



Ninja ZX-10R
Ninja ZX-10R ABS



Motorcycle Service Manual

Quick Reference Guide

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

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



Ninja ZX-10R Ninja ZX-10R ABS

Motorcycle Service Manual

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No liability can be accepted for any inaccuracies or omissions in this publication, although every possible care has been taken to make it as complete and accurate as possible.

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.

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	GB	United Kingdom
AU	Australia	PH	Philippines
BR	Brazil	SEA	Southeast Asia
CA	Canada	US	United States
CAL	California	WVTA (FULL H)	WVTA Model with Honeycomb Catalytic Converter (Full Power)
CH	Switzerland	GB WVTA (FULL H)	WVTA Model with Honeycomb Catalytic Converter (Left Side Traffic Full Power)
DE	Germany	WVTA (78.2 H)	WVTA Model with Honeycomb Catalytic Converter (Restricted Power)
EUR	Europe		

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 inlet 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. Liquid fuel is caught by a vapor separator and returned to the fuel tank.

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

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

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

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

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 inlet 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 ignition 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 Ignition 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.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate 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

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

- Indicates a procedural step or work to be done.
- Indicates a procedural sub-step or how to do the work of the procedural step it follows. It also precedes the text of a NOTE.
- ★ Indicates a conditional step or what action to take based on the results of the test or inspection in the procedural step or sub-step it follows.

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

General Information

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1-2 GENERAL INFORMATION

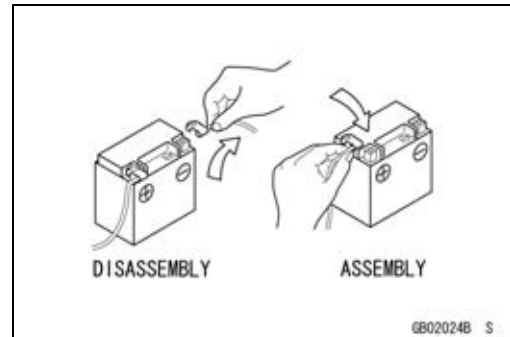
Before Servicing

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.

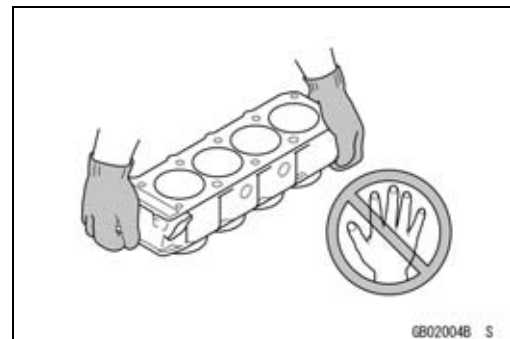
Battery Ground

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.



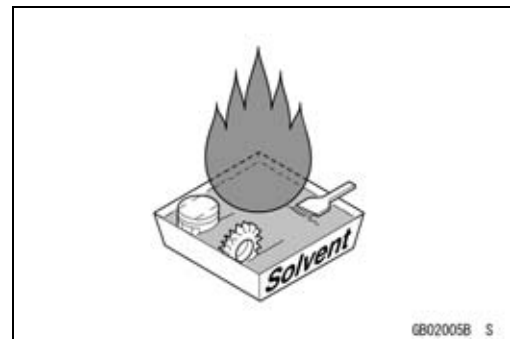
Edges of Parts

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



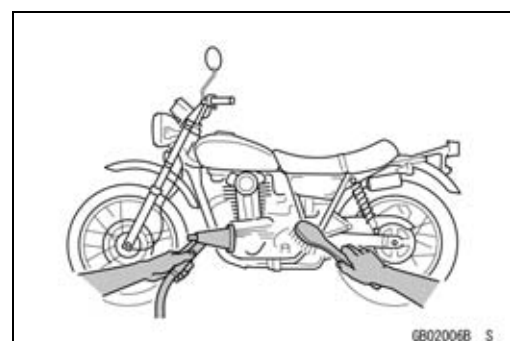
Solvent

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

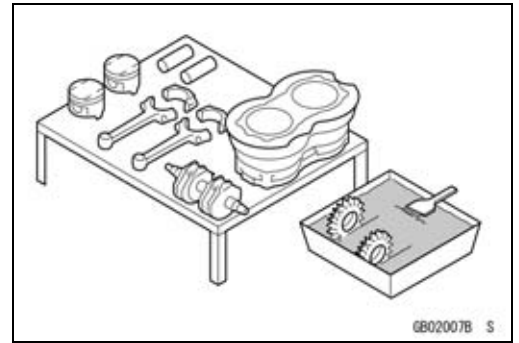
Clean the vehicle thoroughly before disassembly. Dirt or other foreign materials entering into sealed areas during vehicle disassembly can cause excessive wear and decrease performance of the vehicle.



Before Servicing

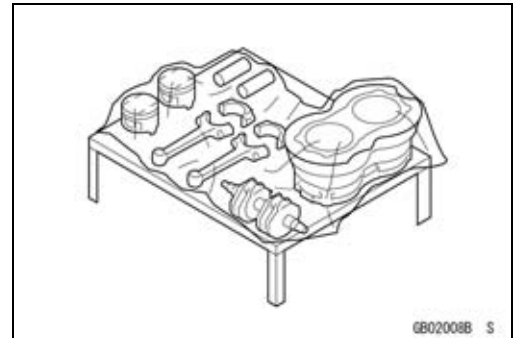
Arrangement and Cleaning of Removed Parts

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.



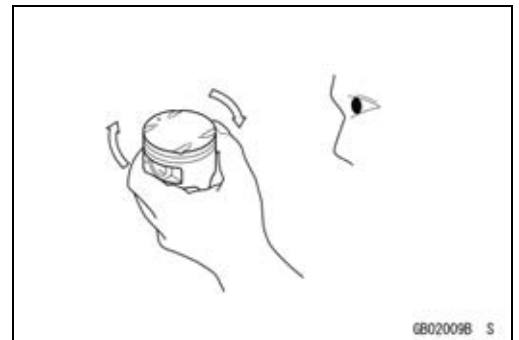
Storage of Removed Parts

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.



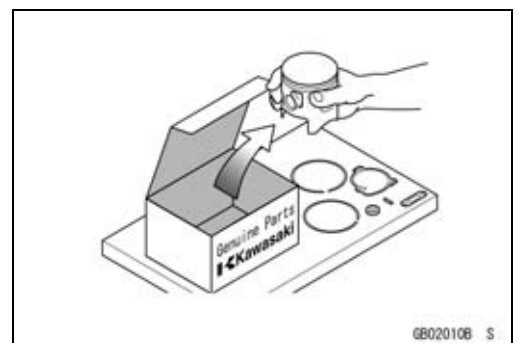
Inspection

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.



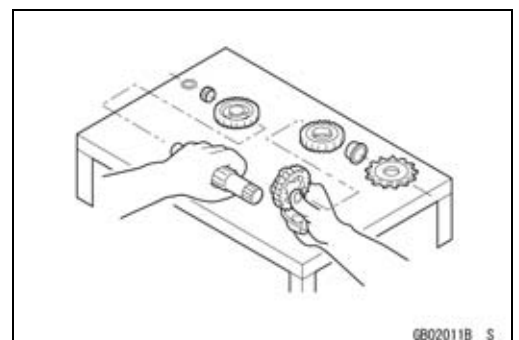
Replacement Parts

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.

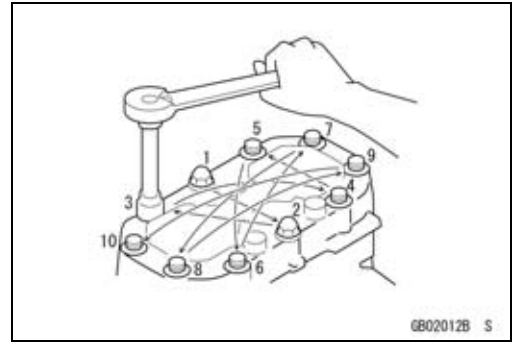


1-4 GENERAL INFORMATION

Before Servicing

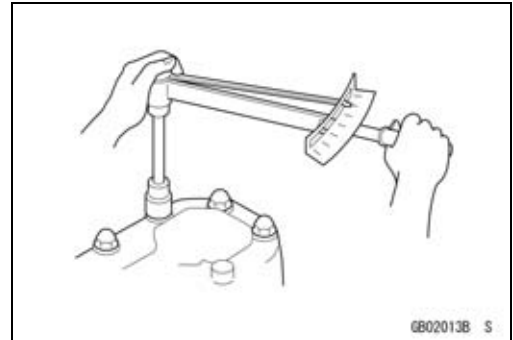
Tightening Sequence

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.



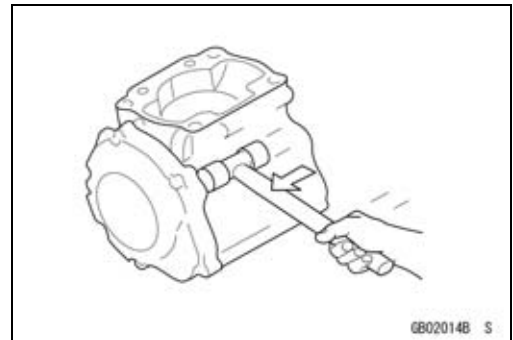
Tightening Torque

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.



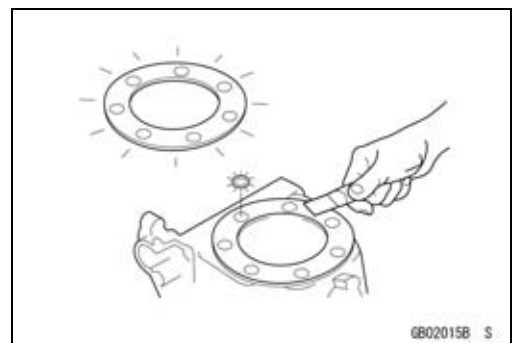
Force

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

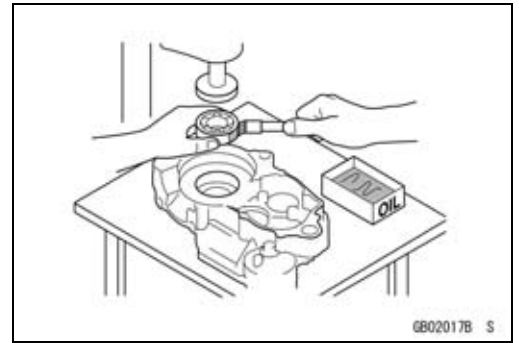
For applications that require Liquid Gasket or a Non-permanent Locking Agent, clean the surfaces so that no oil residue remains before applying liquid gasket or non-permanent locking agent. Do not apply them excessively. Excessive application can clog oil passages and cause serious damage.



Before Servicing

Press

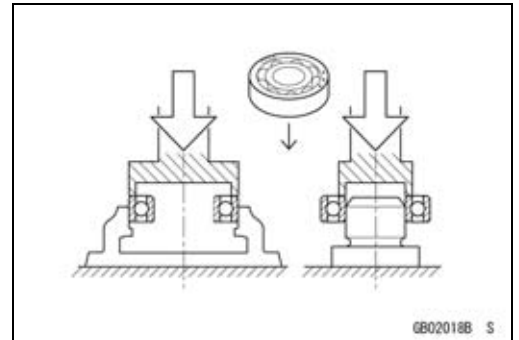
For items such as bearings or oil seals that must be pressed into place, apply small amount of oil to the contact area. Be sure to maintain proper alignment and use smooth movements when installing.



Ball Bearing and Needle Bearing

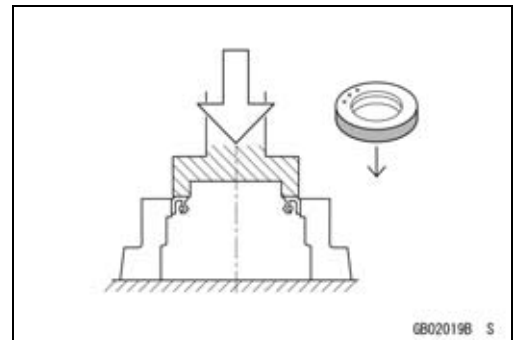
Do not remove pressed ball or needle unless removal is absolutely necessary. Replace with new ones whenever removed. Press bearings with the manufacturer and size marks facing out. Press the bearing into place by putting pressure on the correct bearing race as shown.

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

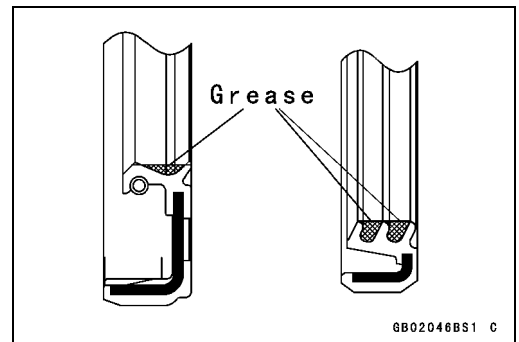


Oil Seal, Grease Seal

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.

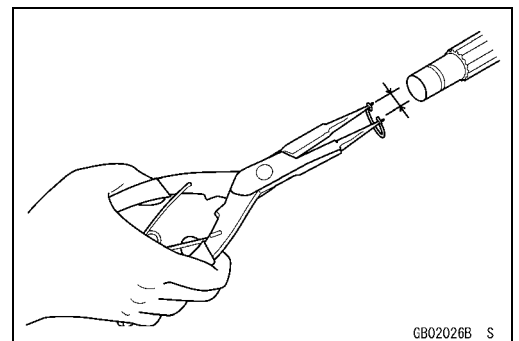


Apply specified grease to the lip of seal before installing the seal.



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.

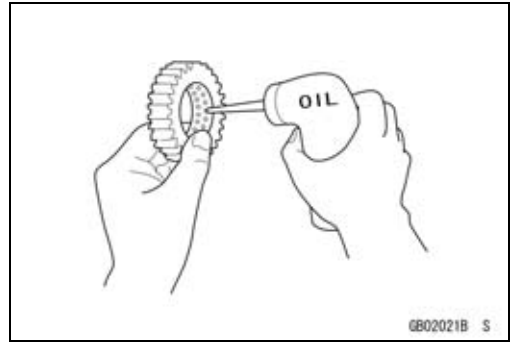


1-6 GENERAL INFORMATION

Before Servicing

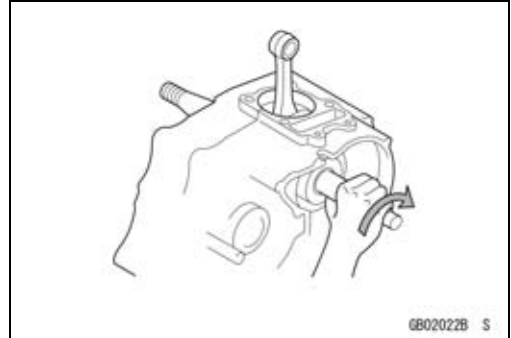
Lubrication

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.



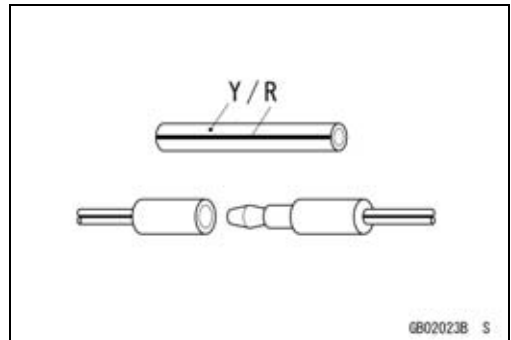
Direction of Engine Rotation

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).



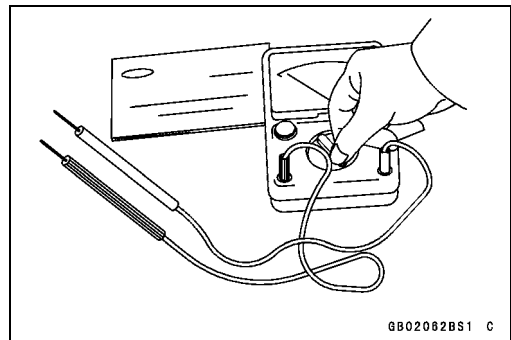
Electrical Leads

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



Instrument

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



Model Identification

ZX1000JBF (US and CA Models) Left Side View



ZX1000JBF (US and CA Models) Right Side View



1-8 GENERAL INFORMATION

Model Identification

ZX1000JBF (EUR Models) Left Side View



ZX1000JBF (EUR Models) Right Side View



Model Identification

ZX1000KBF (US and CA Models) Left Side View



ZX1000KBF (US and CA Models) Right Side View



1-10 GENERAL INFORMATION

Model Identification

ZX1000KBF (EUR Models) Left Side View



ZX1000KBF (EUR Models) Right Side View



Frame Number



Engine Number



General Specifications

Items	ZX1000JBF/KBF
Dimensions	
Overall Length	2 075 mm (81.69 in.)
Overall Width	715 mm (28.1 in.)
Overall Height	1 115 mm (43.90 in.)
Wheelbase	1 425 mm (56.10 in.)
Road Clearance	135 mm (5.31 in.)
Seat Height	813 mm (32.0 in.)
Curb Mass:	
(ZX1000J Model)	198 kg (437 lb)
Front	103 kg (227 lb)
Rear	95 kg (209 lb)
(ZX1000K Model)	201 kg (443 lb)
Front	104 kg (229 lb)
Rear	97 kg (214 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	76.0 × 55.0 mm (3.0 × 2.2 in.)
Displacement	998 cm ³ (60.9 cu in.)
Compression Ratio	13.0:1
Maximum Horsepower	147.1 kW (200 PS) @13 000 r/min (rpm) (WVTA (78.2 H)) 78.2 kW (106 PS) @12 500 r/min (rpm) (SEA) 110.8 kW (151 PS) @10 000 r/min (rpm) (US, CA, CAL) – – –
Maximum Torque	112 N·m (11.4 kgf·m, 82.6 ft·lb) @11 500 r/min (rpm) (WVTA (78.2 H)) 78 N·m (8.0 kgf·m, 57.5 ft·lb) @5 200 r/min (rpm) (SEA) 105.8 N·m (10.8 kgf·m, 78.0 ft·lb) @10 000 r/min (rpm) (US, CA, CAL) – – –
Fuel System	FI (Fuel Injection), KEIHIN TTK47 × 4
Starting System	Electric starter
Ignition System	Battery and coil (transistorized)
Timing Advance	Electronically advanced (IC igniter in ECU)
Ignition Timing	10° BTDC @1 100 r/min (rpm)
Spark Plug	NGK CR9EIA-9
Cylinder Numbering Method	Left to right, 1-2-3-4
Firing Order	1-2-4-3
Valve Timing:	
Intake:	
Open	36° (BTDC)
Close	80° (ABDC)
Duration	296°

1-12 GENERAL INFORMATION

General Specifications

Items	ZX1000JBF/KBF
Exhaust: Open Close Duration Lubrication System Engine Oil: Type Viscosity Capacity	74° (BBDC) 39° (ATDC) 293° Forced lubrication (wet sump with oil cooler) API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2 SAE 10W-40 3.7 L (3.9 US qt)
Drive Train Primary Reduction System: Type Reduction Ratio Clutch Type Transmission: Type Gear Ratios: 1st 2nd 3rd 4th 5th 6th Final Drive System: Type Reduction Ratio Overall Drive Ratio	Gear 1.681 (79/47) Wet multi disc 6-speed, constant mesh, return shift 2.600 (39/15) 2.053 (39/19) 1.737 (33/19) 1.571 (33/21) 1.444 (26/18) 1.348 (31/23) Chain drive 2.294 (39/17) 5.197 @Top gear
Frame Type Caster (Rake Angle) Trail Front Tire: Type Size Rim Size Rear Tire: Type Size Rim Size Front Suspension: Type Wheel Travel	Tubular, diamond 25° 107 mm (4.21 in.) Tubeless 120/70 ZR17 M/C (58 W) J17M/C × MT3.50 Tubeless 190/55 ZR17 M/C (75 W) J17M/C × MT6.00 Telescopic fork (upside-down) 120 mm (4.72 in.)

General Specifications

Items	ZX1000JBF/KBF
Rear Suspension: Type Wheel Travel Brake Type: Front Rear	Swingarm (horizontal back-link) 140 mm (5.51 in.) Dual discs Single disc
Electrical Equipment Battery: (ZX1000J Model) (ZX1000K Model) Headlight: Type Bulb: High Low Tail/Brake Light Alternator: Type Rated Output	12 V 6 Ah 12 V 8.6 Ah Semi-sealed beam 12 V 55 W (quartz-halogen) × 2 12 V 55 W (quartz-halogen) LED Three-phase AC 30 A/14 V @5 000 r/min (rpm)

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

1-14 GENERAL INFORMATION

Technical Information-Sport-Kawasaki TRaction Control System (S-KTRC)

Overview

S-KTRC is a highly sophisticated system based on MotoGP racing technology. Unlike the KTRC system used on the GTR1400 ABS (Concours 14 ABS in N. America), which is designed to offer rider reassurance when traversing slippery surfaces, S-KTRC, is designed to maximize forward motion, allowing riding at the edge of traction.

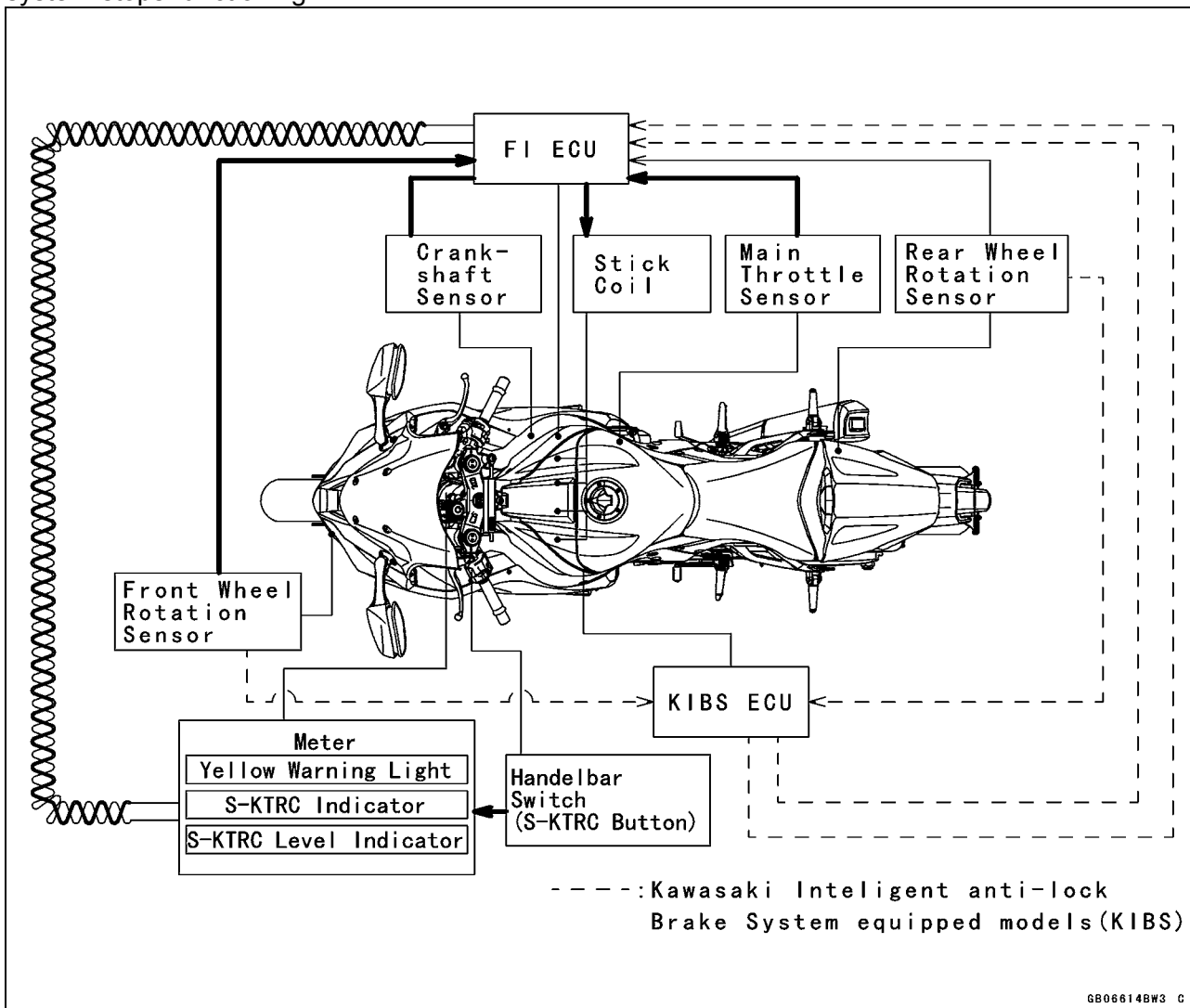
The quickest acceleration requires a certain amount of slip, so in order to optimize traction, S-KTRC actually allows slip. The ideal slip ratio varies according to conditions. The system looks at a number of parameters to get an accurate real-time picture of what is going on: front and rear wheel speed (slippage), engine rpm, throttle position, slippage, acceleration, etc.

Using complex analysis, the system is able to predict when traction conditions are about to become unfavorable. By acting before slippage exceeds the range for optimal traction, drops in power can be minimized resulting in ultra-smooth operation.

There are three available modes that riders can set according to preference (and skill level). Each mode is able to accommodate a range of riding conditions. Of course, engine manageability is such that riders can opt to turn the system OFF without fear of making the bike uncontrollable.

By combining the setting with the power mode, the rider can choose various riding modes to suit the road conditions and riding skill.

The system becomes functional at 5 km/h (3.1 mph) or more. If a failure occurs in the system, the warning indicator light (yellow LED) and mode indicator symbol blink to let the rider know that the system stops functioning.

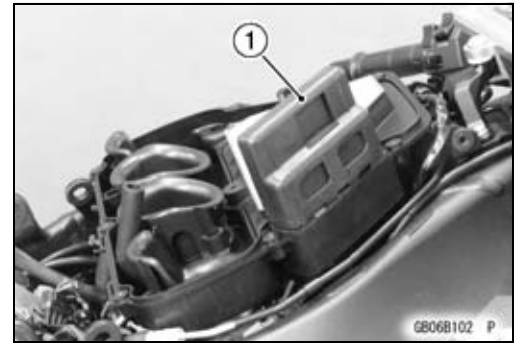


Technical Information-Sport-Kawasaki TRaction Control System (S-KTRC)

System Components

1. FI ECU

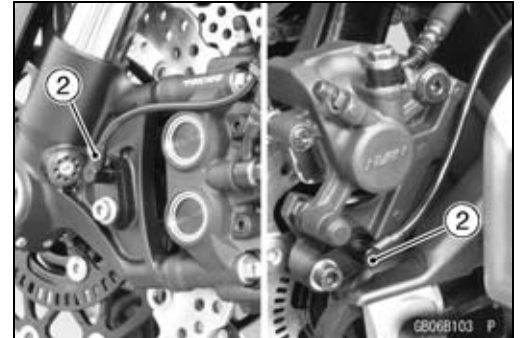
The FI ECU analyzes the motorcycle conditions based on the signals from the front/rear wheel rotation sensors and FI sensors (such as the crankshaft sensor and main throttle sensor), and controls engine power by reducing the number of ignition and retarding the ignition timing. The mode-switching signal is transmitted to the FI ECU by the meter ECU. If a failure occurs in the system, the FI ECU deactivates S-KTRC and displays the warning indication in the meter.



2. Wheel Rotation Sensor

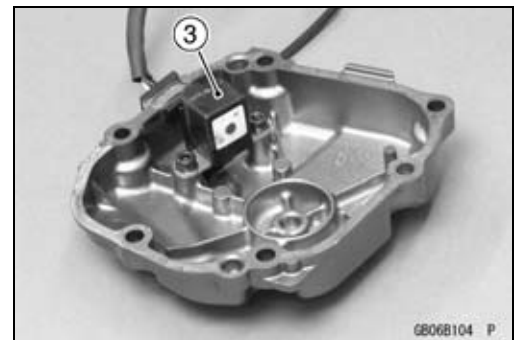
The wheel rotation sensor converts front and rear wheel rotation speed to a pulse signal and transmits it to the FI ECU.

As for the KIBS (Kawasaki Intelligent anti-lock Brake System) equipped model, a pulse signal is transmitted via the KIBS ECU.



3. Crankshaft Sensor

The crankshaft sensor converts the engine speed to a pulse signal and transmits it to the FI ECU.



4. Main Throttle Sensor

The main throttle sensor converts the throttle position to a voltage signal and transmits it to the FI ECU.



5. S-KTRC Button

The mode-switching signal is transmitted to the meter ECU by depressing the S-KTRC button (0.3 ~ 0.4 sec.).



1-16 GENERAL INFORMATION

Technical Information-Sport-Kawasaki TRaction Control System (S-KTRC)

6. Multifunction Meter

The multifunction meter receives a mode-switching signal and displays the mode [A], and transmits it to the FI ECU by the CAN system.

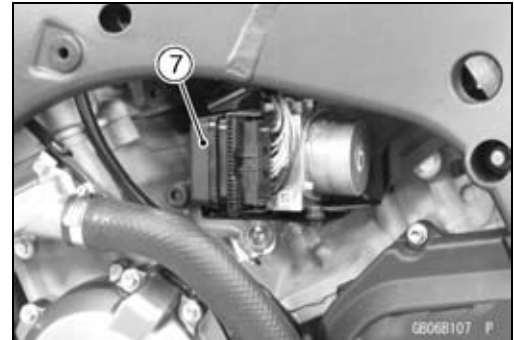
When a failure occurs in the system, the multifunction meter displays the warning indication by blinking the warning indicator light (yellow LED) [B] and mode indicator symbol.

It also displays the S-KTRC operating conditions in the level indicator [C].



7. KIBS ECU

As for the KIBS equipped model, the front and rear wheel sensor signals are transmitted to the FI ECU via the KIBS ECU.



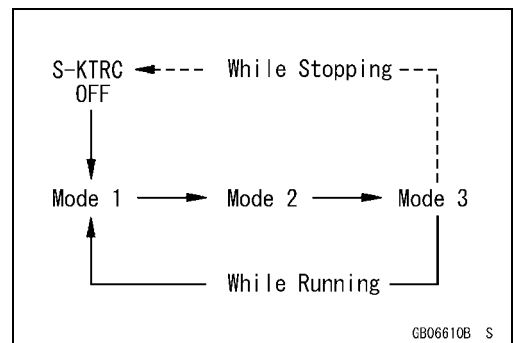
Mode-switching

Depress the S-KTRC button on the left handlebar switch to change the mode. The mode can be changed only when the throttle grip is closed completely.

The S-KTRC OFF can be selected only when the motorcycle is at a stop. Changing to mode 1 from S-KTRC OFF is possible while riding.

NOTE

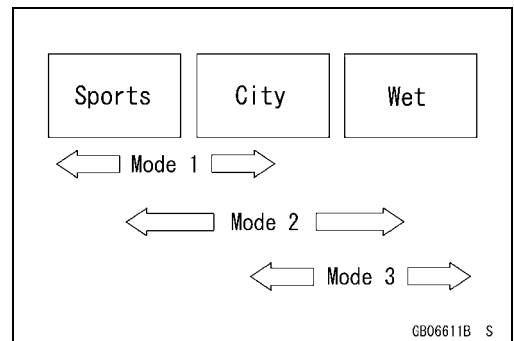
- When changing the mode, stop the motorcycle.
- The mode is retained if the ignition switch is turned to OFF or if the battery is disconnected.
- When the ignition switch is turned to OFF, and then back to ON while S-KTRC is OFF, the system will automatically be set to mode 1.
- If the battery is disconnected and then reconnected while S-KTRC is OFF, the S-KTRC is set in mode 1.



Mode 1: S-KTRC least restrictive among the three modes. This makes lengthy drifts and wheelies possible when exiting tight corners.

Mode 2: There is more S-KTRC interaction compared to mode 1. This makes slight drifts possible when exiting tight corners.

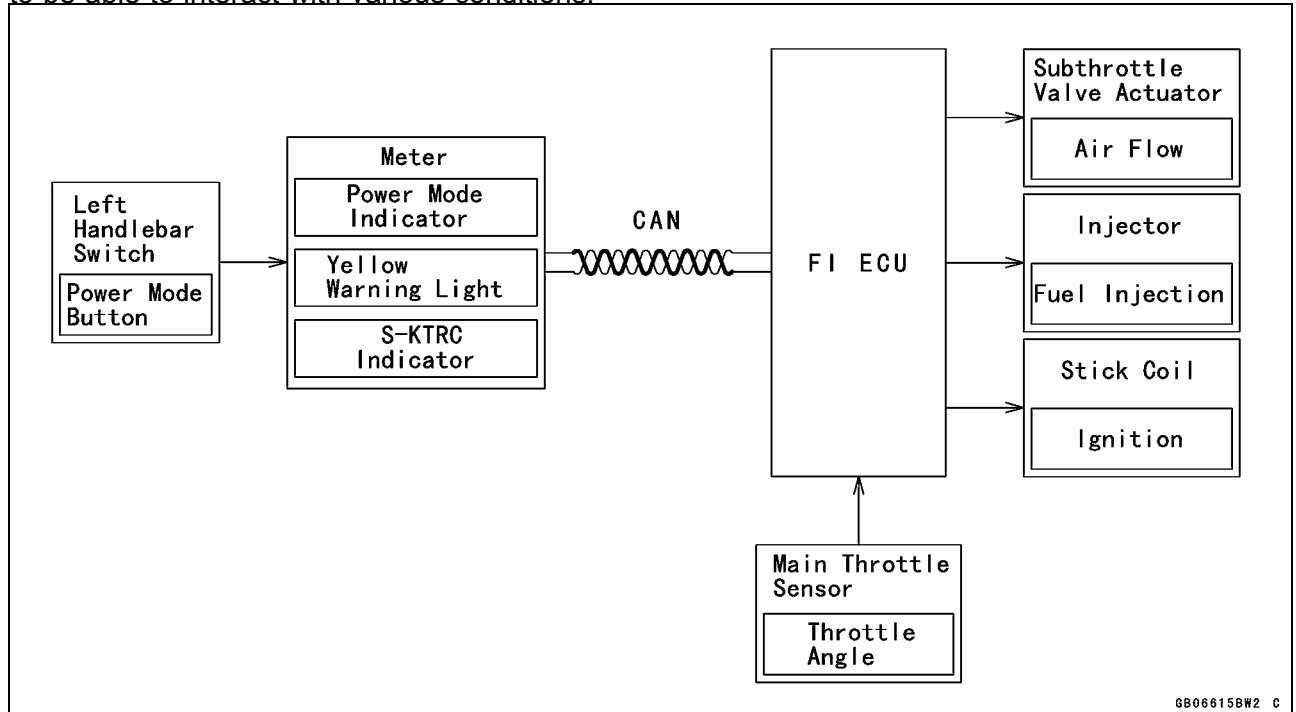
Mode 3: S-KTRC intervenes to prevent the rear wheel from spinning whenever possible.



Technical Information-Power Mode

The rider can choose from three engine power modes to suit their preferences and road conditions. The FI ECU controls the engine power by adjusting fuel injection, air intake, and ignition timing. It enables three-mode selection: Full Power (Mode F), Middle Power (Mode M), and Low Power (Mode L).

In addition, combining each mode with each S-KTRC setting allows the rider to have more choices to be able to interact with various conditions.



GB06615BW2 C

Power Mode Operation

To change the mode, close the throttle grip completely, and depress the power mode button [A] (0.3 ~ 0.4 sec.).

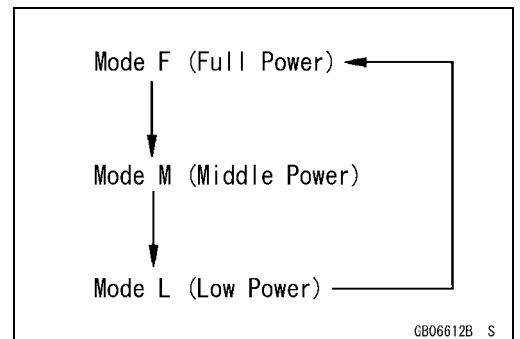


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Power Mode Positions

NOTE

○ The power mode setting is maintained when the ignition switch is turned OFF, or when the battery is disconnected.



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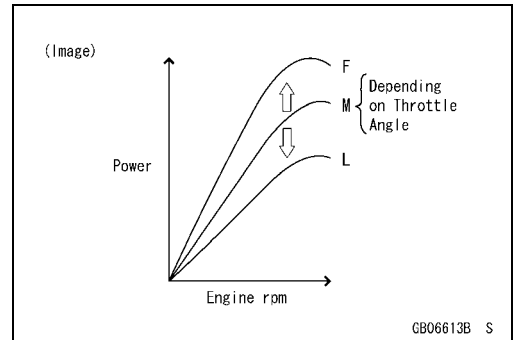
1-18 GENERAL INFORMATION

Technical Information-Power Mode

Mode F: The highest engine power output is achieved. The rider can use the full power of the engine.

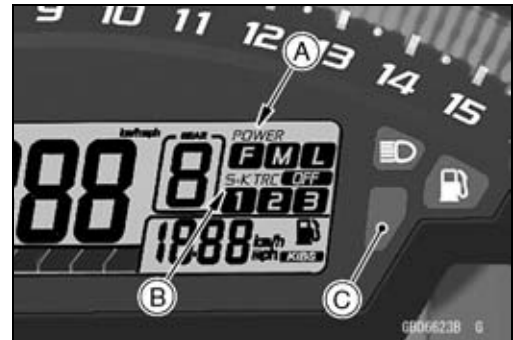
Mode M: The throttle response is less sharp compared to mode F. Depending on the throttle application, full power can be accessed temporarily.

Mode L: About 60% of the highest engine power output is achieved. The throttle response is mildest among the three modes.



The current mode selection is displayed on the power mode indicator [A] in the multifunction meter.

If a failure occurs with a FI related components such as a subthrottle or main throttle sensor, the warning indicator light (red LED) and FI warning symbol will go ON, and/or the S-KTRC indicator [B] and warning indicator light (yellow LED) [C] blink. The current mode cannot be changed at this time.



Technical Information-Kawasaki Intelligent anti-lock Brake System (KIBS/ZX1000K model only)

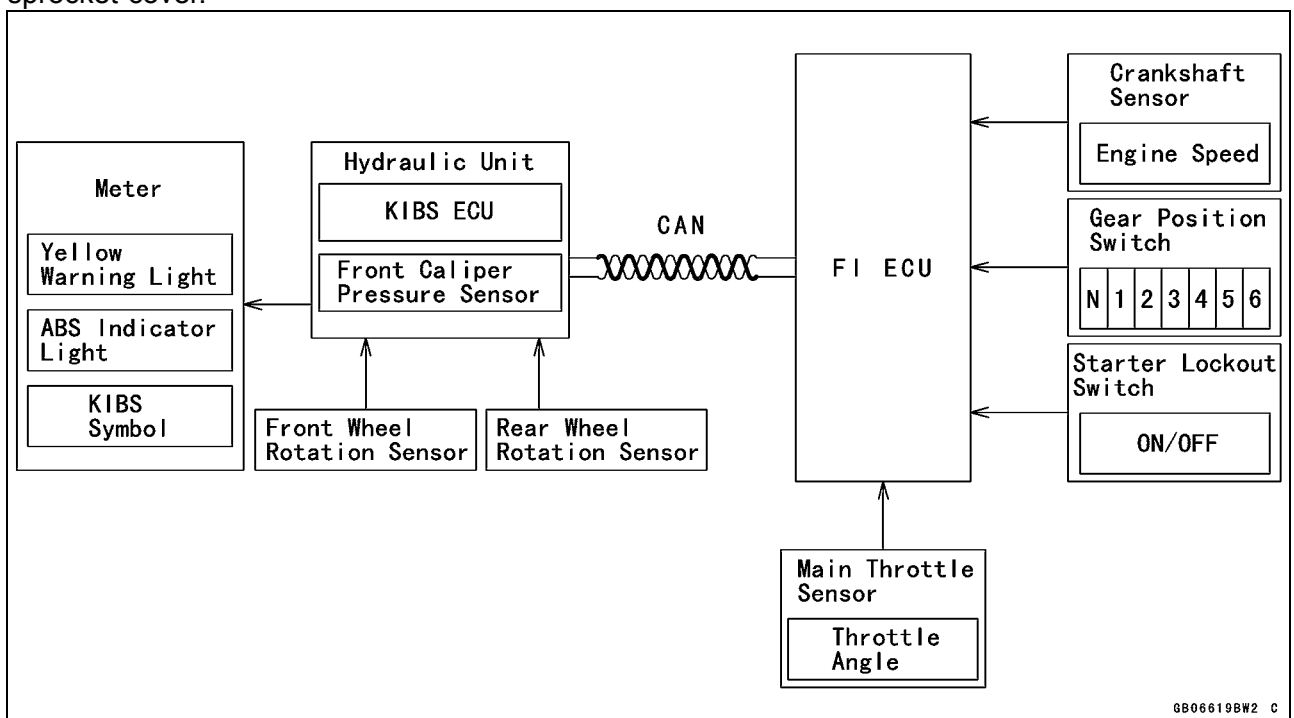
Overview

Kawasaki Intelligent anti-lock Brake System (KIBS) offers enhanced braking stability (ABS performance equivalent to the current model) to supersport models, which pitch more than most motorcycles and also offers high-precision front and rear brake pressure control (high-precision ABS) for sport riding.

Precise control of the ABS operation decreases kickback to the brake lever and brake pedal during braking compared to the conventional system.

In addition to the front and rear wheel sensors in a conventional ABS, KIBS monitors a number of parameters: front caliper hydraulic pressure and information from the FI ECU (engine speed, throttle position, gear position, and clutch actuation).

KIBS uses an all-new BOSCH hydraulic unit which was designed specifically for motorcycle use. The new design is small and light weight (45% less volume and 800g lighter than current units). The unit is located close to the motorcycle's center of gravity, behind the engine cylinder and above the sprocket cover.



GB06619BW2 C

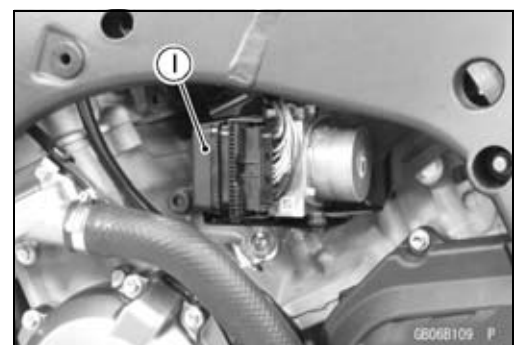
System Components

1. KIBS ECU

With input from the front and rear wheel sensors and front caliper hydraulic pressure, the KIBS ECU analyzes various conditions on the motorcycle, and with additional information from the FI ECU (engine speed, throttle position, gear position, and clutch actuation) precisely controls the brake caliper hydraulic pressure. As a result, brake force is generated to suit conditions. If there is no engine information from the FI ECU, the KIBS is deactivated and the warning is displayed in the meter; however, the conventional ABS function is maintained.

2. Wheel Rotation Sensor

The wheel rotation sensor converts the front and rear wheel rotation speed to a pulse signal and transmits it to the KIBS ECU and FI ECU.



1-20 GENERAL INFORMATION

Technical Information-Kawasaki Intelligent anti-lock Brake System (KIBS/ZX1000K model only)

3. KIBS Hydraulic Unit

The KIBS hydraulic unit consists of the hydraulic unit and KIBS ECU and has the front caliper hydraulic pressure sensor built-in.

When receiving a signal from the KIBS ECU, the hydraulic unit increases or decreases the front and rear brake hydraulic pressure.

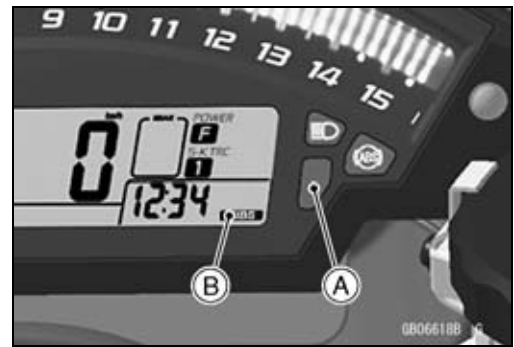
The front caliper hydraulic pressure sensor always monitors the front caliper hydraulic pressure and transmits the hydraulic pressure change to the KIBS ECU.

4. FI ECU

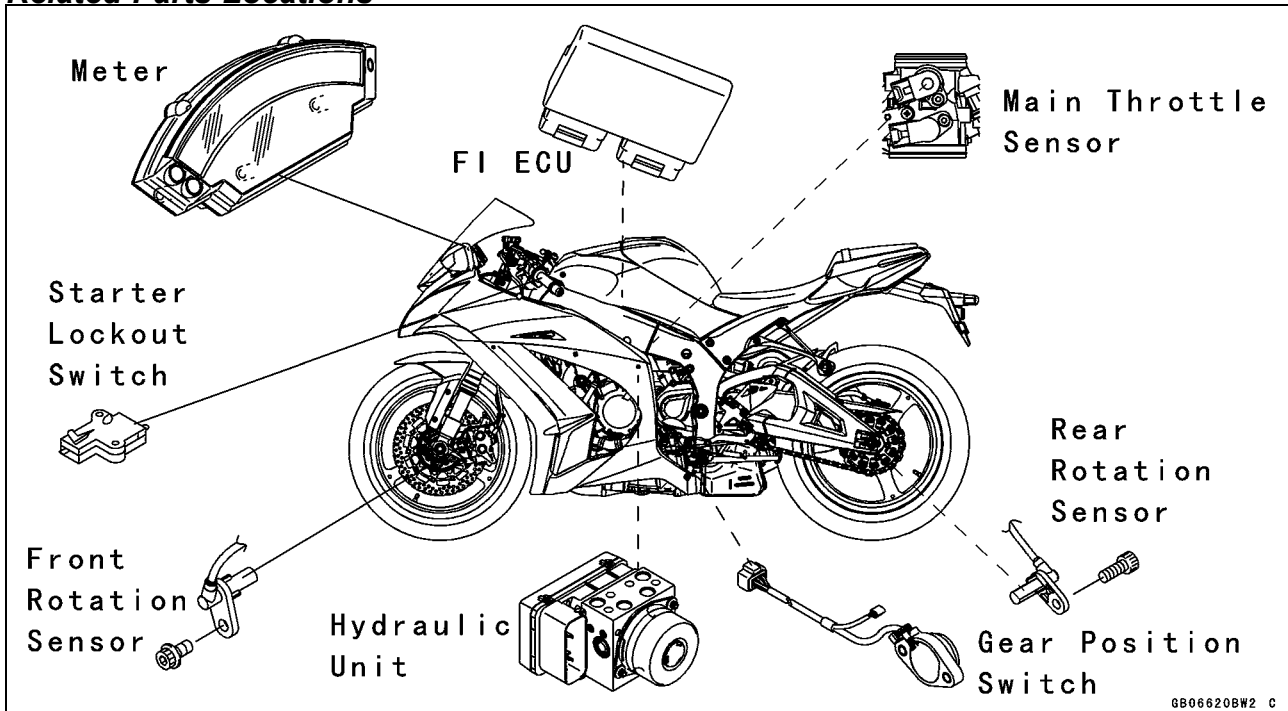
The FI ECU transmits information from the crankshaft sensor (engine speed), the main throttle sensor (throttle position), the gear position switch (gear position), and the starter lockout switch (ON/OFF) to the KIBS ECU by the CAN system.

5. Multifunction Meter

When a failure occurs in the system, the multifunction meter displays the warning indication by turning ON the warning indicator light (yellow LED) [A] and KIBS symbol [B].



Related Parts Locations

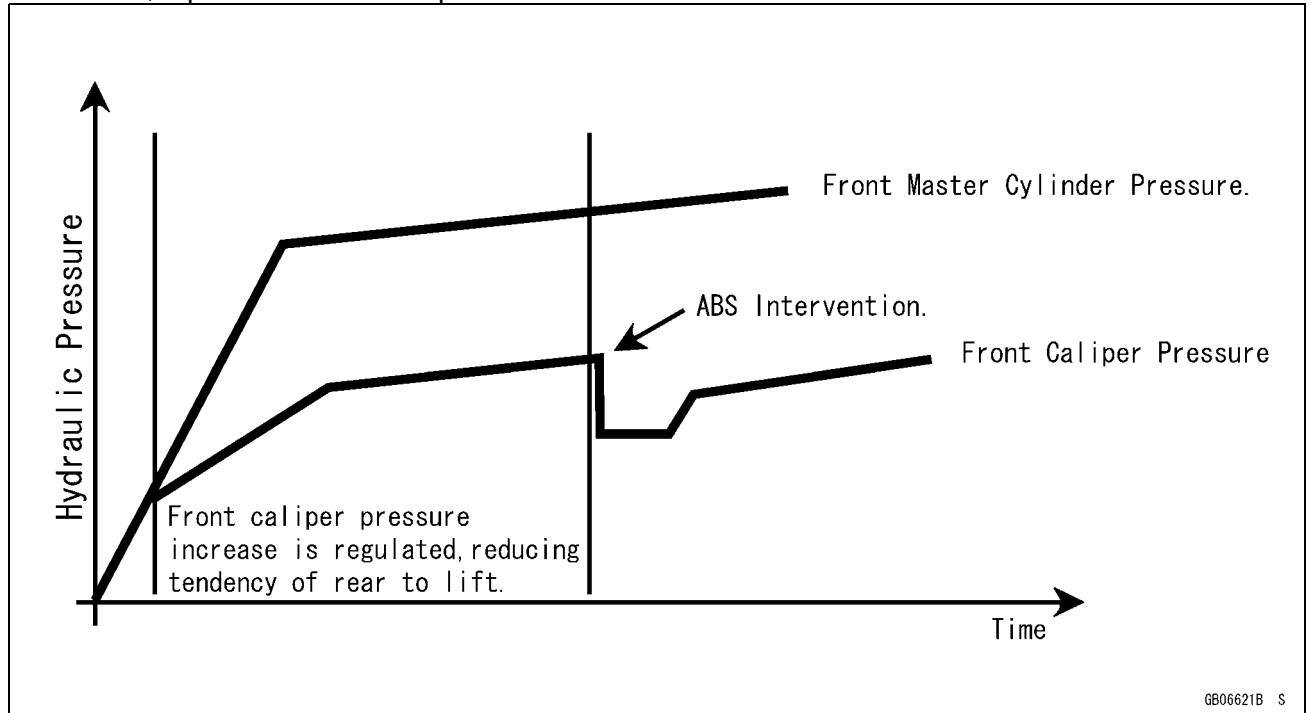


Technical Information-Kawasaki Intelligent anti-lock Brake System (KIBS/ZX1000K model only)

KIBS Control

1. ABS performance equivalent to the current model (enhanced braking stability)

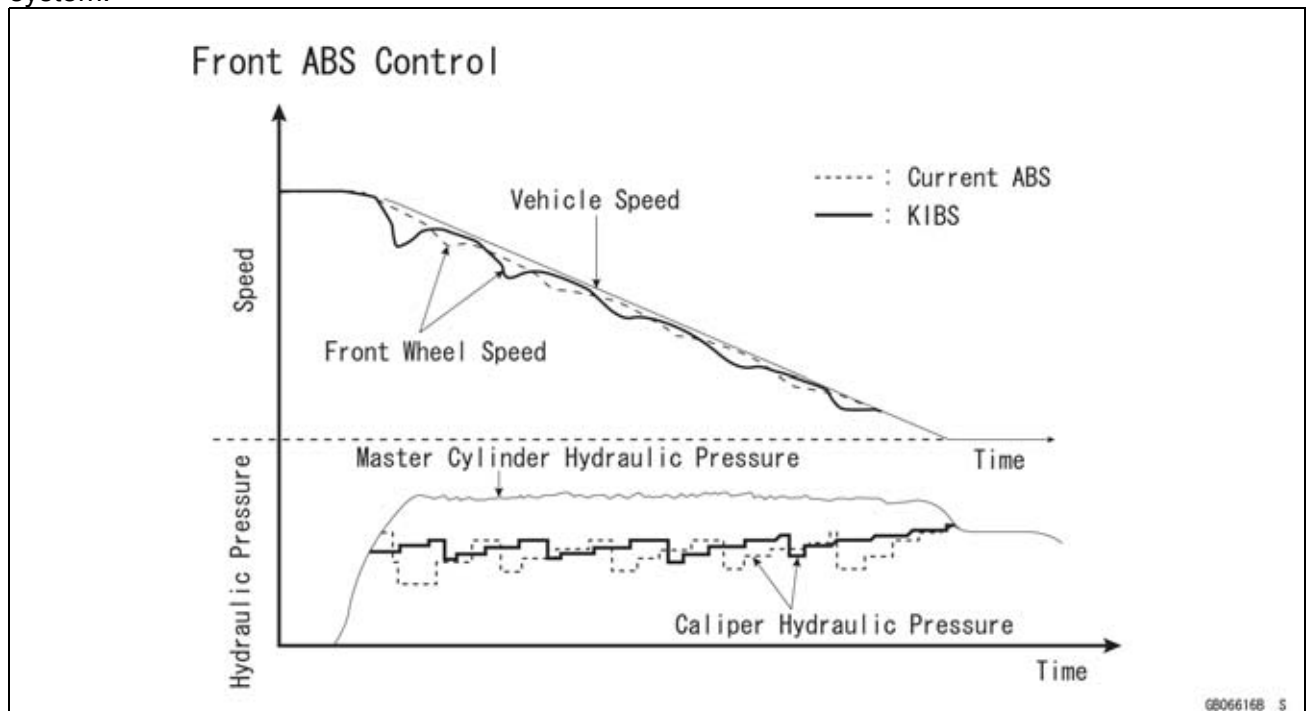
By monitoring front caliper hydraulic pressure, KIBS regulates pressure increases reducing the tendency of the rear to lift. Before the ABS system fully reacts, KIBS system prevents the pressure from increasing too quickly thus suppressing rear lift. And after the ABS has decreased pressure to prevent wheel lock, it prevents a sudden pressure increase that could induce rear lift.



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2. High-precision ABS to enhance front and rear braking performance

By monitoring front caliper hydraulic pressure, the KIBS system is able to regulate pressure changes precisely, so that slips are minimized resulting in smooth operation compared to the conventional ABS system.



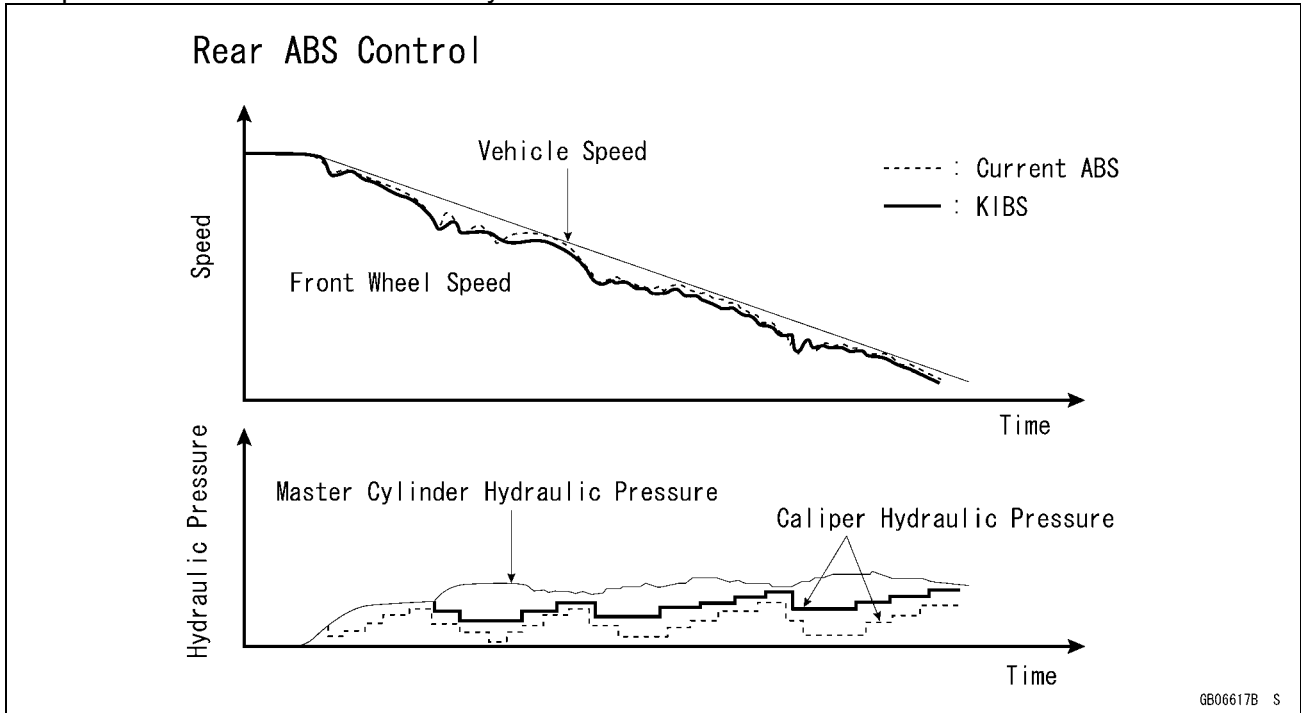
GB06616B S

1-22 GENERAL INFORMATION

Technical Information-Kawasaki Intelligent anti-lock Brake System (KIBS/ZX1000K model only)

3. Rear brake control enhancement during engine braking

By recognizing rear wheel slip due to engine brake force during aggressive throttle operation, and at high rpm or downshifting, the KIBS system prevents unnecessary ABS intervention to the rear wheel compared to the conventional ABS system.



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/cm ²
kPa	×	0.1450	=	psi
kPa	×	0.7501	=	cmHg
kgf/cm ²	×	98.07	=	kPa
kgf/cm ²	×	14.22	=	psi
cmHg	×	1.333	=	kPa

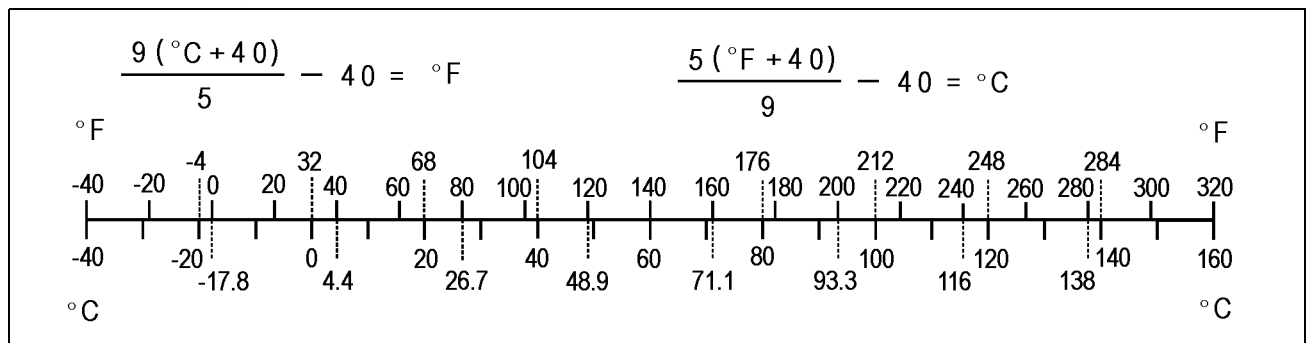
Units of Speed:

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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2-2 PERIODIC MAINTENANCE

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PERIODIC MAINTENANCE 2-3

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

ITEM	FREQUENCY	* ODOMETER READING							See Page
		Whichever comes first ↓ Every	1 (0.6)	6 (3.75)	12 (7.5)	18 (11.25)	24 (15)	30 (18.75)	
Fuel System									
Throttle control system (play, smooth return, no drag) - inspect	year	•		•		•		•	2-15
Engine vacuum synchronization - inspect				•		•		•	2-15
Idle speed - inspect		•		•		•		•	2-19
Fuel leak (fuel hose and pipe) - inspect	year	•		•		•		•	2-20
Fuel hose and pipe damage - inspect	year	•		•		•		•	2-20
Fuel hose and pipe installation condition - inspect	year	•		•		•		•	2-20
Evaporative emission control system function - inspect (CAL and SEA Models)		•	•	•	•	•	•	•	2-21
Cooling System									
Coolant level - inspect		•		•		•		•	2-22
Coolant leak (water hose and pipe) - inspect	year	•		•		•		•	2-22
Water hose damage - inspect	year	•		•		•		•	2-22
Water hose installation condition - inspect	year	•		•		•		•	2-22
Engine Top End									
Valve clearance - inspect						•			2-23
Air suction system damage - inspect				•		•		•	2-26
Clutch									
Clutch operation (play, disengagement, engagement) - inspect		•		•		•		•	2-27
Wheels and Tires									
Tire air pressure - inspect	year			•		•		•	2-28
Wheel/tire damage - inspect				•		•		•	2-28
Tire tread wear, abnormal wear - inspect				•		•		•	2-29

2-4 PERIODIC MAINTENANCE

Periodic Maintenance Chart

FREQUENCY	ITEM	* ODOMETER READING × 1 000 km (× 1 000 mile)							See Page	
		1 (0.6)	6 (3.75)	12 (7.5)	18 (11.25)	24 (15)	30 (18.75)	36 (22.5)		
	Wheel bearing damage - inspect	year			•		•		•	2-29
Final Drive										
	Drive chain lubrication condition - inspect #		Every 600 km (400 mile)							2-30
	Drive chain slack - inspect #		Every 1 000 km (600 mile)							2-31
	Drive chain wear - inspect #				•		•		•	2-32
	Chain guide wear - inspect				•		•		•	2-33
Brakes										
	Brake fluid leak (brake hose and pipe) - inspect	year	•	•	•	•	•	•	•	2-33
	Brake hose and pipe damage - inspect	year	•	•	•	•	•	•	•	2-34
	Brake hose installation condition - inspect	year	•	•	•	•	•	•	•	2-34
	Brake fluid level - inspect	6 months	•	•	•	•	•	•	•	2-34
	Brake pad wear - inspect #			•	•	•	•	•	•	2-35
	Brake operation (effectiveness, play, no drag) - inspect	year	•	•	•	•	•	•	•	2-35
	Brake light switch operation - inspect		•	•	•	•	•	•	•	2-35
Suspension										
	Front forks/rear shock absorber operation (damping and smooth stroke) - inspect				•		•		•	2-36
	Front forks/rear shock absorber oil leak - inspect	year			•		•		•	2-37
	Rocker arms operation - inspect				•		•		•	2-37
	Tie-rod operation - inspect				•		•		•	2-37
Steering										
	Steering play - inspect	year	•		•		•		•	2-38
	Steering stem bearings - lubricate	2 years					•			2-39
	Steering damper oil leak - inspect			•	•	•	•	•	•	2-40
Electrical System										
	Lights and switches operation - inspect	year			•		•		•	2-41
	Headlight aiming - inspect	year			•		•		•	2-43

PERIODIC MAINTENANCE 2-5

Periodic Maintenance Chart

ITEM	FREQUENCY	* ODOMETER READING × 1 000 km (× 1 000 mile)							See Page	
		Whichever comes first ↓	1 (0.6)	6 (3.75)	12 (7.5)	18 (11.25)	24 (15)	30 (18.75)		36 (22.5)
Sidestand switch operation - inspect	year			•			•		•	2-44
Engine stop switch operation - inspect	year			•			•		•	2-45
Others										
Chassis parts - lubricate	year			•			•		•	2-46
Bolts and nuts tightness - inspect		•		•			•		•	2-47

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

*: For higher odometer readings, repeat at the frequency interval established here.

Periodic Replacement Parts

ITEM	FREQUENCY	* ODOMETER READING × 1 000 km (× 1 000 mile)					See Page
		Whichever comes first ↓	1 (0.6)	12 (7.5)	24 (15)	36 (22.5)	
Air cleaner element # - replace	Every 18 000 km (12 000 mile)						2-49
Fuel hose - replace	4 years					•	2-49
Coolant - change	3 years				•		2-52
Radiator hose and O-ring - replace	3 years				•		2-54
Engine oil # - change	year	•	•	•	•	•	2-55
Oil filter - replace	year	•	•	•	•	•	2-56
Brake hose - replace	4 years					•	2-57
Brake fluid - change	2 years			•		•	2-60
Rubber parts of master cylinder and caliper - replace	4 years					•	2-61, 2-63
Spark plug - replace			•	•	•	•	2-67

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

*: For higher odometer readings, repeat at the frequency interval established here.

2-6 PERIODIC MAINTENANCE

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.

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.

Lh: Left-hand Threads

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 (ex. PBC grease).

SS: Apply silicone sealant.

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Fuel System (DFI)				
Air Cleaner Housing Assembly Screws	1.1	0.11	10 in·lb	
Air Cleaner Housing Clamp Bolts	2.0	0.20	18 in·lb	
Air Cleaner Housing Duct Screws	1.1	0.11	10 in·lb	
Air Intake Duct Assembly Screws	1.5	0.15	13 in·lb	
Air Intake Solenoid Valve Nut	7.0	0.71	62 in·lb	
Intake Air Temperature Sensor Screw	0.8	0.08	7.1 in·lb	
Bracket Screw	3.4	0.35	30 in·lb	
Delivery Pipe Assy Mounting Screws	3.43	0.35	30 in·lb	
Fitting Retainer Screws	2.06	0.21	18 in·lb	
Fitting Screws	3.43	0.35	30 in·lb	
Idle Speed Control Valve Actuator Retainer Screws	2.06	0.21	18 in·lb	
Nozzle Assy Mounting Bolts	4.9	0.50	43 in·lb	S
Throttle Body Assy Holder Clamp Bolts	2.0	0.20	18 in·lb	
Crankshaft Sensor Bolts	5.9	0.60	52 in·lb	L
Fuel Pump Bolts	9.8	1.0	87 in·lb	L, S
Gear Position Switch Screws	2.9	0.30	26 in·lb	L
Oxygen Sensor (Equipped Models)	25	2.5	18	
Water Temperature Sensor	12	1.2	106 in·lb	
Exhaust Butterfly Valve Actuator Mounting Screws	1.2	0.12	11 in·lb	
Exhaust Butterfly Valve Actuator Pulley Bolt	4.9	0.50	43 in·lb	
Cooling System				
Water Hose Clamp Screws	3.0	0.31	27 in·lb	
Water Pipe Mounting Bolt	9.8	1.0	87 in·lb	L
Water Pump Cover Bolts	9.8	1.0	87 in·lb	L (2)
Coolant Drain Bolt (Water Pump)	9.8	1.0	87 in·lb	
Impeller Bolt	9.8	1.0	87 in·lb	
Water Temperature Sensor	12	1.2	106 in·lb	
Coolant By-pass Fitting Bolt	8.8	0.90	78 in·lb	L
Thermostat Housing Mounting Bolts	9.8	1.0	87 in·lb	
Thermostat Cap Bolts	5.9	0.60	52 in·lb	

PERIODIC MAINTENANCE 2-7

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Oil Cooler Mounting Bolts	12	1.2	106 in·lb	L, S
Water Hose Fitting Bolts	9.8	1.0	87 in·lb	
Coolant Drain Bolt (Cylinder)	9.8	1.0	87 in·lb	
Water Passage Plugs	20	2.0	15	L
Engine Top End				
Air Suction Valve Cover Bolts	9.8	1.0	87 in·lb	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	9.8	1.0	87 in·lb	
Camshaft Sprocket Bolts	15	1.5	11	L
Coolant Drain Bolt (Cylinder)	9.8	1.0	87 in·lb	
Cylinder Head Bolts (M10)	45	4.6	33	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
Cylinder Head Cover Plug	15	1.5	11	L
Front Camshaft Chain Guide Bolt (Lower)	12	1.2	106 in·lb	
Front Camshaft Chain Guide Bolt (Upper)	25	2.5	18	
Spark Plugs	13	1.3	115 in·lb	
Throttle Body Assy Holder Bolts	9.8	1.0	87 in·lb	S
Upper Camshaft Chain Guide Bolts	12	1.2	106 in·lb	S
Water Passage Plugs	20	2.0	15	L
Muffler Body Mounting Bolt	25	2.5	18	
Premuffler Chamber Mounting Bolt	34	3.5	25	
Clutch				
Clutch Lever Clamp Bolts	7.8	0.80	69 in·lb	S
Clutch Cover Bolts	9.8	1.0	87 in·lb	S
Oil Filler Plug	–	–	–	Hand-tighten
Clutch Cover Plate Bolts	9.8	1.0	87 in·lb	L
Clutch Spring Bolts	11	1.1	97 in·lb	
Sub Clutch Hub Bolts	25	2.5	18	L
Clutch Hub Nut	130	13.3	96	R
Engine Lubrication System				
Oil Cooler Mounting Bolts	12	1.2	106 in·lb	L, S
Oil Pressure Switch	15	1.5	11	SS
Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	G
Oil Pump Drive Chain Guide Bolt	9.8	1.0	87 in·lb	L
Oil Pump Drive Gear Bolt	9.8	1.0	87 in·lb	L, Lh
Oil Passage Plug (Taper)	20	2.0	15	L
Oil Pipe Holder Bolt	9.8	1.0	87 in·lb	L
Oil Pressure Relief Valve	15	1.5	11	L
Oil Filter	17	1.7	13	G, R
Oil Filter Holder Bolt	35	3.6	26	L
Oil Pan Bolts	9.8	1.0	87 in·lb	S

2-8 PERIODIC MAINTENANCE

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Engine Oil Drain Bolt	29	3.0	21	
Engine Removal/Installation				
Adjusting Collar Locknut	49	5.0	36	S
Left Front Engine Mounting Bolt	44	4.5	32	S
Lower Engine Mounting Bolt	9.8	1.0	87 in·lb	S
Lower Engine Mounting Nut	44	4.5	32	R, S
Middle Engine Mounting Bolt	9.8	1.0	87 in·lb	S
Middle Engine Mounting Nut	44	4.5	32	R, S
Right Front Engine Mounting Bolt	44	4.5	32	S
Crankshaft/Transmission				
Balanser Shaft Clamp Bolt	9.8	1.0	87 in·lb	
Balanser Shaft Clamp Lever Bolt	25	2.5	18	L
Bearing Holder Bolts	15	1.5	11	L
Breather Hole Plug	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, R
Coolant Drain Bolt (Cylinder)	9.8	1.0	87 in·lb	
Crankcase Bolt (M6, L = 60)	12	1.2	106 in·lb	
Crankcase Bolt (M7, L = 45)	20	2.0	15	
Crankcase Bolts (M6, L = 40)	12	1.2	106 in·lb	
Crankcase Bolts (M6, L = 45)	12	1.2	106 in·lb	
Crankcase Bolts (M7, L = 50)	20	2.0	15	
Crankcase Bolts (M8, L = 63)	27	2.8	20	
Crankcase Bolts (M9, L = 100)	45	4.6	33	MO, S
Crankcase Bolts (M9, L = 113)	45	4.6	33	MO, S
Oil Jet Nozzle (M6)	4.9	0.50	43 in·lb	
Oil Jet Nozzle (M8)	8.0	0.82	71 in·lb	
Oil Jet Nozzle (M10)	15	1.5	11	
Oil Jet Nozzles (M5)	2.9	0.30	26 in·lb	
Oil Passage Plugs (Taper)	20	2.0	15	L
Oil Pressure Switch	15	1.5	11	SS
Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	G
Plate Bolts	4.9	0.50	43 in·lb	L
Torque Limiter Cover Bolts	9.8	1.0	87 in·lb	
Engine Sprocket Nut	145	14.8	107	MO
Gear Position Switch Screws	2.9	0.30	26 in·lb	L
Gear Positioning Lever Bolt	12	1.2	106 in·lb	
Shift Drum Cam Holder Bolt	24	2.4	18	L
Shift Pedal Mounting Bolt	25	2.5	18	L
Shift Ratchet Assembly Holder Bolts	15	1.5	11	L
Shift Shaft Return Spring Pin	29	3.0	21	L
Transmission Case Bearing Holder Bolts (L = 15)	4.9	0.50	43 in·lb	L

PERIODIC MAINTENANCE 2-9

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Transmission Case Bearing Holder Bolts (L = 14)	4.9	0.50	43 in·lb	L
Transmission Case Bolts	20	2.0	15	
Torque Limiter Shaft Plug	25	2.5	18	L
Starter Clutch Shaft Holder Bolt	9.8	1.0	87 in·lb	L
Starter Clutch Shaft Bolt	20	2.0	15	L
Wheels/Tires				
Front Axle Clamp Bolts	20	2.0	15	AL
Front Axle Nut	127	13.0	94	
Rear Axle Nut	127	13.0	94	
Final Drive				
Engine Sprocket Cover Bolts	9.8	1.0	87 in·lb	
Engine Sprocket Nut	145	14.8	107	MO
Rear Axle Nut	127	13.0	94	
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	1.2	0.12	11 in·lb	Si
Brake Lever Pivot Bolt Locknut	5.9	0.60	52 in·lb	
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	15	1.5	11	
Front Brake Reservoir Cap Stopper Screw	1.2	0.12	11 in·lb	
Front Caliper Assembly Bolts	22	2.2	16	
Front Caliper Mounting Bolts	34	3.5	25	
Front Master Cylinder Bleed Valve	5.4	0.55	48 in·lb	
Front Master Cylinder Clamp Bolts	11	1.1	97 in·lb	S
Brake Pedal Mounting Bolt	8.8	0.90	78 in·lb	L
Rear Brake Pad Pin	17	1.7	13	
Rear Brake Pad Pin Plug	2.5	0.25	22 in·lb	
Rear Caliper Pin Bolt	27	2.8	20	Si
Rear Master Cylinder Mounting Bolts	25	2.5	18	
Rear Master Cylinder Push Rod Locknut	17	1.7	13	
Brake Pipe Joint Nuts	18	1.8	13	
Suspension				
Front Fork Clamp Bolts (Upper)	20	2.0	15	
Front Fork Clamp Bolts (Lower)	23	2.3	17	AL
Front Fork Top Plugs	35	3.6	26	
Piston Rod Guide Case	90	9.2	66	
Front Axle Clamp Bolts	20	2.0	15	AL
Rear Shock Absorber Nut (Lower)	34	3.5	25	R
Rear Shock Absorber Bracket Nut	59	6.0	44	R
Swingarm Pivot Adjusting Collar Locknut	98	10.0	72	

2-10 PERIODIC MAINTENANCE

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Swingarm Pivot Shaft	20	2.0	15	
Swingarm Pivot Shaft Nut	108	11.0	80	
Tie-Rod Nuts	34	3.5	25	R
Rocker Arm Nut	34	3.5	25	R
Rear Shock Absorber Nut (Upper)	34	3.5	25	R
Steering				
Steering Stem Head Nut	78	8.0	58	
Steering Stem Nut	20	2.0	15	
Left Switch Housing Screws	3.5	0.36	31 in·lb	
Right Switch Housing Screws	3.5	0.36	31 in·lb	
Front Fork Clamp Bolts (Upper)	20	2.0	15	
Handlebar Clamp Bolts	25	2.5	18	
Handlebar Positioning Bolts	9.8	1.0	87 in·lb	L
Throttle Case Screws	3.5	0.36	31 in·lb	
Steering Damper Mounting Bolts	11	1.1	97 in·lb	L
Front Fork Clamp Bolts (Lower)	23	2.3	17	AL
Frame				
Front Fender Mounting Bolts	3.9	0.40	35 in·lb	L
Front Footpeg Bracket Bolts	25	2.5	18	
Rear Footpeg Bracket Bolts	25	2.5	18	
Rear Frame Front Bolts	44	4.5	32	L
Rear Frame Rear Bolts	25	2.5	18	L
Sidestand Bolt	44	4.5	32	S
Sidestand Bracket Bolts	49	5.0	36	L
Sidestand Nut	29	3.0	21	R, S
Sidestand Switch Bolt	8.8	0.90	78 in·lb	L
Windshield Mounting Bolts	1.2	0.12	11 in·lb	
Electrical System				
License Plate Light Mounting Screws	1.2	0.12	11 in·lb	
Meter Unit Mounting Screws	1.2	0.12	11 in·lb	
Tail/Brake Light Mounting Screws	1.2	0.12	11 in·lb	
Rear Turn Signal Light Lens Screws	1.0	0.10	8.9 in·lb	
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	L
Crankshaft Sensor Cover Bolts	9.8	1.0	87 in·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
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	
Spark Plugs	13	1.3	115 in·lb	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Stator Coil Bolts	12	1.2	106 in·lb	L
Timing Rotor Bolt	39	4.0	29	
Water Temperature Sensor	12	1.2	106 in·lb	
Brush Holder Screw	3.8	0.39	34 in·lb	
Engine Ground Terminal Bolt	9.8	1.0	87 in·lb	
Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
Left Switch Housing Screws	3.5	0.36	31 in·lb	
Right Switch Housing Screws	3.5	0.36	31 in·lb	
Sidestand Switch Bolt	8.8	0.90	78 in·lb	
Starter Motor Cable Terminal Nut	5.9	0.60	52 in·lb	
Starter Motor Mounting Bolts	9.8	1.0	87 in·lb	
Starter Motor Terminal Locknut	11	1.1	97 in·lb	
Starter Motor Through Bolts	5.0	0.51	44 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

2-12 PERIODIC MAINTENANCE

Specifications

Item	Standard	Service Limit
Fuel System (DFI)		
Throttle Grip Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	---
Idle Speed	1 100 ±50 r/min (rpm)	---
Throttle Body Vacuum	30.7 ±1.33 kPa (230 ±10 mmHg) at idle speed	---
Main Throttle Sensor Output Voltage	DC 0.64 ~ 0.68 V at idle throttle opening	---
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	2.6 L (2.7 US qt)	---
Engine Top End		
Valve Clearance:		
Exhaust	0.17 ~ 0.22 mm (0.0067 ~ 0.0087 in.)	---
Intake	0.15 ~ 0.22 mm (0.0059 ~ 0.0087 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	2.9 L (3.1 US qt) (when filter is not removed)	---
	3.3 L (3.5 US qt) (when filter is removed)	---
	3.7 L (3.9 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	5.3 mm (0.21 in.)	Up to 130 km/h (80 mph): 2 mm (0.08 in.) Over 130 km/h (80 mph): 3 mm (0.12 in.)

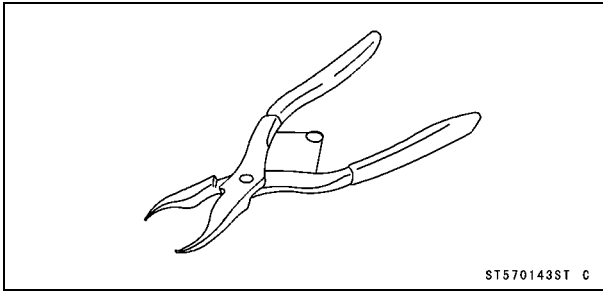
Specifications

Item	Standard	Service Limit
Air Pressure (when Cold): Front Rear	Up to 180 kg (397 lb) load: 250 kPa (2.50 kgf/cm ² , 36 psi) Up to 180 kg (397 lb) load: 290 kPa (2.90 kgf/cm ² , 42 psi)	--- ---
Final Drive Drive Chain Slack Drive Chain Wear (20-link Length) Standard Chain: Make Type Link	25 ~ 35 mm (1.0 ~ 1.4 in.) 317.5 ~ 318.2 mm (12.50 ~ 12.53 in.) ENUMA EK525RMX/3D 112 links	--- 323 mm (12.7 in.) --- --- ---
Brakes Brake Fluid: Grade Brake Pad Lining Thickness: Front Rear Brake Light Timing: Front Rear	DOT4 4.0 mm (0.16 in.) 4.5 mm (0.18 in.) Pulled ON ON after about 10 mm (0.39 in.) of pedal travel	--- 1 mm (0.04 in.) 1 mm (0.04 in.) --- ---
Electrical System Spark Plug: Type Gap	NGK CR9EIA-9 0.8 ~ 0.9 mm (0.031 ~ 0.035 in.)	--- ---

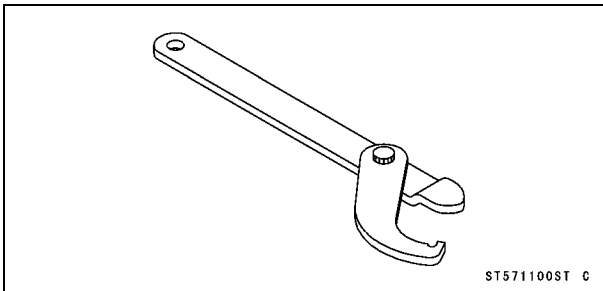
2-14 PERIODIC MAINTENANCE

Special Tools

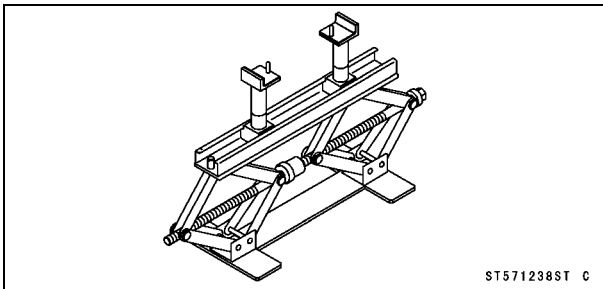
Inside Circlip Pliers:
57001-143



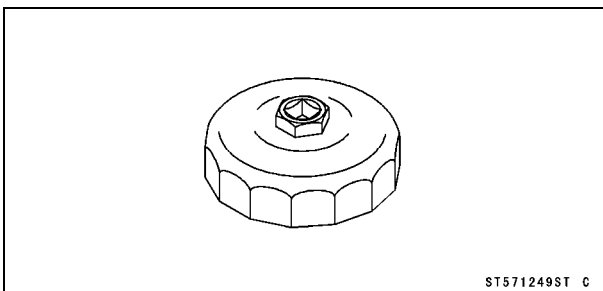
Steering Stem Nut Wrench:
57001-1100



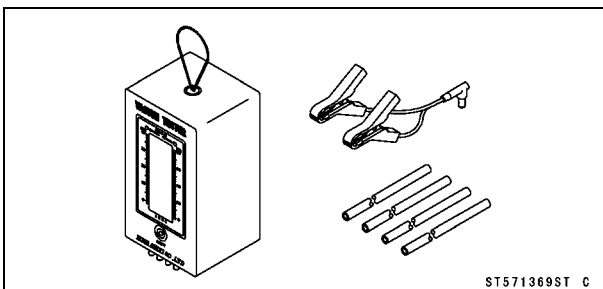
Jack:
57001-1238



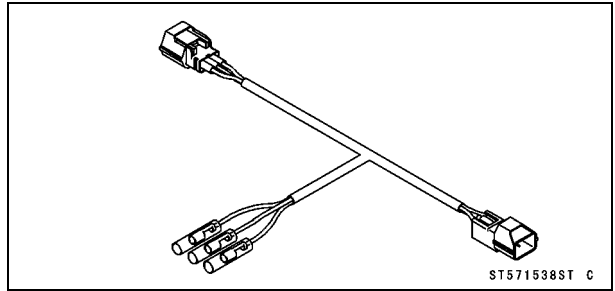
Oil Filter Wrench:
57001-1249



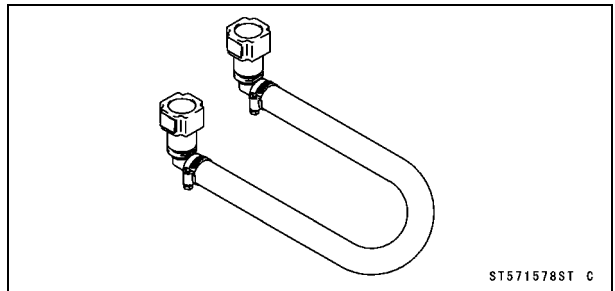
Vacuum Gauge:
57001-1369



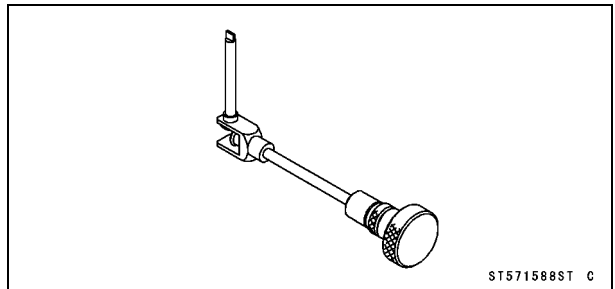
Throttle Sensor Setting Adapter:
57001-1538



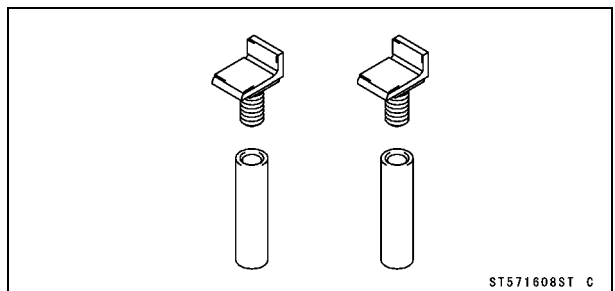
Extension Tube:
57001-1578



Pilot Screw Adjuster, D:
57001-1588



Jack Attachment:
57001-1608



Periodic Maintenance Procedures

Fuel System (DFI)

Throttle Control System Inspection

- Check the throttle grip free play [A].
- ★ If the free play is incorrect, adjust the throttle cables.

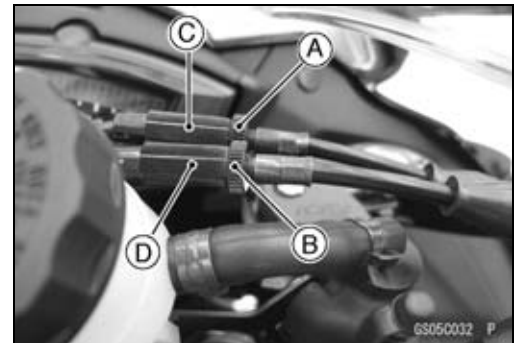
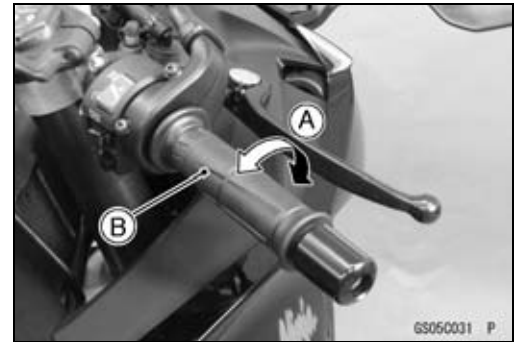
Throttle Grip Free Play

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.

★ 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.

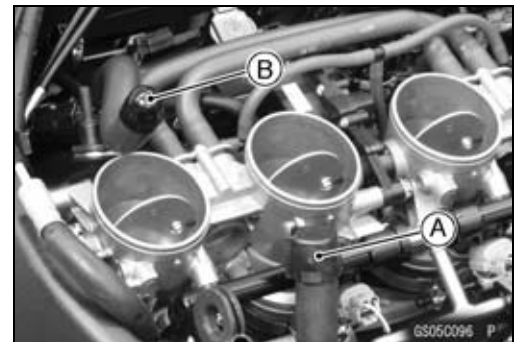


Engine Vacuum Synchronization Inspection

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)
 - Primary Fuel Hose (see Fuel Hose Replacement)
- Plug the breather hose end [A] and the air switching valve hose end [B].



2-16 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

- Remove:
 - Intake Air Pressure Sensor Hose [A]
 - Air Intake Valve Hose [B] (Other than US, CA and CAL Models)
 - Rubber Caps [C]
- For CAL and SEA Models, remove the vacuum hoses.

NOTE

○When the engine is running, the ECU detects the service code 16. But the engine synchronization can be inspected correctly.

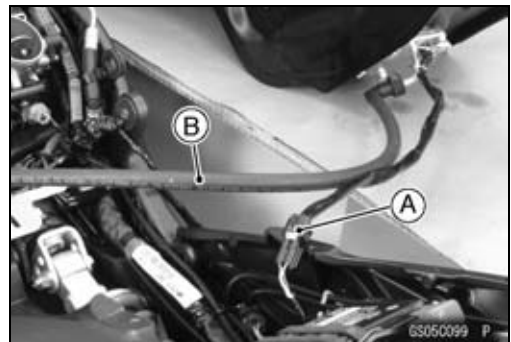
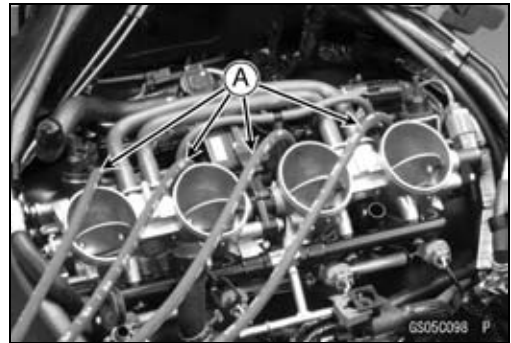
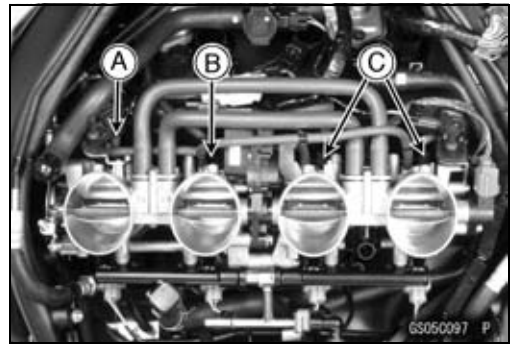
- Connect a vacuum gauge and hoses [A] (Special Tool: 57001-1369) to the fittings on the throttle body.

Special Tool - Vacuum Gauge: 57001-1369

- Connect a highly accurate tachometer to one of the stick coil primary leads.

- Connect the following parts temporarily.
 - Fuel Pump Lead Connector [A]
 - Extension Tube [B]

Special Tool - Extension Tube: 57001-1578



Periodic Maintenance Procedures

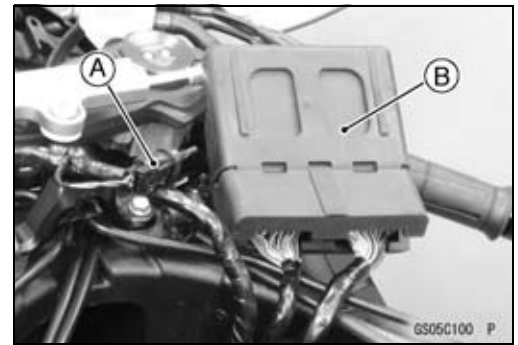
- Connect the following parts temporarily.
 Intake Air Temperature Sensor [A]
 ECU [B]
 Secondary Fuel Hose [C] (see Fuel Hose Replacement)

NOTE

○ Be sure to connect the intake air temperature sensor. When the ignition switch is turned ON without the intake air temperature sensor, the ECU detects the service code 13. Then the ECU starts the fail-safe (see Self-diagnosis Outline in the Fuel System (DFI) chapter). In this case, the engine vacuum synchronization can not be inspected correctly.

○ Do not connect the secondary fuel injector connectors. The engine vacuum synchronization is inspected with the air cleaner housing removed and the engine started. The secondary fuel injectors are operating with following conditions.

1. The engine speed is more than 6 000 r/min (rpm).
2. The throttle opening is more than 12°.



⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, especially when atomized by the fuel injector nozzle. To prevent a fire or explosion, be sure the secondary fuel injector connectors are disconnected before starting the engine so that fuel cannot be sprayed by the injectors.

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

Idle Speed

Standard: 1 100 ±50 r/min (rpm)

- ★ If the idle speed is out of the specified range, inspect the idle speed control valve (see Idle Speed Control Valve Inspection in the Self-Diagnosis System chapter).

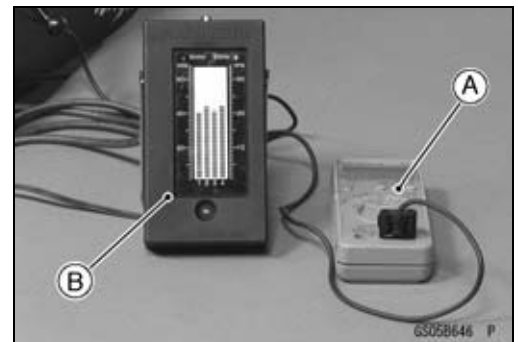
NOTICE

Do not measure the idle speed by the meter unit.

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

Throttle Body Vacuum

Standard: 30.7 ±1.33 kPa (230 ±10 mmHg) at idle speed



2-18 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

- ★ If any vacuum is not within specifications, adjust the bypass screws [A].

View from Front [B]

Special Tool - Pilot Screw Adjuster, D [C]: 57001-1588

- Adjust the each vacuum (#1 ~ #4) to the standard value.
- Open and close the throttle valves after each measurement, and adjust the idle speed as necessary.

NOTE

- The engine vacuum synchronization is adjusted with the secondary fuel injector connectors disconnected. Therefore, the secondary fuel injectors do not operate while adjusting the engine vacuum synchronization. If raising the engine speed more than 6 000 r/min (rpm), the engine may not operate smoothly.
- Do not turn the center adjusting screw [D].

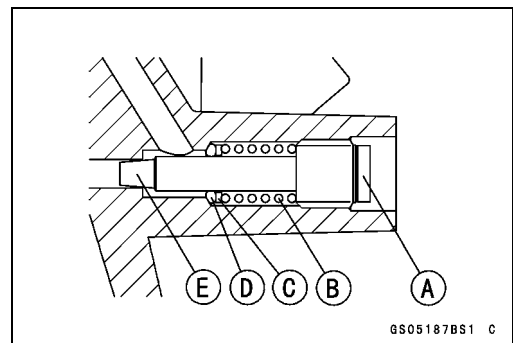
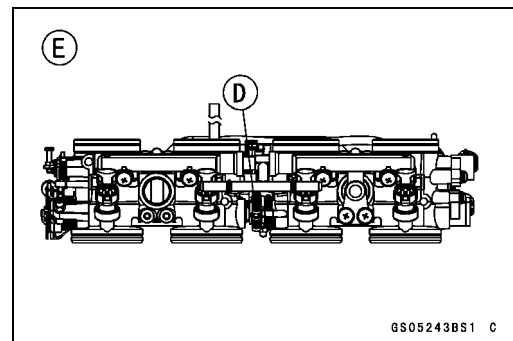
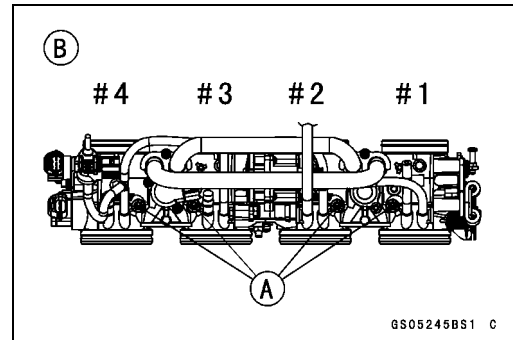
View from Rear [E]

- 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, remove the bypass screws #1 ~ #4 and replace them with new ones.

- Turn in the bypass screw [A] with counting the number of turns until it seals 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 L) lead

Digital Meter (–) → BK (sensor V/W) lead

Standard: DC 0.64 ~ 0.68 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 intake air pressure sensor hose, rubber caps and air intake valve hose on the original position.
- For CAL and SEA Models, install the vacuum hoses.
- Run the vacuum hose according to Cable, Wire, and Hose Routing section in the Appendix chapter.

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 cables could result in an unsafe riding condition. Follow the service manual to be make sure to correct any of these conditions.

- Check the idle speed.
- ★ If the idle speed is out of specified range, check the idle speed control valve (see Idle Speed Control Valve Inspection in the Self-Diagnosis System chapter).

Idle Speed

Standard: 1 100 ±50 r/min (rpm)

2-20 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Idle Speed Adjustment

NOTE

○ This motorcycle is equipped with the idle speed control valve. The idle speed is adjusted automatically at the specified value (1 100 r/min (rpm)) by the idle speed control valve system. Therefore, it is not necessary to adjust the idle speed normally.

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.

● Check that the primary fuel hose [A] and secondary fuel hose [B] are routed according to Cable, Wire, and Hose Routing section in the Appendix chapter.

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

● 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.

○ Check the other hose joint in the same way.

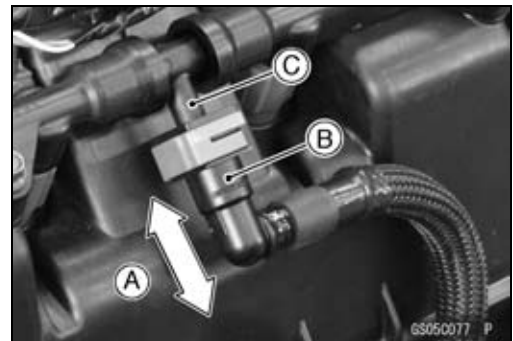
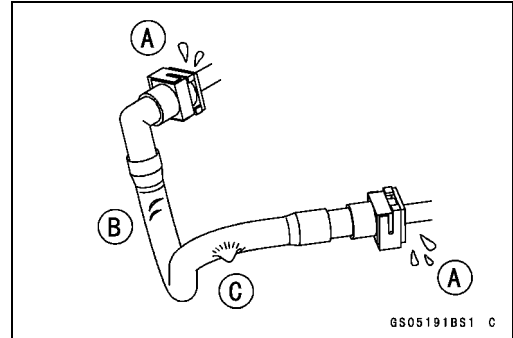
NOTICE

When pushing and pulling the fuel hose joint, do not apply strong force to the delivery pipe [C] on the nozzle assy. The pipe made from resin could be damaged.

⚠ 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.



Periodic Maintenance Procedures

Evaporative Emission Control System Inspection (CAL and SEA Models)

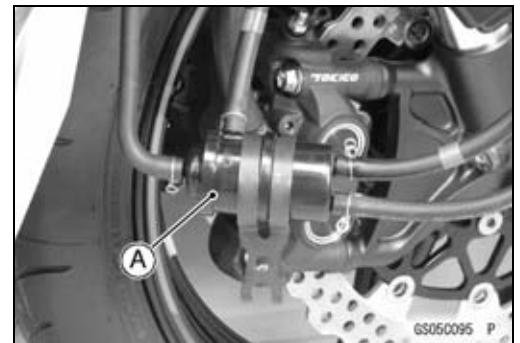
- Inspect the canister as follows.
 - Remove the upper fairing assembly (see Upper Fairing Assembly Removal in the Frame chapter).
 - Remove the canister [A].
 - Visually inspect the canister for cracks or other damage.
 - ★ If the canister has any cracks or bad damage, replace it with a new one.

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 liquid/vapor separator as follows.
 - Remove the upper fairing assembly (see Upper Fairing Assembly Removal in the Frame chapter).
 - Disconnect the hoses from the separator [A].
 - Visually inspect the separator for cracks and other damage.
 - ★ If the separator has any cracks or damage, replace it with a new one.
 - To prevent the gasoline from flowing into or out of the canister, hold the separator perpendicular to the ground.
- Check the hoses of the evaporative emission control system as follows.
 - 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.



2-22 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Cooling System

Coolant Level Inspection

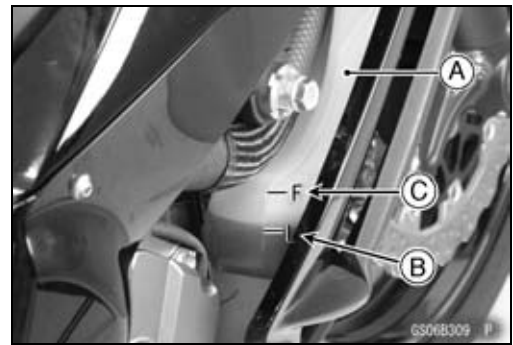
NOTE

○ 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.

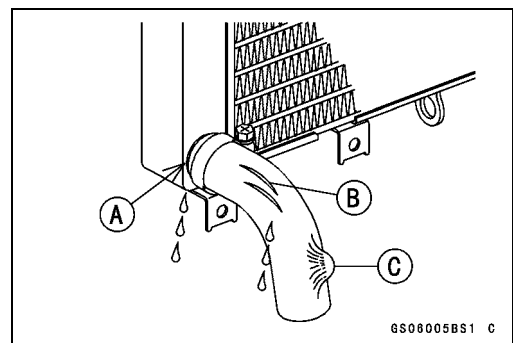
If coolant must be added often or the reservoir tank has run completely dry, there is probably leakage in the cooling system. Check the system for leaks.

Coolant ruins painted surfaces. Immediately wash away any coolant that spills on the frame, engine, wheels or other painted parts.

Radiator 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)



Periodic Maintenance Procedures

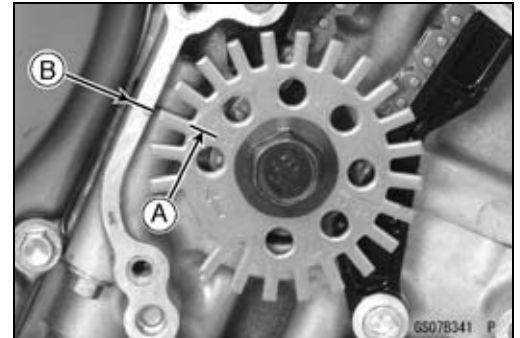
Engine Top End

Valve Clearance Inspection

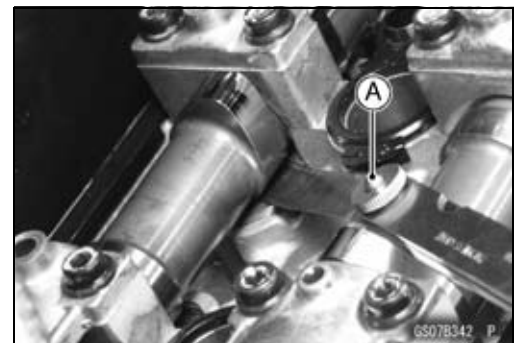
NOTE

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

- Remove:
 - Crankshaft Sensor Cover (see Crankshaft Sensor Removal in the Electrical System chapter)
 - Cylinder Head Cover (see Cylinder Head Cover Removal in the Engine Top End chapter)
- Turn the crankshaft, align the #1, 4 mark on the timing rotor with the crankcase timing mark.
 - TDC Mark [A] for #1, 4 Pistons
 - Timing Mark [B] (Crankcase Halves Mating Surface)



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



Valve Clearance

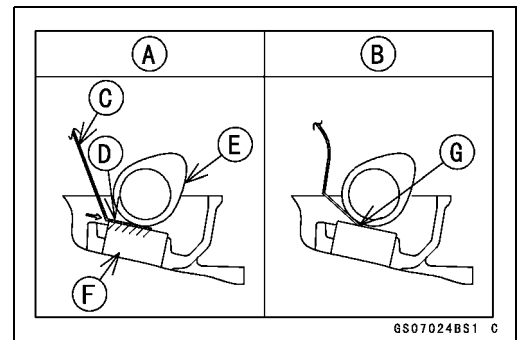
Standard:

- Exhaust 0.17 ~ 0.22 mm (0.0067 ~ 0.0087 in.)
- Intake 0.15 ~ 0.22 mm (0.0059 ~ 0.0087 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]

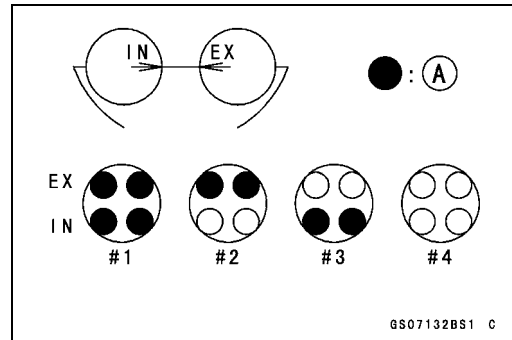


2-24 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

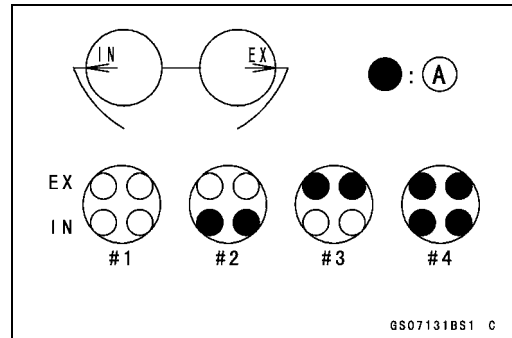
○When positioning #1 piston TDC at the end of the compression stroke:

- 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]



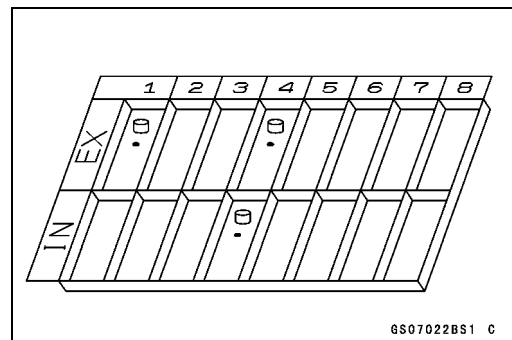
- ★If the valve clearance is not within the specified range, first record the clearance, and then adjust it.

