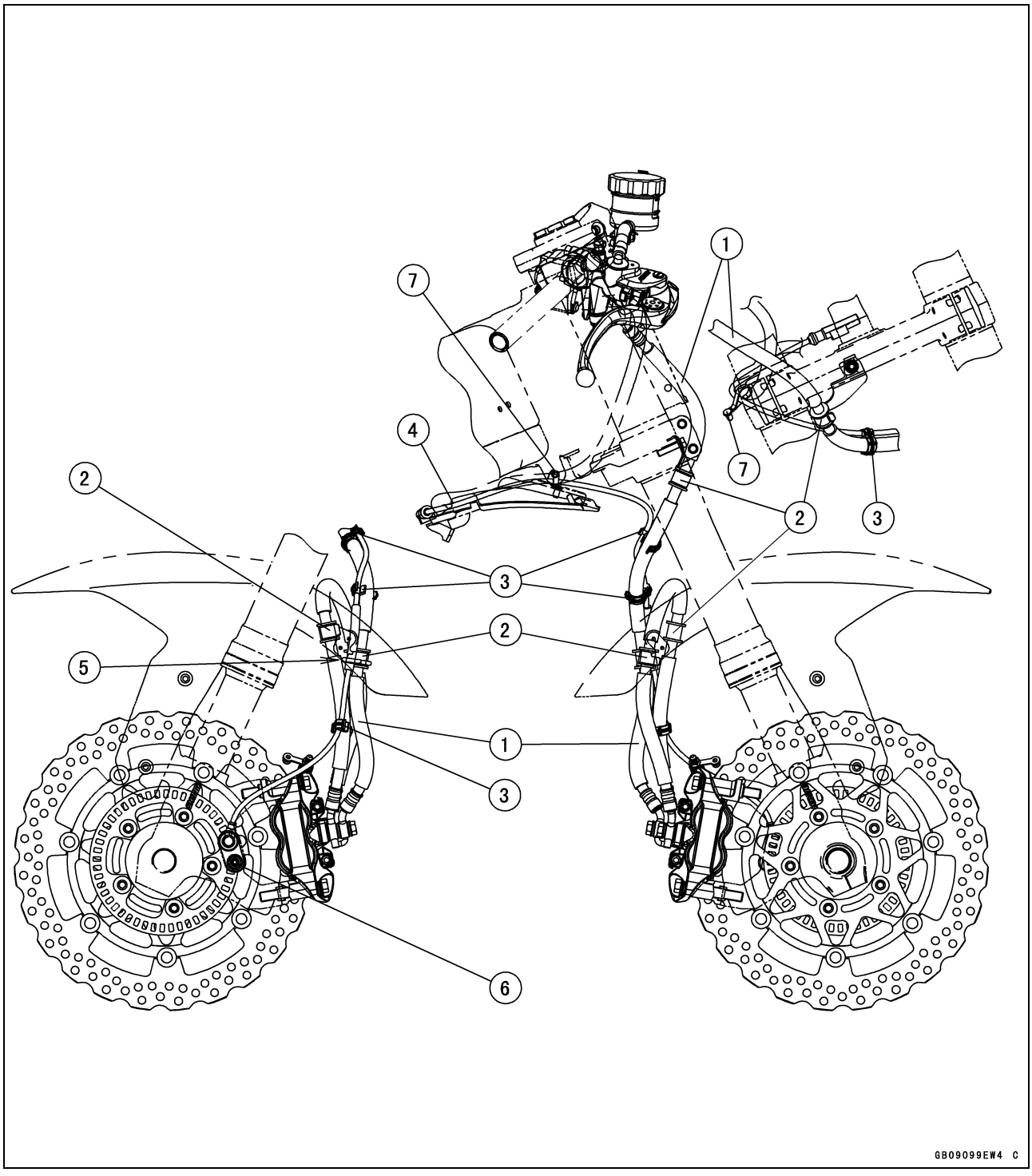
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

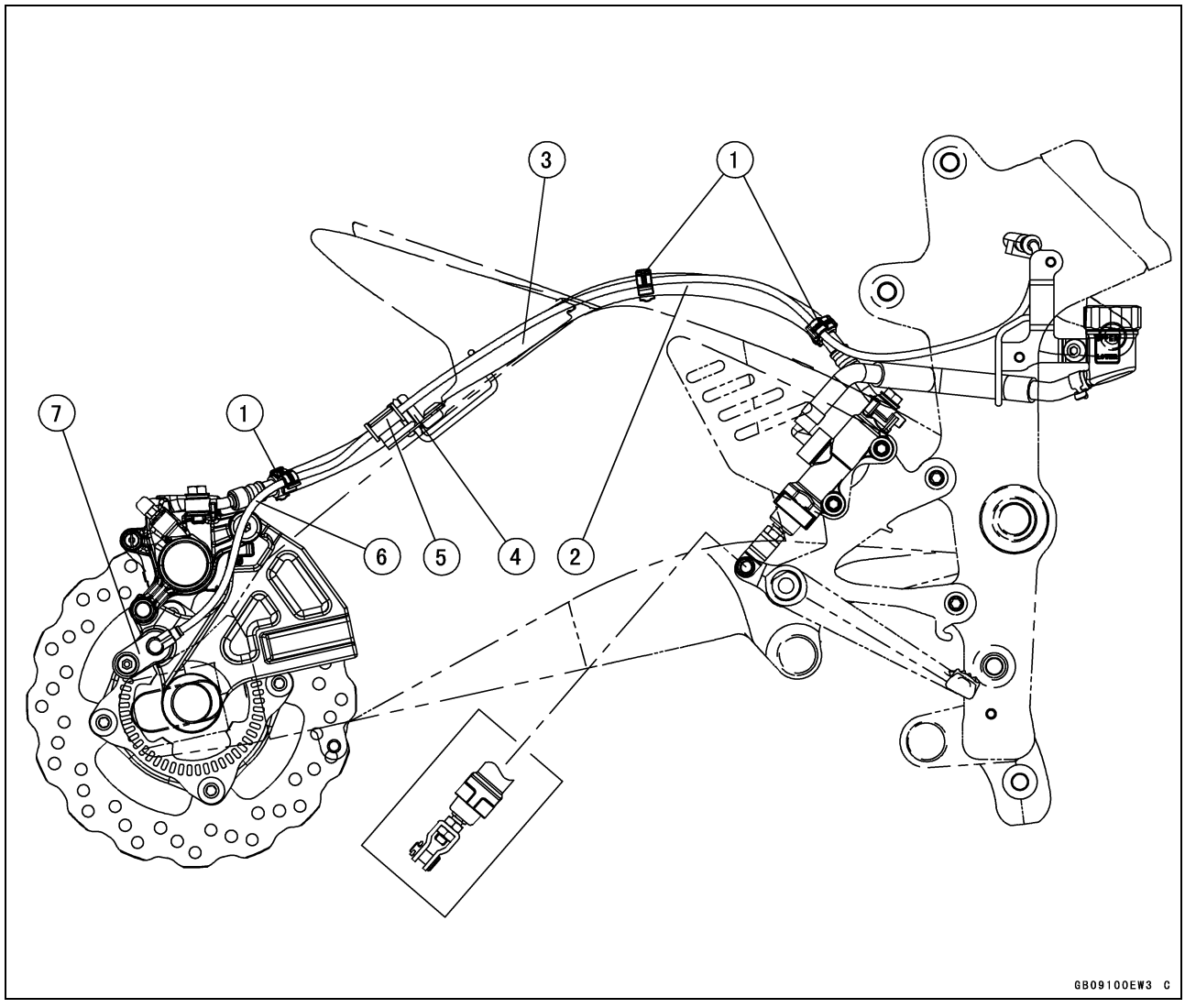
1. Install the water hose so that the yellow paint mark faces upside.
2. Install the water hose so that the white paint mark faces left side.
3. Install the clamp as shown.
4. Water Hose
5. Install the water hose so that the white paint mark faces left side.
6. Align the white paint mark of the water hose with the projection on the water pump cover.
7. Align the center line of the white paint mark on the water hose parallel to the fitting matching surface.
8. Install the breather hose so that the white paint mark faces backward.
9. Install the breather hose so that the white paint mark faces backward.