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 = 0.195 mm (Exhaust), 0.185 mm (Intake))

[d] Replace Shim Thickness

Example (Exhaust):

$$1.600 + 0.28 - 0.195 = 1.685 \text{ mm}$$

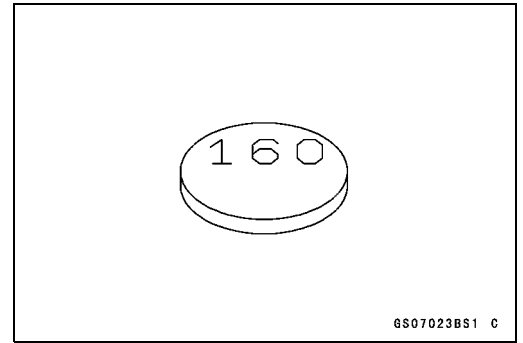
- Exchange the shim for the 1.675 size shim.



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



2-26 PERIODIC MAINTENANCE

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.

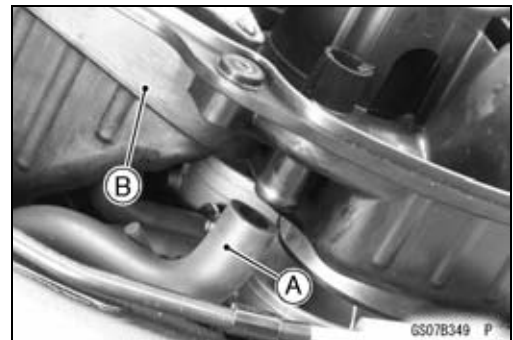
NOTICE

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).

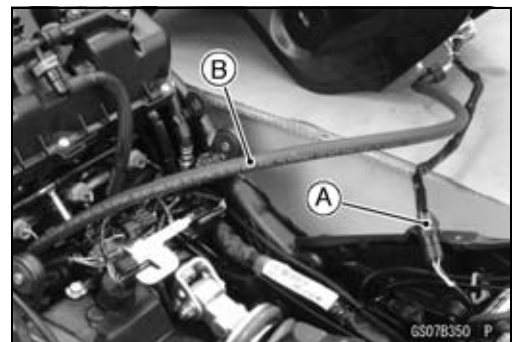
Air Suction System Damage Inspection

- Separate 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

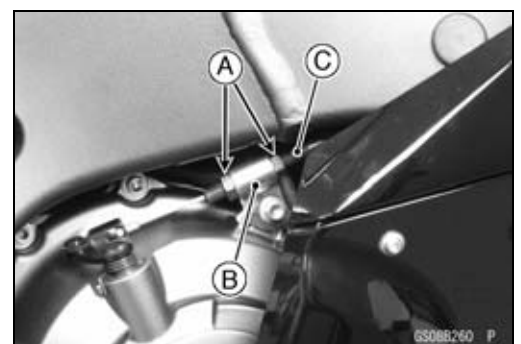
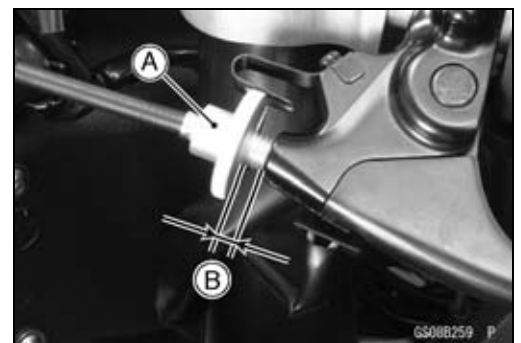
Standard: 2 ~ 3 mm (0.08 ~ 0.12 in.)



⚠ 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.
- Loosen both adjusting nuts [A] at the bracket [B] on the clutch cover as far as they will go.
- Pull the clutch outer cable [C] tight and tighten the adjusting nuts against the bracket.
- Turn the adjuster at the clutch lever until the free play is correct.



2-28 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

- Push the release lever [A] toward the front of the motor-cycle 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.



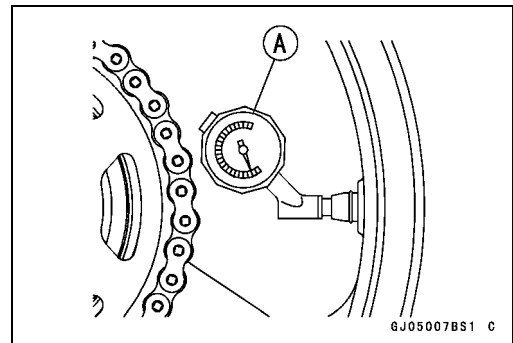
Wheels/Tires

Tire 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.

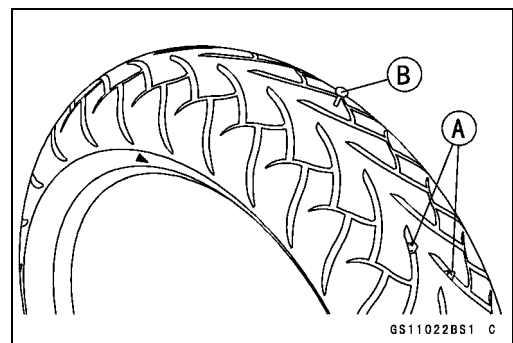
Air Pressure (when Cold)

- 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)



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.

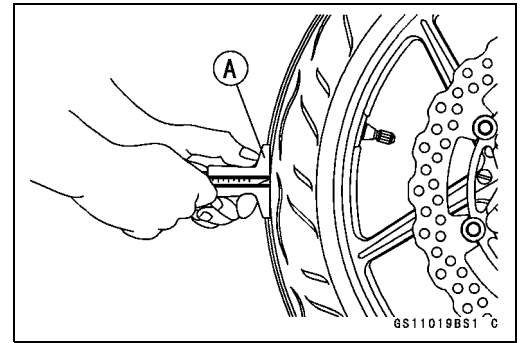


Periodic Maintenance Procedures

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 5.3 mm (0.21 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))

⚠ 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.

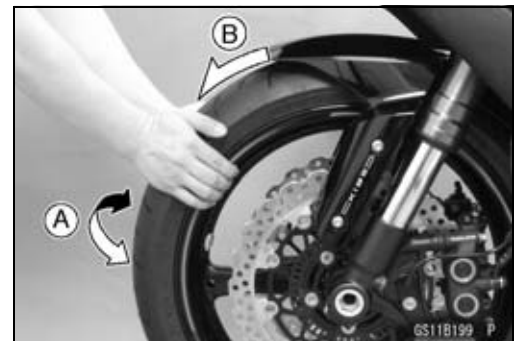
Wheel Bearing Damage Inspection

- 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

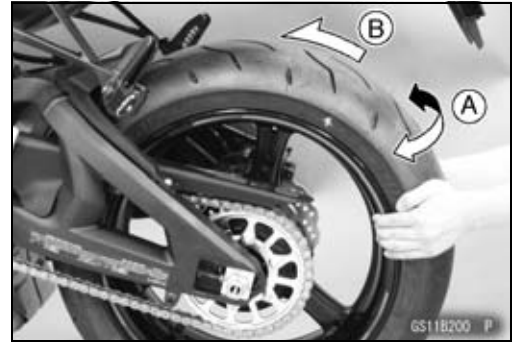
- Turn the handlebar all the way to the right or left.
- Inspect the roughness of the front wheel bearing by moving [A] the wheel while turn the steering to one side.
- Spin [B] the front wheel lightly, and check for smoothly turn, roughness, binding or noise.
- ★ If roughness, binding or noise is found, remove the front wheel and inspect the wheel bearing (see Front Wheel Removal, Hub Bearing Inspection in the Wheels/Tires chapter).



2-30 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

- 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 moving [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).



Final Drive

Drive Chain Lubrication Condition Inspection

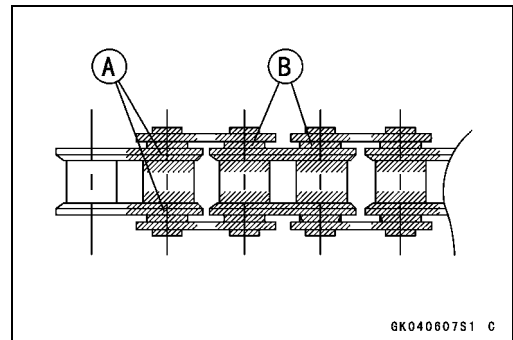
- If a special lubricant is not available, a heavy oil such as SAE 90 is preferred to a lighter oil because it will stay on the chain longer and provide better lubrication.
- If the chain appears especially dirty, clean it before lubrication.

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]

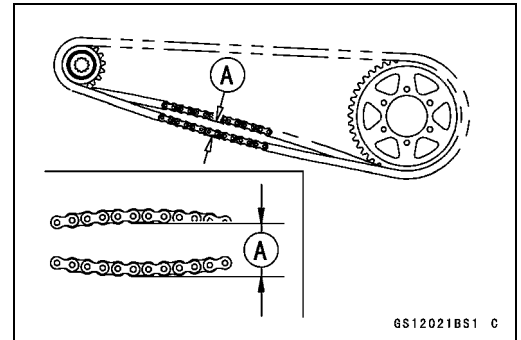


Periodic Maintenance Procedures

Drive Chain Slack Inspection

NOTE

- Check the slack with the motorcycle setting on its side-stand.
- Clean the chain if it is dirty, and lubricate it if it appears dry.
- Check the wheel alignment (see Wheel Alignment Inspection).
- Rotate the rear wheel to find the position where the chain is tightest.
- Measure the vertical movement (chain slack) [A] midway between the sprockets.
- ★ If the chain slack exceeds the standard, adjust it.

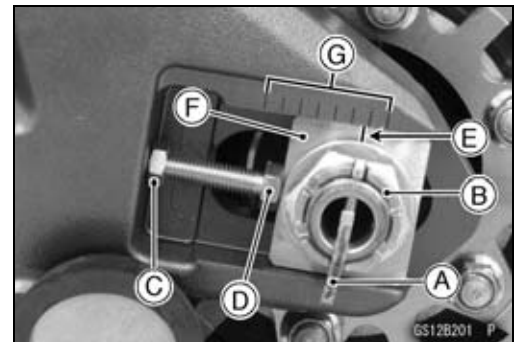


Chain Slack

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

Drive Chain Slack Adjustment

- Remove the cotter pin [A], and loosen the 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.



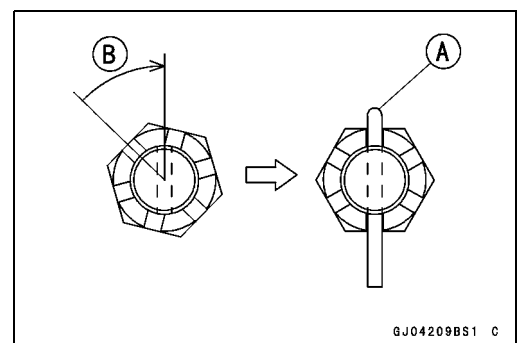
⚠ WARNING

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, 94 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°.
- Loosen once and tighten again when the slot goes past the nearest hole.



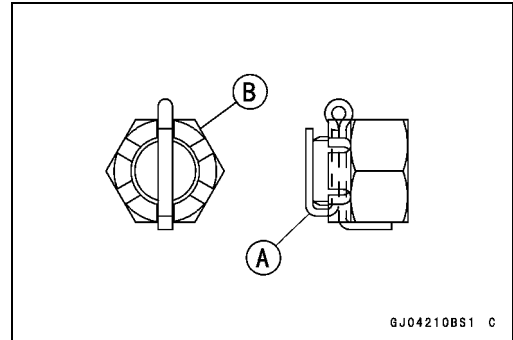
2-32 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

- 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.



Wheel Alignment Inspection

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

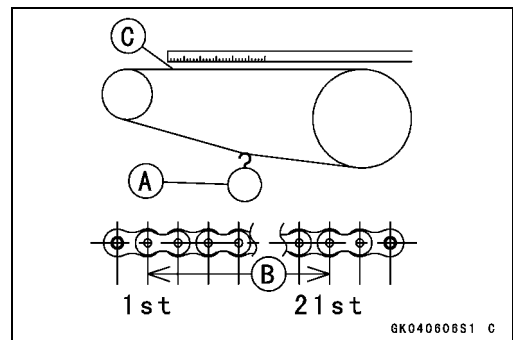
Drive Chain Wear Inspection

- 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: 323 mm (12.7 in.)



Periodic Maintenance Procedures

⚠ WARNING

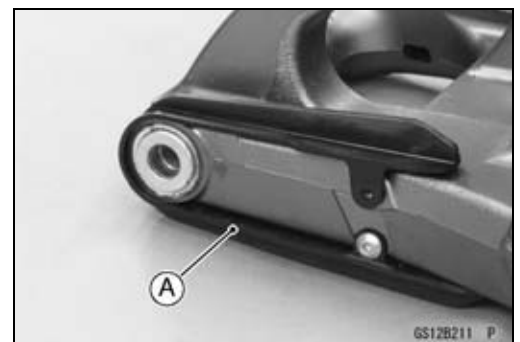
A chain that breaks or jumps off the sprockets could snag on the engine sprocket or lock the rear wheel, severely damaging the motorcycle and causing it to go out of control. Inspect the chain for damage and proper adjustment before each ride. If chain wear exceeds the service limit, replace it with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

Standard Chain

- Make: ENUMA
- Type: EK525RMX/3D
- Link: 112 links

Chain Guide Wear Inspection

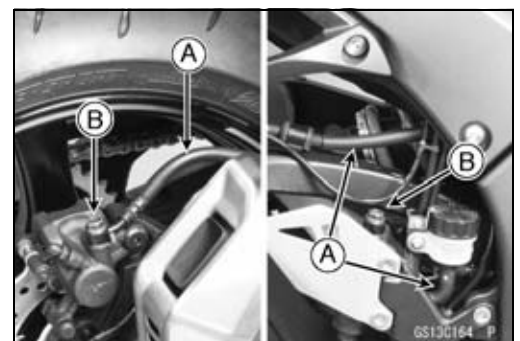
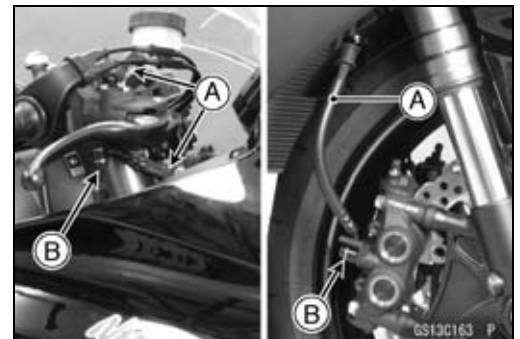
- Remove the swingarm (see Swingarm Removal in the Suspension chapter).
- Visually inspect the chain guide [A].
- ★ Replace the chain guide if it shows any signs of abnormal wear or damage.



Brakes

Brake Fluid Leak (Brake Hose and Pipe) Inspection

- Apply the brake lever or pedal and inspect the brake fluid leak from the brake hoses [A] and fittings [B].
- ★ If the brake fluid leaked from any position, inspect or replace the problem part.



2-34 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Brake Hose and Pipe Damage and Installation Condition Inspection

- Inspect the brake hoses, pipes and fittings for deterioration, cracks and signs of leakage.
- The high pressure inside the brake line can cause fluid to leak [A] or the hose to burst if the line is not properly maintained. Bend and twist the rubber hose while examining it.
- ★ Replace the hose if any crack [B], bulge [C] or leakage is noticed.
- ★ Tighten any brake hose banjo bolts.

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

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

Brake Fluid Level Inspection

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

NOTE

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

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

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

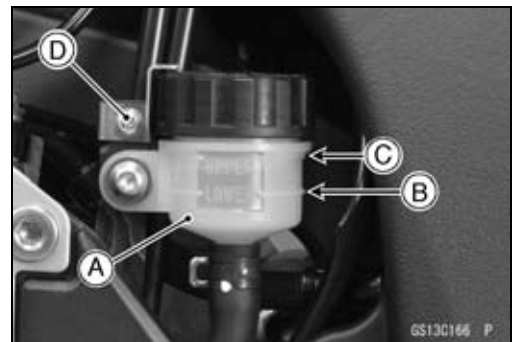
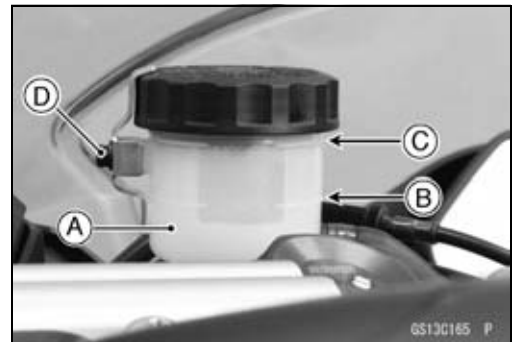
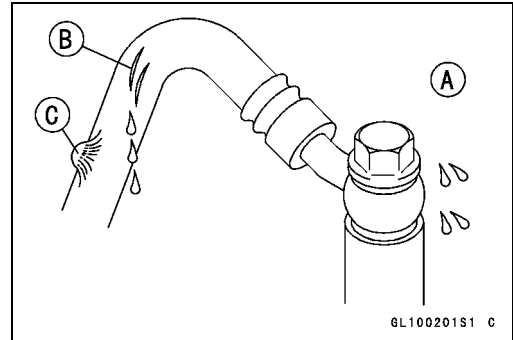
- ★ If the fluid level is lower than the lower level line, fill the reservoir to the upper level line [C].
- Remove the stopper [D].

⚠ 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

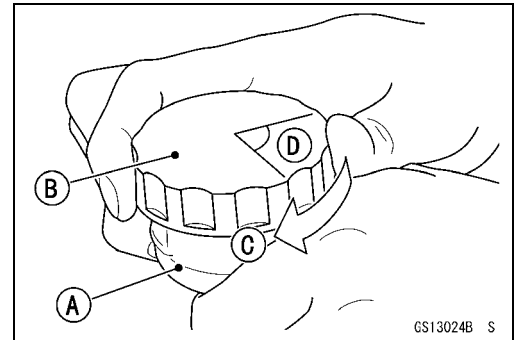
Grade: DOT4



Periodic Maintenance Procedures

- 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.

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



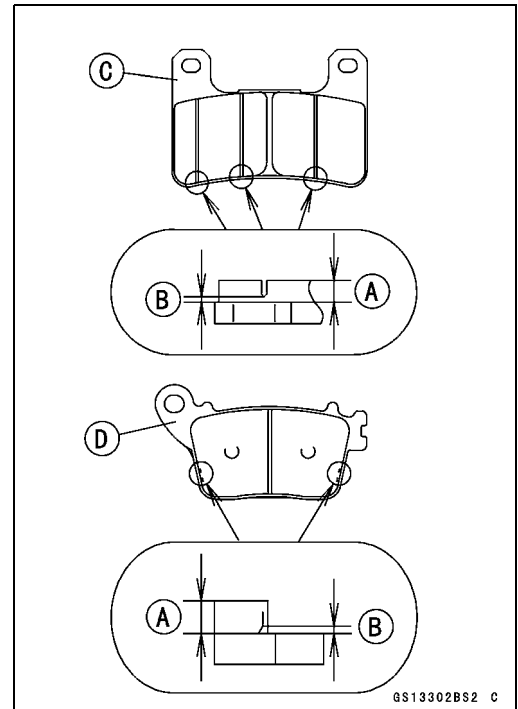
Brake Pad Wear Inspection

- 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	4.5 mm (0.18 in.)
Service Limit:	1 mm (0.04 in.)



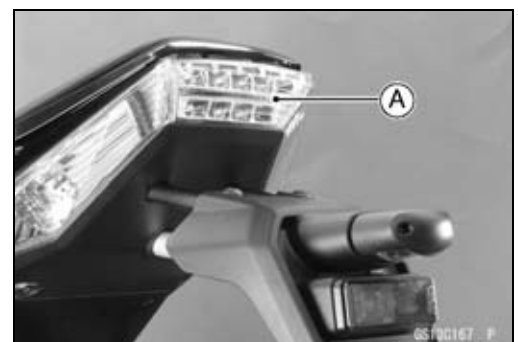
Brake Operation Inspection

- 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 Light Switch Operation Inspection

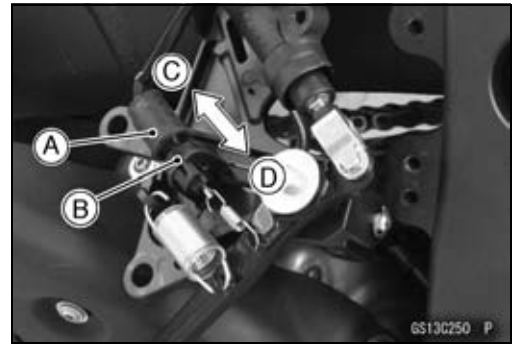
- Turn the ignition switch to ON.
- The brake light (LED) [A] should go on when the brake lever is applied or after the brake pedal is depressed about 10 mm (0.39 in.).



2-36 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

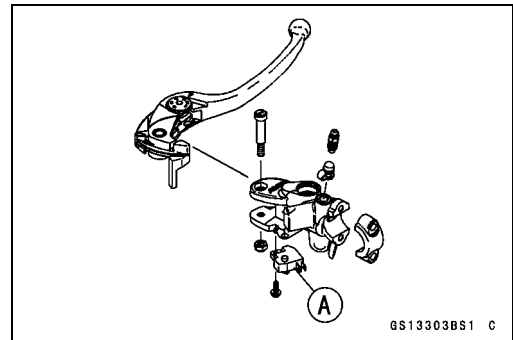
- ★ If it does not, adjust the brake light switch.
- Remove the front footpeg bracket (see Brake Pedal Removal in the Brakes chapter).
- Remove the front footpeg bracket (see Brake Pedal Removal in the Brakes chapter).
- While holding the switch body, turn the adjusting nut to adjust the switch.
 - Switch 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 10 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

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).



Periodic Maintenance Procedures

Front Fork Oil Leak Inspection

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



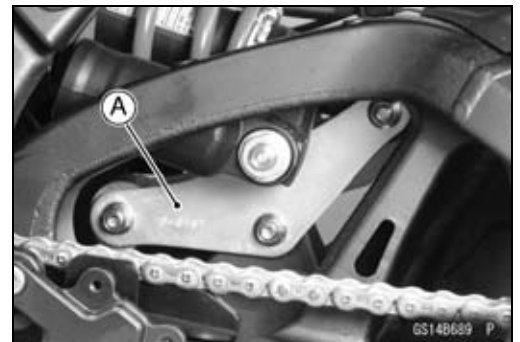
Rear Shock Absorber Oil Leak Inspection

- 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 Tie-Rod/Rocker Arm Bearing, Sleeve Inspection in the Suspension chapter).
- In this photo, the foot guard has been removed for clarity.



Tie-Rod Operation Inspection

- Pump the rear 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 Tie-Rod/Rocker Arm Bearing, Sleeve Inspection in the Suspension chapter).
- In this photo, the foot guard has been removed for clarity.



2-38 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Steering

Steering Play Inspection

- Remove the lower fairings (see Lower Fairing Removal in the Frame chapter).
- Raise the front wheel off the ground with the jack.

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.*

Steering Play Adjustment

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

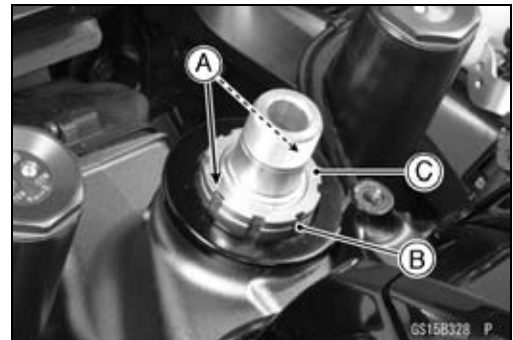
- Adjust the steering using the steering stem nut wrench [A].

Special Tool - Steering Stem Nut Wrench: 57001-1100

- ★ If the steering is too tight, loosen the steering stem nut [B] a fraction of a turn.
- ★ If the steering is too loose, tighten the steering stem nut a fraction of a turn.

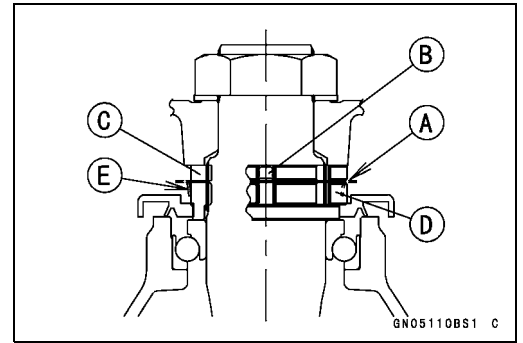
NOTE

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



Periodic Maintenance Procedures

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



- Install the steering stem head.
- Install the washer, and temporary tighten the steering stem head nut.

NOTE

○Tighten the upper front fork clamp bolts first, then the stem head nut.

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

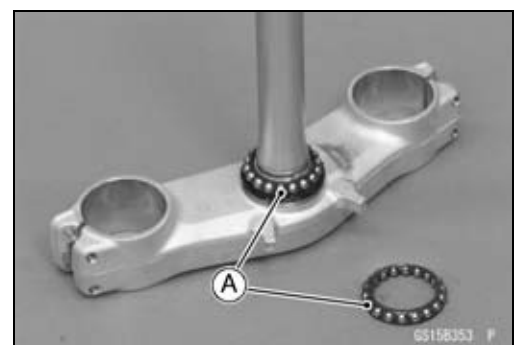
⚠ WARNING

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.

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.
- Wipe the upper and lower outer races which are press-fitted into the head pipe to 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).



2-40 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Steering Damper Oil Leak Inspection

- Visually inspect the steering damper [A] for oil leakage.
- ★ If the oil leakage is found on it, replace the steering damper with a new one (see Steering Damper Removal/Installation in the Steering chapter).



Periodic Maintenance Procedures

Electrical System

Lights and Switches Operation Inspection

First Step

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

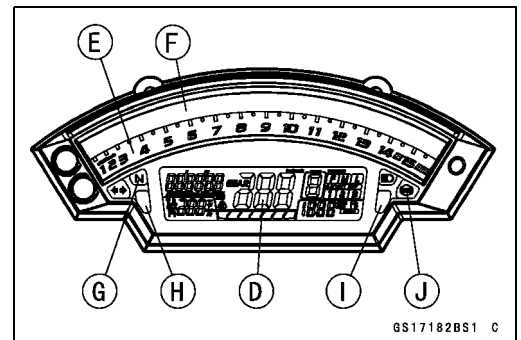
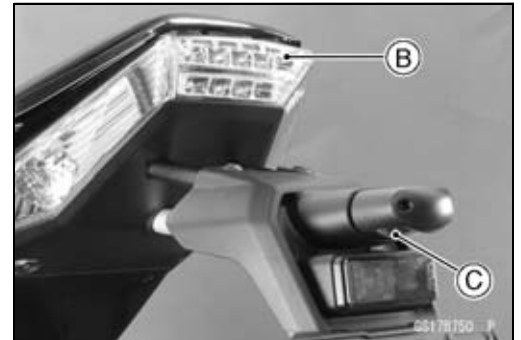
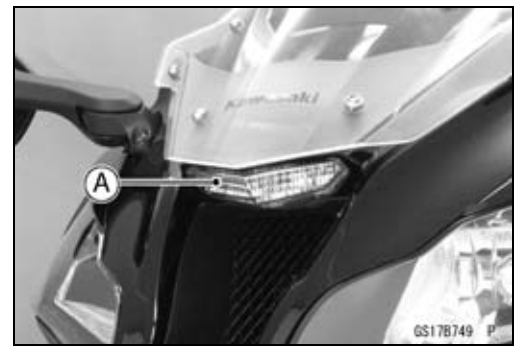
[A]	City Light (LED)	Goes on
[B]	Taillight (LED)	Goes on
[C]	License Plate Light	Goes on
[D]	Meter Panel LCD	Goes on by degrees
[E]	Meter Panel Illumination Light (LED)	
[F]	Tachometer (LED)	Blinks (3 times)
[G]	Neutral Indicator Light (LED)	Goes on
[H]	Warning Indicator Light (Red LED) and Oil Pressure Warning Symbol	Goes on
[I]	Warning Indicator Light (Yellow LED)	Goes on (1 second)
[J]	(ZX1000J) Fuel Level Warning Indicator Light (LED)	Goes on (1 second)
	(ZX1000K) ABS Warning Indicator Light (LED)	Goes on

★ If the following light does not go on, inspect the meter unit (see Meter Unit Inspection in the Electrical System chapter).

- Meter Panel LCD
- Meter Panel Illumination Light (LED)
- Neutral Indicator Light (LED)
- Warning Indicator Light (Red LED)
- Warning Indicator Light (Yellow LED)
- (ZX1000J) Fuel Level Warning Indicator Light (LED)
- (ZX1000K) ABS Warning Indicator Light (LED)

★ 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 (see City Light Removal/Installation in the Electrical System chapter)
- License Plate Light Bulb (see License Plate Light Bulb Replacement in the Electrical System chapter)
- ECU (see ECU Power Supply Inspection in the Fuel System (DFI) chapter)
- Main Fuse 30 A, Meter Fuse 10 A and Brake Light/Horn Fuse 10 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)



2-42 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

- Turn the ignition switch to OFF.
- The all lights should go off.
- For models equipped with an immobilizer system, warning indicator light (Red LED) will blink. 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 to P (Park) position.
- The city light, taillight and license plate light should go on.
- ★ If the light does not go on, inspect or replace the ignition switch (see Switch Inspection in the Electrical System chapter).

Third Step

- Turn the ignition switch to ON.
- Turn the turn signal switch [A] to ON (left or right position).
- The left or right turn signal lights [B] (front and rear) according to the switch position should flash.
- The turn signal indicator light (LED) [C] in the meter unit should flash.
- ★ If the each light does not flash, inspect or replace the following parts.

Front Turn Signal Light (see Upper Fairing Assembly Removal/Installation in the Frame chapter)

Rear Turn Signal Light Bulb (see Rear Turn Signal Light Bulb Replacement in the Electrical System chapter)

Turn Signal Indicator Light (LED) (see Meter Unit Inspection in the Electrical System chapter)

Turn Signal Relay Fuse 10 A (see Fuse Inspection in the Electrical System chapter)

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

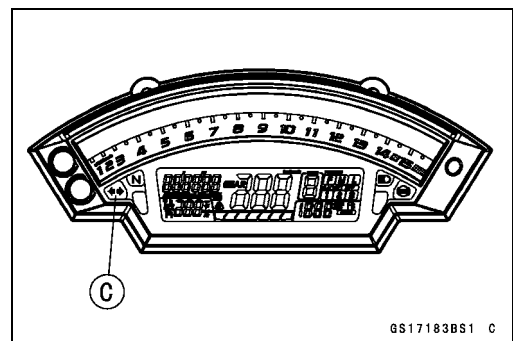
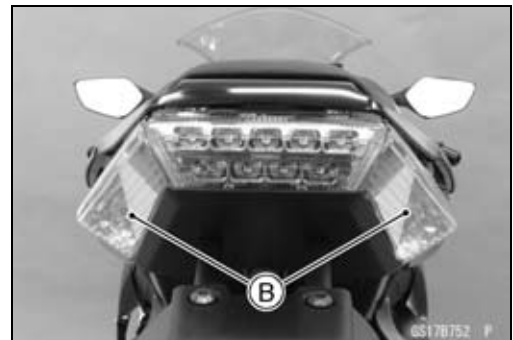
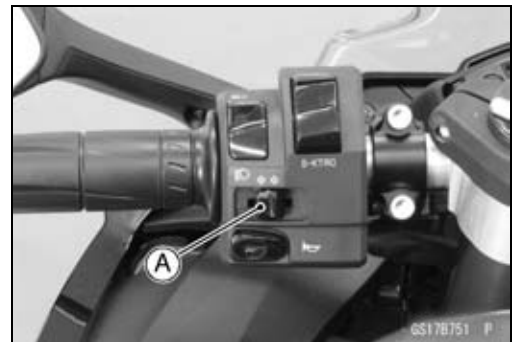
Turn Signal Relay (see Turn Signal Relay Inspection in the Electrical System chapter)

Harness (see Wiring Inspection in the Electrical System chapter)

- Push the turn signal switch.
- The turn signal lights and 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)



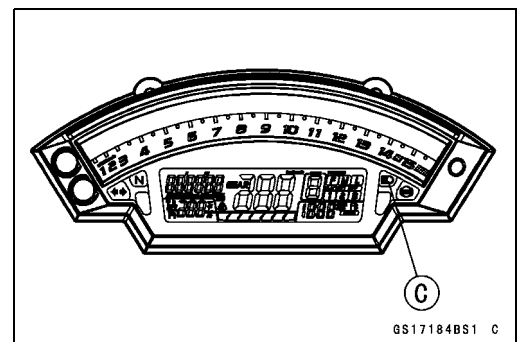
Periodic Maintenance Procedures

Fourth 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)



- Set the dimmer switch to high beam position.
- The low beam [A] and high beam [B] headlights should go on.
- The high beam indicator light (LED) [C] should go on.
- ★ If the high beam headlight and/or 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 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 to OFF.
- The headlights and 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 headlight aiming.

Headlight Aiming Adjustment

NOTE

○ Do not turn the bolts [A] because the reflector in the headlight comes off.
 (In the photo, the headlight unit has been removed for clarity.)



2-44 PERIODIC MAINTENANCE

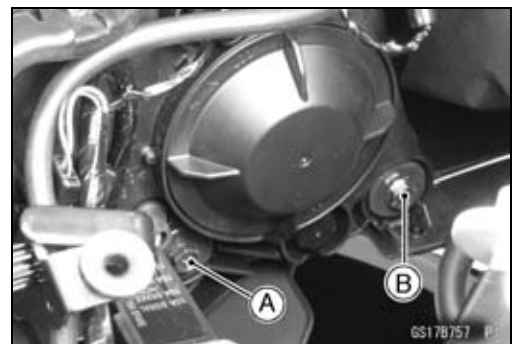
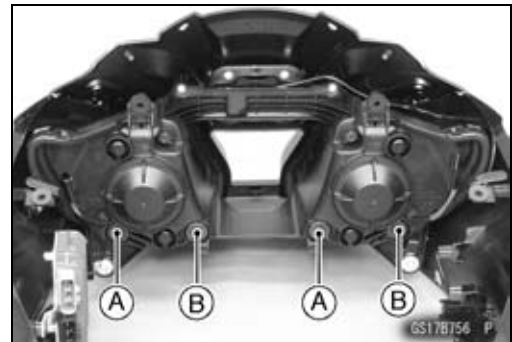
Periodic Maintenance Procedures

NOTE

○The left adjuster [A] and right adjuster [B] can move the direction of the headlight beam to up, down, left and right by turning each adjuster itself as the below table.

	Turning Direction of Adjuster	Moving Direction of Headlight Beam
Left Adjuster	Clockwise	Left and Down
	Counterclockwise	Right and Up
Right Adjuster	Clockwise	Right and Down
	Counterclockwise	Left and Up

- To move the headlight beam leftward, turn the left adjuster [A] clockwise and turn the right adjuster [B] counterclockwise same number as the left adjuster was turned until the beam points straight ahead.
- To move the headlight beam rightward, turn the left adjuster counterclockwise and turn the right adjuster clockwise same number as the left adjuster was turned until the beam points straight ahead.
- To move the headlight beam upward, turn the both adjusters counterclockwise same number.
- To move the headlight beam downward, turn the both adjusters clockwise same number.



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.

NOTE

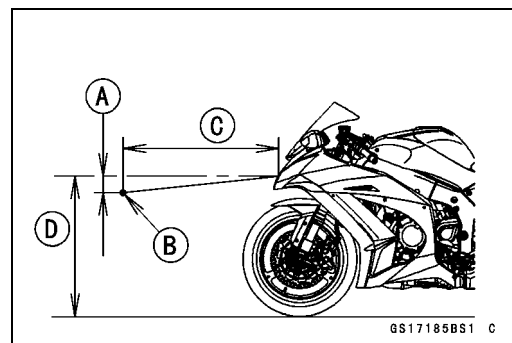
○For US model, the proper angle is 0.4° below horizontal. This is 50 mm (2 in.) drop at 7.6 m (25 ft) measured from the center of the headlight with the motorcycle on its wheels and the rider seated.

50 mm (2 in.) [A]

Center of Brightest Spot [B]

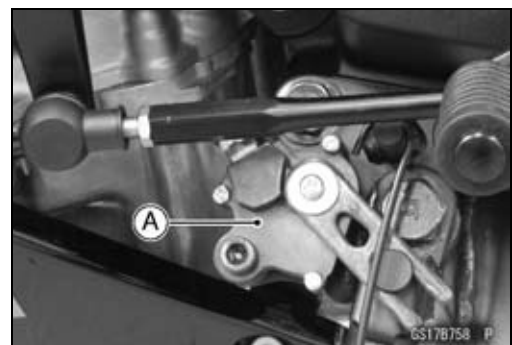
7.6 m (25 ft) [C]

Height of Headlight Center [D]



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.



Periodic Maintenance Procedures

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

- Set the gear position in the neutral position.
 - Turn the ignition switch to ON.
 - Turn the engine stop switch to stop position [A].
 - Push the starter button.
 - The engine does not start.
- ★ If the engine starts, inspect the engine stop switch (see Switch Inspection in the Electrical System chapter).

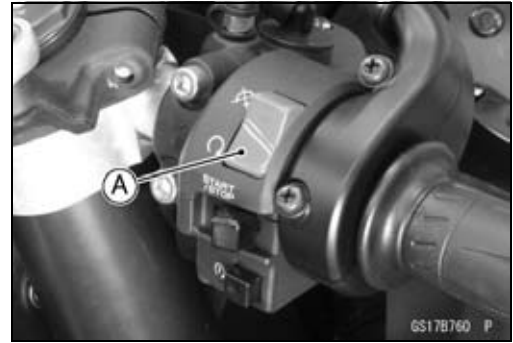


2-46 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Second Step

- 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 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).



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

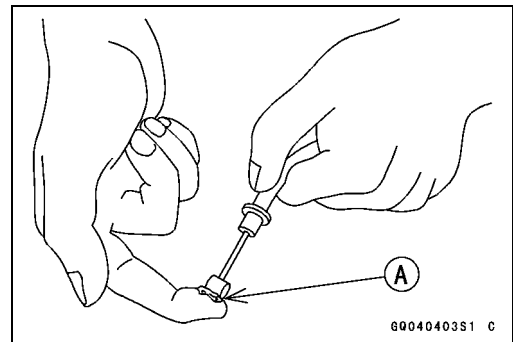
○ Whenever the vehicle has been operated under wet or rainy conditions, or especially after using a high-pressure water spray, perform the general lubrication.

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

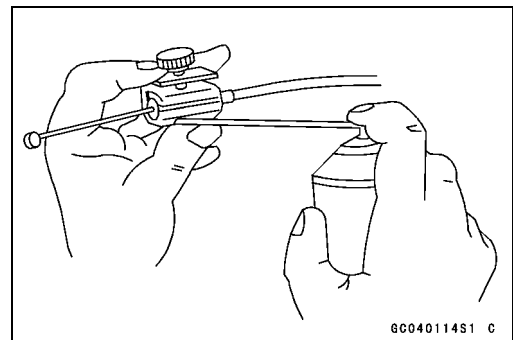


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Cables: Lubricate with Rust Inhibitor.

- Clutch Cable
- Throttle Cables

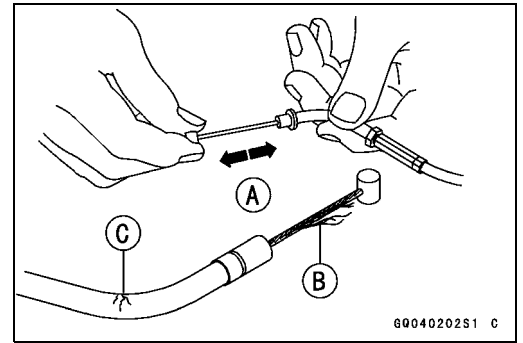
- Lubricate the cables by seeping the oil between the cable and housing.
- The cable may be lubricated by using a commercially available pressure cable lubricator with an aerosol cable lubricant.



60040114S1 C

Periodic Maintenance Procedures

- 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.



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.

2-48 PERIODIC MAINTENANCE

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 Nut
- Rear Axle Nut
- Rear Axle Nut Cotter Pin

Brakes:

- Brake Lever Pivot Bolt and 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 Nut

Others:

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

Periodic Maintenance Procedures

Replacement Parts

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

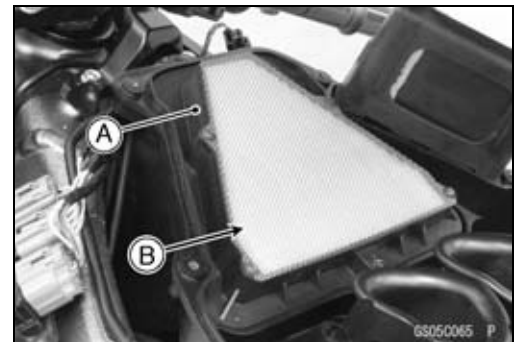
If dirt gets through into the engine, excessive engine wear and possibly engine damage will occur.

- Remove the upper air cleaner housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter).
- Discard the air cleaner element [A], and install a new element so that the screen side [B] faces upward.

NOTICE

Use only the recommended air cleaner element (Kawasaki part number 11013-0041). 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 Installation in the Fuel System (DFI) chapter).

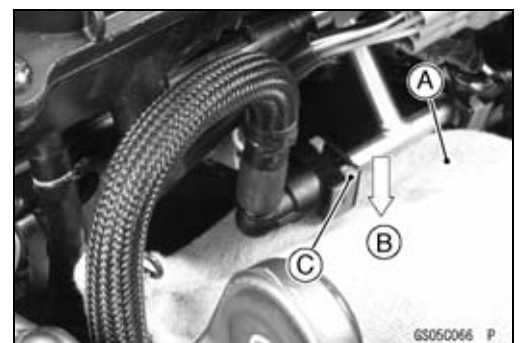


Fuel Hose Replacement

- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).

For Primary Fuel Hose (Fuel Tank ~ Throttle Body Assy)

- Be sure to place a piece of cloth [A] around the fuel hose joint.
- Push [B] the joint lock [C], disconnect it.



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

⚠ WARNING

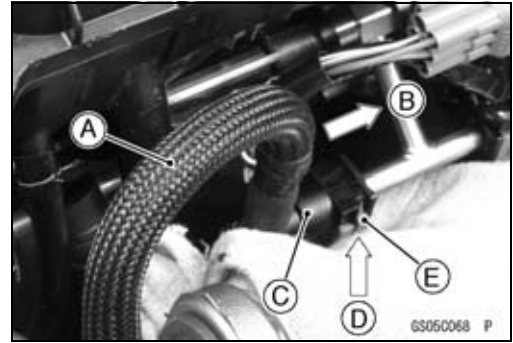
Fuel is flammable and explosive under certain conditions and can cause severe burns. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately. When the fuel hose is disconnected, fuel spills out from the hose and the pipe. Cover the hose connection with a clean shop towel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



2-50 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

- 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.

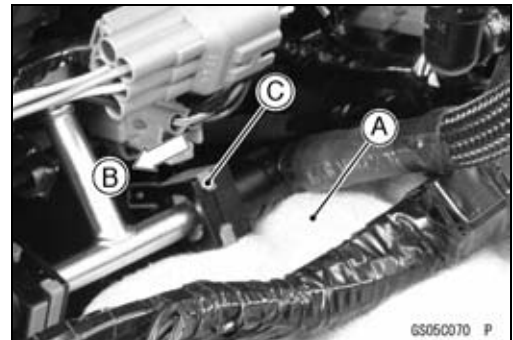
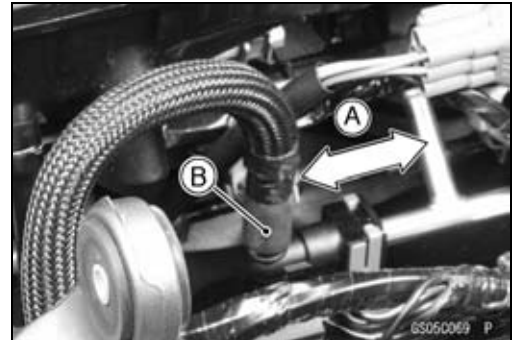
⚠ WARNING

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.

For Secondary Fuel Hose (Throttle Body Assy ~ Nozzle Assy)

- Be sure to place a piece of cloth [A] around the fuel hose joint.
- Push [B] the joint lock [C], disconnect it.

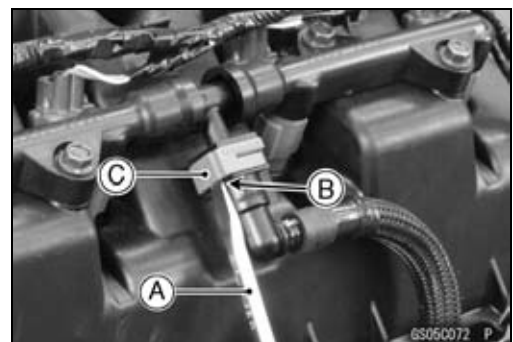


- Pull the fuel hose joint [A] out of the delivery pipe.

⚠ 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.

- Insert a thin blade screwdriver [A] into the slit [B] on the joint lock [C].

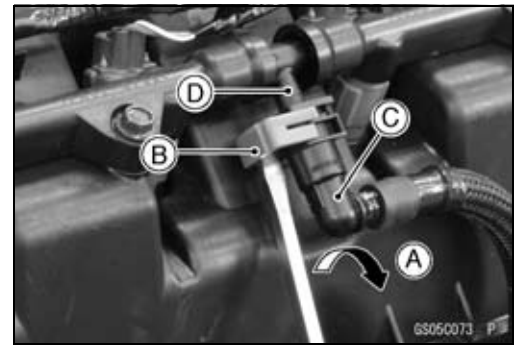


Periodic Maintenance Procedures

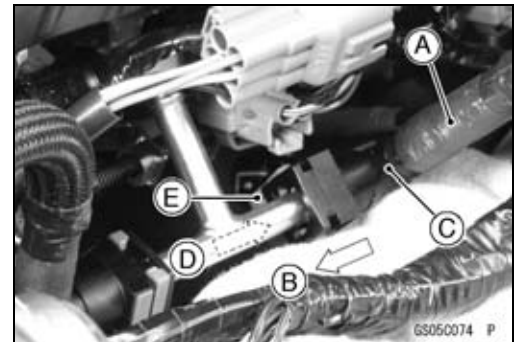
- Turn [A] the driver to disconnect the joint lock [B].
- Pull the fuel hose joint [C] out of the delivery pipe.

NOTICE

When pulling out the fuel hose joint, do not apply strong force to the delivery pipe [D] on the nozzle assy. The pipe made from resin could be damaged.



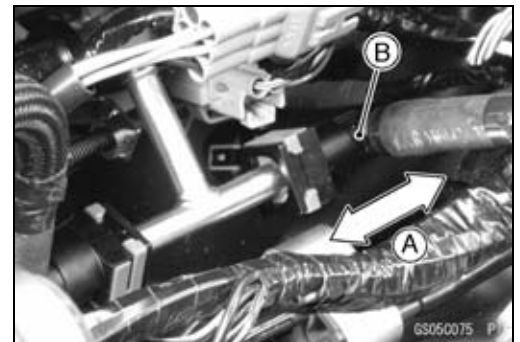
- Replace the fuel hose [A] with a new one.
- Insert [B] the fuel hose joint [C] straight onto the delivery pipe until the hose joint clicks.
- Push [D] the joint lock [E].



- 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.

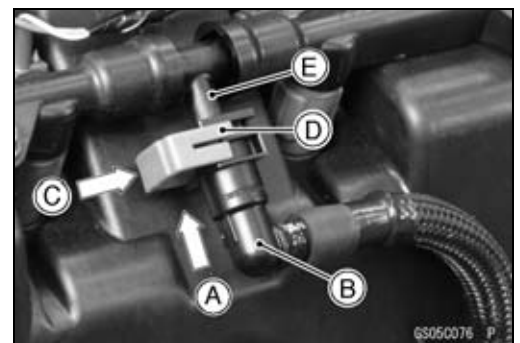


★ If it comes off, reinstall the hose joint.

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

NOTICE

When inserting the fuel hose joint, do not apply strong force to the delivery pipe [E] on the nozzle assy. The pipe made from resin could be damaged.



2-52 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

- 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.

NOTICE

When pushing and pulling the fuel hose joint, do not apply strong force to the delivery pipe [C] on the nozzle assy. The pipe made from resin could be damaged.

⚠ 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.

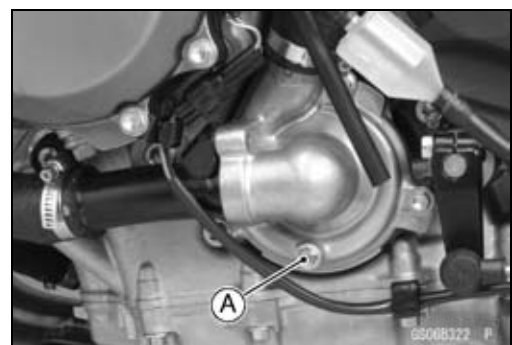
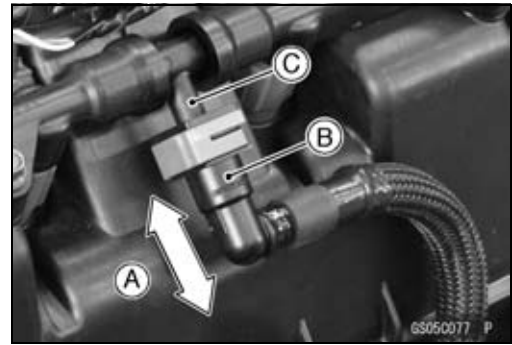
- ★ If it comes off, reinstall the hose joint.
- Install the fuel tank (see Fuel Tank Installation in the Fuel System (DFI) chapter).
- Start the engine and check the fuel hose for leaks.

Coolant Change

⚠ WARNING

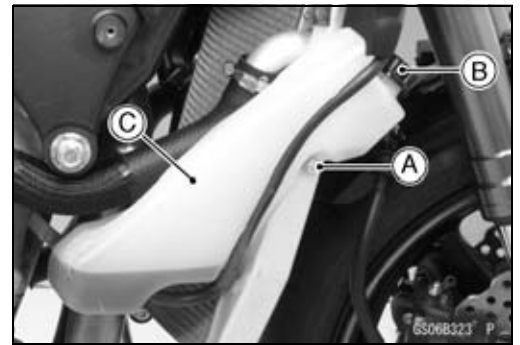
Coolant can be extremely hot and cause severe burns, is toxic and very slippery. Do not remove the radiator cap or attempt to change the coolant when the engine is hot; allow it cool completely. Immediately wipe any spilled coolant from tires, frame, engine or other painted parts. Do not ingest coolant.

- 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.



Periodic Maintenance Procedures

- Remove:
 - Coolant Reserve Tank Mounting Bolt [A]
 - Cap [B]
 - Pour the coolant into a container.
 - Install the coolant reserve tank [C].
 - Tighten the drain bolt with new gasket.
- Torque - Coolant Drain Bolt (Water Pump): 9.8 N·m (1.0 kgf·m, 87 in·lb)**

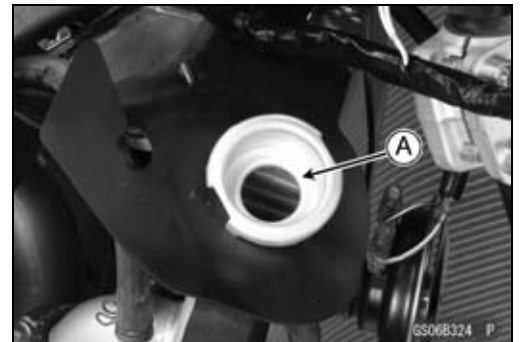


- Fill the radiator up to the filler neck [A] with coolant, and install the radiator cap.

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.

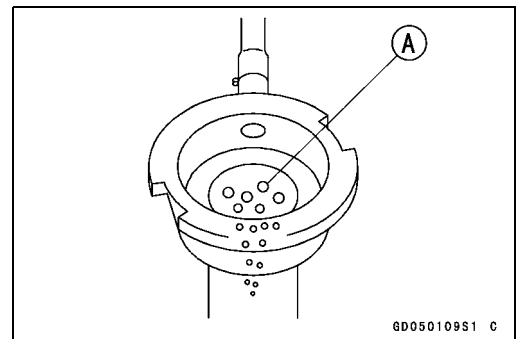
Water and Coolant Mixture Ratio (Recommended)

Soft Water:	50%
Coolant:	50%
Freezing Point:	-35°C (-31°F)
Total Amount:	2.6 L (2.7 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

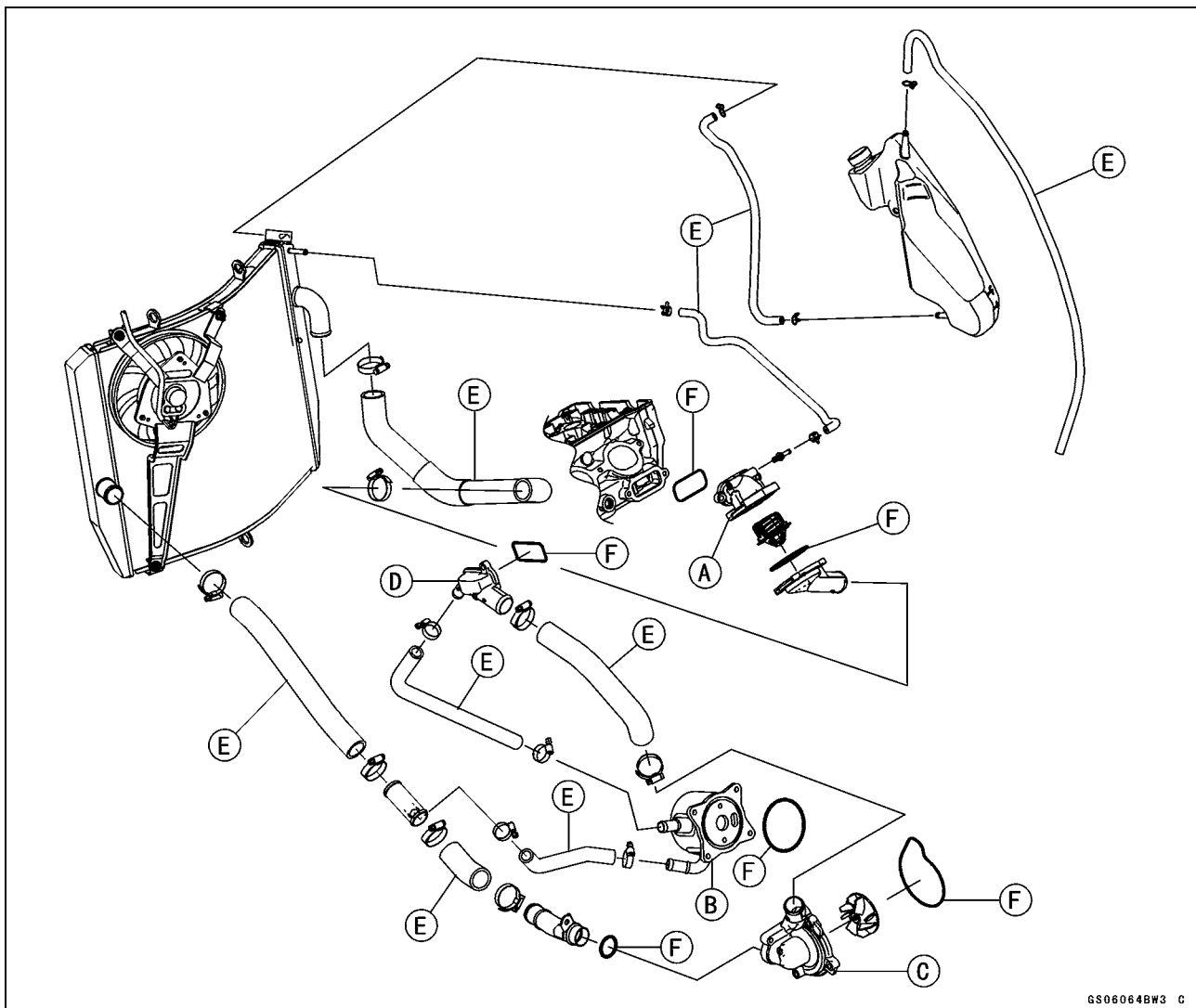
Do not add more coolant above the “F” level line.

2-54 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Radiator Hose and O-ring Replacement

- Drain the coolant (see Coolant Change).
- Remove:
 - Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
 - Thermostat Housing [A] (see Thermostat Removal in the Cooling System chapter)
 - Oil Cooler [B] (see Oil Cooler Removal in the Engine Lubrication System chapter)
 - Water Pump Cover [C] (see Oil Pump Removal in the Engine Lubrication 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.

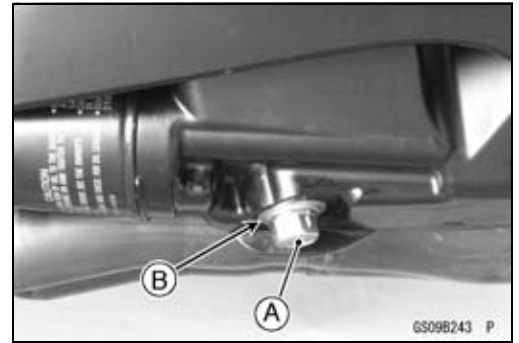


Periodic Maintenance Procedures

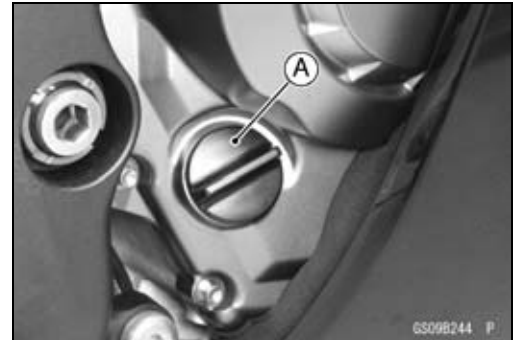
Engine Oil Change

- 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].



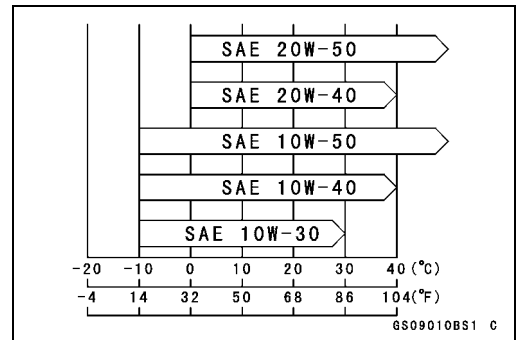
- Pour in the specified type and amount of oil.

Recommended Engine Oil

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

Viscosity: SAE 10W-40

Capacity: 2.9 L (3.1 US qt) (when filter is not removed)
 3.3 L (3.5 US qt) (when filter is removed)
 3.7 L (3.9 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).

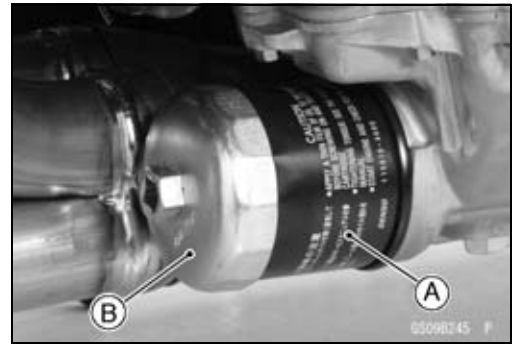
2-56 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Oil Filter Replacement

- Drain the engine oil (see Engine Oil Change).
- Remove the left lower fairing (see Lower Fairing Removal in the Frame chapter).
- 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.

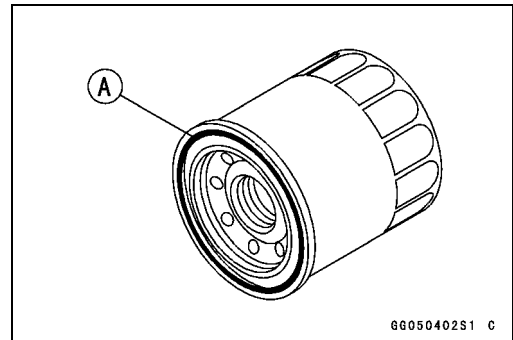
Special Tool - Oil Filter Wrench: 57001-1249

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).



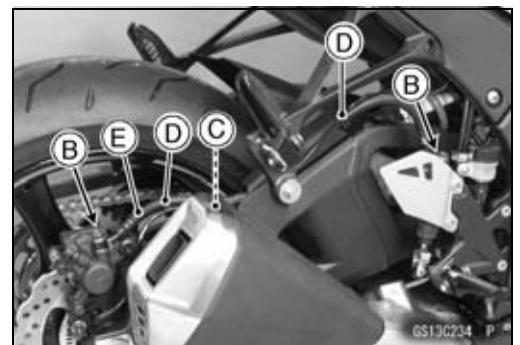
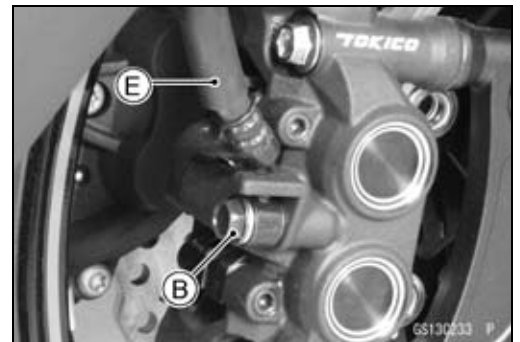
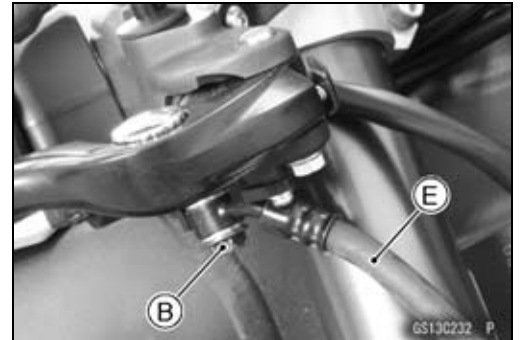
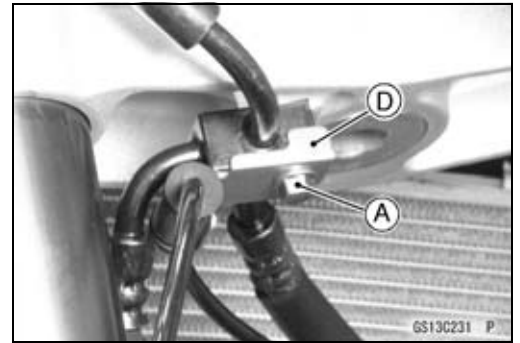
Periodic Maintenance Procedures

Brake Hose and Pipe Replacement

NOTICE

Brake fluid quickly ruins 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]
 - Clamps [D]
- When removing the brake hoses [E], 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, flattening 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).

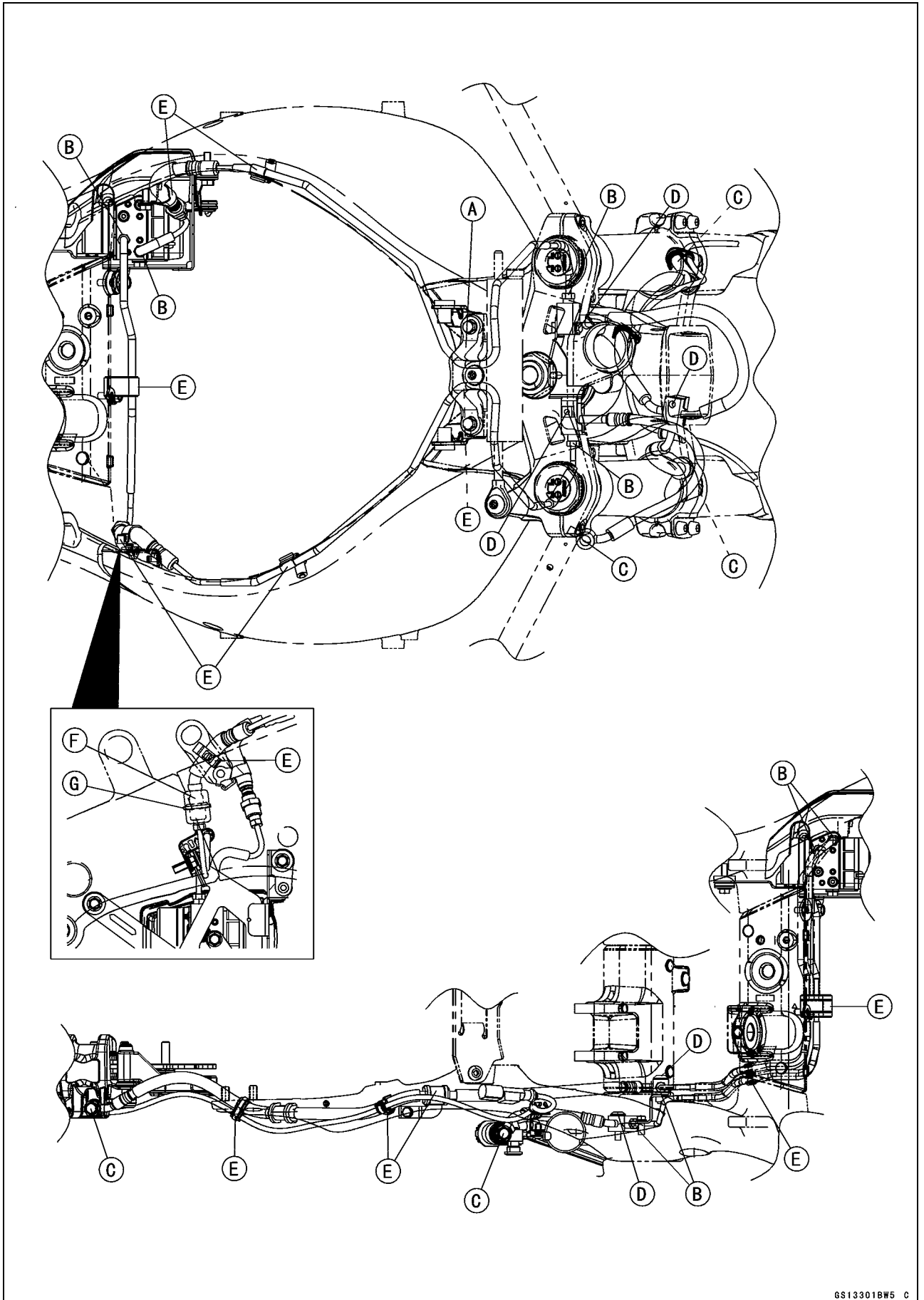


2-58 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

- For KIBS equipped models; note the following.
- Remove:
 - Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
 - Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
 - Rear Fender Front (see Rear Fender Front Removal in the Frame chapter)
 - Rear Shock Absorber (see Rear Shock Absorber Removal in the Suspension chapter)
 - Swingarm (see Swingarm Removal in the Suspension chapter)
 - Rocker Arm (see Rocker Arm Removal in the Suspension chapter)
 - Steering Damper Mounting Bracket [A]
 - Brake Pipe Joint Nuts [B]
 - Brake Hose Banjo Bolts [C]
 - Bolts [D]
 - Clamps [E]
 - Grommet [F]
 - Band [G]
- 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)**

Periodic Maintenance Procedures



2-60 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

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

- 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.

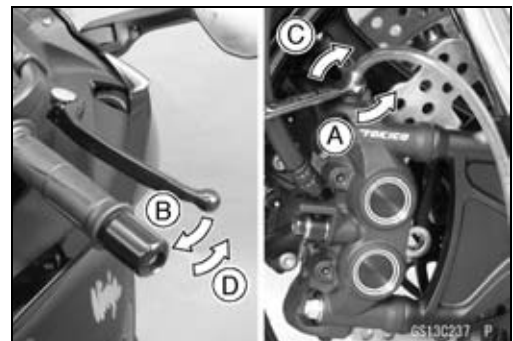
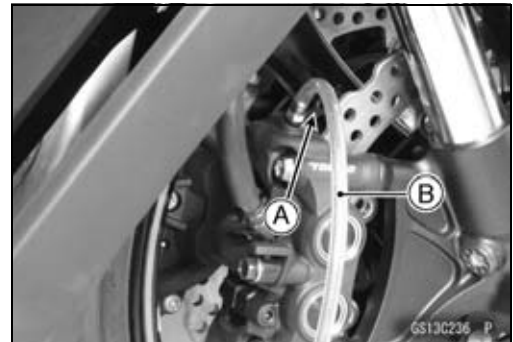
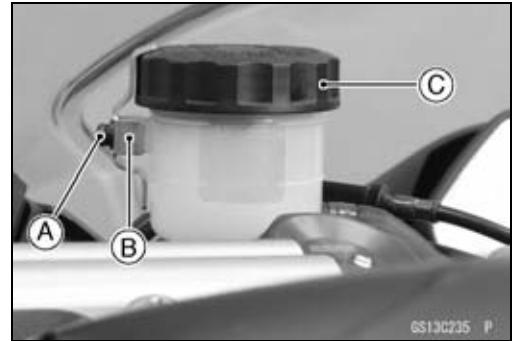
- Change the brake fluid.
- Repeat this operation until fresh brake fluid comes out from the plastic hose or the color of the fluid changes.
 1. Open the bleed valve [A].
 2. Apply the brake and hold it [B].
 3. Close the bleed valve [C].
 4. Release the brake [D].

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.

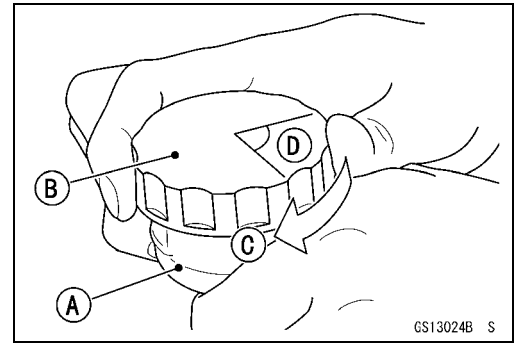
○Front Brake: Repeat the above steps for the other caliper.

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



Periodic Maintenance Procedures

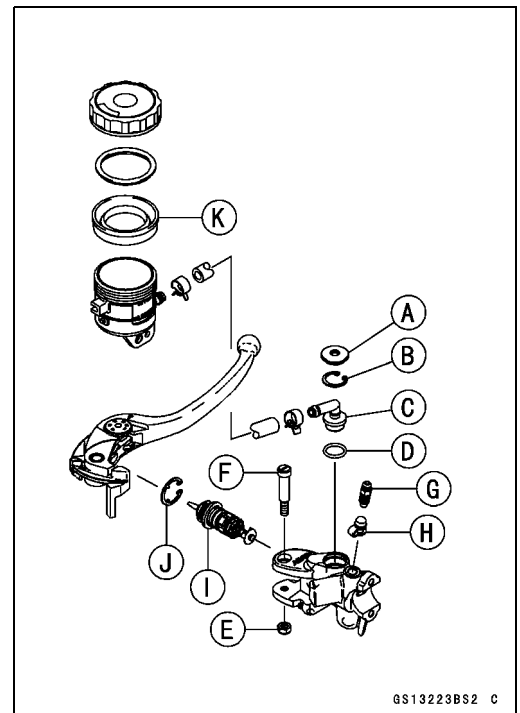
- Follow the procedure below to install the front/rear brake fluid reservoir cap correctly.
- First, tighten the front/rear brake fluid reservoir cap [B] clockwise [C] by hand until slight resistance is felt indicating that the cap is seated on the reservoir body, then tighten the cap an additional 1/6 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.

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]



2-62 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

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].

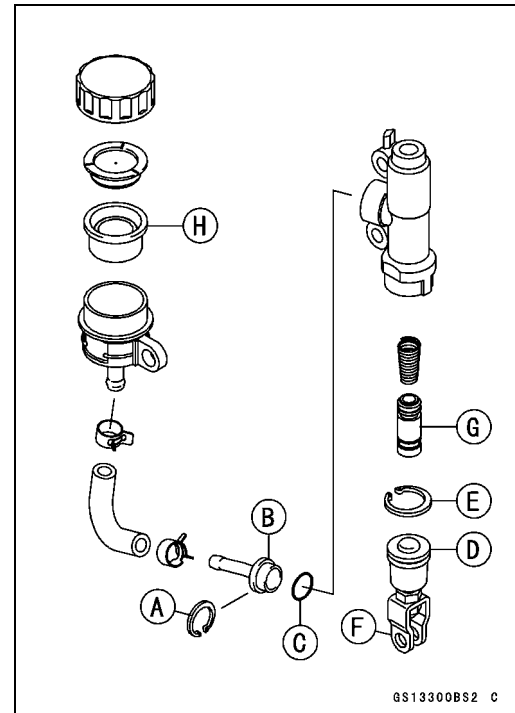
Special Tool - Inside Circlip Pliers: 57001-143

- 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]



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 each parts and the inner wall of the cylinder.
- When installing the piston assembly, 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: 1.2 N·m (0.12 kgf·m, 11 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)

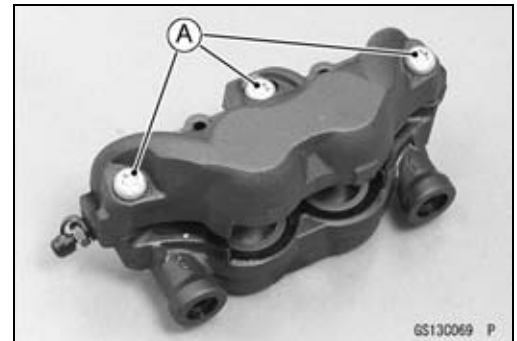
- Fit the circlip into the groove of the cylinder securely.

Periodic Maintenance Procedures

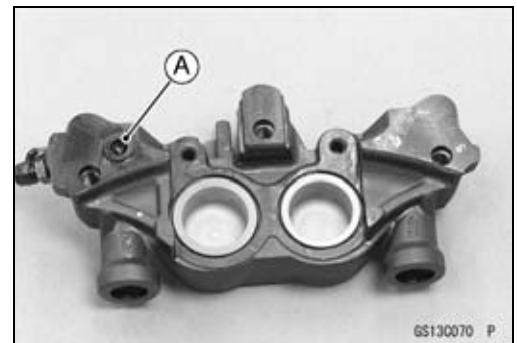
Caliper Rubber Parts Replacement

Front Caliper Disassembly

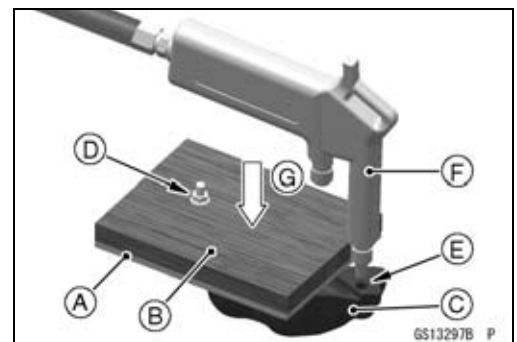
- Remove:
 - Front Caliper (see Front Caliper Removal in the Brakes chapter)
 - Brake Pads (see Front Brake Pad Removal in the Brakes chapter)
- Remove:
 - Front Caliper Assembly Bolts [A]
- Split the front caliper.



- Remove:
 - Pad Spring
 - O-ring [A]

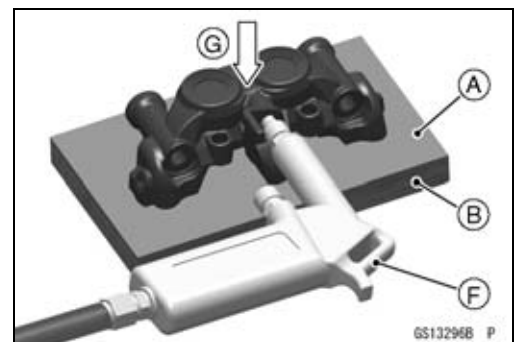


- Using compressed air, remove the pistons. One way to remove the pistons is as follows.
 - Install a rubber gasket [A] and a wooden board [B] more than 10 mm (0.4 in.) thick on the caliper half.
 - For inside caliper half [C], fasten them together with a suitable bolt and nut [D] as shown. Leave one of the oil passage [E] open.
 - Lightly apply compressed air [F] to the oil passage until the pistons hit the rubber gasket. Push down [G]



<p>⚠ WARNING</p> <p>The piston in the brake caliper can crush hands and fingers. Never place your hand or fingers in front of the piston.</p>

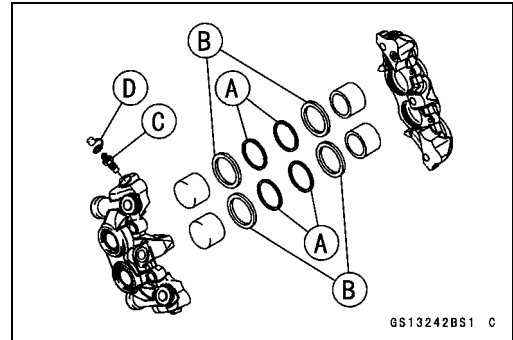
- Pull out the pistons by hand.



2-64 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

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



NOTE

- If compressed air is not available, do as follows for both calipers coincidentally, with the brake hose connected to the caliper.
- Prepare a container for brake fluid, and perform the work above it.
- Remove the pad springs and pads (see *Front Brake Pad Removal in the Brakes chapter*).
- Pump the brake lever until the pistons come out of the cylinders, and then disassemble the caliper.

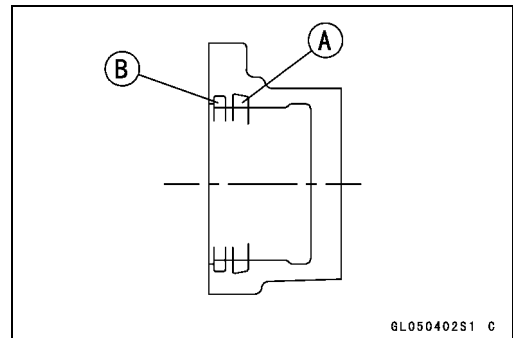
Front Caliper Assembly

- Clean the caliper parts except for the pads.

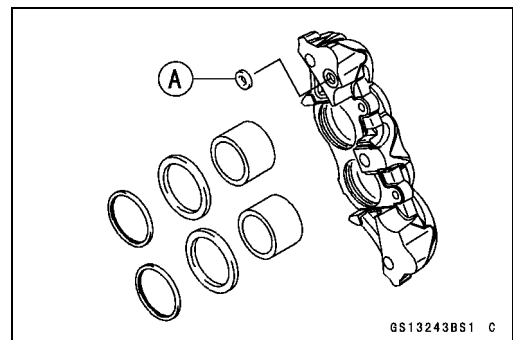
NOTICE

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.
○ Apply silicone grease to the dust seals, and install them into the cylinders by hand.

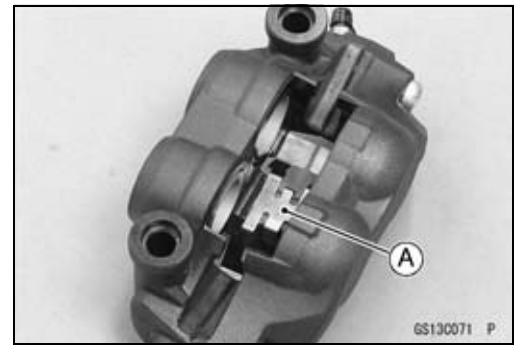


- Replace the O-ring [A] and install it.
- Apply brake fluid to the outside of the pistons, and push them into each cylinder by hand.
- Be sure to install the O-ring.
- Tighten:
Torque - Front Caliper Assembly Bolts: 22 N·m (2.2 kgf·m, 16 ft·lb)



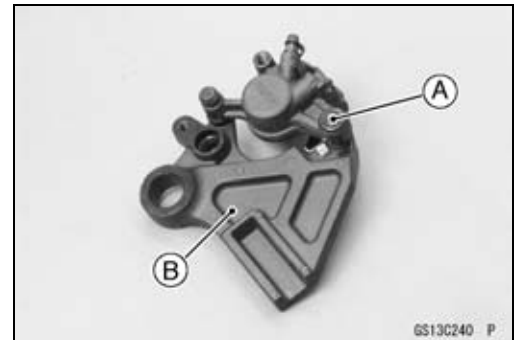
Periodic Maintenance Procedures

- Install the pad spring [A] as shown.
- Install the brake pads (see Front Brake Pad Installation in the Brakes chapter).
- Wipe up any spilled brake fluid on the caliper with wet cloth.

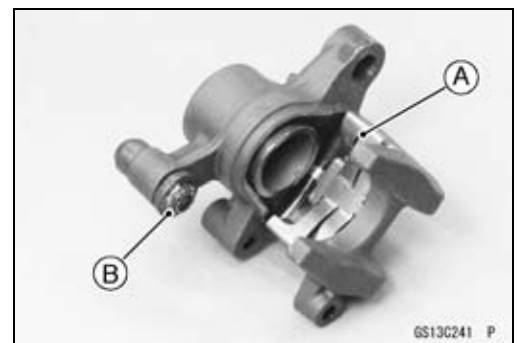


Rear Caliper Disassembly

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



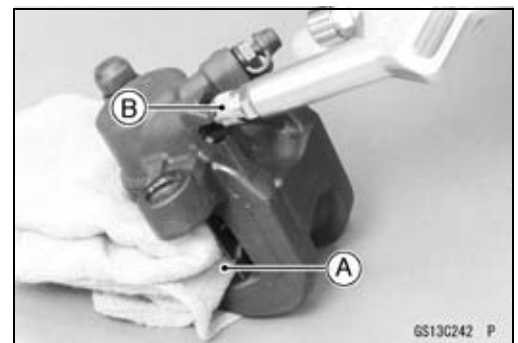
- Remove:
 - Pad Spring [A]
 - Dust Boot [B]



- 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.

NOTE

- If compressed air is not available, do as follows with the brake hose connected to the caliper.
- Prepare a container for brake fluid, and perform the work above it.
- Remove the pads (see Rear Brake Pad Removal in the Brakes chapter).
- Pump the brake pedal to remove the caliper piston.

2-66 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

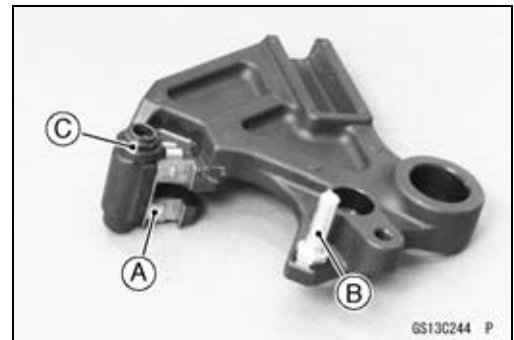
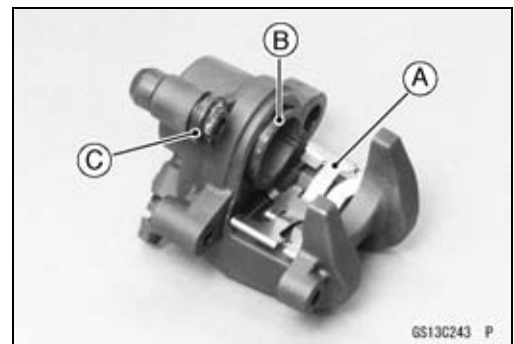
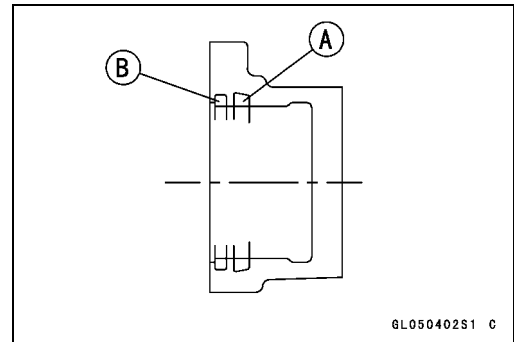
Rear Caliper Assembly

- 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)
- 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 in the figure.
- 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 in the figure.
- 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

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 plug with new ones.

Standard Spark Plug

Type: **NGK CR9EIA-9**

- 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.



Fuel System (DFI)

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3-2 FUEL SYSTEM (DFI)

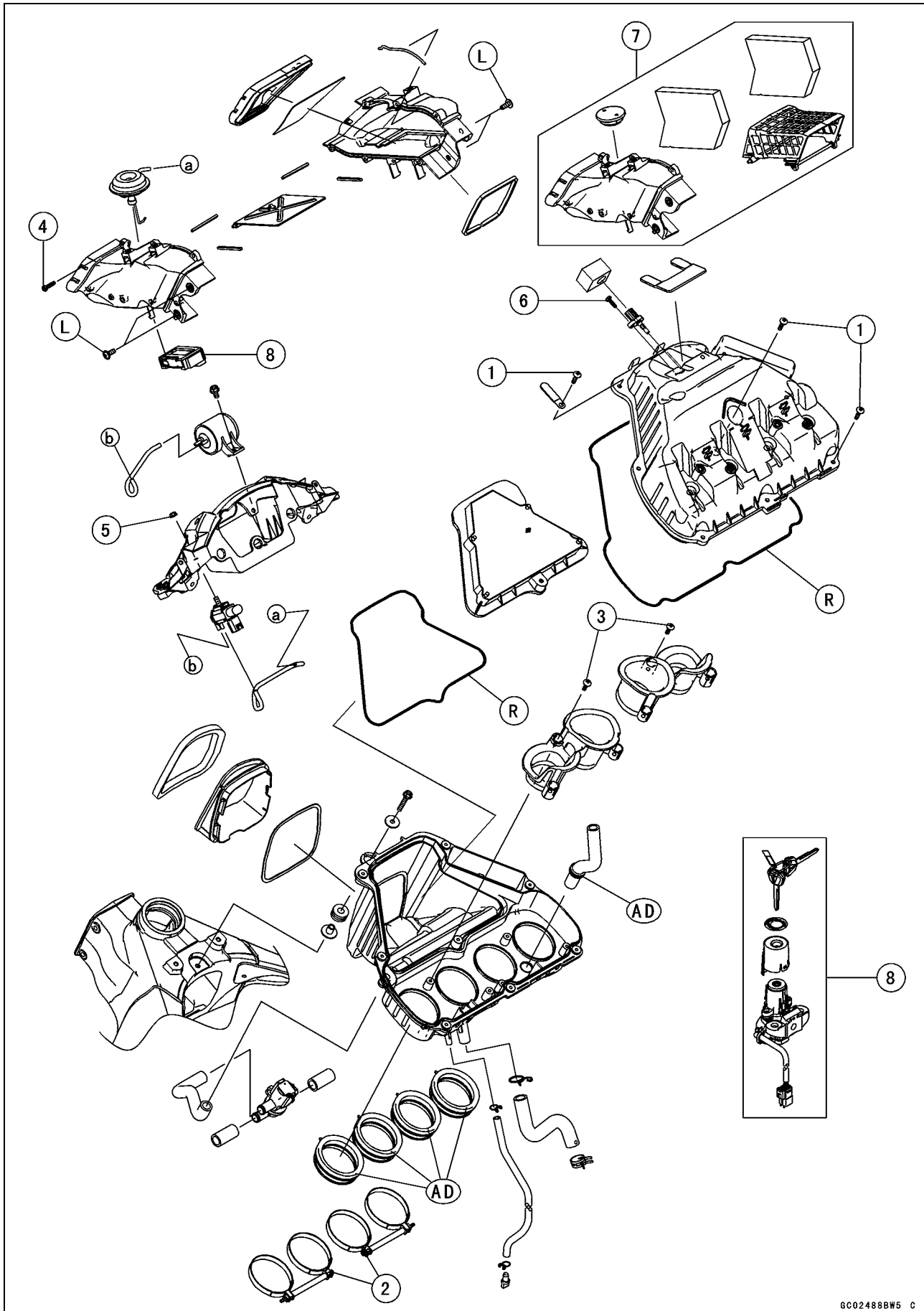
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Exploded View

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3-4 FUEL SYSTEM (DFI)

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Air Cleaner Housing Assembly Screws	1.1	0.11	10 in·lb	
2	Air Cleaner Housing Clamp Bolts	2.0	0.20	18 in·lb	
3	Air Cleaner Housing Duct Screws	1.1	0.11	10 in·lb	
4	Air Intake Duct Assembly Screws	1.5	0.15	13 in·lb	
5	Air Intake Solenoid Valve Nut	7.0	0.71	62 in·lb	
6	Intake Air Temperature Sensor Screw	0.8	0.08	7 in·lb	

7. US, CA and CAL Models

8. Immobilizer System Equipped Models

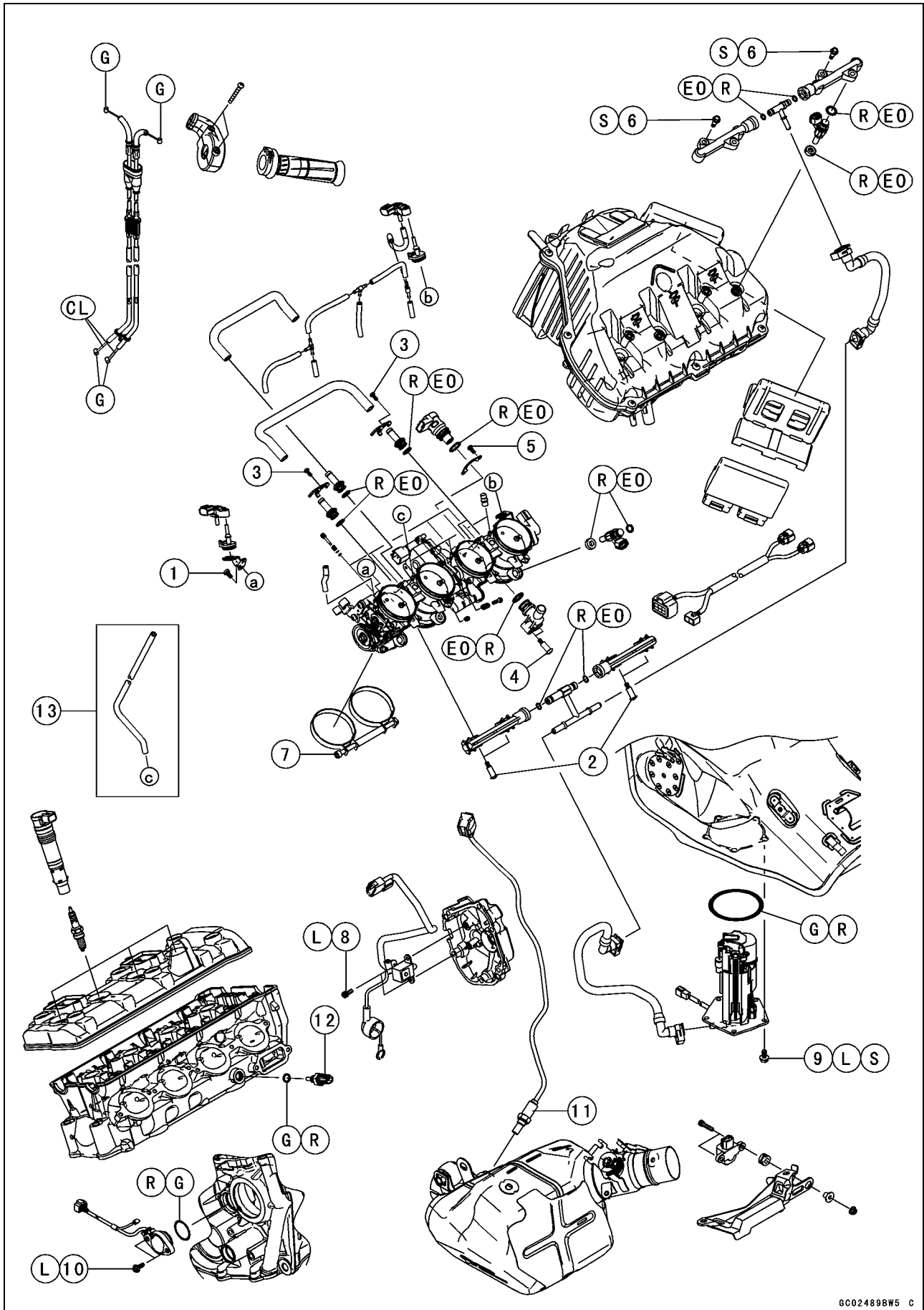
AD: Apply adhesive.

L: Apply a non-permanent locking agent.

R: Replacement Parts

3-6 FUEL SYSTEM (DFI)

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Bracket Screw	3.4	0.35	30 in·lb	
2	Delivery Pipe Assy Mounting Screws	3.43	0.35	30 in·lb	
3	Fitting Retainer Screws	2.06	0.21	18 in·lb	
4	Fitting Screws	3.43	0.35	30 in·lb	
5	Idle Speed Control Valve Actuator Retainer Screws	2.06	0.21	18 in·lb	
6	Nozzle Assy Mounting Bolts	4.9	0.50	43 in·lb	S
7	Throttle Body Assy Holder Clamp Bolts	2.0	0.20	18 in·lb	
8	Crankshaft Sensor Bolts	5.9	0.60	52 in·lb	L
9	Fuel Pump Bolts	9.8	1.0	87 in·lb	L, S
10	Gear Position Switch Screws	2.9	0.30	26 in·lb	L
11	Oxygen Sensor (Equipped Models)	25	2.5	18	
12	Water Temperature Sensor	12	1.2	106 in·lb	

13. Other than US, CA and CAL Models

CL: Apply cable lubricant.

EO: Apply engine oil.

G: Apply grease.

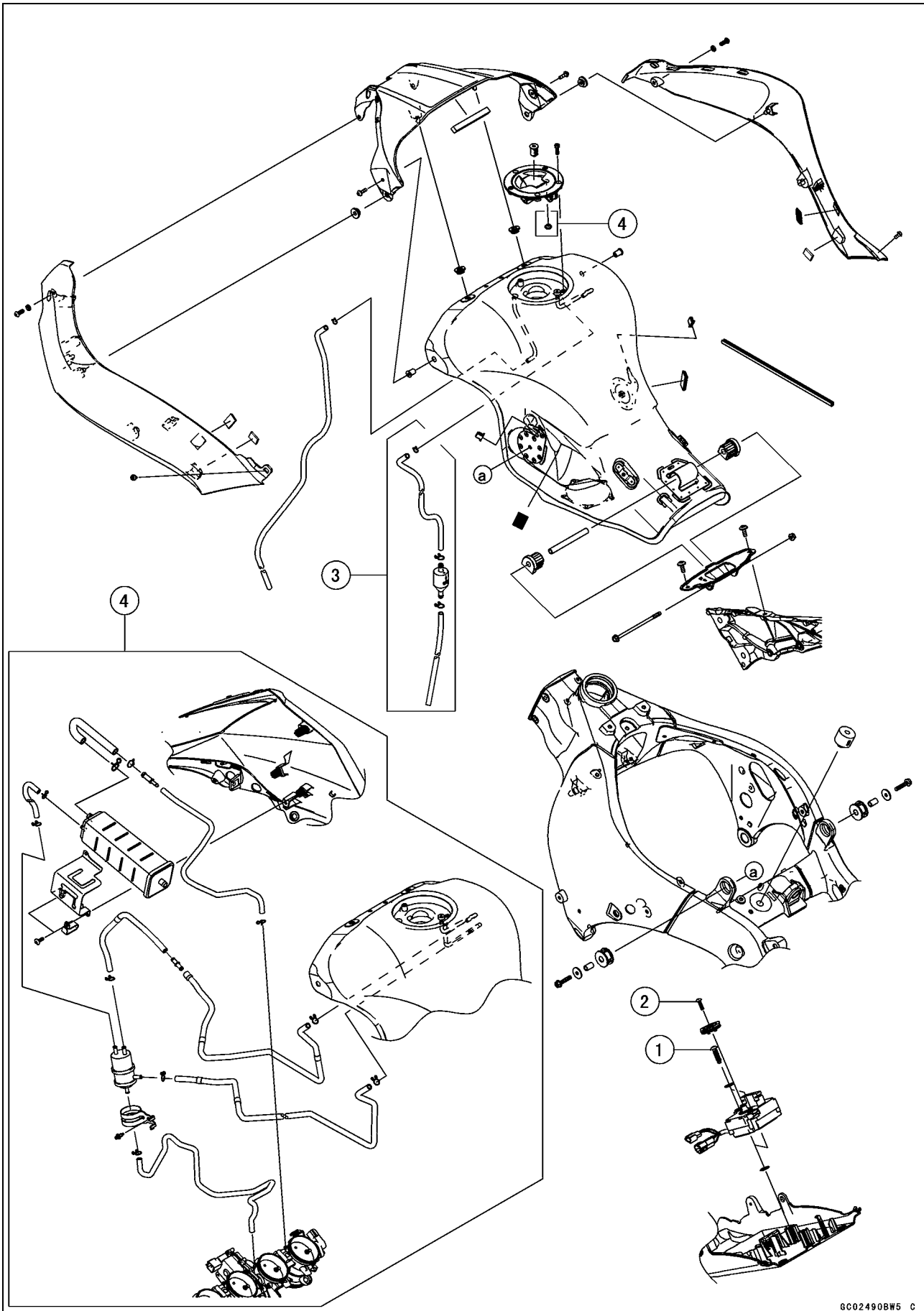
L: Apply a non-permanent locking agent.

R: Replacement Parts

S: Follow the specified tightening sequence.

3-8 FUEL SYSTEM (DFI)

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Exhaust Butterfly Valve Actuator Mounting Screws	1.2	0.12	11 in·lb	
2	Exhaust Butterfly Valve Actuator Pulley Bolt	4.9	0.50	43 in·lb	

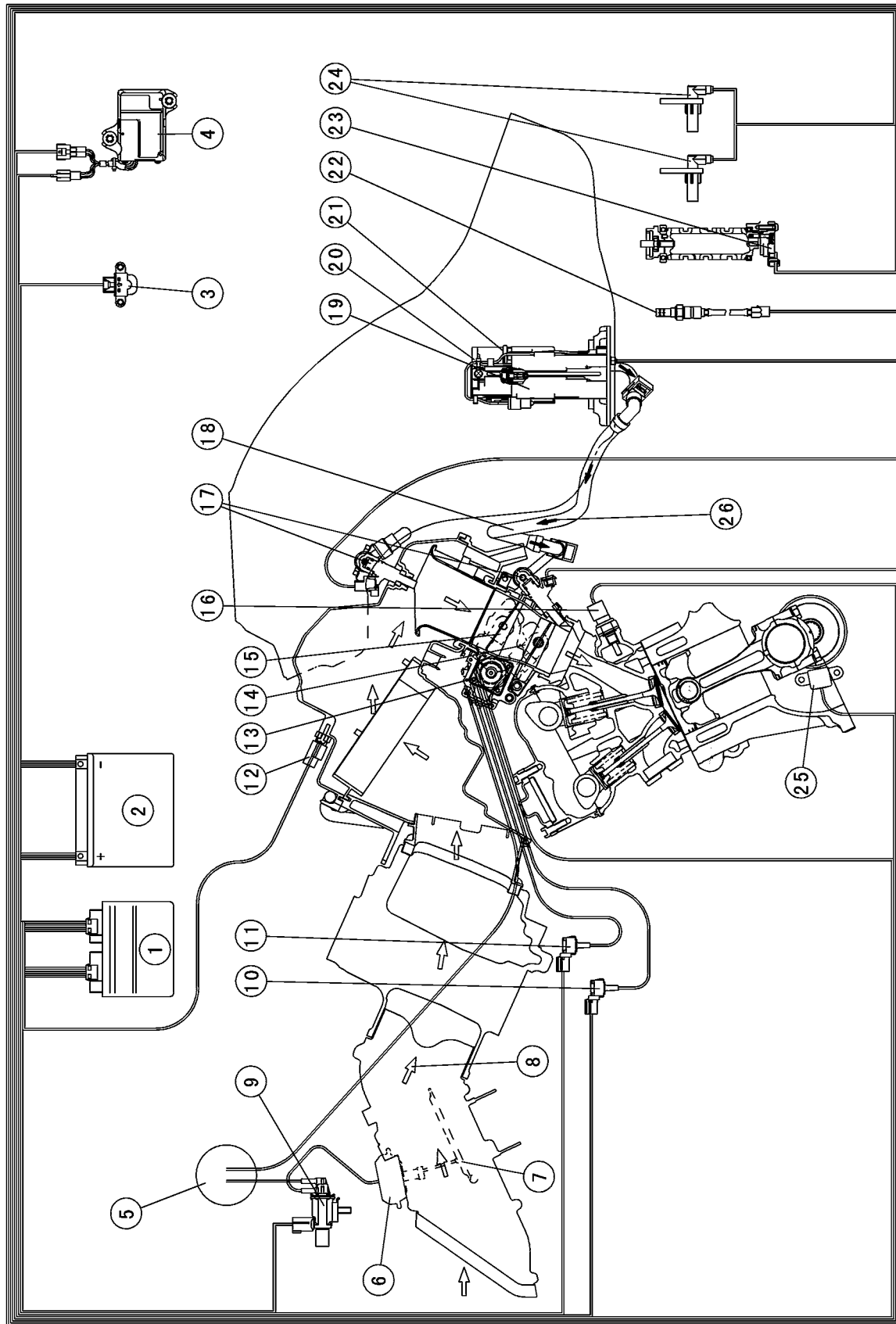
3. Other than CAL and SEA Models

4. CAL and SEA Models

3-10 FUEL SYSTEM (DFI)

DFI System

DFI System



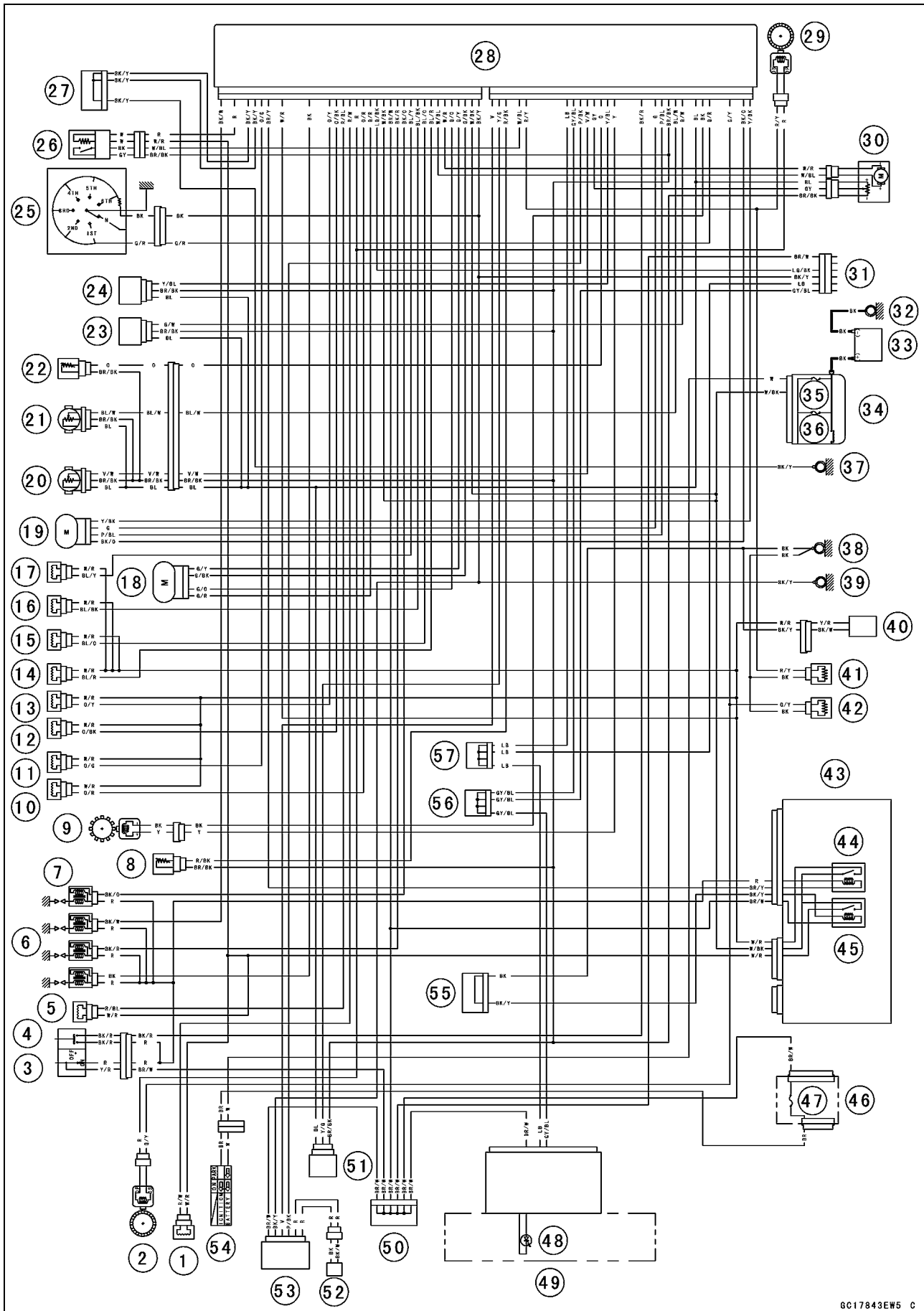
DFI System

1. ECU
2. Battery
3. Vehicle-down Sensor
4. Exhaust Butterfly Valve Actuator
5. Vacuum Chamber (Other than US, CA and CAL Models)
6. Air Intake Valve Actuator (Other than US, CA and CAL Models)
7. Air Intake Valve (Other than US, CA and CAL Models)
8. Air Flow
9. Air Intake Solenoid Valve (Other than US, CA and CAL Models)
10. Intake Air Pressure Sensor #2
11. Intake Air Pressure Sensor #1
12. Intake Air Temperature Sensor
13. Subthrottle Valve Actuator
14. Main Throttle Sensor
15. Subthrottle Sensor
16. Water Temperature Sensor
17. Fuel Injectors
18. Primary Fuel Hose
19. Fuel Pump
20. Fuel Filter
21. Pressure Regulator
22. Oxygen Sensor (Equipped Models)
23. Gear Position Switch
24. Wheel Rotation Sensors
25. Crankshaft Sensor
26. Fuel Flow

3-12 FUEL SYSTEM (DFI)

DFI System

DFI System Wiring Diagram



GC17843EW5 C

Part Names

1. Air Intake Solenoid Valve (Other than US, CA and CAL Models)
2. Front Wheel Rotation Sensor

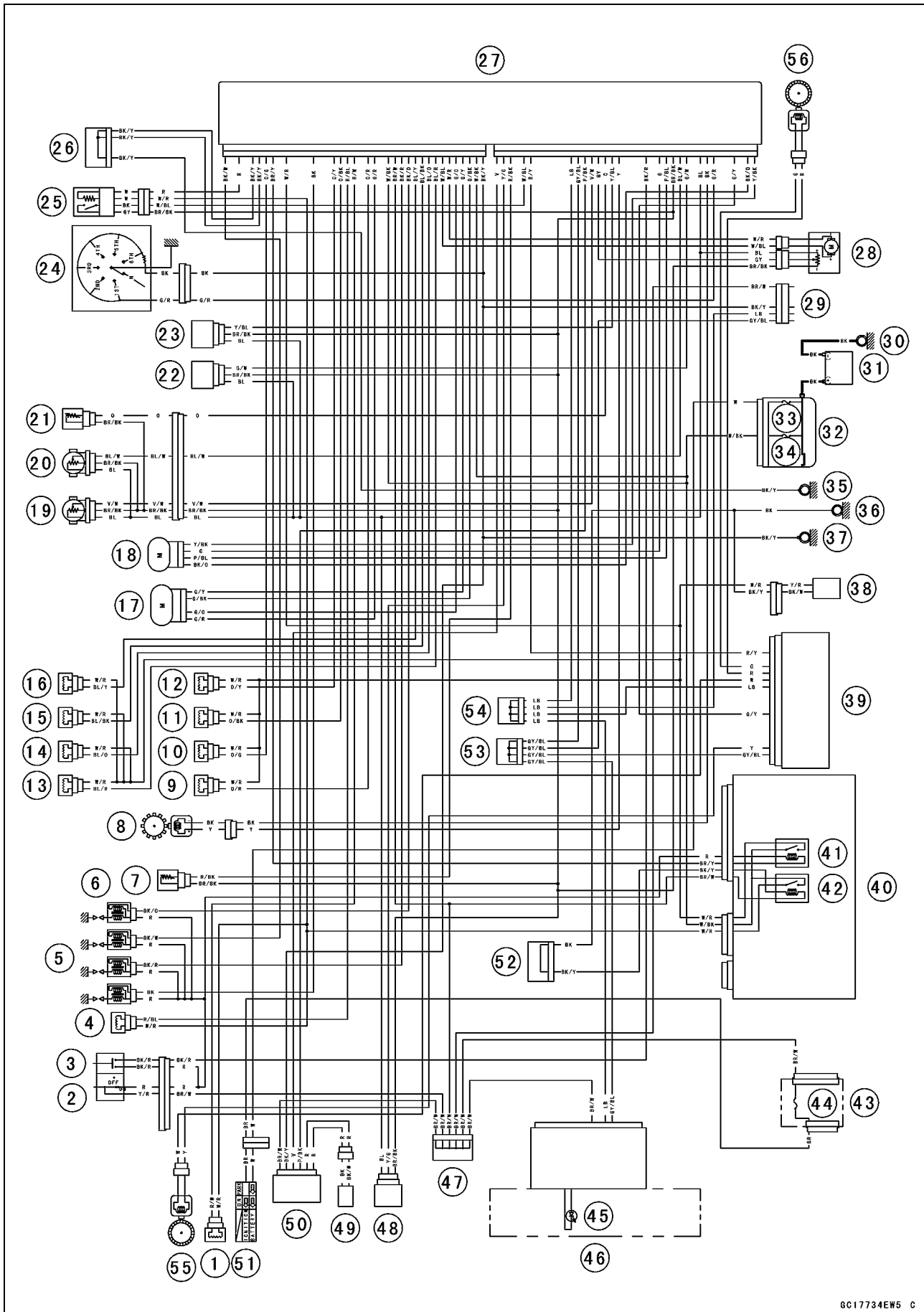
DFI System

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

3-14 FUEL SYSTEM (DFI)

DFI System

DFI System Wiring Diagram (KIBS Equipped Models)



DFI System

Part Names

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

3-16 FUEL SYSTEM (DFI)

DFI System

○Color Codes:

BK: Black

BL: Blue

BR: Brown

CH: Chocolate

DG: Dark Green

G: Green

GY: Gray

LB: Light Blue

LG: Light Green

O: Orange

P: Pink

PU: Purple

R: Red

V: Violet

W: White

Y: Yellow

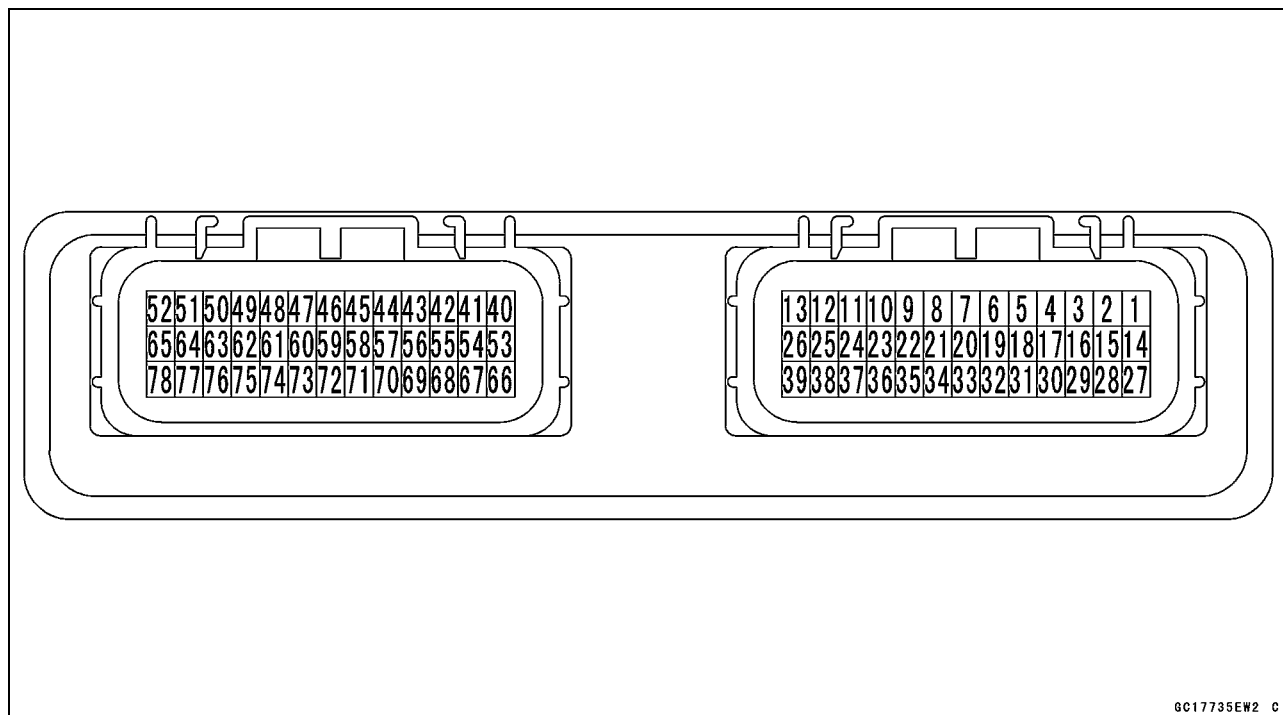
DFI System

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3-18 FUEL SYSTEM (DFI)

DFI System

Terminal Numbers of ECU Connectors



GC17735EW2 C

Terminal Names

1. Subthrottle Valve Actuator: Y/BK
2. Subthrottle Valve Actuator: BK/O
3. Unused
4. Front Wheel Rotation Sensor Signal: G/Y
5. Unused
6. Starter Lockout Switch: R/G
7. Gear Position Switch: G/R
8. Crankshaft Sensor (-): BK
9. Power Supply to Sensors: BL
10. Unused
11. Intake Air Pressure Sensor #2: G/W
12. Subthrottle Sensor: BL/W
13. Ground for Sensors: BR/BK
14. Subthrottle Valve Actuator: P/BL
15. Subthrottle Valve Actuator: G
16. Unused
17. Starter Button: BK/R
18. Unused
19. Sidestand Switch: G/BK
20. Unused
21. Crankshaft Sensor (+): Y
22. Intake Air Pressure Sensor #1: Y/BL
23. Water Temperature Sensor: O
24. Exhaust Butterfly Valve Actuator Sensor: GY
25. Main Throttle Sensor: V/W
26. Immobilizer Amplifier (Equipped Models): P/BK
27. CAN Communication Line (High): GY/BL
28. CAN Communication Line (Low): LB
29. Unused
30. Unused
31. Unused
32. Unused
33. Unused
34. Rear Wheel Rotation Sensor Signal: R/Y

DFI System

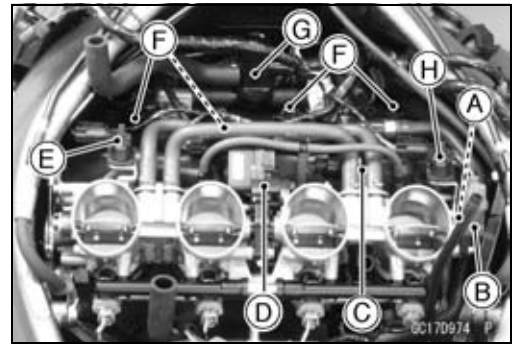
- 35. Oxygen Sensor (Equipped Models): W/BL
- 36. Unused
- 37. Intake Air Temperature Sensor: R/BK
- 38. Vehicle-down Sensor: Y/G
- 39. Immobilizer Amplifier (Equipped Models): V
- 40. Ground for Control System: BK/Y
- 41. Power Supply to ECU (from Battery): W/BK
- 42. Idle Speed Control Valve Actuator: G/BK
- 43. Idle Speed Control Valve Actuator: G/Y
- 44. Idle Speed Control Valve Actuator: G/O
- 45. Exhaust Butterfly Valve Actuator (-): W/R
- 46. Exhaust Butterfly Valve Actuator (+): W/BL
- 47. Primary Fuel Injector #1: BL/R
- 48. Primary Fuel Injector #2: BL/O
- 49. Primary Fuel Injector #3: BL/BK
- 50. Primary Fuel Injector #4: BL/Y
- 51. Stick Coil #4: BK/O
- 52. Stick Coil #2: BK/R
- 53. Power Supply to ECU (from Ignition Switch): BR/W
- 54. Power Supply to ECU (from Battery): W/BK
- 55. External Communication Line (Immobilizer System (Equipped Models)*KDS): LG/BK
- 56. Idle Speed Control Valve Actuator: G/R
- 57. Secondary Fuel Injector #1: O/R
- 58. Power Supply to Wheel Rotation Sensors (ZX1000J Models): R
Unused (ZX1000K Models)
- 59. Air Intake Solenoid Valve (Other than US, CA and CAL Models): R/W
- 60. Air Switching Valve: R/BL
- 61. Secondary Fuel Injector #3: O/BK
- 62. Secondary Fuel Injector #4: O/Y
- 63. Unused
- 64. Unused
- 65. Stick Coil #1: BK
- 66. Unused
- 67. Unused
- 68. Unused
- 69. Battery Monitor Voltage Line: W/R
- 70. Radiator Fan Relay: P/BL
- 71. Fuel Pump Relay: BR/Y
- 72. Secondary Fuel Injector #2: O/G
- 73. Engine Ground: BK/Y
- 74. Engine Ground: BK/Y
- 75. Unused
- 76. Oxygen Sensor Heater (Equipped Models): R
- 77. Unused
- 78. Stick Coil #3: BK/W

*: KDS (Kawasaki Diagnostic System)

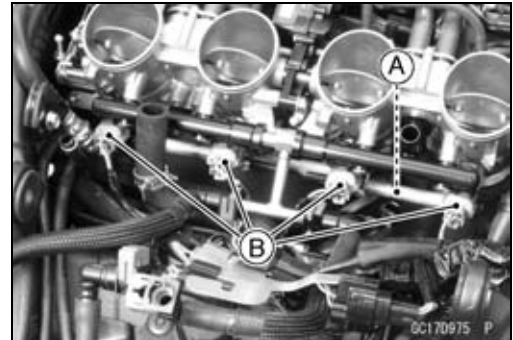
3-20 FUEL SYSTEM (DFI)

DFI Parts Location

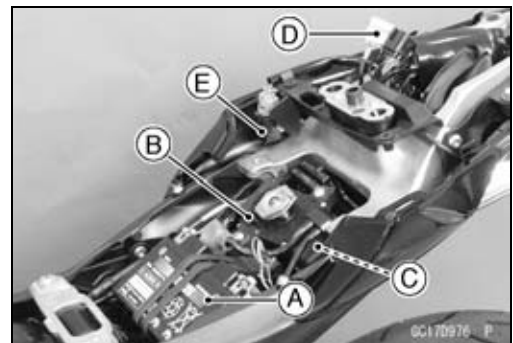
Main Throttle Sensor [A]
Subthrottle Sensor [B]
Idle Speed Control Valve Actuator [C]
Subthrottle Valve Actuator [D]
Intake Air Pressure Sensor #2 [E]
Stick Coils #1, #2, #3, #4 [F]
Air Switching Valve [G]
Intake Air Pressure Sensor #1 [H]



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



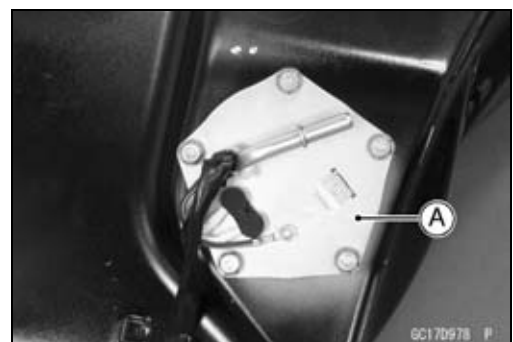
Battery [A]
Exhaust Butterfly Valve Actuator [B]
ECU Fuse 15 A [C]
Kawasaki Diagnostic System/Immobilizer (Equipped Models) Connector [D]
Vehicle-down Sensor [E]



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

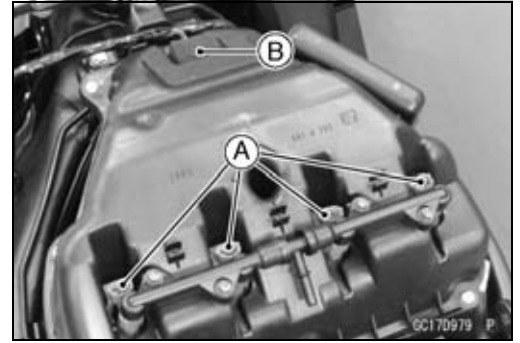


Fuel Pump [A]

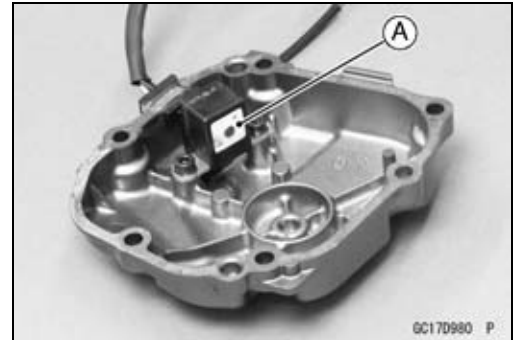


DFI Parts Location

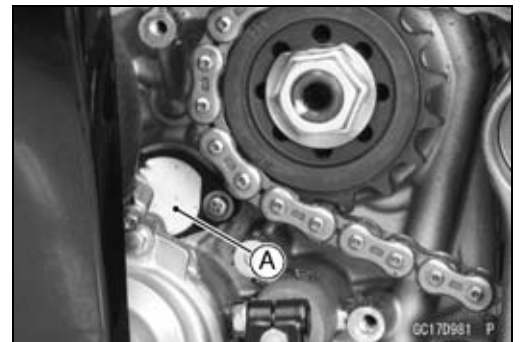
Secondary Fuel Injectors #1, #2, #3, #4 [A]
 Intake Air Temperature Sensor [B]



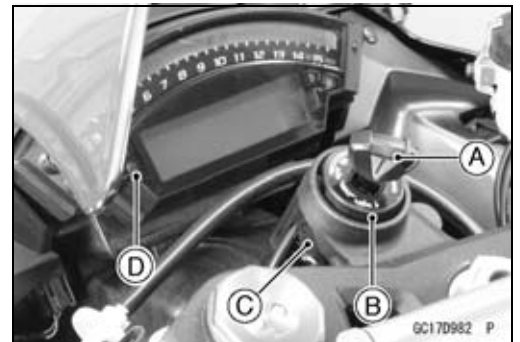
Crankshaft Sensor [A]



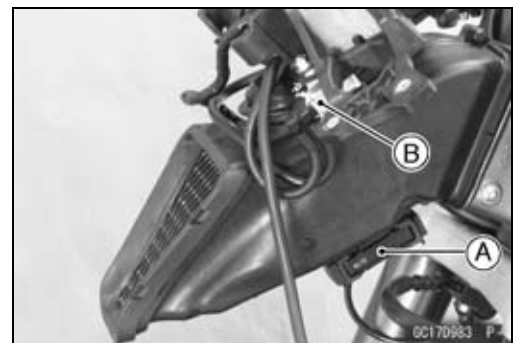
Gear Position Switch [A]



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



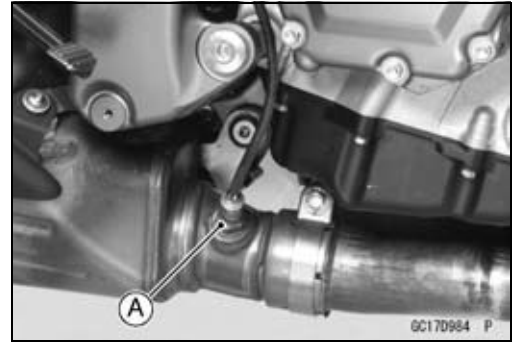
Immobilizer Amplifier [A] (Equipped Models)
 Air Intake Solenoid Valve [B] (Other than US, CA and CAL Models)



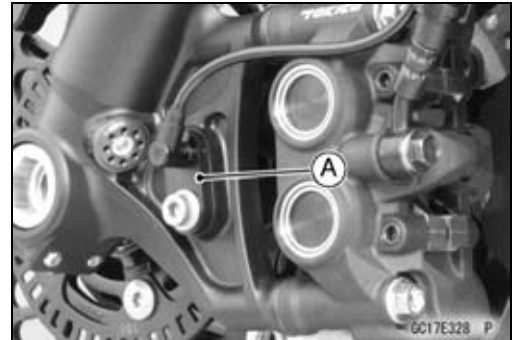
3-22 FUEL SYSTEM (DFI)

DFI Parts Location

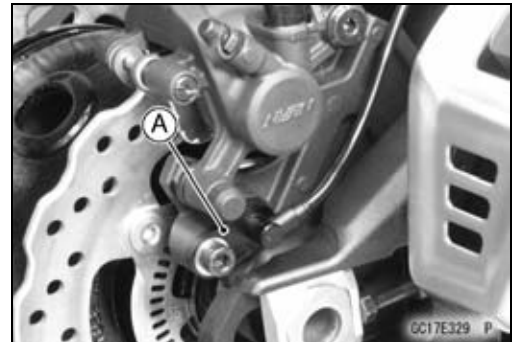
Oxygen Sensor [A] (Equipped Models)



Front Wheel Rotation Sensor [A]



Rear Wheel Rotation Sensor [A]



Specifications

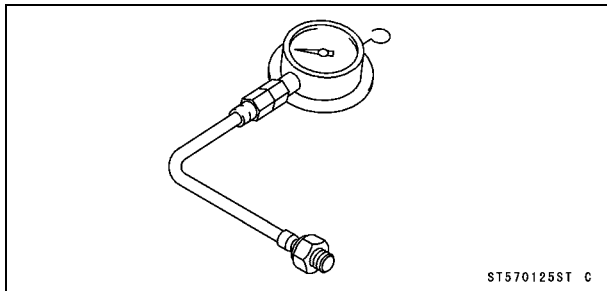
Item	Standard
<p>Digital Fuel Injection System</p> <p>Idle Speed</p> <p>Throttle Body Assy:</p> <p> Throttle Valve</p> <p> Bore</p> <p> Throttle Body Vacuum</p> <p> Bypass Screws (Turn Out)</p> <p>ECU:</p> <p> Make</p> <p> Type</p> <p>Fuel Pressure (High Pressure Line)</p> <p>Fuel Pump:</p> <p> Type</p> <p> Discharge</p> <p>Primary/Secondary Fuel Injectors:</p> <p> Type</p> <p> Nozzle Type</p> <p> Resistance</p> <p>CAN Communication Line:</p> <p> Resistance</p>	<p>1 100 ±50 r/min (rpm)</p> <p>Dual throttle valve</p> <p>φ47 mm (1.85 in.)</p> <p>30.7 ±1.33 kPa (230 ±10 mmHg)</p> <p>0 ~ 2 1/2 (for reference)</p> <p>MITSUBISHI ELECTRIC</p> <p>Digital memory type, with built in IC igniter, sealed with resin</p> <p>294 kPa (3.0 kgf/cm², 43 psi) with engine idling</p> <p>Wesco pump</p> <p>67 mL (2.3 US oz.) or more for 3 seconds</p> <p>EAT803</p> <p>Fine atomizing type with 12 holes</p> <p>About 11.7 ~ 12.3 Ω at 20°C (68°F)</p> <p>123 ~ 125 Ω at ECU connector</p>
<p>Throttle Grip and Cables</p> <p>Throttle Grip Free Play</p>	<p>2 ~ 3 mm (0.08 ~ 0.12 in.)</p>
<p>Air Cleaner</p> <p>Element</p>	<p>Viscous paper element</p>

3-24 FUEL SYSTEM (DFI)

Special Tools and Sealant

Oil Pressure Gauge, 5 kgf/cm²:

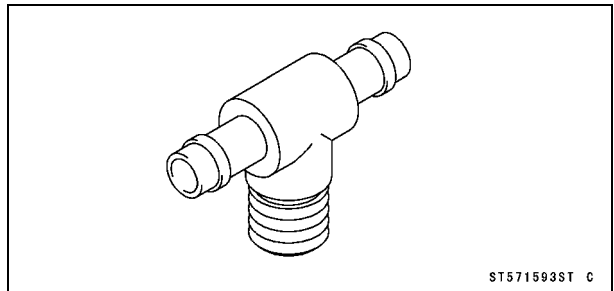
57001-125



ST570125ST C

Fuel Pressure Gauge Adapter:

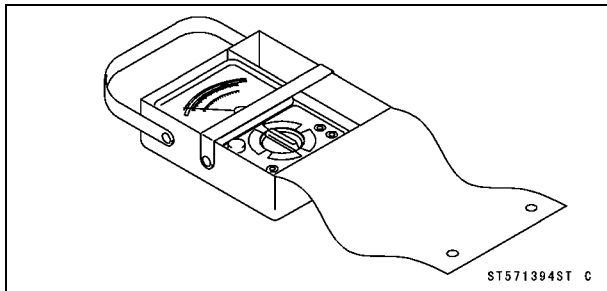
57001-1593



ST571593ST C

Hand Tester:

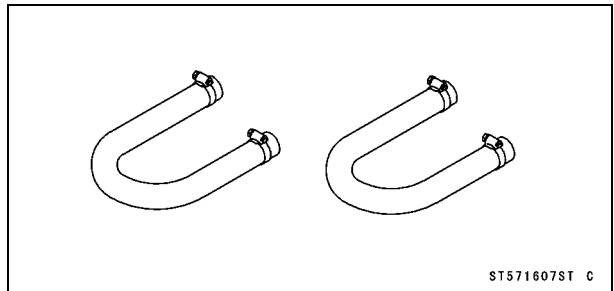
57001-1394



ST571394ST C

Fuel Hose:

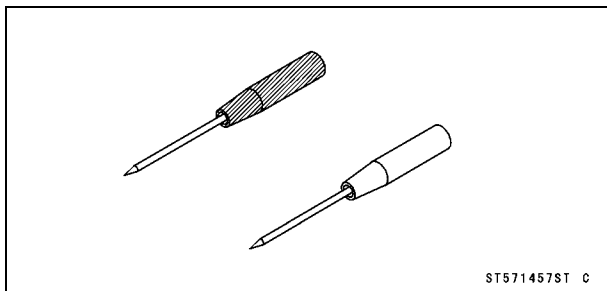
57001-1607



ST571607ST C

Needle Adapter Set:

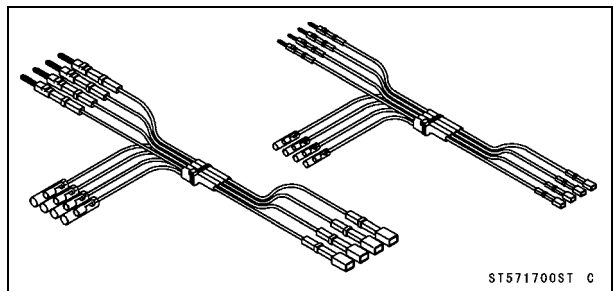
57001-1457



ST571457ST C

Measuring Adapter:

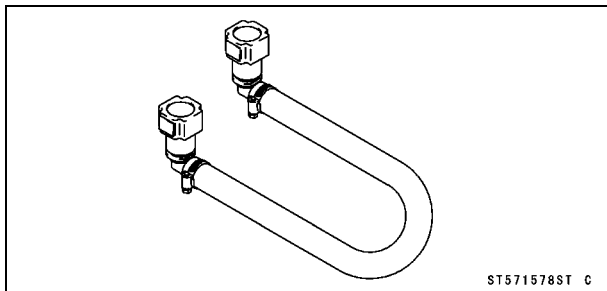
57001-1700



ST571700ST C

Extension Tube:

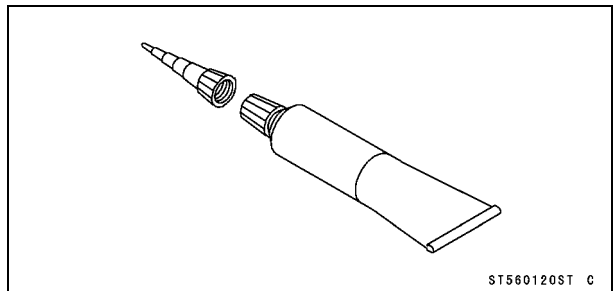
57001-1578



ST571578ST C

Liquid Gasket, TB1211:

56019-120



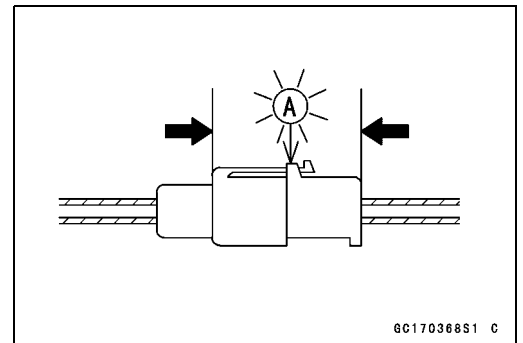
ST560120ST C

DFI Servicing Precautions

DFI Servicing Precautions

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

- This DFI system is designed to be used with a 12 V sealed battery as its power source. Do not use any other battery except for a 12 V sealed battery as a power source.
- Do not reverse the battery cable connections. This will damage the ECU.
- To prevent damage to the DFI parts, do not disconnect the battery cables or any other electrical connections when the ignition 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 to 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.

3-26 FUEL SYSTEM (DFI)

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.

Primary Fuel Hose [A]

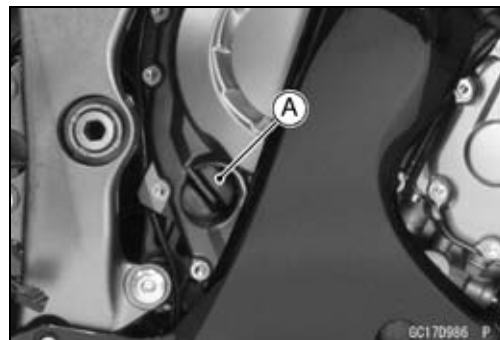
Secondary Fuel Hose [B]

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



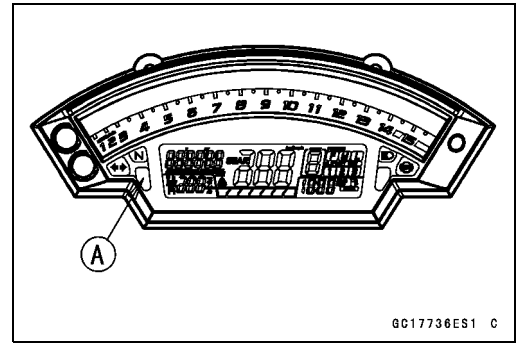
○To maintain the correct fuel/air mixture (F/A), there must be no intake air leaks in the DFI system. Be sure to install the oil filler plug [A] after filling the engine oil.

Torque - Oil Filler Plug: Hand-tighten



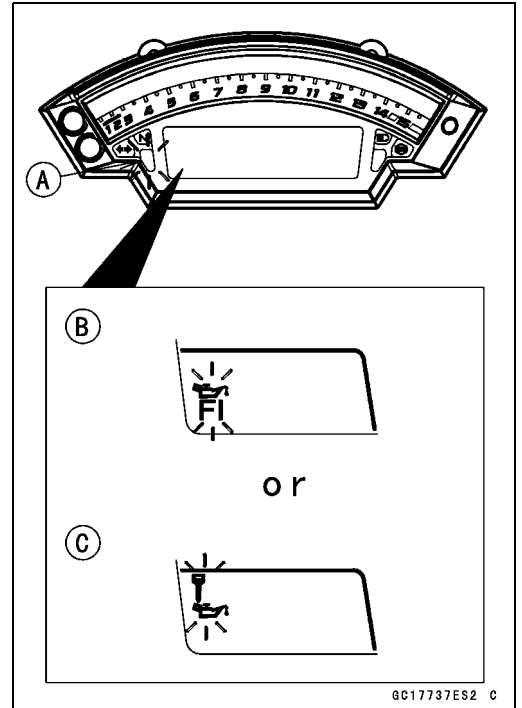
Troubleshooting the DFI System

The warning indicator light (LED) [A] is used for the FI indicator, immobilizer indicator (immobilizer equipped models), water temperature warning indicator and oil pressure warning indicator.



Outline

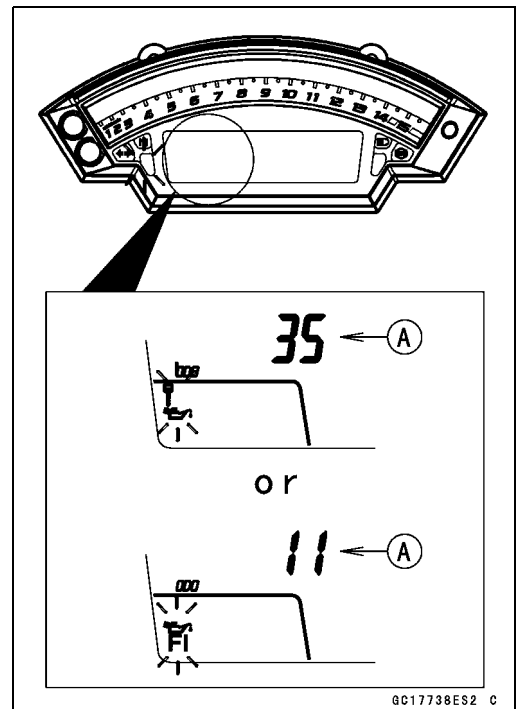
When a problem occurs with DFI system, the warning indicator light (LED) [A] and FI warning symbol [B] goes on to alert the rider. In addition, the condition of the problem is stored in the memory of the ECU. For models equipped with an immobilizer system, the warning indicator light (LED) and immobilizer warning symbol [C] blinks, 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 (see Self-Diagnosis Procedures in the Self-Diagnosis System chapter).

If the problem is with the following parts, the ECU can not recognize these problem. Therefore, the warning indicator light (LED), FI and/or immobilizer warning symbols do not goes on and/or blinks, and service code is not displayed.

- LCD for Meter Unit
- Fuel Pump
- Primary and Secondary Fuel Injectors
- Stick Coil Secondary Wiring and Ground Wiring
- ECU Power Source Wiring and Ground Wiring



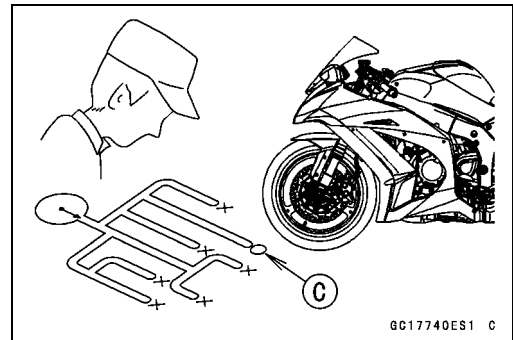
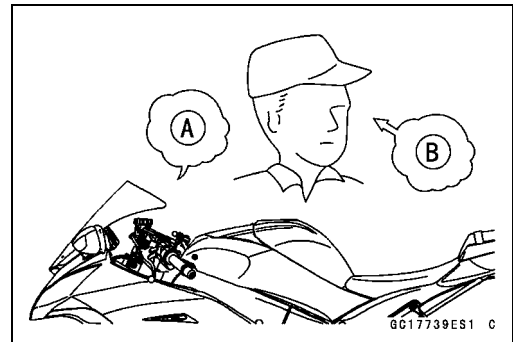
3-28 FUEL SYSTEM (DFI)

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 warning indicator light (LED) and FI warning symbol.

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



Even when the DFI system is operating normally, the warning indicator light (LED) and FI warning symbol may go on under strong electrical interference. Additional measures are not required. Turn the ignition switch to OFF to stop the indicator light and symbol.

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

When the repair has been done, the warning indicator light (LED) and FI warning symbol 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 (primary and secondary) 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 warning indicator light (LED) and FI warning symbol blink but the service code is not displayed. To start the engine again, raise the motorcycle, turn the ignition switch to 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 to ON and measure the voltage with the connector joined.

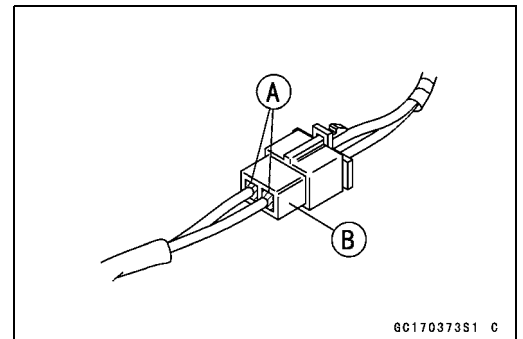
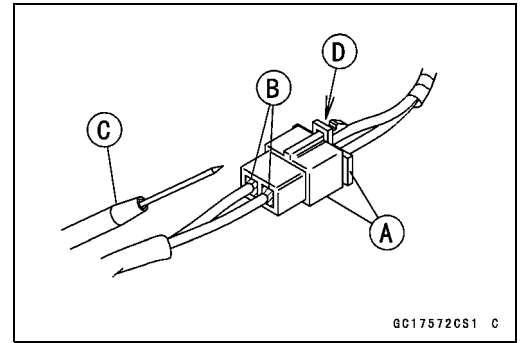
NOTICE

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 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.



3-30 FUEL SYSTEM (DFI)

Troubleshooting the DFI System

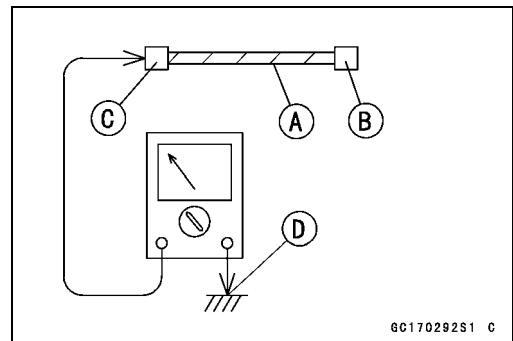
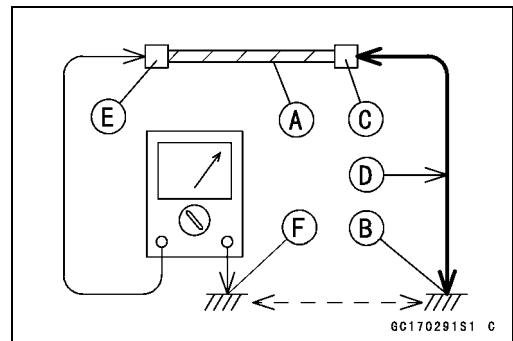
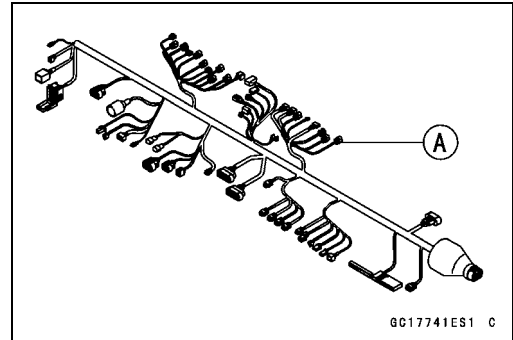
- Pull each connector [A] apart and inspect it for corrosion, dirt, and damage.
- ★ If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it. Connect the connectors securely.
- Check the wiring for continuity.
- Use the wiring diagram to find the ends of the lead which is suspected of being a problem.
- Connect the hand tester between the ends of the leads.

Special Tool - Hand Tester: 57001-1394

- Set the tester to the $\times 1 \Omega$ range, and read the tester.
- ★ If the tester does not read 0Ω , 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.

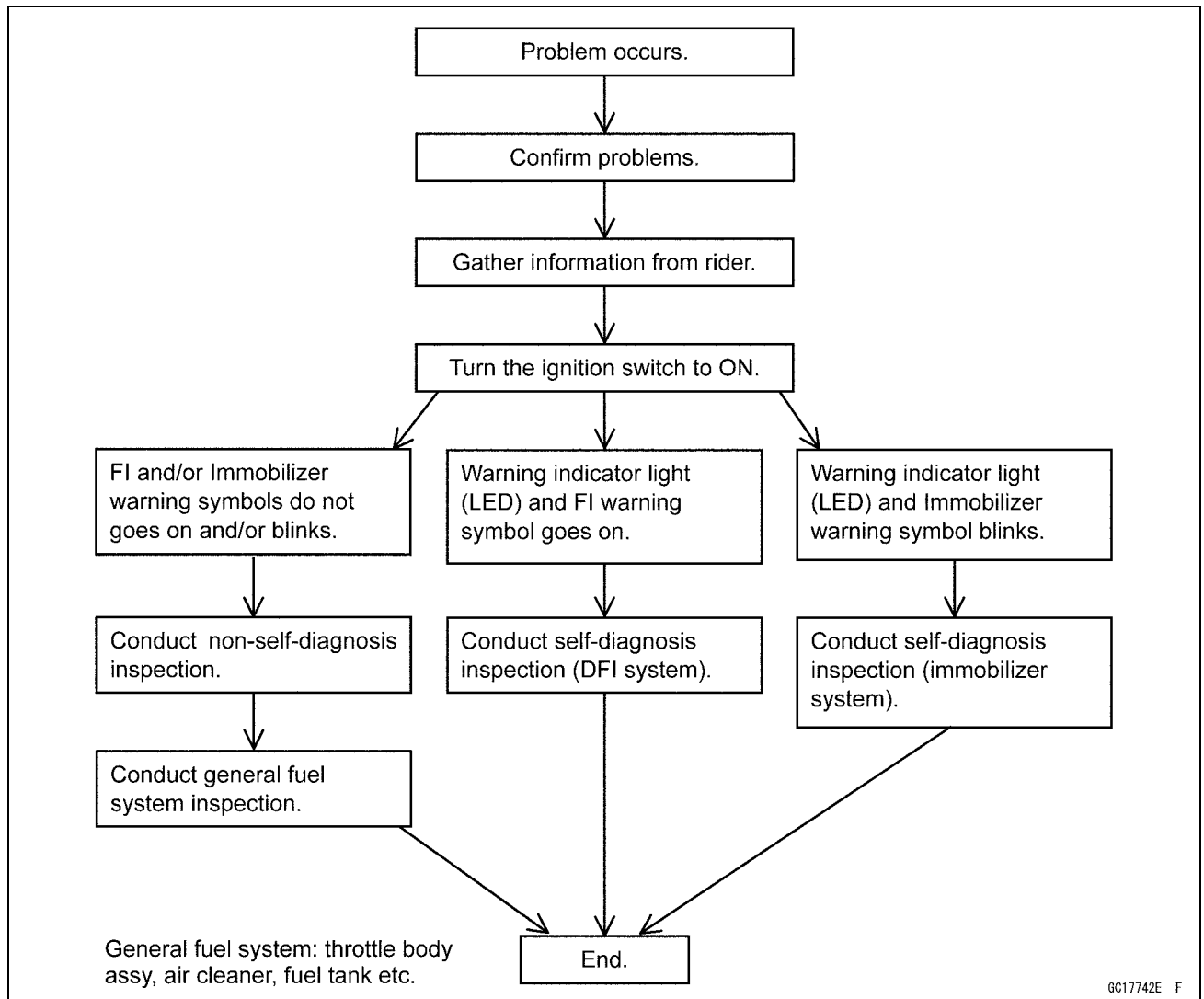
- When checking a harness [A] for short circuit, open one end [B] and check the continuity between the other end [C] and ground [D]. If there is continuity, the harness has a short circuit to ground, and it must be repaired or replaced.

- 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.

3-32 FUEL SYSTEM (DFI)

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	<input type="checkbox"/> fine, <input type="checkbox"/> cloudy, <input type="checkbox"/> rain, <input type="checkbox"/> snow, <input type="checkbox"/> always, <input type="checkbox"/> other:	
Temperature	<input type="checkbox"/> hot, <input type="checkbox"/> warm, <input type="checkbox"/> cold, <input type="checkbox"/> very cold, <input type="checkbox"/> always, <input type="checkbox"/> other:	
Problem frequency	<input type="checkbox"/> chronic, <input type="checkbox"/> often, <input type="checkbox"/> once	
Road	<input type="checkbox"/> street, <input type="checkbox"/> highway, <input type="checkbox"/> mountain road (<input type="checkbox"/> uphill, <input type="checkbox"/> downhill), <input type="checkbox"/> bumpy, <input type="checkbox"/> pebble	
Altitude	<input type="checkbox"/> normal, <input type="checkbox"/> high (about 1 000 m or more)	
Motorcycle conditions when problem occurred.		
Warning indicator light (LED)	<input type="checkbox"/> Goes on about 3 seconds after ignition switch ON, and goes off after engine pressure becomes high enough (with engine running).	
	<input type="checkbox"/> Goes on immediately after ignition switch ON, and the FI warning symbol is displayed on the LCD (DFI system problem).	
	<input type="checkbox"/> Start blinks immediately after ignition switch ON, and the immobilizer warning symbol on the LCD starts blinking (immobilizer system problem).	
	<input type="checkbox"/> Does not go on about 3 seconds after ignition switch ON.	
	<input type="checkbox"/> light up (ECU or meter unit replace).	
Starting difficulty	<input type="checkbox"/> starter motor not rotating.	
	<input type="checkbox"/> starter motor rotating but engine do not turn over.	
	<input type="checkbox"/> starter motor and engine do not turn over.	
	<input type="checkbox"/> no fuel flow (<input type="checkbox"/> no fuel in tank, <input type="checkbox"/> no fuel pump sound).	
	<input type="checkbox"/> no spark.	
	<input type="checkbox"/> other:	
Engine stalls	<input type="checkbox"/> right after starting.	
	<input type="checkbox"/> when opening throttle grip.	
	<input type="checkbox"/> when closing throttle grip.	
	<input type="checkbox"/> when moving off.	
	<input type="checkbox"/> when stopping the motorcycle.	
	<input type="checkbox"/> when cruising.	
	<input type="checkbox"/> other:	
Poor running at low speed	<input type="checkbox"/> very low idle speed, <input type="checkbox"/> very high idle speed, <input type="checkbox"/> rough idle speed.	
	<input type="checkbox"/> battery voltage is low (charge the battery).	
	<input type="checkbox"/> spark plug loose (tighten it).	
	<input type="checkbox"/> spark plug dirty, broken, or gap maladjusted (remedy it).	
	<input type="checkbox"/> backfiring.	
	<input type="checkbox"/> afterfiring.	
	<input type="checkbox"/> hesitation when acceleration.	
	<input type="checkbox"/> engine oil viscosity too high.	
	<input type="checkbox"/> brake dragging.	
	<input type="checkbox"/> engine overheating.	
	<input type="checkbox"/> clutch slipping.	
	<input type="checkbox"/> other:	

Troubleshooting the DFI System

Poor running or no power at high speed	<input type="checkbox"/> spark plug loose (tighten it).
	<input type="checkbox"/> spark plug dirty, broken, or gap maladjusted (remedy it).
	<input type="checkbox"/> spark plug incorrect (replace it).
	<input type="checkbox"/> knocking (fuel poor quality or incorrect, → use high-octane gasoline).
	<input type="checkbox"/> brake dragging.
	<input type="checkbox"/> clutch slipping.
	<input type="checkbox"/> engine overheating.
	<input type="checkbox"/> engine oil level too high.
	<input type="checkbox"/> engine oil viscosity too high.
	<input type="checkbox"/> other:

3-34 FUEL SYSTEM (DFI)

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 2).
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 or pump screen clogged	Inspect and replace fuel pump (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).
Idle speed control valve trouble	Inspect (see chapter 17).

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 2).
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).

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions
Fuel filter or pump screen clogged	Inspect and replace fuel pump (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).
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).
Idle speed control valve trouble	Inspect (see chapter 17).
Engine stalls easily:	
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
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).
Idle speed control valve trouble	Inspect (see chapter 17).
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 or pump screen clogged	Inspect and replace fuel pump (see chapter 3).

3-36 FUEL SYSTEM (DFI)

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions
Fuel pump trouble	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).
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
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 2).
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).

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions
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).
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 2).
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).

3-38 FUEL SYSTEM (DFI)

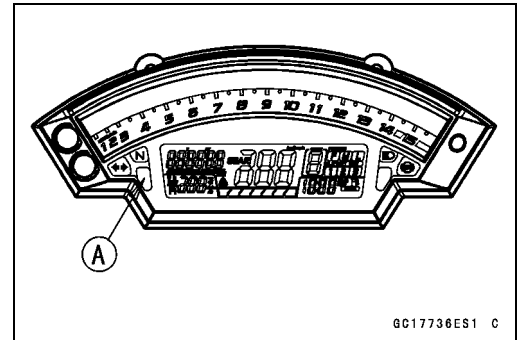
DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions
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).
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)

Light (LED) Inspection

- The warning indicator light (LED) [A] is used for the FI indicator, immobilizer indicator (immobilizer equipped models), water temperature warning indicator and oil pressure warning indicator.
- In this model, the warning indicator light (LED) (FI/immobilizer) goes on or blinks by the data sent from the ECU.
- Refer to the Meter Unit Inspection in the Electrical System chapter.



3-40 FUEL SYSTEM (DFI)

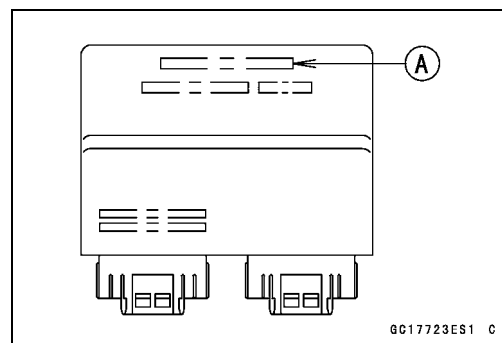
ECU

ECU Identification

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

ECU Identification

Part Number [A]	Specification
21175-0326	AU, with Immobilizer
	PH, with Immobilizer
	WVTA (FULL H), with Immobilizer
	GB WVTA (FULL H), with Immobilizer
21175-0327	WVTA (78.2 H), with Immobilizer
21175-0328	US, without Immobilizer
	CA, without Immobilizer
	CAL, without Immobilizer
21175-0329	SEA, with Immobilizer
21175-0330	BR, with Immobilizer

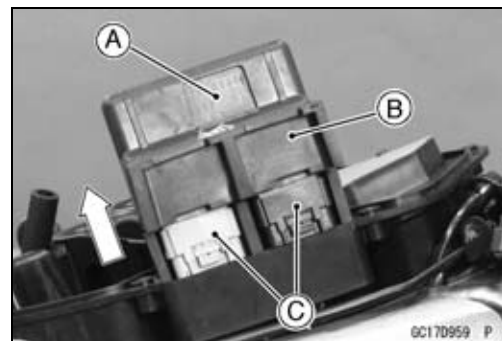


ECU Removal

NOTICE

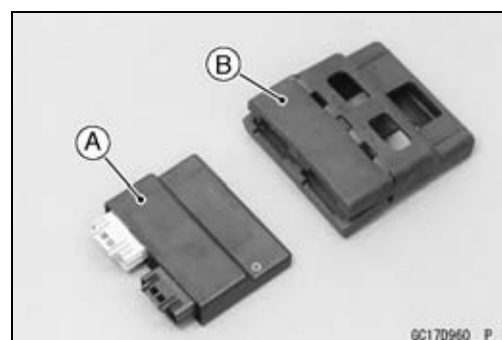
Never drop the ECU especially on a hard surface. Such a shock to the ECU can damage it.

- Remove the upper air cleaner housing (see Air Cleaner Element Replacement in the Periodic Maintenance chapter).
- Lift up the ECU [A] with rubber protector [B] to disconnect the connectors [C].



ECU Installation

- Install:
 - ECU [A] (in Rubber Protector [B])
 - ECU Connectors



ECU

ECU Power Supply Inspection

- Remove the upper air cleaner housing (see Air Cleaner Element Replacement in the Periodic Maintenance 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 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 to OFF.
- Disconnect the ECU connectors.
- Gray Connector [A]
- Set the hand tester [B] to the $\times 1 \Omega$ range and check the following wiring for continuity.

Special Tool - Hand Tester: 57001-1394

ECU Grounding Inspection

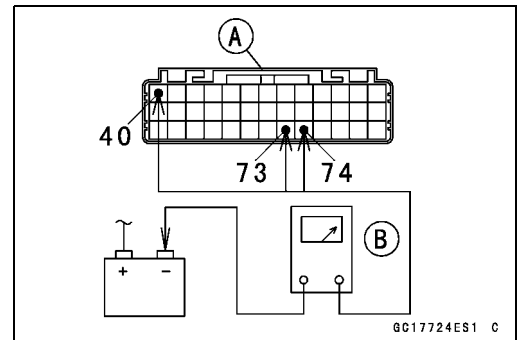
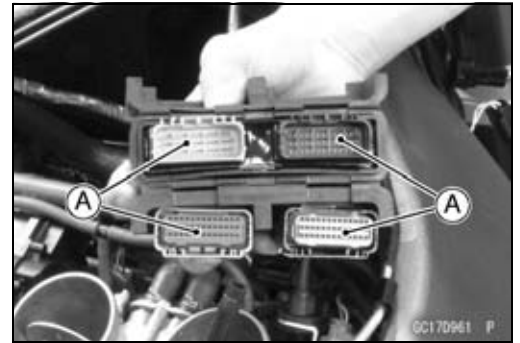
Connections:

- (I) BK/Y leads (ECU terminal 40, 73 or 74) ↔ 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.



3-42 FUEL SYSTEM (DFI)

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 (gray) [B] with the needle adapter set.

Special Tool - Needle Adapter Set: 57001-1457

ECU Power Supply Inspection

Connections:

- (I) Digital Meter (+) → Terminal 41 (W/BK)
Digital Meter (-) → Battery (-) terminal
- (II) Digital Meter (+) → Terminal 53 (BR/W)
Digital Meter (-) → Battery (-) terminal
- (III) Digital Meter (+) → Terminal 54 (W/BK)
Digital Meter (-) → Battery (-) terminal

Ignition Switch OFF:

- Terminal 41 (W/BK): Battery Voltage
- Terminal 53 (BR/W): 0 V
- Terminal 54 (W/BK): Battery Voltage

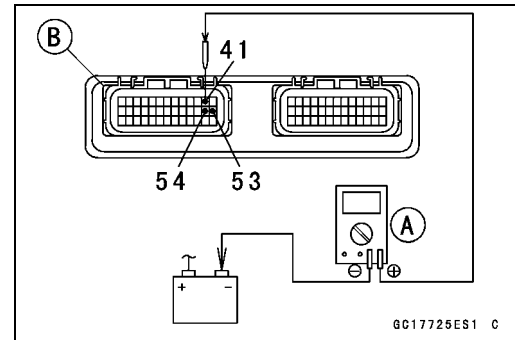
Ignition Switch ON:

All: Battery Voltage

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

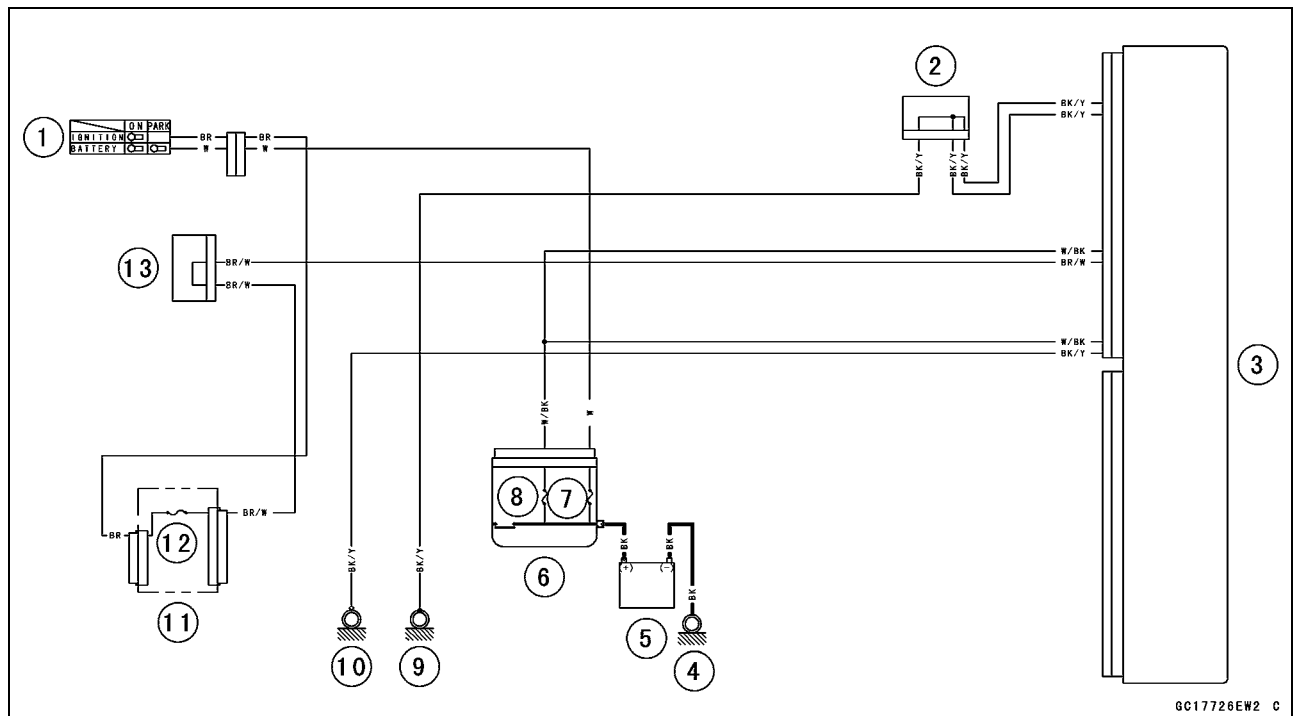
- Main Fuse 30 A (see Fuse Inspection in the Electrical System chapter)
- ECU Fuse 15 A (see Fuse Inspection in the Electrical System chapter)
- ECU Main Relay (see Relay Circuit Inspection in the Electrical System chapter)
- Power Source Wiring (see wiring diagram in this section)

★ If the fuse, wiring and relay are good, replace the ECU (see ECU Removal/Installation).



ECU

ECU Power Source Circuit



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

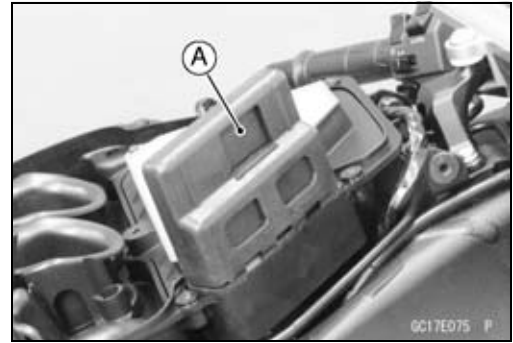
3-44 FUEL SYSTEM (DFI)

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 to OFF.
- Remove:
ECU (see ECU Removal)

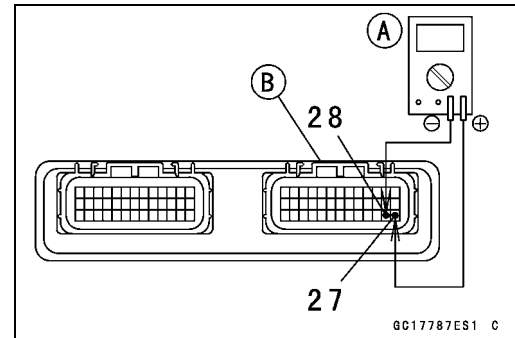


- Connect a digital meter [A] to the ECU connector (black) [B].
- Measure the resistance of the CAN communication line resistor.

CAN Communication Line Resistance (at ECU Connector)

Connections: Terminal 27 ↔ Terminal 28

Standard: 123 ~ 125 Ω



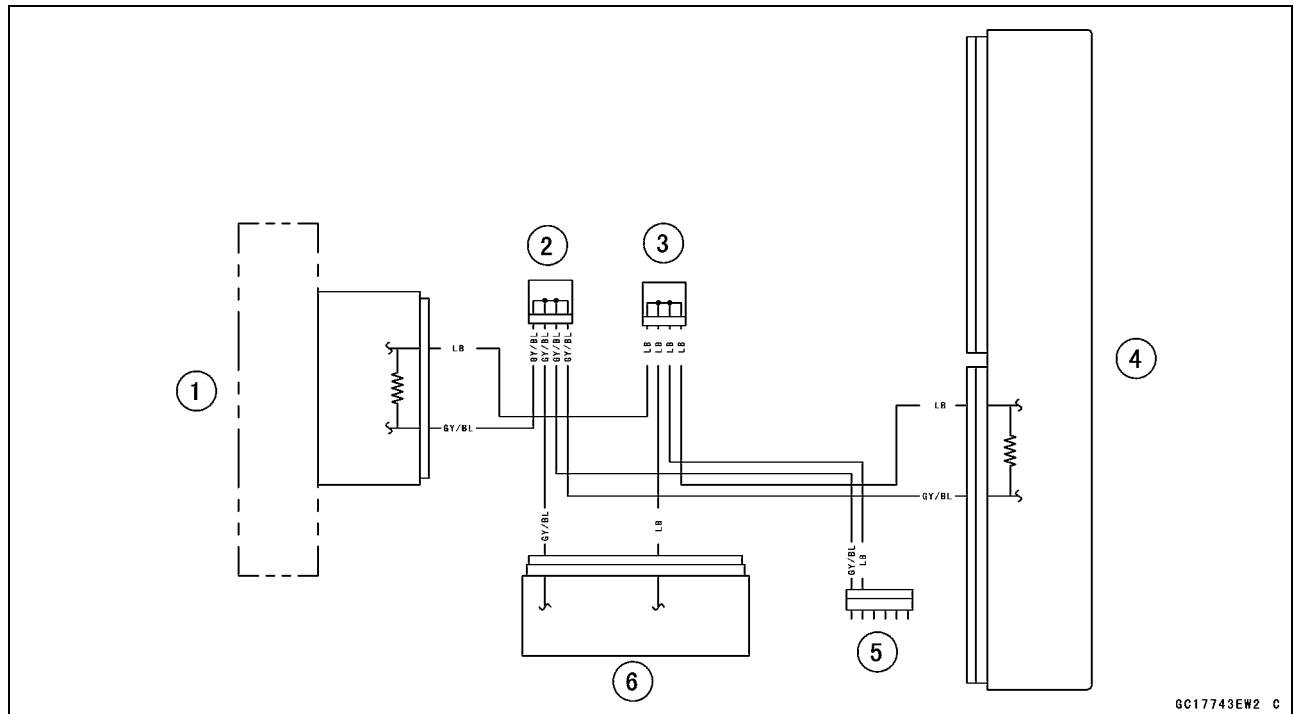
- ★ If the reading is out of the range, replace the ECU (see ECU Removal/Installation).
- ★ If the reading is within the range, resistor of the ECU for CAN communication line is normal.
- Check the wiring for continuity of the CAN communication line (see wiring diagram in this section).

Special Tool - Hand Tester: 57001-1394

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

CAN Communication Line

CAN Communication Line Circuit



1. Meter Unit
2. Joint Connector C
3. Joint Connector D
4. ECU
5. Kawasaki Diagnostic System/Immobilizer (Equipped Models) Connector
6. KIBS Hydraulic Unit (Equipped Models)

3-46 FUEL SYSTEM (DFI)

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

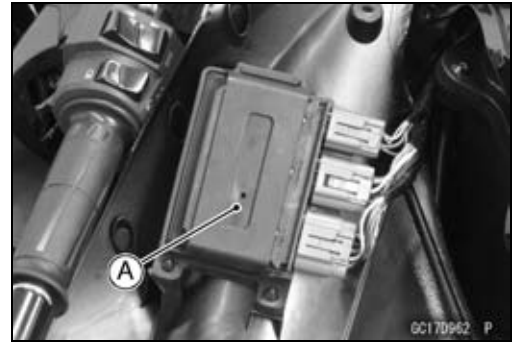
- ★ If a fuse fails during operation, inspect the DFI system to determine the cause, and then replace it with a new fuse of proper amperage.
- Refer to the Fuse Installation in the Electrical System chapter.

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.

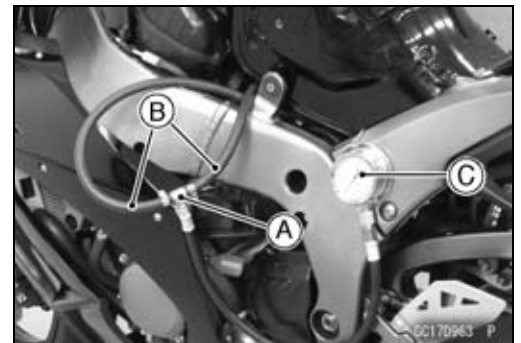
- Remove:
 - Fuel Tank Covers (see Fuel Tank Removal)
 - Fuel Tank Bolts (see Fuel Tank Removal)
 - Primary Fuel Hose (see Fuel Hose Replacement in the Periodic Maintenance chapter)
- Be sure to place a piece of cloth around the fuel outlet pipe of the fuel pump and the delivery pipe of the throttle 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 to run position.
- Turn the ignition switch to 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 3 seconds or more without the fuel in the fuel tank. If the fuel pump is driven without the fuel, it may be damaged.

3-48 FUEL SYSTEM (DFI)

Fuel Line

- 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)

NOTE

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

- Turn the ignition switch to 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 the removed parts (see appropriate chapters).
- 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 to OFF.
- Wait until the engine cools down.
- Prepare a fuel hose (Special Tool: 57001-1607) and a measuring cylinder.

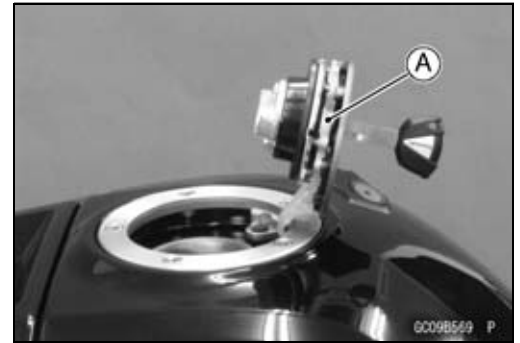
Special Tool - Fuel Hose: 57001-1607

Fuel Line

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

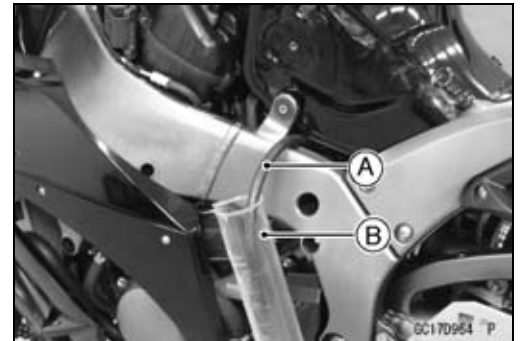
Fuel is flammable and explosive under certain conditions and can cause severe burns. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately. When the fuel hose is disconnected, fuel spills out from the hose and the pipe because of residual pressure. Cover the hose connection 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 to ON.
- The fuel pump should operate for 3 seconds, and then should stop.

NOTICE

Do not drive the fuel pump 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: 67 mL (2.3 US oz.) or more for 3 seconds

- Turn the ignition switch to 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.

3-50 FUEL SYSTEM (DFI)

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

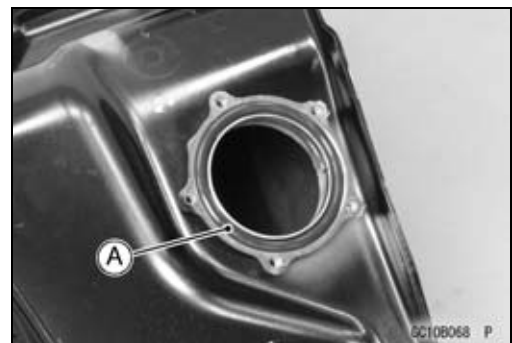
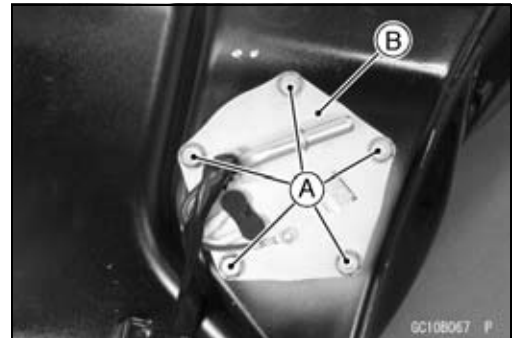
Never drop the fuel pump especially on a hard surface. Such a shock to the pump can damage it.

- 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.

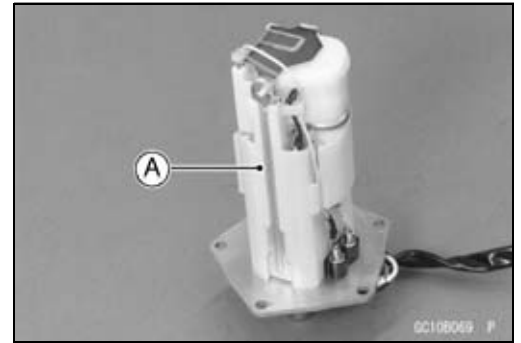
- Discard the fuel pump gasket [A].



Fuel Pump

Fuel Pump Installation

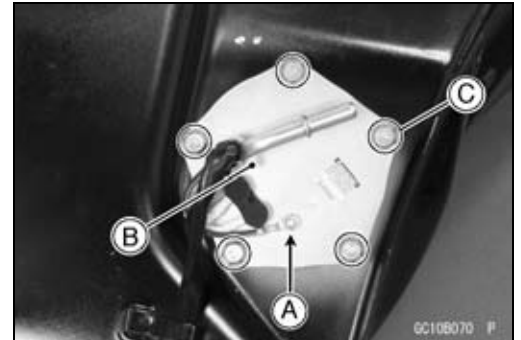
- Remove dirt or dust from the fuel pump [A] by lightly applying compressed air.
- Replace the fuel pump gasket with a new one.



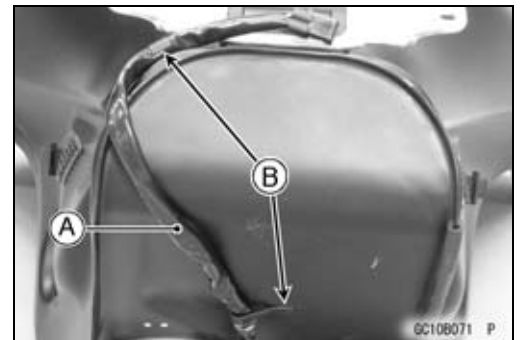
- Check that the fuel pump terminal [A] and band [B] are in place.
- Apply a non-permanent locking agent to the threads of the fuel pump bolts.
- Tighten the fuel pump bolts [C] to a snug fit.
- Tighten the fuel pump bolts alternating diagonally.

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.



- Hold the lead [A] to the clamps [B].



Fuel Pump Operation Inspection

NOTE

○Be sure the battery is fully charged.

- Turn the engine stop switch to run position.
- Turn the ignition switch to ON and make sure that the fuel pump operates (make light sounds) for 3 seconds, and then stops.
- Turn the ignition switch to OFF.
- ★ If the pump does not operate as described above, check the operating voltage (see Fuel Pump Operating Voltage Inspection).

Fuel Pump Operating Voltage Inspection

NOTE

○Be sure the battery is fully charged.

- Turn the ignition switch to OFF.
- Remove:
 - Fuel Tank Bolts (see Fuel Tank Removal)
 - Fuel Tank Bracket Bolts (see Fuel Tank Removal)

3-52 FUEL SYSTEM (DFI)

Fuel Pump

- Disconnect the fuel pump lead connector and connect the harness adapter [A] between these connectors as shown in the figure.

Main Harness [B]
Fuel Pump [C]

Special Tool - Measuring Adapter: 57001-1700

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

Fuel Pump Operating Voltage

Connections to Adapter:

Digital Meter (+) → R (pump Y/R) 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 to run position.
- Turn the ignition switch to ON.

Operating Voltage

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

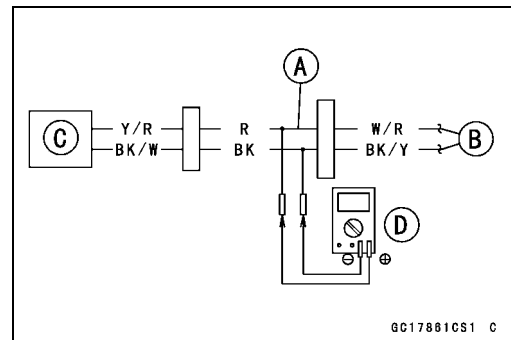
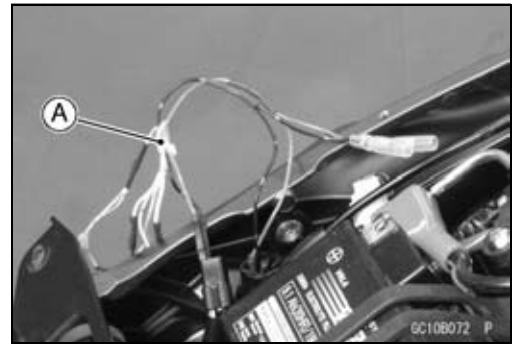
- Turn the ignition switch to OFF.
- ★ If the reading stays on battery voltage and never shows 0 V, check the fuel pump relay (see Relay Circuit Inspection in the Electrical System chapter).
- ★ If the fuel pump relay is normal, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
- ★ 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).

Special Tool - Hand Tester: 57001-1394

- ★ 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).

Pressure Regulator Removal

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



Fuel Pump

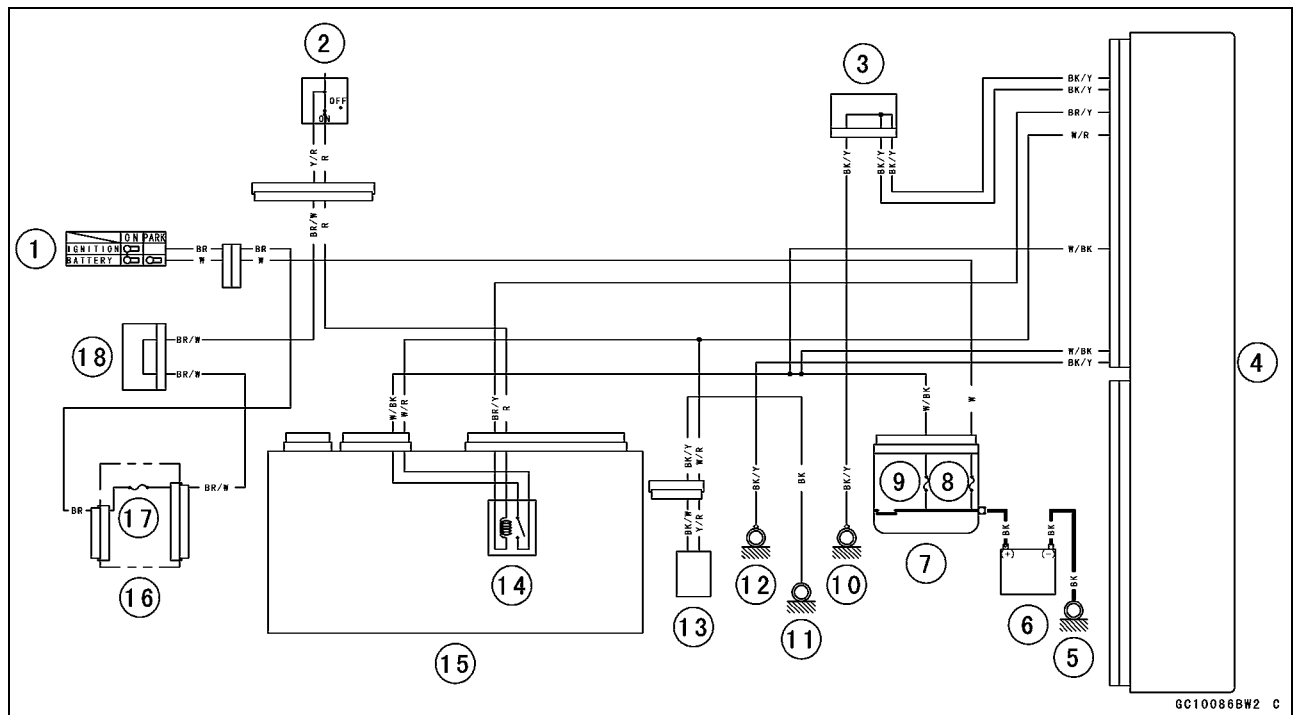
Fuel Filter Cleaning

○ The fuel filter [A] is built into the fuel pump and can not be cleaned or checked.

★ If the fuel filter is suspected of clogging or being damaged, replace it with the fuel pump as a set.



Fuel Pump Circuit



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

3-54 FUEL SYSTEM (DFI)

Fuel Injectors

Primary Fuel Injector Removal/Installation

- Refer to the Throttle Body Assy Disassembly/Assembly.

Secondary Fuel Injector Removal/Installation

- Refer to the Nozzle Assy Disassembly/Assembly.

Fuel Injector Audible Inspection

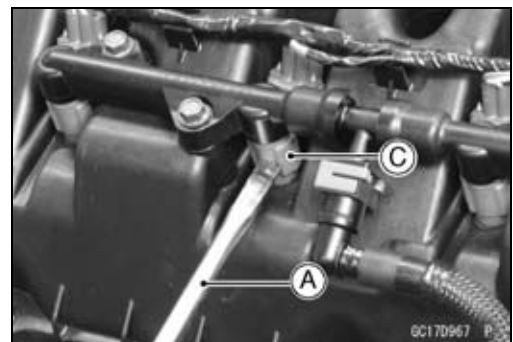
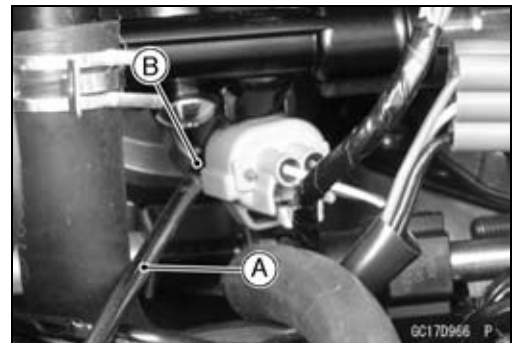
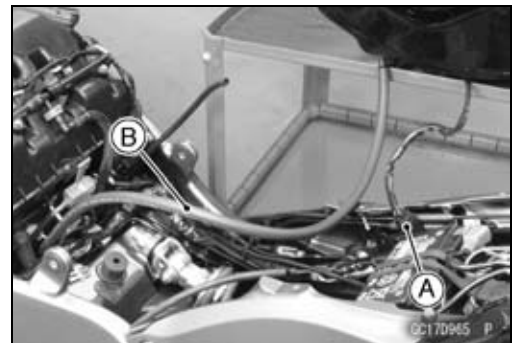
NOTE

- Be sure the battery is fully charged.
- The secondary fuel injectors are operating with following conditions.
 1. The engine speed is more than 6 000 r/min (rpm).
 2. The throttle opening is more than 12°.

- Remove:
 - Fuel Tank (see Fuel Tank Removal)
 - Primary 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 tip of a screwdriver [A] to the fuel injector. Put the grip end onto your ear, and listen whether the fuel injector is clicking or not.
 - Primary Fuel Injector [B]
 - Secondary Fuel Injector [C]
- 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 to OFF.
- ★ If any fuel injector does not click, check the fuel injector resistance (see Fuel Injector Resistance Inspection).

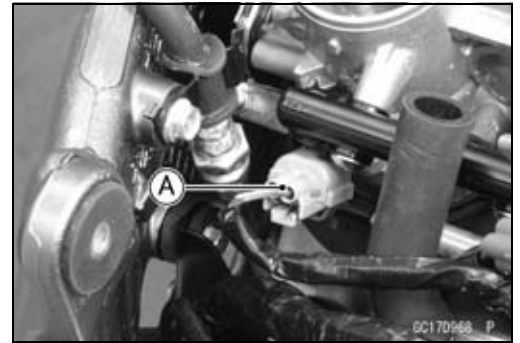


Fuel Injectors

Fuel Injector Resistance Inspection

For Primary Fuel Injectors

- Remove the air cleaner housing (see Air Cleaner Housing Removal).
- Disconnect the primary fuel injector connector [A].



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

Primary Fuel Injector Resistance

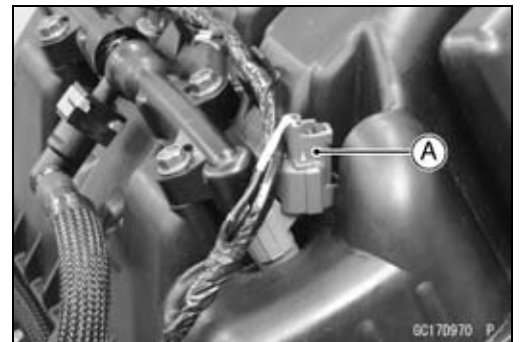
Standard: About 11.7 ~ 12.3 Ω at 20°C (68°F)

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



For Secondary Fuel Injectors

- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the secondary fuel injector connector [A].

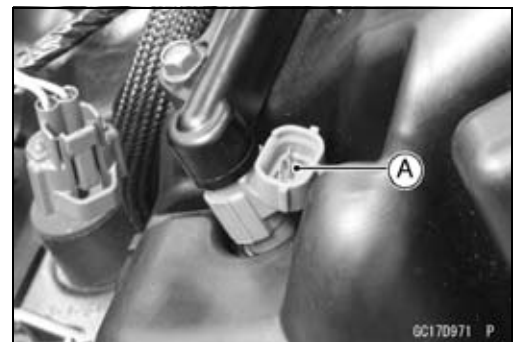


- Connect a digital meter to the terminals in each secondary fuel injector [A].
- Measure the secondary fuel injector resistance.

Secondary Fuel Injector Resistance

Standard: About 11.7 ~ 12.3 Ω at 20°C (68°F)

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



3-56 FUEL SYSTEM (DFI)

Fuel Injectors

Fuel Injector Power Source Voltage Inspection

NOTE

○Be sure the battery is fully charged.

- Turn the ignition switch to OFF.

For Primary Fuel Injectors

- Remove the air cleaner housing (see Air Cleaner Housing Removal).
- Disconnect the injector connector and connect the harness adapter [A] between these connectors as shown in the figure.

Main Harness [B]

Primary Fuel Injector #1 [C]

Special Tool - Measuring Adapter: 57001-1700

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

Primary Fuel Injector Power Source Voltage Connections to Adapter:

For Primary 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 to ON.

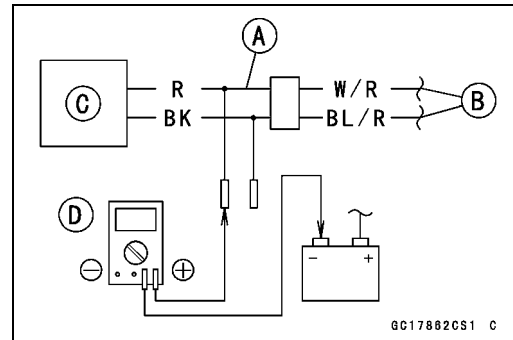
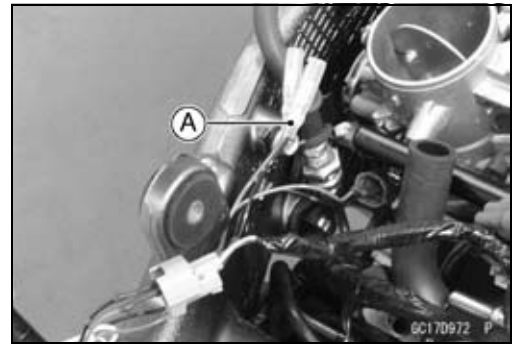
Power Source Voltage

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

- Turn the ignition switch to 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).

Special Tool - Hand Tester: 57001-1394

- ★ 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

For Secondary Fuel Injectors

- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the injector connector and connect the harness adapter [A] between these connectors as shown in the figure.

Main Harness [B]

Secondary Fuel Injector #1 [C]

Special Tool - Measuring Adapter: 57001-1700

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

Secondary Fuel Injector Power Source Voltage Connections to Adapter:

For Secondary 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 to ON.

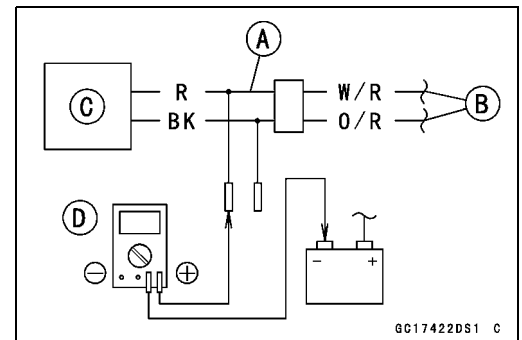
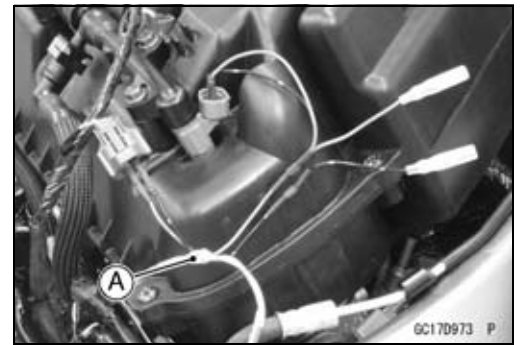
Power Source Voltage

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

- Turn the ignition switch to 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).

Special Tool - Hand Tester: 57001-1394

- ★ 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).



3-58 FUEL SYSTEM (DFI)

Fuel Injectors

Fuel Injector Output Voltage Inspection

NOTE

○Be sure the battery is fully charged.

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

Special Tool - Needle Adapter Set: 57001-1457

Primary Fuel Injector Output Voltage [C]

Connections to ECU Connector:

For Primary Fuel Injector #1

Digital Meter (+) → BL/R lead (ECU terminal 47)

Digital Meter (-) → Battery (-) terminal

For Primary Fuel Injector #2

Digital Meter (+) → BL/O lead (ECU terminal 48)

Digital Meter (-) → Battery (-) terminal

For Primary Fuel Injector #3

Digital Meter (+) → BL/BK lead (ECU terminal 49)

Digital Meter (-) → Battery (-) terminal

For Primary Fuel Injector #4

Digital Meter (+) → BL/Y lead (ECU terminal 50)

Digital Meter (-) → Battery (-) terminal

Secondary Fuel Injector Output Voltage [D]

Connections to ECU Connector:

For Secondary Fuel Injector #1

Digital Meter (+) → O/R lead (ECU terminal 57)

Digital Meter (-) → Battery (-) terminal

For Secondary Fuel Injector #2

Digital Meter (+) → O/G lead (ECU terminal 72)

Digital Meter (-) → Battery (-) terminal

For Secondary Fuel Injector #3

Digital Meter (+) → O/BK lead (ECU terminal 61)

Digital Meter (-) → Battery (-) terminal

For Secondary Fuel Injector #4

Digital Meter (+) → O/Y lead (ECU terminal 62)

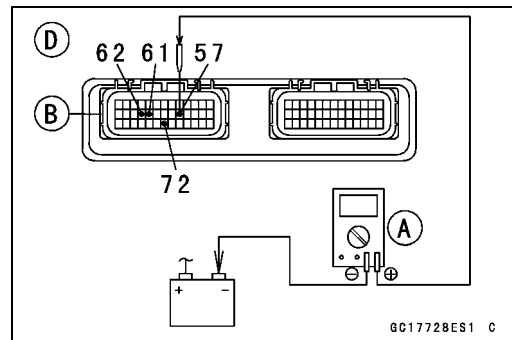
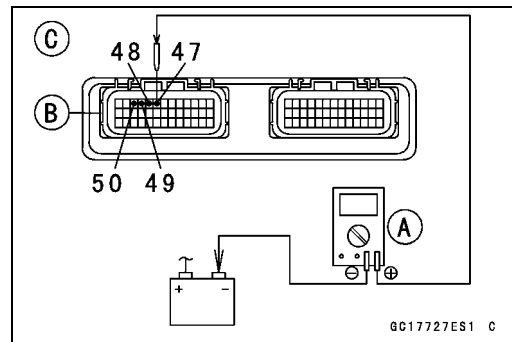
Digital Meter (-) → Battery (-) terminal

- 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 to ON.

Output Voltage

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

- Turn the ignition switch to 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.

Special Tool - Hand Tester: 57001-1394

○ Disconnect the ECU and injector connector.

Wiring Continuity Inspection (Primary Fuel Injectors)

ECU Connector (Gray) [A] ↔ Primary Fuel Injector Connector [B]

For Primary Fuel Injector #1 [C]

BL/R lead (ECU terminal 47) [D]

For Primary Fuel Injector #2

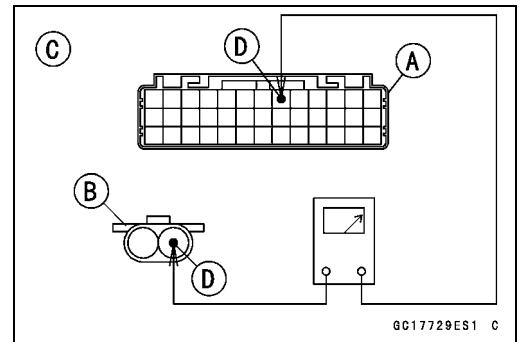
BL/O lead (ECU terminal 48)

For Primary Fuel Injector #3

BL/BK lead (ECU terminal 49)

For Primary Fuel Injector #4

BL/Y lead (ECU terminal 50)



Wiring Continuity Inspection (Secondary Fuel Injectors)

ECU Connector (Gray) [A] ↔ Secondary Fuel Injector Connector [E]

For Secondary Fuel Injector #1 [F]

O/R lead (ECU terminal 57) [G]

For Secondary Fuel Injector #2

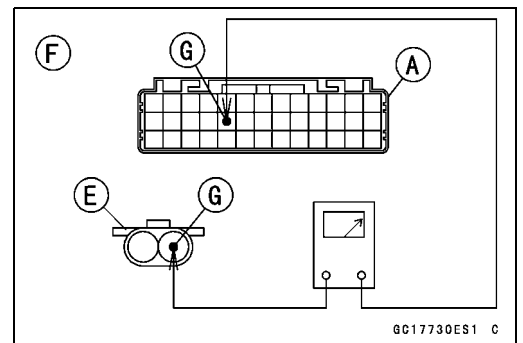
O/G lead (ECU terminal 72)

For Secondary Fuel Injector #3

O/BK lead (ECU terminal 61)

For Secondary Fuel Injector #4

O/Y lead (ECU terminal 62)



★ 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).

3-60 FUEL SYSTEM (DFI)

Fuel Injectors

Fuel Injector Fuel Line Inspection

- Remove:
 - Fuel Tank (see Fuel Tank Removal)
 - Air Cleaner Housing (see Air Cleaner Housing Removal)
 - Primary and Secondary Fuel Hoses (see Fuel Hose Replacement in the Periodic Maintenance chapter)
- Do not remove the nozzle assy from the air cleaner housing.
- 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 injector fuel 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 in the figure.
 - Rear View [E]
- Connect the fuel hose [F] (both ends with the clamps [G]) between the delivery pipes [H] of the throttle body assy and nozzle assy [I] as shown in the figure.
- Apply soap and water solution to the areas [J] as shown in the figure.
- Watching the pressure gauge, squeeze the pump lever, and build up the pressure until the pressure reaches the maximum pressure.

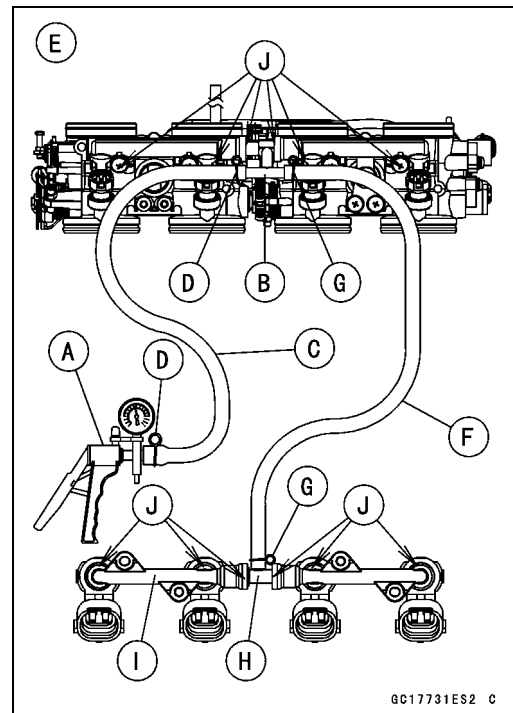
Injector Fuel Line Maximum Pressure

Standard: 300 kPa (3.06 kgf/cm², 43 psi)

NOTICE

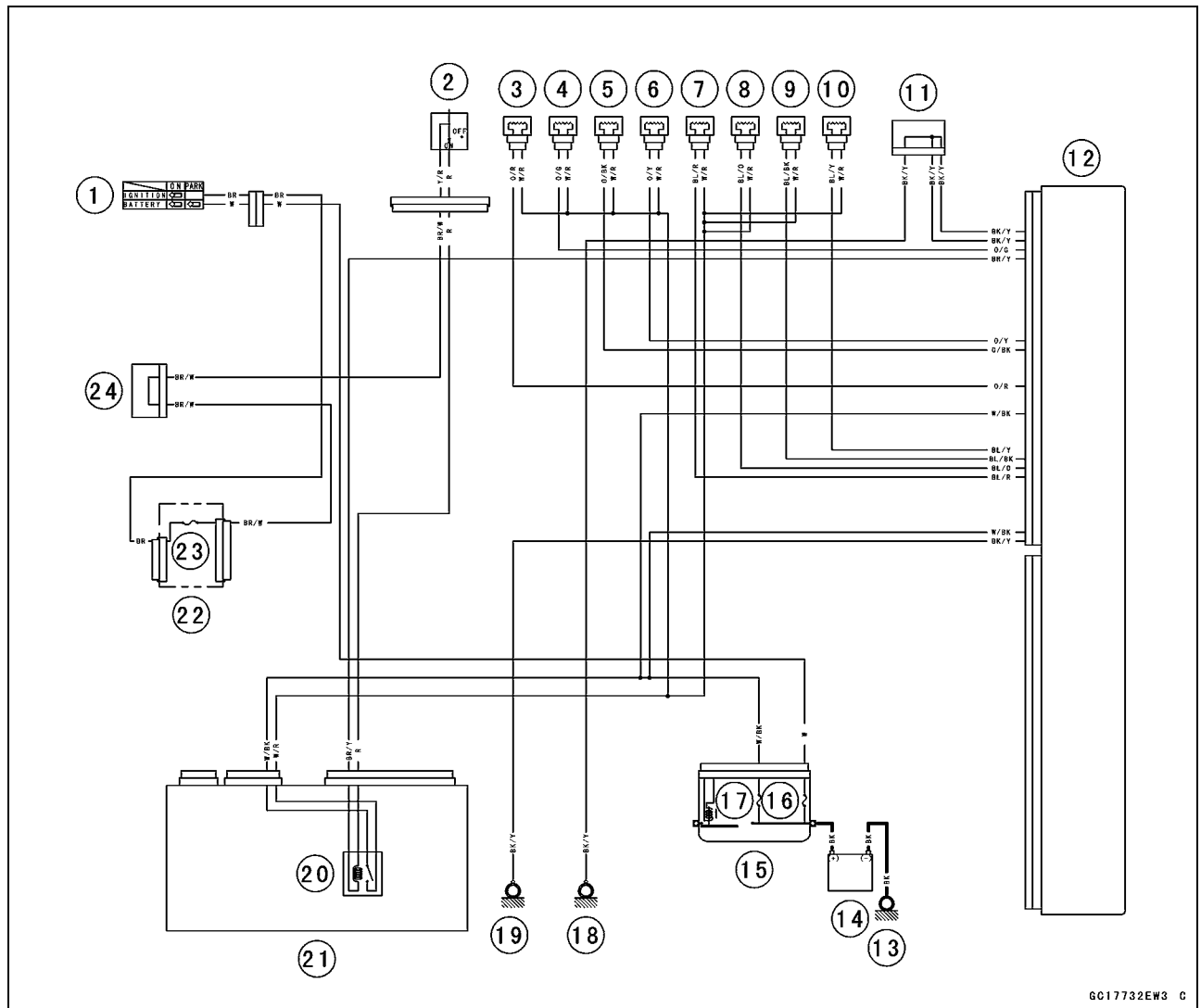
During pressure testing, do not exceed the maximum pressure for which the system is designed.

- 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:
 - Primary and Secondary Fuel Hoses (see Fuel Hose Replacement in the Periodic Maintenance chapter)
 - Air Cleaner Housing (see Air Cleaner Housing Removal)
 - Fuel Tank (see Fuel Tank Removal)
- Start the engine and check for fuel leakage.



Fuel Injectors

Fuel Injector Circuit



GC17732EW3 C

1. Ignition Switch
2. Engine Stop Switch
3. Secondary Fuel Injector #1
4. Secondary Fuel Injector #2
5. Secondary Fuel Injector #3
6. Secondary Fuel Injector #4
7. Primary Fuel Injector #1
8. Primary Fuel Injector #2
9. Primary Fuel Injector #3
10. Primary Fuel Injector #4
11. Joint Connector E
12. ECU
13. Engine Ground
14. Battery
15. Starter Relay
16. Main Fuse 30 A
17. ECU Fuse 15 A
18. Frame Ground 2
19. Frame Ground 1
20. Fuel Pump Relay
21. Relay Box
22. Fuse Box 1
23. Ignition Fuse 15 A
24. Joint Connector F

3-62 FUEL SYSTEM (DFI)

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
--

<p>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.</p>
--

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

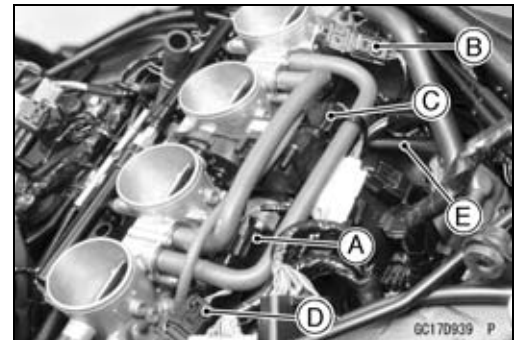
⚠ WARNING

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.

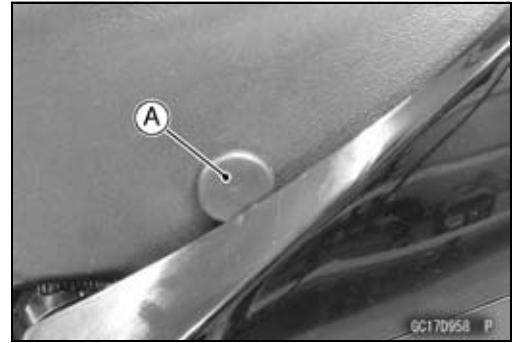
- Remove:
 - Air Cleaner Housing (see Air Cleaner Housing Removal)
 - Primary and Secondary Fuel Hoses (see Fuel Hose Replacement in the Periodic Maintenance chapter)
- Disconnect:
 - Idle Speed Control Valve Actuator Connector [A]
 - Intake Air Pressure Sensor #2 Connector [B]
 - Subthrottle Valve Actuator Connector [C]
 - Intake Air Pressure Sensor #1 Connector [D]
 - Hose [E] (Other than US, CA and CAL Models)
- For the California and Southeast Asia models, pull off the vacuum hose.
- Disconnect:
 - Primary Fuel Injector Connectors [A]



3-64 FUEL SYSTEM (DFI)

Throttle Body Assy

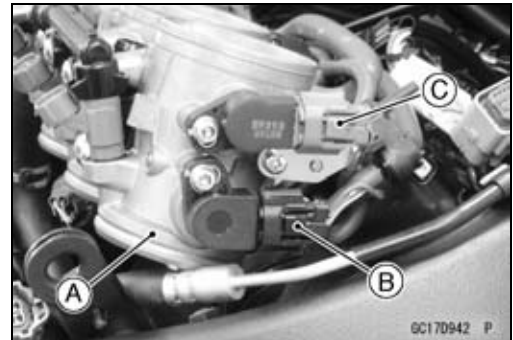
- Remove the caps [A].



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



- Remove the throttle body assy [A] from the throttle body assy holders.
- Disconnect:
 - Main Throttle Sensor Connector [B]
 - Subthrottle Sensor Connector [C]



- Remove:
 - Clamp [A]
 - Throttle Cable Lower Ends [B]
- 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.

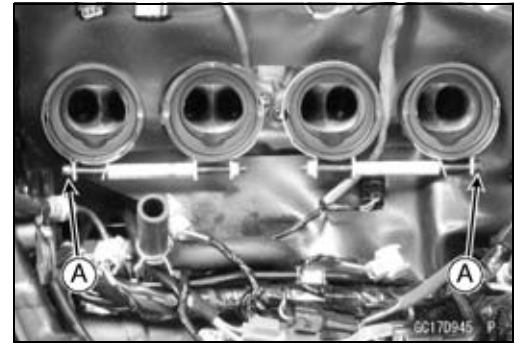
Throttle Body Assy Installation

- Apply a thin coat of grease to the throttle cable lower ends.
- Fit the accelerator cable end [A] and the decelerator cable end [B] into the throttle pulley.
- Install the clamp [C] securely.

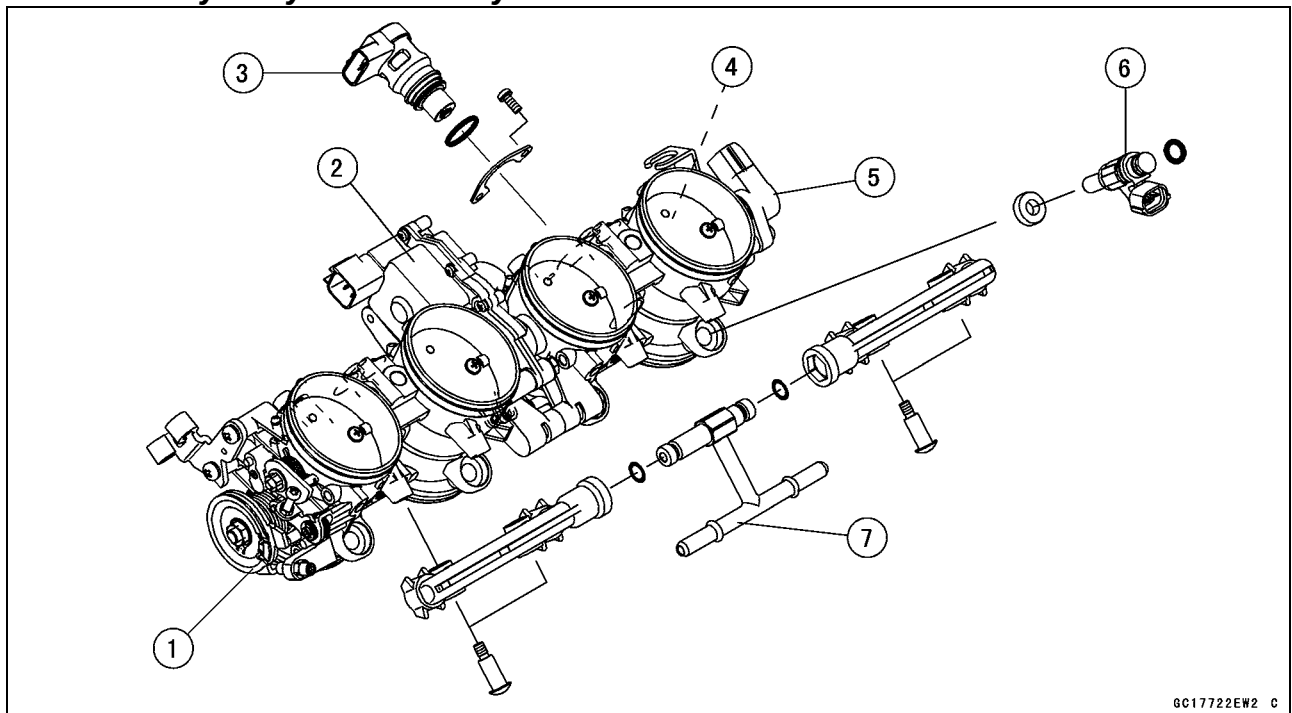


Throttle Body Assy

- Install the throttle body assy holder clamp bolt heads [A] outside as shown in the figure.
- Tighten:
Torque - Throttle Body Assy Holder Clamp Bolts: 2.0 N·m (0.20 kgf·m, 18 in·lb)
- 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).
- Adjust:
 Throttle Grip Free Play (see Throttle Control System Inspection in the Periodic Maintenance chapter)



Throttle Body Assy Disassembly



1. Throttle Body Assy
2. Subthrottle Valve Actuator
3. Idle Speed Control Valve Actuator
4. Main Throttle Sensor
5. Subthrottle Sensor
6. Primary Fuel Injectors
7. Delivery Pipe Assy

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.

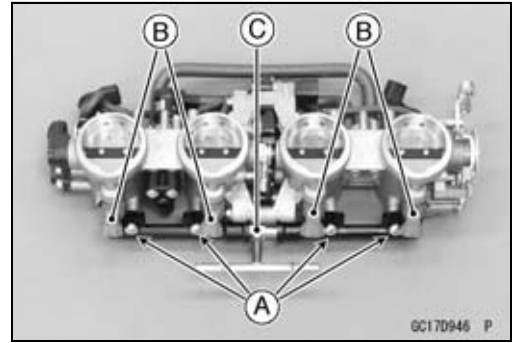
3-66 FUEL SYSTEM (DFI)

Throttle Body Assy

- Remove the throttle body assy (see Throttle Body Assy Removal).
- Remove the screws [A] to pull out the primary fuel injectors [B] from the throttle body assy together with the delivery pipe assy [C].

NOTE

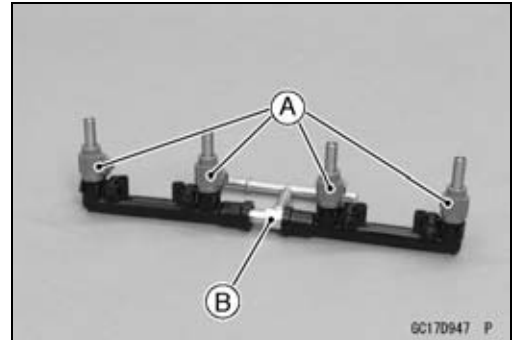
○Do not damage the insertion portions of the injectors when they are pulled out from the throttle body.



- Pull out the primary 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.