Cable, Wire, and Hose Routing



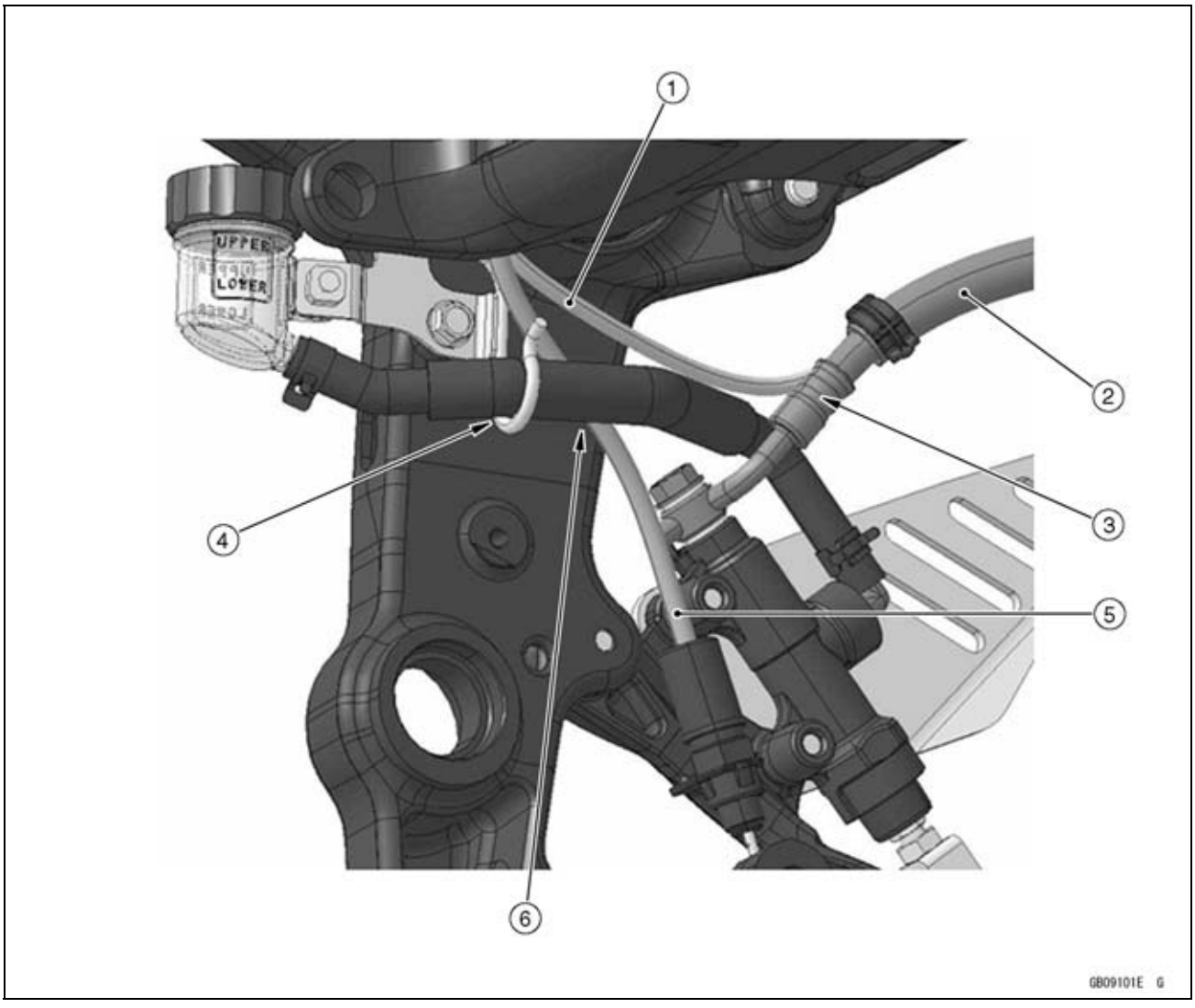
1. Front Brake Hoses
2. Clamps (Hold the front brake hose.)
3. Clamps (Hold the front brake hose and front wheel rotation sensor lead.)
4. Front Wheel Rotation Sensor Lead
5. Run the front wheel rotation sensor lead through the clamp.
6. Front Wheel Rotation Sensor
7. Clamp (Hold the front wheel rotation sensor.)

Cable, Wire, and Hose Routing



1. Clamps (Hold the rear brake hose and rear wheel rotation sensor lead.)
2. Rear Brake Hose
3. Run the rear brake hose to the inside of the mud guard.
4. Clamp (Hold the rear brake hose.)
5. Clamp (Hold the rear wheel rotation sensor lead.)
6. Rear Wheel Rotation Sensor Lead
7. Rear Wheel Rotation Sensor