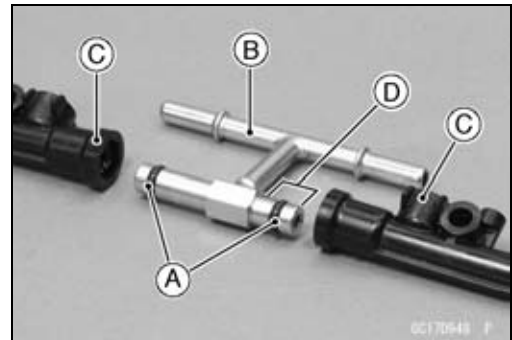


NOTICE

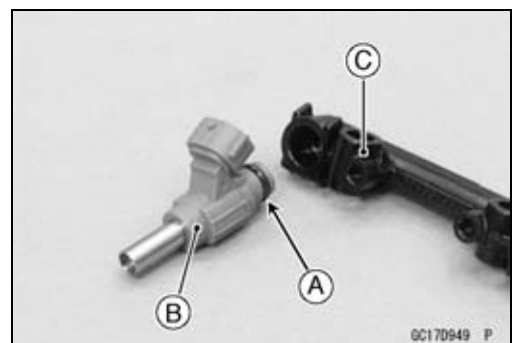
Never drop the primary fuel injector especially on a hard surface. Such a shock to the injector can damage it.

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.

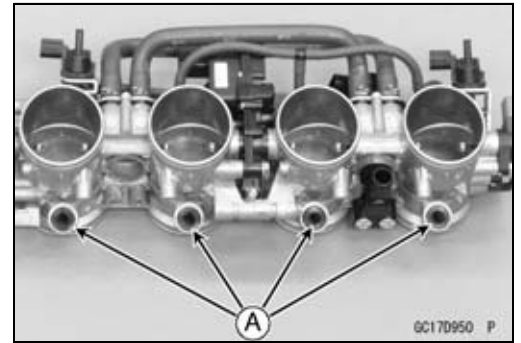


- Replace the O-rings [A] of each primary fuel injector [B] with new ones.
- Apply engine oil to the new O-rings, insert them to the delivery pipe assy [C] and confirm whether the injectors turn smoothly or not.



Throttle Body Assy

- Replace the dust seals [A] with new ones.
- Apply engine oil to the new dust seals.
- Install the primary 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).

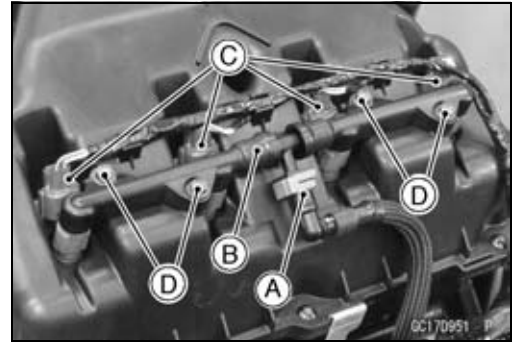


3-68 FUEL SYSTEM (DFI)

Nozzle Assy

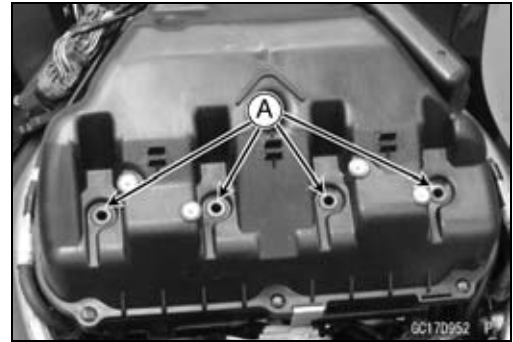
Nozzle Assy Removal

- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the secondary fuel hose [A] from the delivery pipe assy of the nozzle assy [B] (see Fuel Hose Replacement in the Periodic Maintenance chapter).
- Disconnect the secondary fuel injector connectors [C].
- Remove:
 - Nozzle Assy Mounting Bolts [D]
 - Nozzle Assy



Nozzle Assy Installation

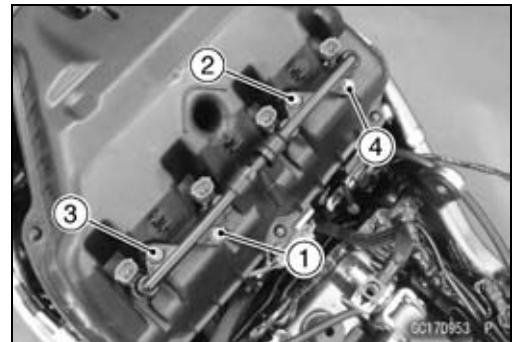
- Replace the dust seals [A] with new ones.
- Apply engine oil to the new dust seals.
- Install the nozzle assy securely.
- Push the four mounting positions of the injectors.



NOTICE

When installing the nozzle assy, apply force equally to the delivery pipe assy. Pushing the fuel pipe strongly could damage it as it is made from resin.

- Tighten the mounting bolts as shown sequence [1 ~ 4] in the figure.
 - Torque - Nozzle Assy Mounting Bolts: 4.9 N·m (0.50 kgf·m, 43 in·lb)
- Run the leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Connect the secondary fuel hose to the delivery pipe of the nozzle assy (see Fuel Hose Replacement in the Periodic Maintenance chapter).



Nozzle Assy Disassembly

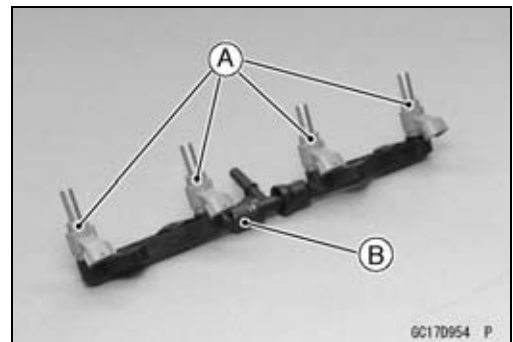
- Remove the nozzle assy (see Nozzle Assy Removal).
- Pull out the secondary fuel injectors [A] from the delivery pipe assy [B].

NOTE

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

NOTICE

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



- Separate the delivery pipe assy.

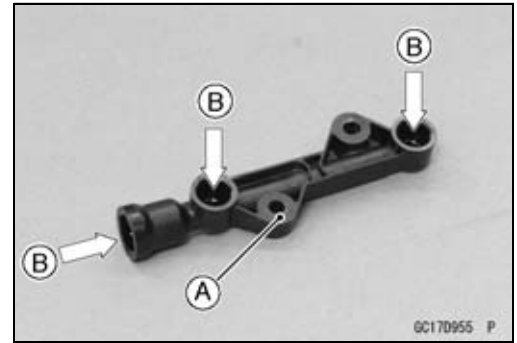
NOTE

○ Mark and record the location of the delivery pipes and the joint pipe so that the delivery pipe assy can be re-assembled in the original position.

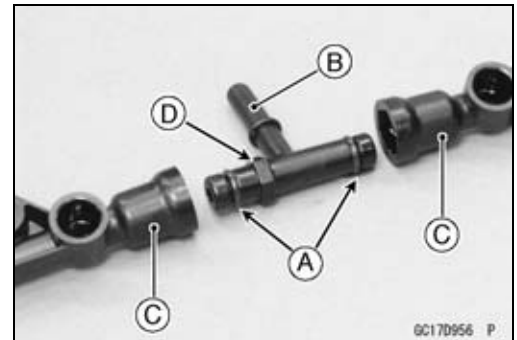
Nozzle Assy

Nozzle Assy Assembly

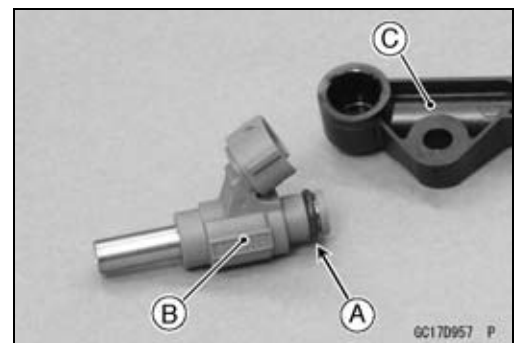
- Before assembling, blow away dirt or dust from the delivery pipes [A] by applying compressed air [B].



- 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 stepped side [D] faces right side.
- Left and right delivery pipes are identical.



- Replace the O-rings [A] of each secondary fuel injector [B] with new ones.
- Apply engine oil to the new O-rings, and insert them to the delivery pipe assy [C] and confirm whether the injectors turn smoothly or not.
- Install the nozzle assy (see Nozzle Assy Installation).



3-70 FUEL SYSTEM (DFI)

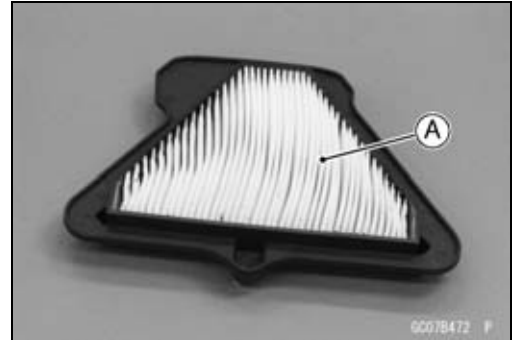
Air Cleaner

Air Cleaner Element Removal/Installation

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

Air Cleaner Element Inspection

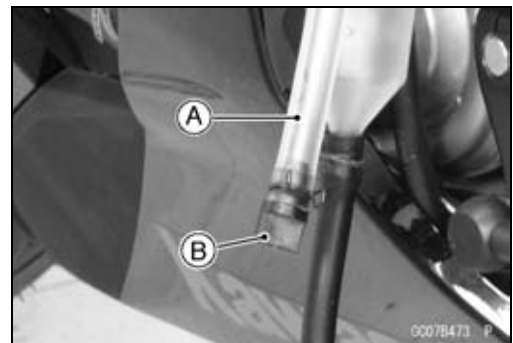
- Remove the air cleaner element (see Air Cleaner Element Replacement in the Periodic Maintenance chapter).
- Visually check the element [A] for tears or breaks.
- ★ If the element has any tears or breaks, replace the element.



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.

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

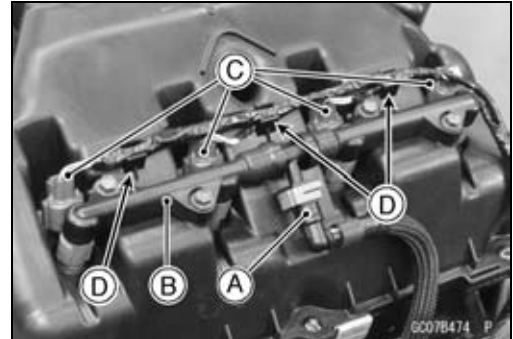


⚠ WARNING

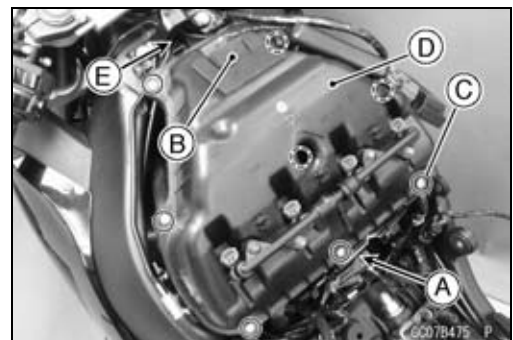
Oil on tires will make them slippery and can cause an accident and injury. Be sure to reinstall the plug in the drain hose after draining.

Air Cleaner Housing Removal

- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the secondary fuel hose [A] from the delivery pipe of the nozzle assy [B] (see Fuel Hose Replacement in the Periodic Maintenance chapter).
- Disconnect the secondary fuel injector connectors [C].
- Free the lead from the grooves [D].

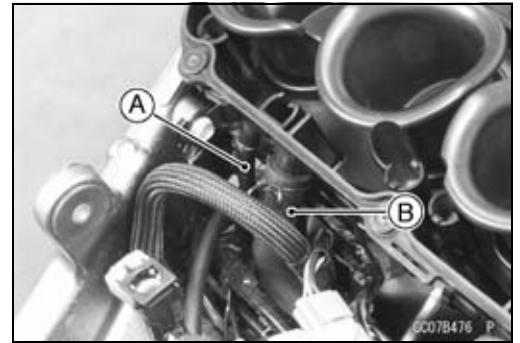


- Remove:
 - Clamp [A]
 - Connector [B]
 - Screws [C]
 - Upper Air Cleaner Housing [D]
 - Bolt [E]

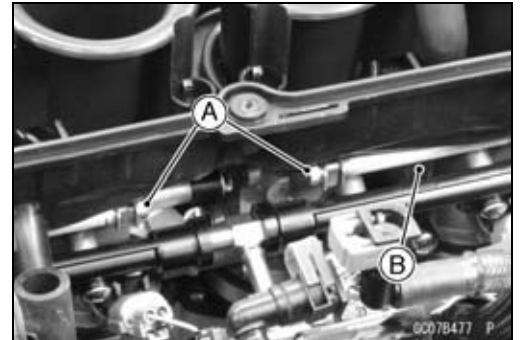


Air Cleaner

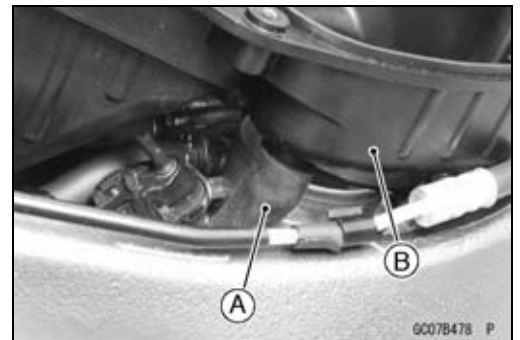
- Remove:
 - ECU (see ECU Removal)
 - Air Cleaner Element (see Air Cleaner Element Replacement in the Periodic Maintenance chapter)
 - Air Cleaner Drain Hose [A]
 - Breather Hose [B]



- Loosen the air cleaner housing clamp bolts [A].
- Remove the hose [B].

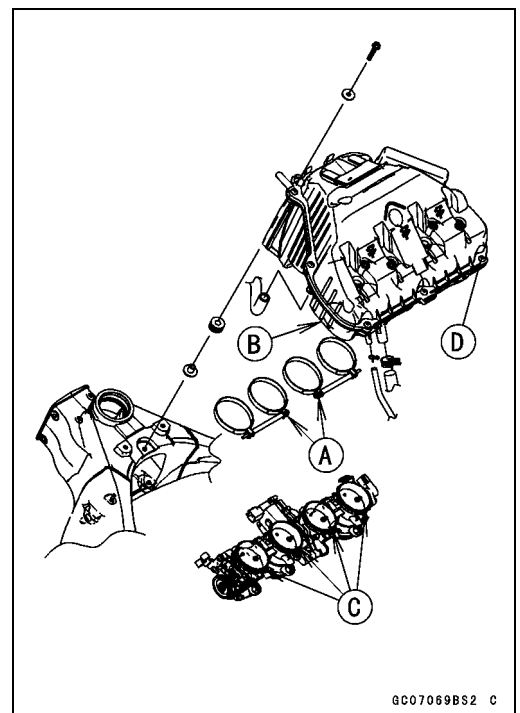


- Separate the air switching valve hose [A] from the lower air cleaner housing [B].



Air Cleaner Housing Installation

- Install the clamp bolt heads [A] inside as shown in the figure.
- Install the air cleaner housing on the throttle body assy.
- Push in the ducts [B] touch the stoppers [C] of the throttle body.
- Be sure the hoses are routed correctly and properly installed.
- Tighten:
 - Torque - Air Cleaner Housing Clamp Bolts: 2.0 N·m (0.20 kgf·m, 18 in·lb)**
 - Air Cleaner Housing Assembly Screws [D]: 1.1 N·m (0.11 kgf·m, 10 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).

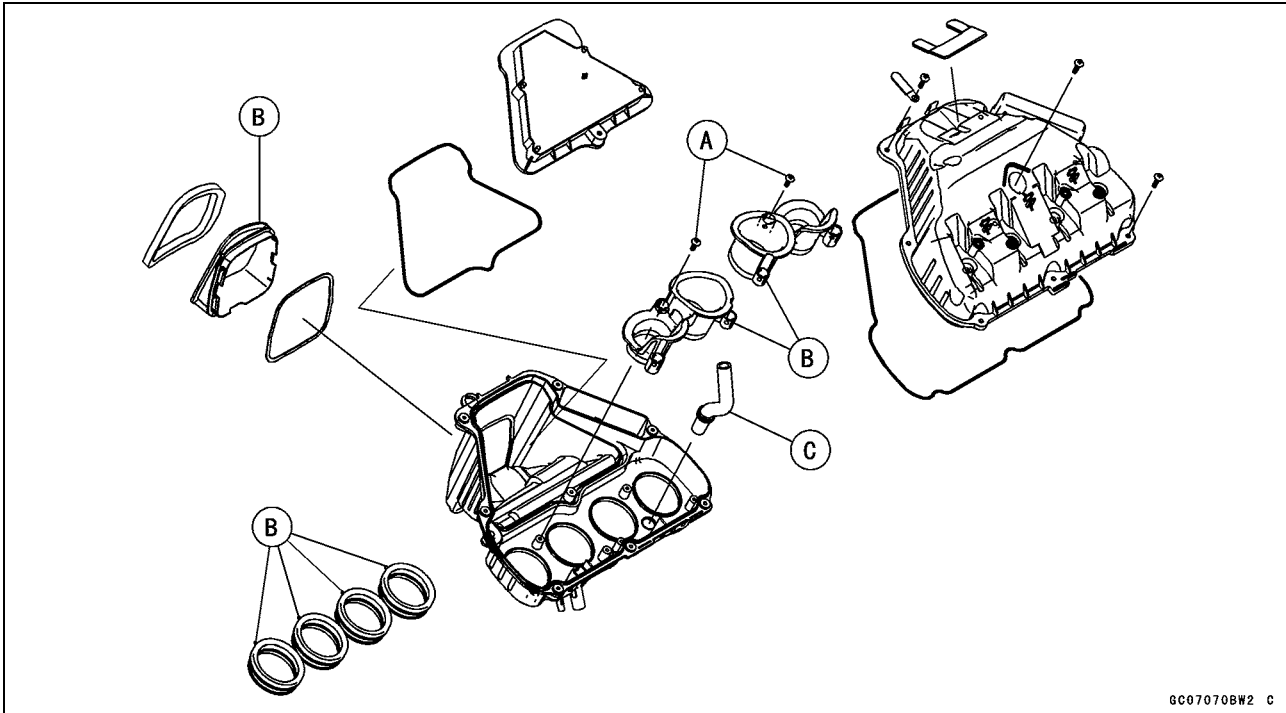


3-72 FUEL SYSTEM (DFI)

Air Cleaner

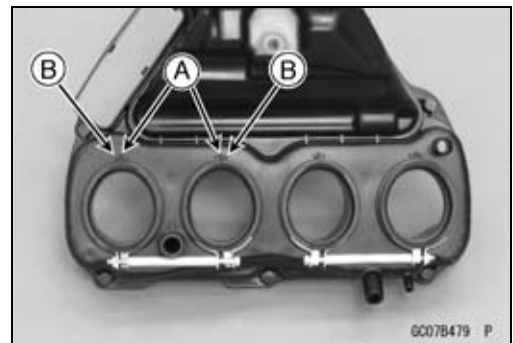
Air Cleaner Housing Disassembly

- Remove:
 - Air Cleaner Housing (see Air Cleaner Housing Removal)
 - Intake Air Temperature Sensor (see Intake Air Temperature Sensor Removal in the Self-Diagnosis System chapter)
 - Nozzle Assy (see Nozzle Assy Removal)
 - Screws [A]
 - Ducts [B]
 - Hose [C]



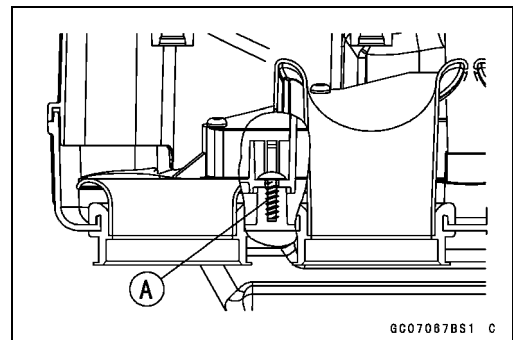
Air Cleaner Housing Assembly

- Install the ducts to the air cleaner housing.
 - Fit the projections [A] of the duct into the slits [B] on the air cleaner housing.



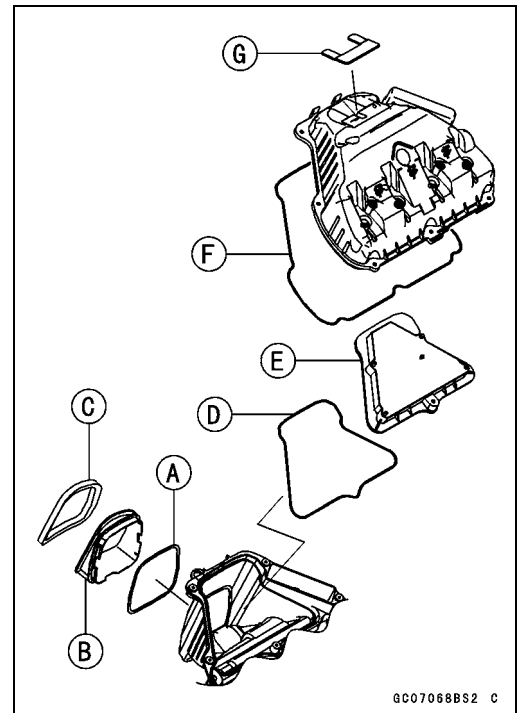
- Tighten the screws [A].

Torque - Air Cleaner Housing Duct Screws: 1.1 N·m (0.11 kgf·m, 10 in·lb)



Air Cleaner

- Install:
 - Air Cleaner Gasket [A]
 - Duct [B]
 - Air Cleaner Frame Gasket [C]
 - Air Cleaner Element Gasket [D]
 - Air Cleaner Element [E]
 - Air Cleaner Case Gasket [F]
 - Damper [G]
- Install the air cleaner housing (see Air Cleaner Housing Installation).

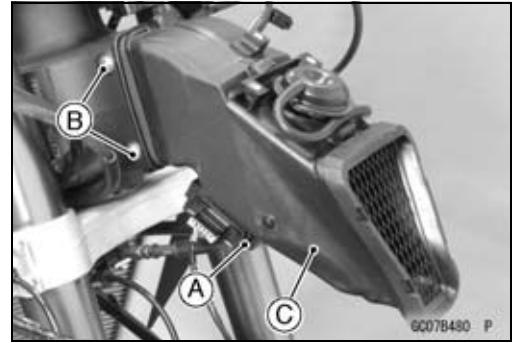


3-74 FUEL SYSTEM (DFI)

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)
 - Immobilizer Amplifier [A] (Equipped Models) (see Immobilizer System Parts Replacement in the Electrical System chapter)
 - Air Intake Duct Mounting Bolts [B] (Both Sides)
 - Air Intake Duct [C]



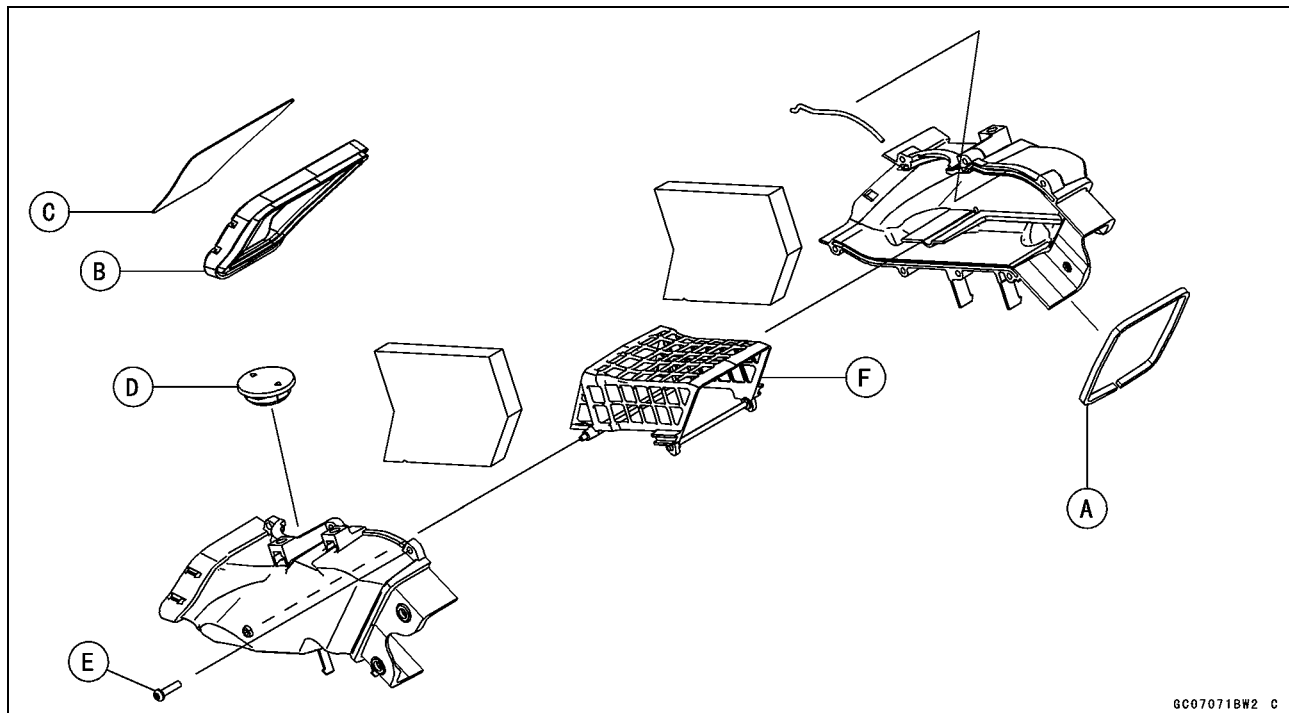
Air Intake Duct Installation

- 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.
- 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

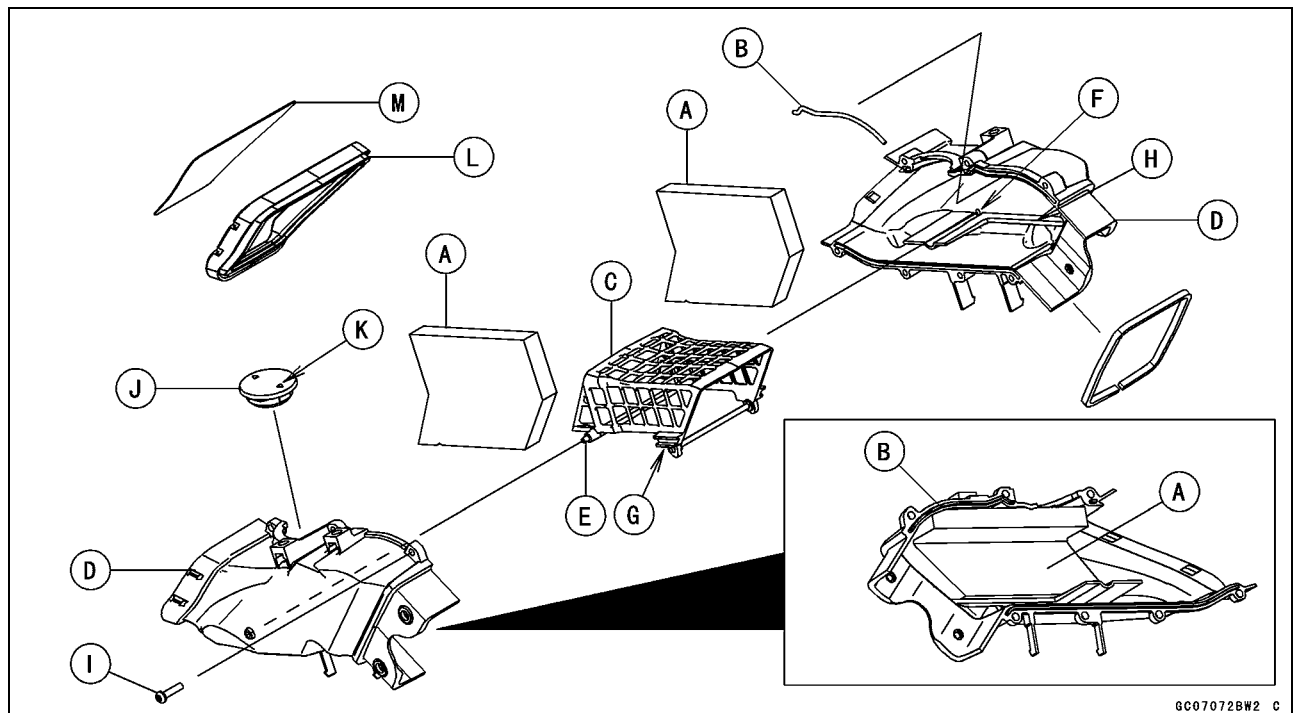
- Remove:
 - Pad [A]
 - Seal [B] and Screen [C]
 - Plug [D] (Turn 90°)
 - Screws [E]
 - Holder [F]



Air Line

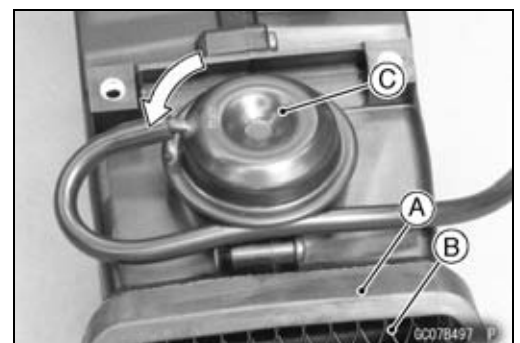
Air Intake Duct Assembly

- Install the dampers [A] and seal [B] as shown in the figure.
- Fit the holder [C] to the air intake ducts [D].
Projections [E] and Holes [F]
Grooves [G] and Ribs [H]
- Tighten:
Torque - Air Intake Duct Assembly Screws [I]: 1.5 N·m (0.15 kgf·m, 13 in·lb)
- Turn the plug [J] so that the triangle marks [K] faces the front and rear.
- Install the seal [L] and screen [M] to the air intake duct securely.



Air Intake Duct Disassembly (Other than US, CA and CAL Models)

- Remove:
Air Intake Duct (see Air Intake Duct Removal)
Seal [A] and Screen [B]
- Turn the air intake valve actuator [C] counterclockwise (90°).



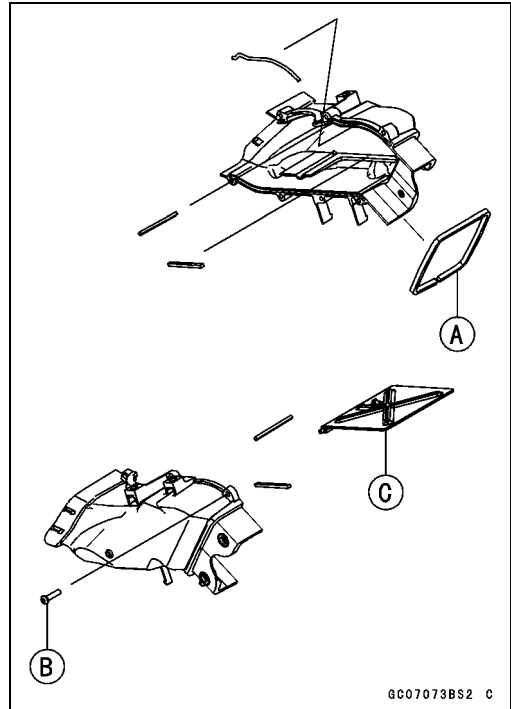
3-76 FUEL SYSTEM (DFI)

Air Line

- Remove the shaft [A] of the air intake valve actuator.

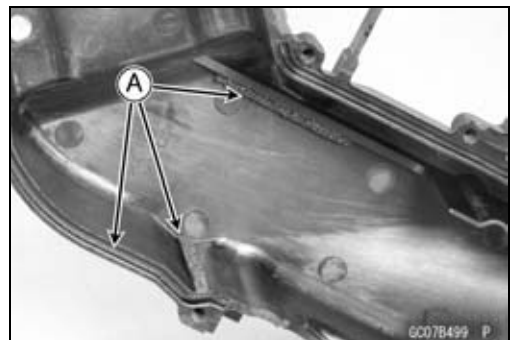


- Remove:
 - Pad [A]
 - Screws [B]
 - Air Intake Valve [C]



Air Intake Duct Assembly (Other than US, CA and CAL Models)

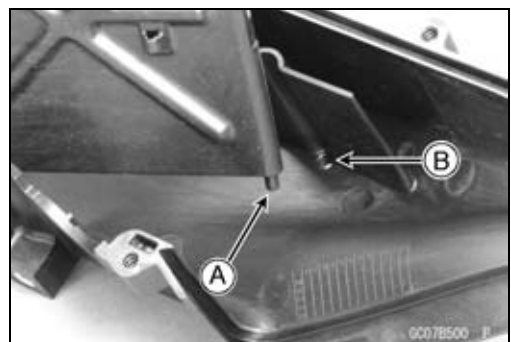
- Install the seals [A] as shown in the figure.



- Fit the projections [A] of the air intake valve to the hole [B] of the air intake ducts.

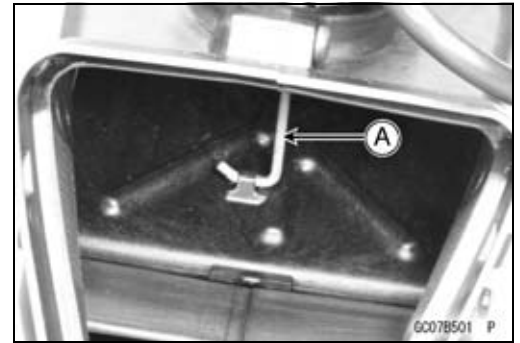
- Tighten:

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

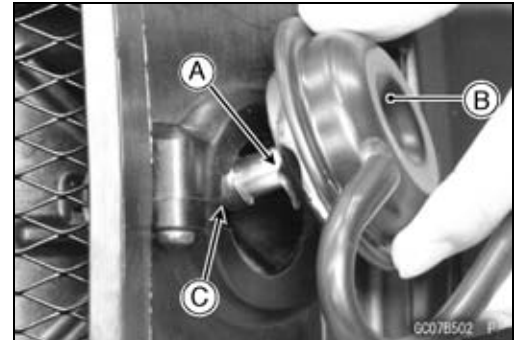


Air Line

- Hang the shaft [A] to the air intake valve securely.

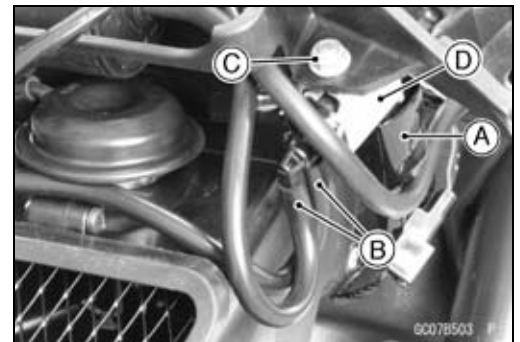


- Fit the projections [A] of the air intake valve actuator [B] to the grooves [C].
- Turn the air intake valve actuator clockwise (90°).
- Check that the air intake valve moves smoothly.
- Install the seal and screen to the air intake duct securely.



Air Intake Solenoid Valve Removal (Other than US, CA and CAL Models)

- Remove:
 - Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
 - Connector [A] (Disconnect)
 - Hoses [B]
 - Nut [C]
 - Air Intake Solenoid Valve [D]



Air Intake Solenoid Valve Installation (Other than US, CA and CAL Models)

- Run the lead and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Tighten:
 - Torque - Air Intake Solenoid Valve Nut: 7.0 N·m (0.71 kgf·m, 62 in·lb)

Air Intake Solenoid Valve Unit Test (Other than US, CA and CAL Models)

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

3-78 FUEL SYSTEM (DFI)

Air Line

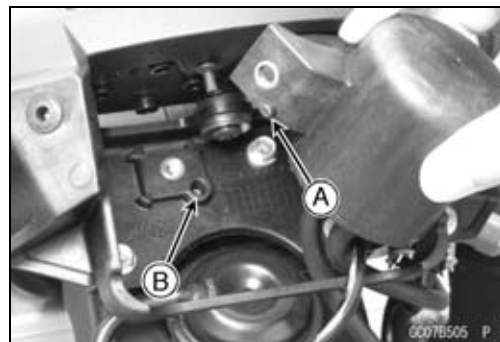
Vacuum Chamber Removal (Other than US, CA and CAL Models)

- Remove:
 - Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
 - Bolt [A]
 - Hoses [B]
 - Vacuum Chamber [C]



Vacuum Chamber Installation (Other than US, CA and CAL Models)

- Run the hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Fit the projection [A] to the hollow [B].



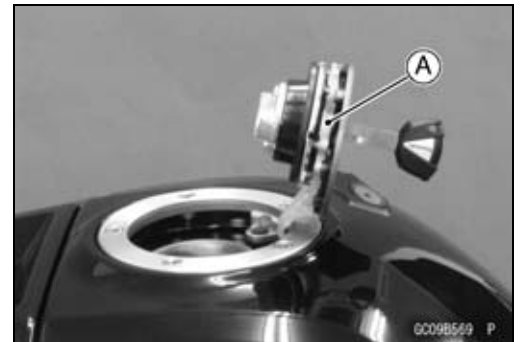
Fuel Tank

Fuel Tank Removal

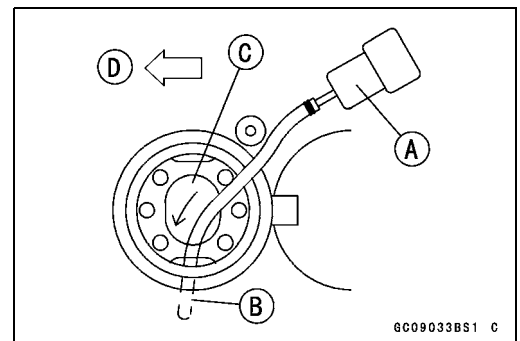
⚠ WARNING

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 to 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]



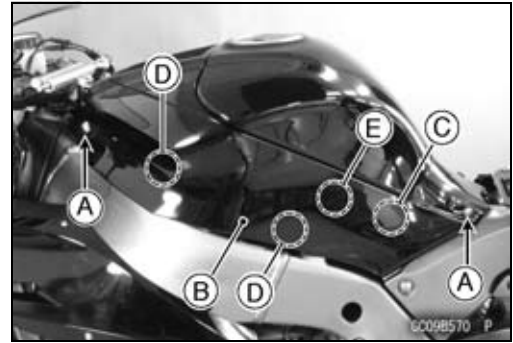
⚠ WARNING

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.

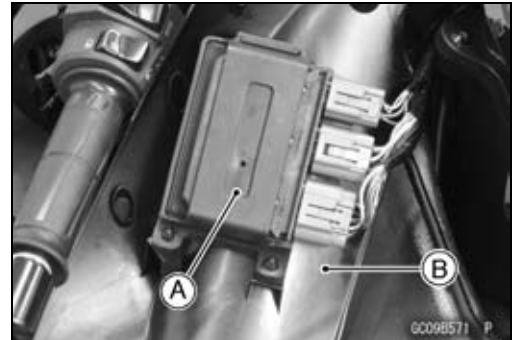
3-80 FUEL SYSTEM (DFI)

Fuel Tank

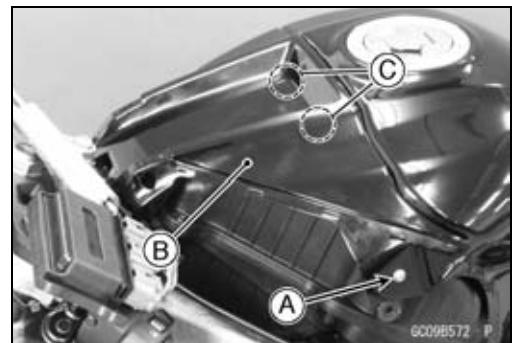
- Remove:
 - Bolts [A]
 - Fuel Tank Covers (Both Sides) [B]
- Clear the hook fastener [C], projections [D] and hook portion [E].



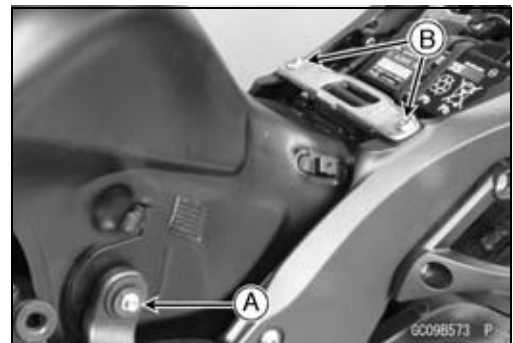
- Remove the relay box [A] from the left fuel tank cover [B].



- Remove:
 - Bolts (Both Sides) [A]
 - Upper Fuel Tank Cover [B]
- Clear the projections [C] from the holes.



- Remove:
 - Fuel Tank Bolts (Both Sides) [A]
 - Fuel Tank Bracket Bolts [B]



- Lift up the front portion of the fuel tank, and then remove the hoses [A].
- For the California and Southeast Asia models, remove the following:
 - Fuel Return Hose

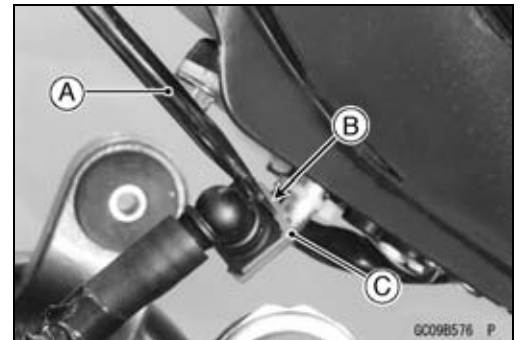


Fuel Tank

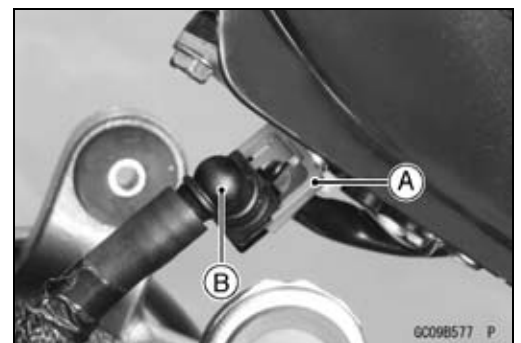
- Disconnect:
 - Battery (-) Terminal
 - Fuel Pump Lead Connector [A]



- Be sure to place a piece of cloth around the fuel hose joint.
- Insert a thin blade screwdriver [A] into the slit [B] on the joint lock [C].



- Turn the driver to disconnect the joint lock [A].
- Pull the fuel hose joint [B] 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 it on a flat surface.
- Do not apply the load to the fuel outlet pipe of the fuel pump.

3-82 FUEL SYSTEM (DFI)

Fuel Tank

- For the California and Southeast Asia models, note the following.

NOTICE

For the California and Southeast Asia models, 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.

- Be sure to plug the evaporative fuel return hose to prevent fuel spilling before fuel tank removal.

WARNING

Spilled fuel is flammable and can be explosive under certain conditions. For California and Southeast Asia models, be careful not to spill fuel through the return hose.

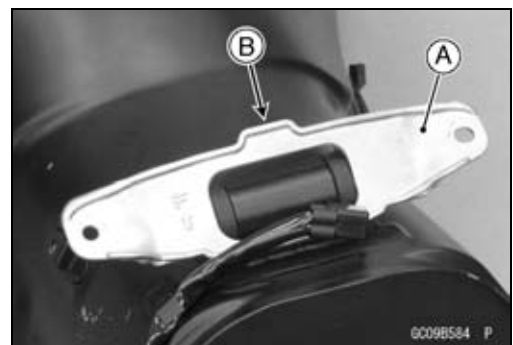
- ★ If liquid or gasoline flows into the breather hose, remove the hose and blow it clean with compressed air.
- Be careful of fuel spillage from the fuel tank since fuel still remains in the fuel tank and fuel pump.

WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Store the fuel tank in an area which is well-ventilated and free from any source of flame or sparks. Do not smoke in this area. Place the fuel tank on a flat surface and plug the fuel pipes to prevent fuel leakage.

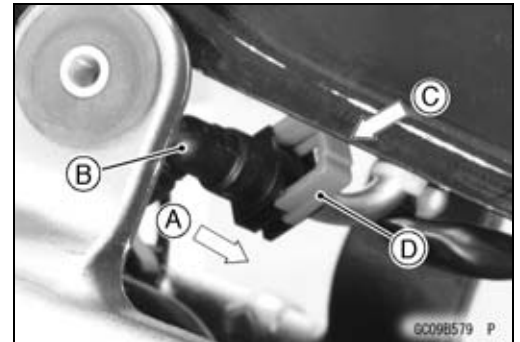
Fuel Tank Installation

- 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] are in place on the fuel tank.
 - ★ If the dampers are damaged or deteriorated, replace them.
-
- If the fuel tank bracket is removed, install the bracket [A] so that its projection [B] faces the front.



Fuel Tank

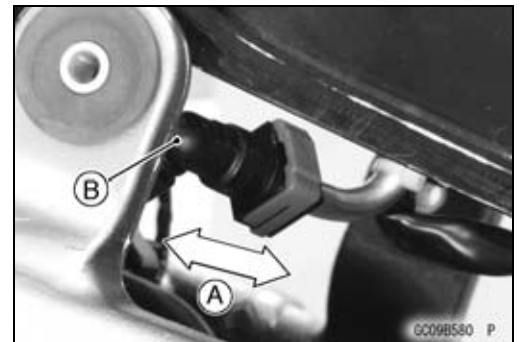
- For the California and Southeast Asia models, note the following.
 - To prevent the gasoline from flowing into or out of the canister, hold the separator perpendicular to the ground.
 - Connect the hoses according to the diagram of the evaporative emission control system. Make sure they do not get pinched or kinked.
 - Run the hoses with a minimum of bending so that the air or vapor will not be obstructed.
- 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.



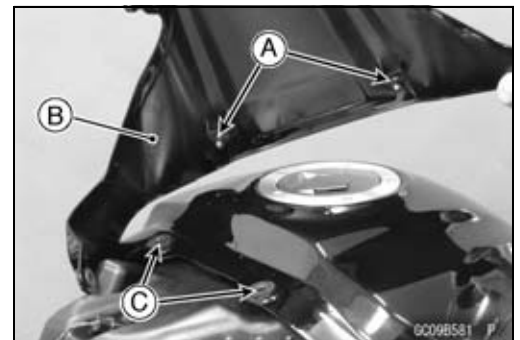
- Push and pull [A] the fuel hose joint [B] back and forth more than two times, and make sure it is locked and does not come off.

⚠ 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.



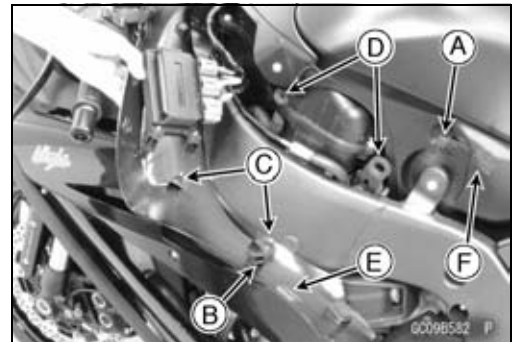
- ★ If it comes off, reinstall the hose joint.
- Tighten the left fuel tank bracket bolt first, and then the right fuel tank bracket bolt.
- Connect the fuel pump lead connector and the battery (-) terminal (see Battery Installation in the Electrical System chapter).
- Installation is the reverse of removal, note the following.
 - Insert the projections [A] of the upper fuel tank cover [B] into the holes [C] of the fuel tank.



3-84 FUEL SYSTEM (DFI)

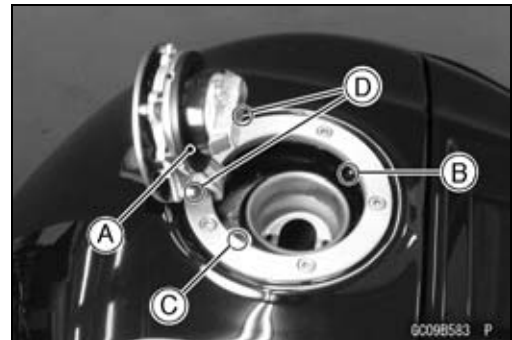
Fuel Tank

- Insert the hook portion [A] of the fuel tank into the slot [B] of the fuel tank cover.
- Insert the projections [C] into the holes [D], and then attach the hook fastener [E] to the hook fastener [F] on the fuel tank.



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 and SEA Models)

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.

- To prevent the gasoline from flowing into or out of the canister, hold the separator perpendicular to the ground.
- 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 and SEA Models) in the Periodic Maintenance chapter.

Separator Inspection

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

3-86 FUEL SYSTEM (DFI)

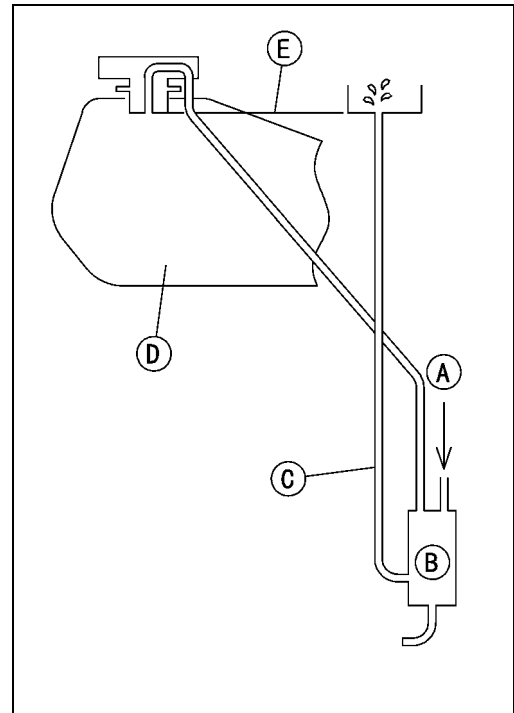
Evaporative Emission Control System (CAL and SEA Models)

Separator Operation Test

⚠ WARNING

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

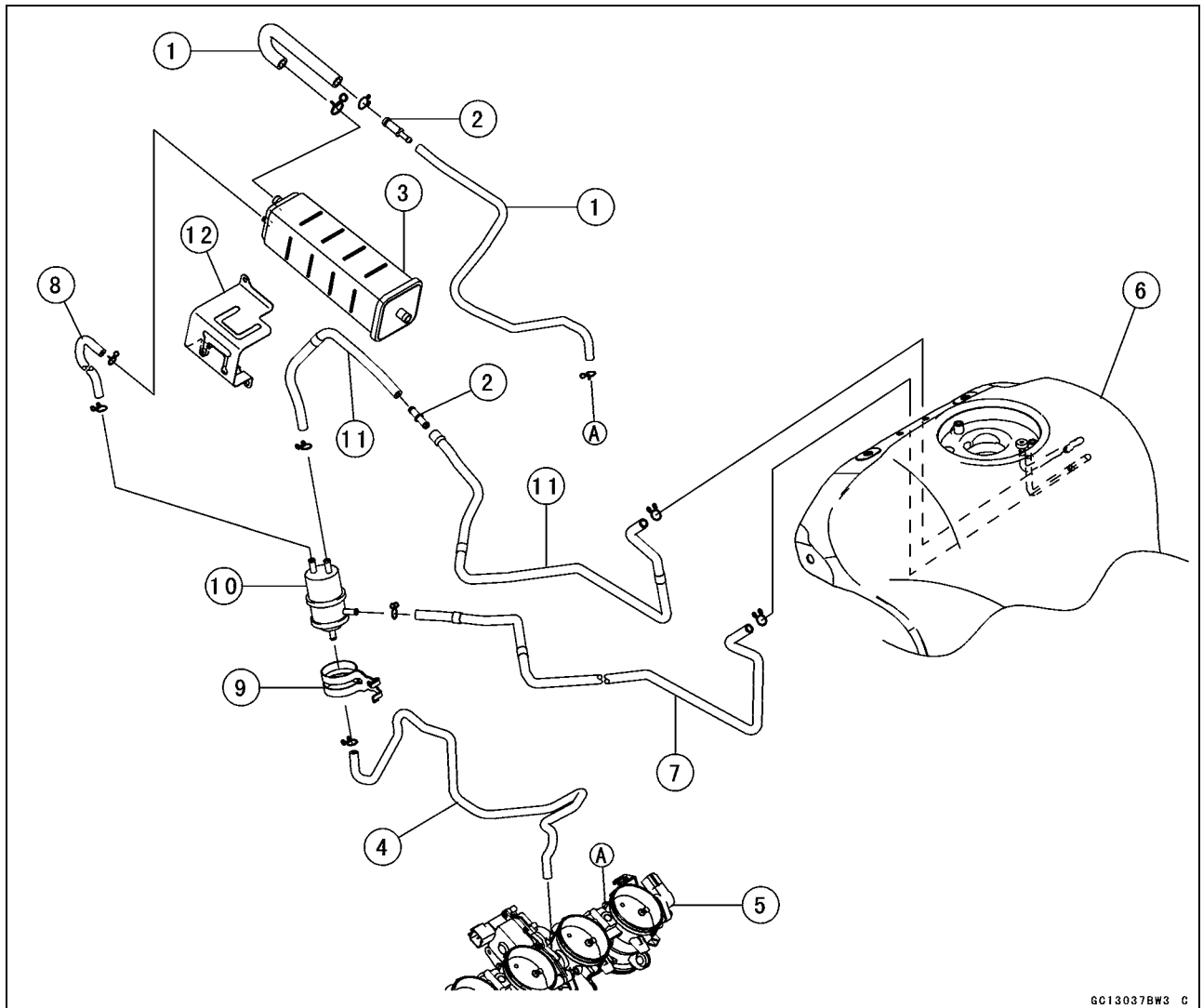
- Connect the hoses to the separator, and install the separator on the motorcycle.
- Disconnect the breather hose from the separator, and inject about 20 mL (0.68 US oz.) of gasoline [A] into the separator [B] through the hose fitting.
- Disconnect the fuel return hose [C] from the fuel tank [D].
- Run the open end of the return hose into the container and hold it level with the tank top [E].
- Start the engine, and let it idle.
- ★ If the gasoline in the separator comes out of the hose, the separator works well. If it does not, replace the separator with a new one.



Evaporative Emission Control System (CAL and SEA Models)

Canister Inspection

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



GC13037BW3 C

1. Green Hoses (Purge)
2. Fittings
3. Canister
4. White Hose (Vacuum)
5. Throttle Body Assy
6. Fuel Tank
7. Red Hose (Return)
8. Blue Hose (Breather)
9. Bracket (for Separator)
10. Separator
11. Blue Hoses (Breather)
12. Bracket (for Canister)

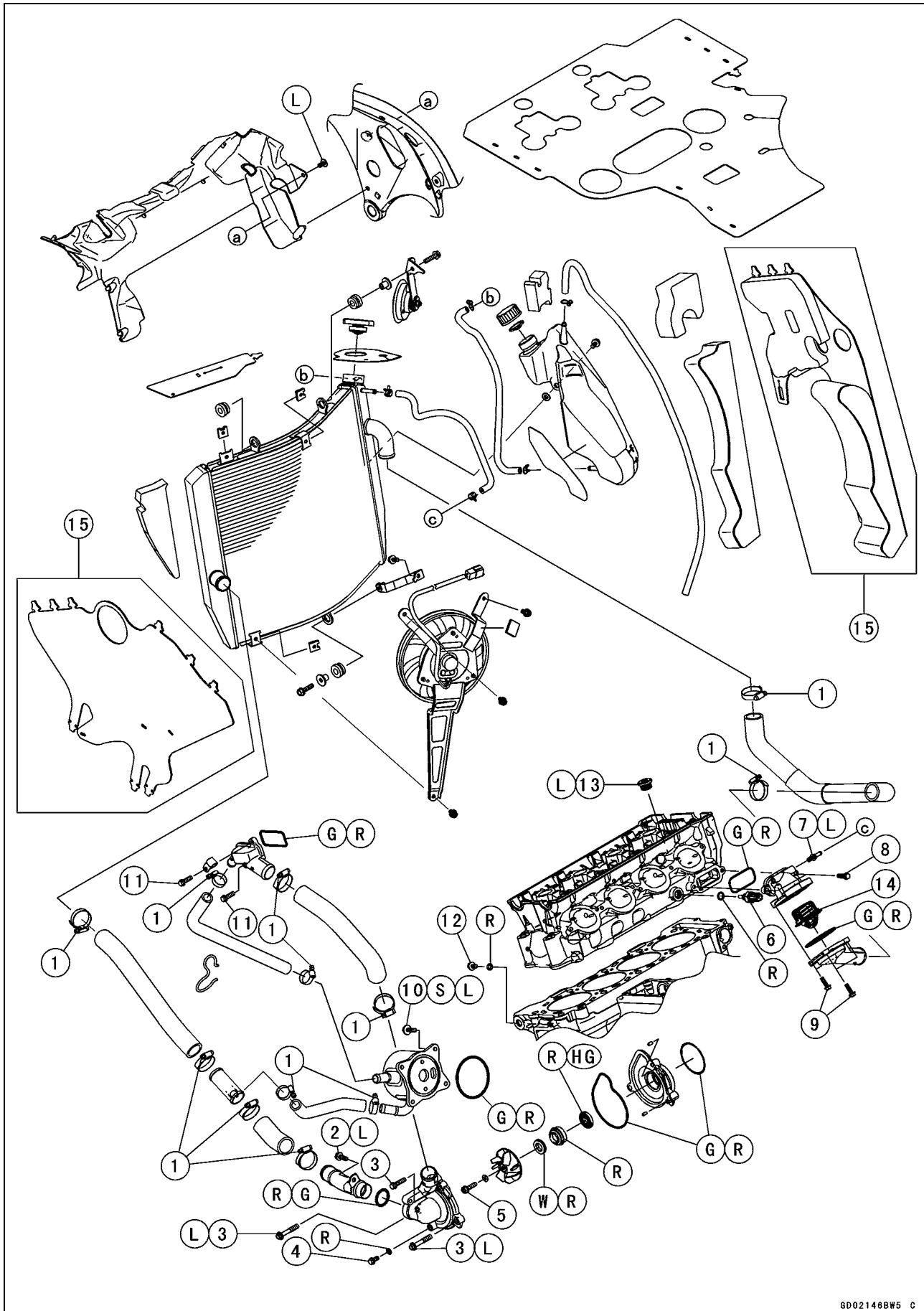
Cooling System

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4-2 COOLING SYSTEM

Exploded View



Exploded View

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

14. Thermostat

15. US, CA and CAL Models

G: Apply grease.

HG: Apply high-temperature grease.

L: Apply a non-permanent locking agent.

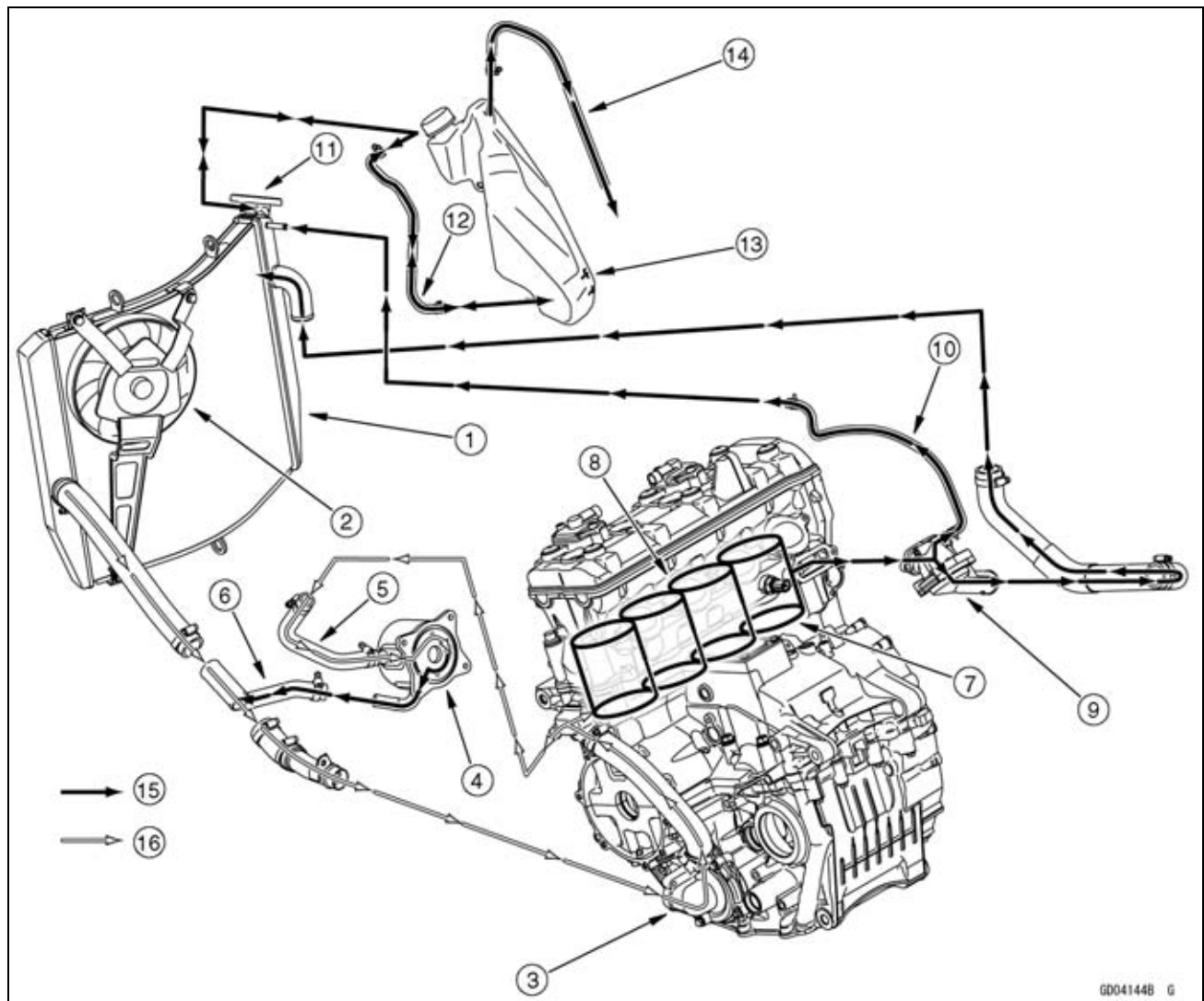
R: Replacement Parts

S: Follow the specified tightening sequence.

W: Apply water.

4-4 COOLING SYSTEM

Coolant Flow Chart



1. Radiator
2. Radiator Fan
3. Water Pump
4. Oil Cooler
5. Oil Cooler Inlet Hose
6. Oil Cooler Outlet Hose
7. Cylinder Jacket
8. Cylinder Head Jacket
9. Thermostat Housing
10. Air Bleeder Hose
11. Radiator Cap
12. Radiator Overflow Hose
13. Reserve Tank
14. Reserve Tank Overflow Hose
15. Hot Coolant
16. 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 95°C (203°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 90°C (194°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 112 ~ 142 kPa (1.14 ~ 1.45 kgf/cm², 16 ~ 21 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 112 ~ 142 kPa (1.14 ~ 1.45 kgf/cm², 16 ~ 21 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.

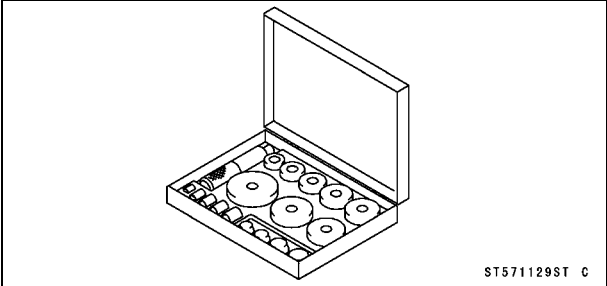
4-6 COOLING SYSTEM

Specifications

Item	Standard
Coolant Provided when Shipping Type (Recommended) Color Mixed Ratio Freezing Point Total Amount	Permanent type of antifreeze (soft water and ethylene glycol plus corrosion and rust inhibitor chemicals for aluminum engines and radiators) Green Soft water 50%, coolant 50% -35°C (-31°F) 2.6 L (2.7 US qt) (Reserve tank full level, including radiator and engine)
Radiator Cap Relief Pressure	112 ~ 142 kPa (1.14 ~ 1.45 kgf/cm ² , 16 ~ 21 psi)
Thermostat Valve Opening Temperature Valve Full Opening Lift	58 ~ 62°C (136 ~ 144°F) 8 mm (0.31 in.) or more at 75°C (167°F)

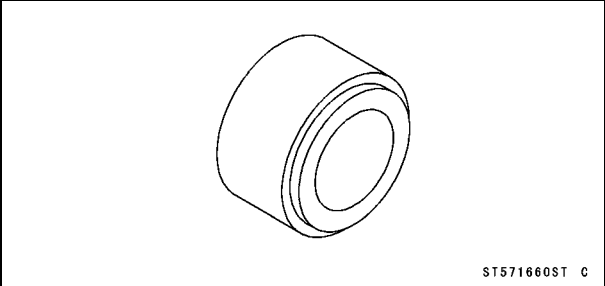
Special Tools

**Bearing Driver Set:
57001-1129**



ST571129ST C

**Oil Seal Driver $\phi 37.5$:
57001-1660**



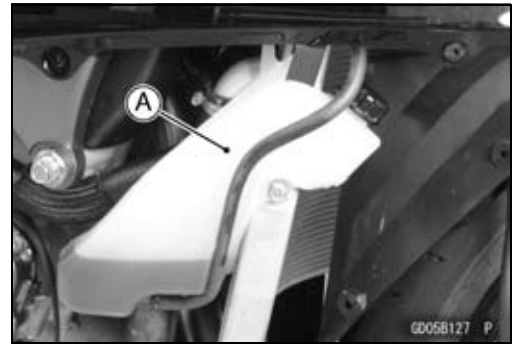
ST571660ST C

4-8 COOLING SYSTEM

Coolant

Coolant Deterioration Inspection

- Remove the right lower fairing (see Lower Fairing 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

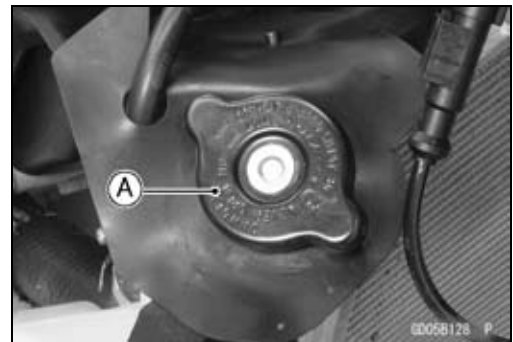
- Refer to the Coolant Change in the Periodic Maintenance chapter.

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.

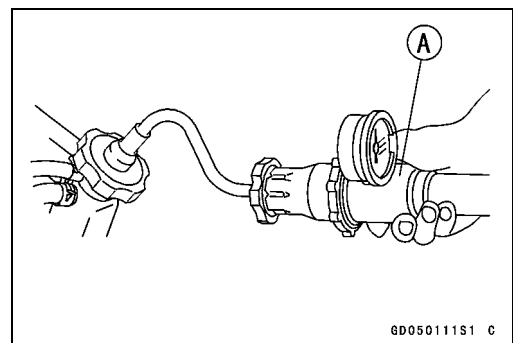
NOTE

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

- Build up pressure in the system carefully until the pressure reaches 142 kPa (1.45 kgf/cm², 21 psi).

NOTICE

During pressure testing, do not exceed the pressure for which the system is designed. The maximum pressure is 142 kPa (1.45 kgf/cm², 21 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.

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 considerably 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.

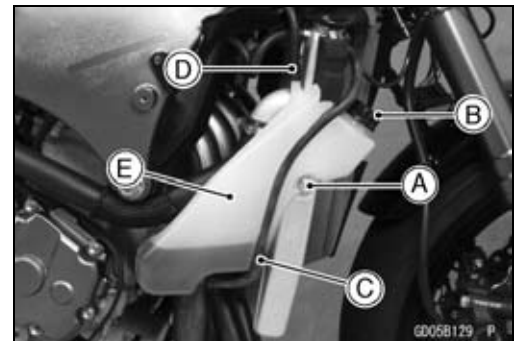
NOTICE

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 10 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).

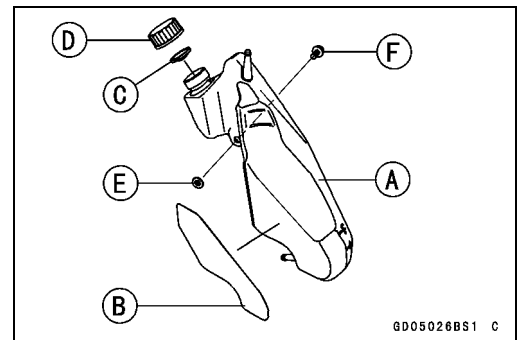
Coolant Reserve Tank Removal

- Remove:
 - Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
 - Bolt [A]
 - Cap [B]
- 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].
 - Pad [B]
 - Gasket [C]
 - Cap [D]
 - Collar [E]
- Install the coolant reserve tank and tighten the bolt [F].
- 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).



4-10 COOLING SYSTEM

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.

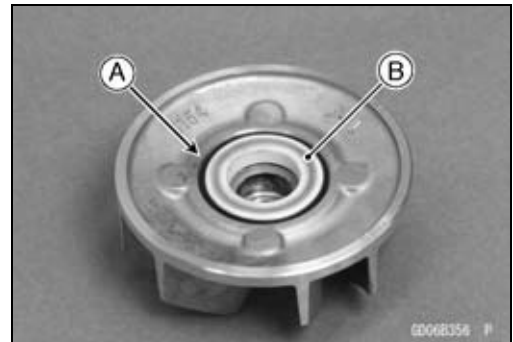
Water Pump Inspection

- 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 the mechanical seal is damaged, the coolant leaks through the seal and drains through the passage. Replace the mechanical seal unit (see Water Pump Housing Disassembly/Assembly).



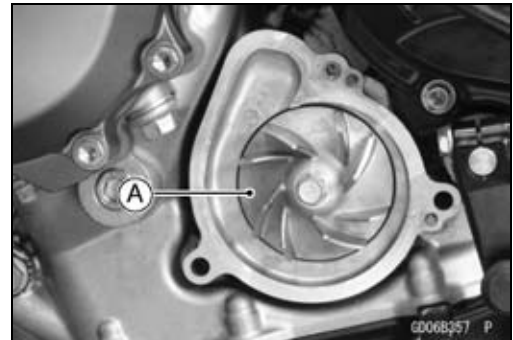
Water Pump Impeller Disassembly/Assembly

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

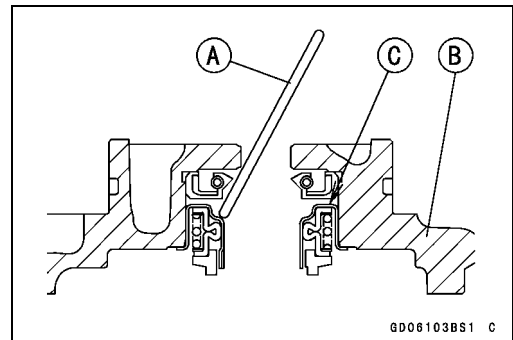


Water Pump Housing Disassembly

NOTICE

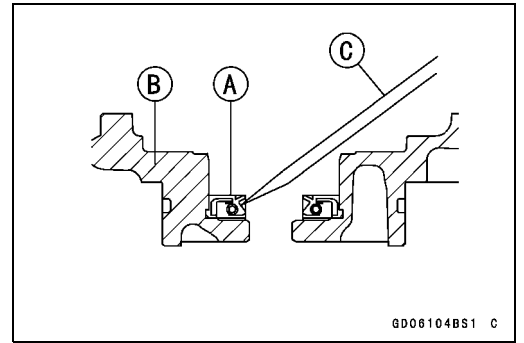
Do not damage the hole wall of the water pump housing.

- Insert a bar [A] into the pump housing [B], and hammer evenly around the circumference of the mechanical seal bottom [C].



Water Pump

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



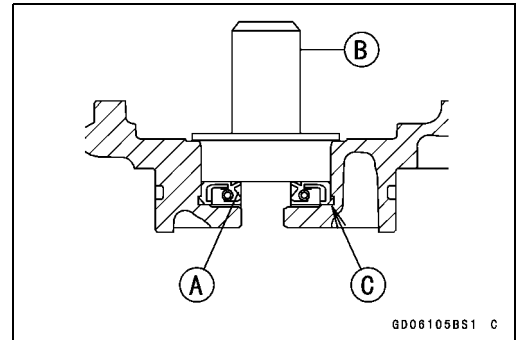
Water Pump Housing Assembly

NOTICE

Do not reuse the mechanical seal and oil seal.

- Apply high-temperature grease to the new 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

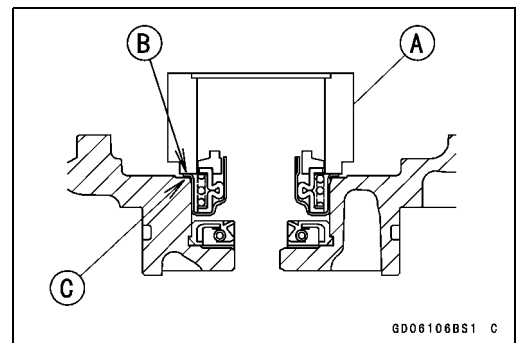


NOTICE

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.

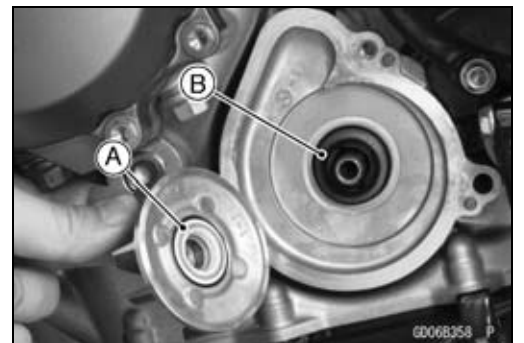
Special Tool - Oil Seal Driver $\phi 37.5$: 57001-1660



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.

- Rubber Seal [A]
- Mechanical Seal [B]

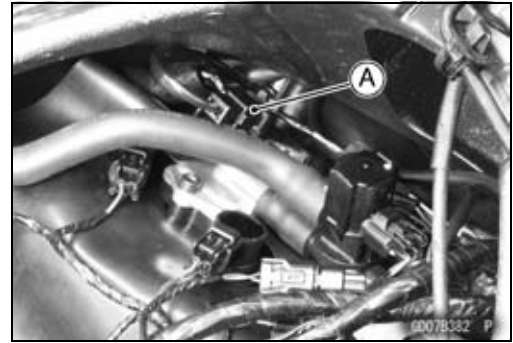


4-12 COOLING SYSTEM

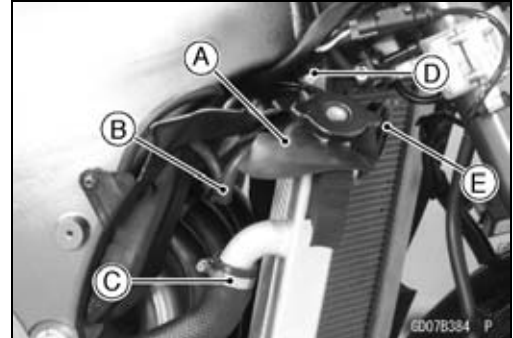
Radiator

Radiator and Radiator Fan Removal

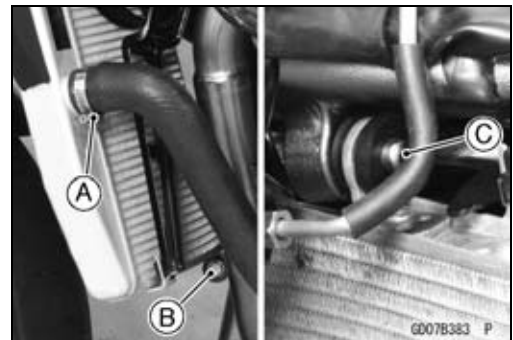
- Remove:
 - Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
 - Coolant (Drain, see Coolant Change in the Periodic Maintenance chapter)
 - Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter)
 - Coolant Reserve Tank (see Coolant Reserve Tank Removal)
 - Radiator Fan Motor Lead Connector [A] (Disconnect)



- Remove:
 - Rubber Sheet [A]
 - Air Bleeder Hose End [B]
 - Radiator Hose End [C]
 - Radiator Upper Bolt [D] and Horn [E]



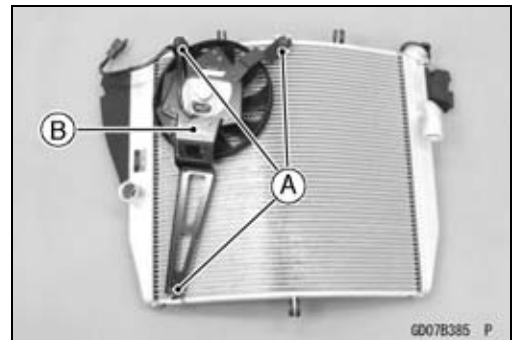
- Remove:
 - Rubber Sheet
 - Radiator Hose End [A]
 - Radiator Lower Bolt [B]
- Remove the radiator off the projection [C].



NOTICE

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

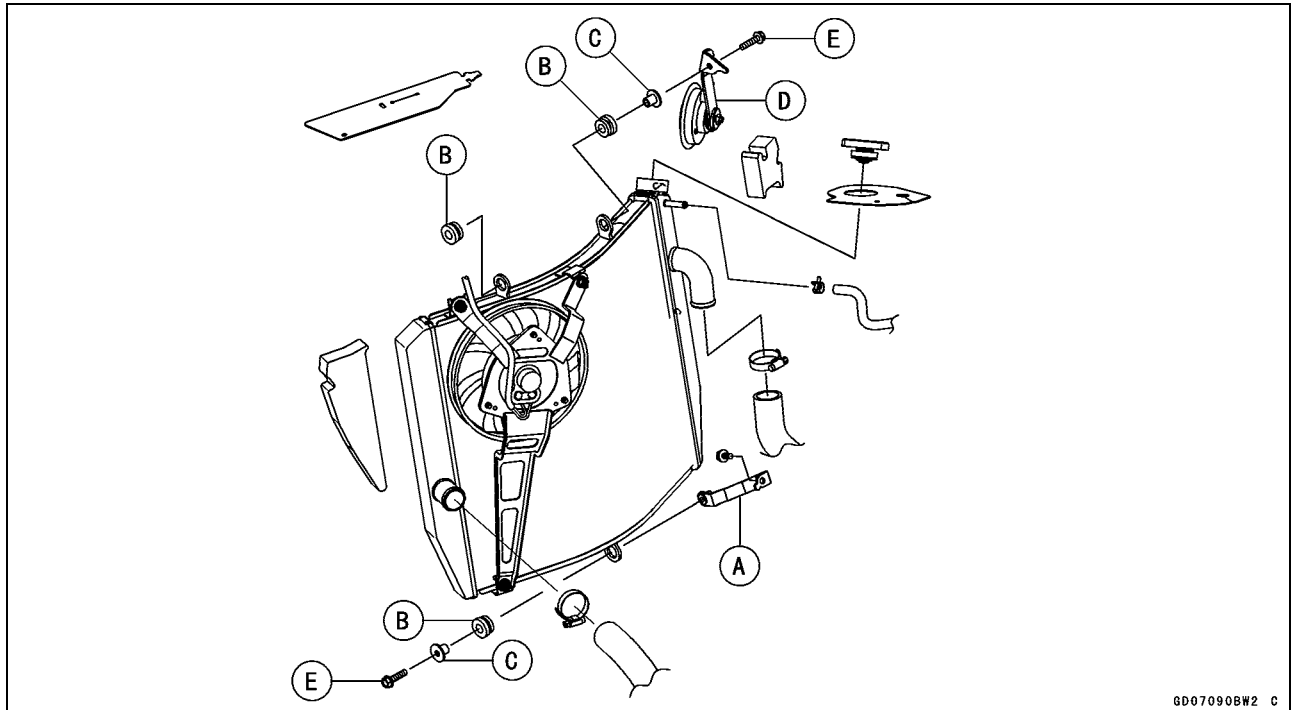
- Remove:
 - Radiator Fan Mounting Bolts [A]
 - Radiator Fan [B]



Radiator

Radiator and Radiator Fan Installation

- ★ If the radiator bracket [A] was removed, install it.
- Install the radiator fan to the radiator.
- Run the radiator fan motor lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the rubber dampers [B] and collars [C] as shown in the figure.
- Turn the small diameter side of the dampers to outside.
- Install the horn [D].
- Tighten the radiator bolts [E].

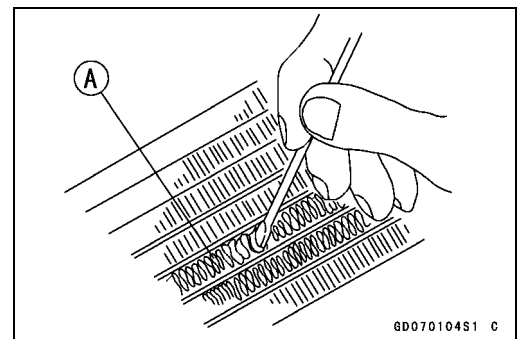


GD07090BW2 C

- 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.



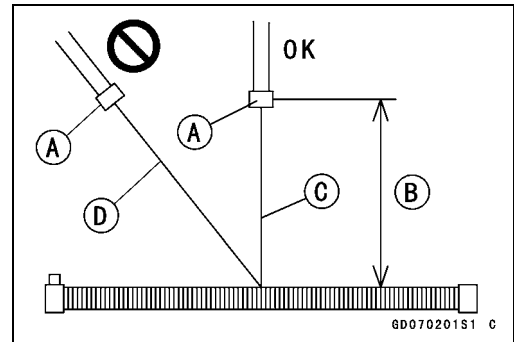
GD070104S1 C

4-14 COOLING SYSTEM

Radiator

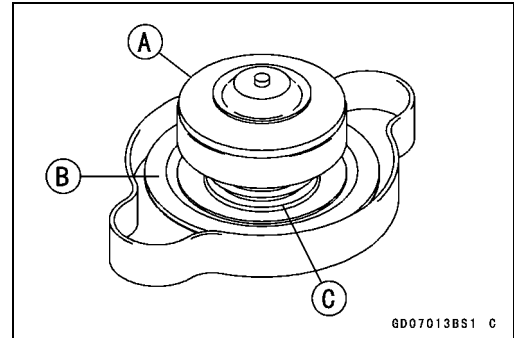
NOTICE

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

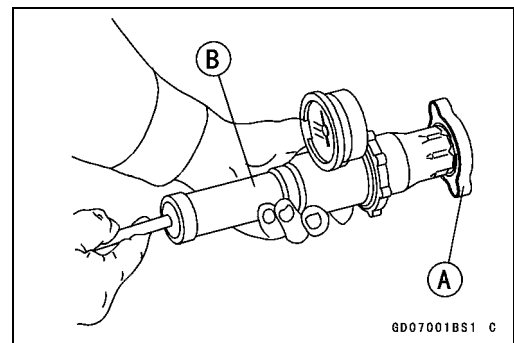
- Remove:
Radiator Cap (see Coolant Change in the Periodic Maintenance chapter)
 - Check the condition of the bottom [A] and top [B] valve seals and valve spring [C].
 - ★ If any one of them shows visible damage, replace the cap with a new one.
- Install the cap [A] on a cooling system pressure tester [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: 112 ~ 142 kPa (1.14 ~ 1.45 kgf/cm², 16 ~ 21 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:
Radiator Cap (see Coolant Change in the Periodic Maintenance chapter)
- 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.



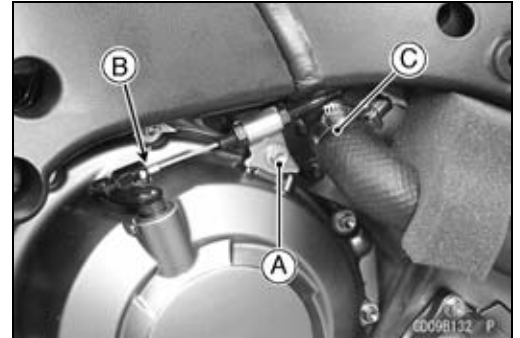
Thermostat

Thermostat Removal

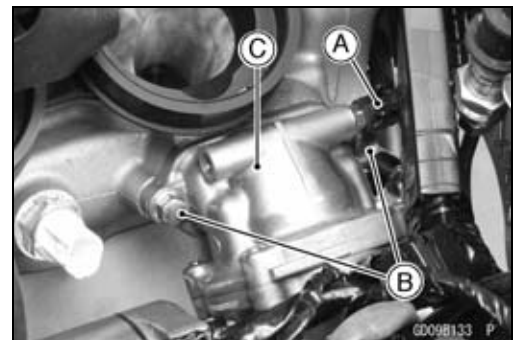
- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
 - Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter)
 - Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
 - Throttle Body Assy Holder Clamp [A]
 - Water Temperature Sensor Connector [B] (Disconnect)
- Roll up the heat insulation rubber plate [D].



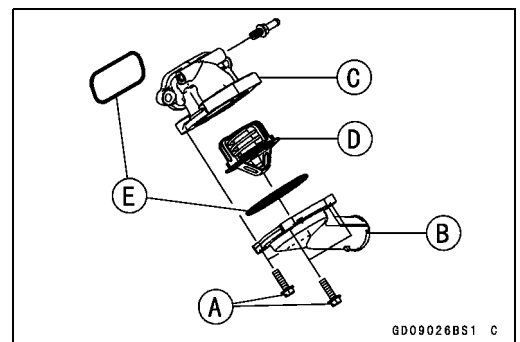
- Remove:
 - Bolt [A]
 - Clutch Cable Lower End [B]
 - Radiator Hose End [C]



- Remove:
 - Air Bleeder Hose End [A]
 - Thermostat Housing Mounting Bolts [B]
 - Thermostat Assembly [C]

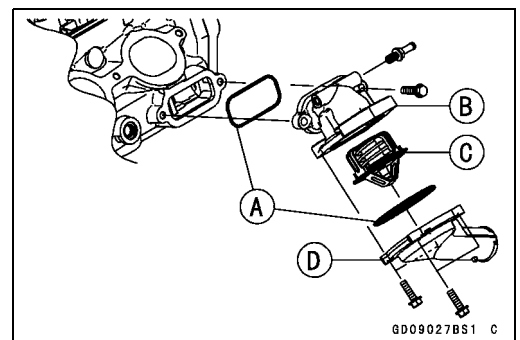


- Remove:
 - Thermostat Cap Bolts [A]
 - Thermostat Cap [B] and Housing [C]
 - Thermostat [D]
 - O-rings [E]



Thermostat Installation

- Replace the O-rings [A] with new ones, and apply grease to them.
- Assemble:
 - O-rings
 - Thermostat Housing [B]
 - Thermostat [C]
 - Thermostat Cap [D]



4-16 COOLING SYSTEM

Thermostat

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

● Tighten:

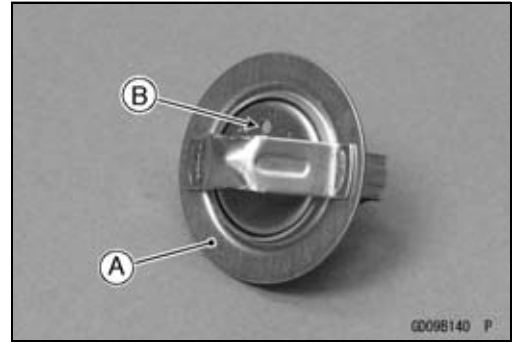
Torque - Thermostat Cap Bolts: 5.9 N·m (0.60 kgf·m, 52 in·lb)

● Install the thermostat assembly to the cylinder head.

● Tighten:

Torque - Thermostat Housing Mounting Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

● Install the removed parts (see appropriate chapters).

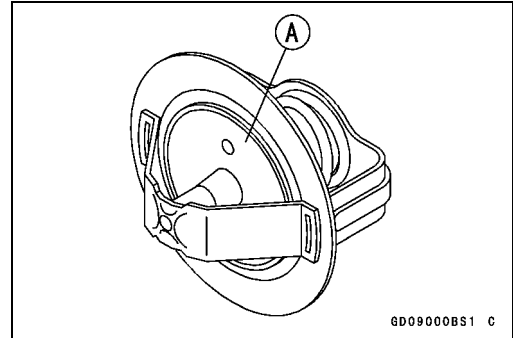


Thermostat Inspection

● 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.



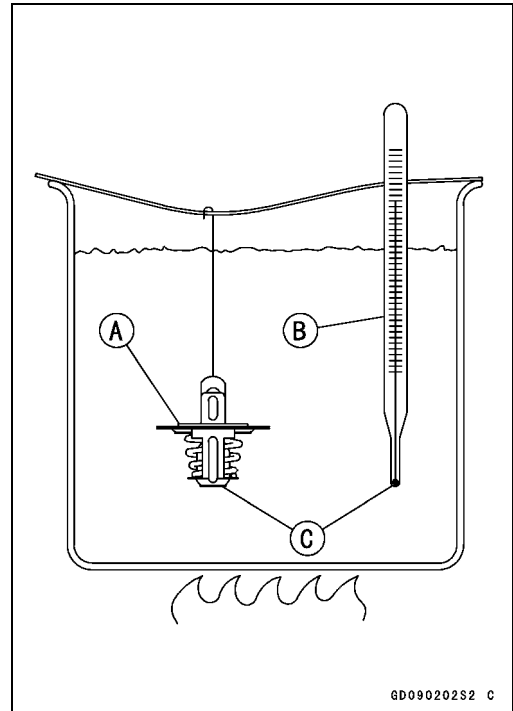
● To check valve opening temperature, suspend the thermostat [A] in a container of water and raise the temperature of the water.

○ 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)



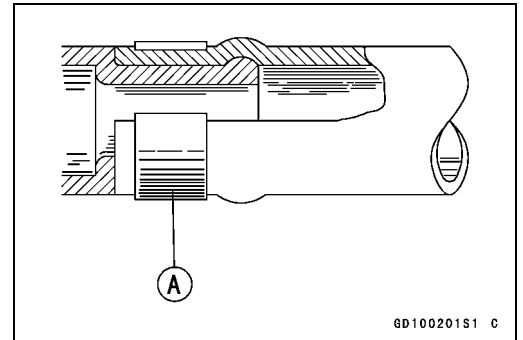
Hoses and Pipes

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.



4-18 COOLING SYSTEM

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.

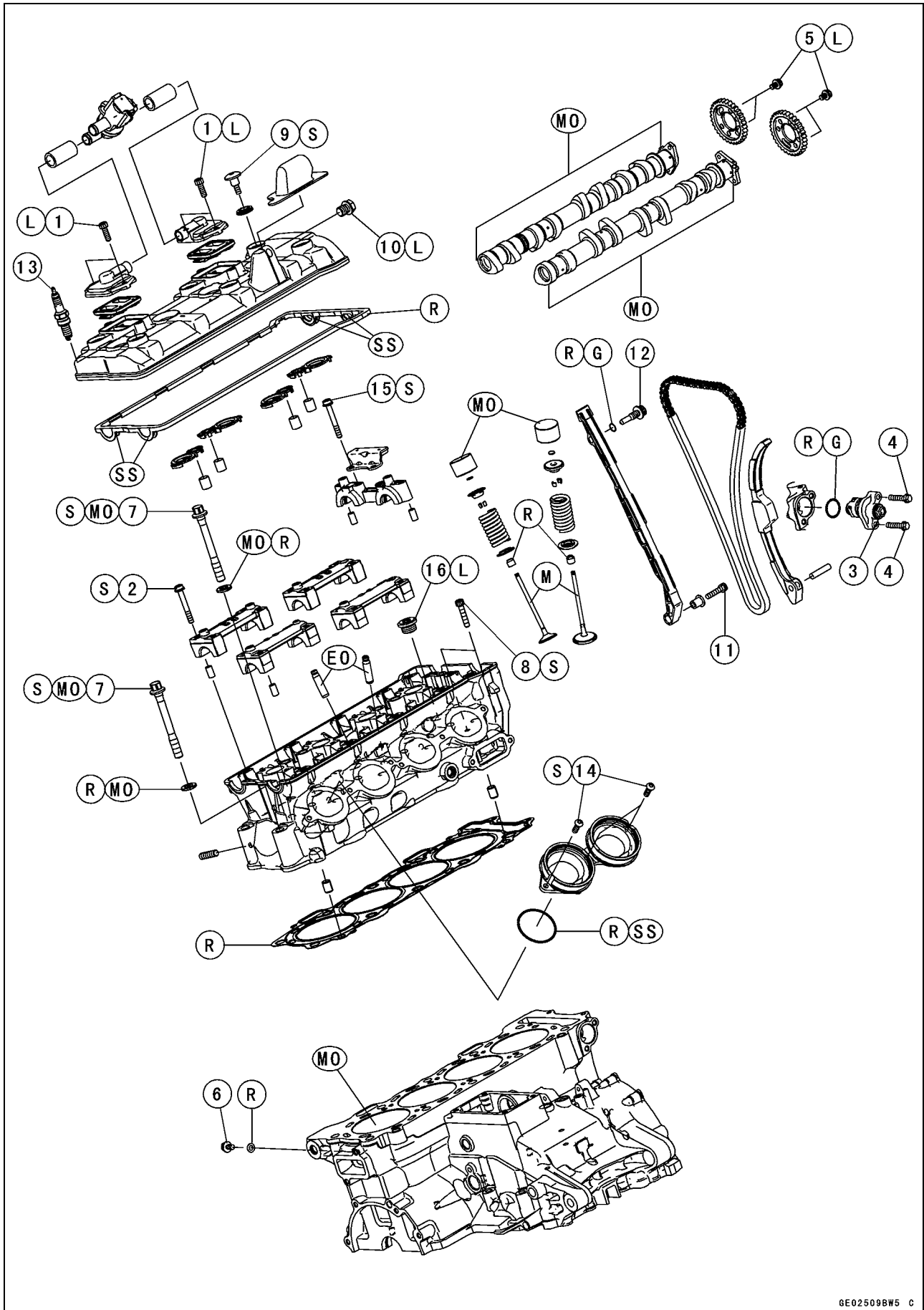
Engine Top End

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5-2 ENGINE TOP END

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	Camshaft Cap Bolts	12	1.2	106 in·lb	S
3	Camshaft Chain Tensioner Cap Bolt	20	2.0	15	
4	Camshaft Chain Tensioner Mounting Bolts	9.8	1.0	87 in·lb	
5	Camshaft Sprocket Bolts	15	1.5	11	L
6	Coolant Drain Bolt (Cylinder)	9.8	1.0	87 in·lb	
7	Cylinder Head Bolts (M10)	45	4.6	33	MO, S
8	Cylinder Head Bolts (M6)	12	1.2	106 in·lb	S
9	Cylinder Head Cover Bolts	9.8	1.0	87 in·lb	S
10	Cylinder Head Cover Plug	15	1.5	11	L
11	Front Camshaft Chain Guide Bolt (Lower)	12	1.2	106 in·lb	
12	Front Camshaft Chain Guide Bolt (Upper)	25	2.5	18	
13	Spark Plugs	13	1.3	115 in·lb	
14	Throttle Body Assy Holder Bolts	9.8	1.0	87 in·lb	S
15	Upper Camshaft Chain Guide Bolts	12	1.2	106 in·lb	S
16	Water Passage Plugs	20	2.0	15	L

EO: Apply engine oil.

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)

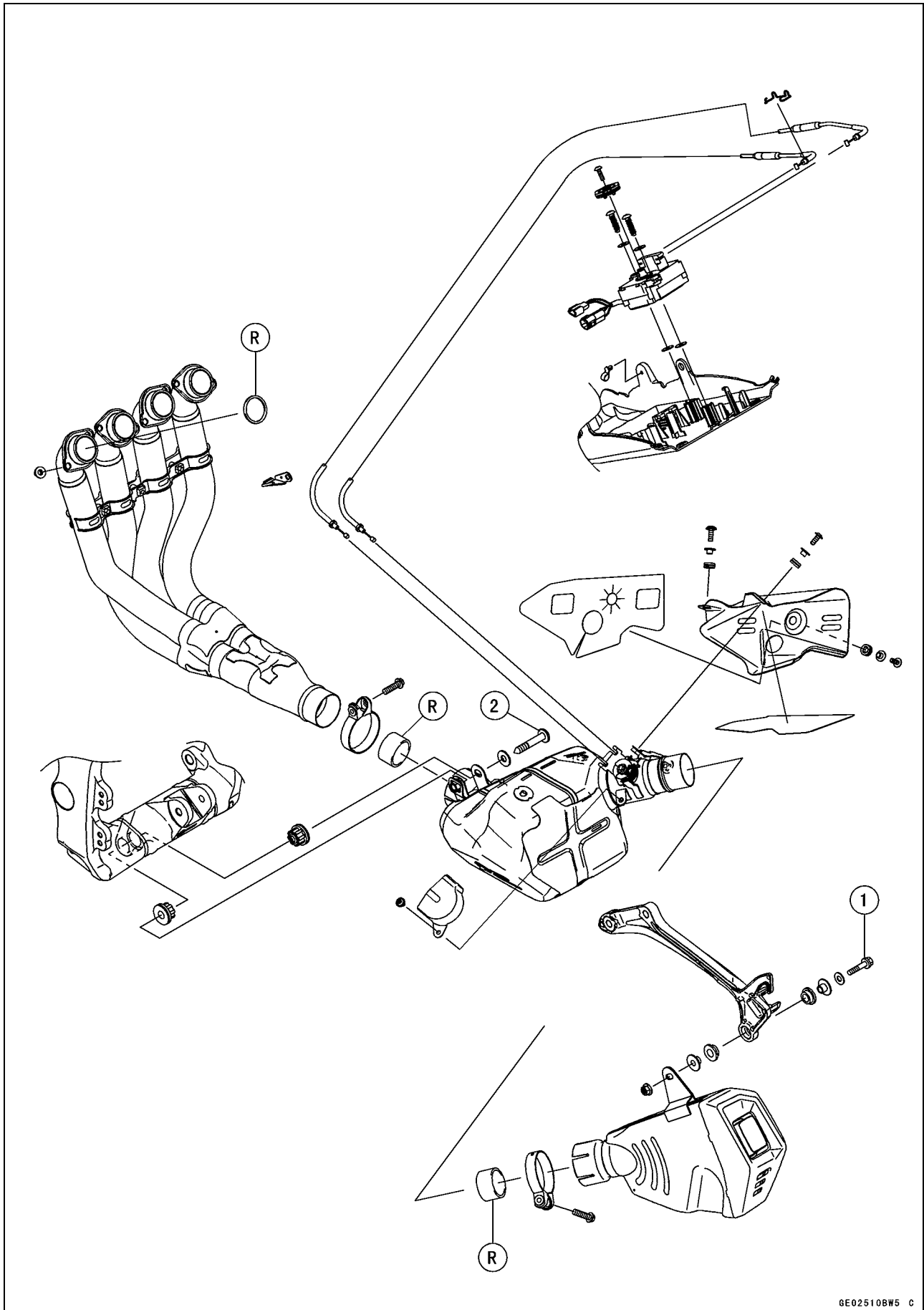
R: Replacement Parts

S: Follow the specified tightening sequence.

SS: Apply silicone sealant.

5-4 ENGINE TOP END

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Muffler Body Mounting Bolt	25	2.5	18	
2	Premuffler Chamber Mounting Bolt	34	3.5	25	

R: Replacement Parts

5-6 ENGINE TOP END

Exhaust System Identification

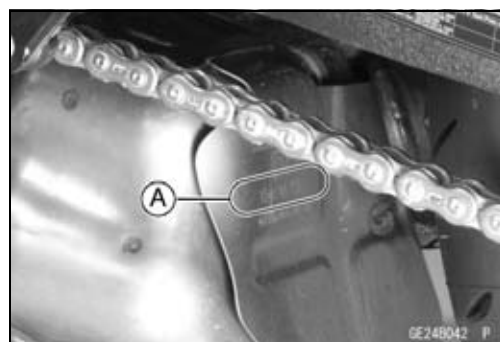
MANIFOLD		MUFFLER BODY	SPECIFICATION	MODEL
Non-Catalyst Exhaust Pipe P/No. 39178-0169 Mark: KHI M 134	Honeycomb Type Catalyst with Oxygen Sensor Premuffler Chamber P/No. 18004-0101 Mark: KHI M 135	Non-Catalyst P/No. 18091-0699 Mark: KHI K 613 EPA Noise Emission Control Information	WVTA (FULL H)	ZX1000JBF/KBF
			GB WVTA (FULL H) WVTA (78.2 H) AU PH BR	ZX1000JBF/KBF ZX1000JBF/KBF ZX1000KBF ZX1000JBF ZX1000JBF/KBF
		Non-Catalyst P/No. 18091-0810 Mark: KHI K 612	SEA	ZX1000JBF/KBF
Non-Catalyst Exhaust Pipe P/No. 39178-0169 Mark: KHI M 134	Honeycomb Type Catalyst without Oxygen Sensor Premuffler Chamber P/No. 18004-0102 Mark: None	Non-Catalyst P/No. 18091-0699 Mark: KHI K 613 EPA Noise Emission Control Information	US	ZX1000JBF/KBF
			CAL CA	ZX1000JBF/KBF ZX1000JBF/KBF ZX1000JBF/KBF

GE24559B F

Exhaust Pipe Mark Position [A]

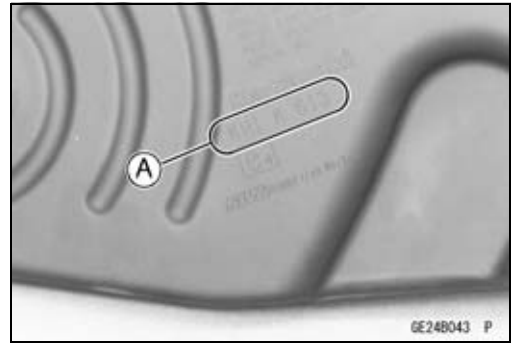


Premuffler Chamber Mark Position [A]

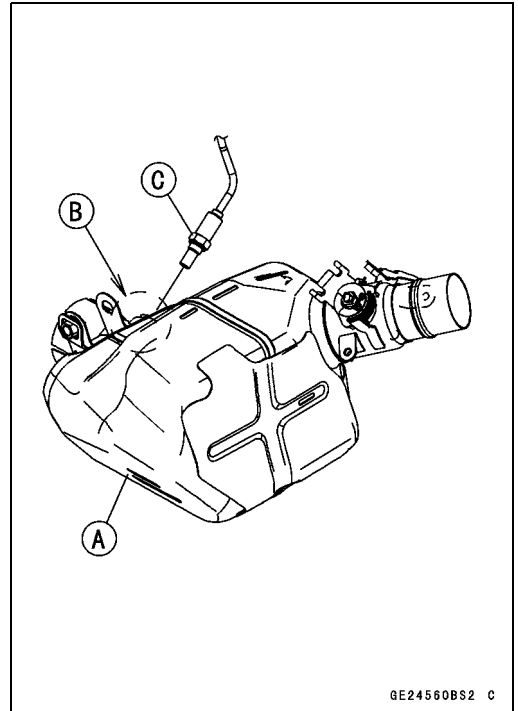


Exhaust System Identification

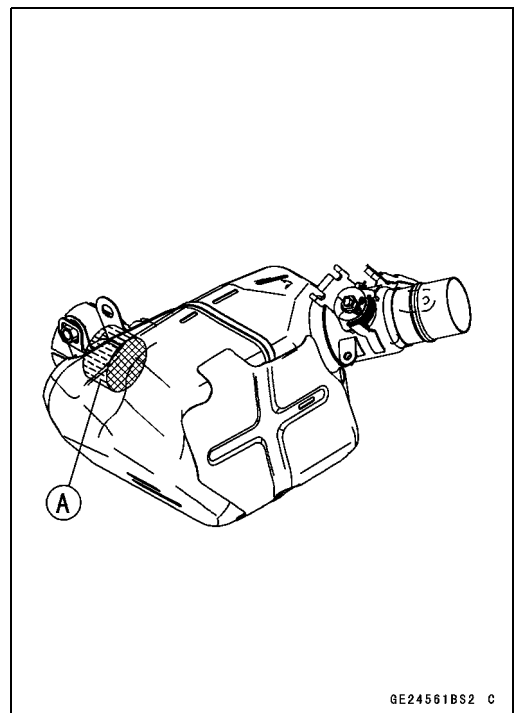
Muffler Body Mark Position [A]



Premuffler Chamber [A] with Hole [B] for Oxygen Sensor [C]



Honeycomb Type Catalyst Position [A]



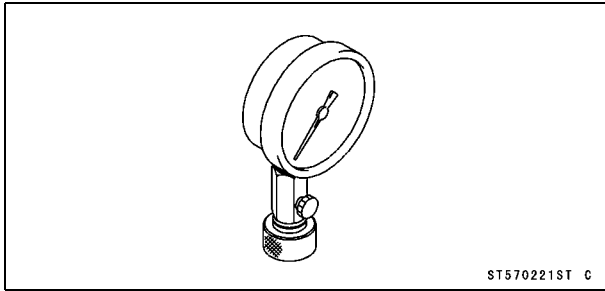
5-8 ENGINE TOP END

Specifications

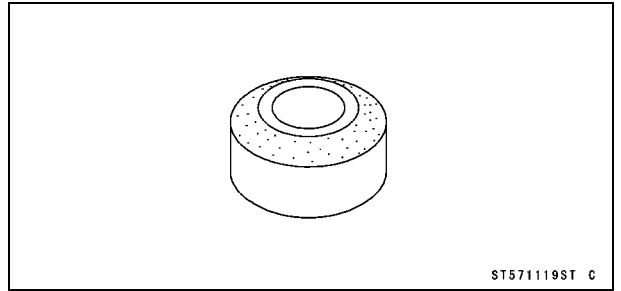
Item	Standard	Service Limit
Camshafts		
Cam Height:		
Exhaust	35.043 ~ 35.157 mm (1.3796 ~ 1.3841 in.)	34.94 mm (1.376 in.)
Intake	38.243 ~ 38.357 mm (1.5056 ~ 1.5101 in.)	38.14 mm (1.502 in.)
Camshaft Journal/Camshaft Cap Clearance	0.038 ~ 0.081 mm (0.0015 ~ 0.0032 in.)	0.17 mm (0.0067 in.)
Camshaft Journal Diameter	23.940 ~ 23.962 mm (0.9425 ~ 0.9434 in.)	23.91 mm (0.9413 in.)
Camshaft Bearing Inside Diameter	24.000 ~ 24.021 mm (0.9449 ~ 0.9457 in.)	24.08 mm (0.9480 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) 1 099 ~ 1 668 kPa (11.2 ~ 17.0 kgf/cm ² , 159 ~ 242 psi) at 320 r/min (rpm)	— — —
Cylinder Head Warp	— — —	0.05 mm (0.0020 in.)
Valves		
Valve Clearance:		
Exhaust	0.17 ~ 0.22 mm (0.0067 ~ 0.0087 in.)	— — —
Intake	0.15 ~ 0.22 mm (0.0059 ~ 0.0087 in.)	— — —
Valve Head Thickness:		
Exhaust	0.8 mm (0.031 in.)	0.4 mm (0.016 in.)
Intake	1.25 mm (0.049 in.)	0.6 mm (0.024 in.)
Valve Stem Bend	TIR 0.01 mm (0.0004 in.) or less	TIR 0.05 mm (0.002 in.)
Valve Stem Diameter:		
Exhaust	4.470 ~ 4.485 mm (0.1760 ~ 0.1766 in.)	4.46 mm (0.176 in.)
Intake	4.475 ~ 4.490 mm (0.1762 ~ 0.1768 in.)	4.46 mm (0.176 in.)
Valve Guide Inside Diameter:		
Exhaust	4.500 ~ 4.512 mm (0.1772 ~ 0.1776 in.)	4.58 mm (0.180 in.)
Intake	4.500 ~ 4.512 mm (0.1772 ~ 0.1776 in.)	4.58 mm (0.180 in.)
Valve/Valve Guide Clearance (Wobble Method):		
Exhaust	0.03 ~ 0.12 mm (0.0012 ~ 0.0047 in.)	0.34 mm (0.013 in.)
Intake	0.03 ~ 0.13 mm (0.0012 ~ 0.0051 in.)	0.36 mm (0.014 in.)
Valve Seat Cutting Angle	32°, 45°, 60°	— — —
Valve Seating Surface:		
Width:		
Exhaust	0.8 ~ 1.2 mm (0.03 ~ 0.05 in.)	— — —
Intake	0.5 ~ 1.0 mm (0.02 ~ 0.04 in.)	— — —
Outside Diameter:		
Exhaust	23.9 ~ 24.1 mm (0.941 ~ 0.949 in.)	— — —
Intake	30.4 ~ 30.6 mm (1.197 ~ 1.205 in.)	— — —
Valve Spring Free Length:		
Exhaust	40.44 mm (1.592 in.)	38.8 mm (1.53 in.)
Intake	43.73 mm (1.722 in.)	42.0 mm (1.65 in.)

Special Tools and Sealant

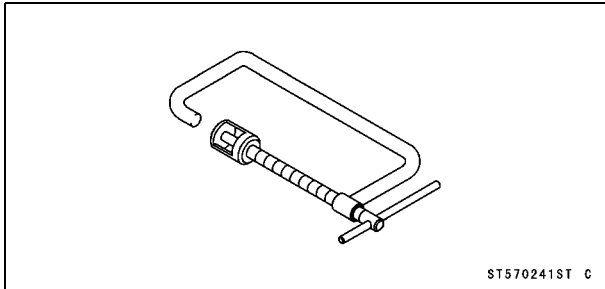
Compression Gauge, 20 kgf/cm²:
57001-221



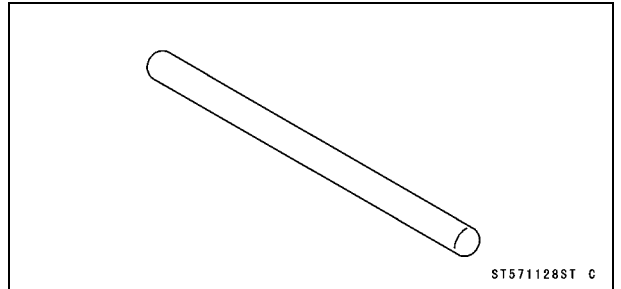
Valve Seat Cutter, 32° - ϕ 28:
57001-1119



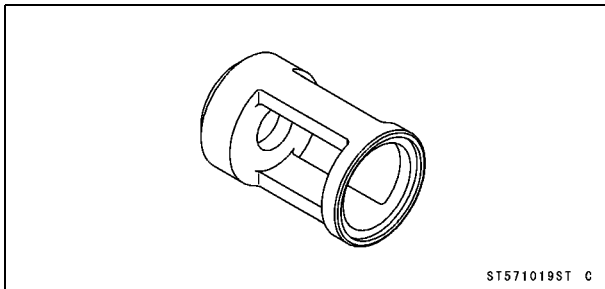
Valve Spring Compressor Assembly:
57001-241



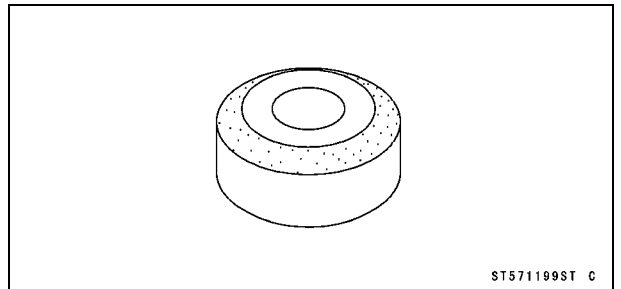
Valve Seat Cutter Holder Bar:
57001-1128



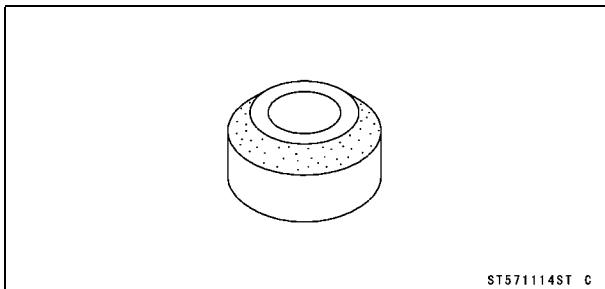
Valve Spring Compressor Adapter, ϕ 25:
57001-1019



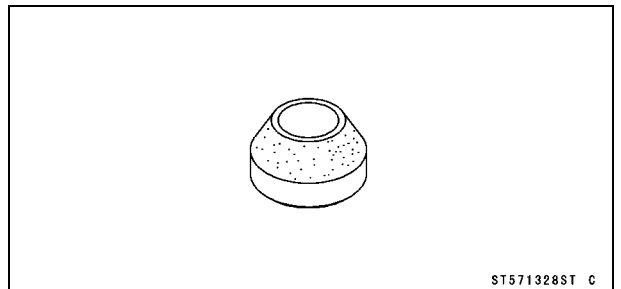
Valve Seat Cutter, 32° - ϕ 33:
57001-1199



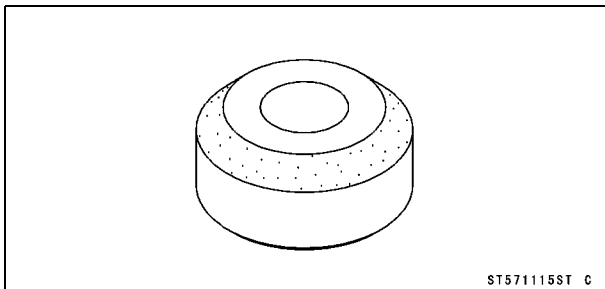
Valve Seat Cutter, 45° - ϕ 27.5:
57001-1114



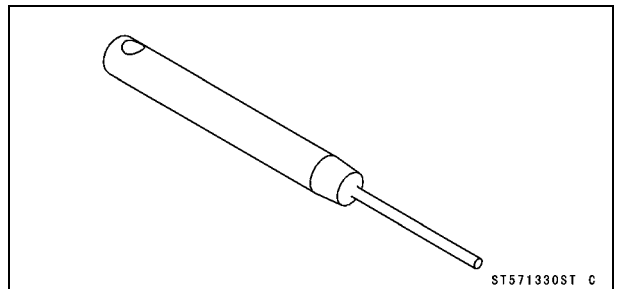
Valve Seat Cutter, 60° - ϕ 25:
57001-1328



Valve Seat Cutter, 45° - ϕ 32:
57001-1115



Valve Seat Cutter Holder, ϕ 4.5:
57001-1330

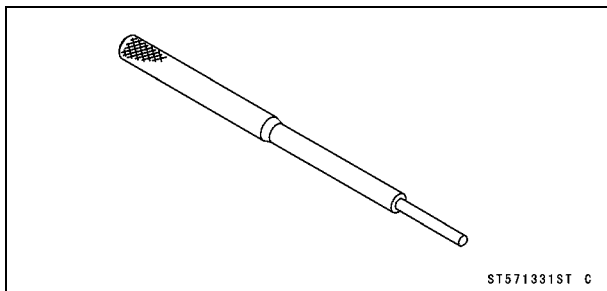


5-10 ENGINE TOP END

Special Tools and Sealant

Valve Guide Arbor, $\phi 4.5$:

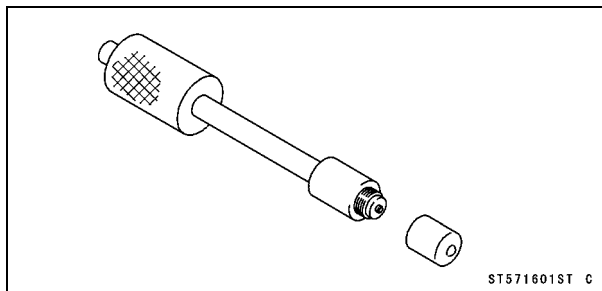
57001-1331



ST571331ST C

Compression Gauge Adapter, M10 \times 1.0:

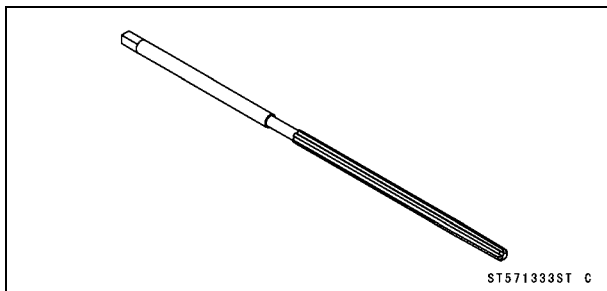
57001-1601



ST571601ST C

Valve Guide Reamer, $\phi 4.5$:

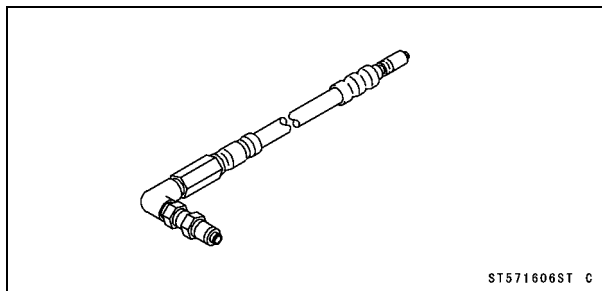
57001-1333



ST571333ST C

L-Shape Hose:

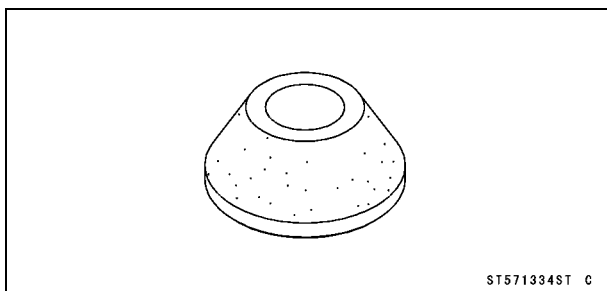
57001-1606



ST571606ST C

Valve Seat Cutter, 60° - $\phi 33$:

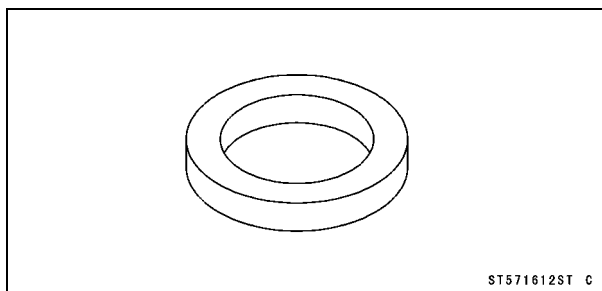
57001-1334



ST571334ST C

Washer:

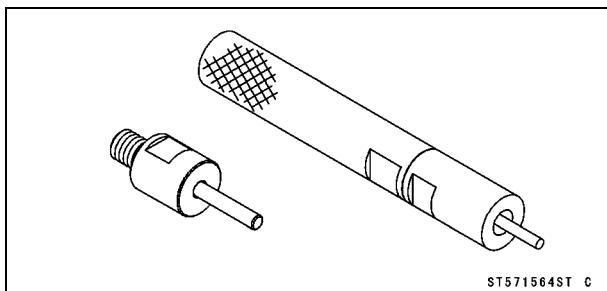
57001-1612



ST571612ST C

Valve Guide Driver:

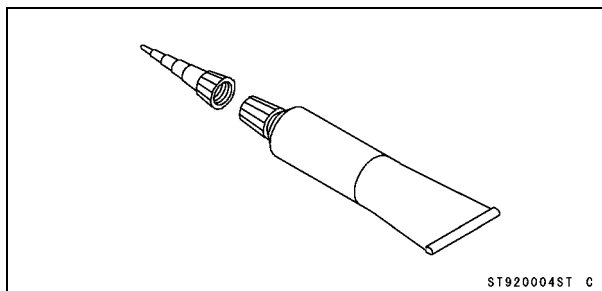
57001-1564



ST571564ST C

Liquid Gasket, TB1211F:

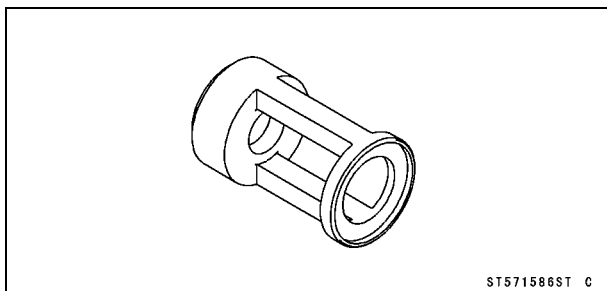
92104-0004



ST920004ST C

Valve Spring Compressor Adapter, $\phi 24$:

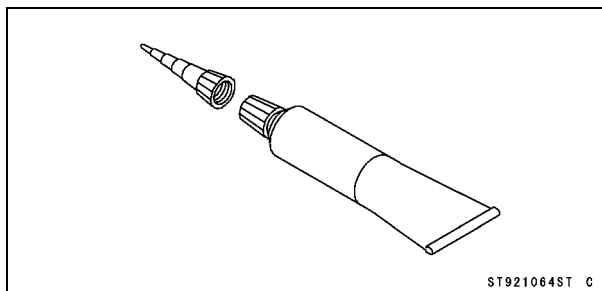
57001-1586



ST571586ST C

Liquid Gasket, TB1216B:

92104-1064

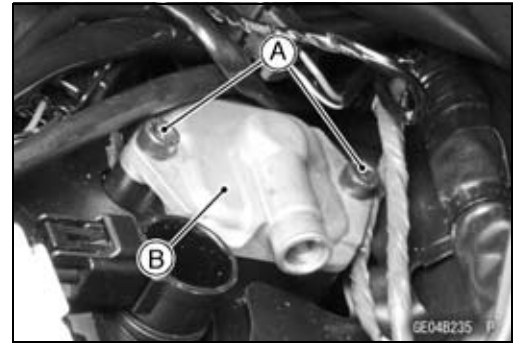


ST921064ST C

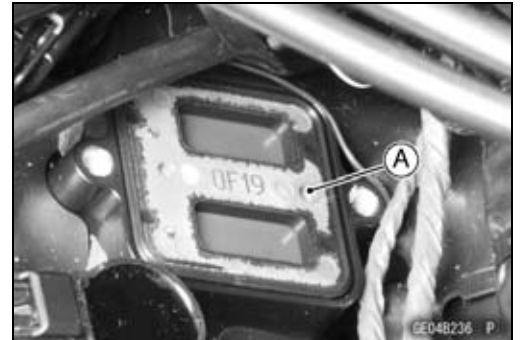
Clean Air System

Air Suction Valve Removal

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

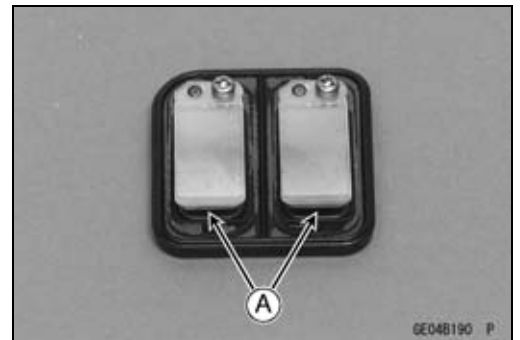


- Remove the air suction valves [A] on both sides.

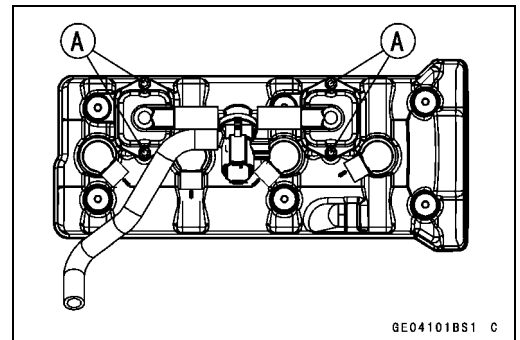


Air Suction Valve Installation

- Install the air suction valve so that opening [A] of the reed faces the 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)**



5-12 ENGINE TOP END

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

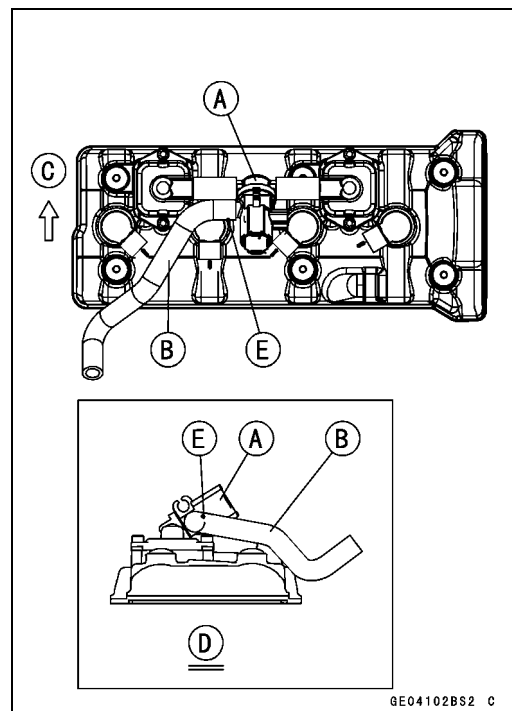
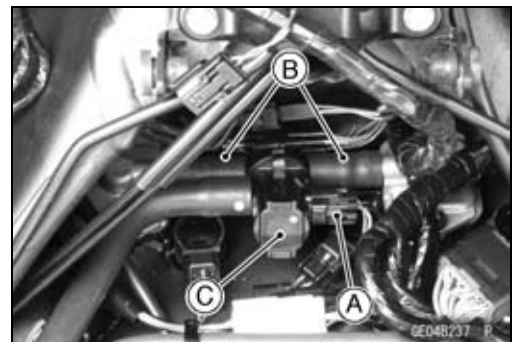
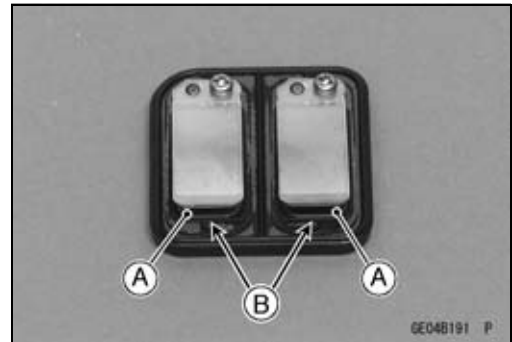
NOTICE

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].
- Separate 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 in the figure.
 - 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

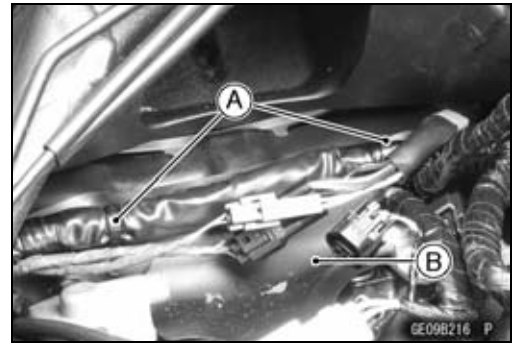
- Be certain that all the hoses are routed without being flattened or kinked, and are connected correctly to the air cleaner housing, air switching valve and air suction valve covers.
- ★ If they are not, correct them. Replace them if they are damaged.

5-14 ENGINE TOP END

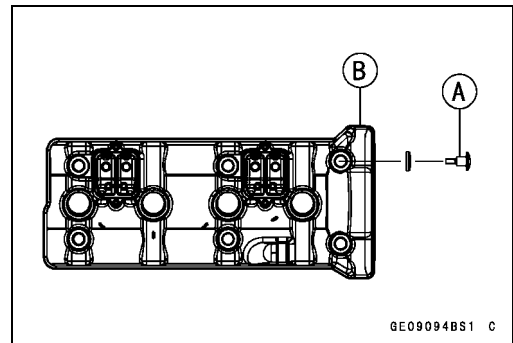
Cylinder Head Cover

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)
- Remove the clamps [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]

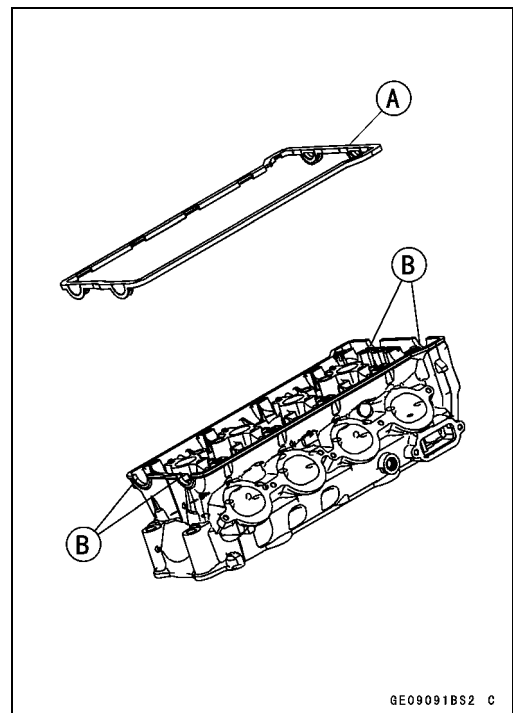


Cylinder Head Cover Installation

- Replace the cylinder head cover gasket [A] with a new one.
- Apply silicone sealant [B] to the cylinder head as shown in the figure.
- Using a high-flash point solvent, clean off any oil or dirt that may be on the silicone sealant coating area. Dry them with a clean cloth.

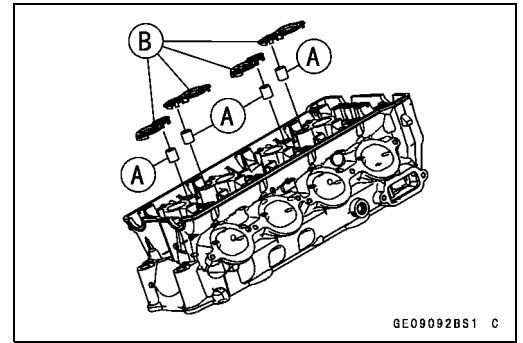
Sealant - Liquid Gasket, TB1216B: 92104-1064

- Install the new cylinder head cover gasket.

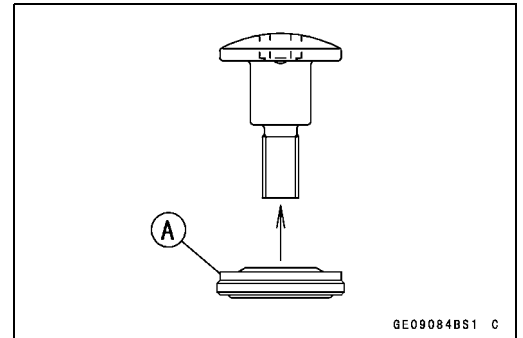


Cylinder Head Cover

- Be sure to install the following parts.
Dowel Pins [A]
Plug Hole Gaskets [B]



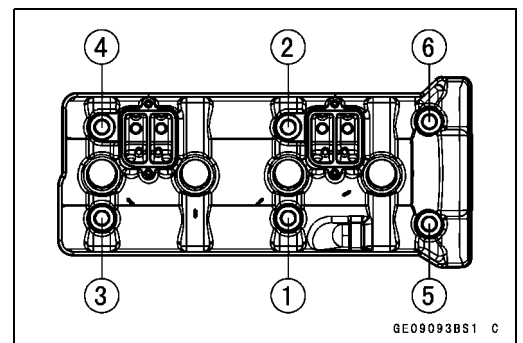
- Install the cylinder head cover.
- Install the rubber washers [A] with the metal side faces upward.



- 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)

- Install the removed parts (see appropriate chapters).



5-16 ENGINE TOP END

Camshaft Chain Tensioner

Camshaft Chain Tensioner Removal

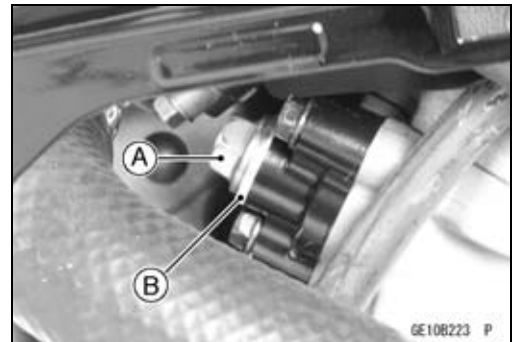
NOTICE

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.

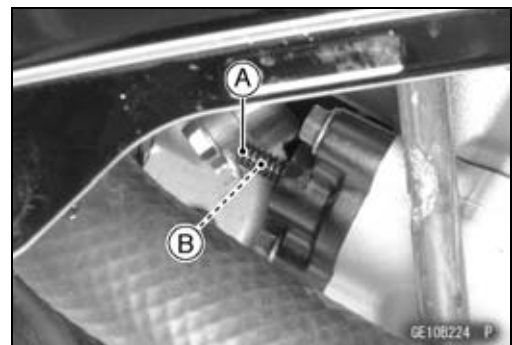
When removing the tensioner, do not take out the mounting bolts only halfway. Retightening the mounting bolts from this position could damage the tensioner and the camshaft chain. Once the bolts are loosened, the tensioner must be removed and reset as described in "Camshaft Chain Tensioner Installation".

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

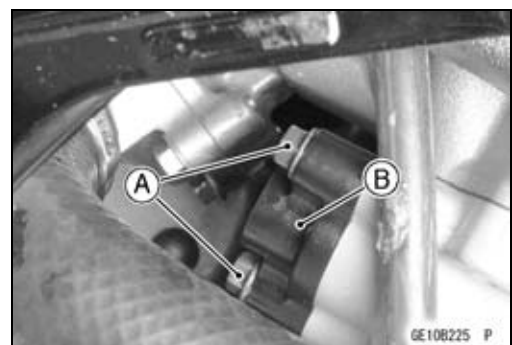
- Remove:
 - Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
 - Pad
 - Cap Bolt [A]
 - Washer [B]



- Remove:
 - Spring [A]
 - Rod [B]



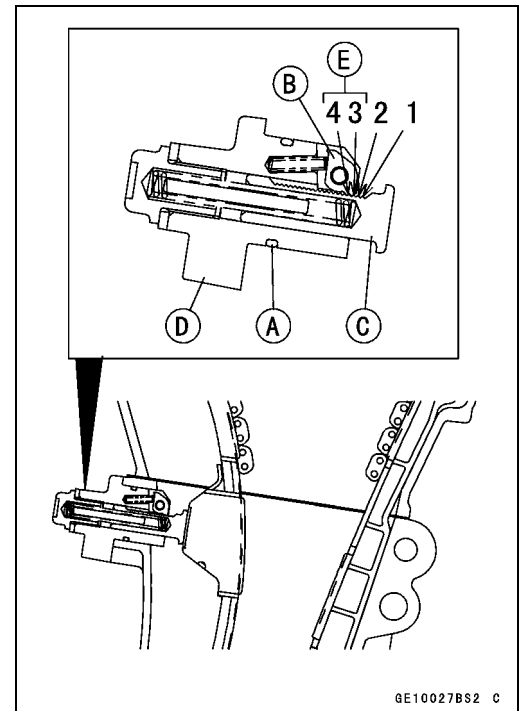
- Remove the mounting bolts [A] and take off the camshaft chain tensioner body [B].



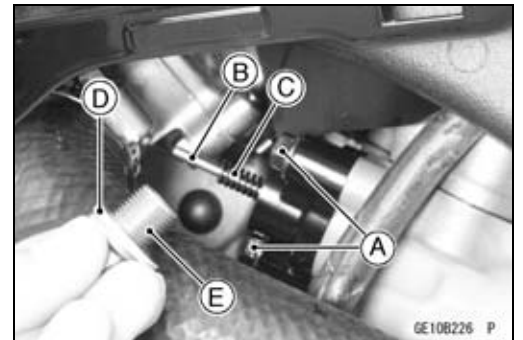
Camshaft Chain Tensioner

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] so that the position of the push rod is 3 or 4 notches [E] as shown in the figure.
- Install the tensioner body so that the stopper faces upward.



- Tighten the tensioner mounting bolts [A].
Torque - Camshaft Chain Tensioner Mounting Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)
- Install:
 Rod [B]
 Spring [C]
 Washer [D]
- Tighten the cap bolt [E].
Torque - Camshaft Chain Tensioner Cap Bolt: 20 N·m (2.0 kgf·m, 15 ft·lb)

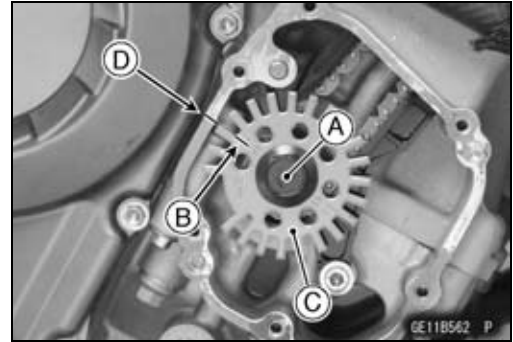


5-18 ENGINE TOP END

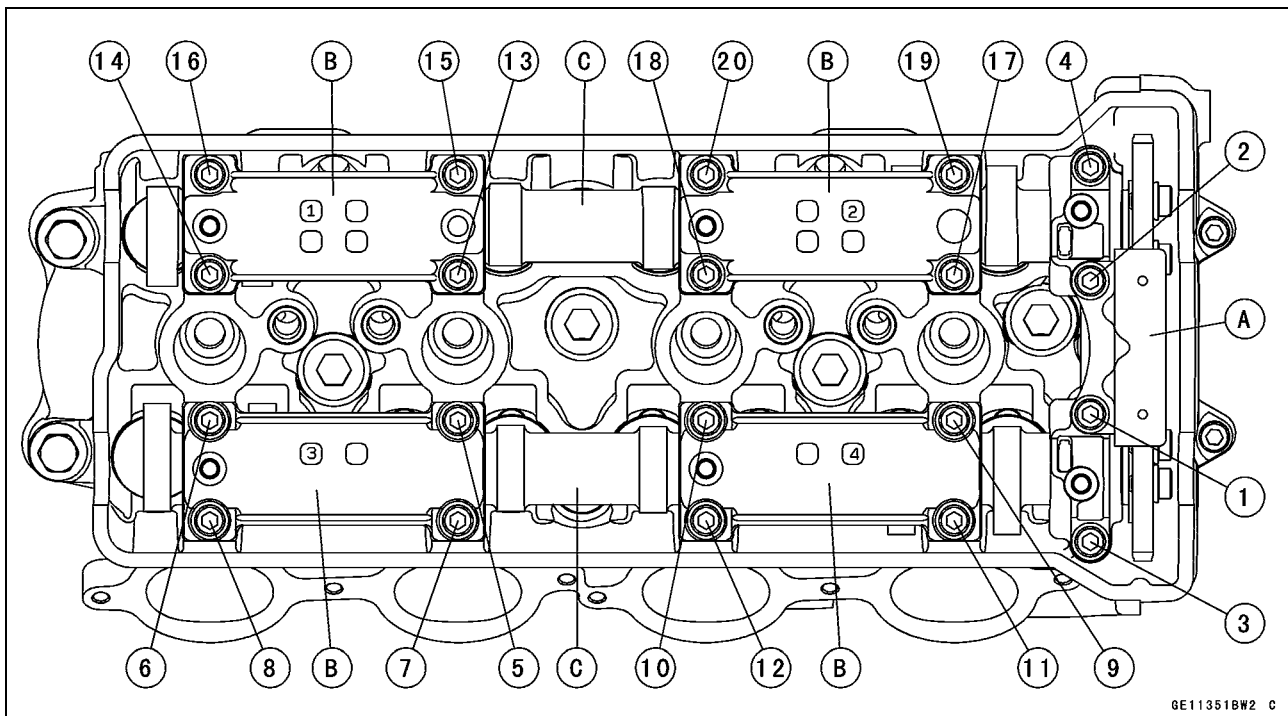
Camshaft, Camshaft Chain

Camshaft Removal

- Remove:
 - Cylinder Head Cover (see Cylinder Head Cover Removal)
 - Crankshaft Sensor Cover (see Crankshaft Sensor Removal in the Electrical System chapter)
- Using a wrench on the timing rotor bolt [A], turn the crankshaft clockwise until the line [B] (TDC mark for #1,4 pistons) on the timing rotor [C] is aligned with the mating surface [D] of the crankcase.



- Remove the camshaft chain tensioner (see Camshaft Chain Tensioner Removal).
- Loosen the upper camshaft chain guide bolts and camshaft cap bolts as shown sequence [1 ~ 20] in the figure, 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.



Camshaft, Camshaft Chain

- 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

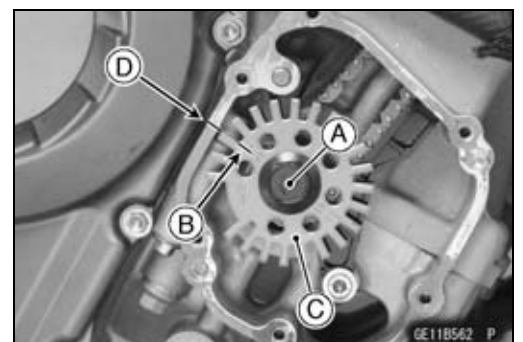
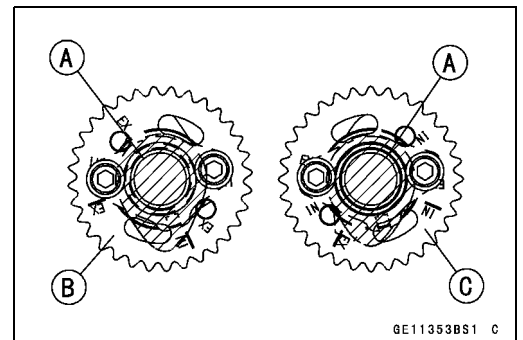
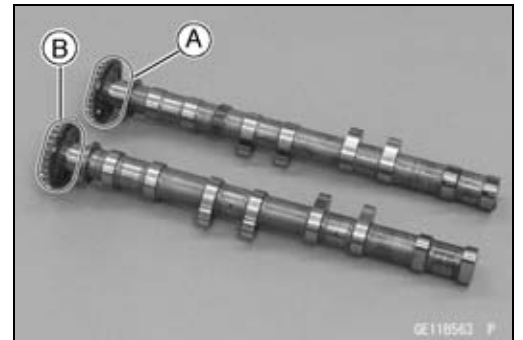
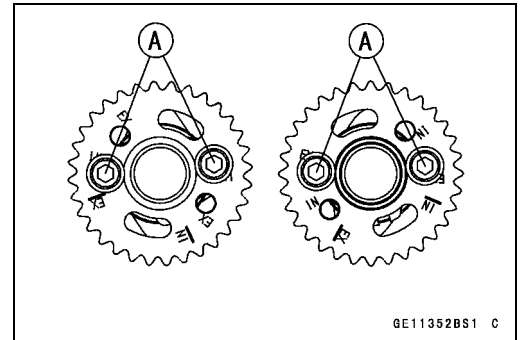
- The exhaust camshaft has a 1001 EX mark [A] and the intake camshaft has a 3154 IN mark [B]. Be careful not to mix up these shafts.

- Install the camshaft sprockets as shown in the figure.
 - #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 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 timing rotor bolt [A], turn the crankshaft clockwise until the line [B] (TDC mark for #1,4 pistons) on the timing rotor [C] is aligned with the mating surface [D] of the crankcase.

NOTICE

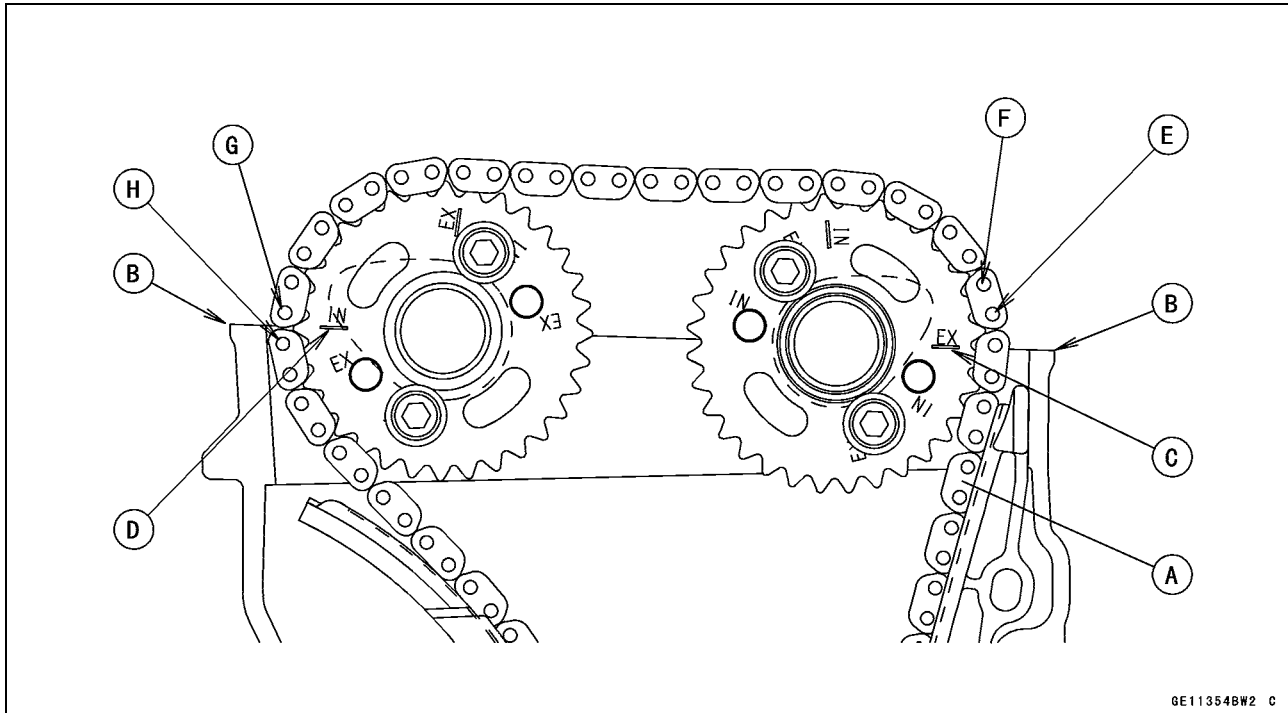
The crankshaft may be turned while the camshafts are removed. Always pull the chain taut while turning the crankshaft. This avoids kinking the chain on the lower (crankshaft) sprocket. A kinked chain could damage both the chain and the sprocket.



5-20 ENGINE TOP END

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 in the figure.
- 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]
 - #28 Pin [G]
 - #29 Pin [H]

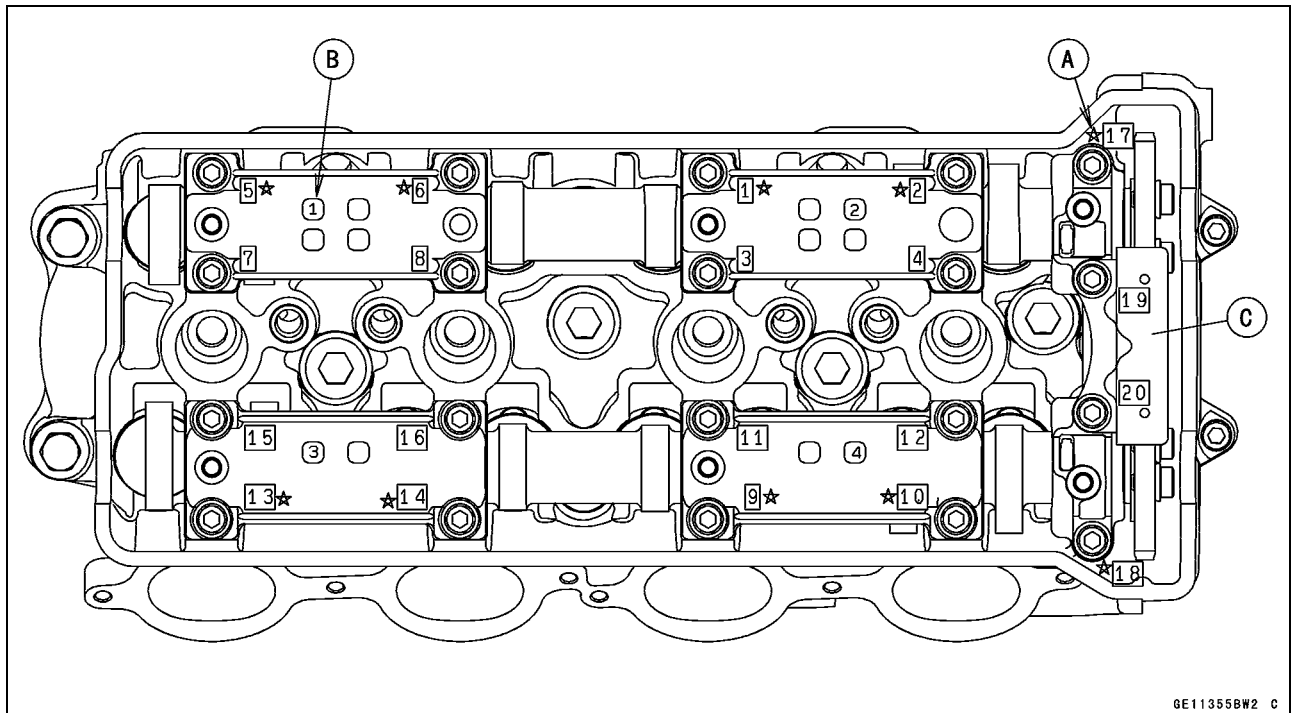


Camshaft, Camshaft Chain

- Install the ten dowel pins on the ★ marks [A].
- Install the camshaft cap, following the identification No. [B] and upper camshaft chain guide [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 ~ 18): 12 N·m (1.2 kgf·m, 106 in·lb)

Upper Camshaft Chain Guide Bolts (19, 20): 12 N·m (1.2 kgf·m, 106 in·lb)



- 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.
- Install the removed parts (see appropriate chapters).

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

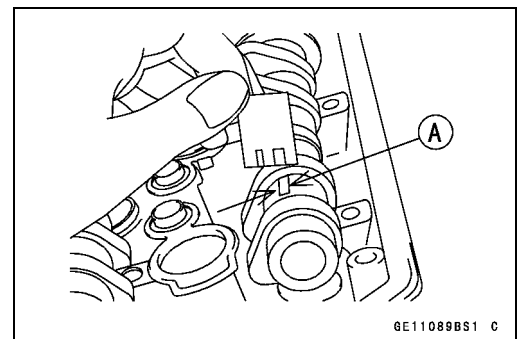
○ Do not turn the camshaft when the plastigage is between the journal and camshaft cap.

- 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.)



5-22 ENGINE TOP END

Camshaft, Camshaft Chain

- ★ 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 (0.9413 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.

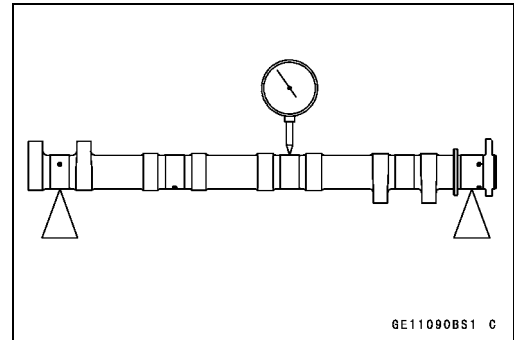
Camshaft Runout Inspection

- 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 at the specified place as shown in the figure.
- ★ 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:

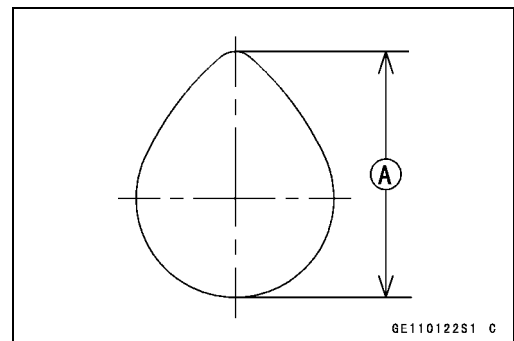
Exhaust 35.043 ~ 35.157 mm (1.3796 ~ 1.3841 in.)

Intake 38.243 ~ 38.357 mm (1.5056 ~ 1.5101 in.)

Service Limit:

Exhaust 34.94 mm (1.376 in.)

Intake 38.14 mm (1.502 in.)

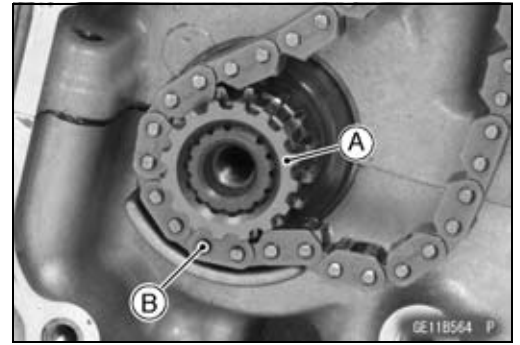


Camshaft Chain Removal

- Remove:
 - Camshafts (see Camshaft Removal)
 - Timing Rotor (see Timing Rotor Removal in the Electrical System chapter)
 - Front and Rear Camshaft Chain Guides (see Cylinder Head Removal)

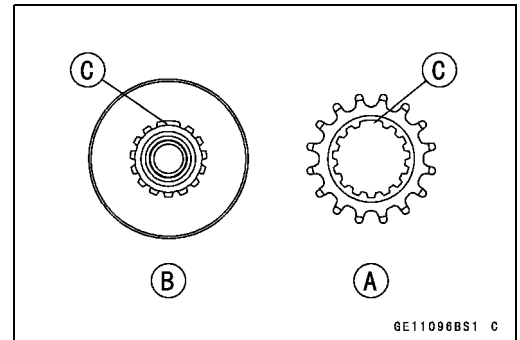
Camshaft, Camshaft Chain

- Remove the crankshaft sprocket [A].
- Pull out the camshaft chain [B] downward.



Camshaft Chain Installation

- Install the camshaft chain from head side.
- Install the crankshaft sprocket [A] on the crankshaft [B] with their teeth [C] aligned.
- Install the removed parts (see appropriate chapters).



5-24 ENGINE TOP END

Cylinder Head

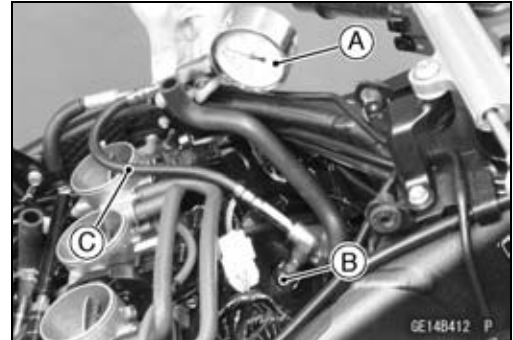
Cylinder Compression Measurement

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 [C]: 57001-1606



Cylinder Compression

Usable Range: 1 099 ~ 1 668 kPa (11.2 ~ 17.0 kgf/cm², 159 ~ 242 psi) at 320 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.

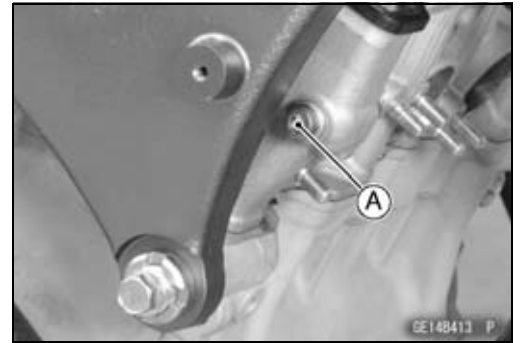
Problem	Diagnosis	Remedy (Action)
Cylinder compression is higher than usable range	Carbon accumulation on piston and in combustion chamber possibly due to damaged valve stem oil seal and/or damaged piston oil rings (This may be indicated by white exhaust smoke).	Remove the carbon deposits and replace 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 Removal

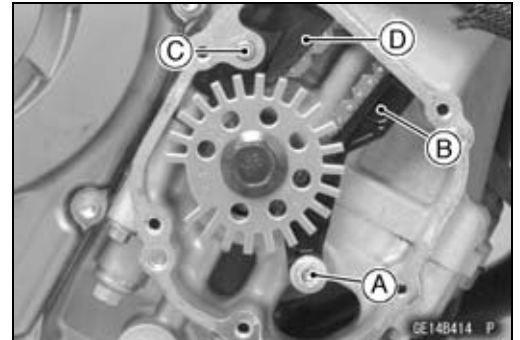
- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove:
 - Thermostat Housing (see Thermostat Removal in the Cooling System chapter)
 - Exhaust Pipe (see Exhaust Pipe Removal)
 - Camshafts (see Camshaft Removal)

Cylinder Head

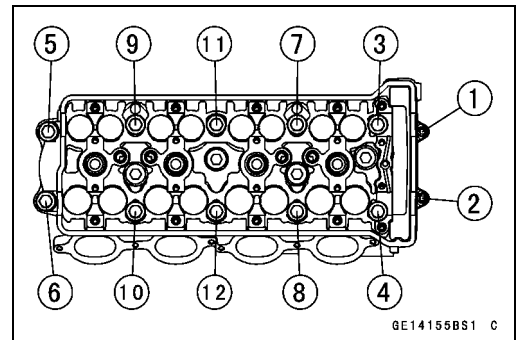
- Remove the front camshaft chain guide bolt (upper) [A].



- 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 M10 cylinder head bolts as shown sequence [1 ~ 12] in the figure, and remove them with washers.
- Remove the cylinder head forward.



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].
- Tighten the M10 cylinder head bolts as shown sequence [1 ~ 10] in the figure.

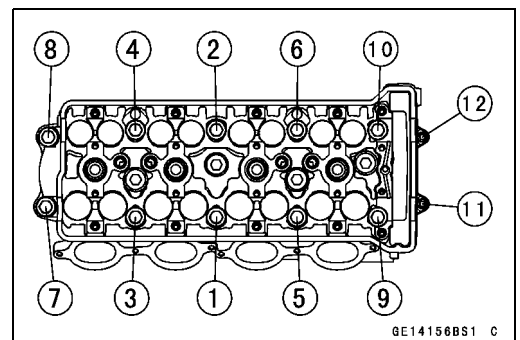
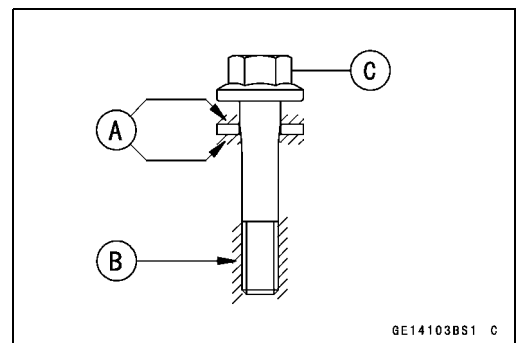
Torque - Cylinder Head Bolts (M10):

First: 20 N·m (2.0 kgf·m, 15 ft·lb)

Final: 45 N·m (4.6 kgf·m, 33 ft·lb)

- Tighten the M6 cylinder head bolts as shown sequence [11, 12] in the figure.

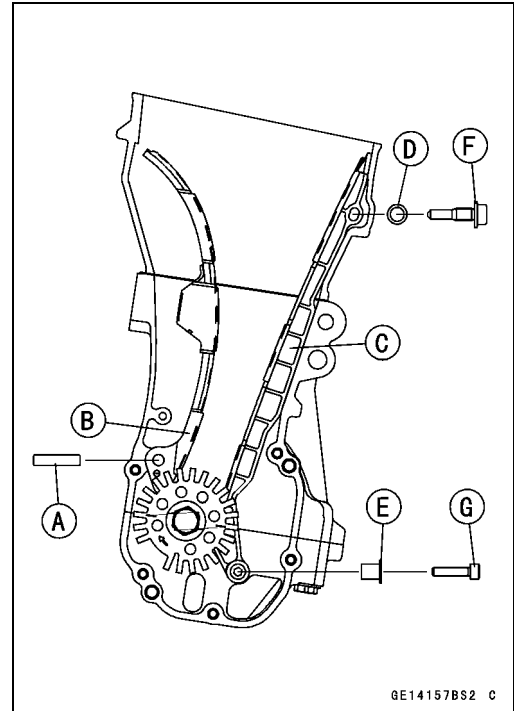
Torque - Cylinder Head Bolts (M6): 12 N·m (1.2 kgf·m, 106 in·lb)



5-26 ENGINE TOP END

Cylinder Head

- 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)**
- Install the removed parts (see appropriate chapters).



Cylinder Head Warp Inspection

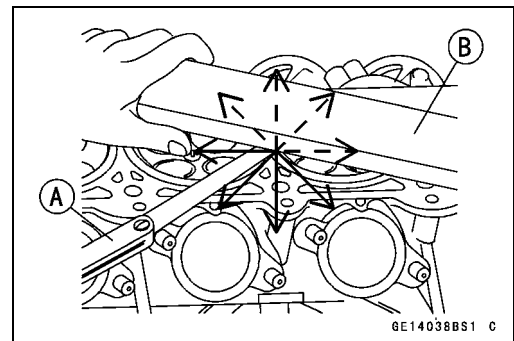
- Clean the cylinder head.
- Lay a straightedge across the lower surface of the cylinder head at several positions.
- Use a thickness gauge [A] to measure the space between the straightedge [B] and the head.

Cylinder Head Warp

Standard: ---

Service Limit: 0.05 mm (0.0020 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.

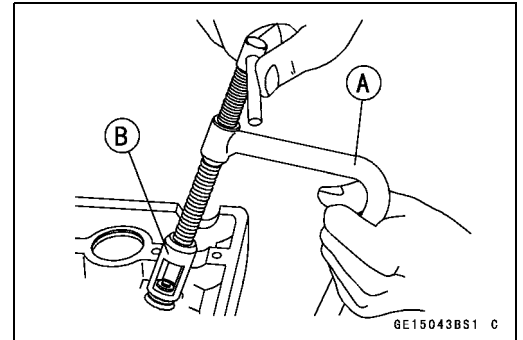
Valve Removal

- Remove the cylinder head (see Cylinder Head Removal).
- Remove the valve lifter and shim.
- 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, ϕ 25 [B]:
57001-1019

Valve Spring Compressor Adapter, ϕ 24:
57001-1586



Valve Installation

NOTICE

Do not lap the valve to the valve seat, using the grinding compound. It will come off oxide film treated surface of the valve.

- 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]

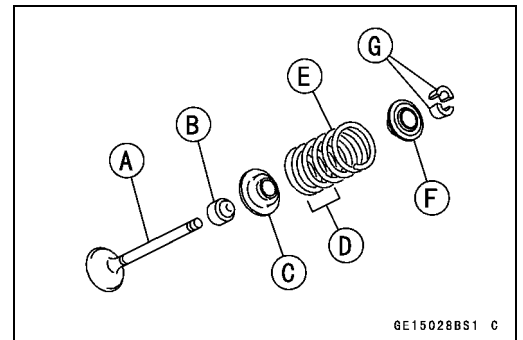
Valve Spring [E]:

EX - Yellow Paint

IN - White Paint

Retainer [F]

Split Keepers [G]

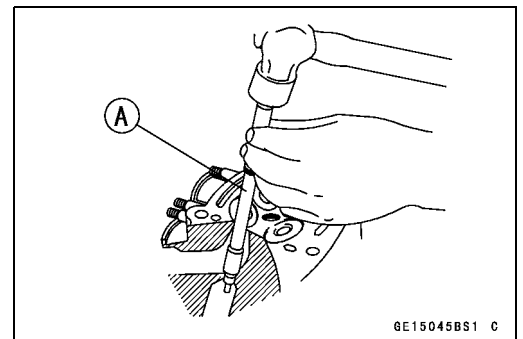


Valve Guide Removal

- 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, ϕ 4.5: 57001-1331

5-28 ENGINE TOP END

Valves

Valve Guide Installation

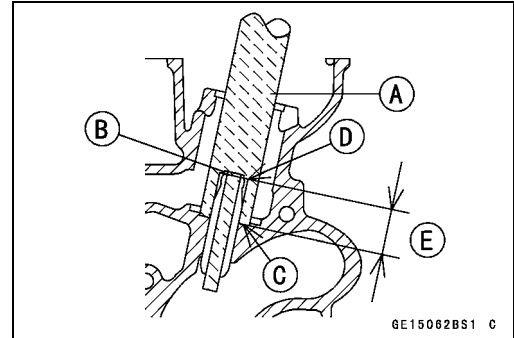
- Apply engine oil to the valve guide outer surface before installation.
- Heat the area around the valve guide hole to about 120 ~ 150°C (248 ~ 302°F).

NOTICE

Do not heat the cylinder head with a torch. This will warp the cylinder head. Soak the cylinder head and heat the oil.

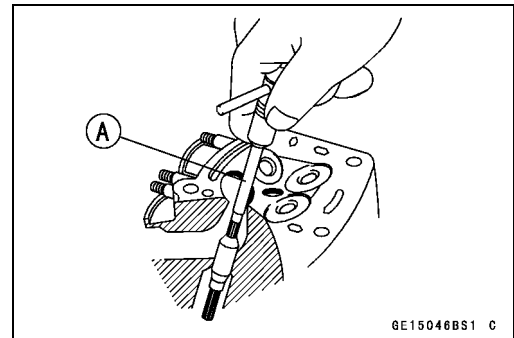
- Using the valve guide driver [A] and washer [B], press and insert the valve guide in until the valve guide driver surface [C] touches the head surface [D].
13.3 ~ 13.5 mm (0.52 ~ 0.53 in.) [E]

**Special Tools - Valve Guide Driver: 57001-1564
Washer: 57001-1612**



- Ream the valve guide with valve guide reamer [A], even if the old guide is reused.

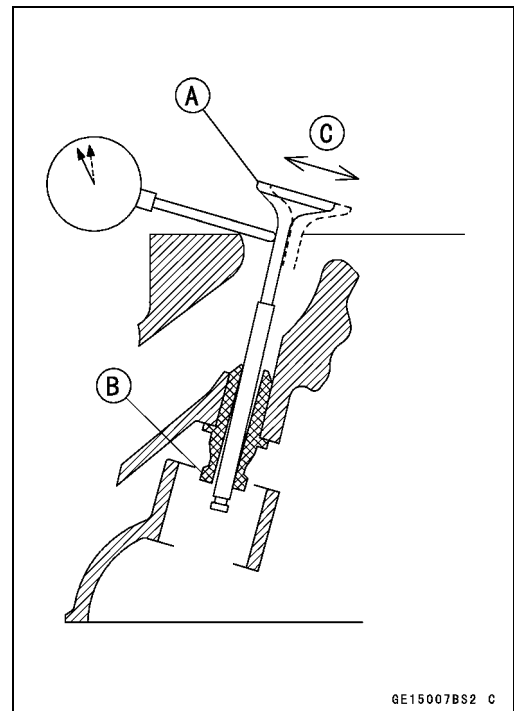
Special Tool - Valve Guide Reamer, $\phi 4.5$: 57001-1333



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 0.03 ~ 0.12 mm (0.0012 ~ 0.0047 in.)

Intake 0.03 ~ 0.13 mm (0.0012 ~ 0.0051 in.)

Service Limit:

Exhaust 0.34 mm (0.013 in.)

Intake 0.36 mm (0.014 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 23.9 ~ 24.1 mm (0.941 ~ 0.949 in.)

Intake 30.4 ~ 30.6 mm (1.197 ~ 1.205 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 (0.03 ~ 0.05 in.)

Intake 0.5 ~ 1.0 mm (0.02 ~ 0.04 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, $\phi 4.5$ [C]: 57001-1330

[For Exhaust Valve Seat]

Valve Seat Cutter, 45° - $\phi 27.5$: 57001-1114

Valve Seat Cutter, 32° - $\phi 28$: 57001-1119

Valve Seat Cutter, 60° - $\phi 25$: 57001-1328

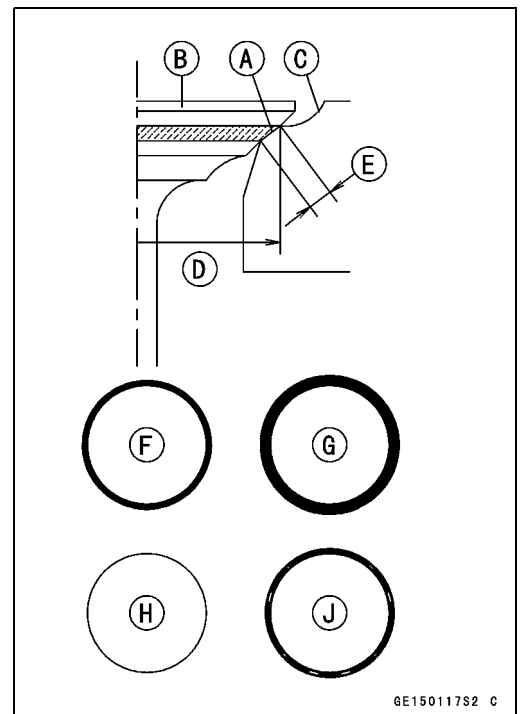
[For Intake Valve Seat]

Valve Seat Cutter, 45° - $\phi 32$: 57001-1115

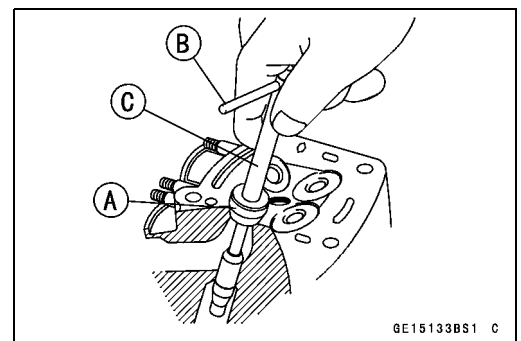
Valve Seat Cutter, 32° - $\phi 33$: 57001-1199

Valve Seat Cutter, 60° - $\phi 33$: 57001-1334

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



6E150117S2 C



6E15133BS1 C

5-30 ENGINE TOP END

Valves

Seat Cutter Operation Care

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

NOTE

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

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

NOTE

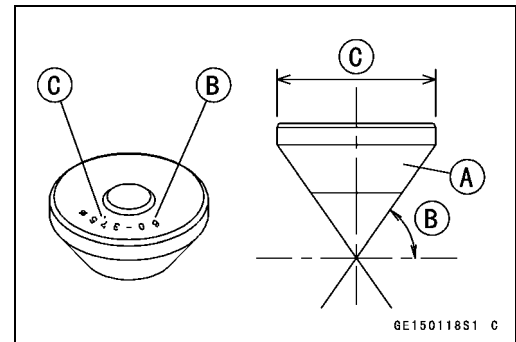
○Prior to grinding, apply engine oil to the cutter and during the operation, wash off any ground particles sticking to the cutter with washing oil.

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

Marks Stamped on the Cutter

The marks stamped on the back of the cutter [A] represent the following.

- 60° Cutter angle [B]
37.5φ Outer diameter of cutter [C]



Operating Procedures

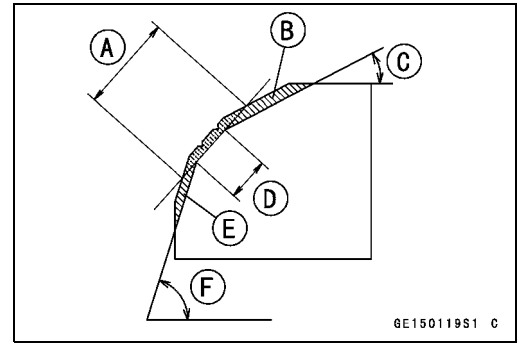
- Clean the seat area carefully.
- Coat the seat with machinist's dye.
- Fit a 45° cutter into the holder and slide it into the valve guide.
- Press down lightly on the handle and turn it right or left. Grind the seating surface only until it is smooth.

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

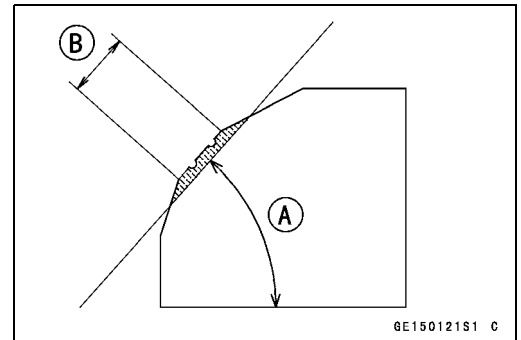
- Measure the outside diameter of the seating surface with a vernier caliper.
- ★ If the outside diameter of the seating surface is too small, repeat the 45° grind until the diameter is within the specified range.
 - Widened Width [A] of engagement by machining with 45° cutter
 - Ground Volume [B] by 32° cutter
 - 32° [C]
 - Correct Width [D]
 - Ground Volume [E] by 60° cutter
 - 60° [F]



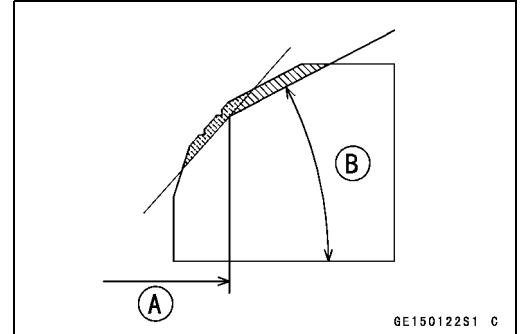
- Measure the outside diameter of the seating surface with a vernier caliper.
- ★ If the outside diameter of the seating surface is too small, repeat the 45° grind [A] until the diameter is within the specified range.
 - Original Seating Surface [B]

NOTE

- Remove all pittings or flaws from 45° ground surface.
- After grinding with 45° cutter, apply thin coat of machinist's dye to seating surface. This makes seating surface distinct and 32° and 60° grinding operation easier.
- When the valve guide is replaced, be sure to grind with 45° cutter for centering and good contact.



- ★ If the outside diameter [A] of the seating surface is too large, make the 32° grind described below.
- ★ If the outside diameter of the seating surface is within the specified range, measure the seat width as described below.
- Grind the seat at a 32° angle [B] until the seat 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

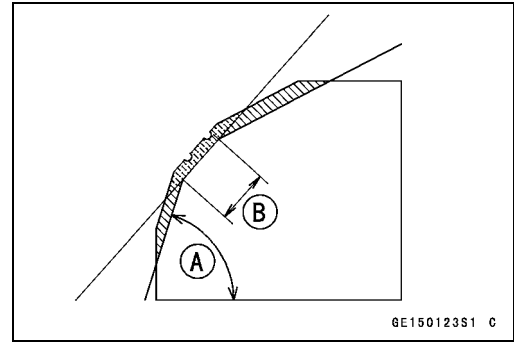
The 32° cutter removes material very quickly. Check the seat outside diameter frequently to prevent overgrinding.

- 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.

5-32 ENGINE TOP END

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]

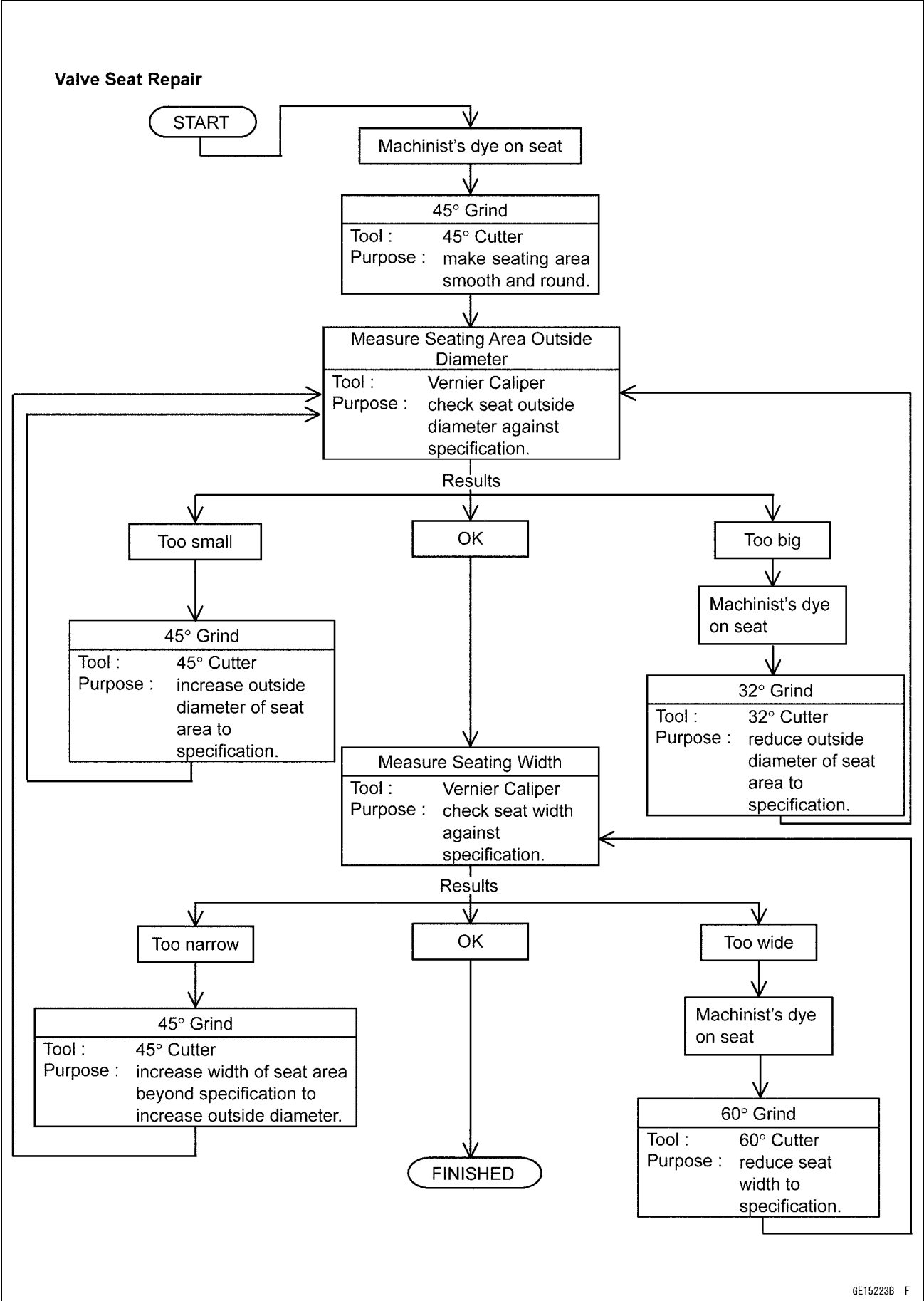


NOTICE

Do not lap the valve to the valve seat, using the grinding compound. It will come off oxide film treated surface of the valve.

- When the engine is assembled, be sure to adjust the valve clearance (see Valve Clearance Inspection in the Periodic Maintenance chapter).

Valves

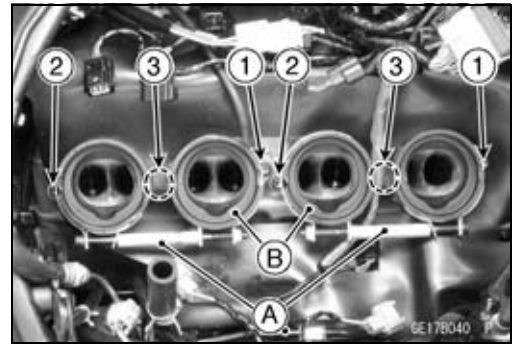


5-34 ENGINE TOP END

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]
- Loosen the throttle body assy holder bolts as shown sequence [1 ~ 3] in the figure, and remove them.
- Remove the throttle body assy holders [B].



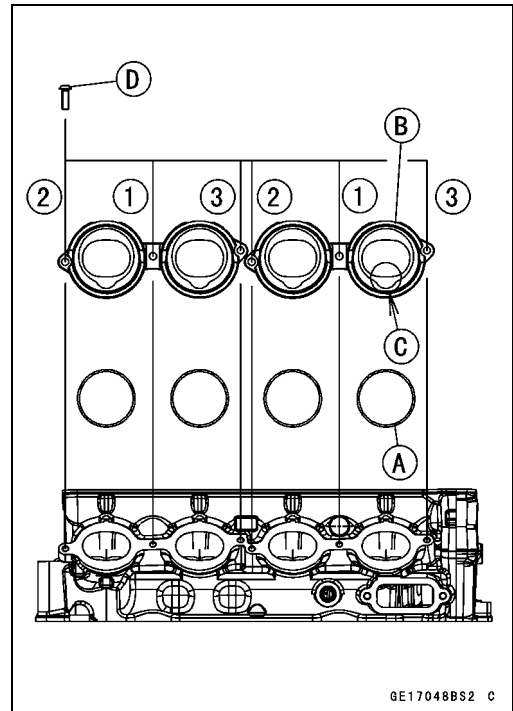
Throttle Body Assy Holder Installation

- Be sure to install the new O-rings [A].
- Apply silicone sealant to any two positions of the new O-ring.
- Using a high-flash point solvent, clean off any oil or dirt that may be on the silicone sealant coating area. Dry them with a clean cloth.

Sealant - Liquid Gasket, TB1211F: 92104-0004

- Install the holders [B] as shown in the figure.
 - Recession [C]
- Tighten the holder bolts [D] as shown sequence [1 ~ 3] in the figure.

Torque - Throttle Body Assy Holder Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)



Muffler

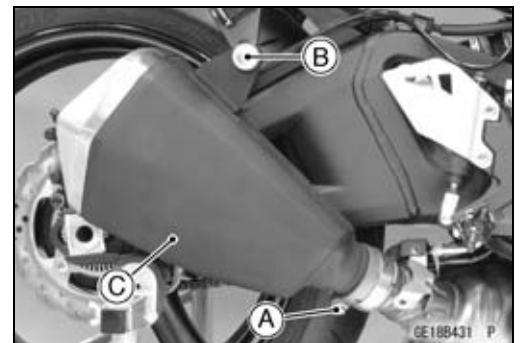
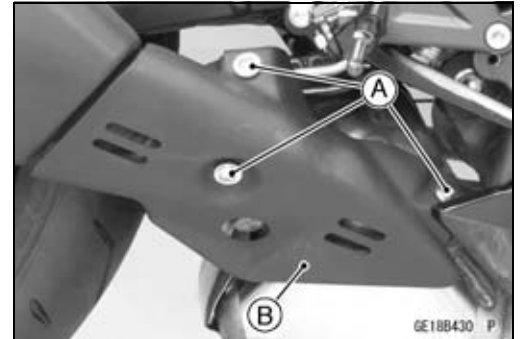
⚠ WARNING

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:
 - Bolts [A]
 - Muffler Body Cover [B]

- Loosen the muffler body clamp bolt [A].
- Remove the muffler body mounting bolt [B], and pull out the muffler body [C] backward from the pre-muffler chamber.



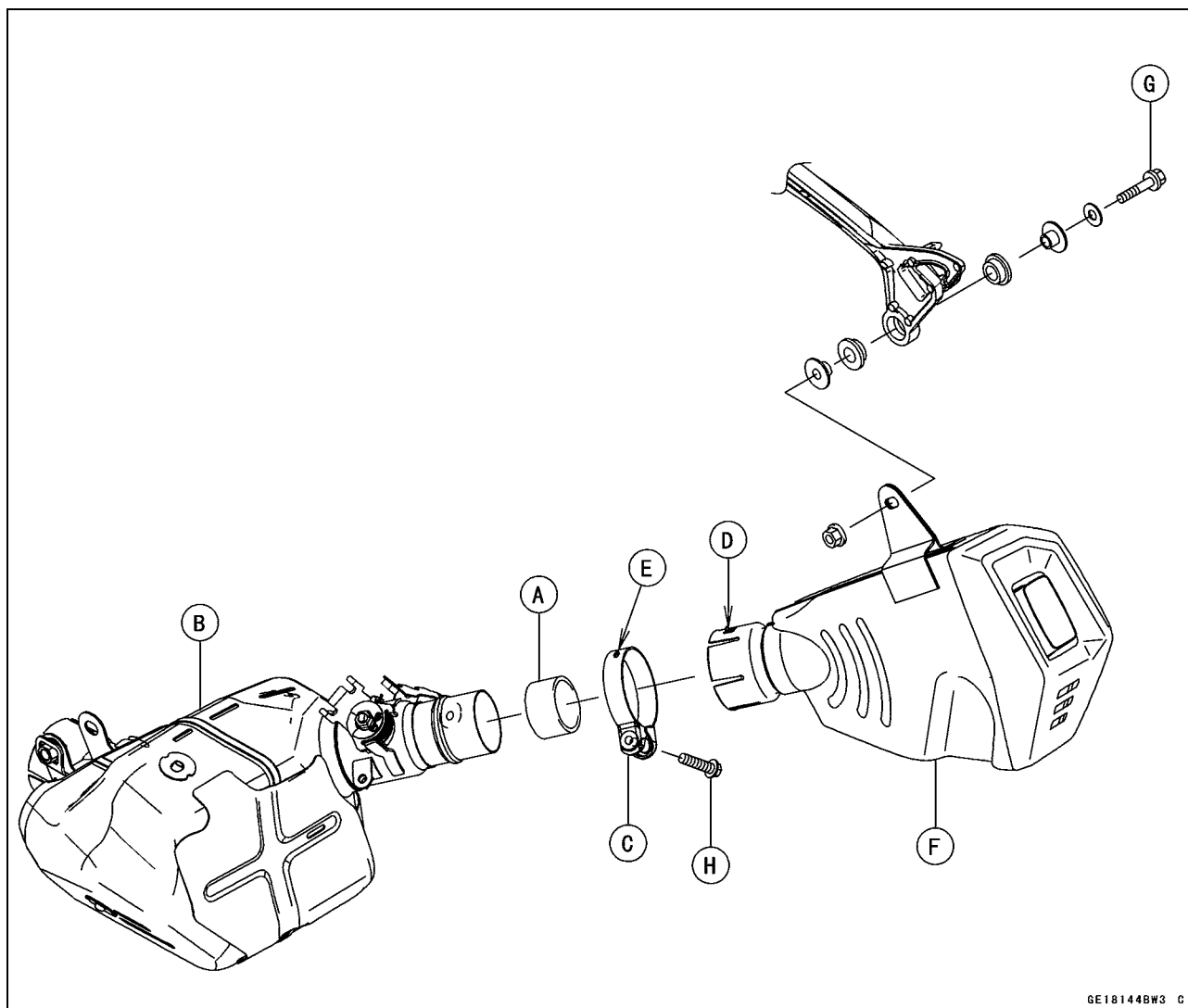
Muffler Body Installation

- Replace the muffler body gasket [A] with a new one.
- Install the muffler body gasket to the pre-muffler chamber [B] until it is bottomed so that the chamfer side faces pre-muffler chamber.
- Install the muffler body clamp [C] as shown in the figure.
- Insert the projection [D] into the slot [E].
- Install the muffler body [F].
- Tighten the mounting bolt [G] and clamp bolt [H] securely.

Torque - Muffler Body Mounting Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

5-36 ENGINE TOP END

Muffler



GE18144BW3 C

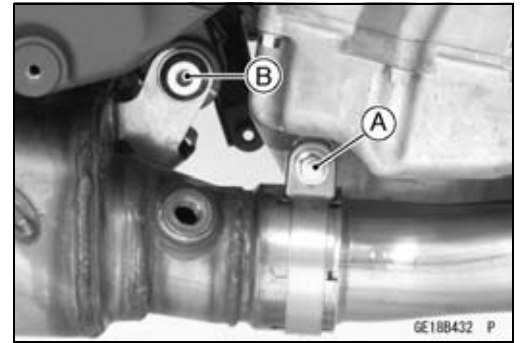
- Thoroughly warm up the engine, wait until the engine cools down, retighten all the bolts.
- Install the removed parts (see appropriate chapters).

Premuffler Chamber Removal

- Remove:
 - Muffler Body (see Muffler Body Removal)
 - Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
 - Front Seat (see Front Seat Removal in the Frame chapter)
 - Oxygen Sensor (Equipped Models) (see Oxygen Sensor Removal (Equipped Models) in the Electrical System chapter)
- Remove the lower ends of the exhaust butterfly valve cables from the pulley of the premuffler chamber (see Exhaust Butterfly Valve Cable Removal).

Muffler

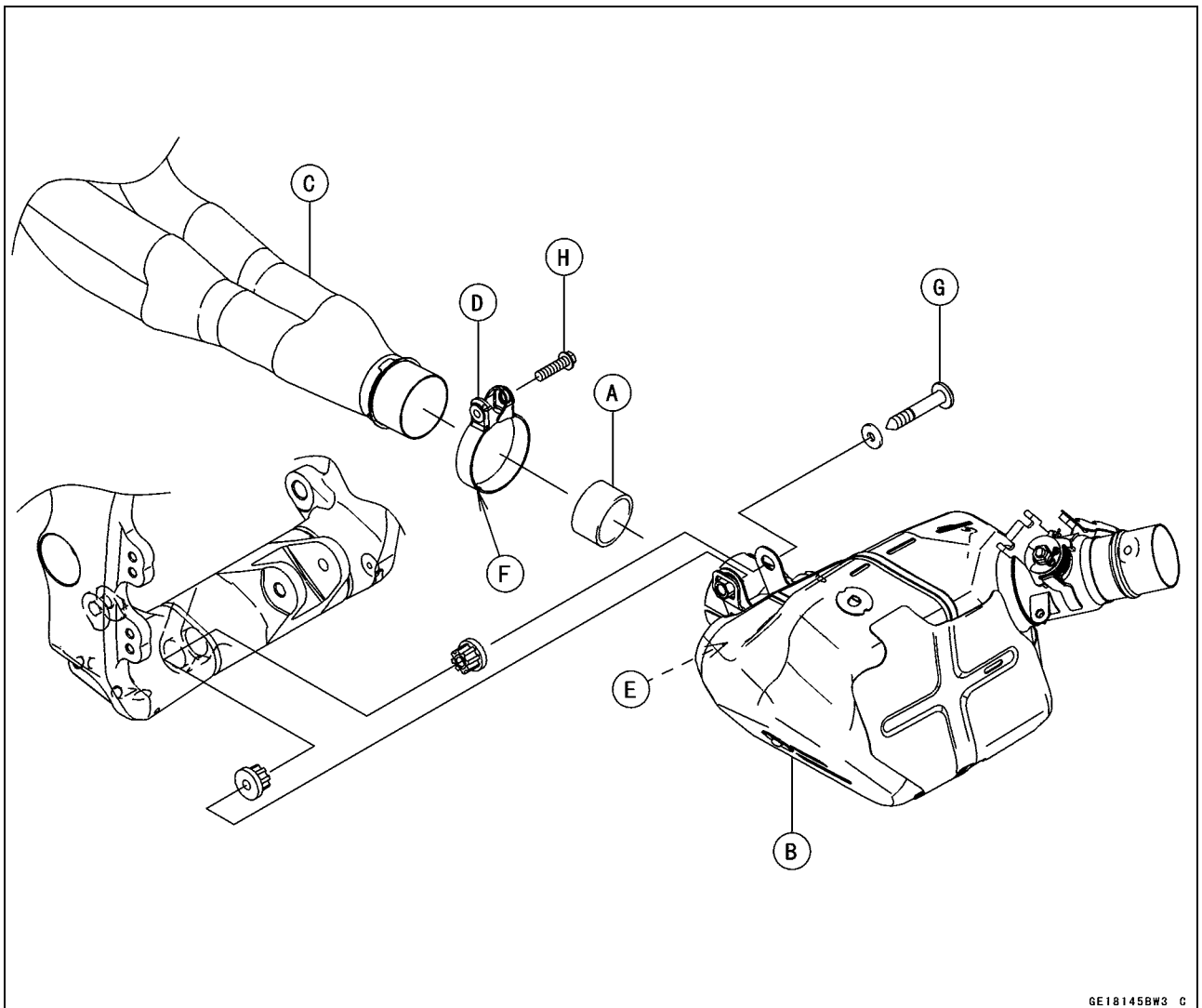
- Loosen the exhaust pipe clamp bolt [A].
- Remove the bolt [B].
- Pull out the premuffler chamber backward from the exhaust pipe.



Premuffler Chamber Installation

- Replace the premuffler chamber gasket [A] with a new one.
- Install the premuffler chamber gasket to the premuffler chamber [B] until it is bottomed so that the chamfer side faces exhaust pipe [C].
- Install the exhaust pipe clamp [D] as shown in the figure.
- Insert the projection [E] into the slot [F].
- Install the premuffler chamber.
- Tighten the mounting bolt [G] and clamp bolt [H] securely.

Torque - Premuffler Chamber Mounting Bolt: 34 N·m (3.5 kgf·m, 25 ft·lb)



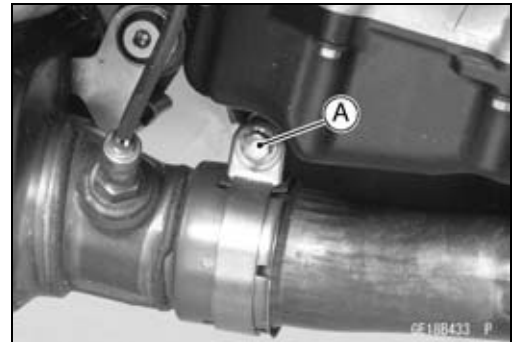
5-38 ENGINE TOP END

Muffler

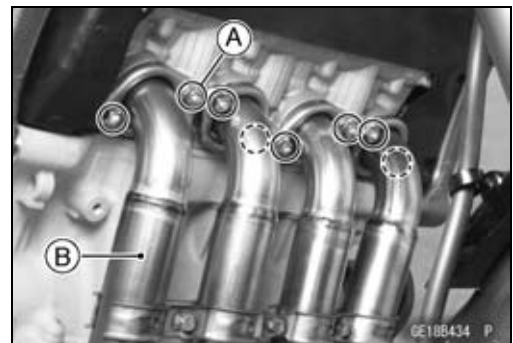
- Install the removed parts (see appropriate chapters).
- Thoroughly warm up the engine, wait until the engine cools down, retighten all the bolts.

Exhaust Pipe Removal

- Remove:
 - Radiator (see Radiator and Radiator Fan Removal in the Cooling System chapter)
 - Exhaust Pipe Clamp Bolt [A] (Loosen)



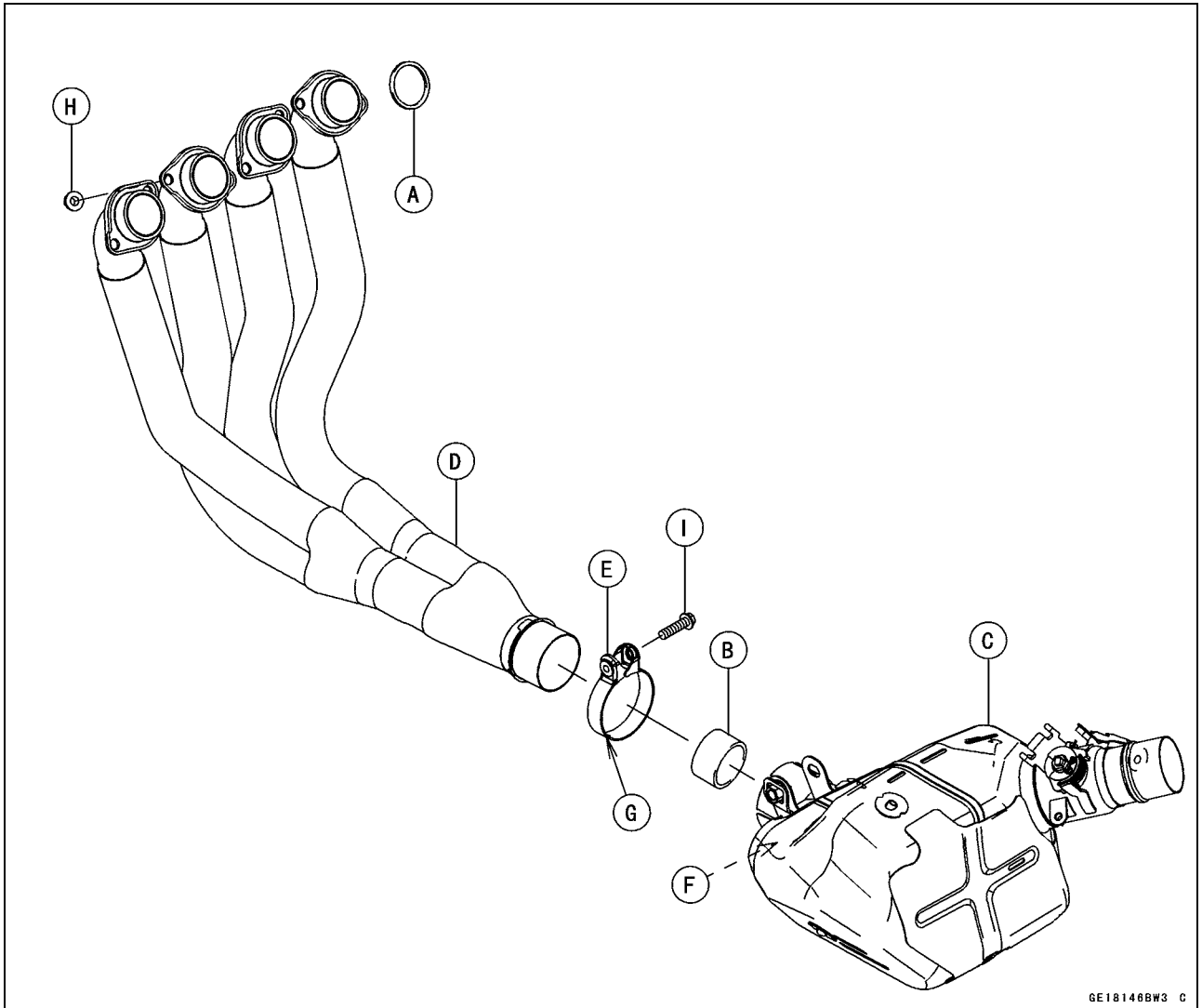
- Remove the exhaust pipe holder nuts [A], and pull out the exhaust pipe [B] forward from the premuffler chamber.



Exhaust Pipe Installation

- Replace the exhaust pipe gaskets [A] and premuffler chamber gasket [B] with new ones.
- Install the premuffler chamber gasket to the premuffler chamber [C] until it is bottomed so that the chamfer side faces exhaust pipe [D].
- Install the exhaust pipe clamp [E] as shown in the figure.
- Insert the projection [F] into the slot [G].
- Install the exhaust pipe.
- Tighten the following bolts securely.
 - Exhaust Pipe Holder Nuts [H]
 - Exhaust Pipe Clamp Bolt [I]

Muffler

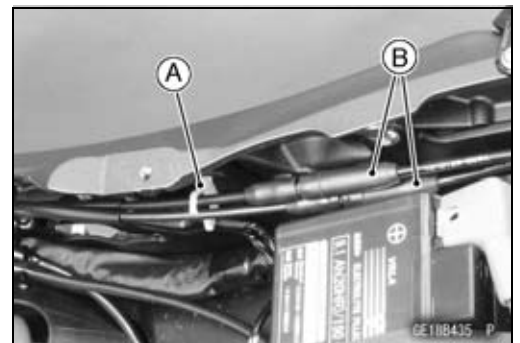


GE18146B/3 C

- Install the removed parts (see appropriate chapters).
- Thoroughly warm up the engine, wait until the engine cools down, retighten all the bolts and nuts.

Exhaust Butterfly Valve Cable Removal

- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Open the clamp [A] and free the cables.
- Slide the dust covers [B].

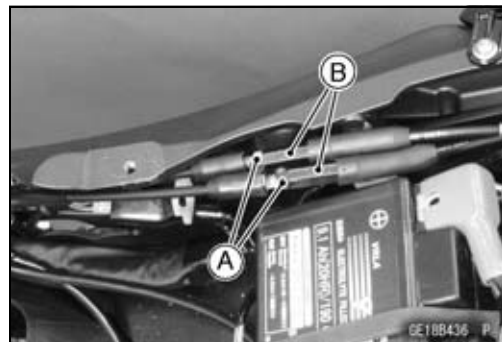


GE118435 P

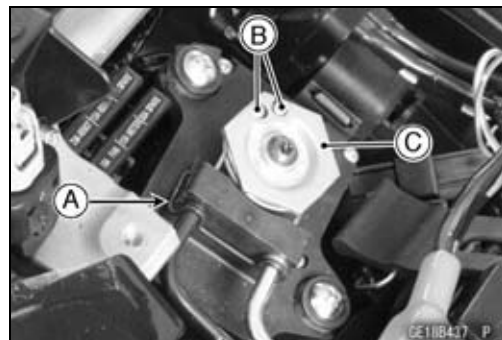
5-40 ENGINE TOP END

Muffler

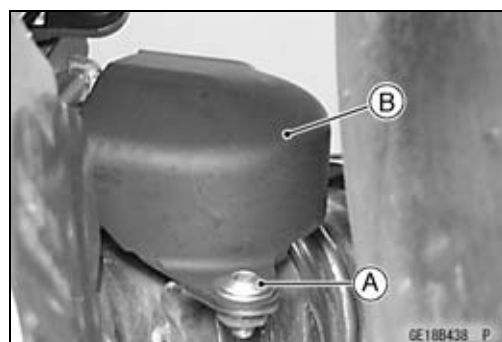
- Loosen the locknuts [A], and turn the adjusters [B] to give the cable plenty of play.



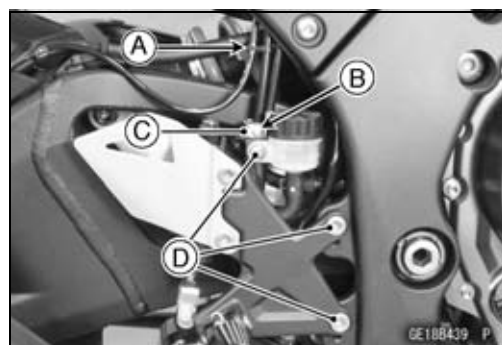
- Remove the clamp [A].
- Remove the upper ends [B] of the exhaust butterfly valve cables from the pulley [C].



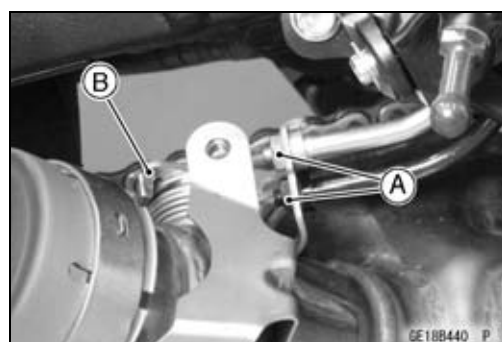
- Remove the muffler body cover (see Muffler Body Removal).
- Remove the bolt [A] and pulley cover [B].



- Remove:
 - Clamp [A]
 - Screw [B] and Stopper [C]
 - Bolts [D]



- Loosen the locknuts [A].
- Remove the lower ends of the exhaust butterfly valve cables from the pulley [B].
- Pull the exhaust butterfly valve cables out of the frame.



Muffler

Exhaust Butterfly Valve Cable Installation

- Confirm whether pulley [A] is an angle shown in the figure.
41.7° ±0.7° [B]
- This position is original position of the pulley.

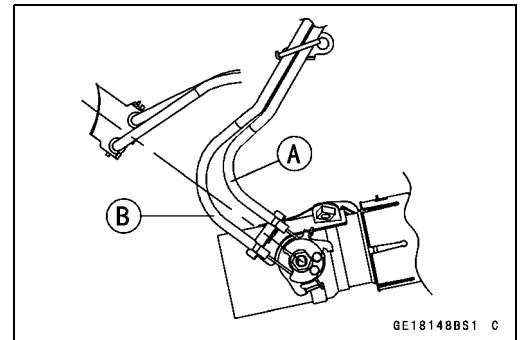
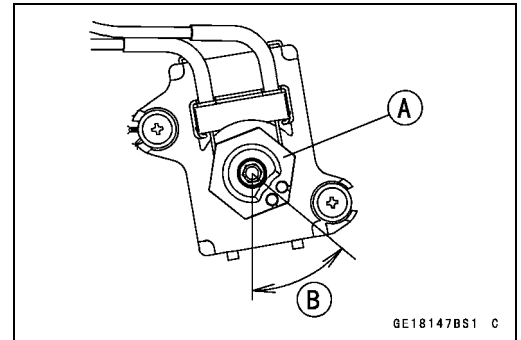
NOTE

- Correct the position electrically after confirming use is discontinued and there is no damage when differing from the angle of shown in the figure.

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 premuffler chamber as shown in the figure.
 - Open Cable (White) [A]
 - Close Cable (Black) [B]
- Tighten the exhaust butterfly valve cable locknuts securely.
- Install the pulley cover, and tighten the bolt.



5-42 ENGINE TOP END

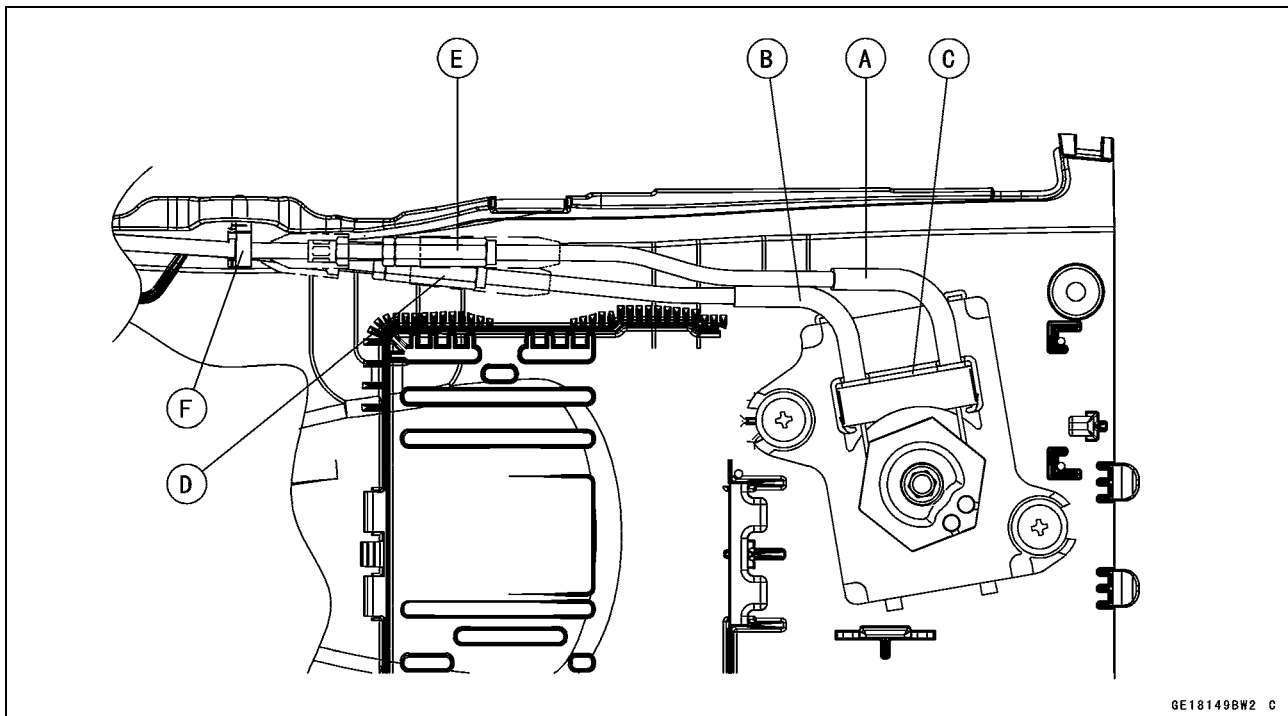
Muffler

- 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, install the clamp [C].
 - Fourth, stretch the open cable (white) by using the adjuster [D].
 - Turn the adjuster counterclockwise until the play of the open cable becomes no play.

NOTICE

To keep the correct exhaust butterfly valve position, be sure to adjust the open cable first. Do not overstretch the cable.

- Fifth, tighten the adjuster locknut (white) of the open cable securely.
- Sixth, stretch the close cable (black) by using the adjuster [E].
- Turn the adjuster counterclockwise until the play of the close cable becomes no play.
- Seventh, turn the adjuster of the close cable (black) clockwise by 1/2 to 1 rotation.
- Lastly, tighten the adjuster locknut (black) of the close cable securely.
- After installation, cover the dust covers on the adjusters as shown in the figure.
- Fix the exhaust butterfly valve cables with the clamp [F].



Clutch

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Damper Cam Inspection	6-17

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Clutch Lever Clamp Bolts	7.8	0.80	69 in·lb	S
2	Clutch Cover Bolts	9.8	1.0	87 in·lb	S
3	Oil Filler Plug	–	–	–	Hand-tighten
4	Clutch Cover Plate Bolts	9.8	1.0	87 in·lb	L
5	Clutch Spring Bolts	11	1.1	97 in·lb	
6	Sub Clutch Hub Bolts	25	2.5	18	L
7	Clutch Hub Nut	130	13.3	96	R

CL: Apply cable lubricant.

EO: Apply engine oil.

G: Apply grease.

HG: Apply high-temperature grease.

L: Apply a non-permanent locking agent.

M: Apply molybdenum disulfide grease.

R: Replacement Parts

S: Follow the specified tightening sequence.

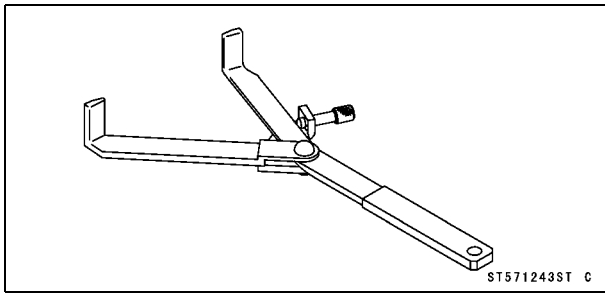
6-4 CLUTCH

Specifications

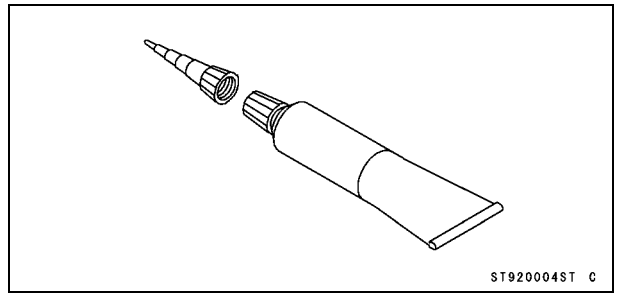
Item	Standard	Service Limit
Clutch Lever Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	— — —
Clutch		
Spring Plate Free Play	(Usable Range) 0.05 ~ 0.70 mm (0.002 ~ 0.028 in.)	— — —
Clutch Plate Assembly Length	(Reference) 53.5 mm (2.11 in.)	— — —
Friction Plate Thickness: 13088-0003/0013	2.72 ~ 2.88 mm (0.107 ~ 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.)
Clutch Spring Free Length	43.5 mm (1.71 in.)	42.1 mm (1.66 in.)