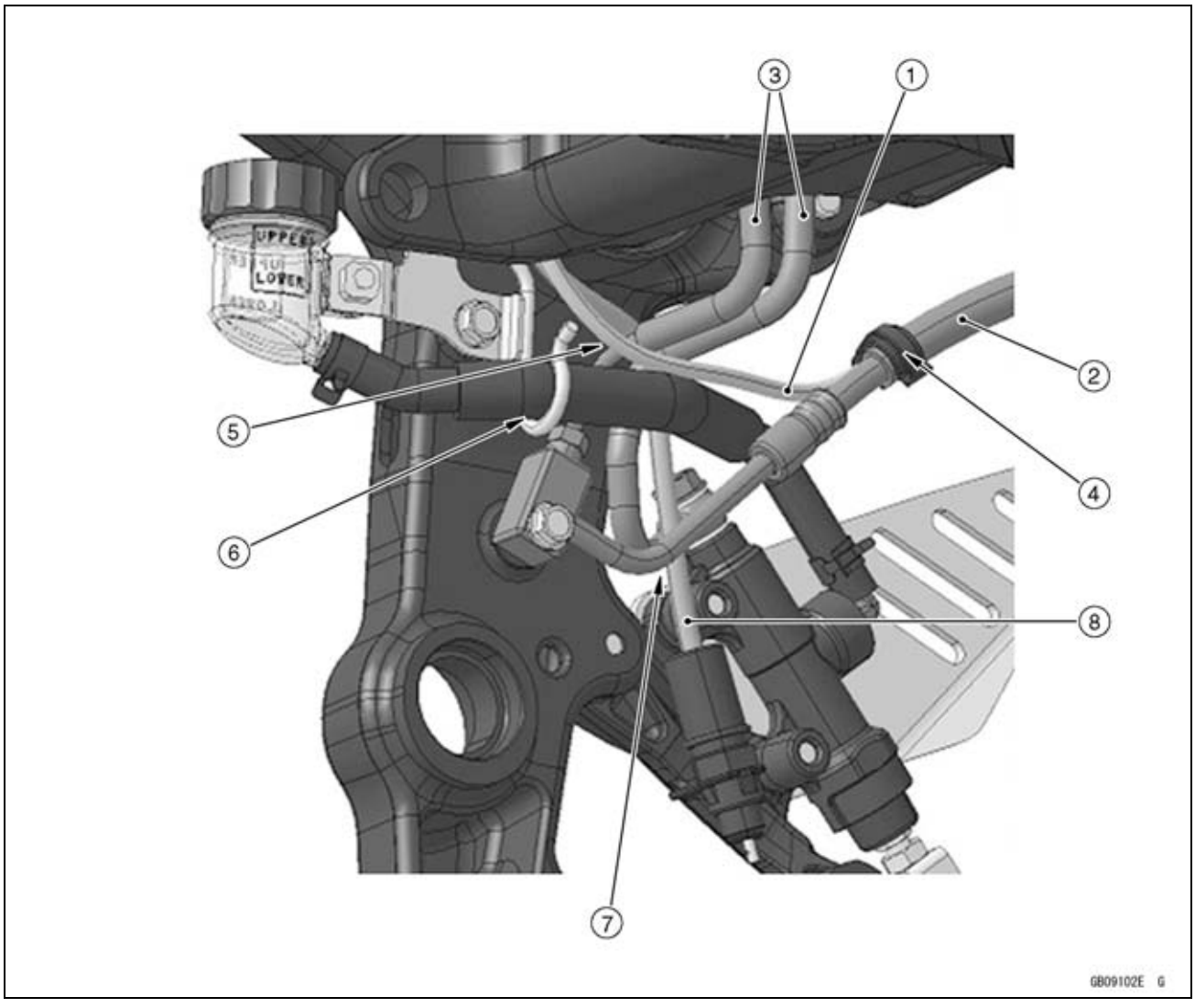
Cable, Wire, and Hose Routing



1. Rear Wheel Rotation Sensor Lead
2. Rear Brake Hose
3. Run the rear wheel rotation sensor lead to the outside of the rear brake hose.
4. Run the rear brake hose through the clamp of the bracket.
5. Rear Brake Switch Lead
6. Run the rear brake switch lead between the brake hose and frame.

Cable, Wire, and Hose Routing

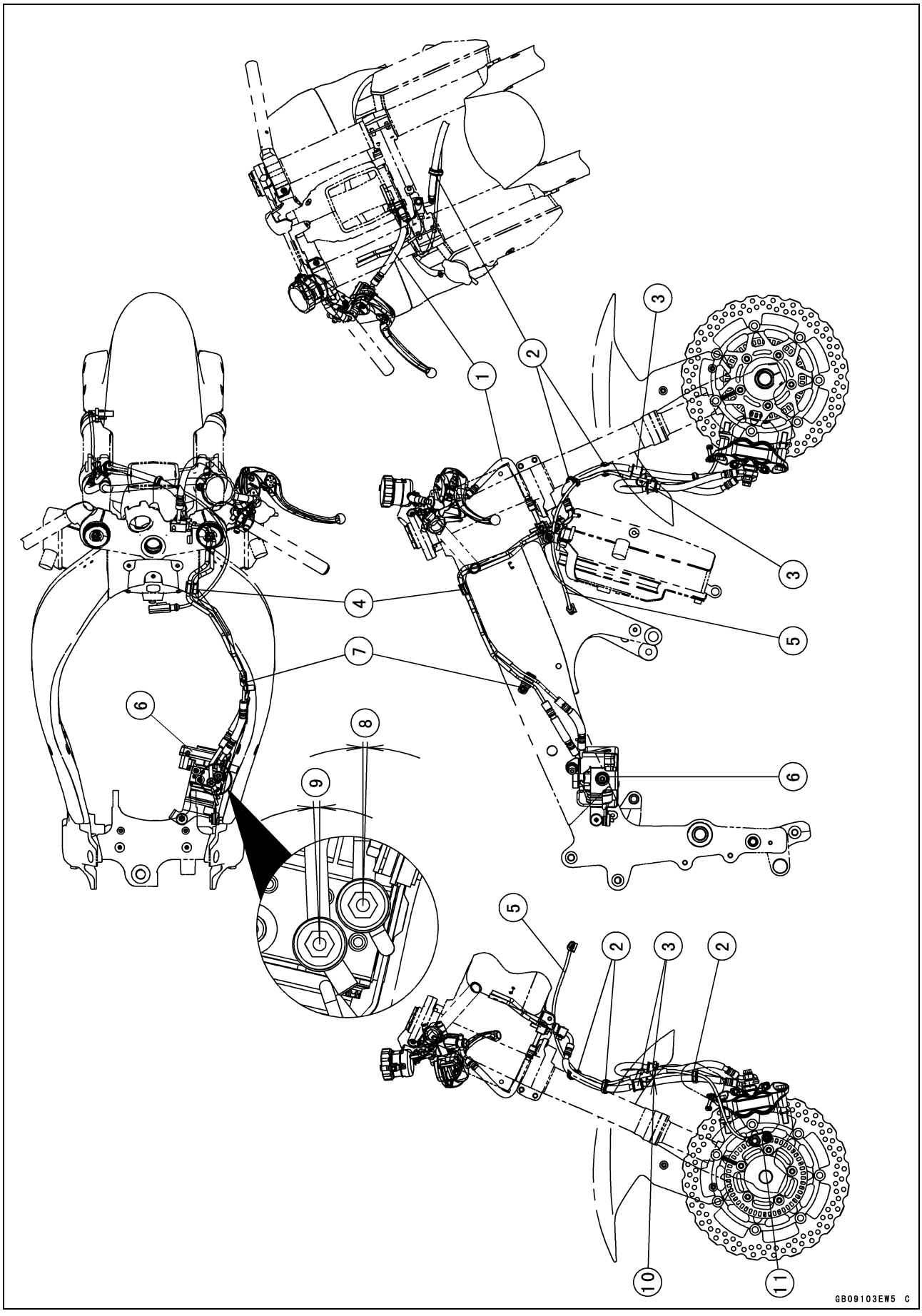
ABS Equipped Models



1. Rear Wheel Rotation Sensor Lead
2. Rear Brake Hose
3. Run the ABS brake pipes to the side of the frame.
4. Run the rear wheel rotation sensor lead to the outside of the rear brake hose.
5. Run the rear wheel rotation sensor lead, ABS brake pipes and rear brake switch lead in order from the inside.
6. Run the rear brake hose through the clamp of the bracket.
7. Run the rear brake switch lead between the brake pipes.
8. Rear Brake Switch Lead