Special Tool and Sealant

**Clutch Holder:
57001-1243**



**Liquid Gasket, TB1211F:
92104-0004**



6-6 CLUTCH

Clutch Lever and Cable

Clutch Lever Free Play Inspection

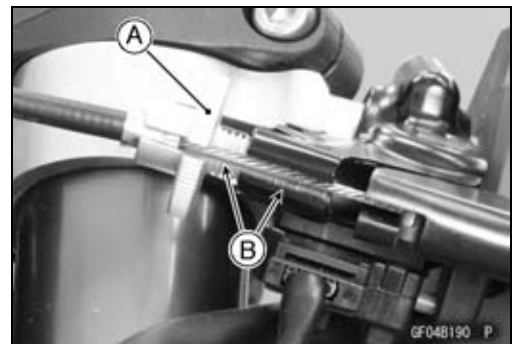
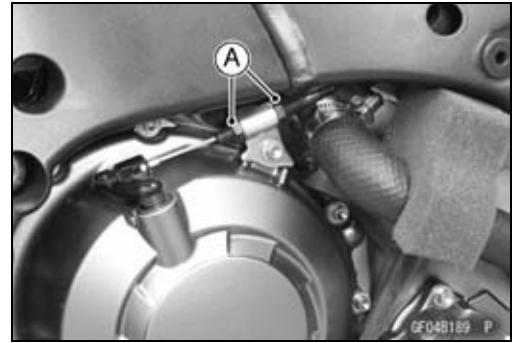
- Refer to the Clutch Operation Inspection in the Periodic Maintenance chapter.

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)
 - Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
- Loosen the nuts [A], 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.



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

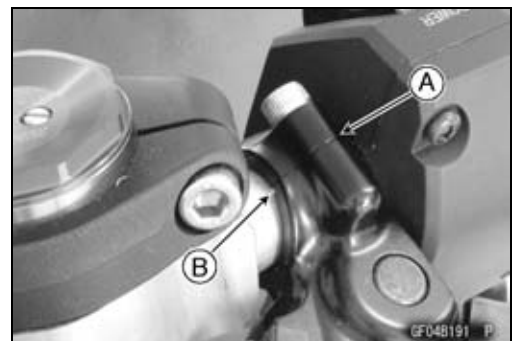
- Refer to the Chassis Parts Lubrication in the Periodic Maintenance chapter.

Clutch Lever Installation

- Install the clutch lever so that the mating surface [A] of the clutch lever clamp is aligned with the punch mark [B] of the handlebar.
- Tighten the upper clamp bolt first, and then the lower clamp bolt.

Torque - Clutch Lever Clamp Bolts: 7.8 N·m (0.80 kgf·m, 69 in·lb)

- There will be a gap at the lower part of the clamp after tightening.



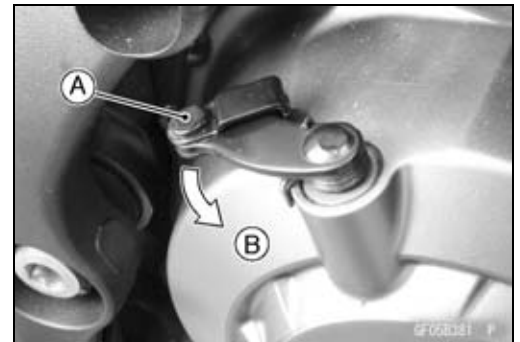
Clutch Cover

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 (see Cable Removal)
 - Clutch Cover Bolts [A]

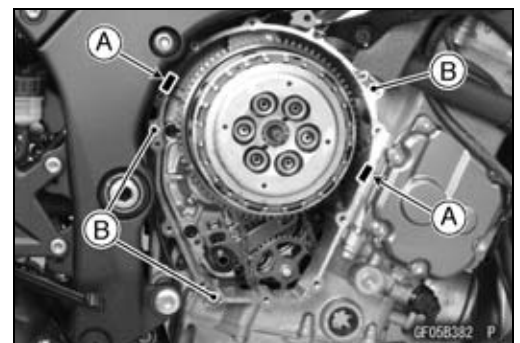


- Turn the release lever [A] counterclockwise as shown, and remove the clutch cover. About 90° [B]



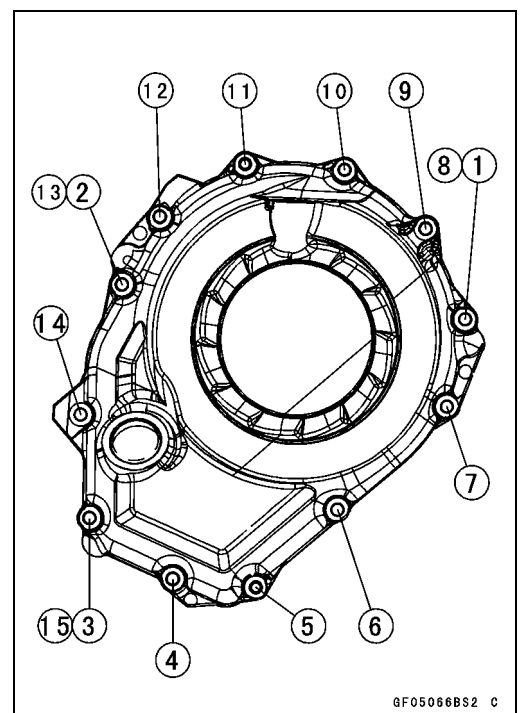
Clutch Cover Installation

- Apply silicone sealant 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.



- Tighten the clutch cover bolts by following the sequence numbers [1 ~ 15].

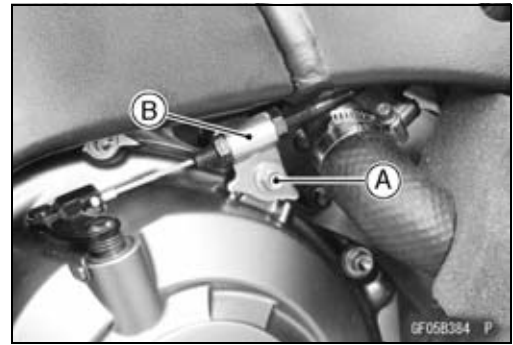
Torque - Clutch Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)



6-8 CLUTCH

Clutch Cover

○ Tighten the bolt (L = 45 mm, 1.8 in.) [A] together with the clutch cable bracket [B] as shown in the figure.

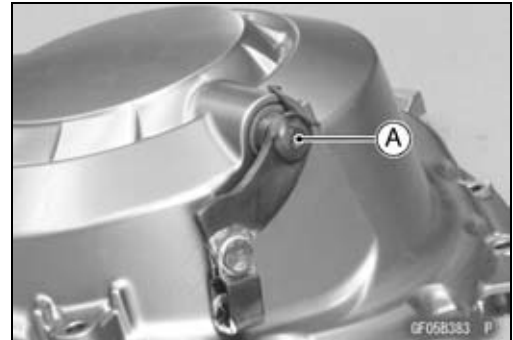


Release Shaft Removal

NOTICE

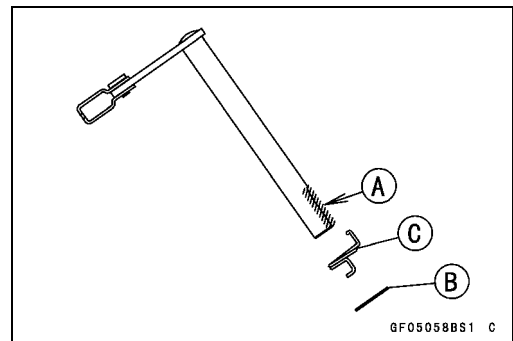
Do not remove the clutch release lever and shaft assembly unless it is absolutely necessary. If removed, the oil seal replacement may be required.

- Remove the clutch cover (see Clutch Cover Removal).
- Pull the release lever and shaft assembly [A] straight out of the clutch cover.



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].

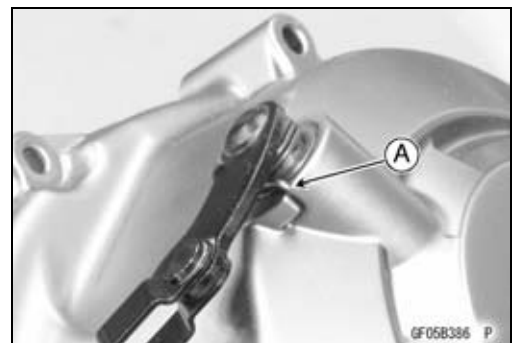


- Insert the release shaft straight into the upper hole of the clutch cover.

NOTICE

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

- Fit the spring [A] as shown in the figure.



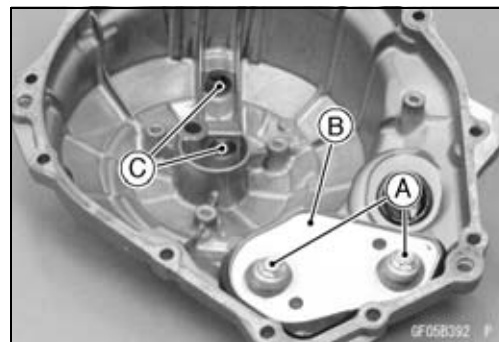
Clutch Cover Disassembly

- Remove:
 - Clutch Cover (see Clutch Cover Removal)
 - Release Lever and Shaft Assembly (see Release Shaft Removal)
 - Oil Seal [A]
 - Oil Filler Plug [B]



Clutch Cover

- Remove:
 - Bolts [A]
 - Plate [B]
 - Pads
 - Needle Bearings [C]



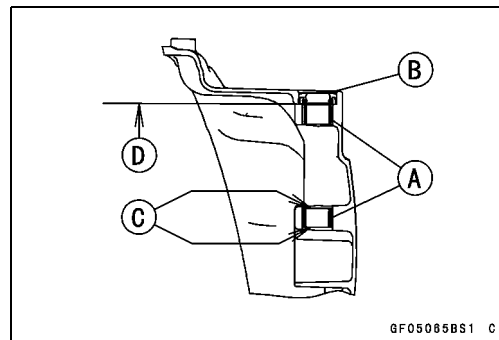
Clutch Cover Assembly

- Replace the needle bearings and oil seal with new ones.

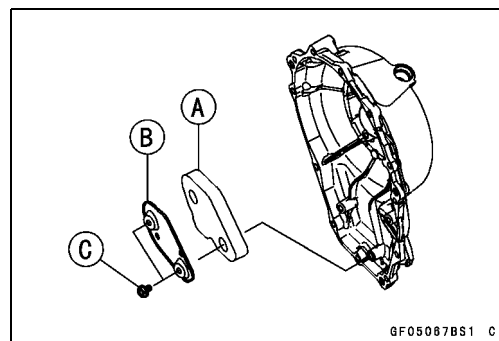
NOTE

○ Install the needle bearings so that the manufacture's mark face out.

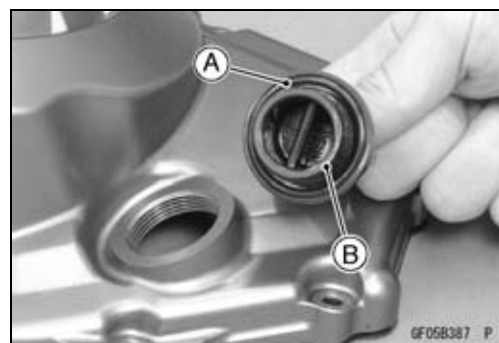
- Install the needle bearings [A] and oil seal [B] position as shown in the figure.
- Press the lower bearing, do not protrude from the boss [C] of the clutch cover.
- Press the upper bearing so that the bearing surface [D] is flush with the housing end of clutch cover.
- Press the oil seal until the bottom.
- Apply grease to the oil seal lips.



- Install:
 - Pad [A]
 - Clutch Cover Plate [B]
- Apply a non-permanent locking agent to the clutch cover plate bolts [C].
- Tighten:
 - Torque - Clutch Cover Plate Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)**



- 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**

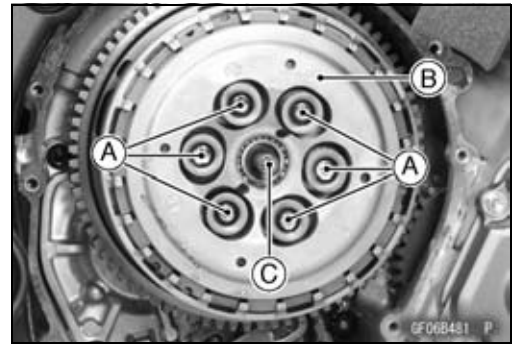


6-10 CLUTCH

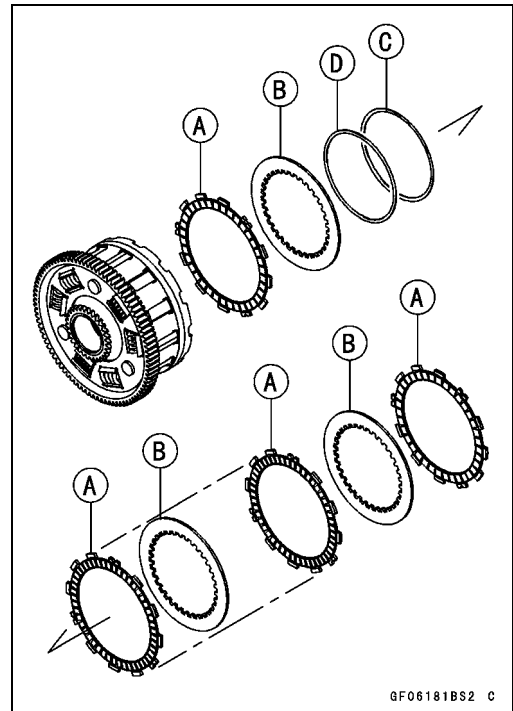
Clutch

Clutch Removal

- Remove:
 - Clutch Cover (see Clutch Cover Removal)
 - Clutch Spring Bolts [A]
 - Clutch Springs (with Clutch Spring Holders)
 - Clutch Spring Plate [B]
 - Pusher [C]

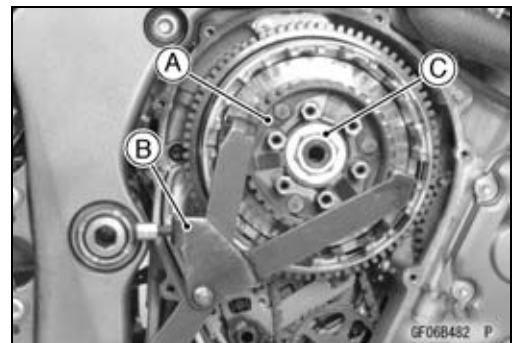


- Remove:
 - Friction Plates (10) [A]
 - Steel Plates (9) [B]
 - Spring [C]
 - Spring Seat [D]



- Hold the sub clutch hub [A] steady with the clutch holder [B], and remove the nut [C].

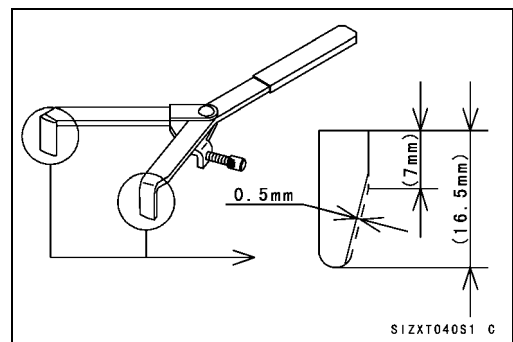
Special Tool - Clutch Holder: 57001-1243



- Use the clutch holder with sharpened hook nose by grinding.

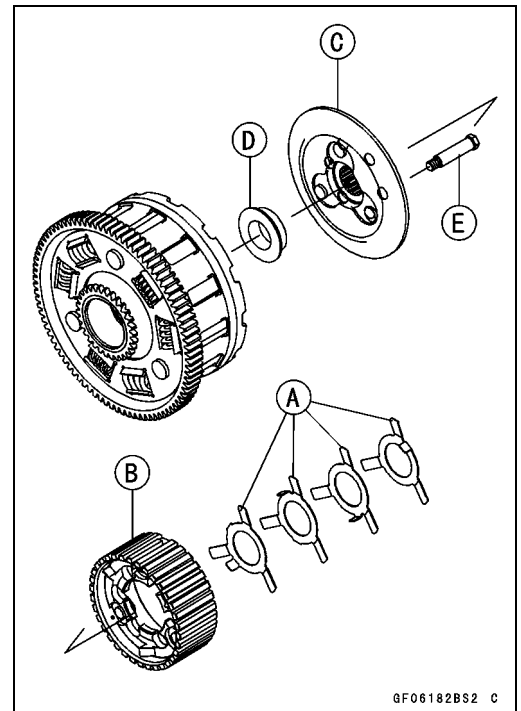
Special Tool - Clutch Holder: 57001-1243

- Grind the hook nose by 0.5 mm (0.02 in.) as shown in the figure.

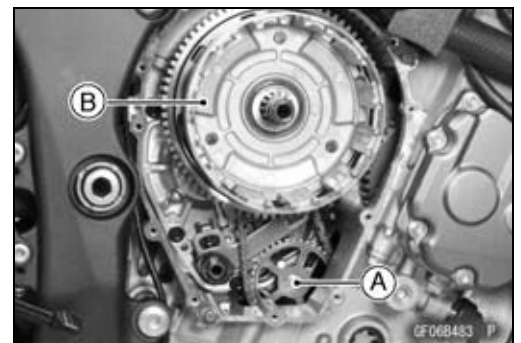


Clutch

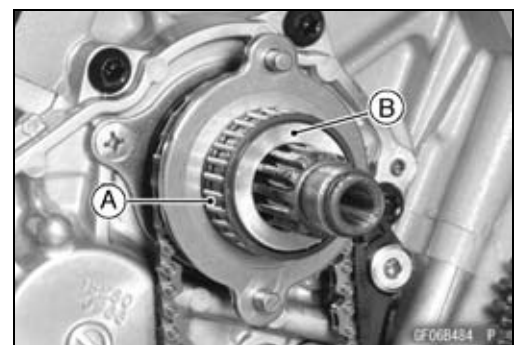
- Remove:
 - Torque Limiter Springs [A]
 - Sub Clutch Hub [B]
 - Clutch Hub [C]
 - Spacer [D]
- Remove the sub clutch hub bolts [E] as necessary.



- ★ If the oil pump drive gear is to be disassembled, loosen the oil pump drive gear bolt [A] (Left-hand Threads).
- Remove the clutch housing [B].

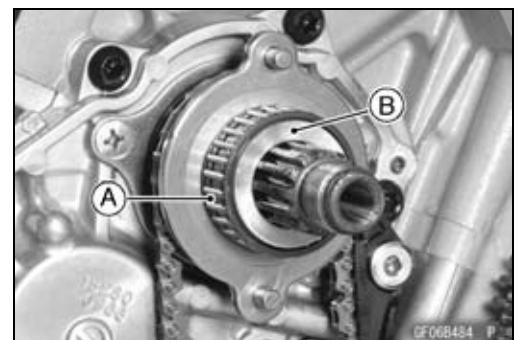


- Remove:
 - Needle Bearing [A]
 - Sleeve [B]



Clutch Installation

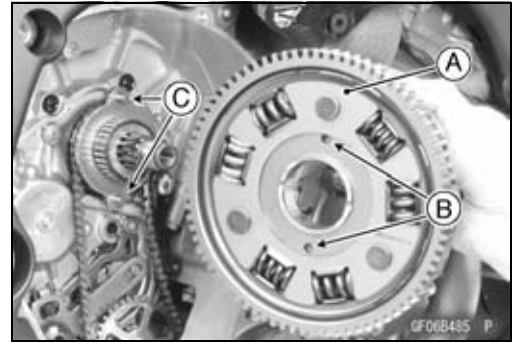
- Apply engine oil to the needle bearing [A] and the sleeve [B].
- Install:
 - Needle Bearing
 - Sleeve



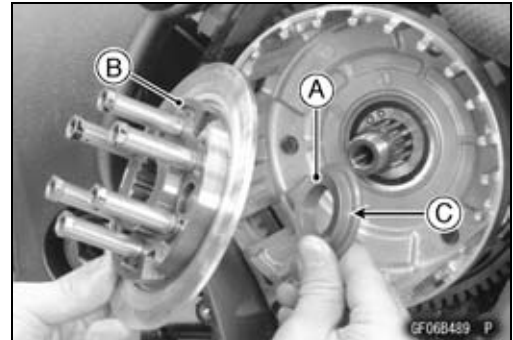
6-12 CLUTCH

Clutch

- Install the clutch housing [A].
- Fit the holes [B] and projections [C].
- Engage the clutch housing gear and the crankshaft primary gear.



- Install the spacer [A] and the clutch hub [B].
- Turn the stepped side [C] of the spacer to outside.

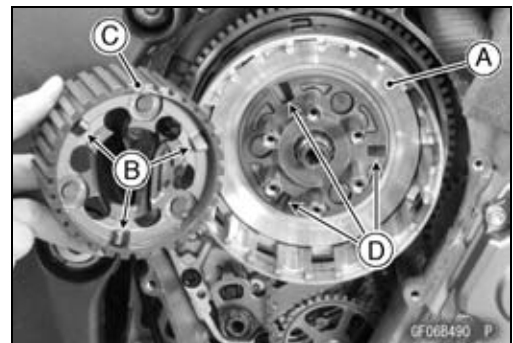


- ★ If the sub clutch hub bolts were removed, install them as follows.

- Apply a non-permanent locking agent to the threads of the sub clutch hub bolts, and tighten them.

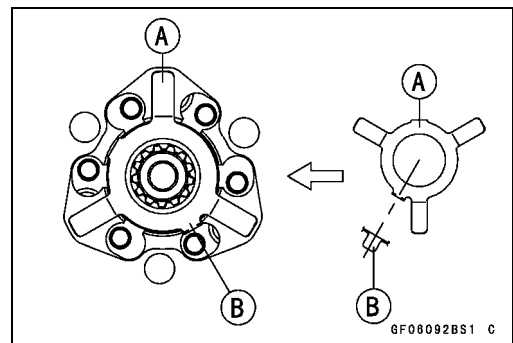
Torque - Sub Clutch Hub Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Install the clutch hub [A] on the drive shaft.
- Align the damper cams [B] of the sub clutch hub [C] to the cam followers [D] of the clutch hub.

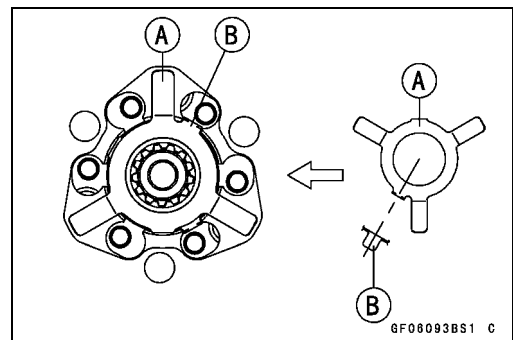


- Install the four torque limiter springs as shown in the figure.

- First Torque Limiter Spring [A]
Tang [B]

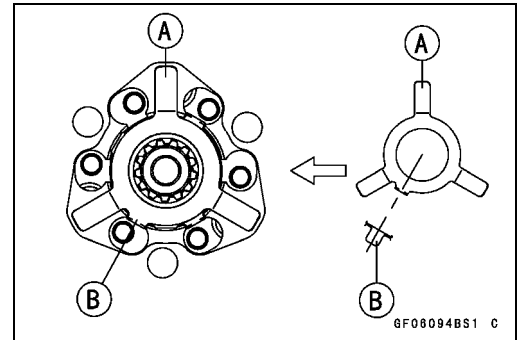


- Second Torque Limiter Spring [A]
Tang [B]

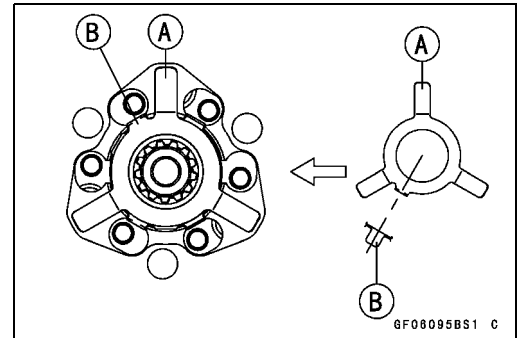


Clutch

- Third Torque Limiter Spring [A]
Tang [B]



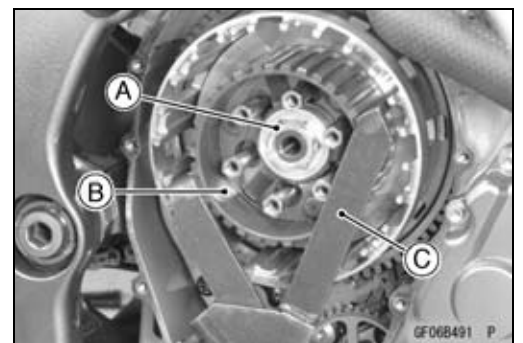
- Fourth Torque Limiter Spring [A]
Tang [B]



- 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

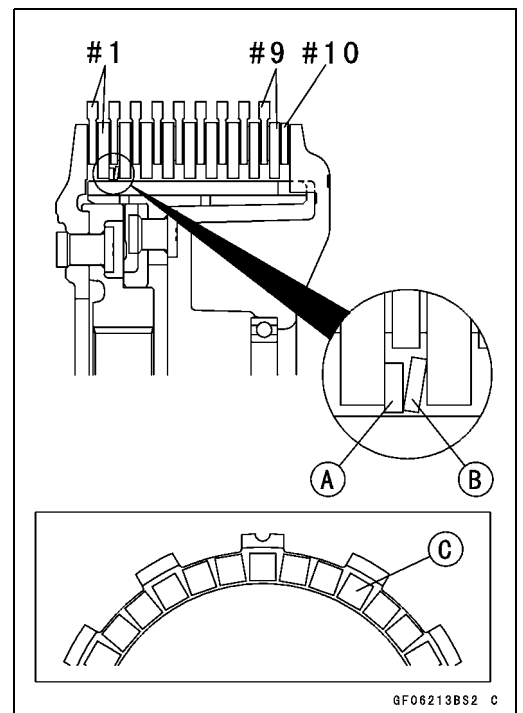
Torque - Clutch Hub Nut: 130 N·m (13.3 kgf·m, 96 ft·lb)



- Install the following as shown in the figure.
 - Friction Plates (48 Lining Blocks) [#1, #10]
 - Friction Plates (36 Lining Blocks) [#2 ~ #9]
 - Steel Plates (T = 2.9) [#1 ~ #7]
 - Steel Plates (T = 2.6) [#8, #9]
 - Spring Seat [A]
 - Spring [B]

NOTE

- The lining blocks [C] of the friction plate [#1, #10] are smaller than them of the friction plates [#2 ~ #9].
- Install the spring seat and spring between first steel plate and second steel plate.



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.

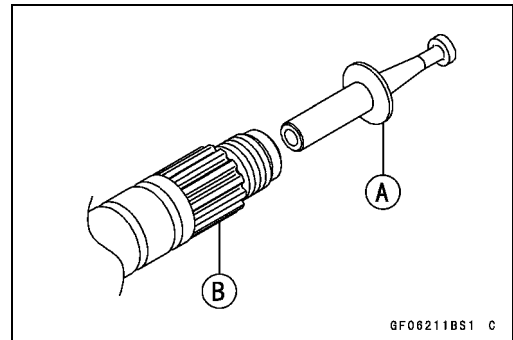
6-14 CLUTCH

Clutch

- Install the last friction plate (48 lining blocks) [A] fitting the tangs in the grooves in the housing as shown in the figure.



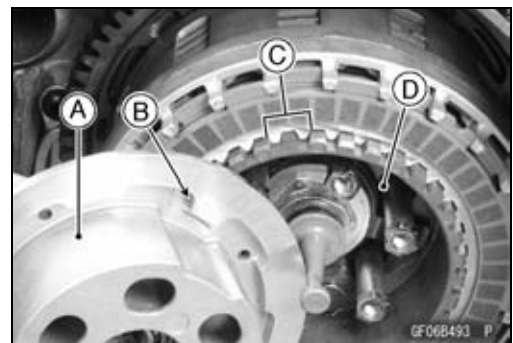
- Apply molybdenum disulfide grease to the pusher [A].
- Install the pusher to the drive shaft [B] direction as shown in the figure.



- Apply engine oil to the ball bearing on the spring plate [A].
- Align the projections [B] of the spring plate to the grooves [C] of the sub clutch hub [D] to install the spring plate on the sub clutch hub.
- Install the clutch springs and spring holders, and tighten the clutch spring bolts.

Torque - Clutch Spring Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)

- Install the clutch cover (see Clutch Cover Installation).

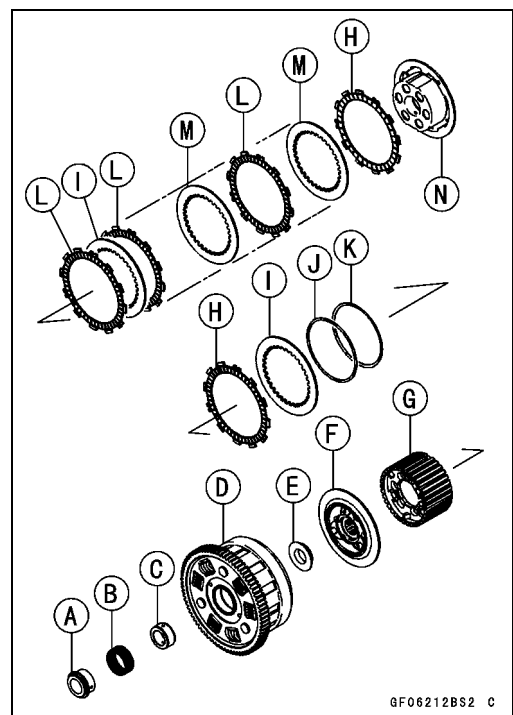


Spring Plate Free Play Measurement

Insufficient clutch free play will cause the engine braking effect to be more sudden, resulting in rear wheel hop. On the other hand, if the free play is excessive, the clutch lever may feel “spongy” or pulsate when pulled.

- Hold an extra drive shaft in a vise and install the following clutch parts on the shaft (see Clutch Installation).

- Collar [A]
- Needle Bearing [B]
- Sleeve [C]
- Clutch Housing [D]
- Spacer [E]
- Clutch Hub [F]
- Sub Clutch Hub [G]
- Friction Plates (48 Lining Blocks) [H] (#1, #10)
- Steel Plates (T = 2.9) [I] (#1 ~ #7)
- Spring Seat [J]
- Spring [K]
- Friction Plates (36 Lining Blocks) [L] (#2 ~ #9)
- Steel Plates (T = 2.6) [M] (#8, #9)
- Clutch Spring Plate [N]



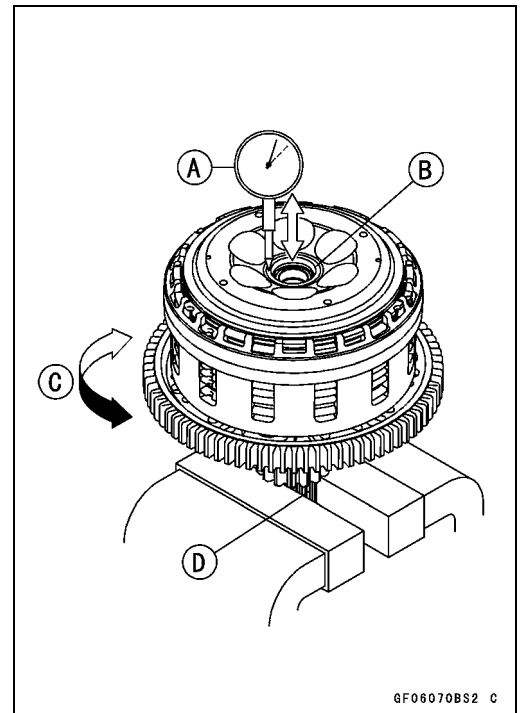
Clutch

- Engage the clutch hub with the sub clutch hub.
- To measure the free play, set a dial gauge [A] against the raised center [B] of the clutch spring plate.
- Move the clutch housing gear back and forth [C]. The difference between the highest and lowest gauge readings is the amount of free play.
Drive Shaft [D]
- Measure the spring plate free play.

Spring Plate Free Play

Usable Range: 0.05 ~ 0.70 mm (0.002 ~ 0.028 in.)

- ★ If the free play is not within the usable range, change all of the friction plate and measure the free play again.
- ★ If the free play is not within the usable range, adjust the free play (see Spring Plate Free Play Adjustment).



Spring Plate Free Play Adjustment

NOTE

- The free play adjustment is performed by replacing the steel plate(s).
- Measure the clutch spring plate free play (see Clutch Spring Plate Free Play Measurement), and then replace the steel plate(s) which brings the free play within the usable range.

Spring Plate Free Play

Usable Range: 0.05 ~ 0.70 mm (0.002 ~ 0.028 in.)

- Replace the following steel plate(s).

Thickness	Part Number
2.3 mm (0.090 in.)	13089-0008
2.6 mm (0.102 in.) (STD)	13089-0009
2.9 mm (0.114 in.)	13089-1093

NOTE

- Do not use the steel plate of 2.3 mm (0.090 in.) and 2.9 mm (0.114 in.) thickness at the same time.

6-16 CLUTCH

Clutch

Clutch Plate Assembly Length (Reference Information)

- Assemble the following parts.

Clutch Hub [A]
Spring Seat [B]
Spring [C]
Sub Clutch Hub [D]
Sub Clutch Hub Bolts [E]
New Friction Plates [F]
Steel Plates [G]
Spring Plate [H]
Clutch Springs [I]
Clutch Spring Holders [J]
Clutch Spring Bolts [K]

Torque - Clutch Spring Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)

- Measure the clutch plate assembly length [L].

Clutch Plate Assembly Length (Reference)

53.5 mm (2.11 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.)

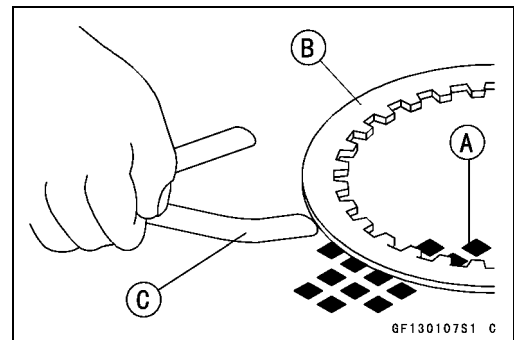
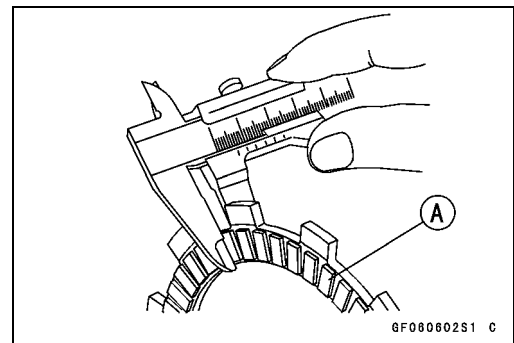
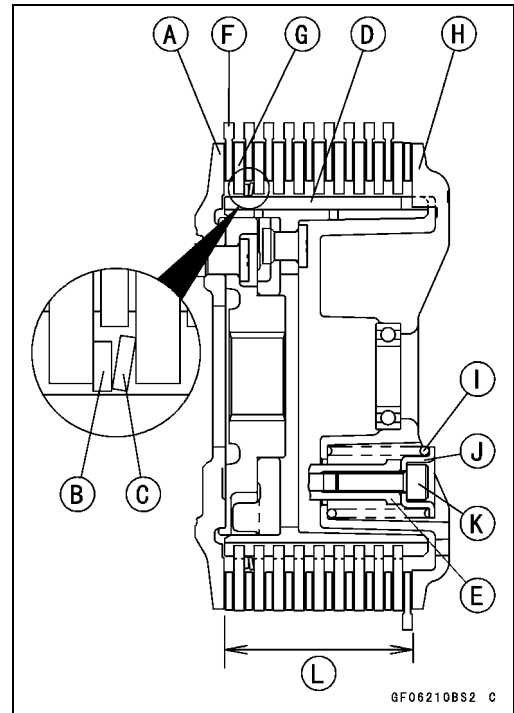
Clutch Plate Warp Inspection

- 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

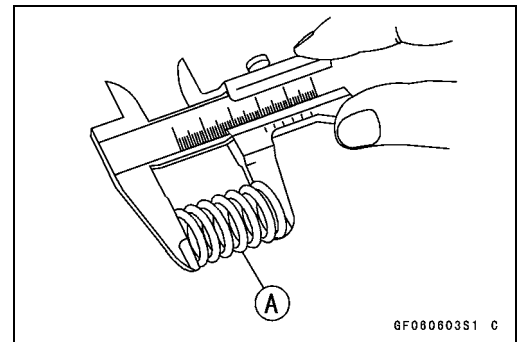
Clutch Spring Free Length Measurement

- Measure the free length of the clutch springs [A].
- ★ If any spring is shorter than the service limit, it must be replaced.

Clutch Spring Free Length

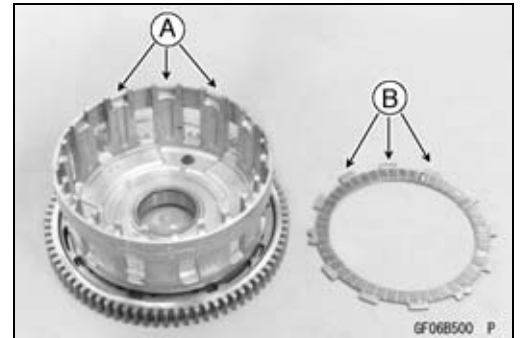
Standard: 43.5 mm (1.71 in.)

Service Limit: 42.1 mm (1.66 in.)



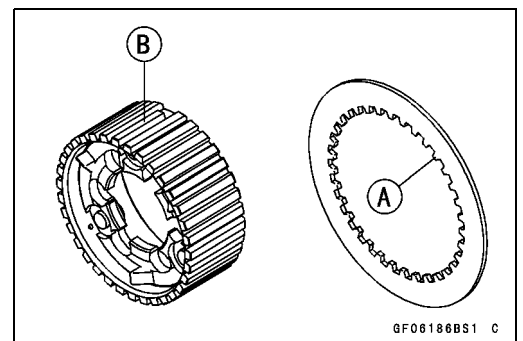
Clutch Housing Finger Inspection

- 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.



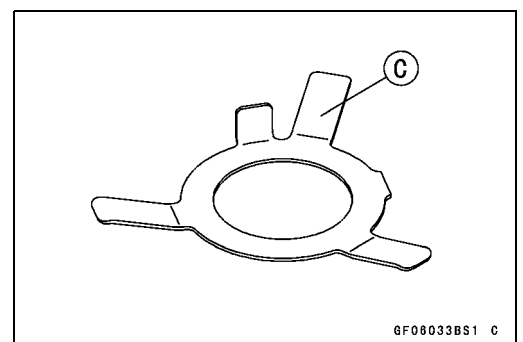
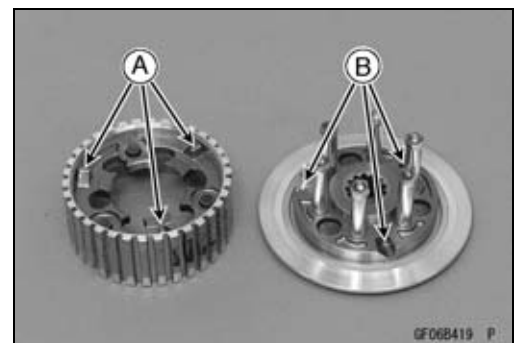
Clutch Housing Spline Inspection

- 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.



Damper Cam Inspection

- Remove the clutch (see Clutch Removal).
- Visually inspect the damper cam [A], cam follower [B], and the torque limiter spring [C].
- Replace the part if it appears damaged.



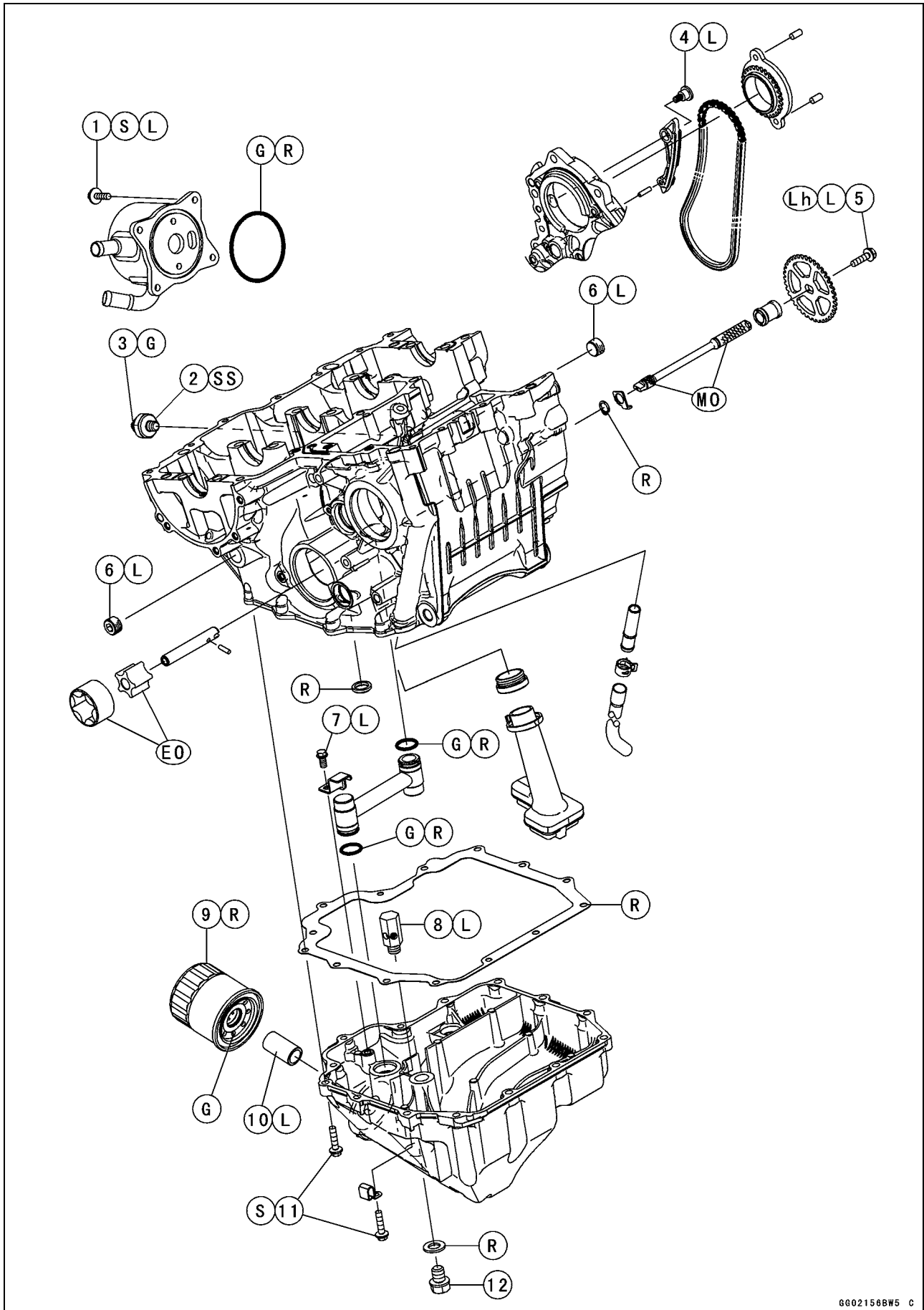
Engine Lubrication System

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7-2 ENGINE LUBRICATION SYSTEM

Exploded View



ENGINE LUBRICATION SYSTEM 7-3

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Oil Cooler Mounting Bolts	12	1.2	106 in·lb	L, S
2	Oil Pressure Switch	15	1.5	11	SS
3	Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	G
4	Oil Pump Drive Chain Guide Bolt	9.8	1.0	87 in·lb	L
5	Oil Pump Drive Gear Bolt	9.8	1.0	87 in·lb	L, Lh
6	Oil Passage Plug (Taper)	20	2.0	15	L
7	Oil Pipe Holder Bolt	9.8	1.0	87 in·lb	L
8	Oil Pressure Relief Valve	15	1.5	11	L
9	Oil Filter	17	1.7	13	G, R
10	Oil Filter Holder Bolt	35	3.6	26	L
11	Oil Pan Bolts	9.8	1.0	87 in·lb	S
12	Engine Oil Drain Bolt	29	3.0	21	

EO: Apply engine oil.

G: Apply grease.

L: Apply a non-permanent locking agent.

Lh: Left-hand Threads

MO: Apply molybdenum disulfide oil solution.

(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)

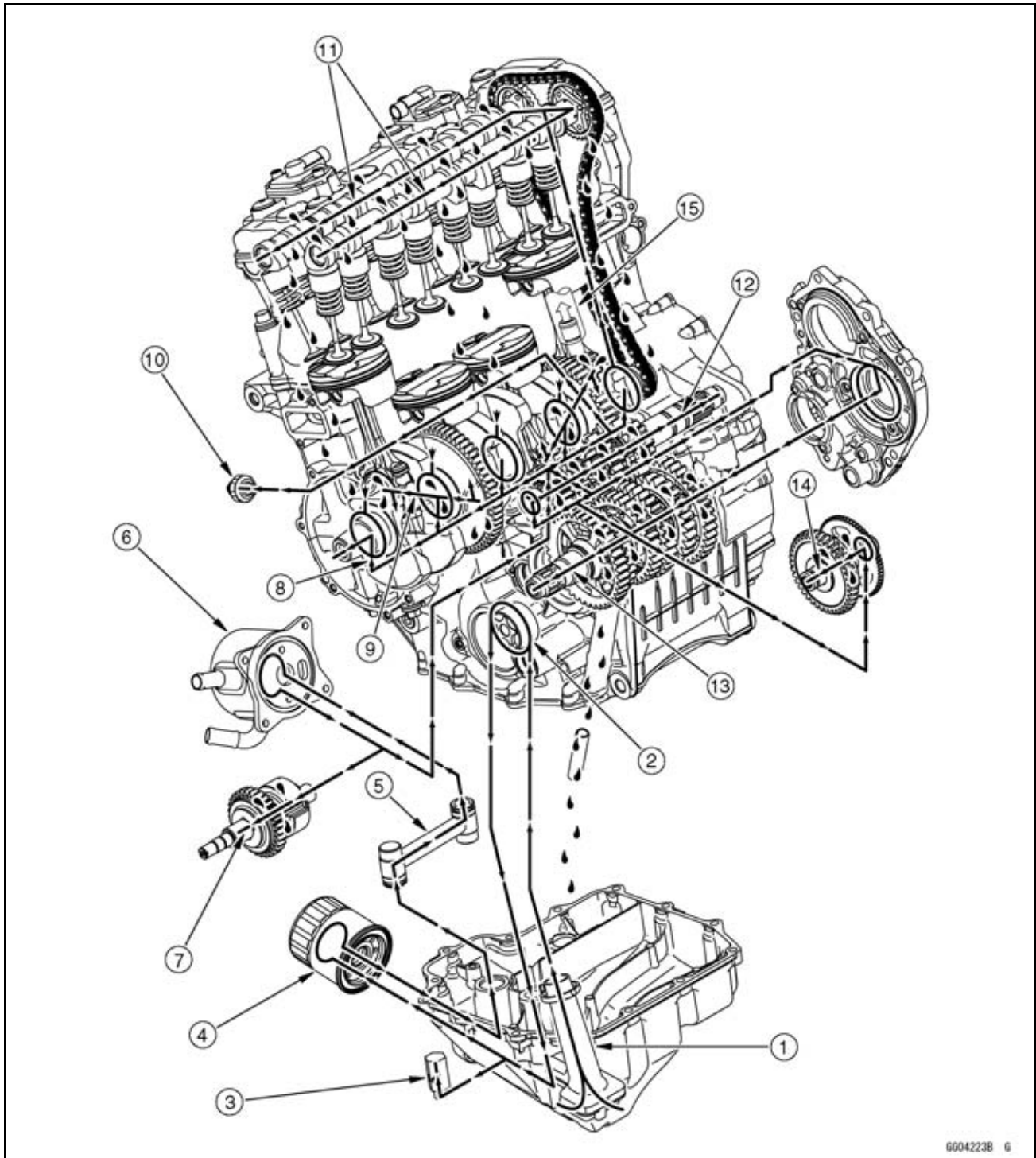
R: Replacement Parts

S: Follow the specified tightening sequence.

SS: Apply silicone sealant.

7-4 ENGINE LUBRICATION SYSTEM

Engine Oil Flow Chart



- | | |
|------------------------------|--|
| 1. Oil Screen | 9. Crankshaft Oil Passage |
| 2. Oil Pump | 10. Oil Pressure Switch |
| 3. Oil Pressure Relief Valve | 11. Camshaft Oil Passages |
| 4. Oil Filter | 12. Drive Shaft Oil Passage |
| 5. Oil Pipe | 13. Output Shaft Oil Passage |
| 6. Oil Cooler | 14. Starter Clutch Oil Passage |
| 7. Balancer Oil Passage | 15. Blowby Gas (Crankcase → Air Cleaner Housing) |
| 8. Main Oil Passage | |

ENGINE LUBRICATION SYSTEM 7-5

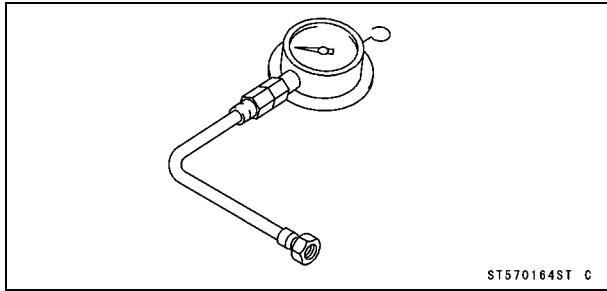
Specifications

Item	Standard
Engine Oil Type Viscosity Capacity Level	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2 SAE 10W-40 2.9 L (3.1 US qt) (when filter is not removed) 3.3 L (3.5 US qt) (when filter is removed) 3.7 L (3.9 US qt) (when engine is completely dry) Between upper and lower level lines (Wait 2 ~ 3 minutes after idling or running)
Oil Pressure Measurement Oil Pressure	About 196 kPa (2.00 kgf/cm ² , 28 psi) at 4 000 r/min (rpm), Oil Temperature 50°C (122°F)

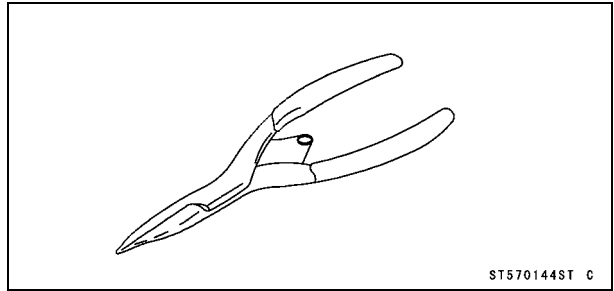
7-6 ENGINE LUBRICATION SYSTEM

Special Tools and Sealant

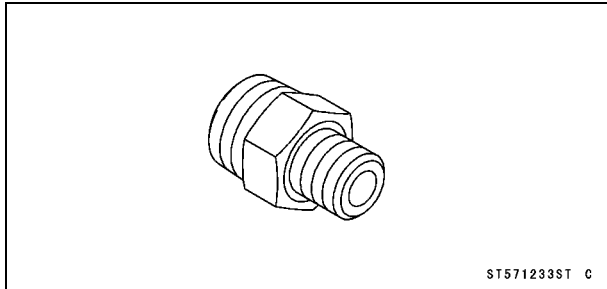
Oil Pressure Gauge, 10 kgf/cm²:
57001-164



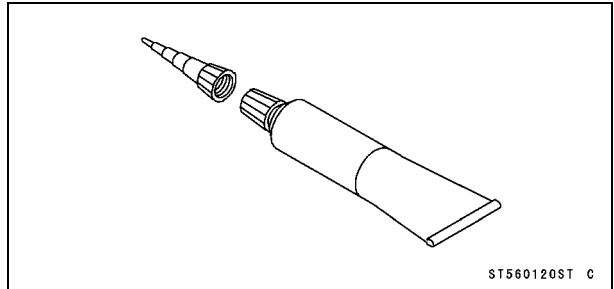
Outside Circlip Pliers:
57001-144



Oil Pressure Gauge Adapter, PT3/8:
57001-1233



Liquid Gasket, TB1211:
56019-120



Engine Oil and Oil Filter

⚠ WARNING

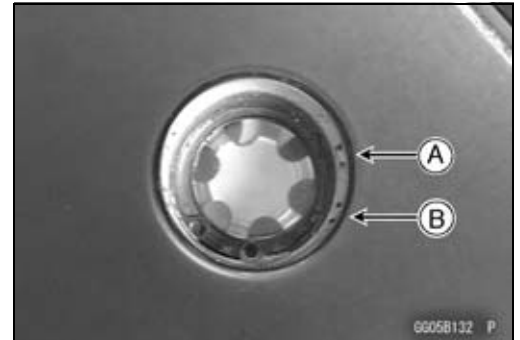
Vehicle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated wear and may result in engine seizure, accident, and injury. Check the oil level before each use and change the oil and filter according to the periodic maintenance chart.

Oil Level Inspection

- Check that the engine oil level is between the upper [A] and lower [B] levels in the gauge.

NOTE

- Situate the motorcycle so that it is perpendicular to the ground.
- If the motorcycle has just been used, wait several minutes for all the oil to drain down.
- If the oil has just been changed, start the engine and run it for several minutes at idle speed. This fills the oil filter with oil. Stop the engine, then wait several minutes until the oil settles.



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 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

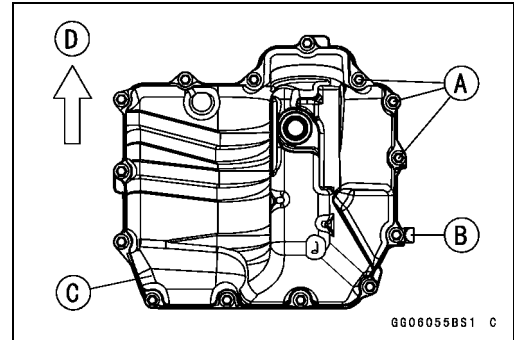
- Refer to the Oil Filter Replacement in the Periodic Maintenance chapter.

7-8 ENGINE LUBRICATION SYSTEM

Oil Pan

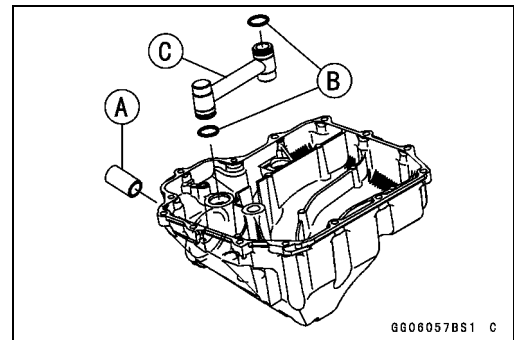
Oil Pan Removal

- Remove:
 - Engine Oil (Drain, see Engine Oil Change in the Periodic Maintenance chapter)
 - Exhaust Pipe (see Exhaust Pipe Removal in the Engine Top End chapter)
 - Oil Filter (see Oil Filter Replacement in the Periodic Maintenance chapter)
 - Oil Pan Bolts [A]
 - Clamp [B]
 - Oil Pan [C]
 - Front [D]

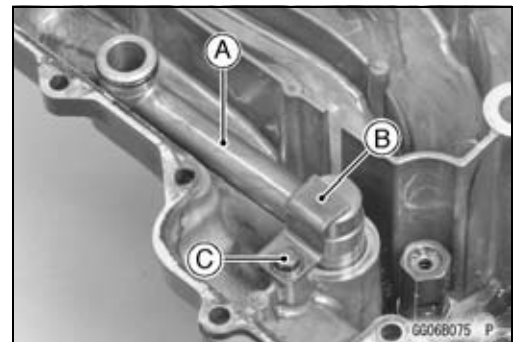


Oil Pan Installation

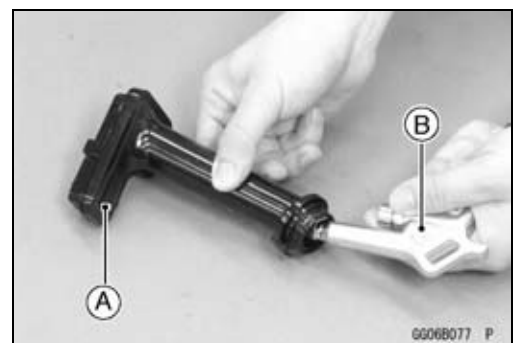
- ★ If the oil filter holder bolt [A] was removed, tighten it.
- Apply a non-permanent locking agent to the threads of the oil filter holder bolt.
- Torque - Oil Filter Holder Bolt: 35 N·m (3.6 kgf·m, 26 ft·lb)**
- Replace the O-rings [B] with new ones, and apply grease to them.
- Install the O-rings to the oil pipe [C].



- Install:
 - Oil Pressure Relief Valve (see Oil Pressure Relief Valve Installation)
 - Oil Pipe [A]
 - Oil Pipe Holder [B]
- Apply a non-permanent locking agent to the oil pipe holder bolt [C].
- Tighten:
 - Torque - Oil Pipe Holder Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)**



- Clean the oil screen [A] with a high-flash point solvent and remove any particles stuck to them.
- Blow away the particles by applying compressed air [B] 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.

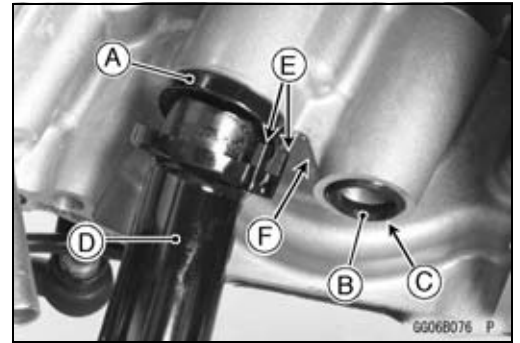
NOTE

○ 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.

Oil Pan

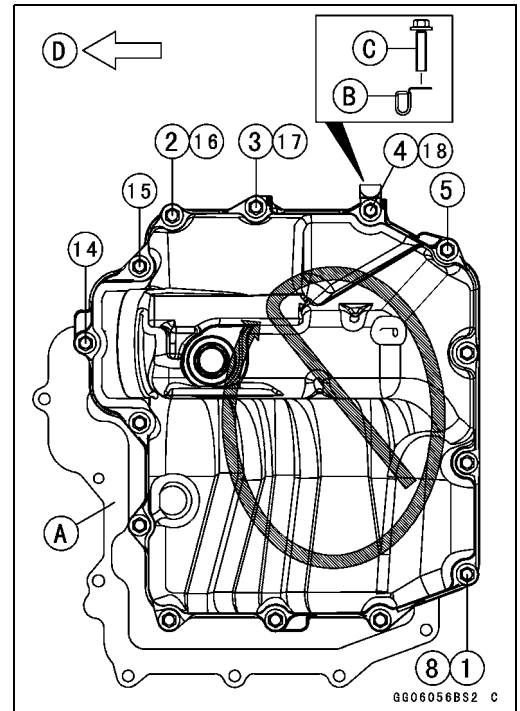
- Replace the O-rings [A] [B] with new ones, and apply grease to them.
- Install the O-rings.
- Turn the chamfered side [C] downward.
- Install the oil screen [D].
- Fit the claws [E] to the crankcase rib [F].



- Replace the oil pan gasket [A] with a new one.
- Install the clamp [B] as shown in the figure.
- Tighten the oil pan bolts [C] as shown sequence [1 ~ 18] in the figure.

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

Front [D]

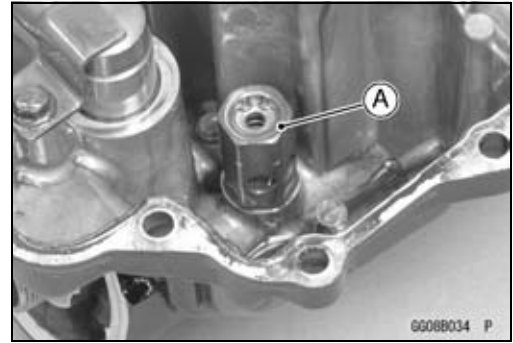


7-10 ENGINE LUBRICATION SYSTEM

Oil Pressure Relief Valve

Oil Pressure Relief Valve Removal

- Remove:
 - Oil Pan (see Oil Pan Removal)
 - Oil Pressure Relief Valve [A]



Oil Pressure Relief Valve Installation

- Apply a non-permanent locking agent to the threads of the oil pressure relief valve, 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)

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

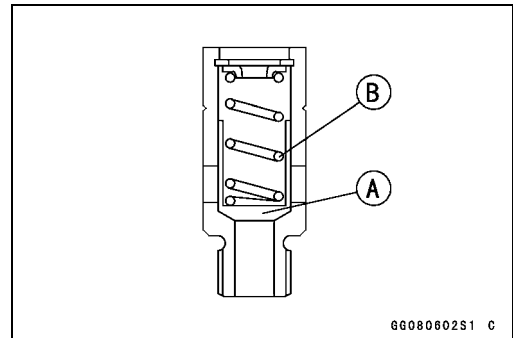
○ Inspect the valve in its assembled state. Disassembly and assembly may change the valve performance.

- ★ 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.

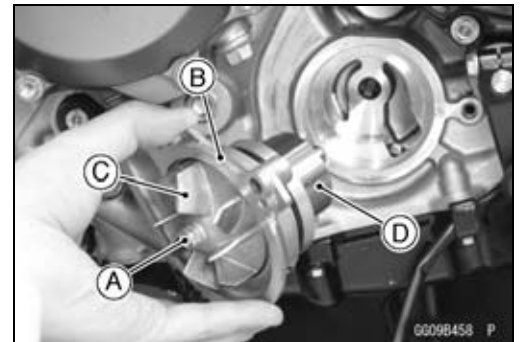
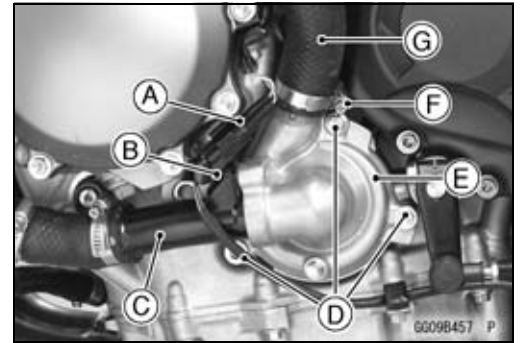
- ★ If cleaning does not solve the problem, replace the oil pressure relief valve as an assembly. The oil pressure relief valve is precision made with no allowance for replacement of individual parts.



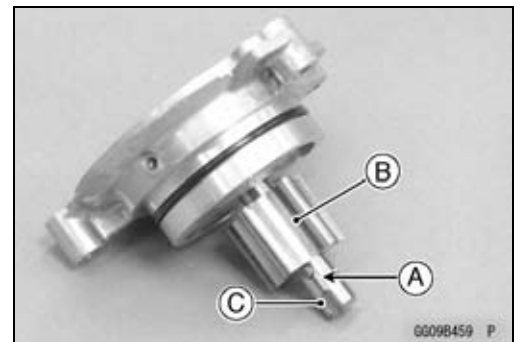
Oil Pump

Oil Pump Removal

- Remove:
 - Coolant (Drain, see Coolant Change in the Periodic Maintenance chapter)
 - Engine Oil (Drain, see Engine Oil Change in the Periodic Maintenance chapter)
 - Sidestand Switch Lead Connector [A] (Disconnect)
 - Bolt [B] and Water Pipe [C]
 - Water Pump Cover Bolts [D]
 - Water Pump Cover [E]
 - Water Hose Clamp Screw [F] (Loosen)
 - Water Hose [G]
- Loosen the impeller bolt [A].
- Remove the oil (water) pump body [B] together with the impeller [C] and the outer rotor [D].
- Remove the impeller bolt and the impeller.

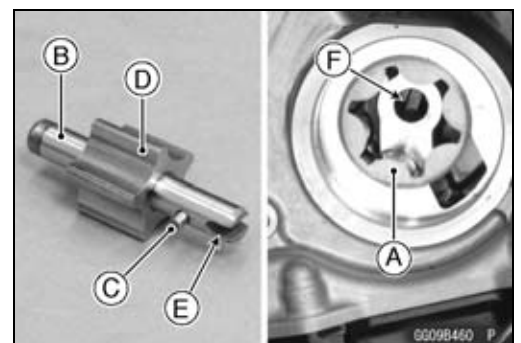


- Remove:
 - Pin [A]
 - Inner Rotor [B]
 - Oil (Water) Pump Shaft [C]



Oil Pump Installation

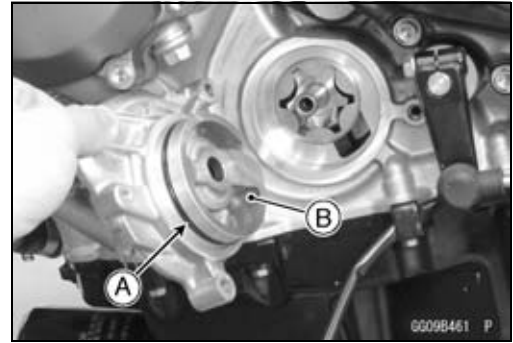
- Install the outer rotor [A] into the crankcase.
- Assemble:
 - Oil (Water) Pump Shaft [B]
 - Pin [C]
 - Inner Rotor [D]
- Install the inner rotor assembly into the crankcase.
 - Fit the slot [E] onto the projection [F].



7-12 ENGINE LUBRICATION SYSTEM

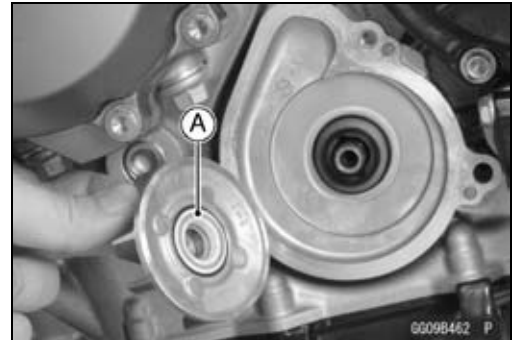
Oil Pump

- Replace the O-ring [A] with a new one.
- Apply grease to the new O-ring.
- Install the oil (water) pump body [B].



- Apply coolant to the surface of the rubber seal [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)



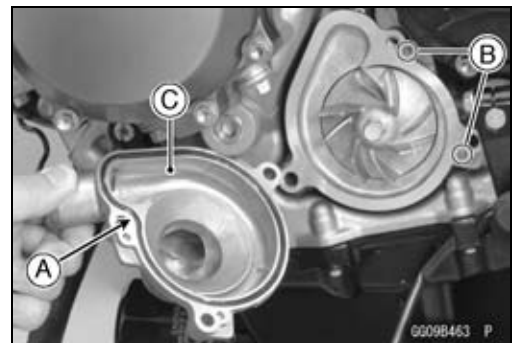
- Replace the O-ring [A] with a new one.
- Apply grease to the new O-ring.
- Install the dowel pins [B] and water pump cover [C].
- Apply a non-permanent locking agent to the water pump cover bolts (L = 40 mm, 1.6 in.), and tighten them.

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

- Insert the bolt (L = 25 mm, 1.0 in.) to the upper bolt hole.
- Install the water pipe and hoses (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Apply a non-permanent locking agent to the water pipe mounting bolt.
- Tighten:

Torque - Water Pipe Mounting Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

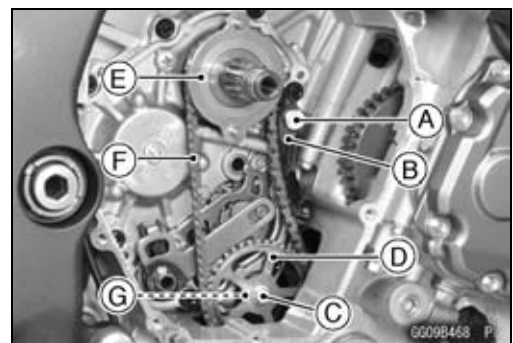
Water Hose Clamp Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)



Oil Pump Drive Gear Removal/Installation

- Remove:
 - Clutch (see Clutch Removal in the Clutch chapter)
 - Oil Pump Drive Chain Guide Bolt [A]
 - Oil Pump Drive Chain Guide [B]
 - Oil Pump Drive Gear Bolt [C]
 - Oil Pump Drive Gear [D]
 - Oil Pump Sprocket [E]
 - Oil Pump Chain [F]
 - Collar [G]

- The oil pump drive gear bolt is left-hand threads.



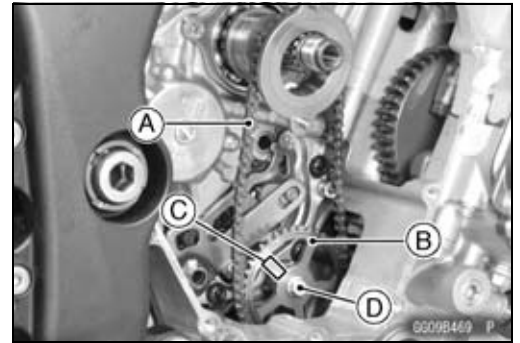
Oil Pump

Oil Pump Drive Gear Installation

- Install is the reverse of removal. Note the following.
 - First, engage the oil pump chain [A] to the gears, and then install the oil pump drive gear [B].
 - Turn the “OUT” mark [C] to outside.
 - Tighten the oil pump drive gear bolt [D] temporary.
 - The oil pump drive gear bolt is left-hand threads.
 - Apply a non-permanent locking agent to the oil pump drive chain guide bolt and the oil pump drive gear bolt.
- Tighten:

Torque - Oil Pump Drive Chain Guide Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

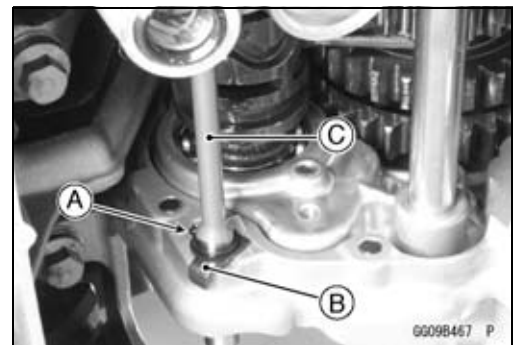
Oil Pump Drive Gear Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)



Oil Pump Drive Gear Shaft Removal

- Remove:
 - Clutch (see Clutch Removal in the Clutch chapter)
 - Oil Pan (see Oil Pan Removal)
 - Circlip [A]
 - Washer [B]
 - Oil Pump Drive Gear Shaft [C]

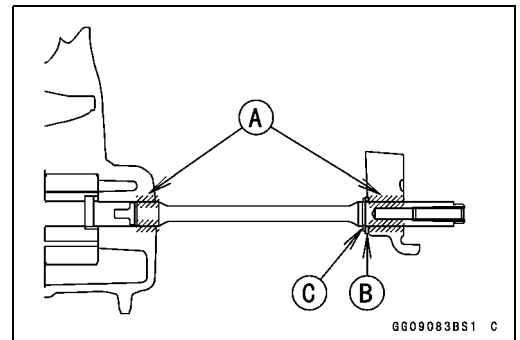
Special Tool - Outside Circlip Pliers: 57001-144



Oil Pump Drive Gear Shaft Installation

- Apply molybdenum disulfide oil to the journal portions [A] on the oil pump drive gear shaft.
- Install the oil pump drive gear shaft and washer [B] as shown in the figure.
- Install the new circlip [C] into the groove of the oil pump drive gear shaft.

Special Tool - Outside Circlip Pliers: 57001-144

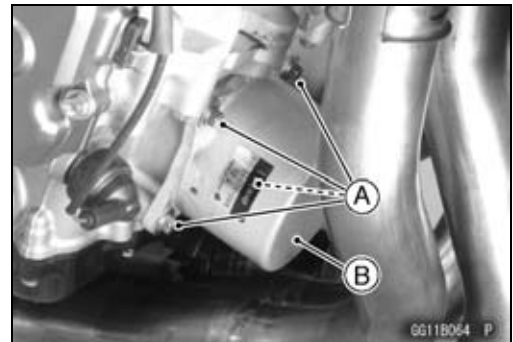
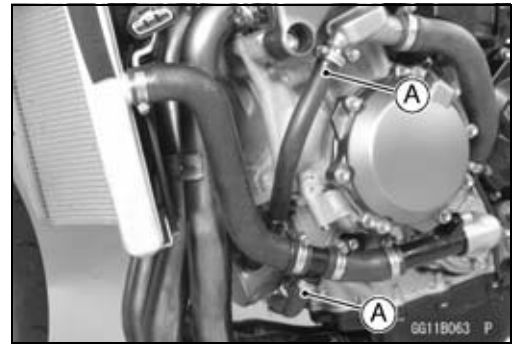


7-14 ENGINE LUBRICATION SYSTEM

Oil Cooler

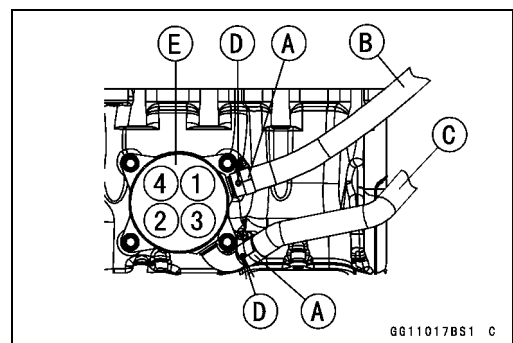
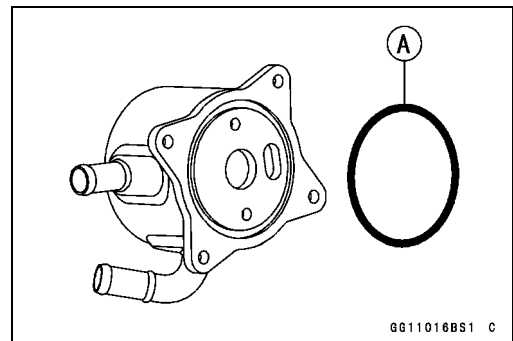
Oil Cooler Removal

- Remove:
 - Coolant (Drain, see Coolant Change in the Periodic Maintenance chapter)
 - Engine Oil (Drain, see Engine Oil Change in the Periodic Maintenance chapter)
 - Lower Fairings (see Lower Fairing Removal in the Frame chapter)
 - Water Hose Ends [A]
- Remove:
 - Oil Cooler Mounting Bolts [A]
 - Oil Cooler [B]



Oil Cooler Installation

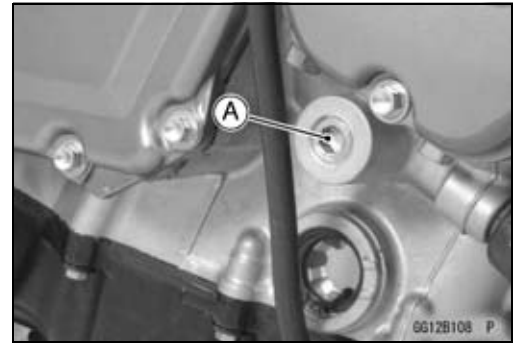
- Replace the O-ring [A] with a new one.
 - Apply grease to the new O-ring.
-
- Install the water hoses and hose clamps [A] as shown in the figure.
 - Water Hose (About 300 mm, 11.8 in.) [B]
 - Water Hose (About 130 mm, 5.1 in.) [C]
 - Yellow Paint [D]
 - Tighten:
 - Torque - Water Hose Clamp Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)**
 - Install the oil cooler [E].
 - Apply a non-permanent locking agent to the oil cooler mounting bolts.
 - Tighten the oil cooler mounting bolts by following the sequence numbers [1 ~ 4].
 - Torque - Oil Cooler Mounting Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)**
 - Pour:
 - Coolant (see Coolant Change in the Periodic Maintenance chapter)
 - Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
 - Install the removed parts (see appropriate chapters).



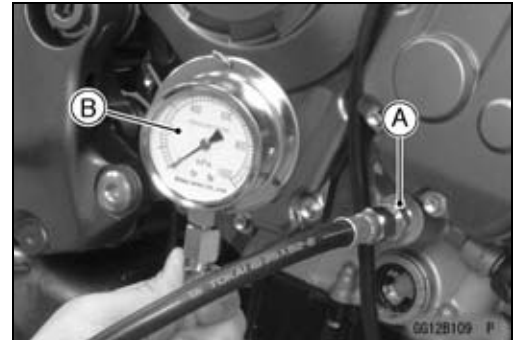
Oil Pressure Measurement

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: About 196 kPa (2.00 kgf/cm², 28 psi) at 4 000 r/min (rpm), Oil Temperature 50°C (122°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 tighten it.

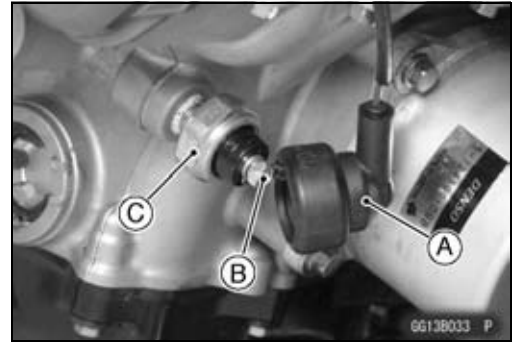
Torque - Oil Passage Plug (Taper): 20 N·m (2.0 kgf·m, 15 ft·lb)

7-16 ENGINE LUBRICATION SYSTEM

Oil Pressure Switch

Oil Pressure Switch Removal

- Remove:
 - Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
 - Engine Oil (Drain, see Engine Oil Change in the Periodic Maintenance chapter)
 - Switch Cover [A]
 - Switch Terminal Bolt [B]
 - Oil Pressure Switch [C]



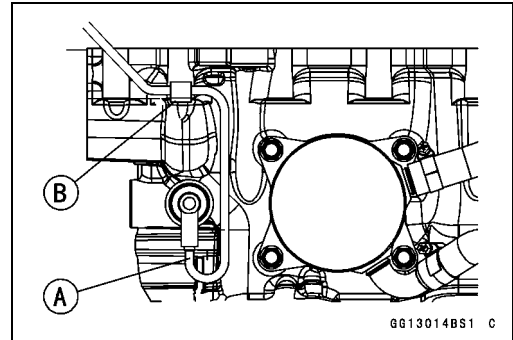
Oil Pressure Switch Installation

- Using a high-flash point solvent, clean off any oil or dirt that may be on the silicon sealant coating area. Dry them with a clean cloth.
- Apply silicone sealant 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 in the figure.
 - Clamp [B]
- Apply grease to the switch 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).



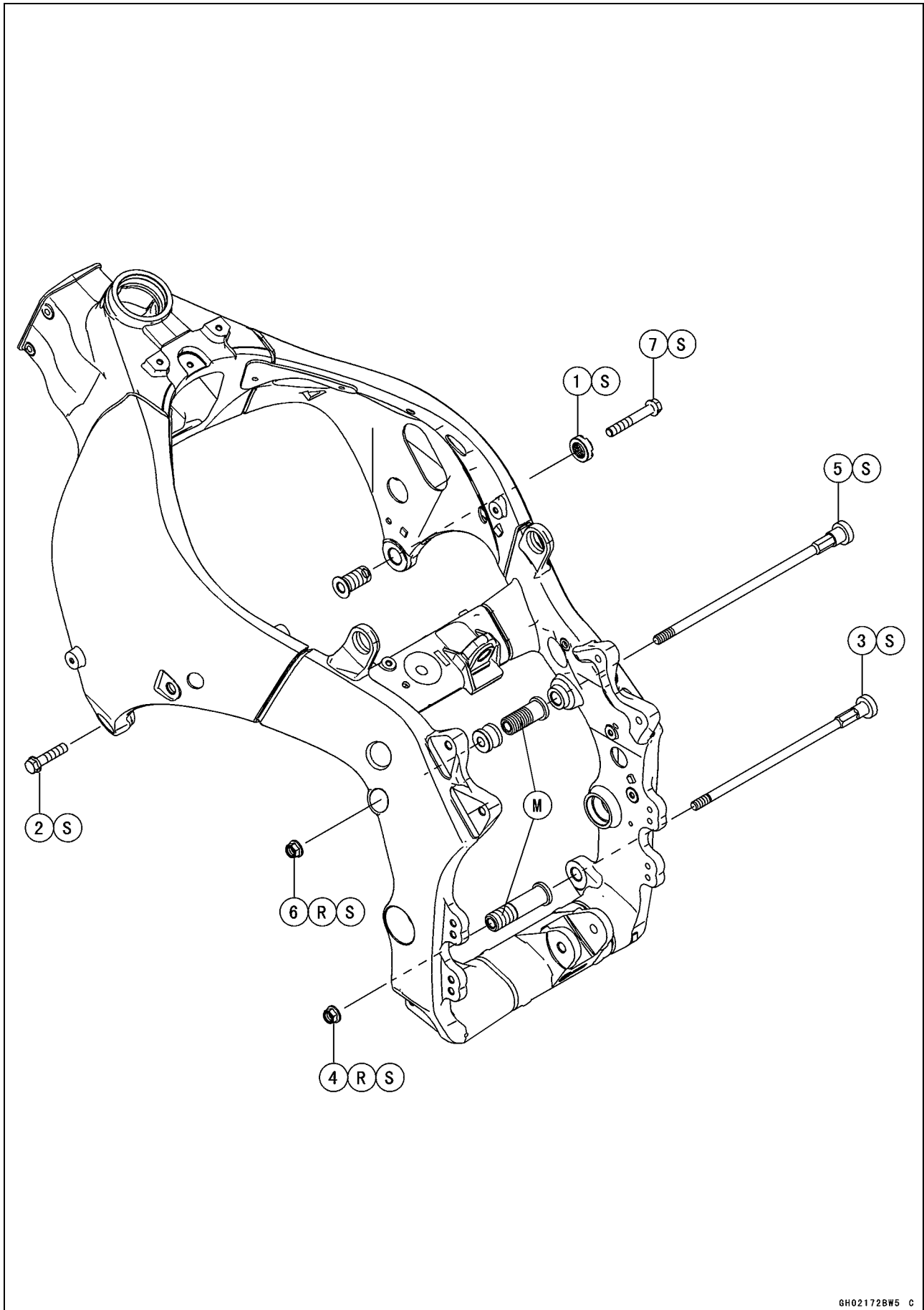
Engine Removal/Installation

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8-2 ENGINE REMOVAL/INSTALLATION

Exploded View



ENGINE REMOVAL/INSTALLATION 8-3

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Adjusting Collar Locknut	49	5.0	36	S
2	Left Front Engine Mounting Bolt	44	4.5	32	S
3	Lower Engine Mounting Bolt	9.8	1.0	87 in·lb	S
4	Lower Engine Mounting Nut	44	4.5	32	R, S
5	Middle Engine Mounting Bolt	9.8	1.0	87 in·lb	S
6	Middle Engine Mounting Nut	44	4.5	32	R, S
7	Right Front Engine Mounting Bolt	44	4.5	32	S

M: Apply molybdenum disulfide grease.

R: Replacement Parts

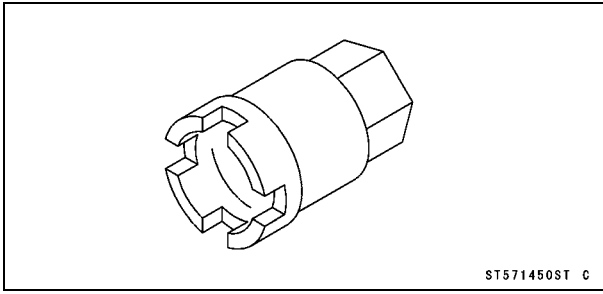
S: Follow the specified tightening sequence.

8-4 ENGINE REMOVAL/INSTALLATION

Special Tool

Engine Mount Nut Wrench:

57001-1450



Engine Removal/Installation

Engine Removal

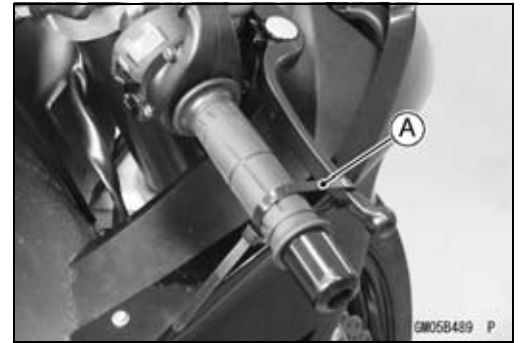
- Support the rear part of the swingarm with a stand.
- Squeeze the brake lever slowly and hold it with a band [A].

⚠ WARNING

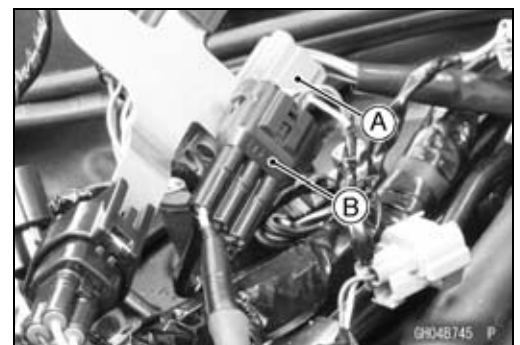
Motorcycle may fall over unexpectedly resulting in an accident or injury. Be sure to hold the front brake when removing the engine.

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.



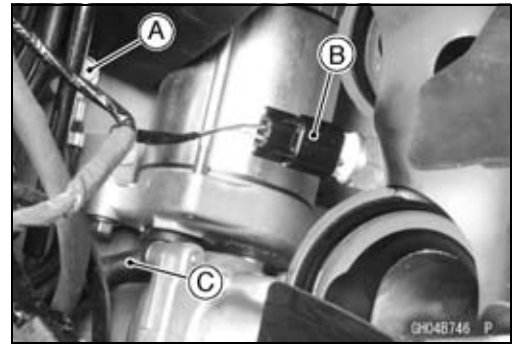
- Drain:
 - Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
 - Coolant (see Coolant Change in the Periodic Maintenance chapter)
- Remove:
 - Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) 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)
 - Exhaust Pipe (see Exhaust Pipe Removal in the Engine Top End chapter)
 - Premuffler Chamber (see Premuffler Chamber 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)
- Disconnect:
 - Gear Position Switch/Sidestand Switch Lead Connector [A]
 - Crankshaft Sensor/Oil Pressure Switch Lead Connector [B]
 - Stick Coil Connectors (see Stick Coil Removal in the Electrical System chapter)
- Remove the air switching valve (see Air Switching Valve Removal in the Engine Top End chapter).



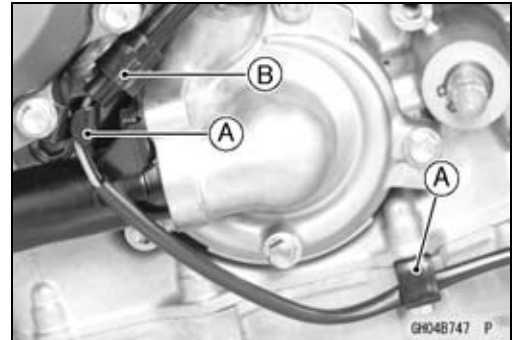
8-6 ENGINE REMOVAL/INSTALLATION

Engine Removal/Installation

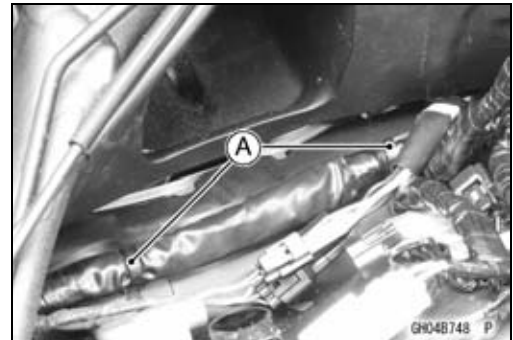
- Remove the engine ground cable terminal bolt [A].
- Disconnect:
 - Water Temperature Sensor Connector [B]
 - Starter Motor Cable [C] (see Starter Motor Removal in the Electrical System chapter)



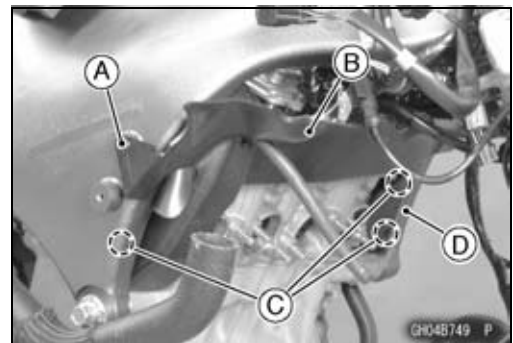
- Free the lead from the clamps [A].
- Disconnect the sidestand switch lead connector [B].



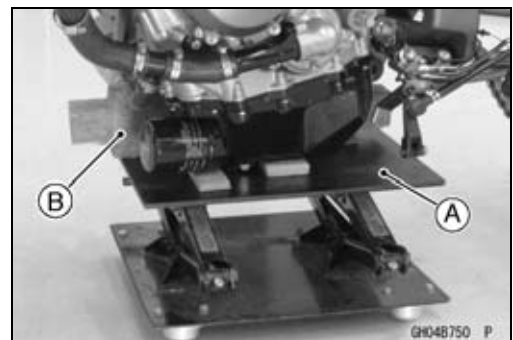
- Remove the clamps [A].



- Remove:
 - Bolt [A]
 - Heat Insulation Plate [B]
- Clear the projections [C] from the frame [D].

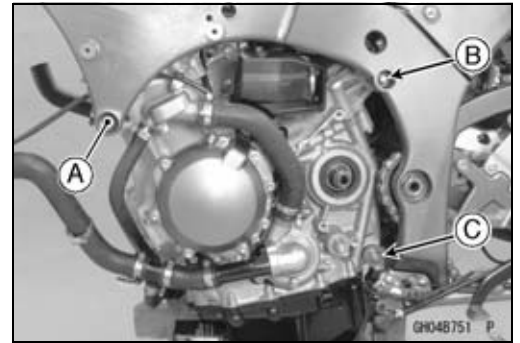


- Support the engine with a suitable stand [A].
- Put a plank [B] onto the suitable stand for engine balance.

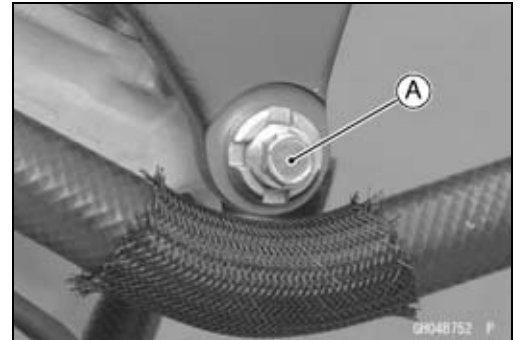


Engine Removal/Installation

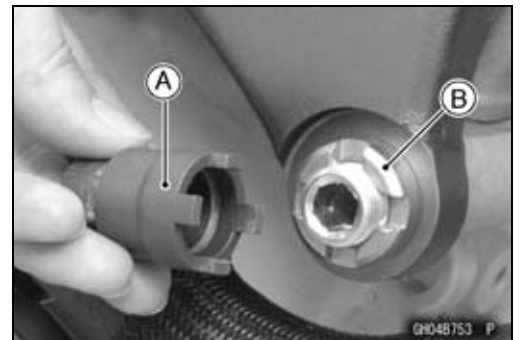
- Remove:
 - Left Front Engine Mounting Bolt [A]
 - Middle Engine Mounting Nut [B]
 - Lower Engine Mounting Nut [C]



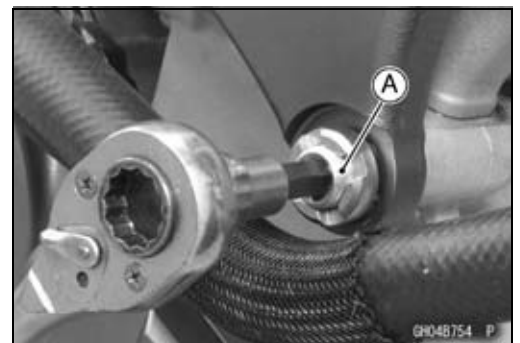
- Remove:
 - Right Front Engine Mounting Bolt [A]



- Using the nut wrench [A], loosen the locknut [B].
Special Tool - Engine Mount Nut Wrench: 57001-1450



- Using the Hexagon Wrench, turn the adjusting collar [A] counterclockwise to make the gap between the engine and adjusting collar.



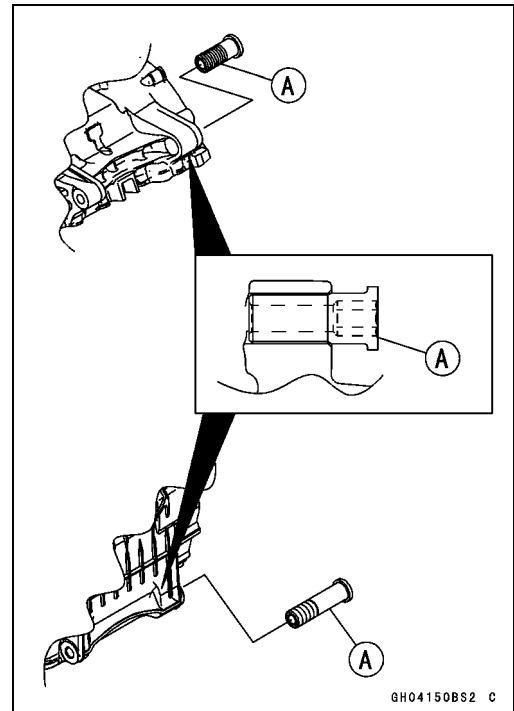
- Turn the middle and lower engine mounting bolts clockwise to make the gap between the adjusting collar and frame.
- Pull out the engine mounting bolts.
- Using the stand, take out the engine.

8-8 ENGINE REMOVAL/INSTALLATION

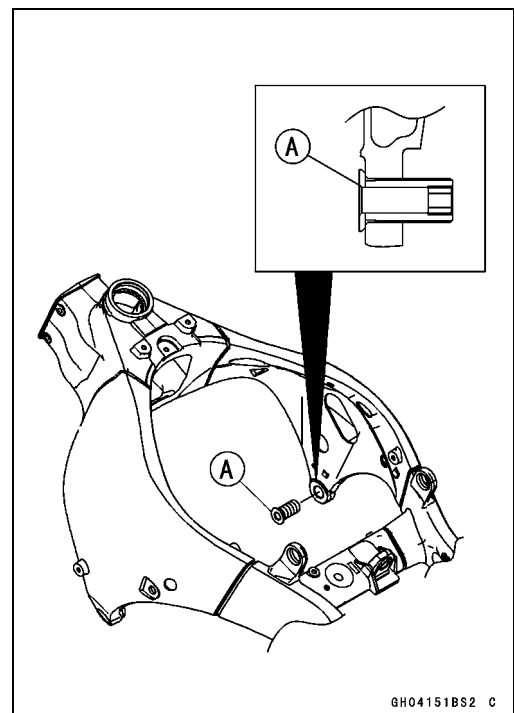
Engine Removal/Installation

Engine Installation

- Apply molybdenum disulfide grease to the threads of the adjusting collars [A].
- Install the adjusting collars to crankcase backside until end of the threads.



- Install the adjusting collar [A] to the frame until end of the threads.



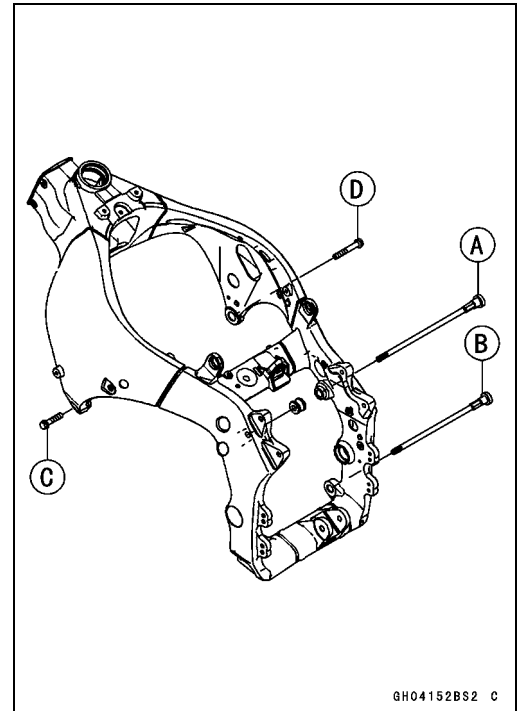
- Replace the engine mounting nuts with new ones.
- Support the engine with a suitable stand.
- Put a plank onto the suitable stand for engine balance.

Engine Removal/Installation

- Install the engine mounting bolts and nuts, following the specified installing sequence.

○ First, install and tighten the following bolts temporarily.

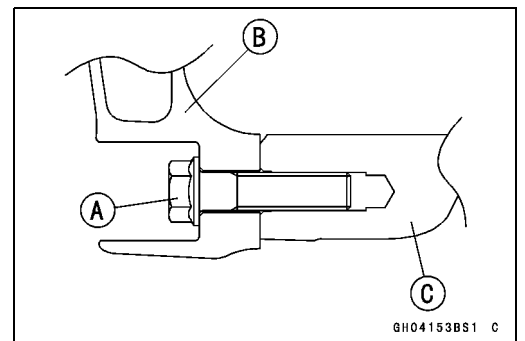
- Middle Engine Mounting Bolt [A]
- Lower Engine Mounting Bolt [B]
- Left Front Engine Mounting Bolt [C]
- Right Front Engine Mounting Bolt [D]



○ 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)



8-10 ENGINE REMOVAL/INSTALLATION

Engine Removal/Installation

- Third, insert the middle [A] and lower [B] engine mounting bolts to the adjusting collars [C], and tighten the bolts counterclockwise.

NOTE

- Tighten the bolts until the clearance [D] between the frame and collar come to 0 mm (0 in.).

Torque - Middle Engine Mounting Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

Lower Engine Mounting Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Fourth, tighten the middle [E] and lower [F] engine mounting nuts.

Torque - Middle Engine Mounting Nut: 44 N·m (4.5 kgf·m, 32 ft·lb)

Lower Engine Mounting Nut: 44 N·m (4.5 kgf·m, 32 ft·lb)

- Fifth, remove the right front engine mounting bolt [A].
- Sixth, tighten the adjusting collar [B] counterclockwise by hand until the clearance [C] between the engine [D] and collar come to 0 mm (0 in.).
- Seventh, tighten the adjusting collar locknut [E].

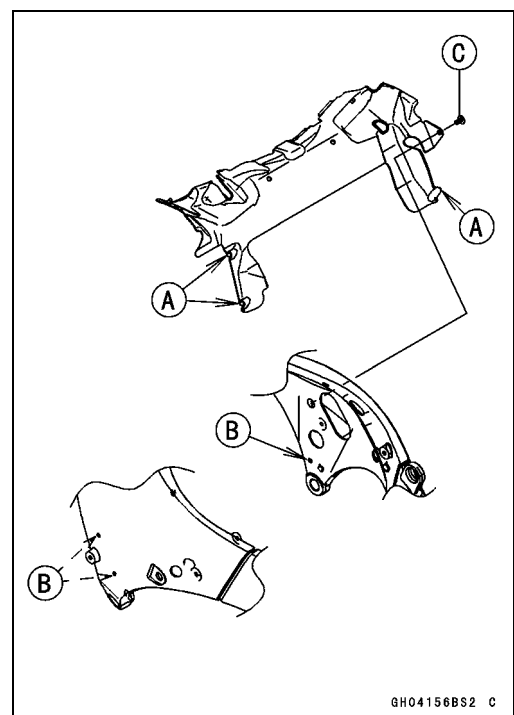
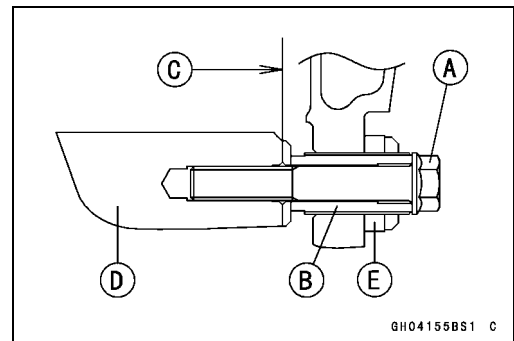
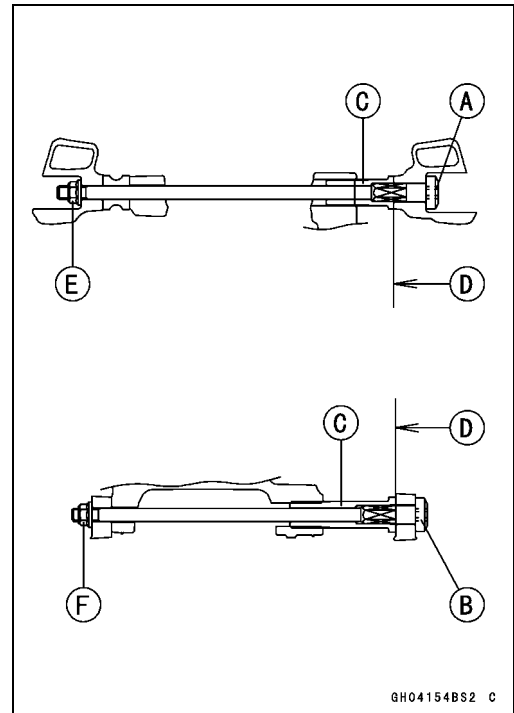
Special Tool - Engine Mount Nut Wrench: 57001-1450

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)

- 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).
- Insert the projections [A] into the holes [B].
- Apply a non-permanent locking agent to the threads of the heat insulation plate bolt [C] and tighten it.
- 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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CRANKSHAFT/TRANSMISSION 9-3

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Balanser Shaft Clamp Bolt	9.8	1.0	87 in·lb	
2	Balanser Shaft Clamp Lever Bolt	25	2.5	18	L
3	Bearing Holder Bolts	15	1.5	11	L
4	Breather Hole Plug	15	1.5	11	L
5	Breather Plate Bolts	9.8	1.0	87 in·lb	L
6	Connecting Rod Big End Nuts	see the text			MO, R
7	Coolant Drain Bolt (Cylinder)	9.8	1.0	87 in·lb	
8	Crankcase Bolt (M6, L = 60)	12	1.2	106 in·lb	
9	Crankcase Bolt (M7, L = 45)	20	2.0	15	
10	Crankcase Bolts (M6, L = 40)	12	1.2	106 in·lb	
11	Crankcase Bolts (M6, L = 45)	12	1.2	106 in·lb	
12	Crankcase Bolts (M7, L = 50)	20	2.0	15	
13	Crankcase Bolts (M8, L = 63)	27	2.8	20	
14	Crankcase Bolts (M9, L = 100)	45	4.6	33	MO, S
15	Crankcase Bolts (M9, L = 113)	45	4.6	33	MO, S
16	Oil Jet Nozzle (M6)	4.9	0.50	43 in·lb	
17	Oil Jet Nozzle (M8)	8.0	0.82	71 in·lb	
18	Oil Jet Nozzle (M10)	15	1.5	11	
19	Oil Jet Nozzles (M5)	2.9	0.30	26 in·lb	
20	Oil Passage Plugs (Taper)	20	2.0	15	L
21	Oil Pressure Switch	15	1.5	11	SS
22	Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	G
23	Plate Bolts	4.9	0.50	43 in·lb	L
24	Torque Limiter Cover Bolts	9.8	1.0	87 in·lb	

25. "1T" marked side faces up.

26. "T2" marked side faces up.

27. Hollow mark faces exhaust side.

G: Apply grease.

L: Apply a non-permanent locking agent.

LG: Apply liquid gasket.

M: Apply molybdenum disulfide grease.

MO: Apply molybdenum disulfide oil.

(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)

R: Replacement Parts

S: Follow the specified tightening sequence.

SS: Apply silicone sealant.

WL: Apply soap and water solution or rubber lubricant.

CRANKSHAFT/TRANSMISSION 9-5

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Engine Sprocket Nut	145	14.8	107	MO
2	Gear Position Switch Screws	2.9	0.30	26 in·lb	L
3	Gear Positioning Lever Bolt	12	1.2	106 in·lb	
4	Shift Drum Cam Holder Bolt	24	2.4	18	L
5	Shift Pedal Mounting Bolt	25	2.5	18	L
6	Shift Ratchet Assembly Holder Bolts	15	1.5	11	L
7	Shift Shaft Return Spring Pin	29	3.0	21	L
8	Transmission Case Bearing Holder Bolts (L = 15)	4.9	0.50	43 in·lb	L
9	Transmission Case Bearing Holder Bolts (L = 14)	4.9	0.50	43 in·lb	L
10	Transmission Case Bolts	20	2.0	15	
11	Torque Limiter Shaft Plug	25	2.5	18	L
12	Starter Clutch Shaft Holder Bolt	9.8	1.0	87 in·lb	L
13	Starter Clutch Shaft Bolt	20	2.0	15	L

G: Apply grease.