Cable, Wire, and Hose Routing

ABS Equipped Models

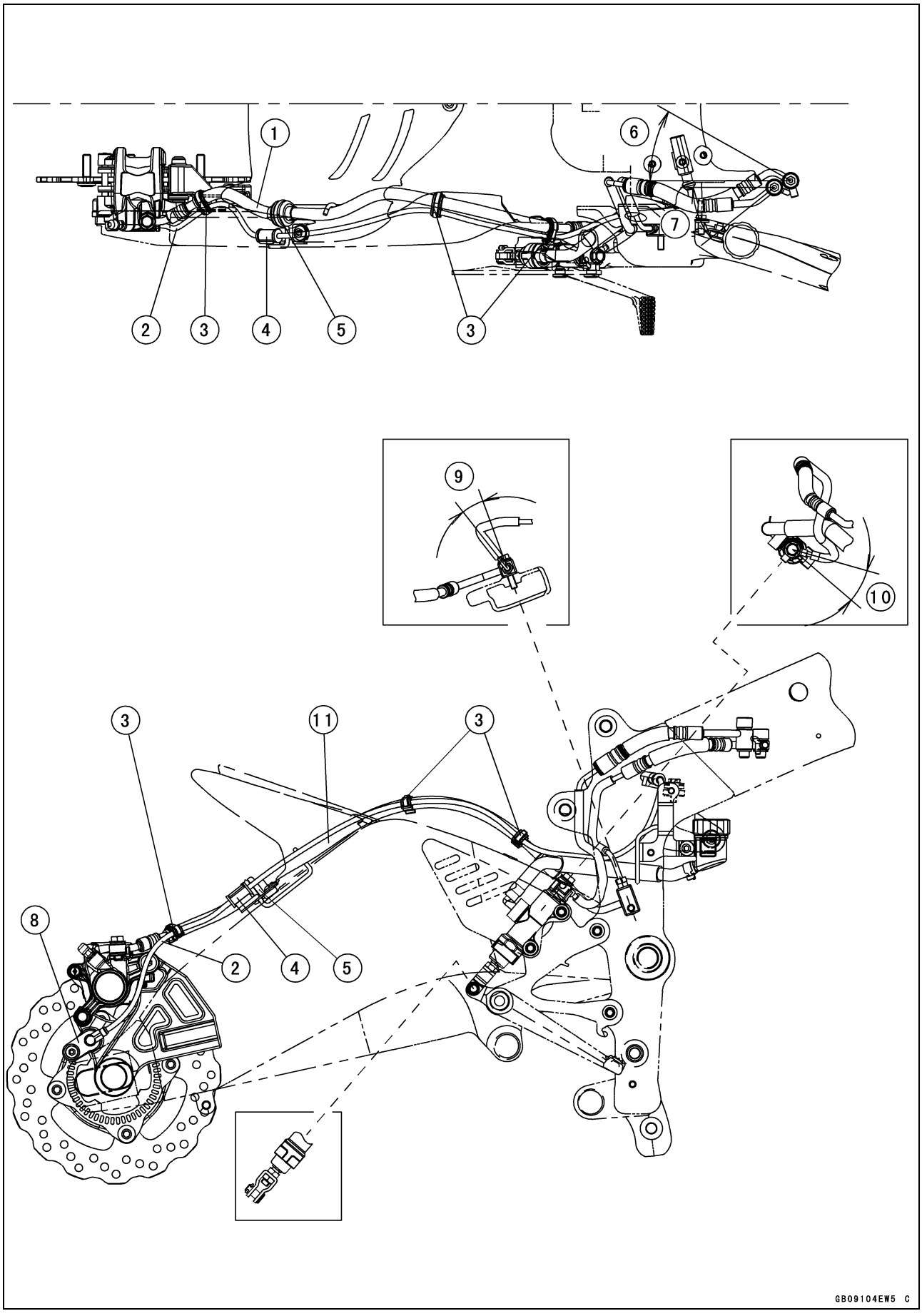


Cable, Wire, and Hose Routing

1. Front Brake Hose
2. Clamps (Hold the front brake hose and front wheel rotation sensor lead.)
3. Clamps (Hold the front brake hose.)
4. Damper (Hold the ABS brake pipes.)
5. Front Wheel Rotation Sensor Lead
6. ABS Hydraulic Unit
7. Clamp (Hold the ABS brake pipes.)
8. About 1.5°
9. About 2.5°
10. Run the front wheel rotation sensor through the clamp.
11. Front Wheel Rotation Sensor

Cable, Wire, and Hose Routing

ABS Equipped Models

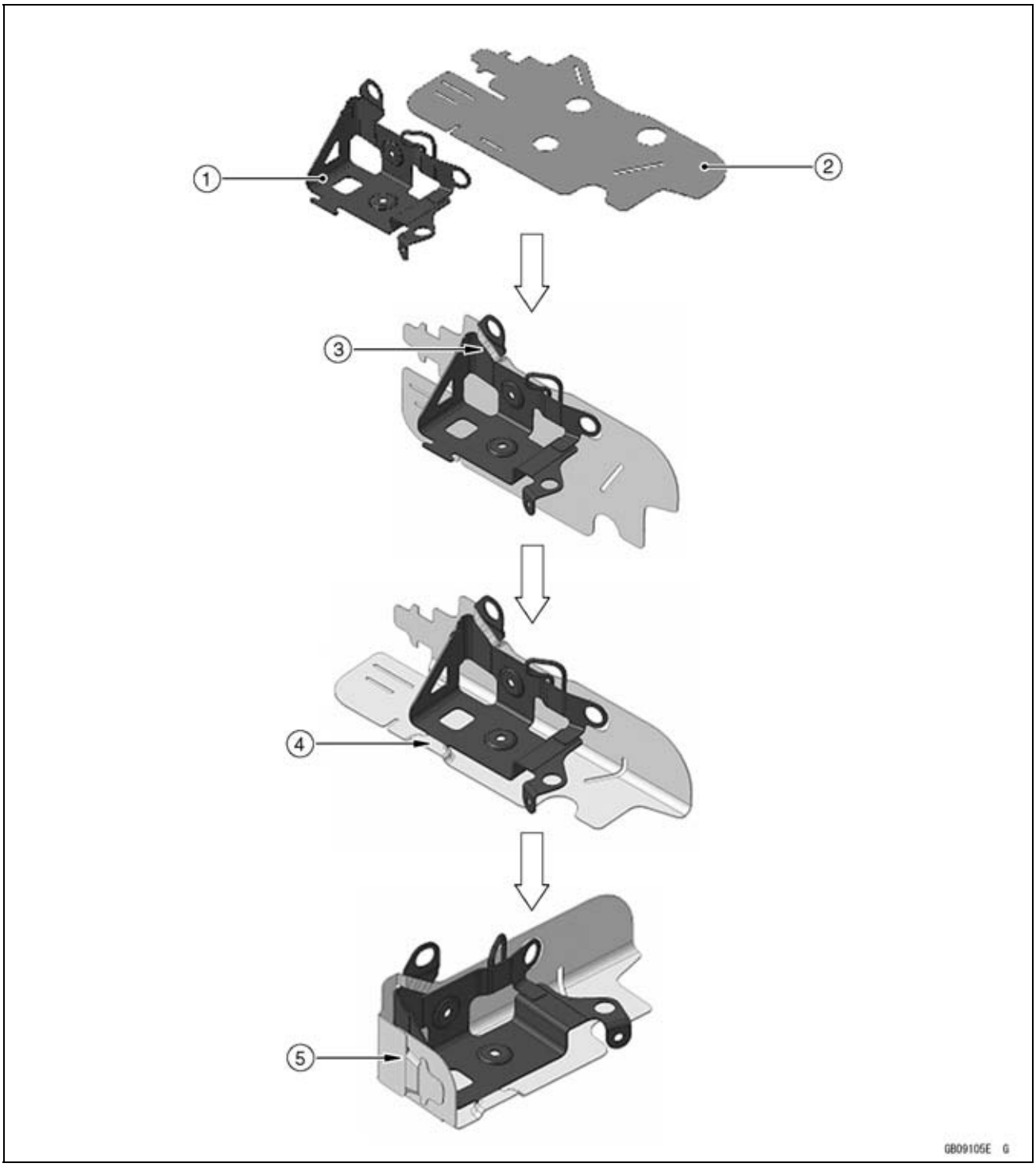


Cable, Wire, and Hose Routing

1. Rear Brake Hose
2. Rear Wheel Rotation Sensor Lead
3. Clamps (Hold the rear brake hose and rear wheel rotation sensor lead.)
4. Clamp (Hold the rear wheel rotation sensor lead.)
5. Clamp (Hold the rear brake hose.)
6. About 30°
7. About 38.5°
8. Rear Wheel Rotation Sensor
9. About 18.1°
10. About 25°
11. Run the rear brake hose to the inside of the mud guard.