L: Apply a non-permanent locking agent.

MO: Apply molybdenum disulfide oil.

(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)

R: Replacement Parts

9-6 CRANKSHAFT/TRANSMISSION

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	0.030 ~ 0.060 mm (0.0012 ~ 0.0024 in.)	0.10 mm (0.0039 in.)
Crankpin Diameter:	34.484 ~ 34.500 mm (1.3576 ~ 1.3583 in.)	34.47 mm (1.3571 in.)
Marking:		
None	34.484 ~ 34.492 mm (1.3576 ~ 1.3580 in.)	— — —
○	34.493 ~ 34.500 mm (1.3580 ~ 1.3583 in.)	— — —
Connecting Rod Big End Inside Diameter:	37.500 ~ 37.516 mm (1.4764 ~ 1.4770 in.)	— — —
Marking:		
None	37.500 ~ 37.508 mm (1.4764 ~ 1.4767 in.)	— — —
○	37.509 ~ 37.516 mm (1.4767 ~ 1.4770 in.)	— — —
Connecting Rod Big End Bearing Insert Thickness:		
Brown	1.478 ~ 1.483 mm (0.05819 ~ 0.05839 in.)	— — —
Black	1.483 ~ 1.488 mm (0.05839 ~ 0.05858 in.)	— — —
Blue	1.488 ~ 1.493 mm (0.05858 ~ 0.05878 in.)	— — —
Connecting Rod Bolt Stretch	(Usable Range) 0.24 ~ 0.34 mm (0.0094 ~ 0.0134 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	23.49 ~ 23.54 mm (0.9248 ~ 0.9268 in.)	— — —
Crankshaft Runout	TIR 0.03 mm (0.0012 in.) or less	TIR 0.08 mm (0.0032 in.)
Crankshaft Main Bearing Insert/Journal Clearance	0.010 ~ 0.034 mm (0.0004 ~ 0.0013 in.)	0.06 mm (0.0024 in.)
Crankshaft Main Journal Diameter:	34.984 ~ 35.000 mm (1.3773 ~ 1.3780 in.)	34.96 mm (1.3764 in.)
Marking:		
None	34.984 ~ 34.992 mm (1.3773 ~ 1.3776 in.)	— — —
1	34.993 ~ 35.000 mm (1.3777 ~ 1.3780 in.)	— — —
Crankcase Main Bearing Inside Diameter:	38.000 ~ 38.016 mm (1.4961 ~ 1.4967 in.)	— — —
Marking:		
○	38.000 ~ 38.008 mm (1.4961 ~ 1.4964 in.)	— — —
None	38.009 ~ 38.016 mm (1.4964 ~ 1.4967 in.)	— — —

CRANKSHAFT/TRANSMISSION 9-7

Specifications

Item	Standard	Service Limit
Crankshaft Main Bearing Insert Thickness:		
Brown	1.491 ~ 1.495 mm (0.05870 ~ 0.05886 in.)	— — —
Black	1.495 ~ 1.499 mm (0.05886 ~ 0.05902 in.)	— — —
Blue	1.499 ~ 1.503 mm (0.05902 ~ 0.05917 in.)	— — —
Cylinder, Pistons		
Cylinder (Upper Crankcase) Inside Diameter	75.994 ~ 76.006 mm (2.9919 ~ 2.9924 in.)	76.09 mm (2.996 in.)
Piston Diameter	75.959 ~ 75.974 mm (2.9905 ~ 2.9911 in.)	75.81 mm (2.985 in.)
Piston/Cylinder Clearance	0.020 ~ 0.047 mm (0.0008 ~ 0.0019 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 ~ 0.06 mm (0.0012 ~ 0.0024 in.)	0.16 mm (0.0063 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 (0.0276 in.)
Second	0.78 ~ 0.79 mm (0.0307 ~ 0.0311 in.)	0.71 mm (0.0280 in.)
Piston Ring End Gap:		
Top	0.20 ~ 0.30 mm (0.0079 ~ 0.0118 in.)	0.6 mm (0.024 in.)
Second	0.35 ~ 0.50 mm (0.0138 ~ 0.0197 in.)	0.8 mm (0.031 in.)
Transmission		
Shift Fork Ear Thickness	5.7 ~ 6.0 mm (0.224 ~ 0.236 in.)	5.6 mm (0.220 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	6.9 ~ 7.0 mm (0.272 ~ 0.276 in.)	6.8 mm (0.268 in.)
Shift Drum Groove Width	7.05 ~ 7.20 mm (0.278 ~ 0.283 in.)	7.3 mm (0.287 in.)

9-8 CRANKSHAFT/TRANSMISSION

Specifications

Connecting Rod Big End Bearing Insert Selection

Connecting Rod Big End Inside Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Size Color	Part Number
None	○	Brown	92139-0721
None	None	Black	92139-0720
○	○		
○	None	Blue	92139-0719

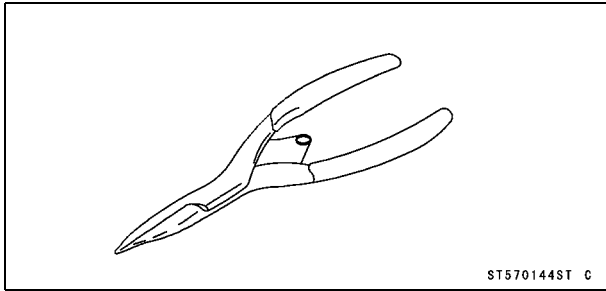
Crankshaft Main Bearing Insert Selection

Crankcase Main Bearing Inside Diameter Marking	Crankcase Main Bearing Inside Diameter Marking	Bearing Insert	
		Size Color	Part Number (Journal Nos.*)
○	1	Brown	92139-0300 (1, 3, 5) 92139-0303 (2, 4)
None	1	Black	92139-0299 (1, 3, 5) 92139-0302 (2, 4)
○	None		
None	None	Blue	92139-0298 (1, 3, 5) 92139-0301 (2, 4)

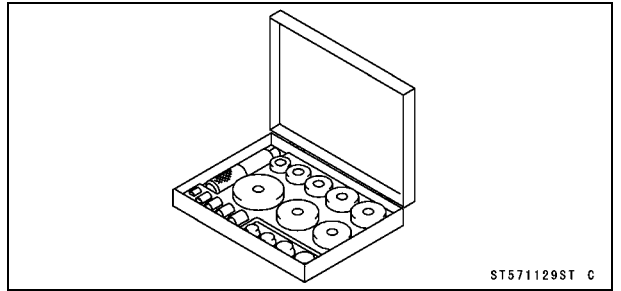
*: The bearing inserts for Nos. 2 and 4 journals have an oil groove, respectively.

Special Tools and Sealants

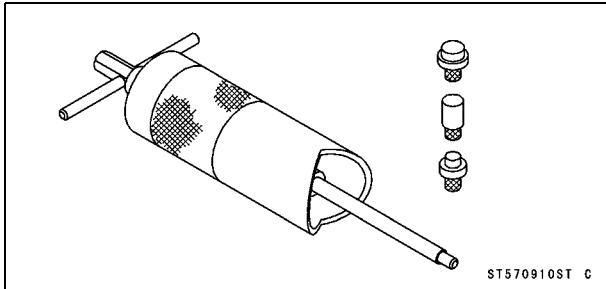
Outside Circlip Pliers:
57001-144



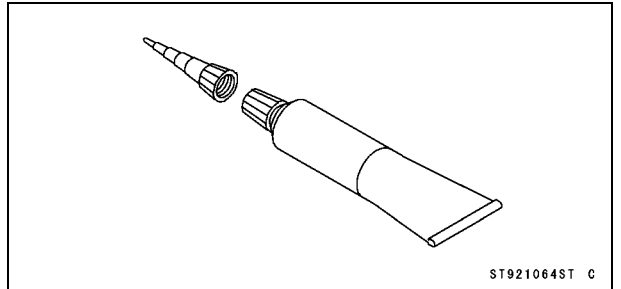
Bearing Driver Set:
57001-1129



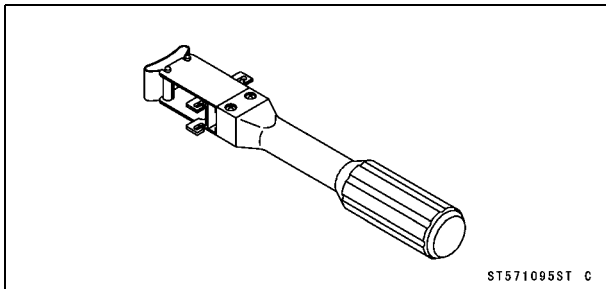
Piston Pin Puller Assembly:
57001-910



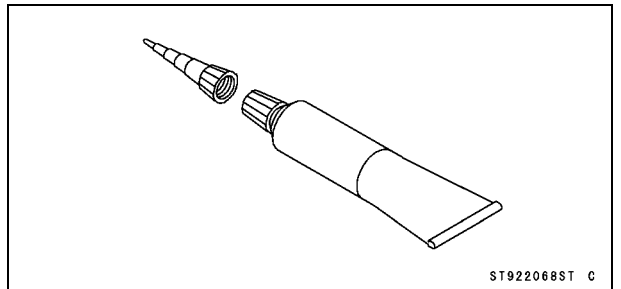
Liquid Gasket, TB1216B:
92104-1064



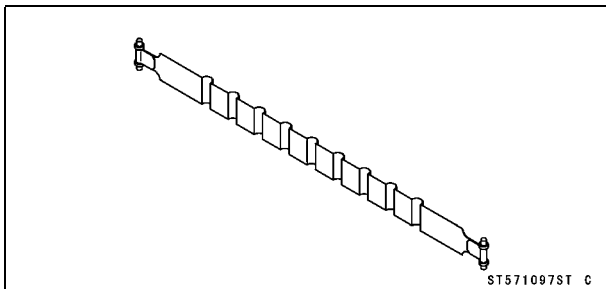
Piston Ring Compressor Grip:
57001-1095



Liquid Gasket, TB1207B:
92104-2068



Piston Ring Compressor Belt, $\phi 67 \sim \phi 79$:
57001-1097

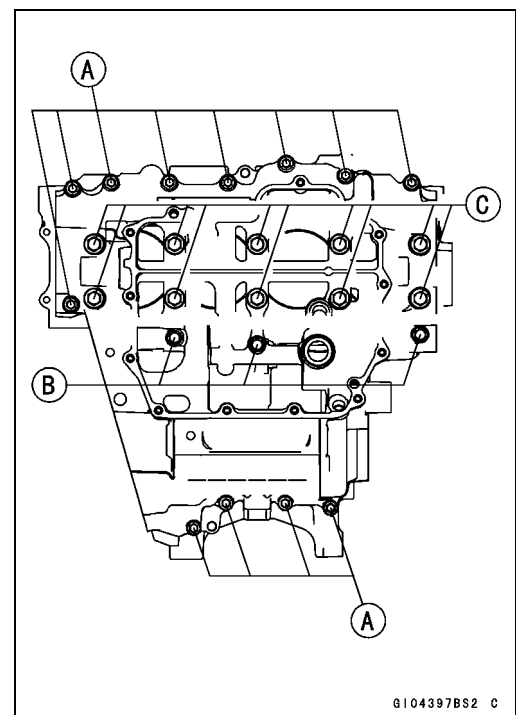
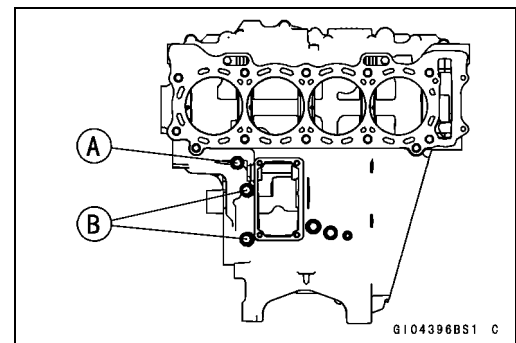


9-10 CRANKSHAFT/TRANSMISSION

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:
 - Cylinder Head (see Cylinder Head Removal in the Engine Top End chapter)
 - Starter Motor (see Starter Motor Removal in the Electrical System chapter)
 - Oil Pump (see Oil Pump Removal in the Engine Lubrication System chapter)
 - Alternator Rotor (see Alternator Rotor Removal in the Electrical System chapter)
 - Transmission Assy (see Transmission Assy Removal)
 - Oil Cooler (see Oil Cooler Removal in the Engine Lubrication System chapter)
 - Oil Pan (see Oil Pan Removal in the Engine Lubrication System chapter)
 - Oil Screen
- Remove the upper crankcase bolts, following the specified sequence.
 1. Loosen the M7 bolt [A].
 2. Loosen the M8 bolts [B].
- Remove the lower crankcase bolts, following the specified sequence.
 1. Loosen the M6 bolts [A].
 2. Loosen the M7 bolts [B].
 3. Loosen the M9 bolts [C].
- 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.

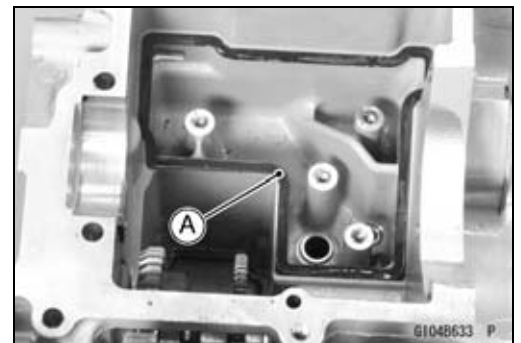
⚠ WARNING

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.
- Install the balancer (see Balancer Installation).

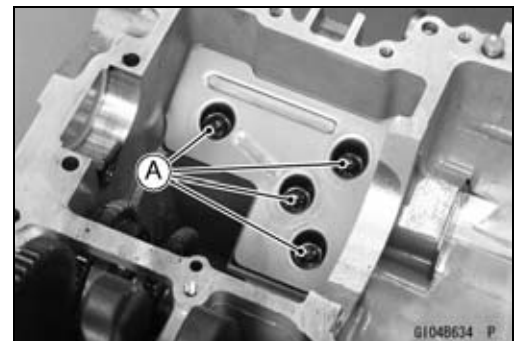
Upper Crankcase Assembly

- When installing the breather plate, replace the gasket [A] with a new one.



- Apply a non-permanent locking agent to the threads of the bolts [A] and tighten them.

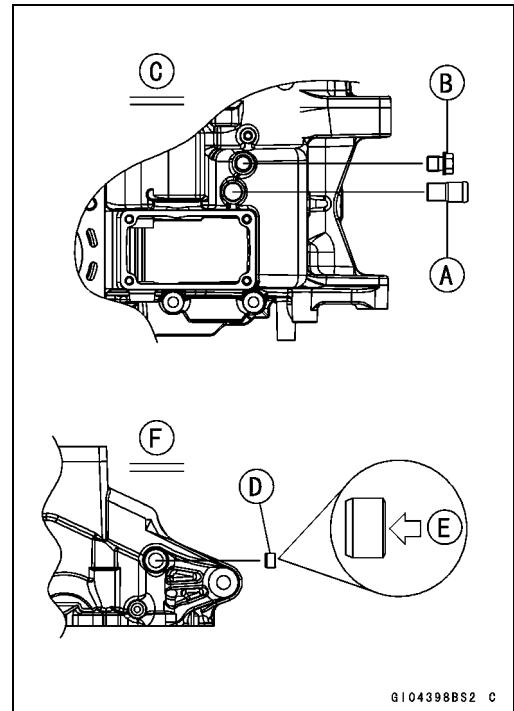
Torque - Breather Plate Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)



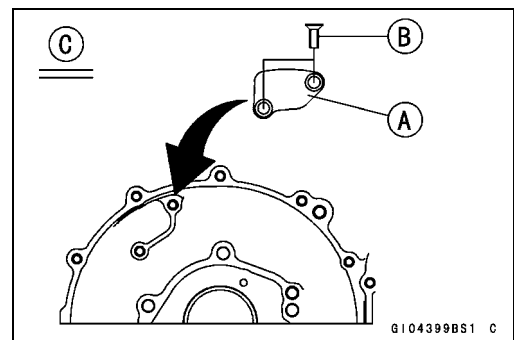
9-12 CRANKSHAFT/TRANSMISSION

Crankcase

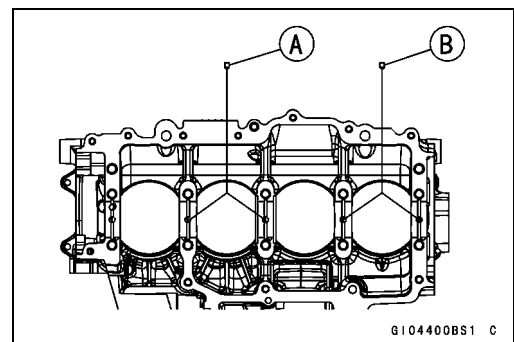
- Install the fitting [A] until it is bottomed.
Special Tool - Bearing Driver Set: 57001-1129
 - Apply a non-permanent locking agent to the threads of the breather plug [B] and tighten it.
- Torque - Breather Plug: 15 N·m (1.5 kgf·m, 11 ft·lb)**
- View from Upside [C]
- Install the plug [D] so that the plug surface [E] is flush with the end of the hole.
- View from Left Side [F]



- Install the plate [A] as shown in the figure.
 - Apply a non-permanent locking agent to the plate bolts [B].
 - Tighten:
- Torque - Plate Bolts: 4.9 N·m (0.50 kgf·m, 43 in·lb)**
- View from Right Side [C]

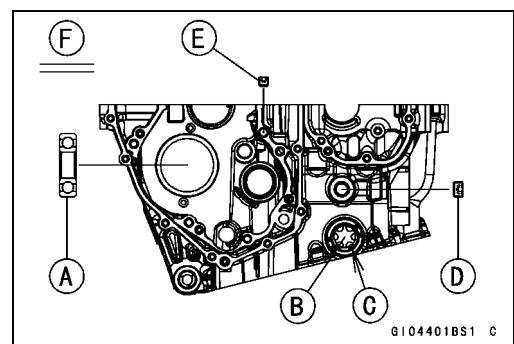


- Install:
Oil Jet Nozzles (Part No.: 92062-0010) [A]
Oil Jet Nozzles (Part No.: 92062-0004) [B]
 - Tighten:
- Torque - Oil Jet Nozzles (M5): 2.9 N·m (0.30 kgf·m, 26 in·lb)**



Lower Crankcase Assembly

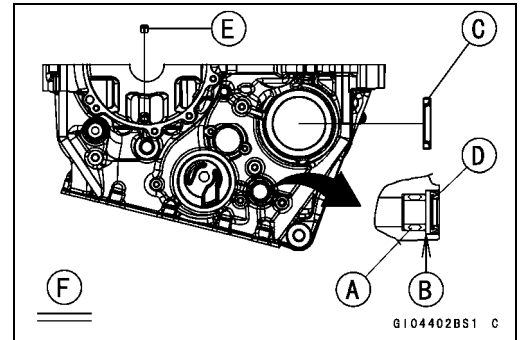
- Install the ball bearing [A] and the oil level gauge [B] until they are bottomed.
 - Apply soap and water solution to the oil level gauge before installation.
 - Install the new circlip [C].
 - Apply a non-permanent locking agent to the oil passage plug [D].
 - Tighten:
- Torque - Oil Passage Plug (Taper): 20 N·m (2.0 kgf·m, 15 ft·lb)**
- Oil Jet Nozzle (M10) [E]: 15 N·m (1.5 kgf·m, 11 ft·lb)**
- View from Right Side [F]



Crankcase

- Install the needle bearing [A] so that its surface is flush with the end of hole [B].
- Replace the output shaft oil seal [C] and the shift shaft oil seal [D] with new ones, and install them.
- Apply grease to the oil seal lips.
- Install the oil jet nozzle [E] so that its surface is flush with the end of hole.

View from Left Side [F]



- Tighten:

Torque - Oil Jet Nozzle (M8) [A]: 8.0 N·m (0.82 kgf·m, 71 in·lb)

Oil Jet Nozzle (M6) [B]: 4.9 N·m (0.50 kgf·m, 43 in·lb)

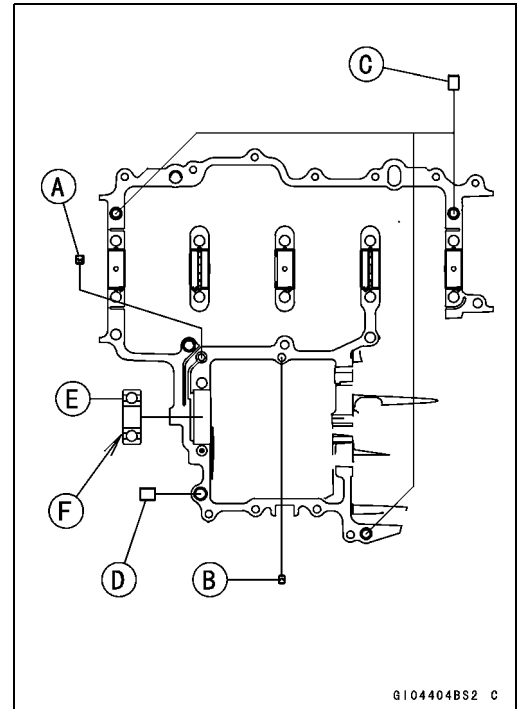
- Install:

Dowel Pins [C]

Dowel Pin (Pipe) [D]

Ball Bearing [E]

- Turn the oil seal side [F] to the engine left side.



Crankcase Halves Assembly

- Install:

Crankshaft (see Crankshaft Installation)

Connecting Rods (see Connecting Rod Installation)

9-14 CRANKSHAFT/TRANSMISSION

Crankcase

- Using a cleaning fluid, clean off any oil or dirt on the mating surface of the crankcase halves.
- Apply liquid gasket to the mating surface of the lower crankcase half as shown in the figure.

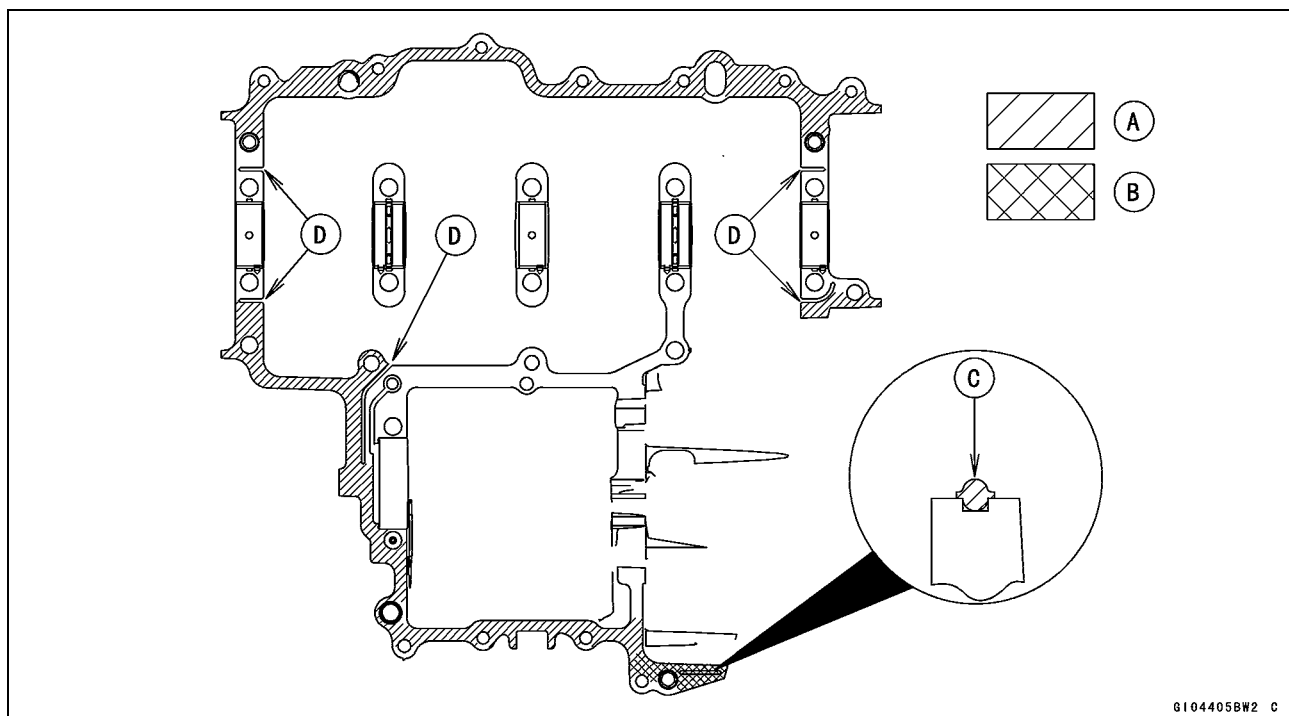
Sealant - Liquid Gasket, TB1216B [A]: 92104-1064
Liquid Gasket, TB1207B [B]: 92104-2068

NOTE

- Especially, apply a sealant so that it shall be filled up on the groove [C].
- Do not apply liquid gasket to the inside of the grooves [D].

NOTICE

Do not apply liquid gasket around the crankshaft main bearing inserts and oil passage.



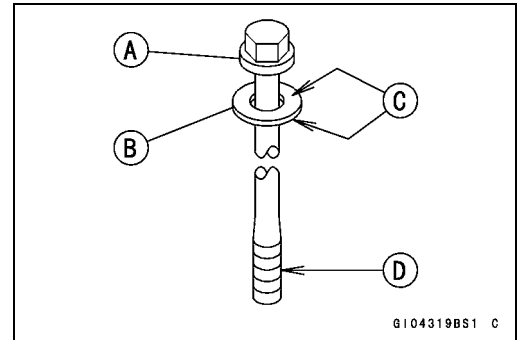
- Fit the lower crankcase half to the upper crankcase half.

NOTE

- Make the application finish within 20 minutes when the liquid gasket (TB1216B) to the mating surface of the lower crankcase half is applied.
- Make the application finish within 7 minutes when the liquid gasket (TB1207B) 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 bolt [A] has a copper plated washer [B], replace them with new ones.
- Apply molybdenum disulfide oil to both sides [C] of the washers and threads [D].



- Tighten the lower crankcase bolts with the following procedures.

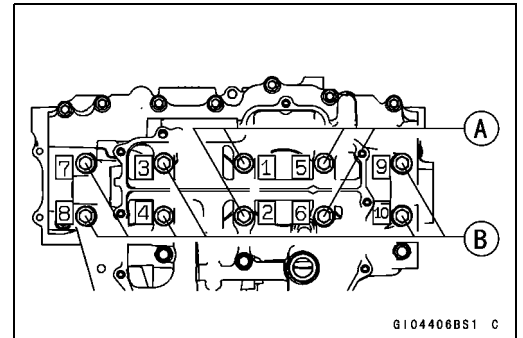
○ Install the M9 bolts and washers.

L = 113 mm (4.45 in.) [A]

L = 100 mm (3.94 in.) [B]

○ Tighten M9 bolts by following the sequence numbers [1 ~ 10].

Torque - Lower Crankcase Bolts (M9): 45 N·m (4.6 kgf·m, 33 ft·lb)



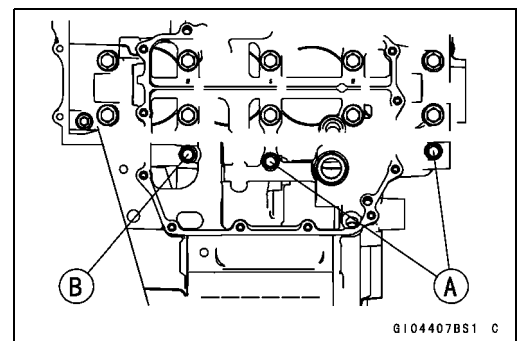
○ Install the M7 bolts.

L = 50 mm (2.0 in.) [A]

L = 45 mm (1.8 in.) [B]

○ Tighten:

Torque - Lower Crankcase Bolts (M7): 20 N·m (2.0 kgf·m, 15 ft·lb)



○ Replace the M6 bolt washers with new ones.

○ Install the M6 bolts.

L = 60 mm (2.4 in.) [A] (With Washer)

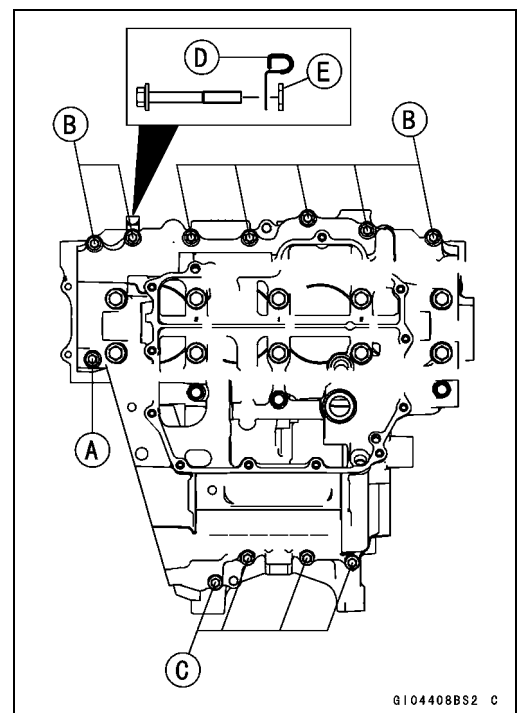
L = 45 mm (1.8 in.) [B]

L = 40 mm (1.6 in.) [C]

○ Install the clamp [D] and washer [E] as shown in the figure.

○ Tighten:

Torque - Lower Crankcase Bolts (M6): 12 N·m (1.2 kgf·m, 106 in·lb)



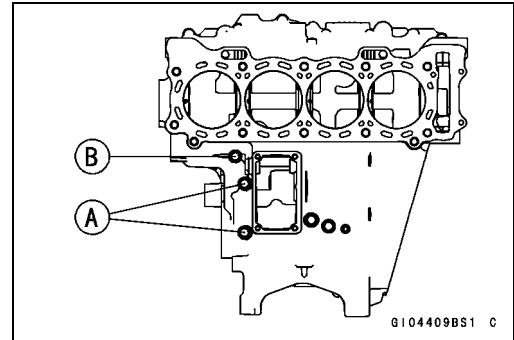
9-16 CRANKSHAFT/TRANSMISSION

Crankcase

- Tighten the upper crankcase bolts with the following procedures.
- Replace the M8 bolt washers with new ones.
- Install the M8 bolts [A] and washers.
- Install the M7 bolt [B].
- Tighten:

Torque - Upper Crankcase Bolts (M8): 27 N·m (2.8 kgf·m, 20 ft·lb)

Upper Crankcase Bolt (M7): 20 N·m (2.0 kgf·m, 15 ft·lb)

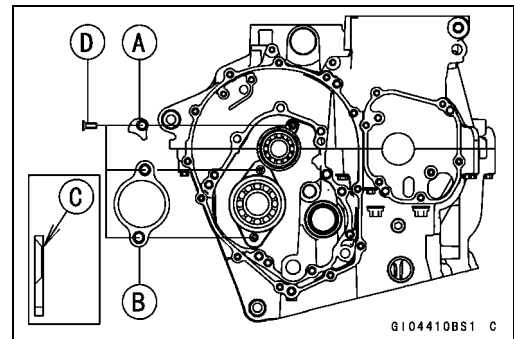


- After tightening all crankcase bolts, check the following items.
- Wipe up the liquid gasket that seeps out around the crankcase mating surface.
- Crankshaft turns freely.

- Press the drive shaft bearing until it is bottomed.
- Install:
 - Drive Shaft Bearing Holder [A]
 - Output Shaft Bearing Holder [B]
- Turn the flat side [C] of the holders to inside.
- Apply a non-permanent locking agent to the bearing holder bolts [D].
- Tighten:

Torque - Bearing Holder Bolts: 15 N·m (1.5 kgf·m, 11 ft·lb)

- Install the removed parts (see appropriate chapters).



Crankshaft and Connecting Rods

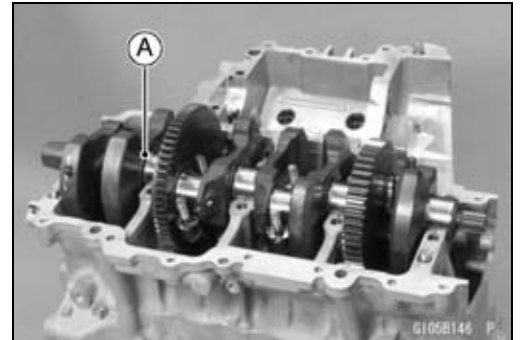
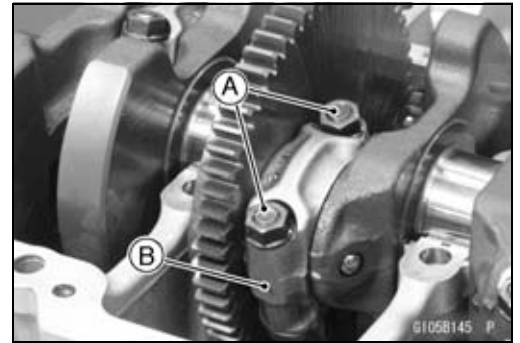
Crankshaft Removal

- Split the crankcase (see Crankcase Splitting).
- Remove:
 - Connecting Rod Big End Nuts [A]
 - Connecting Rod Big End Caps [B]

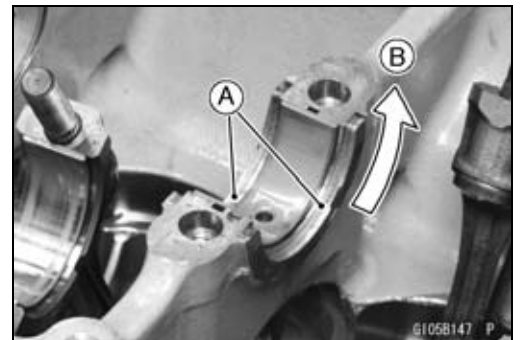
NOTE

○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 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.

- Apply molybdenum disulfide oil to the crankshaft main bearing inserts.
- Install:
 - Crankshaft
 - Connecting Rod Big End Caps (see Connecting Rod Installation)

9-18 CRANKSHAFT/TRANSMISSION

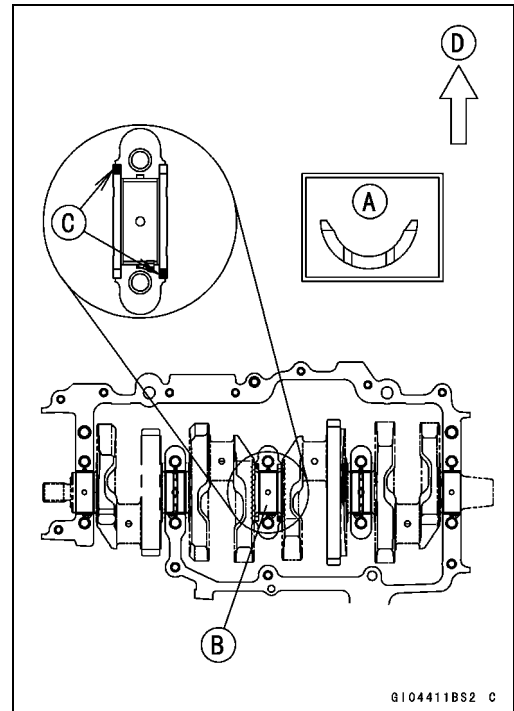
Crankshaft and Connecting Rods

- Apply molybdenum disulfide grease to the grooved side [A] of the thrust washers.
- Insert the thrust washers into the groove of the #3 main journal [B].
- Turn the oil groove side of the thrust washer to the crankshaft.

NOTE

- The thrust washers are identical.
- If the thrust washer installed properly, the blue-painted edges [C] are positioned as shown in the figure.

Front [D]



Connecting Rod Removal

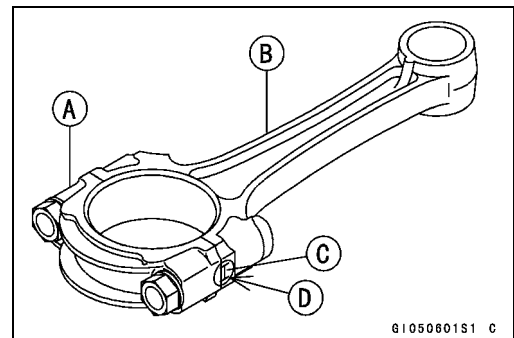
- Refer to the Piston Removal.

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] ("O" or No Mark)



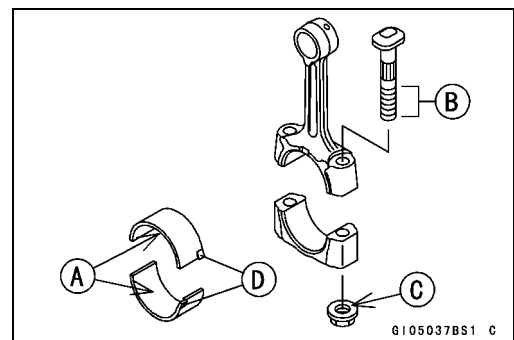
NOTICE

If the connecting rods, big end bearing inserts, or crankshaft are replaced with new ones, select the bearing insert and check clearance with a plasti-gage (press gauge) before assembling engine to be sure the correct bearing inserts are installed.

- Apply molybdenum disulfide oil to the inner surface of the upper and lower bearing inserts [A].
- Apply molybdenum disulfide oil 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.

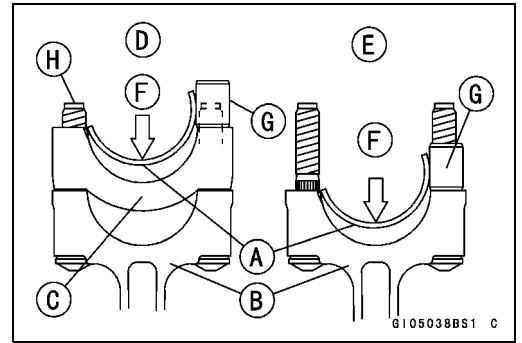
NOTICE

Wrong application of oil and grease could cause bearing damage.



Crankshaft and Connecting Rods

- 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 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.

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.

9-20 CRANKSHAFT/TRANSMISSION

Crankshaft and Connecting Rods

(1) Bolt Length Measurement Method

- Be sure to clean the bolts, nuts, and connecting rods thoroughly with a high-flash point solvent, because the new connecting rods, bolts, and nuts are treated with an anti-rust solution.

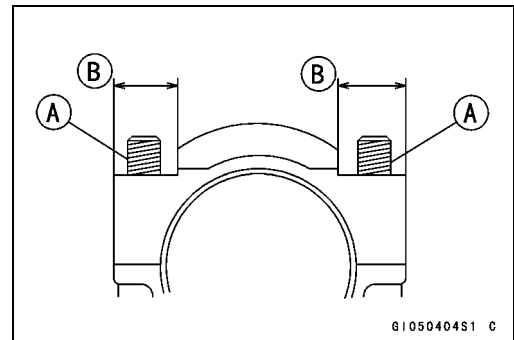
⚠ WARNING

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 to the following portions.
 - Threads [A] of Nuts and Bolts
 - Seating Surfaces [B] of Nuts and Connecting Rods



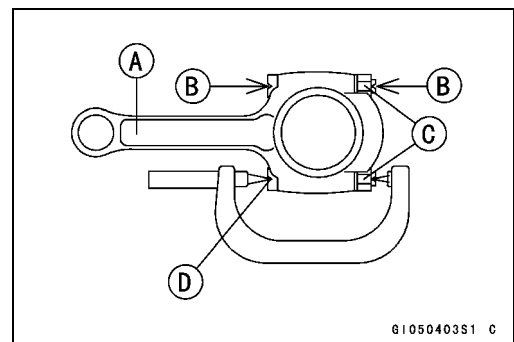
- Dent both bolt head and bolt tip with a punch as shown in the figure.
- Before tightening, use a point micrometer to measure the length of new connecting rod bolts and record the values to find the bolt stretch.
 - Connecting Rod [A]
 - Dent here with a punch [B].
 - Nuts [C]
 - Fit micrometer pins into dents [D].
- Tighten the big end nuts until the bolt elongation reaches the length specified as follows.

$$\text{Bolt Length after tightening} - \text{Bolt Length before tightening} = \text{Bolt Stretch}$$

Connecting Rod Bolt Stretch

Usable Range: 0.24 ~ 0.34 mm (0.0094 ~ 0.0134 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.



Crankshaft and Connecting Rods

(2) Rotation Angle Method

- ★ If you do not 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.

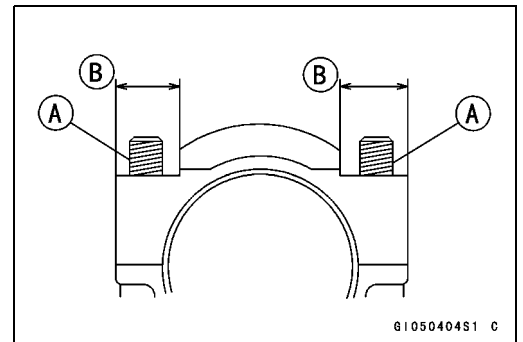
⚠ WARNING

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

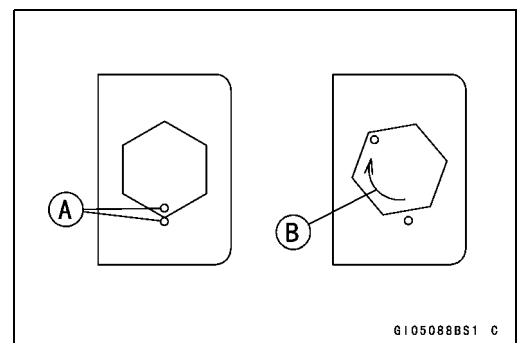
Immediately dry the bolts and nuts with compressed air after cleaning. Clean and dry the bolts and nuts completely.

- 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 to the following portions.
 - Threads [A] of Nuts and Bolts
 - Seating Surfaces [B] of Nuts and Connecting Rods



- First, tighten the nuts with **20 N·m (2.0 kgf·m, 15 ft·lb)** of torque.
- Next, tighten the nuts **150°**.
- Mark [A] the connecting rod big end caps and nuts so that nuts can be turned 150° [B] properly.

Connecting Rod Assy	Bolt	Nut	Torque + Angle N·m (kgf·m, ft·lb)
New	Attached to new con-rod	Attached to new con-rod	20 (2.0, 15) + 150°
	New	New	
Used	Replace the bolts with new ones	Replace the nuts with new ones	20 (2.0, 15) + 150°



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.

9-22 CRANKSHAFT/TRANSMISSION

Crankshaft and Connecting Rods

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.)

Connecting Rod Big End Side Clearance Inspection

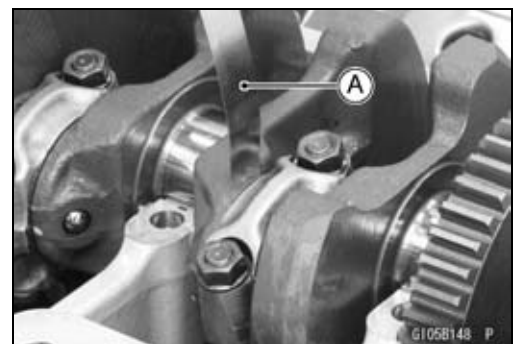
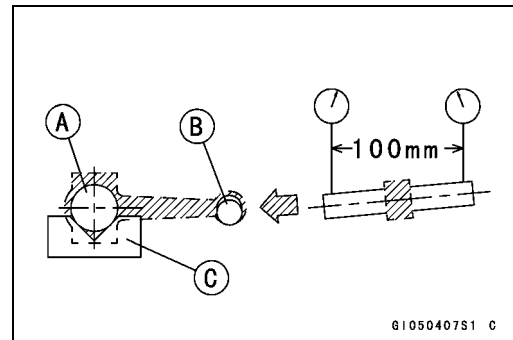
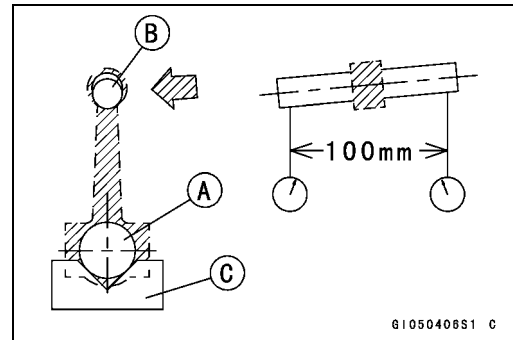
- Measure connecting rod big end side clearance.
- Insert a thickness gauge [A] between the big end and either crank web to determine clearance.

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.



Crankshaft and Connecting Rods

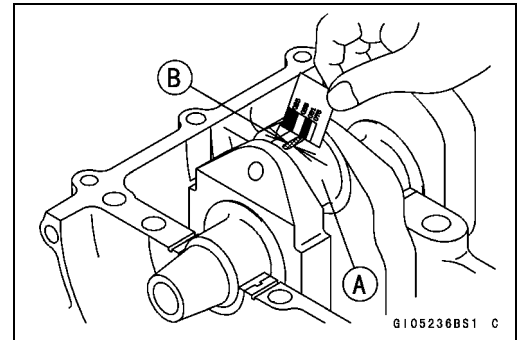
Connecting Rod Big End Bearing Insert/Crankpin Wear Inspection

- Remove the connecting rod big end (see Connecting Rod Removal).
- Cut strips of plastigage 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

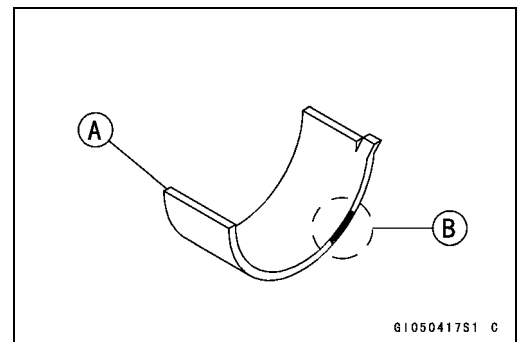
After measurement, replace the connecting rod bolts and nuts.

Connecting Rod Big End Bearing Insert/Crankpin Clearance

Standard: 0.030 ~ 0.060 mm (0.0012 ~ 0.0024 in.)

Service Limit: 0.10 mm (0.0039 in.)

- ★ 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 (0.10 mm, 0.0039 in.), replace the bearing inserts [A] with inserts painted blue [B]. Check insert/crankpin clearance with the plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.
- ★ If the clearance exceeds the service limit, measure the diameter of the crankpins.



Crankpin Diameter

Standard: 34.484 ~ 34.500 mm (1.3576 ~ 1.3583 in.)

Service Limit: 34.47 mm (1.3571 in.)

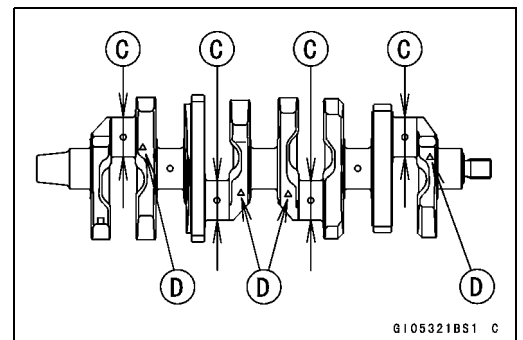
- ★ If any crankpin has worn past the service limit, replace the crankshaft with a new one.
- ★ If the measured crankpin diameters [C] are not less than the service limit, but do not coincide with the original diameter markings [D] on the crankshaft, make new marks on it.

Crankpin Diameter Marks

None 34.484 ~ 34.492 mm (1.3576 ~ 1.3580 in.)

○ 34.493 ~ 34.500 mm (1.3580 ~ 1.3583 in.)

△: Crankpin Diameter Marks ("○" or No Mark)



9-24 CRANKSHAFT/TRANSMISSION

Crankshaft and Connecting Rods

- Measure the connecting rod big end inside diameter, and mark each connecting rod big end in accordance with the inside diameter.
- Tighten the connecting rod big end nuts to the specified torque (see Connecting Rod Installation).

NOTE

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

Connecting Rod Big End Inside Diameter Marks

None 37.500 ~ 37.508 mm (1.4764 ~ 1.4767 in.)

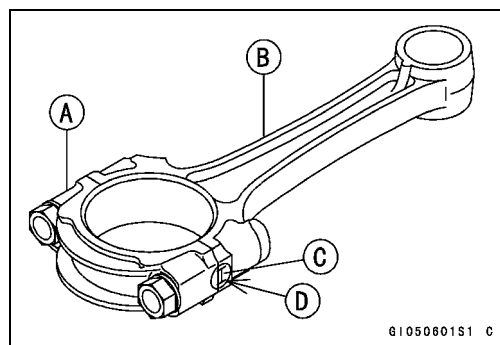
- 37.509 ~ 37.516 mm (1.4767 ~ 1.4770 in.)

Big End Cap [A]

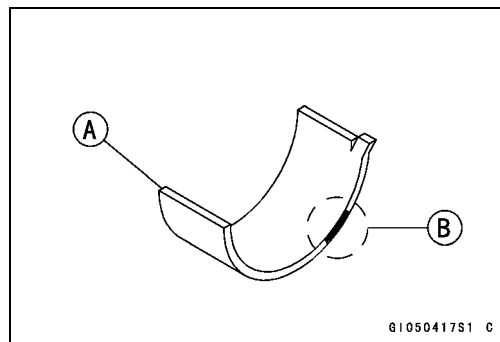
Connecting Rod [B]

Weight Mark, Alphabet [C]

Diameter 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]



Connecting Rod Big End Inside Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Size Color	Part Number
None	○	Brown	92139-0721
None	None	Black	92139-0720
○	○		
○	None	Blue	92139-0719

- Install the new inserts in the connecting rod and check insert/crankpin clearance with the plastigage.

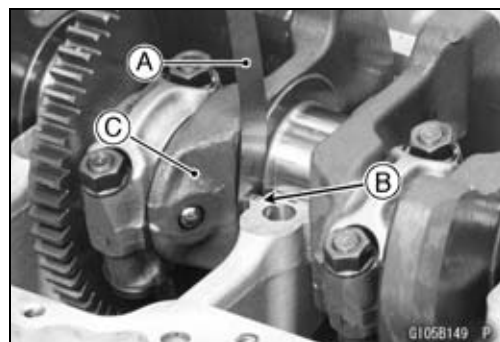
Crankshaft Side Clearance Inspection

- 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.)

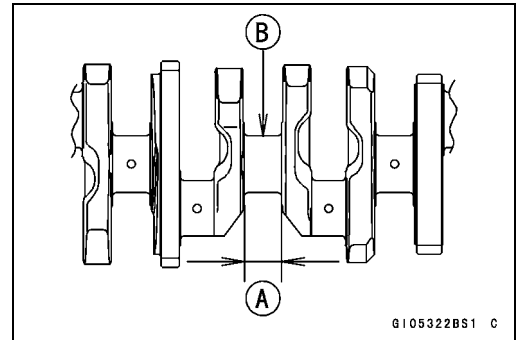


Crankshaft and Connecting Rods

- 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: 23.49 ~ 23.54 mm (0.9248 ~ 0.9268 in.)



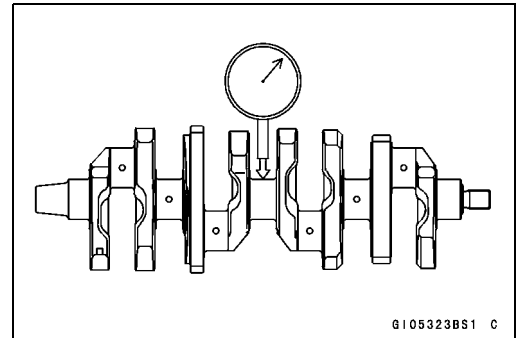
Crankshaft Runout Inspection

- Measure the crankshaft runout.
- ★ If the measurement exceeds the service limit, replace the crankshaft.

Crankshaft Runout

Standard: TIR 0.03 mm (0.0012 in.) or less

Service Limit: TIR 0.08 mm (0.0032 in.)



Crankshaft Main Bearing Insert/Journal Wear Inspection

- Split the crankcase (see Crankcase Splitting).
- Cut strips of plastigage 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

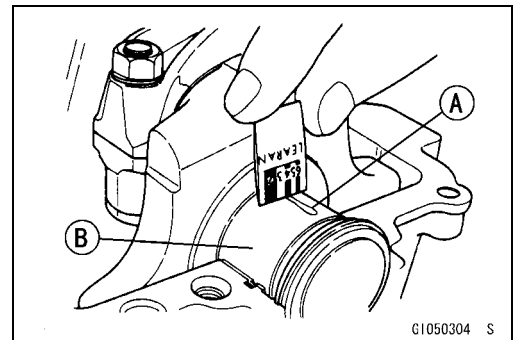
- Do not turn the crankshaft during clearance measurement.
- Journal clearance less than 0.025 mm (0.00098 in.) can not be measured by plastigage [A], however, using genuine parts maintains the minimum standard clearance.

- Split the crankcase again, measure each clearance between the bearing insert and journal [B] using plastigage (press gauge).

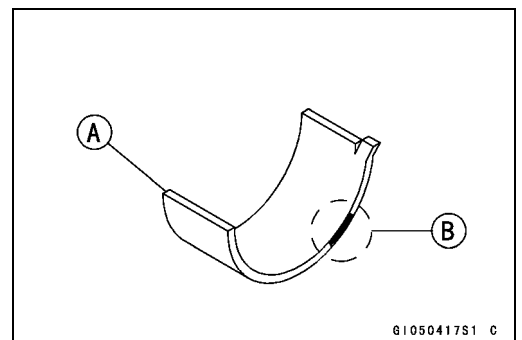
Crankshaft Main Bearing Insert/Journal Clearance

Standard: 0.010 ~ 0.034 mm (0.0004 ~ 0.0013 in.)

Service Limit: 0.06 mm (0.0024 in.)



- ★ If the clearance is within the standard, no bearing replacement is required.
- ★ If the clearance is between 0.035 mm (0.0014 in.) and the service limit (0.06 mm, 0.0024 in.), replace the bearing inserts [A] with inserts painted blue [B]. Check insert/journal clearance with the plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.
- ★ If the clearance exceeds the service limit, measure the diameter of the crankshaft main journal.



9-26 CRANKSHAFT/TRANSMISSION

Crankshaft and Connecting Rods

Crankshaft Main Journal Diameter

Standard: 34.984 ~ 35.000 mm (1.3773 ~ 1.3780 in.)

Service Limit: 34.96 mm (1.3764 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 34.984 ~ 34.992 mm (1.3773 ~ 1.3776 in.)

1 34.993 ~ 35.000 mm (1.3777 ~ 1.3780 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

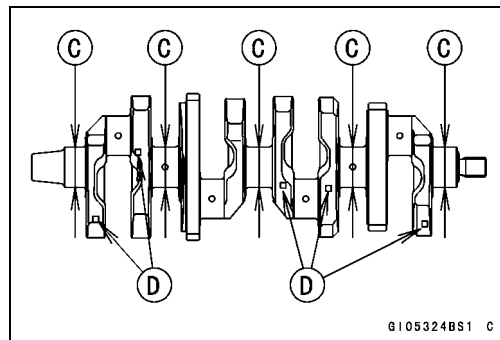
○ The mark already on the upper crankcase half should almost coincide with the measurement.

Crankcase Main Bearing Inside Diameter Marks

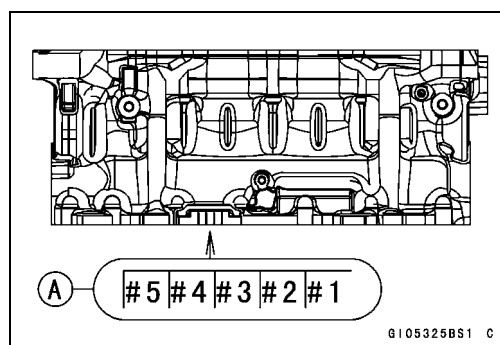
○ 38.000 ~ 38.008 mm (1.4961 ~ 1.4964 in.)

None 38.009 ~ 38.016 mm (1.4964 ~ 1.4967 in.)

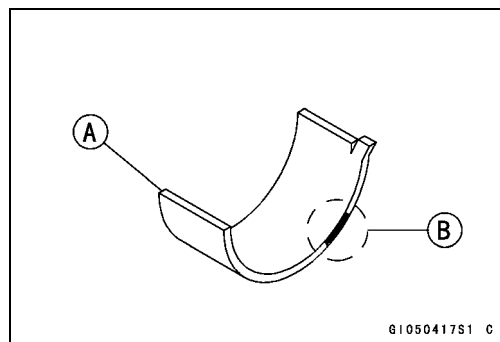
- Select the proper bearing insert [A] in accordance with the combination of the crankcase and crankshaft coding.
Size Color [B]



G105324BS1 C



G105325BS1 C



G1050417S1 C

Crankcase Main Bearing Inside Diameter Marking	Crankcase Main Bearing Inside Diameter Marking	Bearing Insert	
		Size Color	Part Number (Journal Nos.*)
○	1	Brown	92139-0300 (1, 3, 5) 92139-0303 (2, 4)
None	1	Black	92139-0299 (1, 3, 5) 92139-0302 (2, 4)
○	None		
None	None	Blue	92139-0298 (1, 3, 5) 92139-0301 (2, 4)

*: 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.

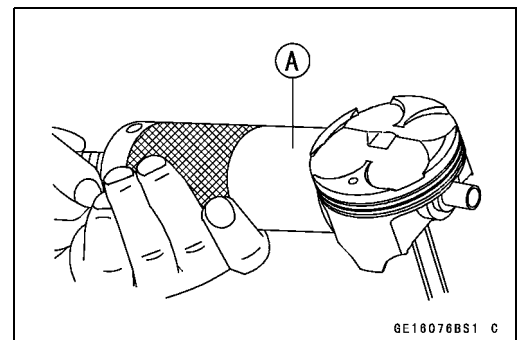
- Remove the piston pin snap ring [A] (Both Sides).



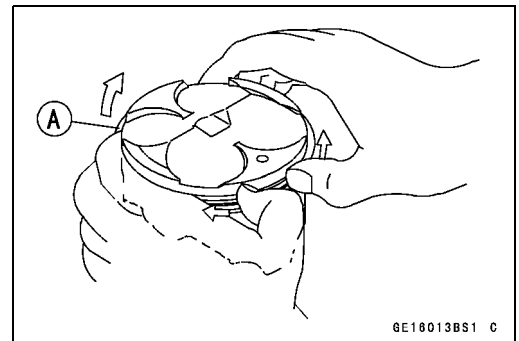
- Using the piston pin puller assembly [A], remove the piston pin.

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.



9-28 CRANKSHAFT/TRANSMISSION

Pistons

Piston Installation

- Apply molybdenum disulfide oil 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 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 to the piston rings.

NOTE

- Do not mix up the top and second ring.

- Install the top ring [A] so that the "1T" mark [B] faces up.
- Install the second ring [C] so that the "T2" mark [D] faces up.

- Apply molybdenum disulfide oil to the piston pin and piston journal.

NOTE

- If a new piston is used, use new piston rings.

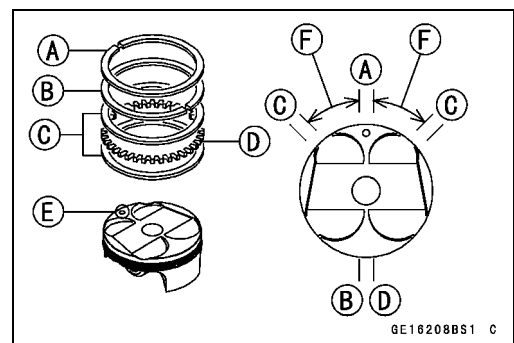
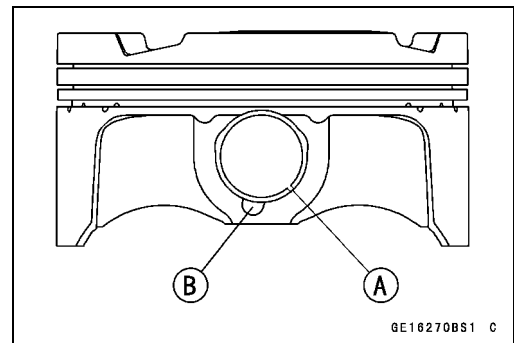
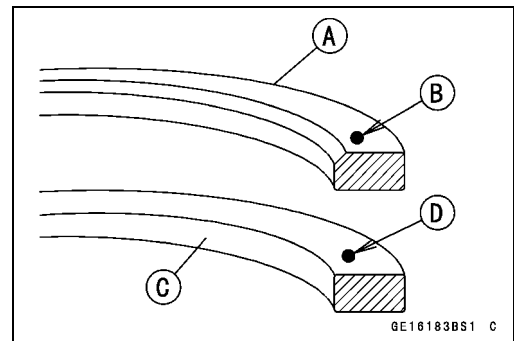
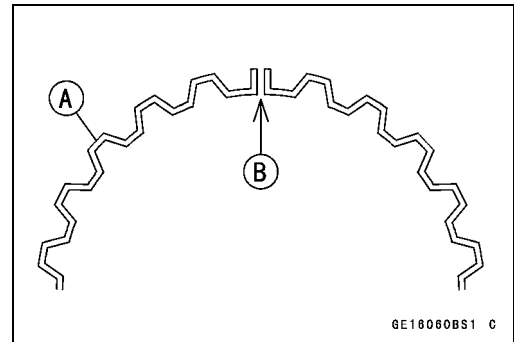
- Fit a new piston pin snap ring into the side of the piston so that the ring opening [A] does not coincide with the slit [B] of the piston pin hole.
- When installing the piston pin snap ring, compress it only enough to install it and no more.

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 in the figure. The openings of the oil ring steel rails must be about 30 ~ 40° of angle from the opening of the top ring.

- Top Ring [A]
- Second Ring [B]
- Oil Ring Steel Rails [C]
- Oil Ring Expander [D]
- Hollow [E]
- 30 ~ 40° [F]

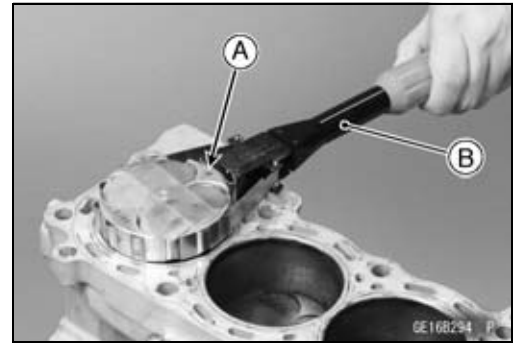


Pistons

- Apply molybdenum disulfide oil to the cylinder bore and piston skirt.
- Install the piston with its marking hollow [A] facing exhaust side.
- Using the piston ring compressor assembly [B] to install the piston from the cylinder head side.

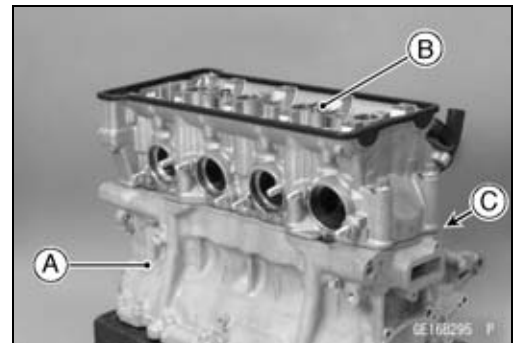
Special Tools - Piston Ring Compressor Grip: 57001-1095
Piston Ring Compressor Belt, $\phi 67 \sim \phi 79$: 57001-1097

- Install:
 Crankshaft (see Crankshaft Installation)
 Connecting Rod Big End Caps (see Connecting Rod Installation)

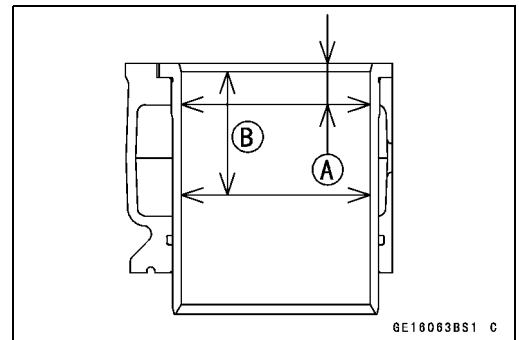


Cylinder (Upper Crankcase) Wear Inspection

- Split the crankcase (see Crankcase Splitting).
- Remove the pistons (see Piston Removal).
- Assemble the cylinder (upper crankcase) [A], the cylinder head [B] and the cylinder head gasket [C].
- Tighten the cylinder head bolts (see Cylinder Head Installation in the Engine Top End chapter).
- Put the crankcase upside down.



- 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 in the figure.
- ★ 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]

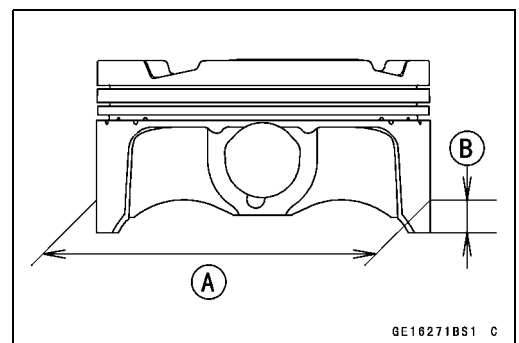


Cylinder (Upper Crankcase) Inside Diameter
Standard: 75.994 ~ 76.006 mm (2.9919 ~ 2.9924 in.)
Service Limit: 76.09 mm (2.996 in.)

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: 75.959 ~ 75.974 mm (2.9905 ~ 2.9911 in.)
Service Limit: 75.81 mm (2.985 in.)



9-30 CRANKSHAFT/TRANSMISSION

Pistons

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.

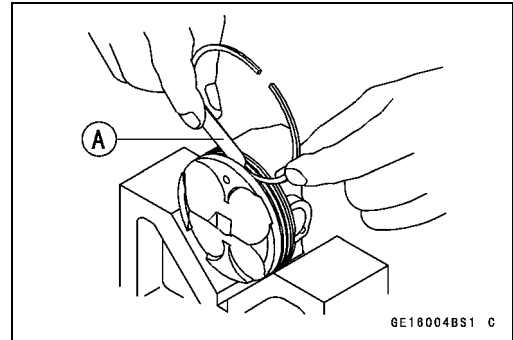
Piston Ring/Groove Clearance

Standard:

- Top** **0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in.)**
- Second** **0.03 ~ 0.06 mm (0.0012 ~ 0.0024 in.)**

Service Limit:

- Top** **0.17 mm (0.0067 in.)**
- Second** **0.16 mm (0.0063 in.)**



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

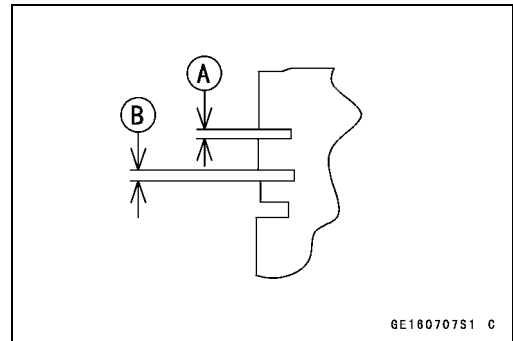
Standard:

- 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]** **0.78 ~ 0.79 mm (0.0307 ~ 0.0311 in.)**

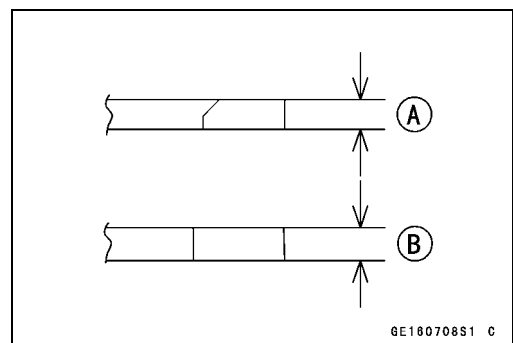
Service Limit:

- Top** **0.70 mm (0.0276 in.)**
- Second** **0.71 mm (0.0280 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.



Pistons

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 **0.20 ~ 0.30 mm (0.0079 ~ 0.0118 in.)**

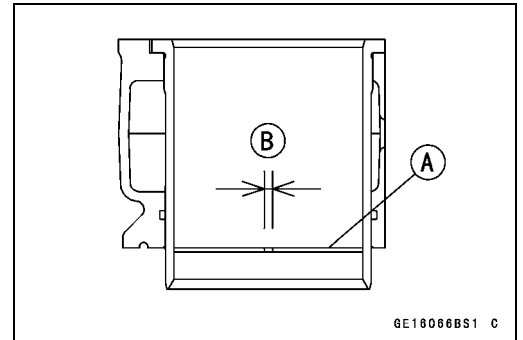
Second **0.35 ~ 0.50 mm (0.0138 ~ 0.0197 in.)**

Service Limit:

Top **0.6 mm (0.024 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.

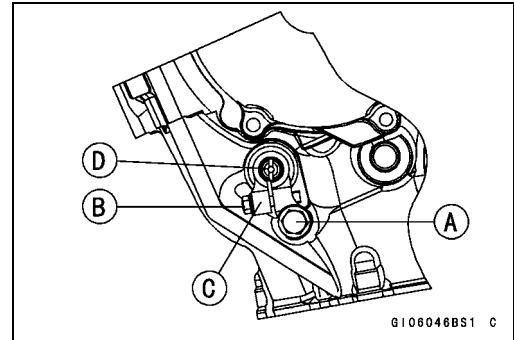


9-32 CRANKSHAFT/TRANSMISSION

Balancer

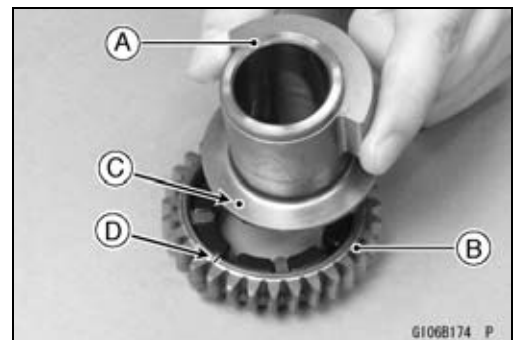
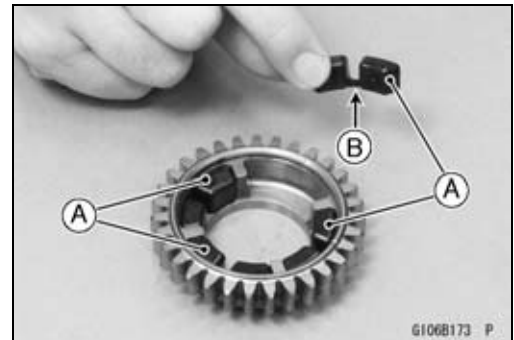
Balancer Removal

- Remove:
 - Engine (see Engine Removal in the Engine Removal/Installation chapter)
 - Oil Pan (see Oil Pan Removal in the Engine Lubrication System chapter)
- Remove:
 - Balancer Shaft Clamp Lever Bolt [A]
 - Balancer Shaft Clamp Bolt [B]
 - Balancer Shaft Clamp Lever [C]
 - Balancer Shaft [D]
 - Balancer Shaft Oil Seal
- Take the balancer assembly off the crankcase.

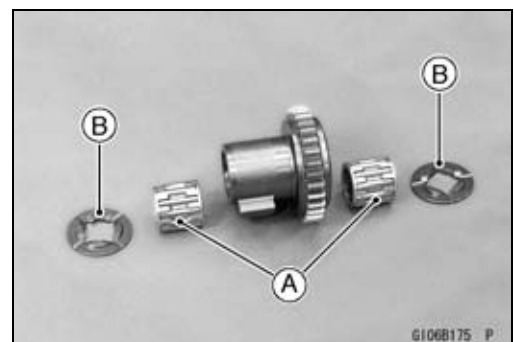


Balancer Assemble

- Check that the rubber dampers [A] are in place.
 - Turn the linked portion [B] to the bottom.
-
- Assemble the balancer weight [A] and the gear [B].
 - Align the punch mark [C] of the balancer weight and the groove [D] of the gear.



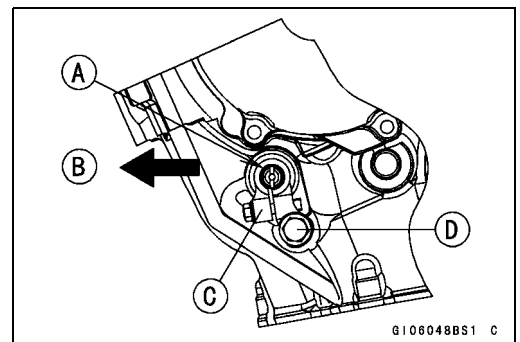
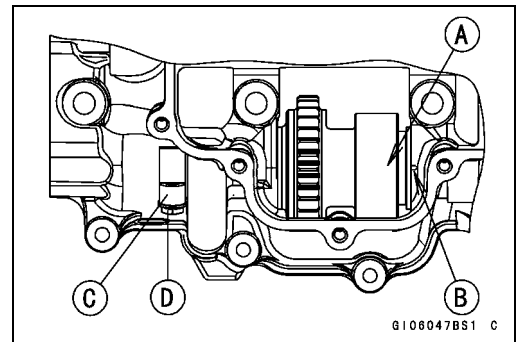
- Apply molybdenum disulfide oil to the needle bearings [A].
- Install the needle bearings and the washers [B].
- Turn the grooved side of the washer to inside.



Balancer

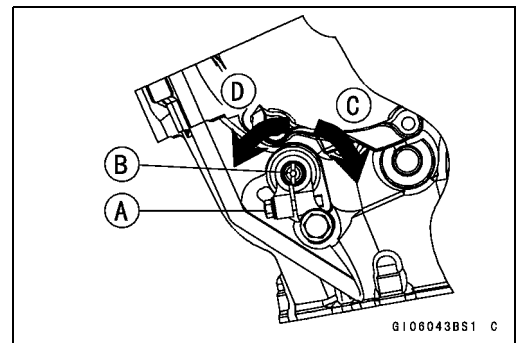
Balancer Installation

- Position the crankshaft at #2, 3 positions TDC or at #1, 4 positions TDC.
- Install the balancer assembly as follows.
 - Align the punch mark [A] on the weight and the projection [B] on the crankcase.
 - Engage the balancer gear and the crankshaft gear.
 - Insert the balancer shaft until it is bottomed.
- Replace the balancer shaft oil seal with a new one.
- Apply grease to the oil seal lips.
- Install the oil seal so that its surface is flush with the end of hole.
- Install:
 - Balancer Shaft Clamp Lever [C]
- Tighten:
 - Torque - Balancer Shaft Clamp Bolt [D]: 9.8 N·m (1.0 kgf·m, 87 in·lb)
- Turn the mark [A] on the balancer shaft to the engine forward [B].
- Check that the lever [C] is in contact with the crankcase.
- Tighten:
 - Torque - Balancer Shaft Clamp Lever Bolt [D]: 25 N·m (2.5 kgf·m, 18 ft·lb)



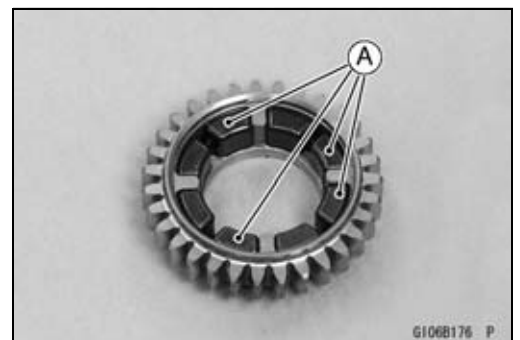
Balancer Adjustment

- Remove the left lower fairing (see Lower Fairing Removal in the Frame chapter).
- Start the engine and warm it up thoroughly.
- Adjust the balancer gear backlash with the engine idling. The amount of backlash can be changed by turning the balancer shaft which has eccentric journals.
- Start the engine and let it idle.
- Loosen the clamp bolt [A] and turn the balancer shaft [B] clockwise [C] until the balancer gear makes a whining sound.
- Turn the shaft counterclockwise [D] until the balancer gear whining sound disappears and tighten the clamp bolt.
- Torque - Balancer Shaft Clamp Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)



Balancer Damper Inspection

- Remove the balancer and disassemble the weight and gear assembly.
- Visually inspect the rubber dampers [A].
- ★ If they appear damaged or deteriorated, replace them.

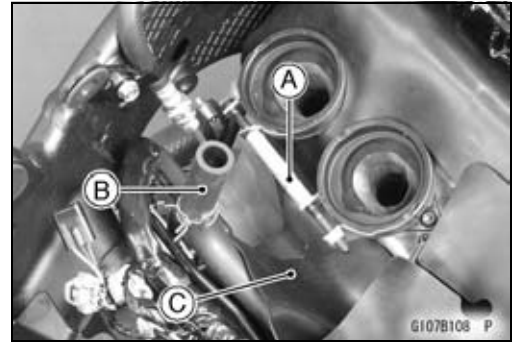


9-34 CRANKSHAFT/TRANSMISSION

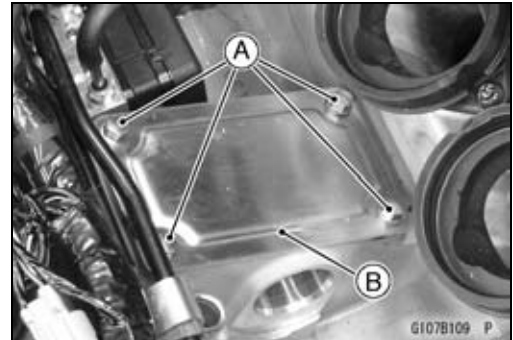
Torque Limiter

Torque Limiter Removal

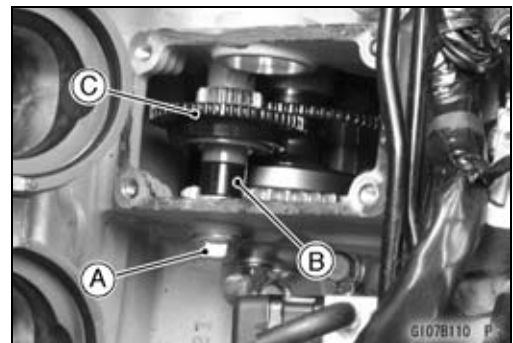
- Remove:
 - Starter Motor (see Starter Motor Removal in the Electrical System chapter)
 - Throttle Body Assy Holder [A]
 - Breather Hose [B]
- Roll up the heat insulation rubber plate [C].



- Remove:
 - Torque Limiter Cover Bolts [A]
 - Torque Limiter Cover [B]

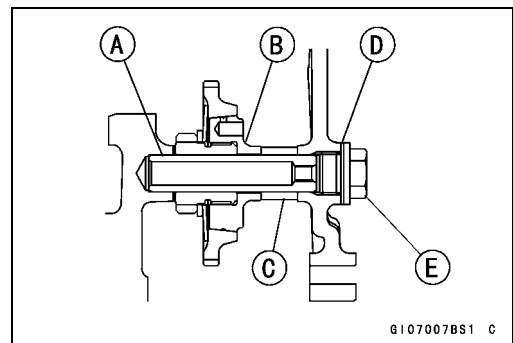


- Remove:
 - Torque Limiter Shaft Plug [A] and Washer
 - Torque Limiter Shaft Collar [B]
 - Torque Limiter [C]



Torque Limiter Installation

- Apply molybdenum disulfide grease to the torque limiter shaft [A].
- Install the torque limiter [B], the collar [C] and the shaft.
- Turn the large-hole end of the shaft to inside as shown in the figure.
- Replace the washer [D] with a new one.
- Apply a non-permanent locking agent to the torque limiter shaft plug [E].
- Tighten:



Torque - Torque Limiter Shaft Plug: 25 N·m (2.5 kgf·m, 18 ft·lb)

Torque Limiter

- Replace the torque limiter cover with a new one.
- Using a cleaning fluid, clean off any oil or dirt on the mating surface of the crankcase. And then dry it with a clean cloth.
- Apply liquid gasket to the crankcase.
Sealant - Liquid Gasket, TB1207B: 92104-2068

- Install the torque limiter cover.

NOTE

○ *Make the application finish within 7 minutes when the liquid gasket to the mating surface of the crankcase is applied.*

○ *Moreover fit the cover and tighten the bolts just after application of the liquid gasket.*

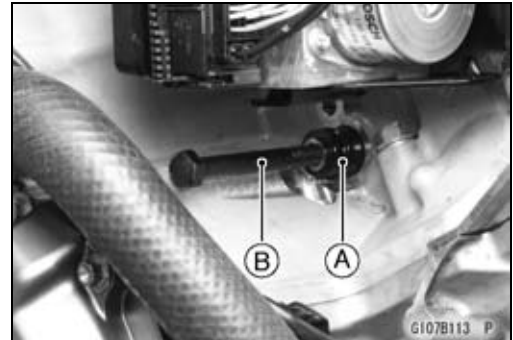
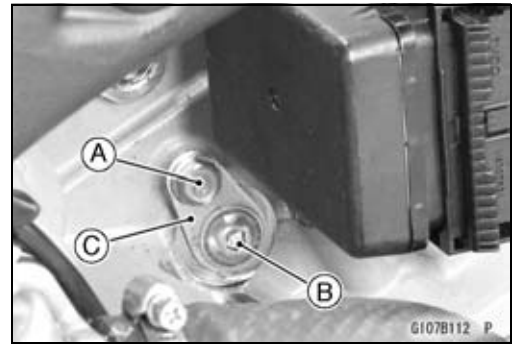
- Tighten:
Torque - Torque Limiter Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)
- Install the removed parts (see appropriate chapters).

9-36 CRANKSHAFT/TRANSMISSION

Starter Clutch

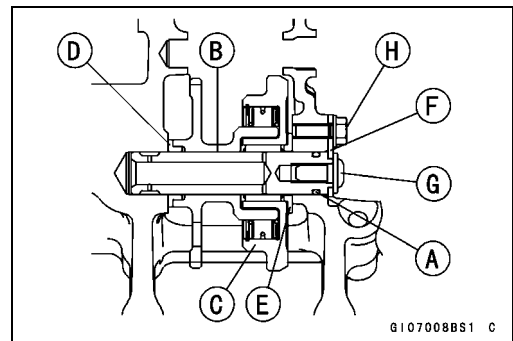
Starter Clutch Removal

- Remove:
 - Torque Limiter (see Torque Limiter Removal)
 - Transmission Assy (see Transmission Assy Removal)
 - Starter Clutch Shaft Holder Bolt [A]
 - Starter Clutch Shaft Bolt [B]
 - Starter Clutch Shaft Holder [C]
- Remove the starter clutch shaft [A] using a suitable M8 bolt [B].
- Take care not to drop the starter clutch parts.
- Remove the starter clutch from the engine right side.



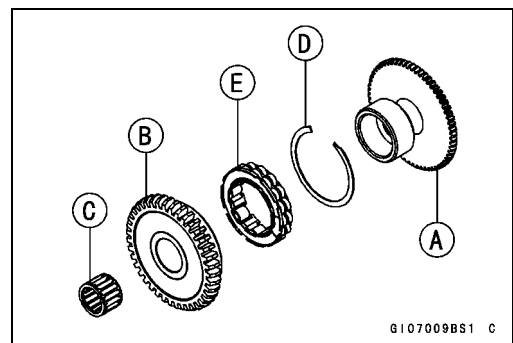
Starter Clutch Installation

- Replace the O-ring [A] with a new one.
- Apply molybdenum disulfide grease to the starter clutch shaft [B].
- Install:
 - Starter Clutch [C]
 - Spacer (Small Diameter) [D]
 - Spacer (Large Diameter) [E]
 - Starter Clutch Shaft
 - Starter Clutch Shaft Holder [F]
- Turn the O-ring side of the shaft to outside as shown in the figure.
- Apply a non-permanent locking agent to the starter clutch shaft bolt [G] and the starter clutch shaft holder bolt [H].
- Tighten:
 - Torque - Starter Clutch Shaft Holder Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)**
 - Starter Clutch Shaft Bolt: 20 N·m (2.0 kgf·m, 15 ft·lb)**
- Install the removed parts (see appropriate chapters).



Starter Clutch Disassembly

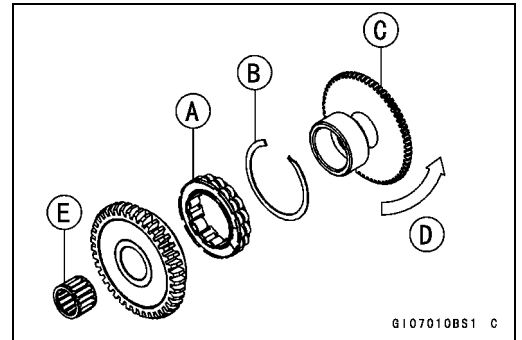
- Remove the starter clutch (see Starter Clutch Removal).
- Take the drive gear [A] off the driven gear [B].
- Remove the needle bearing [C].
- Remove the snap ring [D].
- Take the one-way clutch [E] off the driven gear.



Starter Clutch

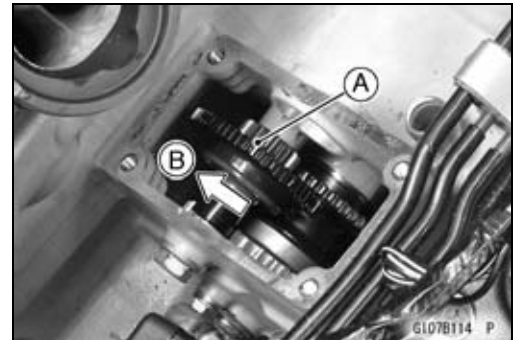
Starter Clutch Assembly

- Install the one-way clutch [A] to the driven gear.
- Face the circlip side of the one-way clutch to inside.
- Install the new snap ring [B] to the one-way clutch.
- Install the drive gear [C] while turn it counterclockwise [D].
- Apply molybdenum disulfide oil to the needle bearing [E], and install it.

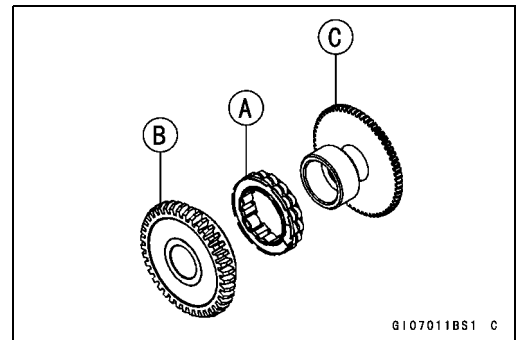


Starter Clutch Inspection

- Remove:
 - Torque Limiter Cover (see Torque limiter Removal)
- Turn the torque limiter [A] by hand. The torque limiter should turn forward freely [B], but should not turn backward.
- ★ 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]
 - Driven Gear [B]
- ★ If there is any worn or damaged part, replace it.
- Examine the drive gear [C] as well. Replace the clutch gear if it is worn or damaged.

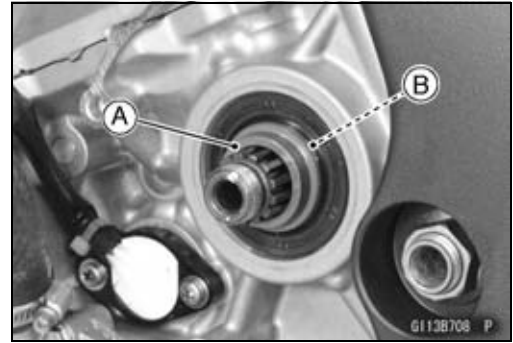


9-38 CRANKSHAFT/TRANSMISSION

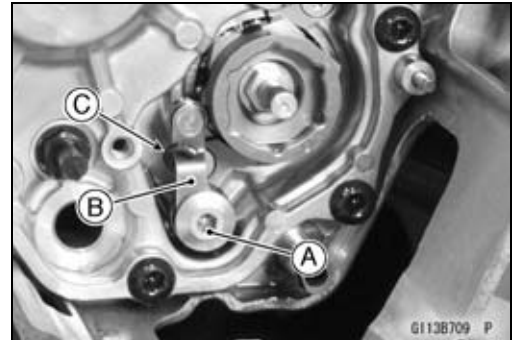
Transmission

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)
- ★ If the transmission assy is to be disassembled, remove the following.
 - Shift Ratchet Assembly and Holder
 - Gear Positioning Lever Bolt [A]
 - Gear Positioning Lever [B], Spring [C] and Collar

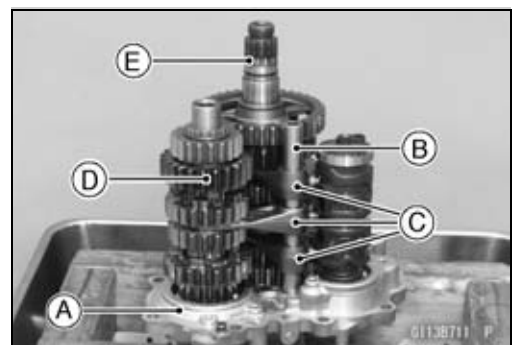


- Remove the transmission case bolts [A], and take the transmission assy [B] off the crankcase.



Transmission Assy Disassembly

- Remove the transmission assy (see Transmission Assy Removal).
- Remove the following from the transmission case [A].
 - Shift Rod [B]
 - Shift Forks [C]
 - Drive Shaft [D]
 - Output Shaft [E]
 - Shift Drum Assembly



Transmission

Transmission Assy Assembly

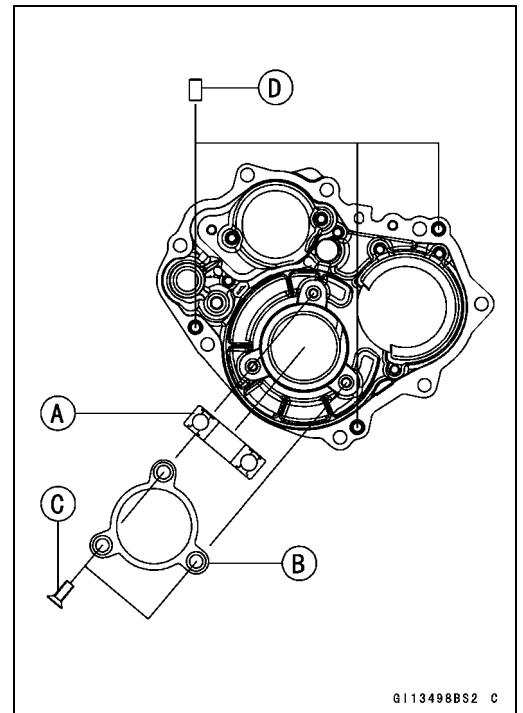
- Install the ball bearing [A] until it is bottomed.
- Turn the oil seal side to the bottom.

Special Tool - Bearing Driver Set: 57001-1129

- Install the bearing holder [B].
- Turn the flat side to the bottom.
- Apply a non-permanent locking agent to the bearing holder bolts [C].
- Tighten:

**Torque - Transmission Case Bearing Holder Bolts: 4.9 N·m
(0.50 kgf·m, 43 in·lb)**

- Install the dowel pins [D] until they are bottomed.



- Install the ball bearing [A] until it is bottomed.
- Turn the stepped edge to upside.

Special Tool - Bearing Driver Set: 57001-1129

- Install the bearing holder [B].
- Turn the flat side to the bottom.
- Apply a non-permanent locking agent to the bearing holder bolts [C].
- Tighten:

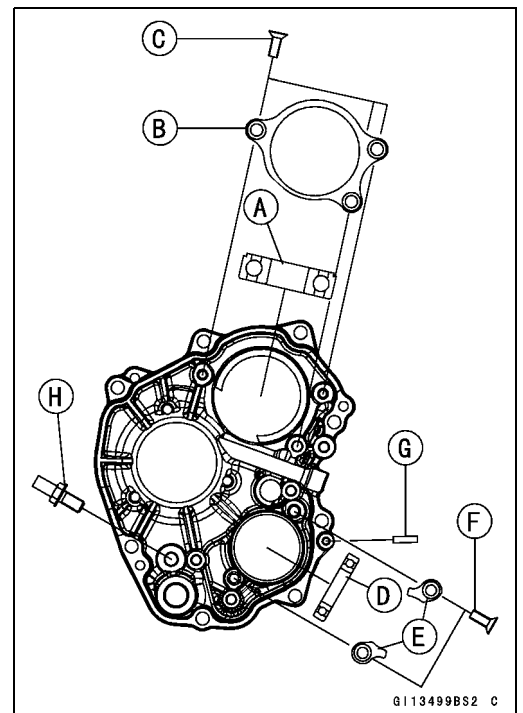
**Torque - Transmission Case Bearing Holder Bolts: 4.9 N·m
(0.50 kgf·m, 43 in·lb)**

- Install the ball bearing [D] until it is bottomed.
- Install the bearing holders [E].
- Turn the flat side to the bottom.
- Apply a non-permanent locking agent to the bearing holder bolts [F].
- Tighten:

**Torque - Transmission Case Bearing Holder Bolts: 4.9 N·m
(0.50 kgf·m, 43 in·lb)**

- Install the pin [G] until it is bottomed.
- Apply a non-permanent locking agent to the shift shaft return spring pin [H].
- Tighten:

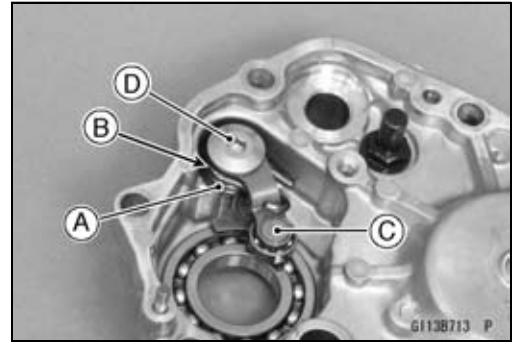
**Torque - Shift Shaft Return Spring Pin: 29 N·m (3.0 kgf·m,
21 ft·lb)**



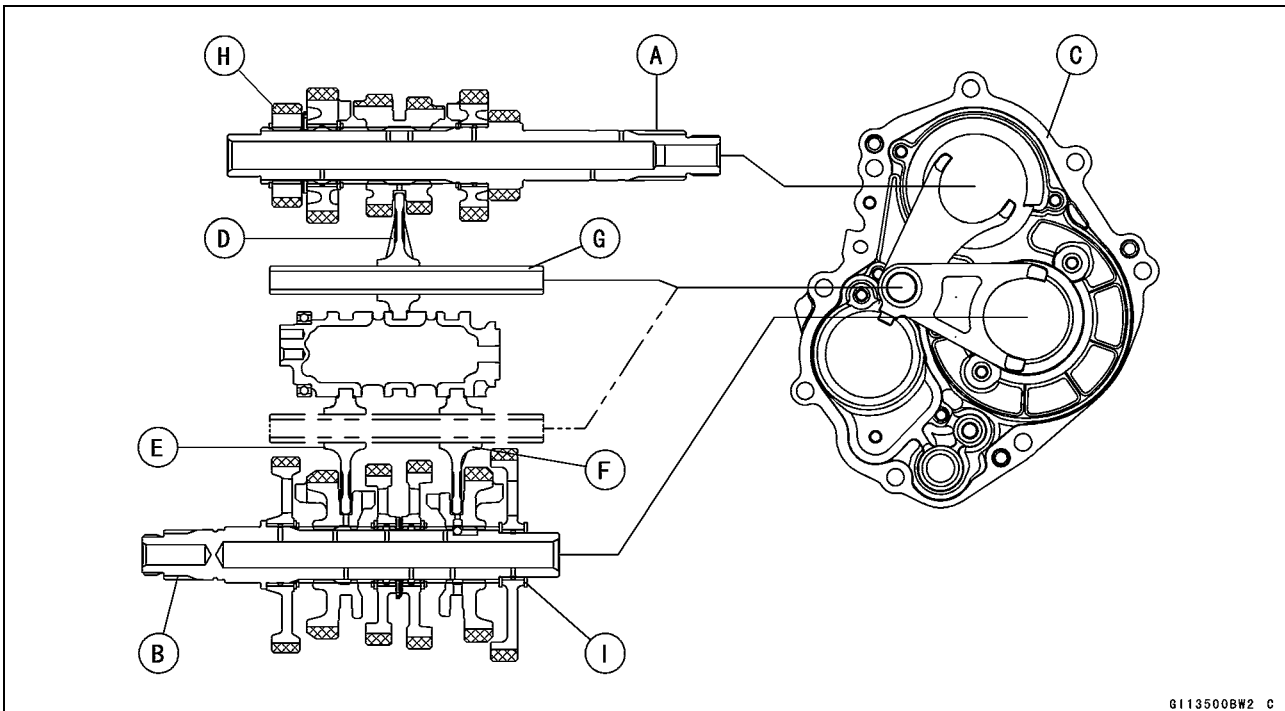
9-40 CRANKSHAFT/TRANSMISSION

Transmission

- Install the following parts as shown in the figure.
Spring [A]
Washer [B]
Gear Positioning Lever [C]
- Tighten:
Torque - Gear Positioning Lever Bolt [D]: 12 N·m (1.2 kgf·m, 106 in·lb)
- Install the shift ratchet assembly (see External Shift Mechanism Installation).



- Install the drive shaft [A] and output shaft [B] as a set in the transmission case [C].
- Install the shift forks as shown in the figure.
 - The shift fork [D] for drive shaft has “A2” mark. Turn the mark to the upside.
 - The shift forks [E] for output shaft have “A1” mark. Turn the mark to the bottom.
 - The shift forks [F] for output shaft have “A3” mark. Turn the mark to the bottom.
- Install the shift rod [G].
- Apply molybdenum disulfide oil to the transmission gears (x marks) [H].
- Install the washer [I] on the output shaft.



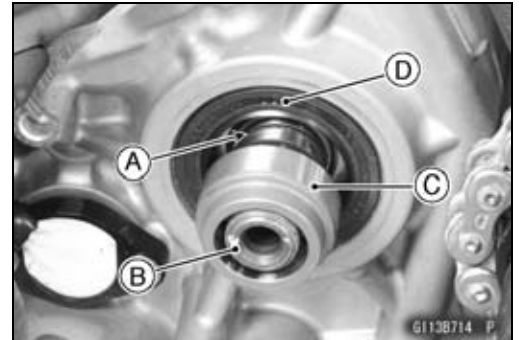
Transmission Assy Installation

- Assemble the transmission assy (see Transmission Assy Assembly).
- Be sure that the dowel pins are in position.
- Install the transmission assy on the crankcase.
- Tighten:
Torque - Transmission Case Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)

Transmission

- Install:
 - Shift Shaft (see External Shift Mechanism Installation)
 - Shift Lever (see Shift Lever Installation)
- Set the gear positioning lever to the neutral position.
- Check that the drive and output shaft turn freely.

- Apply grease to the 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 oil to the outer circumference of the oil seal so that it will go into place smoothly.
 - Install the oil seal to the crankcase so that the surface of the oil seal is flush with the surface of the crankcase.
- Install the removed parts (see appropriate chapters).



Transmission Shaft Removal

- Refer to the Transmission Assy Disassembly.

Transmission Shaft Installation

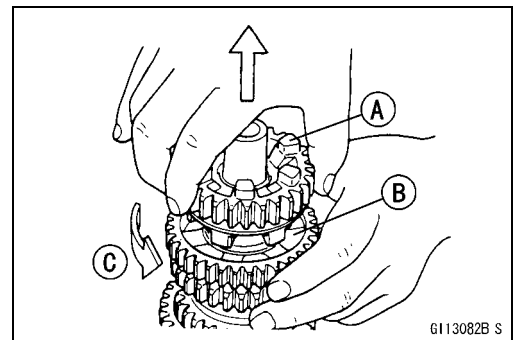
- Refer to the Transmission Assy Assembly.

Transmission Shaft Disassembly

- Remove the transmission shafts (see Transmission Shaft Removal).
- Remove the circlips, and then disassemble the transmission shafts.

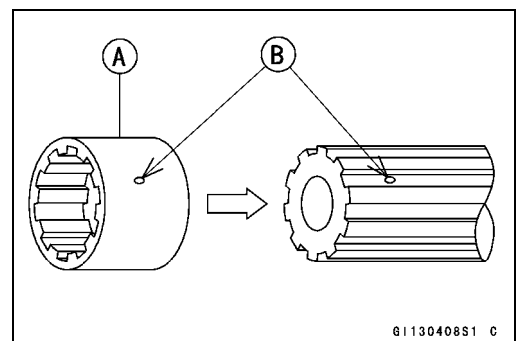
Special Tool - Outside Circlip Pliers: 57001-144

- 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 as follows.
 - 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

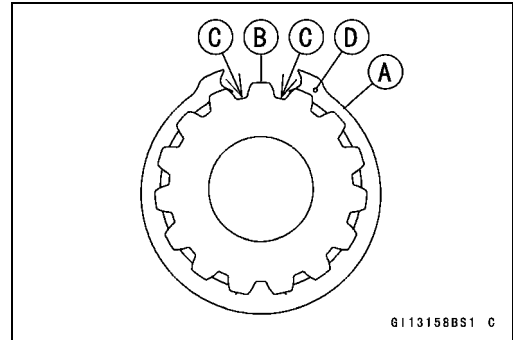
- Apply molybdenum disulfide oil to the sliding surfaces of the gears and shafts.
- Install the gears and the gear bushings [A] with their holes [B] aligned.



9-42 CRANKSHAFT/TRANSMISSION

Transmission

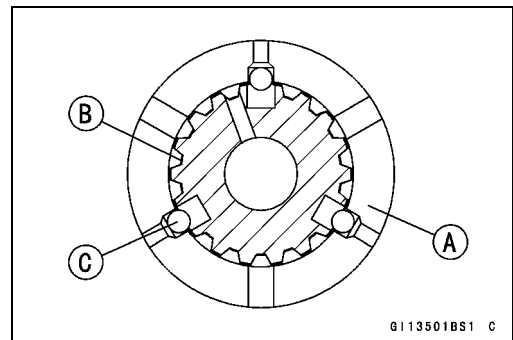
- Replace any circlips removed with new ones.
- Install the circlips [A] so that the opening [B] of it is aligned with spline grooves [C].
- Install the circlips so that the mark [D] on them faces to each gear side.



- 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 gear 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.
- Fit the steel balls into the 5th gear holes in the output shaft.
 - 5th Gear [A]
 - Output Shaft [B]
 - Steel Balls [C]

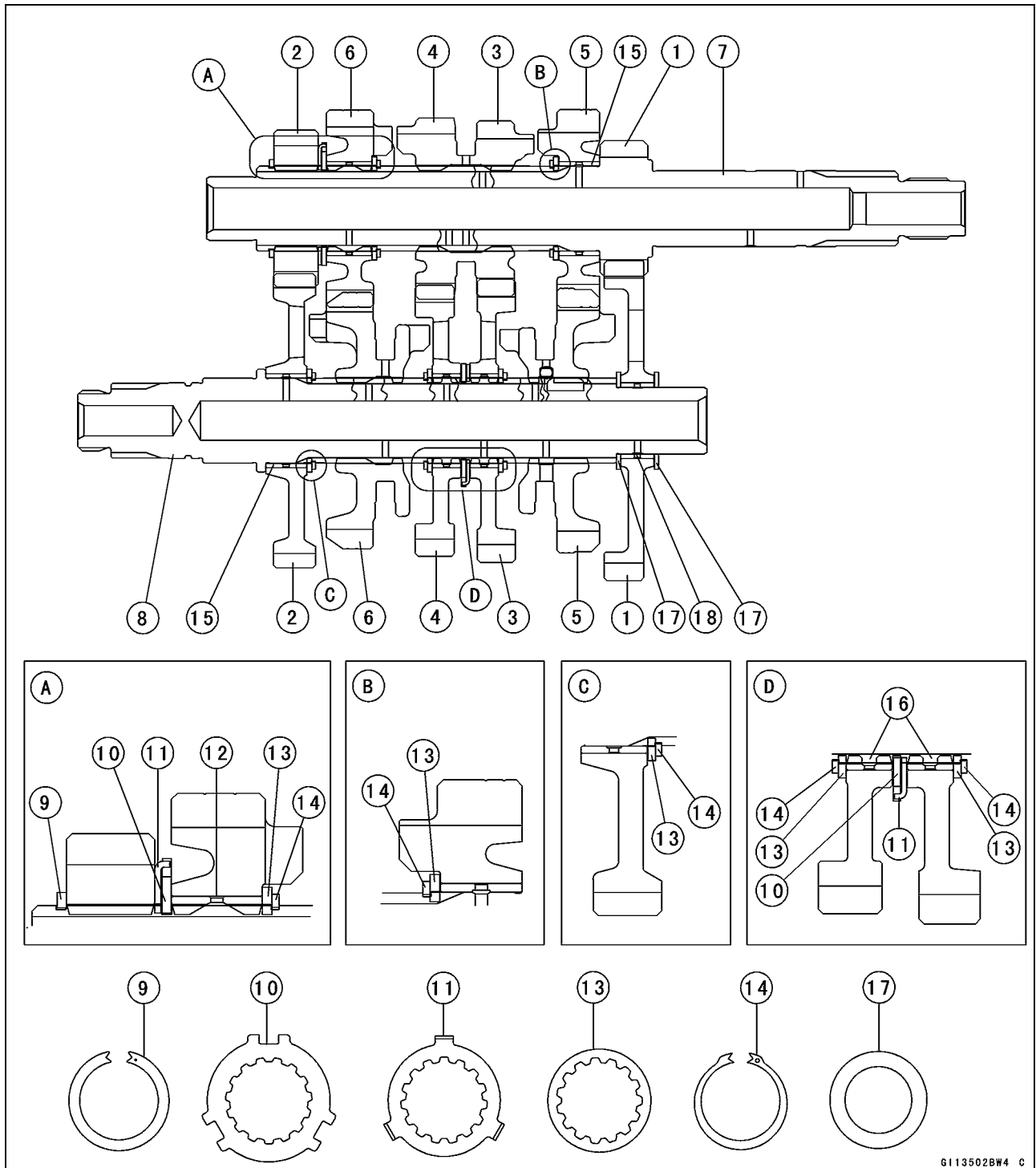
NOTICE

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



G113502BW4 C

- | | |
|--|---|
| <ul style="list-style-type: none"> 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. Circlip (Turn the punch mark to the gear.) 10. Toothed Washer | <ul style="list-style-type: none"> 11. Toothed Washer 12. Toothed Bushing, L = 15 mm (0.60 in.) 13. Toothed Washer 14. Circlip (Turn the punch mark to the washer.) 15. Bushing, $\phi 31$ mm (1.2 in.) 16. Toothed Bushing, L = 9.4 mm (0.37 in.) 17. Washer 18. Bushing, $\phi 25$ mm (1.0 in.) |
|--|---|

9-44 CRANKSHAFT/TRANSMISSION

Transmission

Shift Drum and Fork Removal

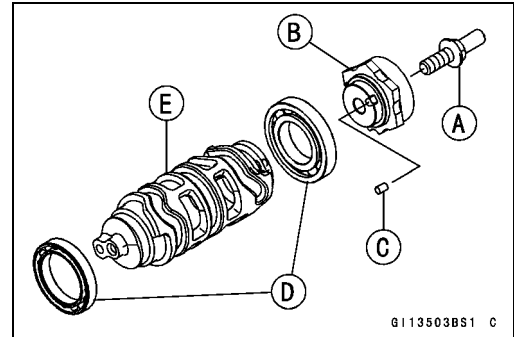
- Refer to the Transmission Assy Disassembly.