Cable, Wire, and Hose Routing

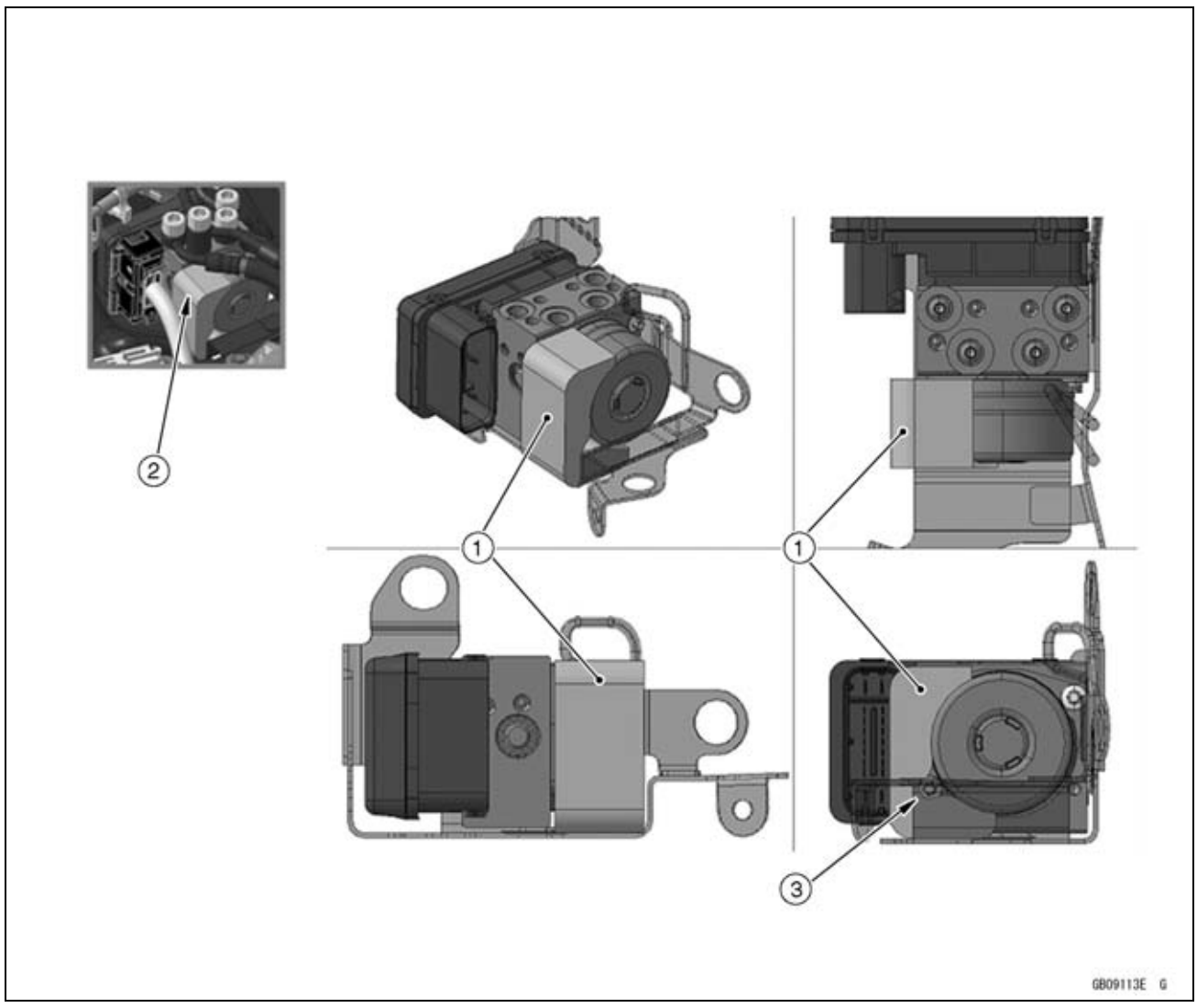
ABS Equipped Models



1. ABS Hydraulic Unit Bracket
2. ABS Hydraulic Unit Rubber Cover
3. Insert the upper portion of the bracket into the slit of the rubber cover
4. Insert the hooks of the bracket into the slits of the rubber cover.
5. Insert the Tab of the rubber cover into the slits of the rubber cover.

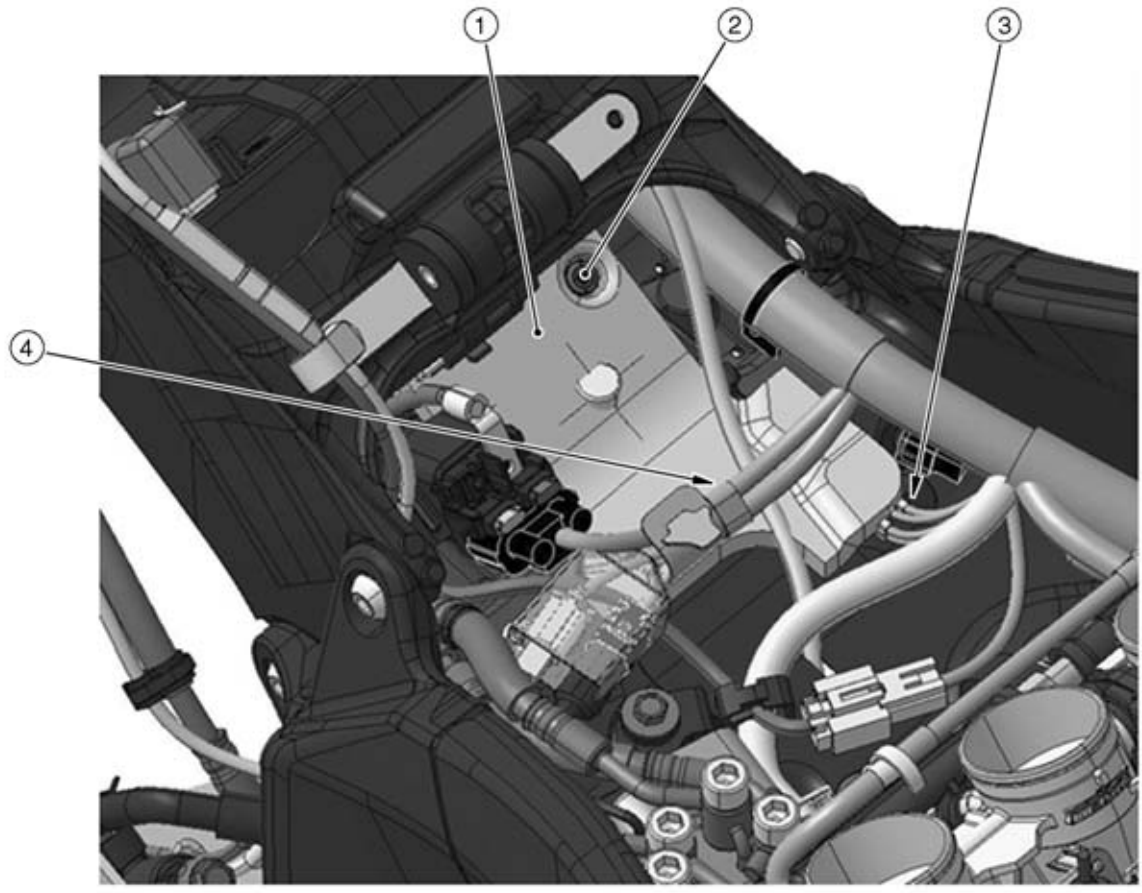
Cable, Wire, and Hose Routing

ABS Equipped Models



1. Pad
2. Install the pad to the lower side of the ABS brake pipes.
3. Align the dent of the pad with the bolt of the hydraulic unit.

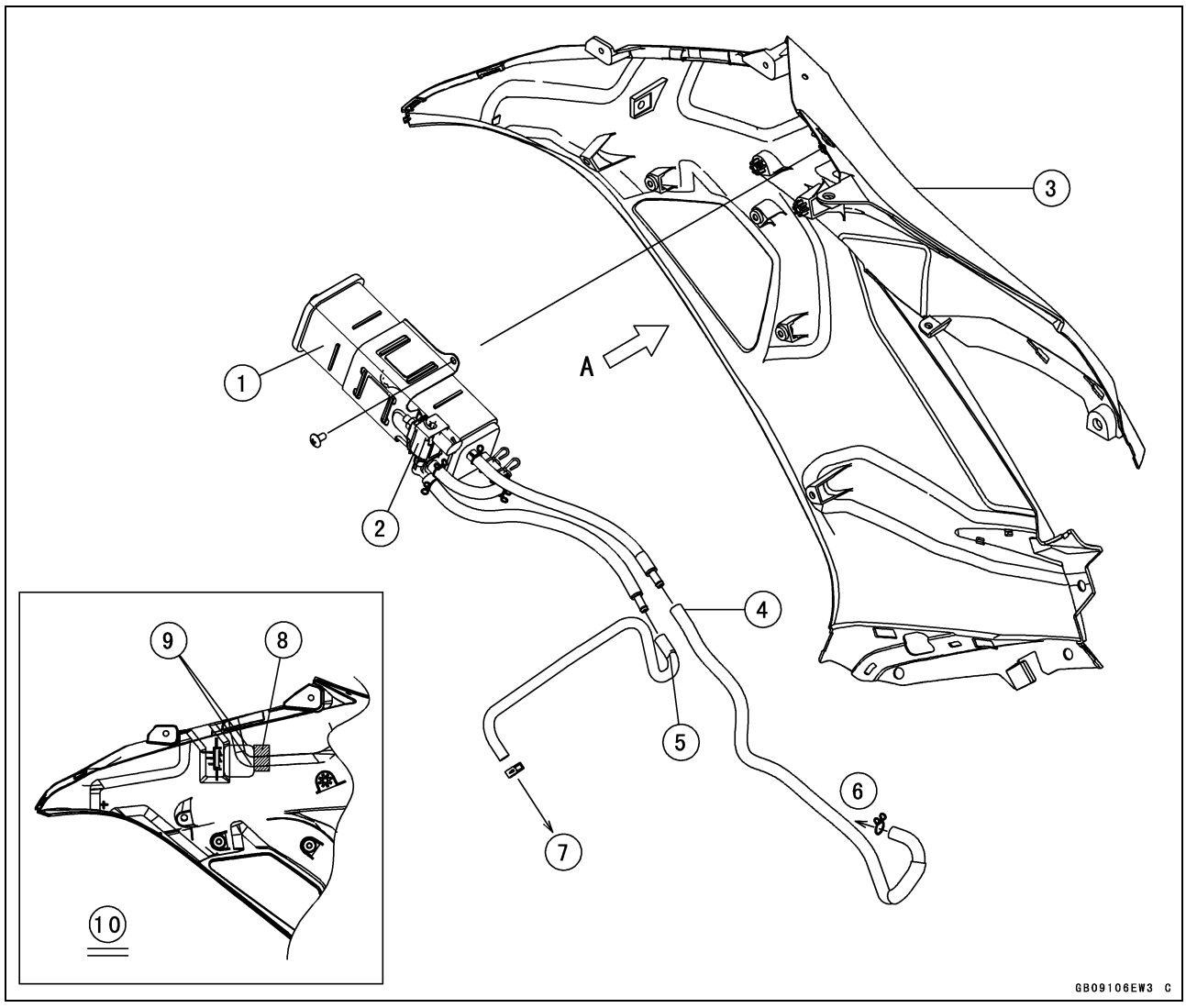
Cable, Wire, and Hose Routing



1. Pad
2. Quick Rivet
3. Install the pad to the upside of the frame ground.
4. Run the harnesses to the upside of the pad.

Cable, Wire, and Hose Routing

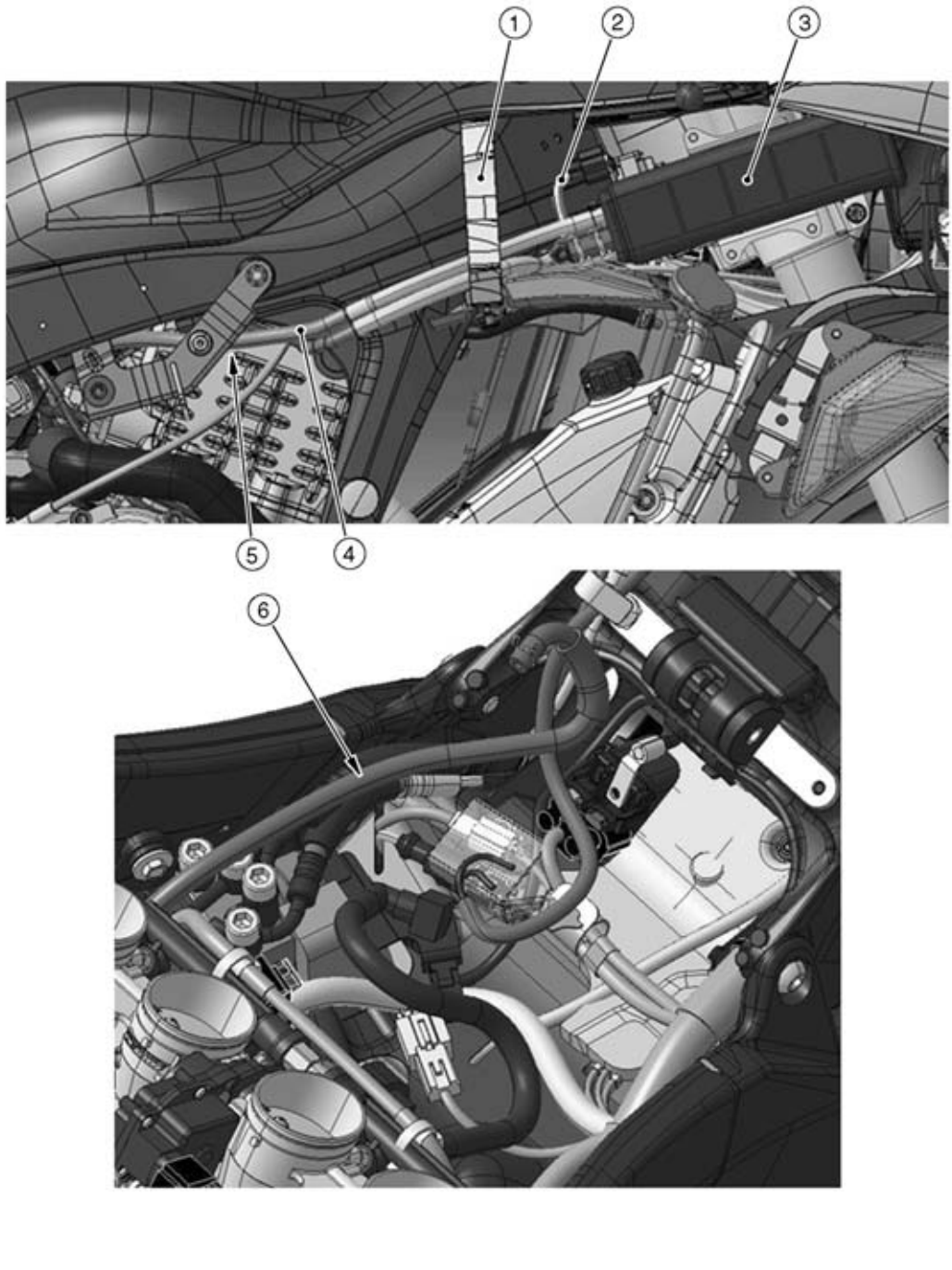
CAL Model



1. Canister
2. Purge Valve
3. Right Middle Fairing
4. Blue Paint (Breather Hose)
5. Green Paint (Purge Hose)
6. To Fuel Tank
7. To Throttle Body Assy
8. Pad
9. Align the pad with line of the middle fairing.
10. View from A

Cable, Wire, and Hose Routing

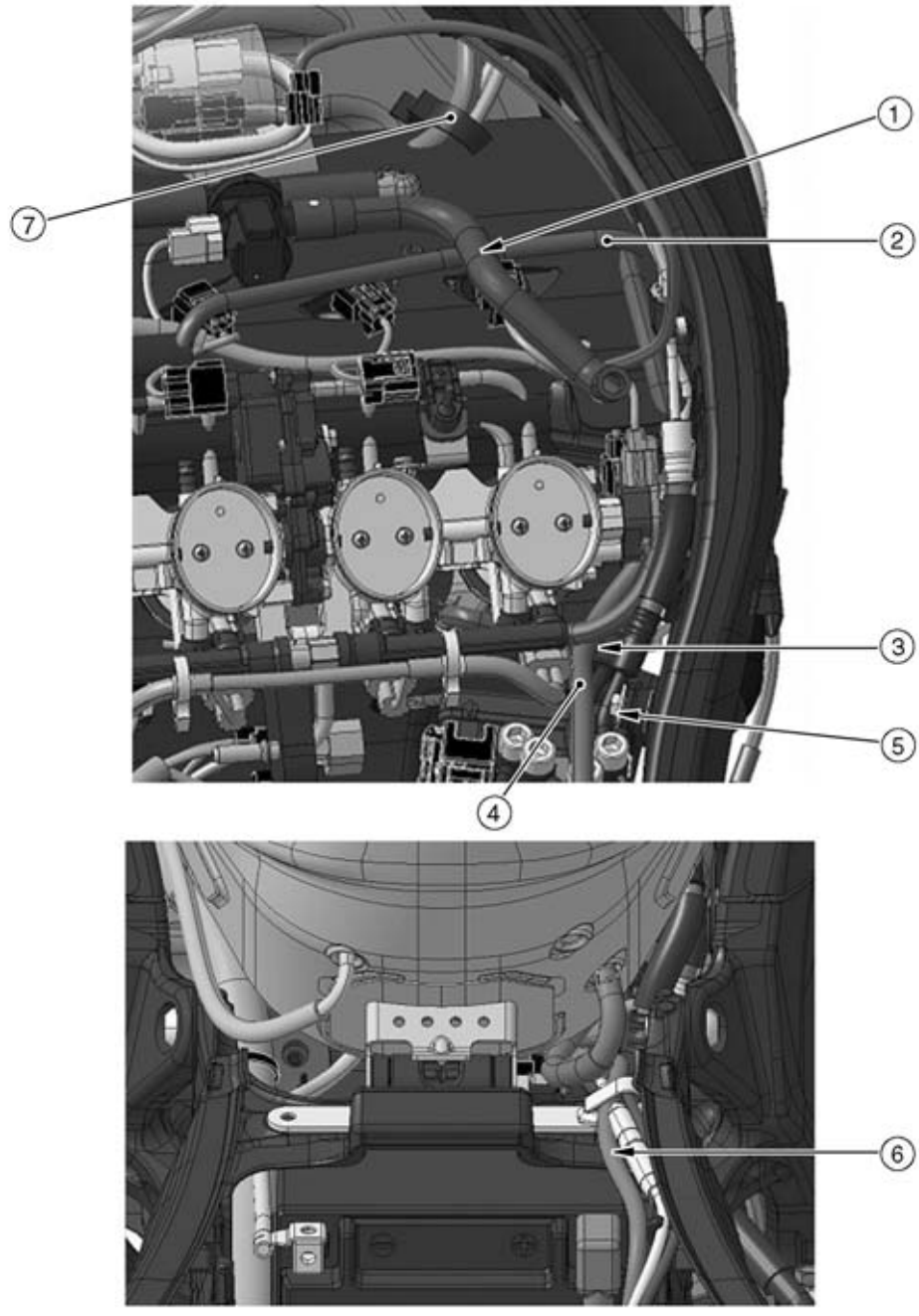
CAL Model



1. Pad
2. Purge Valve Lead
3. Canister
4. Breather Hose (Blue Paint)
5. Run the breather hose to the inside of the bracket.
6. Run the breather hose to upside of the brake hoses and leads.

Cable, Wire, and Hose Routing

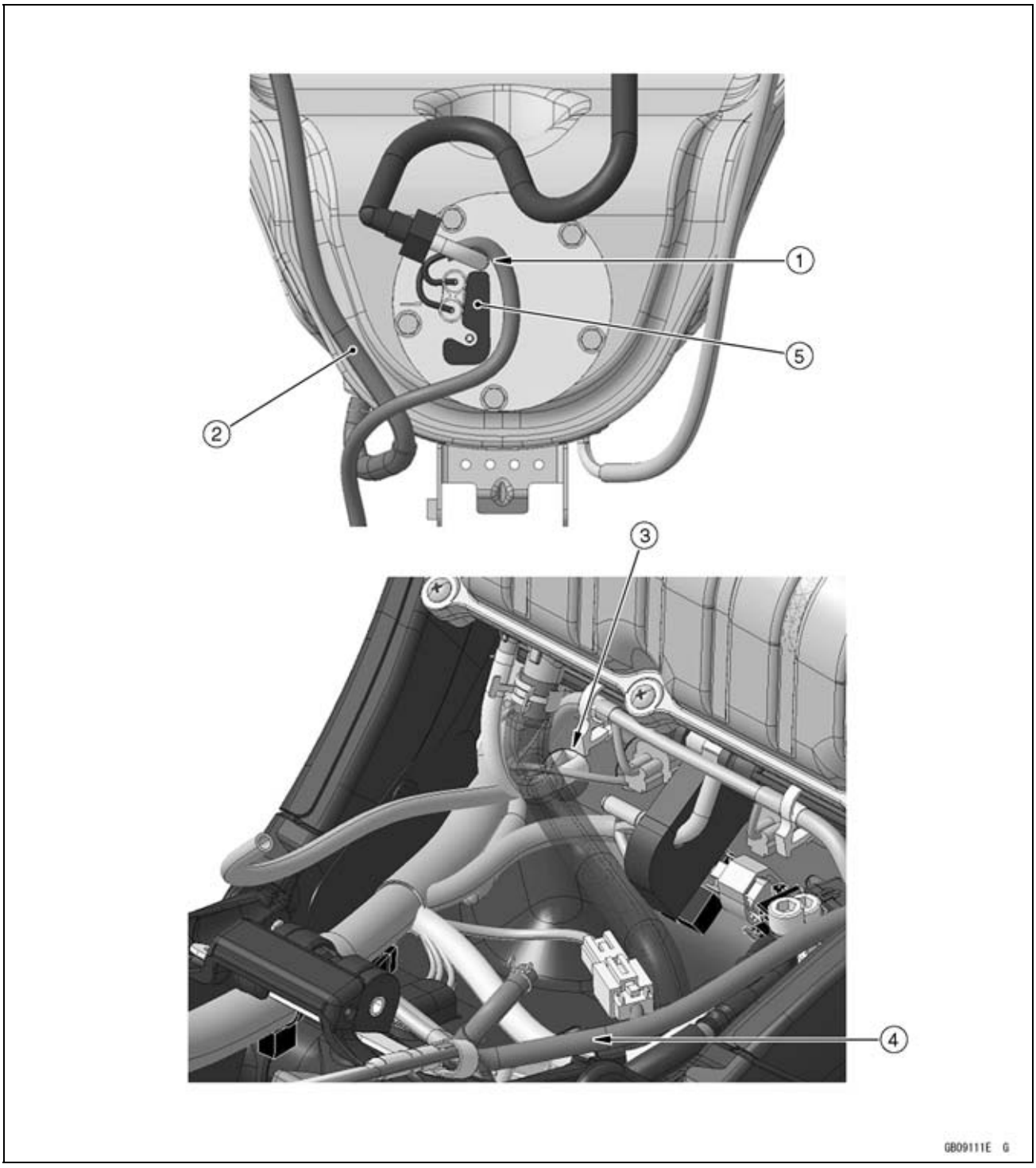
CAL Model



1. Run the purge hose under the air switching valve hose and clutch cable. Run the purge hose to the upside of the stick coil leads.
2. Purge Hose (Green Paint)
3. Run the breather hose under the water hose.
4. Breather Hose (Blue Paint)
5. Run the breather hose to the upside of the brake hoses and leads.
6. Run the fuel pump lead under the breather hose (blue paint).
7. Clamp (Hold the right switch housing lead, radiator fan lead, front wheel rotation sensor lead and purge valve lead.)

Cable, Wire, and Hose Routing

CAL Model



1. Run the fuel pump lead to the front of the fuel pump pipe. Run the fuel pump lead between the fuel tank and fuel hose.
2. Breather Hose (Blue Paint)
3. Run the air cleaner drain hose and fuel tank drain hose into the hole of the heat insulation rubber plate. Run the air cleaner drain hose and fuel tank drain hose under the water temperature sensor lead and fuel injector lead.
4. Run the breather hose to upside of the brake hoses and lead.
5. Pad

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:
- Ignition and engine stop switch not ON
- Starter lockout switch or gear position switch trouble
- Starter motor trouble
- Battery voltage low
- Starter relay not contacting or operating
- Starter button not contacting
- Starter system wiring shorted or open
- Ignition switch trouble
- Engine stop switch trouble
- Main 30 A or ignition fuse blown

Starter motor rotating but engine doesn't turn over:
- Vehicle-down sensor (DFI) coming off
- Immobilizer system trouble (Equipped Models)
- Starter clutch trouble
- Starter idle gear trouble

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

No spark; spark weak:
- Vehicle-down sensor (DFI) coming off
- Ignition switch not ON
- Engine stop switch turned to stop position
- Clutch lever not pulled in or gear not in neutral
- Battery voltage low
- Immobilizer system trouble (Equipped Models)
- Spark plug dirty, broken, or gap maladjusted
- Spark plug incorrect
- Stick coil shorted or not in good contact
- Stick coil trouble
- ECU trouble
- Gear position, starter lockout, or sidestand switch trouble
- Crankshaft sensor trouble
- Ignition switch or engine stop switch shorted
- Starter system wiring shorted or open
- Main 30 A or ignition fuse blown

Fuel/air mixture incorrect:
- Bypass screw maladjusted
- Air passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Leak from oil filler cap, crankcase breather hose or air cleaner drain hose.

Compression Low:
- Spark plug loose
- Cylinder head not sufficiently tightened down
- 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
- No valve clearance
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

Poor Running at Low Speed:

Spark weak:
- Battery voltage low
- Immobilizer system trouble (Equipped Models)
- Stick coil trouble
- Stick coil shorted or not in good contact
- Spark plug dirty, broken, or maladjusted
- Spark plug incorrect
- ECU trouble
- Crankshaft sensor 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
- Fuel to injector insufficient
- Fuel line clogged
- Throttle body assy holder loose

Air cleaner housing holder 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 gasket damaged
Cylinder head warped
Valve spring broken or weak
Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)
Camshaft cam worn
Run-on (dieseling):
Ignition switch trouble
Engine stop switch trouble
Fuel injector trouble
Loosen terminal of battery (–) cable or ECU ground lead
Carbon accumulating on valve seating surface
Engine overheating
Other:
ECU trouble
Throttle body assy not synchronizing
Engine oil viscosity too high
Drive train trouble
Brake dragging
Clutch slipping
Engine overheating
Air suction valve trouble
Air switching valve trouble

Poor Running or No Power at High Speed:

Firing incorrect:
Spark plug dirty, broken, or maladjusted
Spark plug incorrect
Stick coil shorted or not in good contact
Stick coil trouble
ECU trouble
Fuel/air mixture incorrect:
Air cleaner clogged, poorly sealed, or missing
Throttle body assy holder loose
Air cleaner housing holder loose
Water or foreign matter in fuel
Fuel to fuel injector insufficient
Fuel tank air vent obstructed
Fuel line clogged
Fuel pump trouble
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
ECU 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
Camshaft cam worn
Air suction valve trouble
Air switching valve trouble
Catalytic converter melt down due to muffler overheating (KLEEN)

Overheating:

Firing incorrect:
Spark plug dirty, broken, or maladjusted
Spark plug incorrect
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)
ECU trouble
Fuel/air mixture incorrect:
Throttle body assy holder loose
Air cleaner housing holder loose
Air cleaner poorly sealed, or missing

Troubleshooting Guide

Air cleaner clogged
Compression high:
Carbon built up in combustion chamber
Engine load faulty:
Brake dragging
Clutch slipping
Engine oil level too high
Engine oil viscosity too high
Drive train trouble
Lubrication inadequate:
Engine oil level too low
Engine oil poor quality or incorrect
Oil cooler incorrect:
Oil cooler clogged
Water temperature meter incorrect:
Water temperature meter 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 relay trouble
Fan motor broken
Fan blade damaged
Water pump not turning
Water pump impeller damaged

Over Cooling:

Water temperature meter incorrect:
Water temperature meter broken
Water temperature sensor broken
Cooling system component incorrect:
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
Sub 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 ratchet assembly spring broken
Shift ratchet assembly 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 ratchet assembly spring weak or broken

Abnormal Engine Noise:

Knocking:
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
Engine mounting portions loose
Crankshaft bearing worn
Primary gear worn or chipped
Camshaft chain tensioner trouble
Camshaft chain, sprocket, guide worn
Air suction valve damaged
Air switching valve damaged
Alternator rotor loose
Catalytic converter melt down due to muffler overheating (KLEEN)
Exhaust butterfly valve cable loose

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

Warning Indicator Light (Oil Pressure Warning) Doesn't Go OFF:

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 housing holder loose
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 portions 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

Troubleshooting Guide

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 cable 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

Part No.99924-1462-06

MODEL APPLICATION

Year	Model	Beginning Frame No.
2013	ZX636ED	JKBZXJE1□DA000001 JKBZX636EEA000001
2013	ZX636FD	JKBZXJF1□DA000001 JKBZX636EFA000001
2014	ZX636EE	JKBZXJE1□EA010001 JKBZX636EEA010001
2014	ZX636FE	JKBZXJF1□EA003001 JKBZX636EFA010001
2015	ZX636EF	JKBZXJE1□FA014001 JKBZX636EEA014001
2015	ZX636FF	JKBZXJF1□FA006001 JKBZX636EFA014001
2016	ZX636EG	JKBZXJE1□GA019001 JKBZX636EEA019001
2016	ZX636FG	JKBZXJF1□GA008001 JKBZX636EFA019001
2017	ZX636EH	JKBZXJE1□HA025001
2017	ZX636FH	JKBZXJF1□HA012001
2018	ZX636EJ	JKBZXJE1□JA027001
2018	ZX636FJ	JKBZXJF1□JA014001

□:This digit in the frame number changes from one machine to another.

Kawasaki Heavy Industries, Ltd. Motorcycle & Engine Company

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