Shift Drum and Fork Installation

- Refer to the Transmission Assy Assembly.

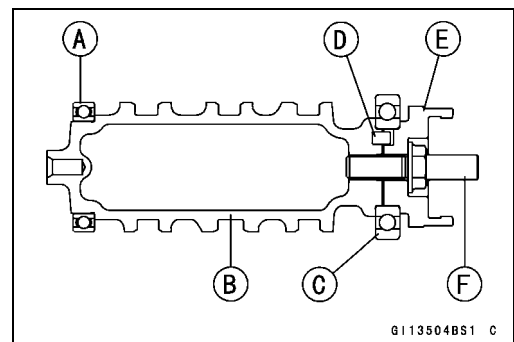
Shift Drum Disassembly

- 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]



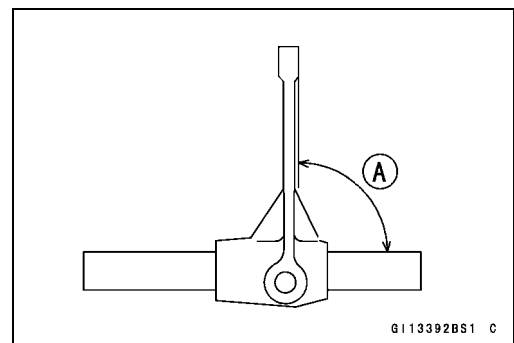
Shift Drum Assembly

- Press and insert 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 shift drum cam holder bolt [F].
- Tighten:
 - Torque - Shift Drum Cam Holder Bolt: 24 N·m (2.4 kgf·m, 18 ft·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: 5.7 ~ 6.0 mm (0.224 ~ 0.236 in.)

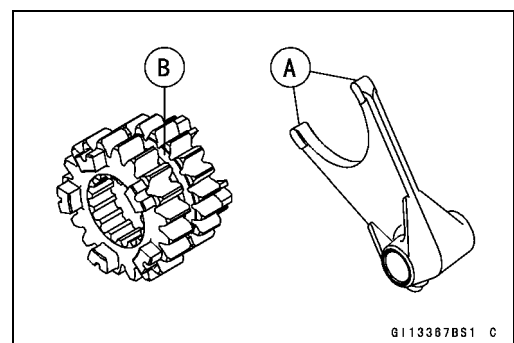
Service Limit: 5.6 mm (0.220 in.)

- ★ 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 [B] of each shift drum groove.
- ★ If the guide pin on any shift fork is less than the service limit, the fork must be replaced.

Shift Fork Guide Pin Diameter

Standard: 6.9 ~ 7.0 mm (0.272 ~ 0.276 in.)

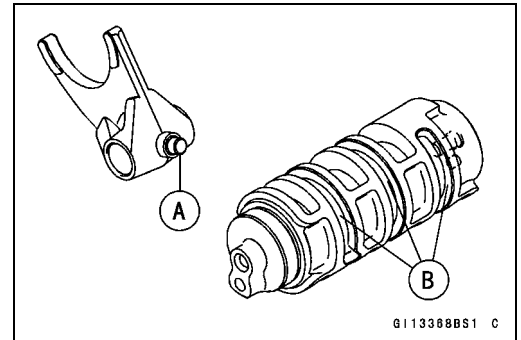
Service Limit: 6.8 mm (0.268 in.)

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

Shift Drum Groove Width

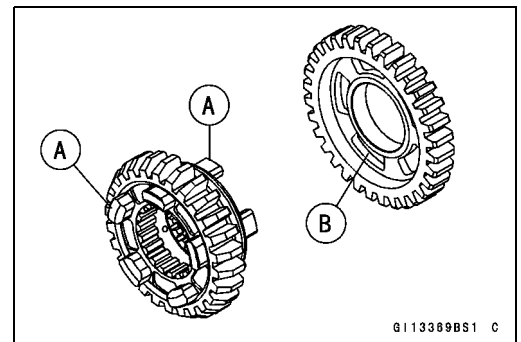
Standard: 7.05 ~ 7.20 mm (0.278 ~ 0.283 in.)

Service Limit: 7.3 mm (0.287 in.)



Gear Dog and Gear Dog Hole Damage 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.

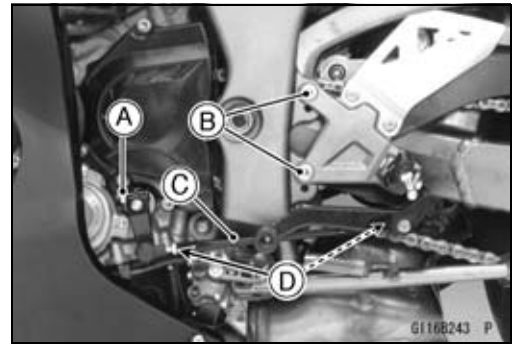


9-46 CRANKSHAFT/TRANSMISSION

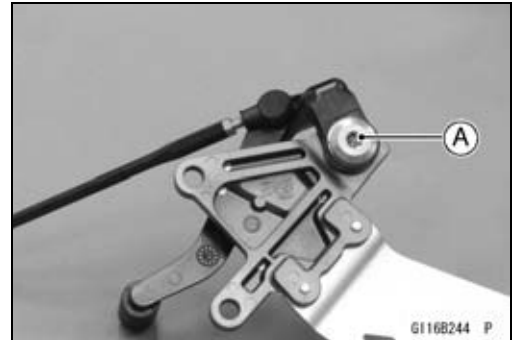
External Shift Mechanism

Shift Pedal Removal

- Remove:
 - Shift Lever Bolt [A]
 - Front Footpeg Bracket Bolts [B]
- ★ If the tie-rod [C] is to be removed from the shift pedal and the shift lever, loosen the tie-rod locknuts [D].
- The front tie-rod locknut is left-hand thread.

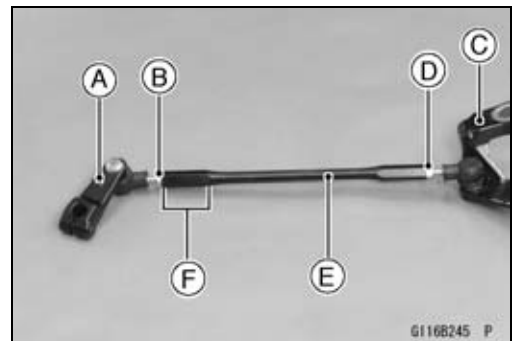


- Remove:
 - Shift Pedal Mounting Bolt [A]

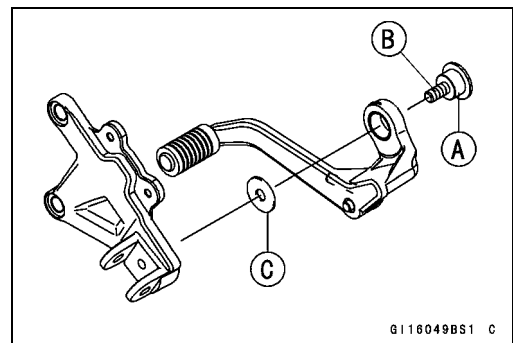


Shift Pedal Installation

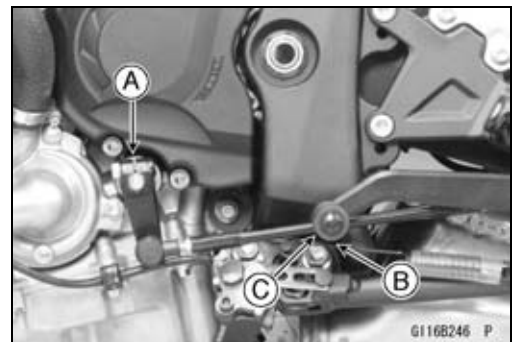
- Install the rubber damper to the shift pedal.
- Turn the chamfered side to inside.
- Assemble:
 - Shift Lever [A] and Locknut [B] (Left-hand Thread)
 - Shift Pedal [C] and Locknut [D]
 - Tie-Rod [E]
- Turn the grooved end [F] of the tie-rod to the shift lever.



- Apply grease to the sliding surface [A] on the shift pedal mounting bolt [B].
- Apply a non-permanent locking agent to the thread of the shift pedal mounting bolt.
- Install:
 - Washer [C]
 - Shift Pedal Assembly
- Tighten:
 - Torque - Shift Pedal Mounting Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)**



- Align the punch mark on the shift shaft with the slit [A] of the shift lever.
- Tighten the shift lever bolt.
- After installation, the shift pedal lower surface [B] aligns with the tie-rod lower surface [C].
- ★ 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.

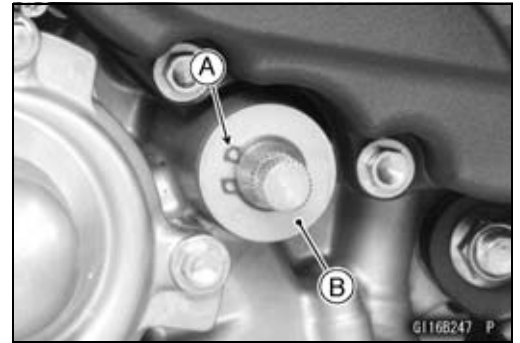


External Shift Mechanism

External Shift Mechanism Removal

- Remove:
 - Shift Lever (see Shift Pedal Removal)
 - Oil Pump Drive Gear (see Oil Pump Drive Gear Removal/Installation in the Engine Lubrication System chapter)
 - Circlip [A]
 - Washer [B]

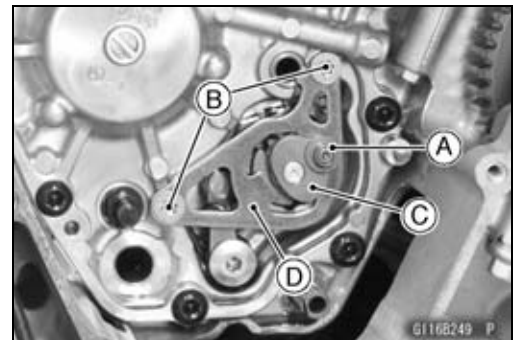
Special Tool - Outside Circlip Pliers: 57001-144



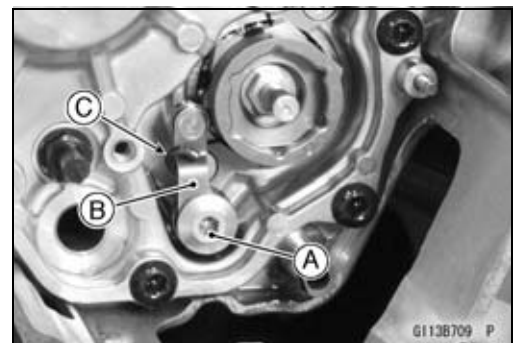
- Remove:
 - Shift Shaft Assembly [A]
 - Washer [B]
- Take care not to drop the parts into the crankcase.



- Remove:
 - Collar [A]
 - Bolts [B]
 - Shift Ratchet Assembly [C] and Holder [D]

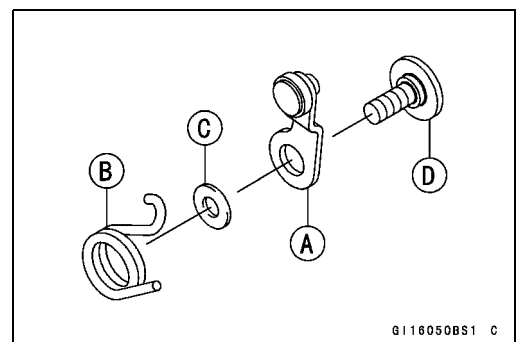


- Remove:
 - Gear Positioning Lever Bolt [A]
 - Gear Positioning Lever [B]
 - Washer and Spring [C]



External Shift Mechanism Installation

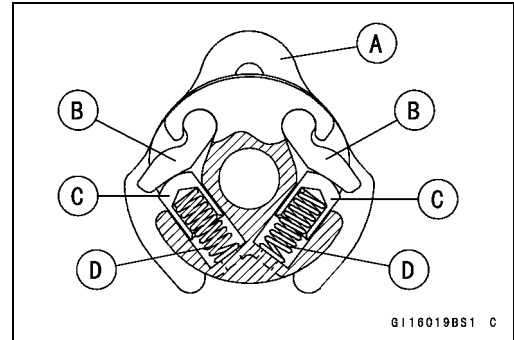
- Install the gear positioning lever [A] as shown in the figure.
- Install:
 - Spring [B]
 - Washer [C]
- Tighten:
 - Torque - Gear Positioning Lever Bolt [D]: 12 N·m (1.2 kgf·m, 106 in·lb)**



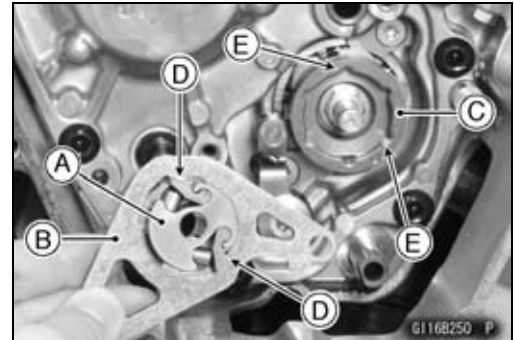
9-48 CRANKSHAFT/TRANSMISSION

External Shift Mechanism

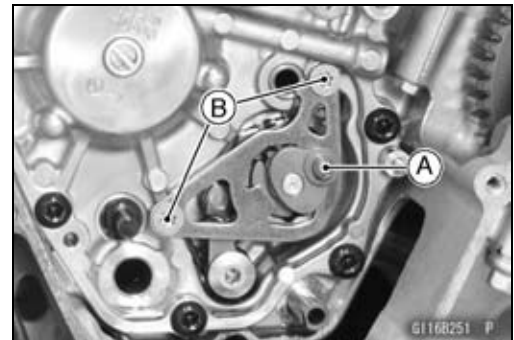
- Assemble:
 - Ratchet [A]
 - Pawls [B]
 - Pins [C]
 - Springs [D]



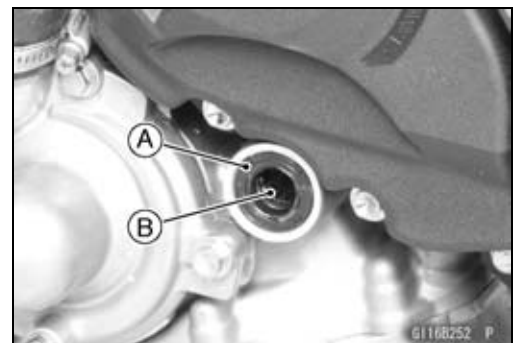
- Install the shift ratchet assembly [A] to the holder [B] as shown in the figure.
- Install the shift ratchet assembly to the shift drum cam [C].
- Fit the pawls [D] and the grooves [E].



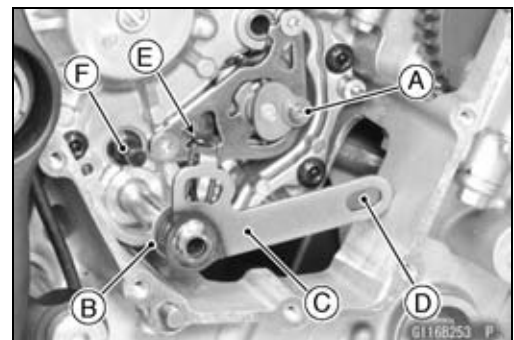
- Set the shift ratchet assembly [A] as shown in the figure.
- Turn the shift ratchet assembly while pushing the pawls.
- Apply a non-permanent locking agent to the shift ratchet assembly holder bolts [B].
- Tighten:
 - Torque - Shift Ratchet Assembly Holder Bolts: 15 N·m (1.5 kgf·m, 11 ft·lb)**



- Replace the oil seal [A] with a new one.
- Apply grease to the lips of the grease seal.
- Apply engine oil to the needle bearing [B].

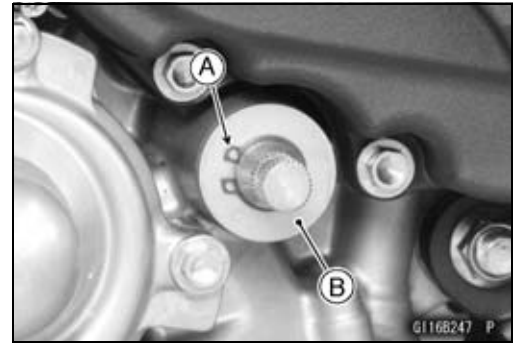


- Install:
 - Collar [A]
 - Washer [B]
 - Shift Shaft Assembly [C]
- Fit the hole [D] and the collar.
- Fit the return spring [E] and the pin [F].



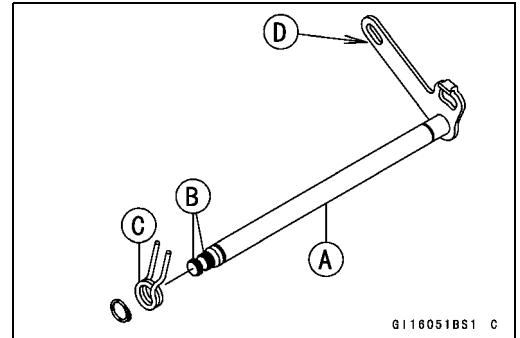
External Shift Mechanism

- Replace the circlip [A] with a new one.
 - Install:
 - Washer [B]
 - Circlip
- Special Tool - Outside Circlip Pliers: 57001-144**
- Fit the circlip into the groove of the shift shaft securely.

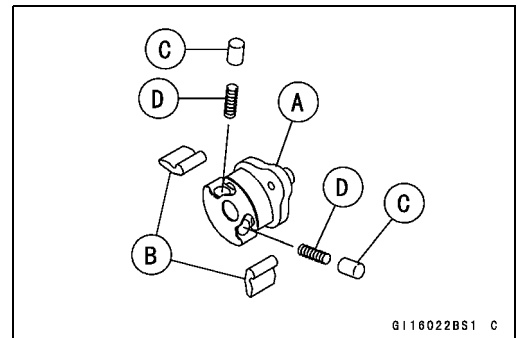


External Shift Mechanism Inspection

- Examine the shift shaft [A] for any damage.
- ★ If the shaft is bent, straighten or replace it.
- ★ If the serration [B] are damaged, replace the shaft.
- ★ If the spring [C] is damaged in any way, replace it.
- ★ If the shift mechanism arm [D] is damaged in any way, replace the shaft.



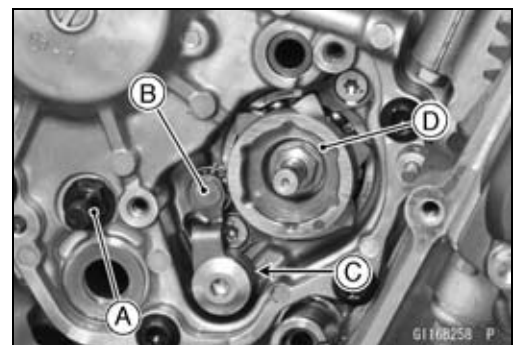
- Check the shift ratchet assembly for any damage.
- ★ If the ratchet [A], pawls [B], pins [C] or springs [D] are damaged in any way, replace them.



- Check the return spring pin [A] is not loose.
- ★ If it is loose, unscrew it, apply a non-permanent locking agent to the threads, and tighten it.

Torque - Shift Shaft Return Spring Pin: 29 N·m (3.0 kgf·m, 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.



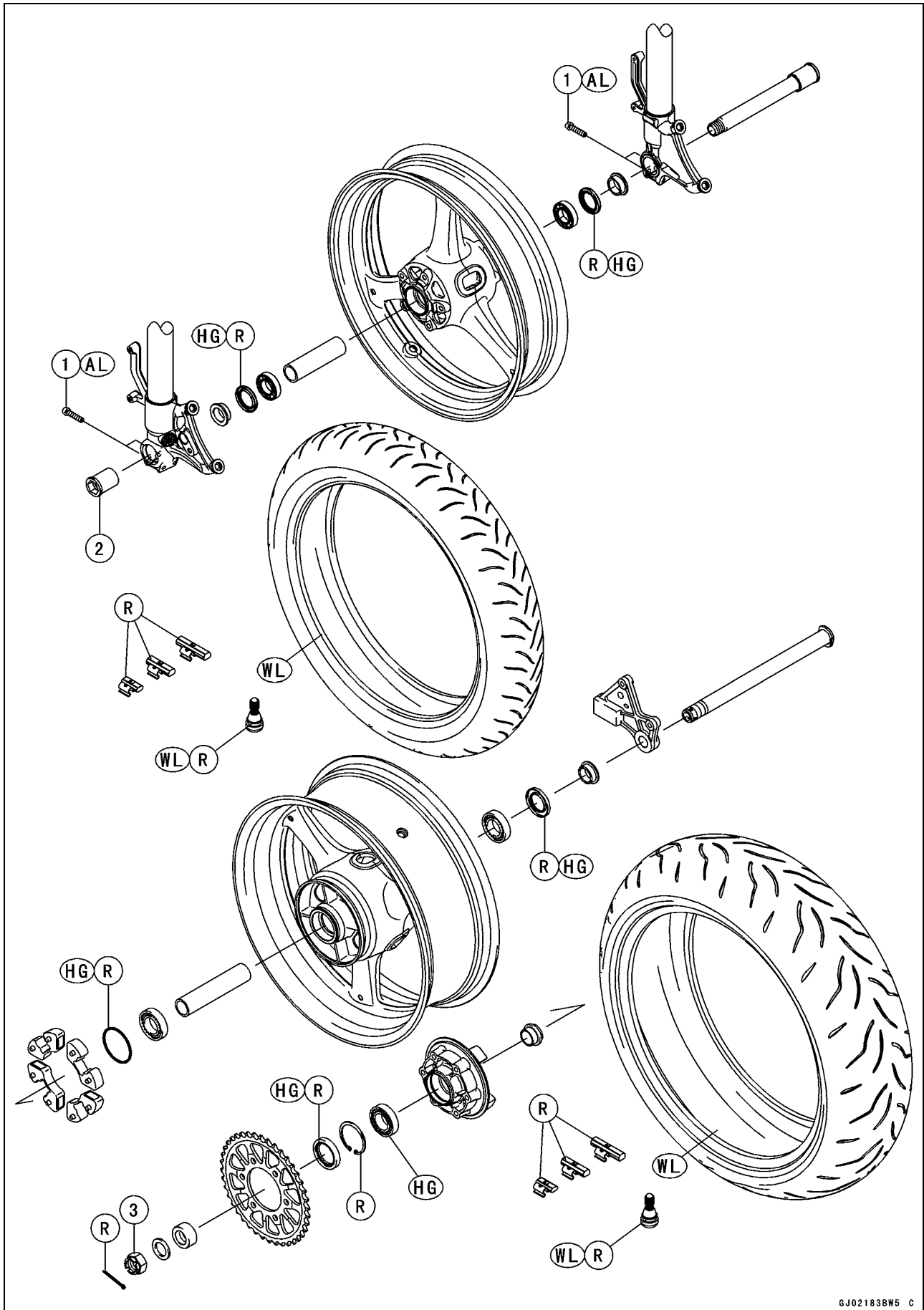
Wheels/Tires

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10-2 WHEELS/TIRES

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 Nut	127	13.0	94	
3	Rear Axle Nut	127	13.0	94	

AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque.

HG: Apply high-temperature grease.

R: Replacement Parts

WL: Apply soap and water solution or rubber lubricant.

10-4 WHEELS/TIRES

Specifications

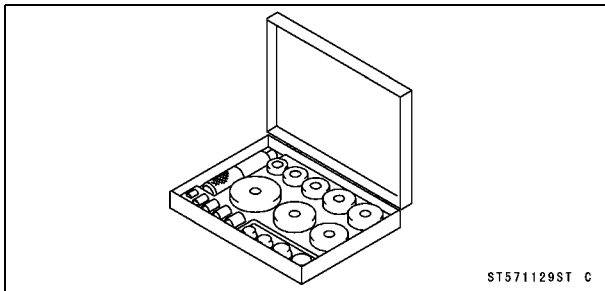
Item	Standard	Service Limit
Wheels (Rims)		
Rim Runout:		
Axial	TIR 0.5 mm (0.02 in.) or less	TIR 1.0 mm (0.04 in.)
Radial	TIR 0.8 mm (0.03 in.) or less	TIR 1.0 mm (0.04 in.)
Axle Runout/100 mm (3.94 in.)	TIR 0.03 mm (0.0012 in.) or less	TIR 0.2 mm (0.008 in.)
Wheel Balance	10 g (0.35 oz.) or less	---
Balance Weights	10 g (0.35 oz.), 20 g (0.71 oz.), 30 g (1.06 oz.)	---
Rim Size:		
Front	J17M/C × MT3.50	---
Rear	J17M/C × MT6.00	---
Tires		
Air Pressure (when Cold):		
Front	Up to 180 kg (397 lb) load: 250 kPa (2.50 kgf/cm ² , 36 psi)	---
Rear	Up to 180 kg (397 lb) load: 290 kPa (2.90 kgf/cm ² , 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	5.3 mm (0.21 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, BATTLEAX BT016F CC	120/70 ZR17 M/C (58 W)
Rear	BRIDGESTONE, BATTLEAX BT016R CC	190/55 ZR17 M/C (75 W)

WARNING

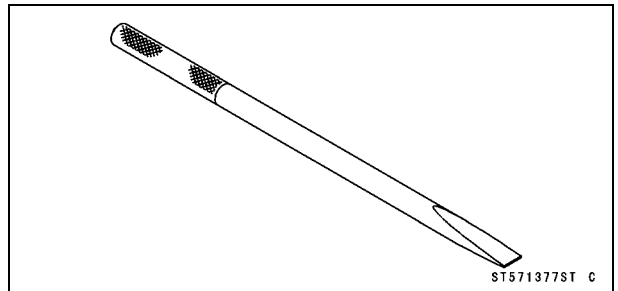
Some replacement tires may adversely affect handling and cause an accident resulting in serious injury or death. To ensure proper handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.

Special Tools

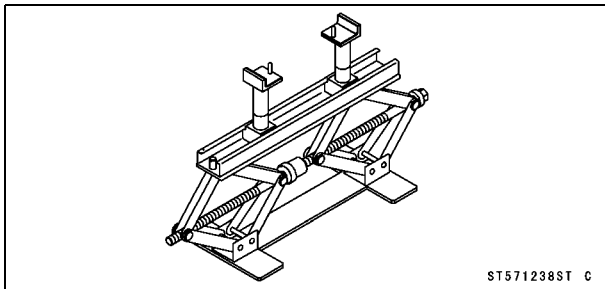
Bearing Driver Set:
57001-1129



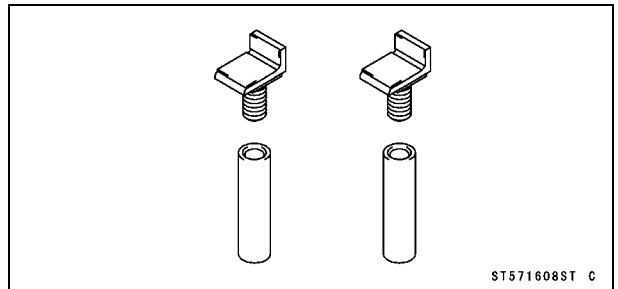
Bearing Remover Shaft, $\phi 13$:
57001-1377



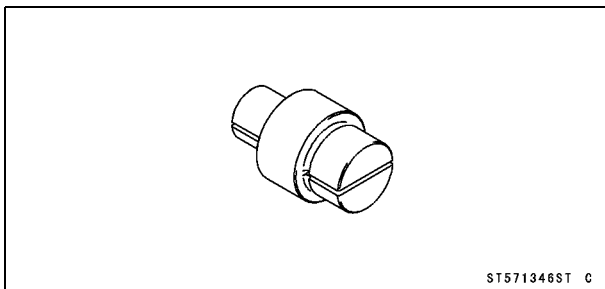
Jack:
57001-1238



Jack Attachment:
57001-1608



Bearing Remover Head, $\phi 25 \times \phi 28$:
57001-1346



10-6 WHEELS/TIRES

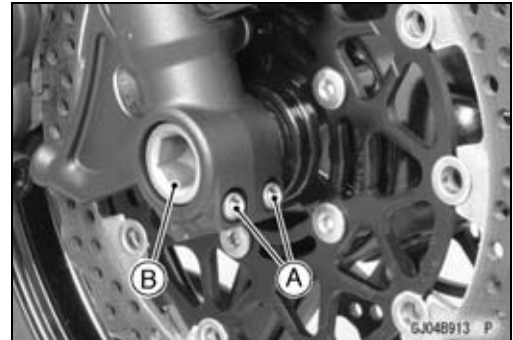
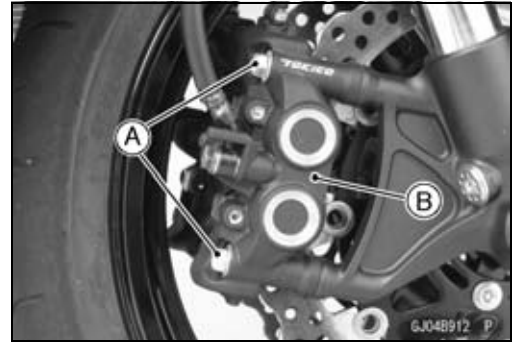
Wheels (Rims)

Front Wheel Removal

- Remove:
 - Front Caliper Mounting Bolts [A] (Both Sides)
 - Front Caliper [B] (Both Sides)

- Loosen:
 - Front Axle Clamp Bolts [A] (Right Side)
 - Front Axle [B]

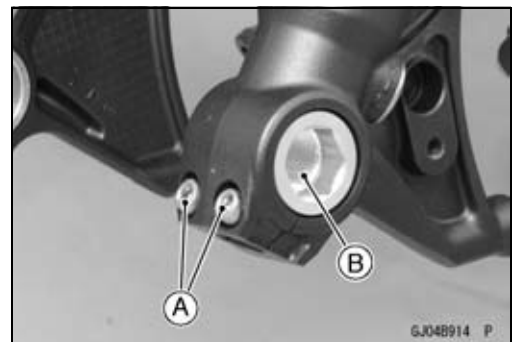
- Remove the lower fairings (see Lower Fairing Removal in the Frame chapter).
- Raise the front wheel off the ground.
 - Special Tools - Jack: 57001-1238**
 - Jack Attachment: 57001-1608**
- Pull out the front axle to the right side and drop the front wheel out of the front forks.



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.

- Loosen the front axle clamp bolts (left side) [A] and remove the front axle nut [B].



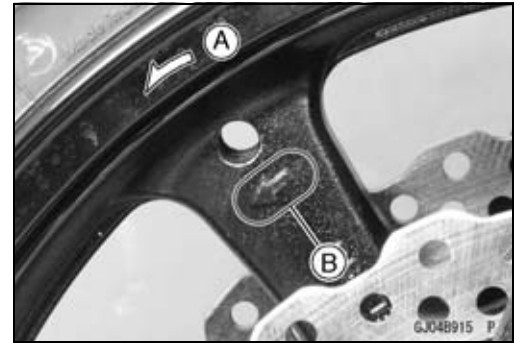
Wheels (Rims)

Front Wheel Installation

NOTE

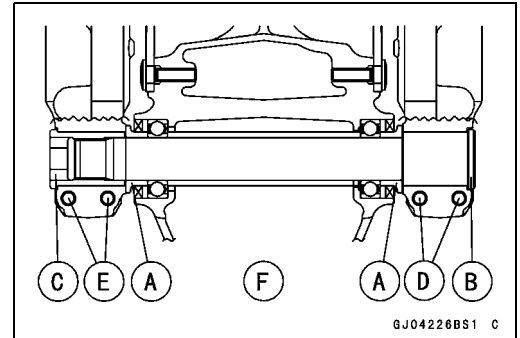
○The direction of the wheel rotation [A] is shown by an arrow [B] on the wheel spoke.

- Check the wheel rotation mark on the front wheel and install it.



- 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 the front axle nut [C].
- Right Front Axle Clamp Bolts [D]
- Left Front Axle Clamp Bolts [E]
- Viewed from Rear [F]

Torque - Front Axle Nut: 127 N·m (13.0 kgf·m, 94 ft·lb)



- 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 the front axle clamp bolts on the right fork leg first. Next, tighten the left front axle clamp bolts.

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.

10-8 WHEELS/TIRES

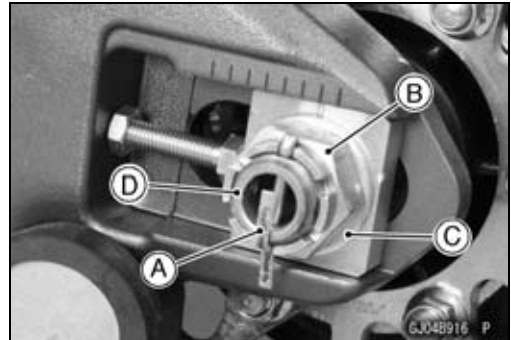
Wheels (Rims)

Rear Wheel Removal

- Raise the rear wheel off the ground with the stand [A].



- Remove:
 - Cotter Pin [A]
 - Rear Axle Nut [B]
 - Washer [C]
 - Rear Axle [D] (from Right Side)
- Remove the rear wheel rotation sensor from the caliper bracket (see Rear Wheel Rotation Sensor Removal in the Brakes chapter).



- Remove the drive chain [A] from the rear sprocket toward the left.
- Move the rear wheel back and remove it.

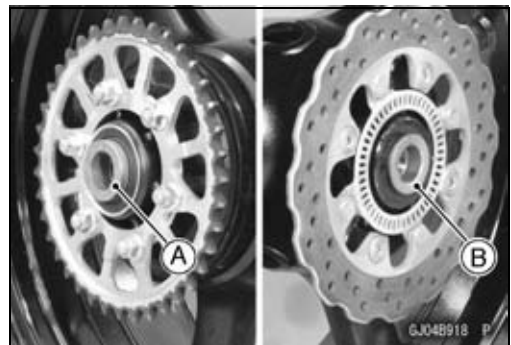


NOTICE

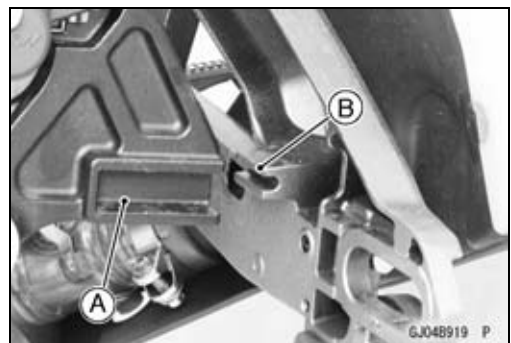
Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

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.
- 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:



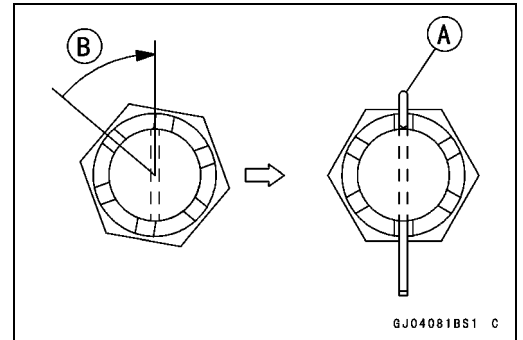
Torque - Rear Axle Nut: 127 N·m (13.0 kgf·m, 94 ft·lb)

Wheels (Rims)

- Insert a new cotter pin [A].

NOTE

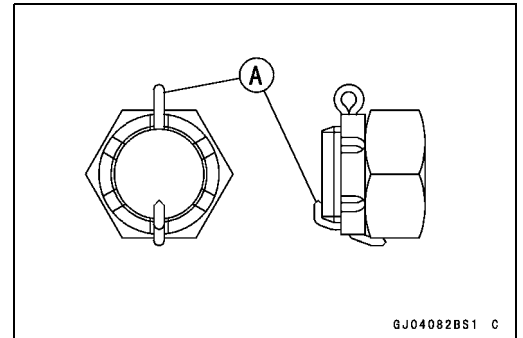
- When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axle, tighten the nut clockwise [B] up to next alignment.
- It should be within 30°.
- Loosen once and tighten again when the slot goes past the nearest hole.



- 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.

10-10 WHEELS/TIRES

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.

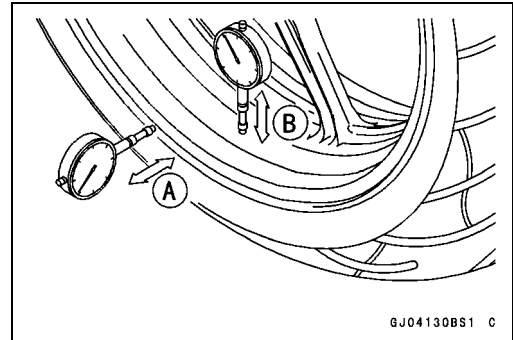
Rim Runout (with tire installed)

Standard:

- Axial** **TIR 0.5 mm (0.02 in.) or less**
- Radial** **TIR 0.8 mm (0.03 in.) or less**

Service Limit:

- Axial** **TIR 1.0 mm (0.04 in.)**
- Radial** **TIR 1.0 mm (0.04 in.)**



⚠ WARNING

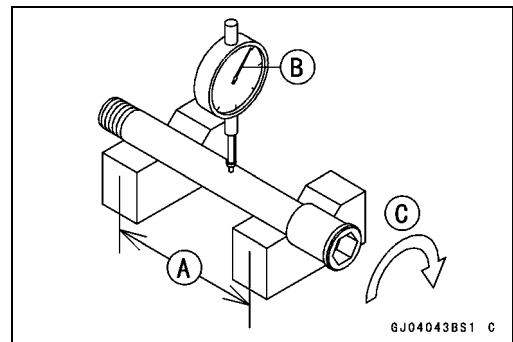
Damaged wheel parts may fail and cause an accident resulting in serious injury or death. Never attempt to repair a damaged wheel part. If the wheel part is damaged, it must be replaced with a new one.

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.)

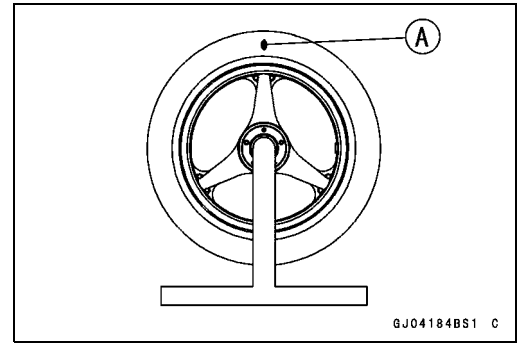
- Standard:** **TIR 0.03 mm (0.0012 in.) or less**
- Service Limit:** **TIR 0.2 mm (0.008 in.)**



Wheels (Rims)

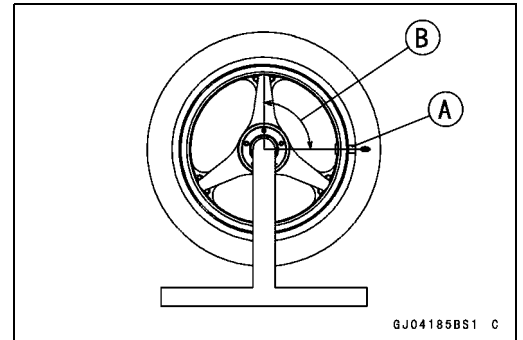
Balance Inspection

- 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).



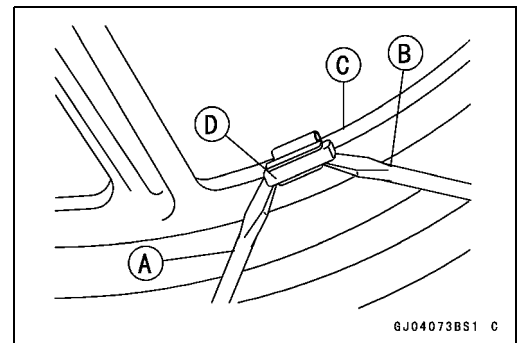
Balance Adjustment

- 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 a regular tip screwdrivers [A] [B] between the rib [C] and weight [D] as shown in the figure.
- 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.

10-12 WHEELS/TIRES

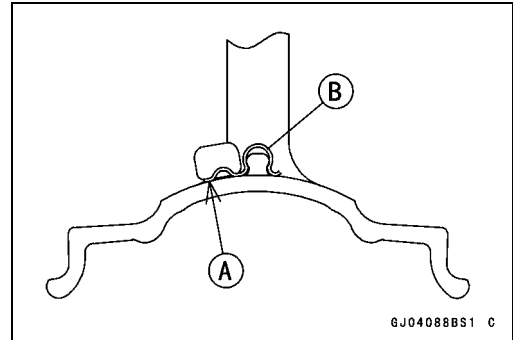
Wheels (Rims)

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.

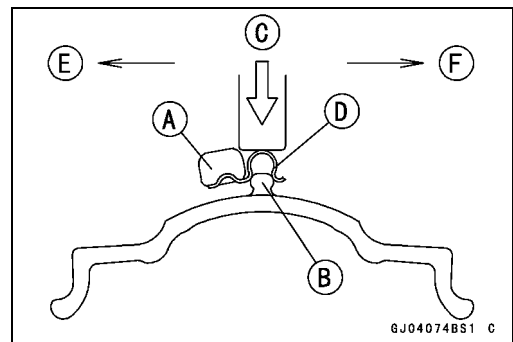


Balance Weight

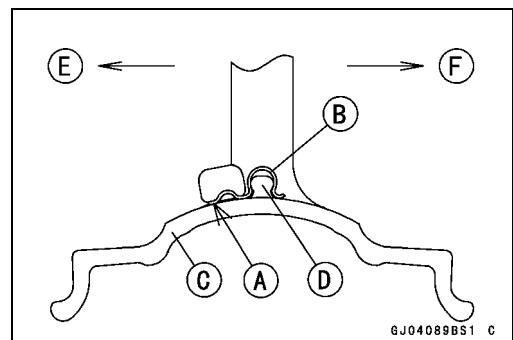
Part Number	Weight
41075-0007	10 g (0.35 oz.)
41075-0008	20 g (0.71 oz.)
41075-0009	30 g (1.06 oz.)

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

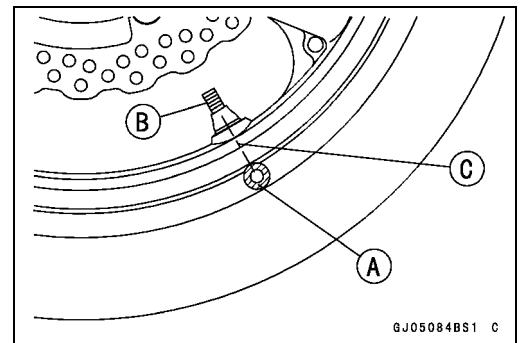
- Refer to the Air Pressure Inspection in the Periodic Maintenance chapter.

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

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.

- 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.

10-14 WHEELS/TIRES

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.

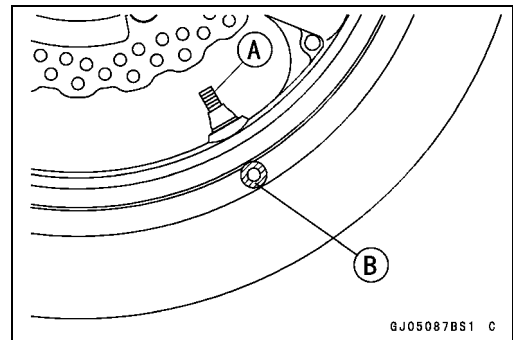
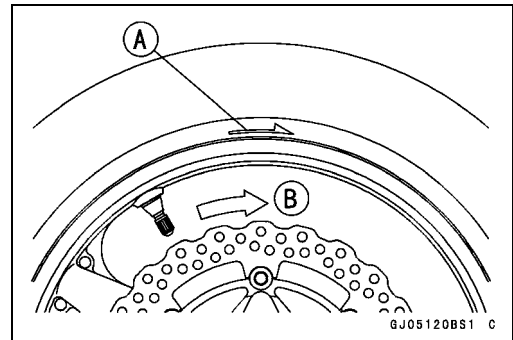
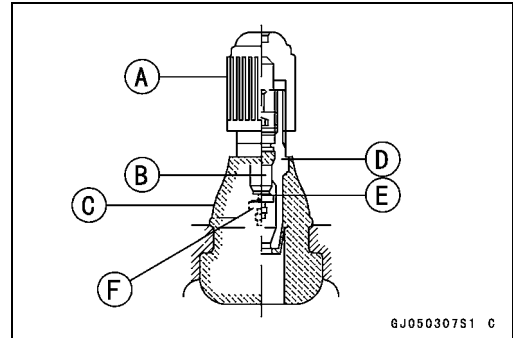
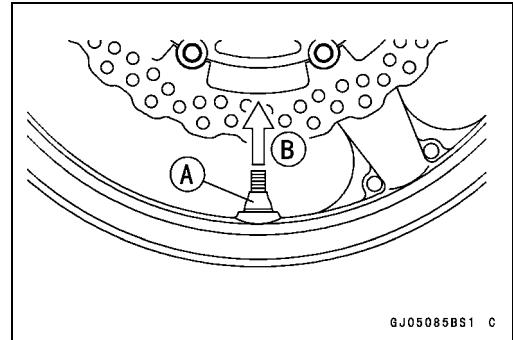
- The air valve is shown in the figure.

Valve Cap [A]
Valve Core [B]
Stem Seal [C]
Valve Stem [D]
Valve Seat [E]
Valve Opened [F]

- Check the tire rotation mark on the front and rear tires and install them on the rim accordingly.

Tire Rotation Mark [A]
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.

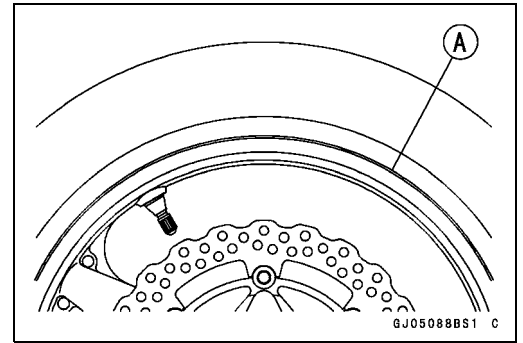


⚠ WARNING

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 kg/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.

10-16 WHEELS/TIRES

Hub Bearing

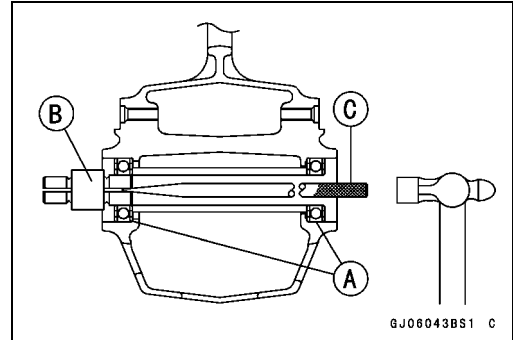
Hub Bearing Removal

- 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, $\phi 25 \times \phi 28$ [B]: 57001-1346
Bearing Remover Shaft, $\phi 13$ [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

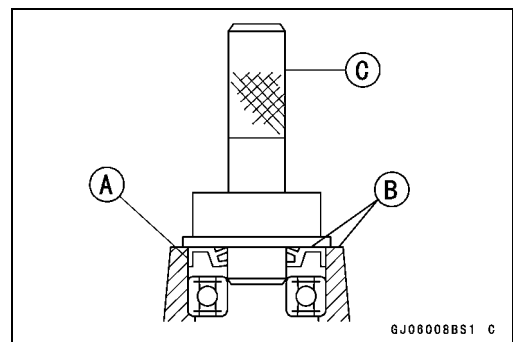
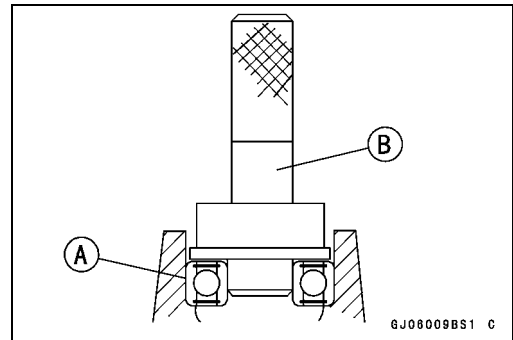
○ Install the bearings so that the marked side faces out.

- Press in each right the bearing [A] until they are bottomed.

Special Tool - Bearing Driver Set [B]: 57001-1129

- 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



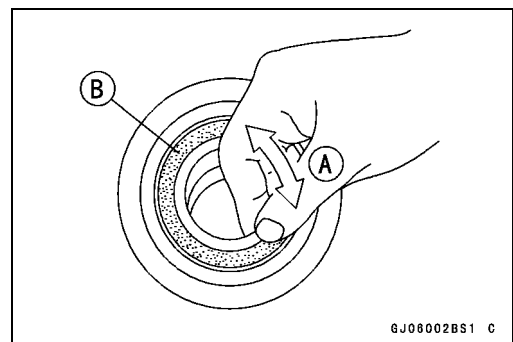
Hub Bearing Inspection

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

Hub Bearing Lubrication

NOTE

- *Since the hub bearings are packed with grease and sealed, lubrication is not required.*

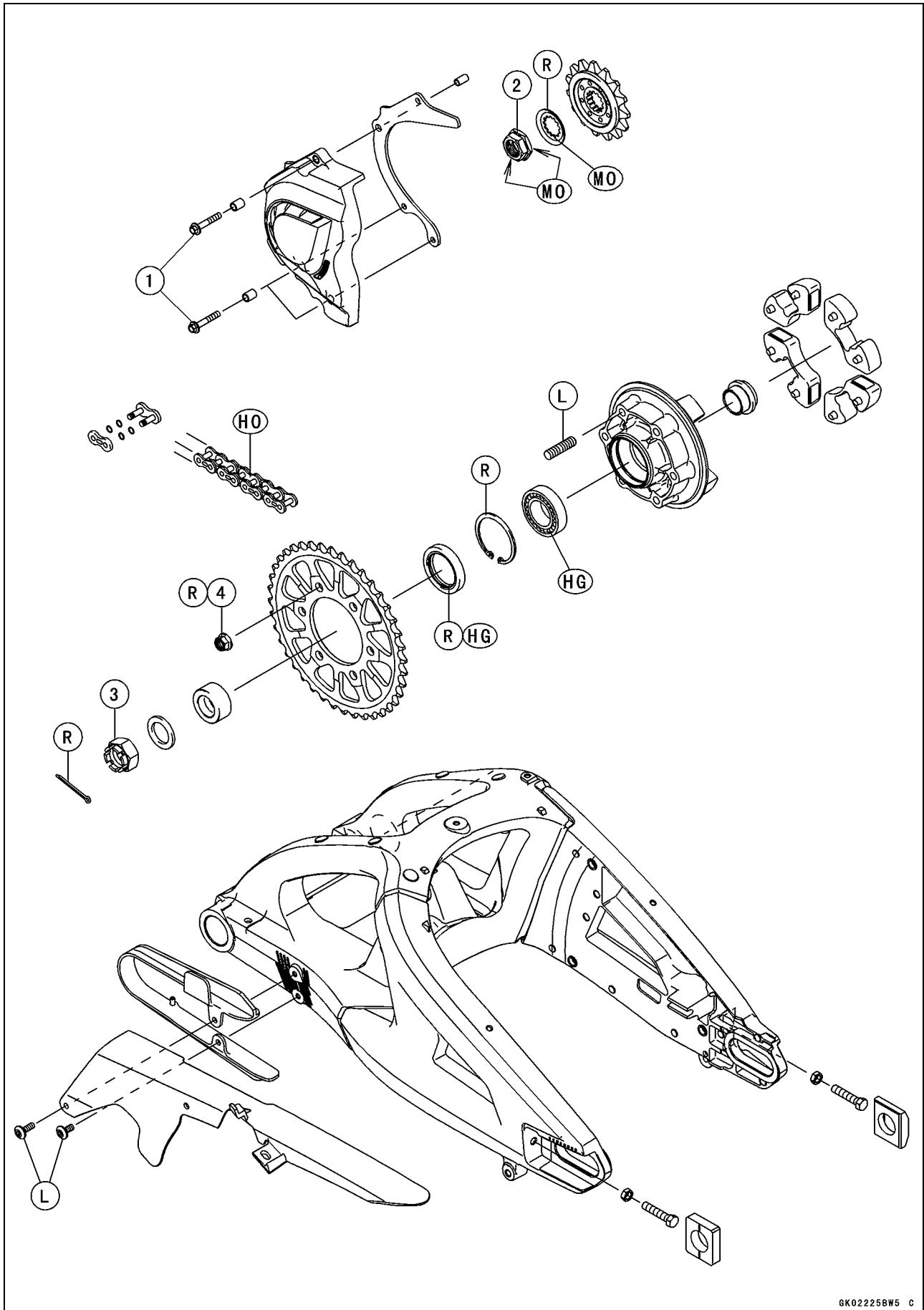
Final Drive

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11-2 FINAL DRIVE

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Engine Sprocket Cover Bolts	9.8	1.0	87 in·lb	
2	Engine Sprocket Nut	145	14.8	107	MO
3	Rear Axle Nut	127	13.0	94	
4	Rear Sprocket Nuts	59	6.0	44	R

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

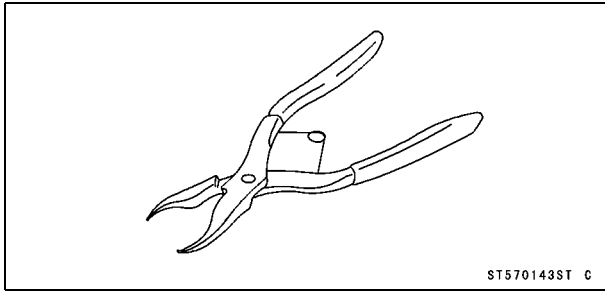
11-4 FINAL DRIVE

Specifications

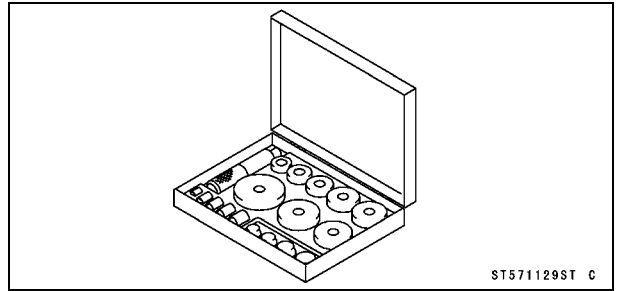
Item	Standard	Service Limit
Drive Chain		
Drive Chain Slack	25 ~ 35 mm (1.0 ~ 1.4 in.)	---
Drive Chain Wear (20-link Length)	317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)	323 mm (12.7 in.)
Standard Chain:		
Make	ENUMA	---
Type	EK525RMX/3D	---
Link	112 links	---
Sprockets		
Rear Sprocket Warp	TIR 0.4 mm (0.016 in.) or less	TIR 0.5 mm (0.020 in.)

Special Tools

Inside Circlip Pliers:
57001-143



Bearing Driver Set:
57001-1129



11-6 FINAL DRIVE

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

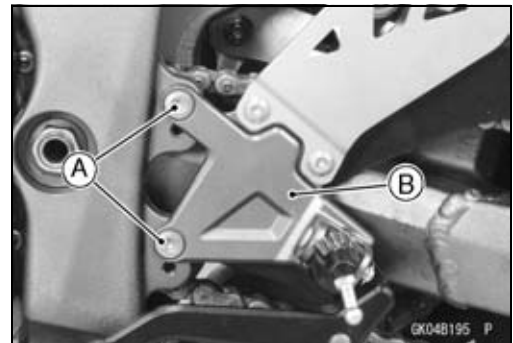
- Refer to the Chain Guide Wear Inspection in the Periodic Maintenance chapter.

Drive Chain Removal

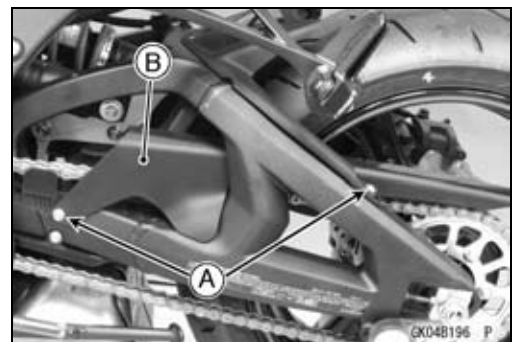
NOTE

- 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:
Bolts [A]
Front Footpeg Bracket [B]



- Remove:
Bolts [A]
Chain Cover [B]



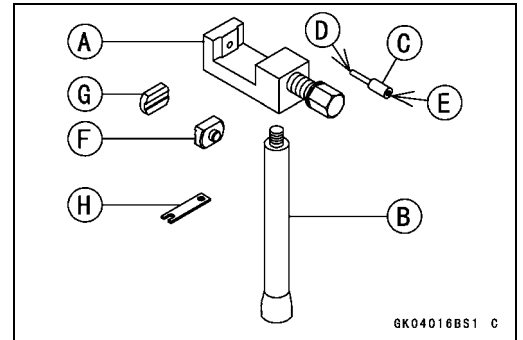
NOTICE

For safety, if the drive chain shall be replaced, replace it using a recommended tool.

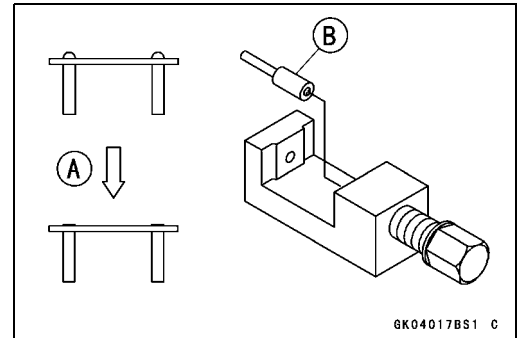
Recommended Tool - Type: EK Joint Tool #50
Brand: ENUMA

Drive Chain

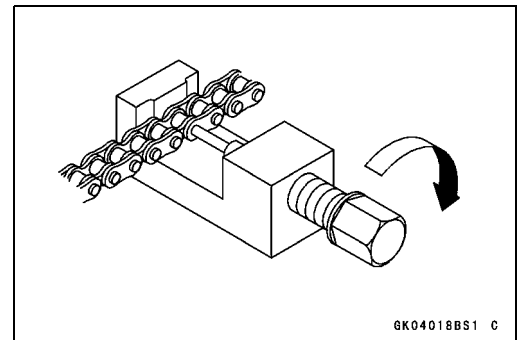
- Body [A]
- Handlebar [B]
- Cutting and Riveting Pin [C]
- For Cutting [D]
- For Riveting [E]
- Plate Holder (A) [F]
- Plate Holder (B) [G]
- Gauge [H]



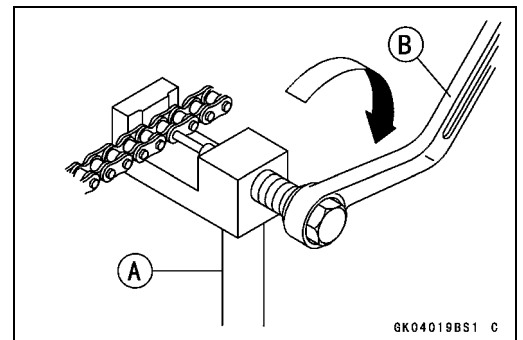
- Grind [A] the pin head to make it flat.
- Set the cutting and riveting pin [B] as shown in the figure.



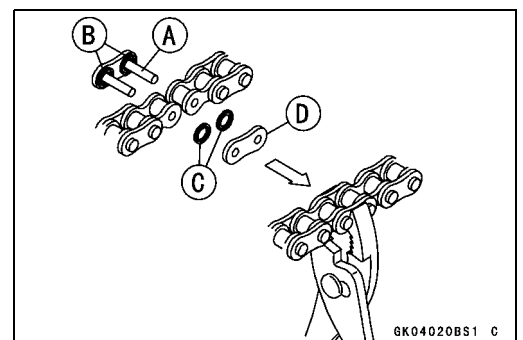
- Screw the pin holder until it touches the link pin.
- Be sure that the cutting pin hits center of the link pin.



- Screw the handlebar [A] into the body.
- Turn the pin holder with the wrench [B] clockwise to extract the link pin.



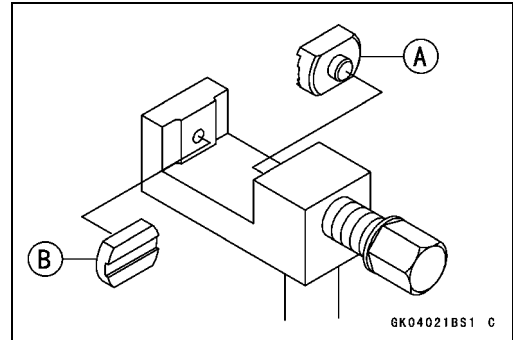
- Replace the link pin, link plate and grease seals.
- Apply grease to the link pins [A] and grease seals [B] [C].
- Engage the drive chain on the engine and rear sprockets.
- Insert the link pins in the drive chain ends.
- Install the grease seals.
- Install the link plate so that the mark [D] faces out.
- Push the link plate by hand or plier to fix it.
- Be sure to set the grease seals correctly.



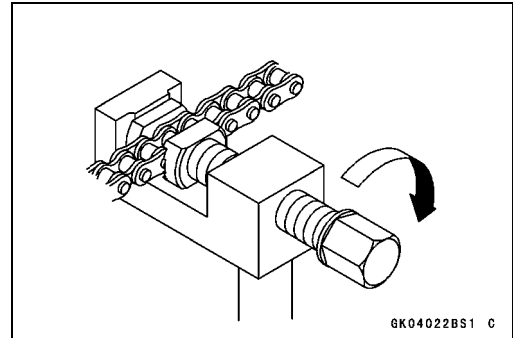
11-8 FINAL DRIVE

Drive Chain

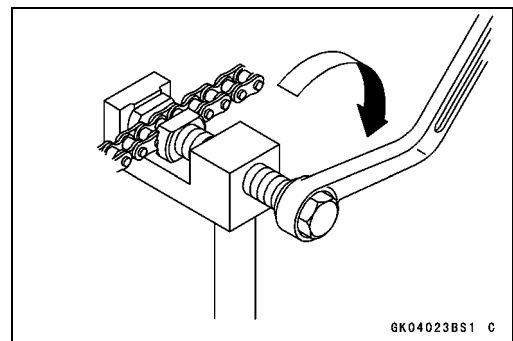
- Set the plate holder (A) [A] and plate holder (B) [B] on the body.



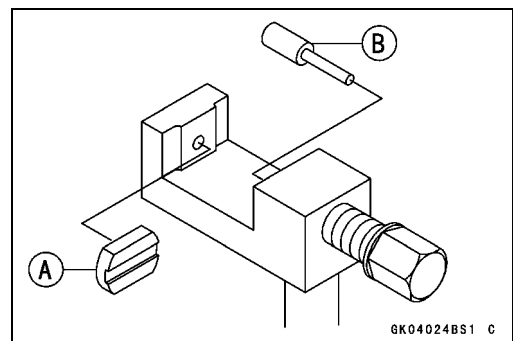
- Fit the plate holder (A) to the link plate.
- Turn the pin holder by hand until the plate holder (B) touches the other link plate.



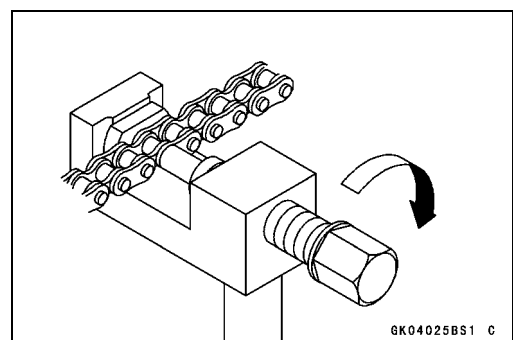
- Turn the pin holder by a wrench clockwise until two pins of link come into groove of the plate holder (A).
- Take off the plate holder.



- Set the plate holder (B) [A] and cutting and riveting pin [B] as shown in the figure.

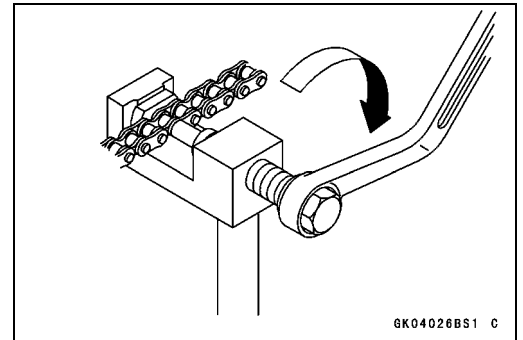


- Turn the pin holder until the riveting pin touches the link pin.



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: 19.35 ~ 19.55 mm (0.762 ~ 0.770 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).

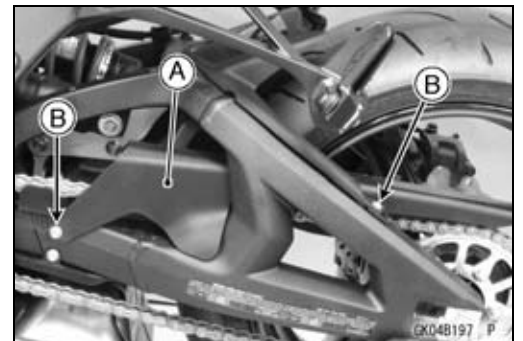
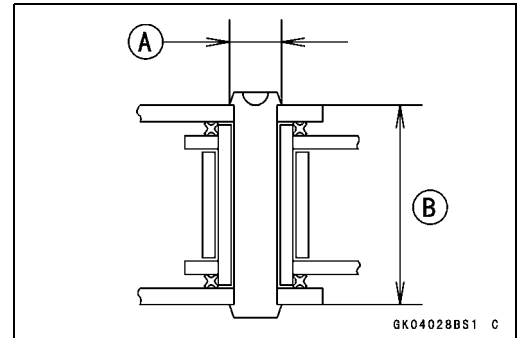
- Install the chain cover [A].

- Apply a non-permanent locking agent to the bolts [B] and tighten them.

- Install the front footpeg bracket.

- Tighten:

Torque - Front Footpeg Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

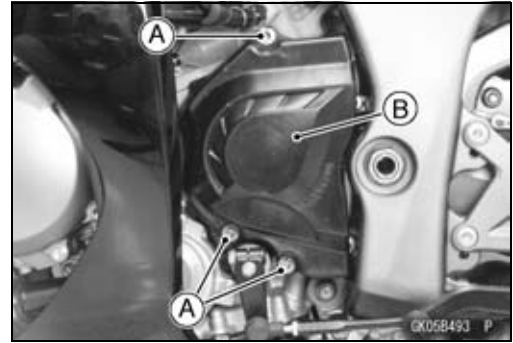


11-10 FINAL DRIVE

Sprocket, Coupling

Engine Sprocket Removal

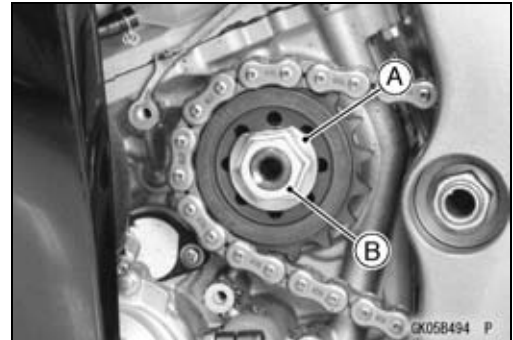
- Remove:
 - Engine Sprocket Cover Bolts [A]
 - Engine Sprocket Cover [B]



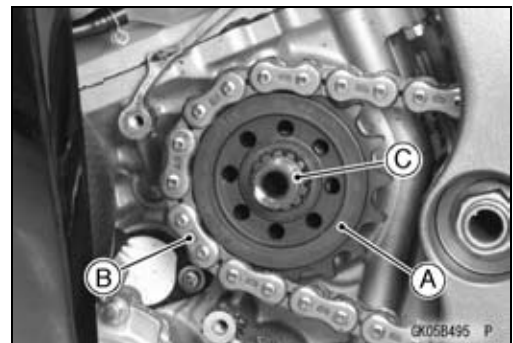
- Flatten out the bended washer [A].
- Remove the engine sprocket nut [B] and washer.

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

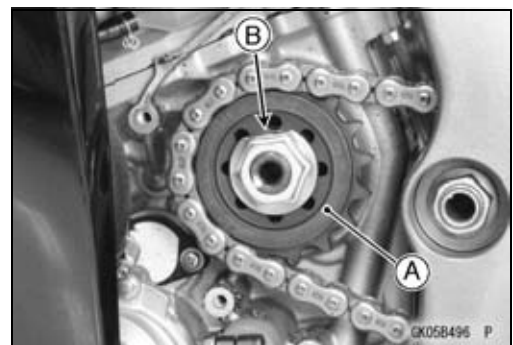
- Replace the sprocket washer and axle cotter pin.
- Install the engine sprocket [A] onto the output shaft.
- Apply molybdenum disulfide oil solution to the threads and seating surface of the engine sprocket nut.
- Tighten:

Torque - Engine Sprocket Nut: 145 N·m (14.8 kgf·m, 107 ft·lb)

NOTE

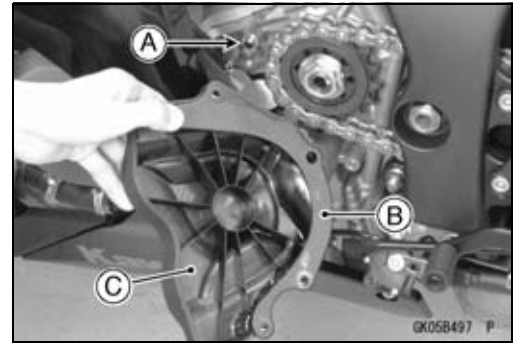
○Tighten the engine sprocket nut while applying the rear brake.

- 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:
 - Pin [A]
 - Chain Guide [B]
 - Engine Sprocket Cover [C]
- Tighten:
 - Torque - Engine Sprocket Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)**



Rear Sprocket Removal

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

NOTICE

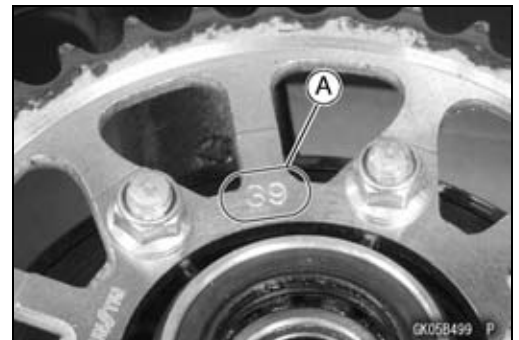
Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.



- Remove:
 - Rear Sprocket Nuts [A]
 - Rear Sprocket [B]

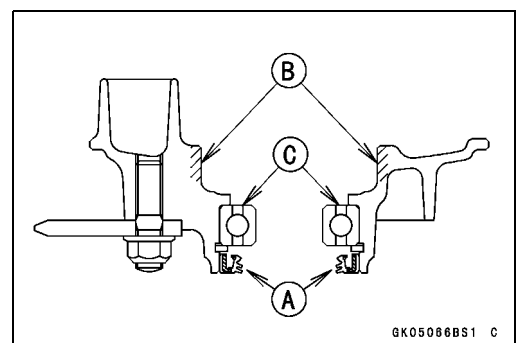
Rear Sprocket Installation

- 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]



11-12 FINAL DRIVE

Sprocket, Coupling

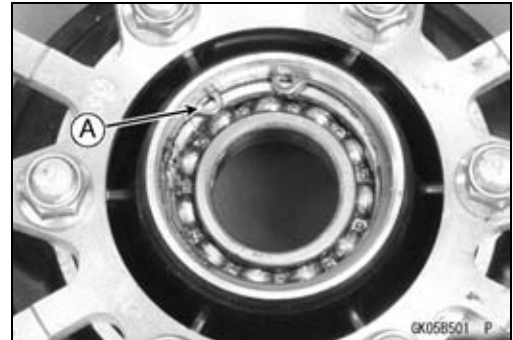
- Install:
 - Collar [A]
 - Coupling



Coupling Bearing Removal

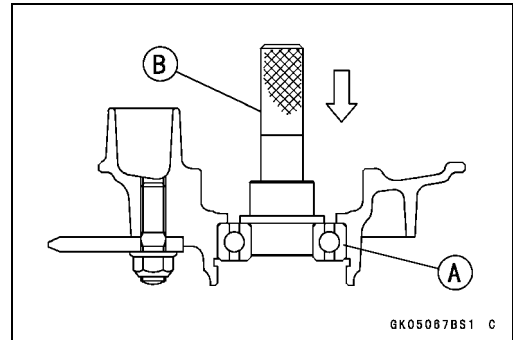
- Remove:
 - Coupling
 - Grease Seal
 - Circlip [A]

Special Tool - Inside Circlip Pliers: 57001-143



- Remove the bearing [A] by tapping from the wheel side.

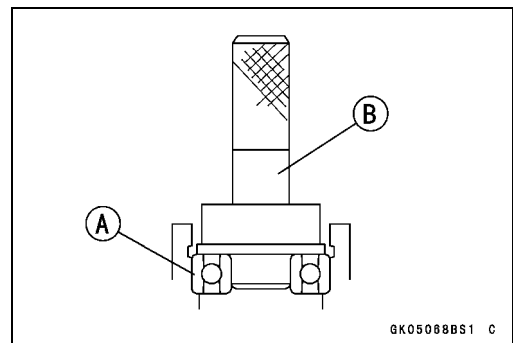
Special Tool - Bearing Driver Set [B]: 57001-1129



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

Sprocket, Coupling

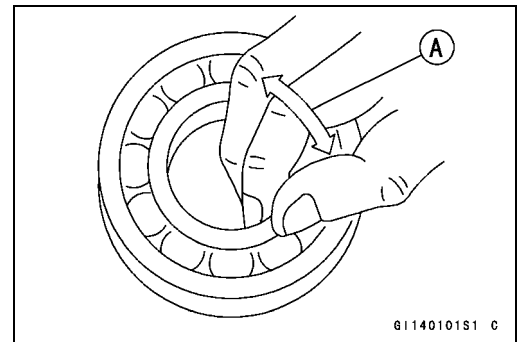
Coupling Bearing Inspection

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.

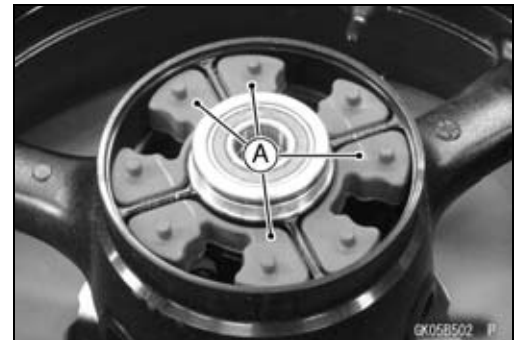


Coupling Bearing Lubrication

- 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.

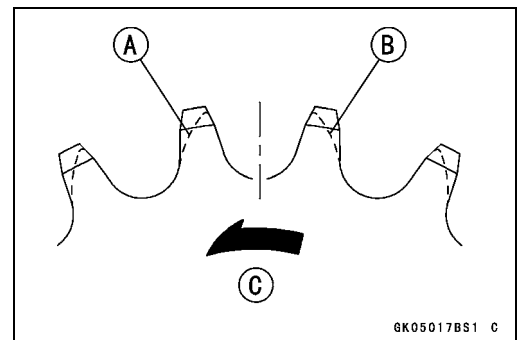
Coupling Damper Inspection

- 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]

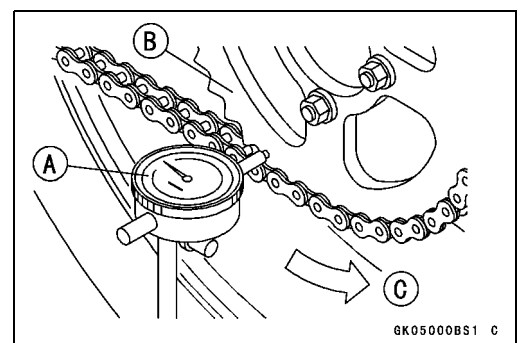


NOTE

○ *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 in the figure, 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.)

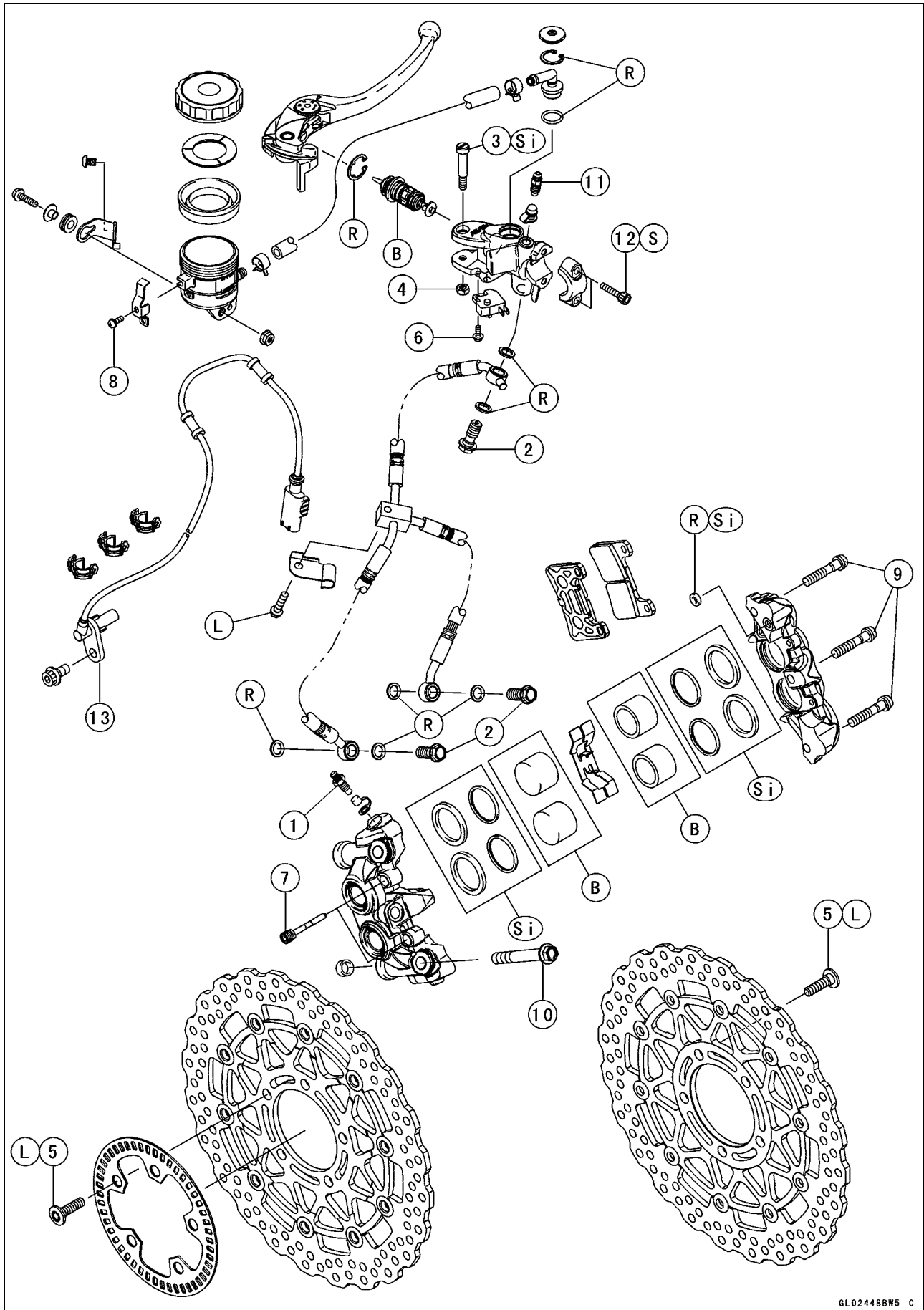
Brakes

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12-2 BRAKES

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Bleed Valves	7.8	0.80	69 in·lb	
2	Brake Hose Banjo Bolts	25	2.5	18	
3	Brake Lever Pivot Bolt	1.2	0.12	11 in·lb	Si
4	Brake Lever Pivot Bolt Locknut	5.9	0.60	52 in·lb	
5	Brake Disc Mounting Bolts	27	2.8	20	L
6	Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
7	Front Brake Pad Pins	15	1.5	11	
8	Front Brake Reservoir Cap Stopper Screw	1.2	0.12	11 in·lb	
9	Front Caliper Assembly Bolts	22	2.2	16	
10	Front Caliper Mounting Bolts	34	3.5	25	
11	Front Master Cylinder Bleed Valve	5.4	0.55	48 in·lb	
12	Front Master Cylinder Clamp Bolts	11	1.1	97 in·lb	S

13. Front Wheel Rotation Sensor

B: Apply brake fluid.

L: Apply a non-permanent locking agent.

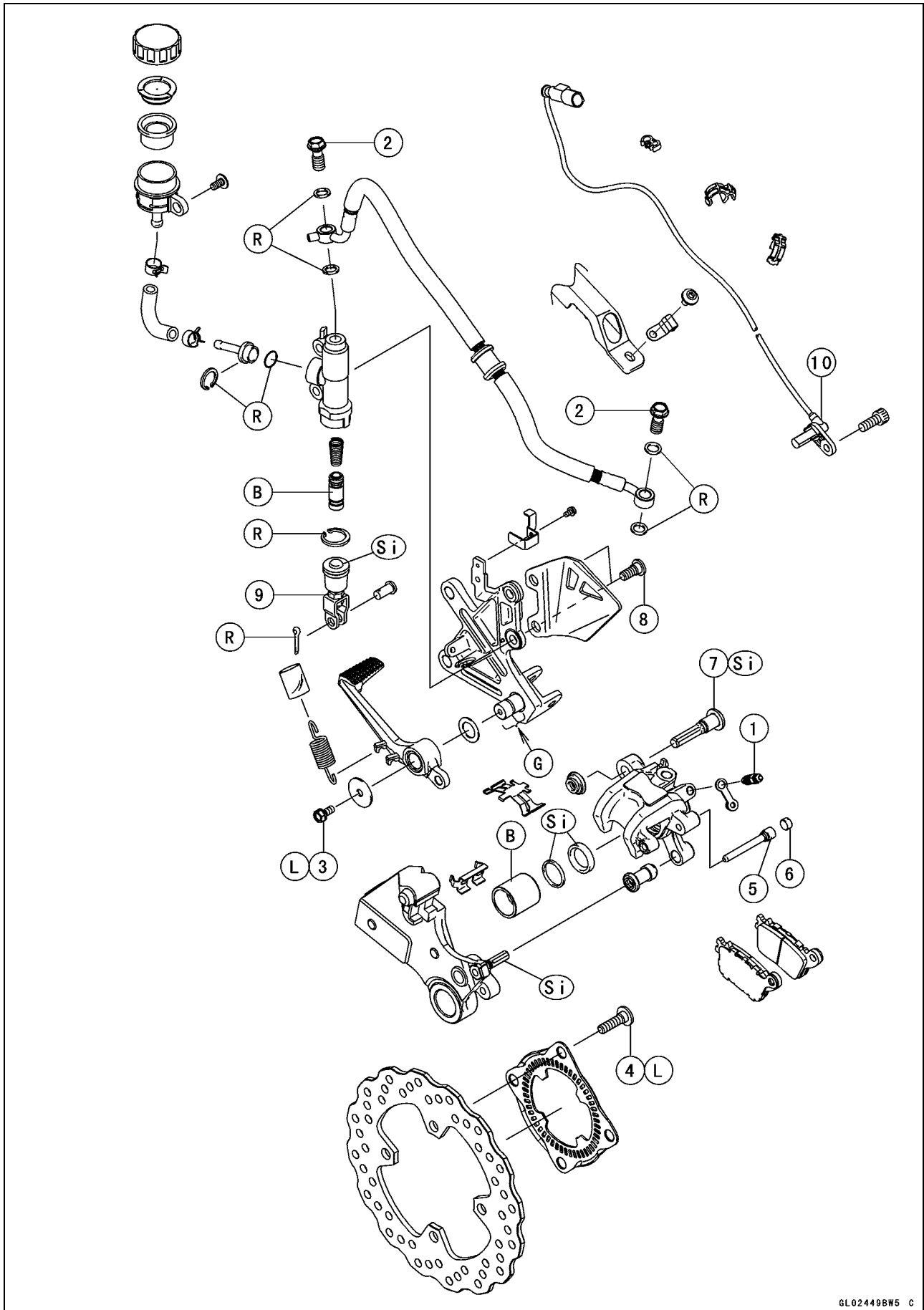
R: Replacement Parts

S: Follow the specified tightening sequence.

Si: Apply silicone grease (ex. PBC grease).

12-4 BRAKES

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Bleed Valve	7.8	0.80	69 in·lb	
2	Brake Hose Banjo Bolts	25	2.5	18	
3	Brake Pedal Mounting Bolt	8.8	0.90	78 in·lb	L
4	Brake Disc Mounting Bolts	27	2.8	20	L
5	Rear Brake Pad Pin	17	1.7	13	
6	Rear Brake Pad Pin Plug	2.5	0.25	22 in·lb	
7	Rear Caliper Pin Bolt	27	2.8	20	Si
8	Rear Master Cylinder Mounting Bolts	25	2.5	18	
9	Rear Master Cylinder Push Rod Locknut	17	1.7	13	

10. Rear Wheel Rotation Sensor

B: Apply brake fluid.

G: Apply grease.

L: Apply a non-permanent locking agent.

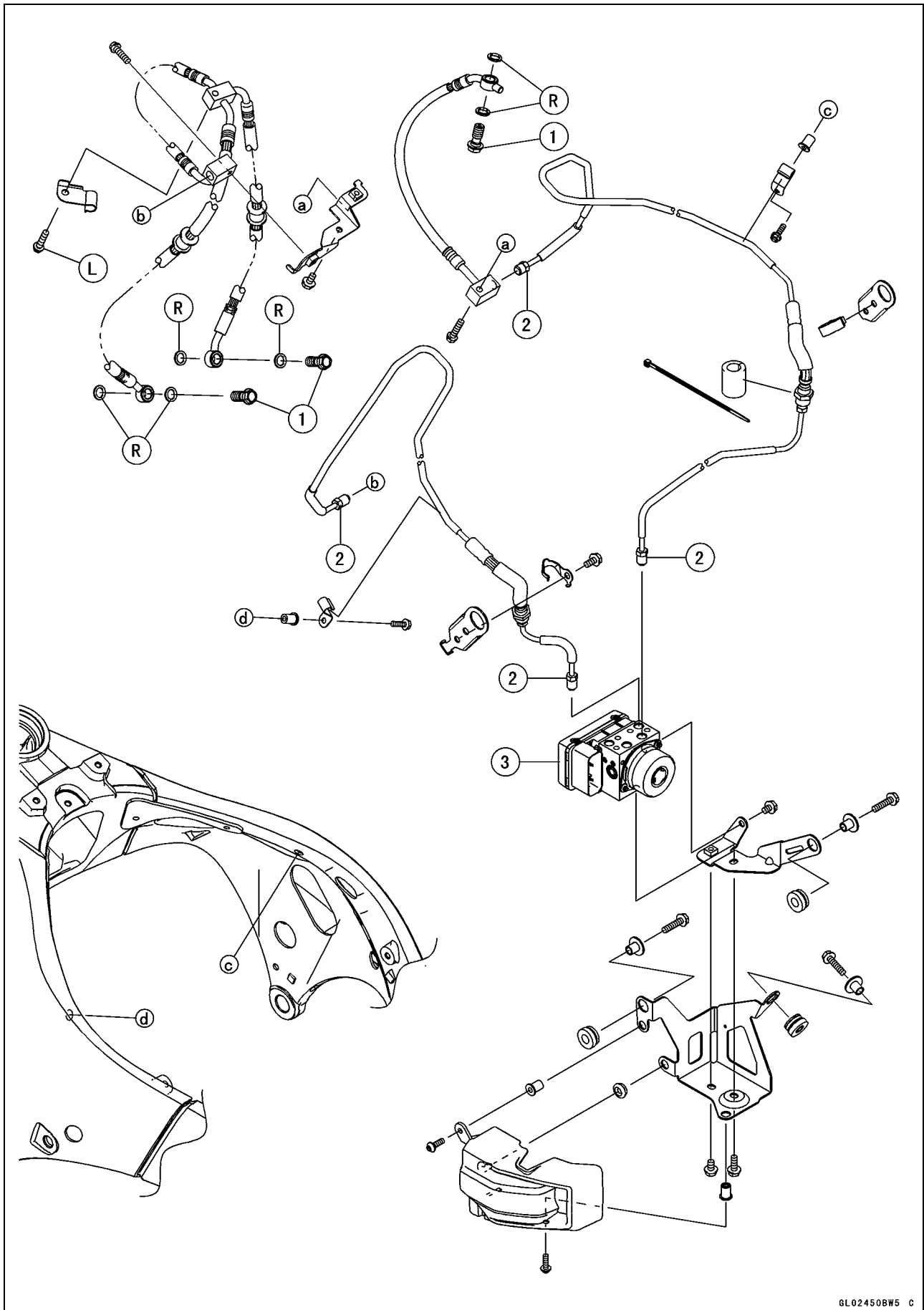
R: Replacement Parts

Si: Apply silicone grease (ex. PBC grease).

12-6 BRAKES

Exploded View

KIBS 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. KIBS Hydraulic Unit

L: Apply a non-permanent locking agent.

R: Replacement Parts

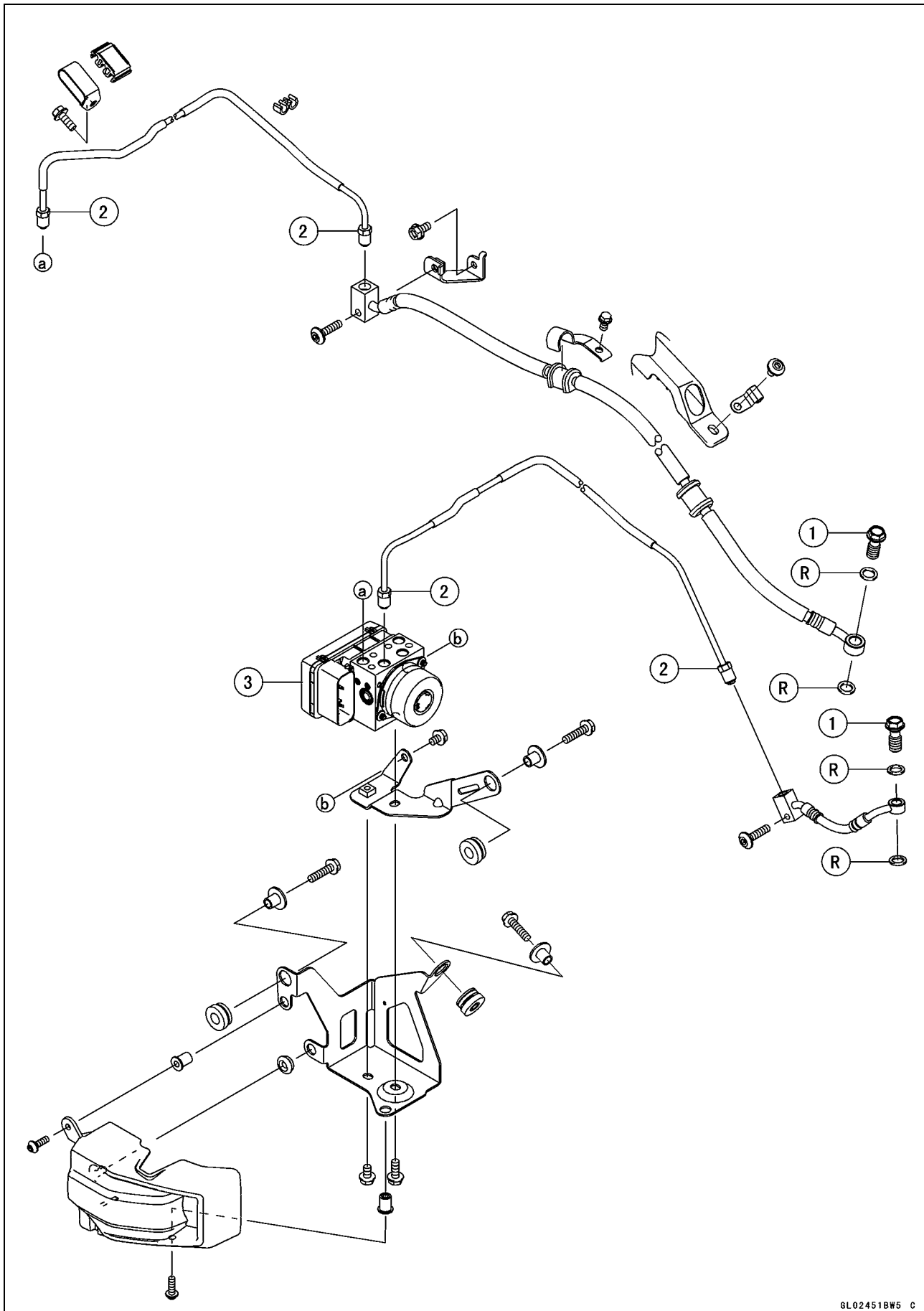
NOTE

○When disassembling the brake hose and pipe, disassemble them by the unit as shown in the exploded view.

12-8 BRAKES

Exploded View

KIBS 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. KIBS Hydraulic Unit

4. Rear Wheel Rotation Sensor

L: Apply a non-permanent locking agent.

R: Replacement Parts

NOTE

○When disassembling the brake hose and pipe, disassemble them by the unit as shown in the exploded view.

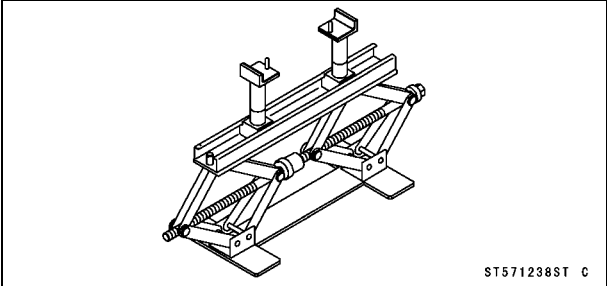
12-10 BRAKES

Specifications

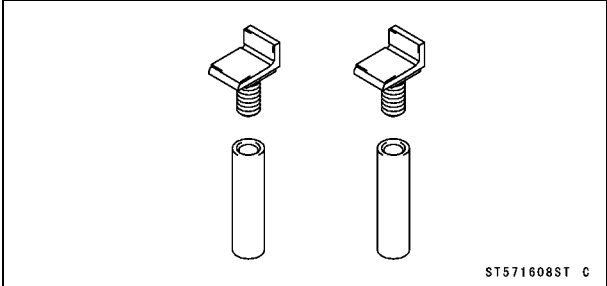
Item	Standard	Service Limit
Brake Lever, Brake Pedal		
Brake Lever Position	6-way adjustable (to suit rider)	---
Brake Lever Free Play	Non-adjustable	---
Pedal Free Play	Non-adjustable	---
Pedal Position	About 65 mm (2.6 in.) below top of footpeg	---
Brake Pads		
Lining Thickness:		
Front	4.0 mm (0.16 in.)	1 mm (0.04 in.)
Rear	4.5 mm (0.18 in.)	1 mm (0.04 in.)
Brake Discs		
Thickness:		
Front	5.3 ~ 5.7 mm (0.21 ~ 0.22 in.)	5.0 mm (0.20 in.)
Rear	4.8 ~ 5.2 mm (0.19 ~ 0.20 in.)	4.5 mm (0.18 in.)
Runout	TIR 0.15 mm (0.006 in.) or less	TIR 0.3 mm (0.01 in.)
Brake Fluid		
Grade	DOT4	---
KIBS (Equipped Models)		
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

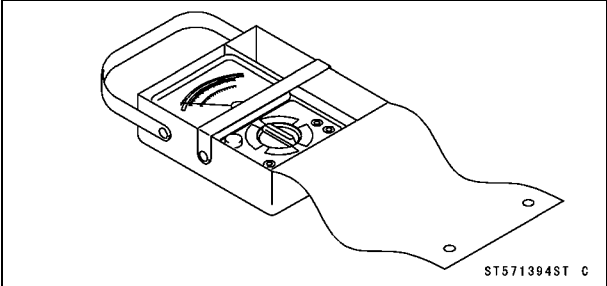
**Jack:
57001-1238**



**Jack Attachment:
57001-1608**



**Hand Tester:
57001-1394**



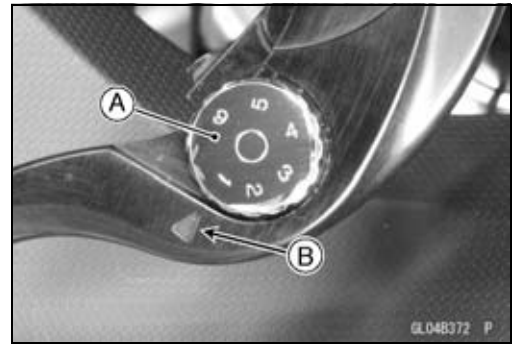
12-12 BRAKES

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.



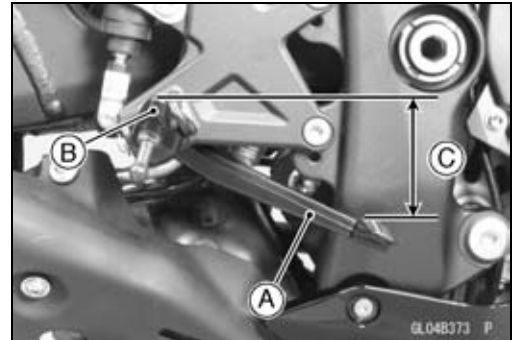
Brake Pedal Position Inspection

- Check that the brake pedal [A] is in the correct position. Footpeg [B]

Pedal Position

Standard: About 65 mm (2.6 in.) [C] below top of footpeg

- ★ If it is incorrect, adjust the position.



Brake Pedal Position Adjustment

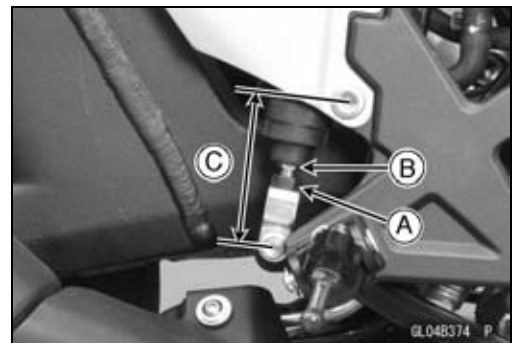
NOTE

○ 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 **69 ±1 mm (2.7 ±0.04 in.)**, the pedal position will be within the standard range.
- Tighten:

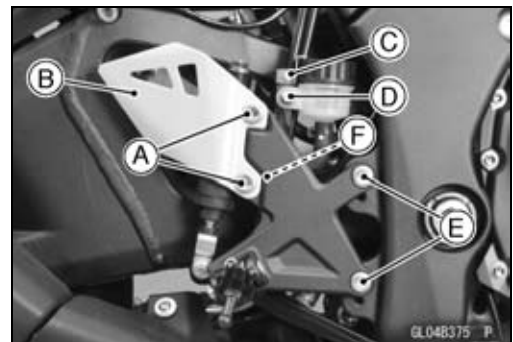
Torque - Rear Master Cylinder Push Rod Locknut: 17 N·m (1.7 kgf·m, 13 ft·lb)

- Check the brake light switch operation (see Brake Light Switch Operation Inspection in the Periodic Maintenance chapter).



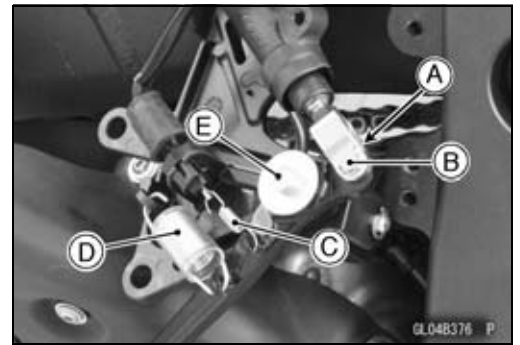
Brake Pedal Removal

- Remove:
 - Rear Master Cylinder Mounting Bolts [A]
 - Foot Guard [B]
 - Screw and Stopper [C]
 - Bolt [D]
 - Front Footpeg Bracket Bolts [E]
 - Cable Guide [F]



Brake Lever, Brake Pedal

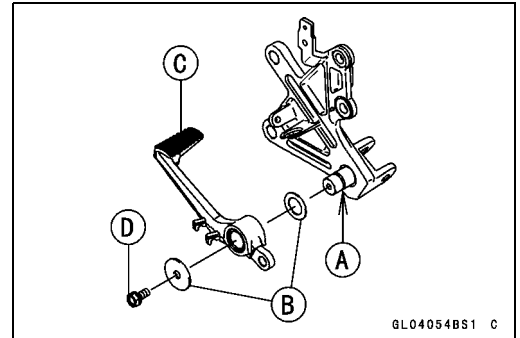
- Remove:
 - Cotter Pin [A]
 - Joint Pin [B]
 - Rear Brake Light Switch Spring [C]
 - Return Spring [D]
- Remove the brake pedal mounting bolt [E] and take out the brake pedal.



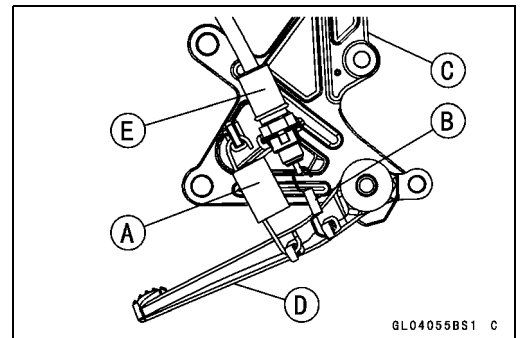
Brake Pedal Installation

- Apply grease to the brake pedal pivot shaft [A].
- Install:
 - Washers [B]
 - Brake Pedal [C]
- Apply a non-permanent locking agent to the threads of the brake pedal mounting bolt [D], and tighten it.

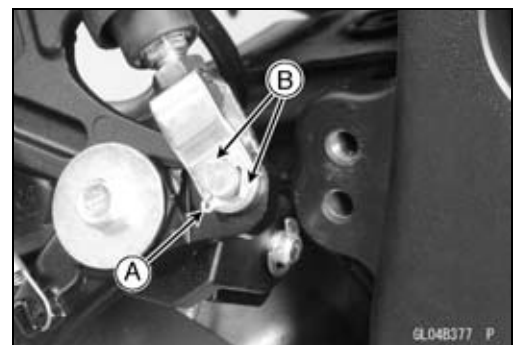
Torque - Brake Pedal Mounting Bolt: 8.8 N·m (0.90 kgf·m, 78 in·lb)



- Install the return spring [A] and the rear brake light switch spring [B] as shown in the figure.
 - Front Footpeg Bracket [C]
 - Brake Pedal [D]
 - Rear Brake Light Switch [E]



- Replace the cotter pin [A] with a new one.
- Insert the cotter pin and bend the pin ends [B].



12-14 BRAKES

Brake Lever, Brake Pedal

- Assemble:

- Front Footpeg Bracket [A]
- Rear Master Cylinder [B]
- Foot Guard [C]
- Cable Guide [D]

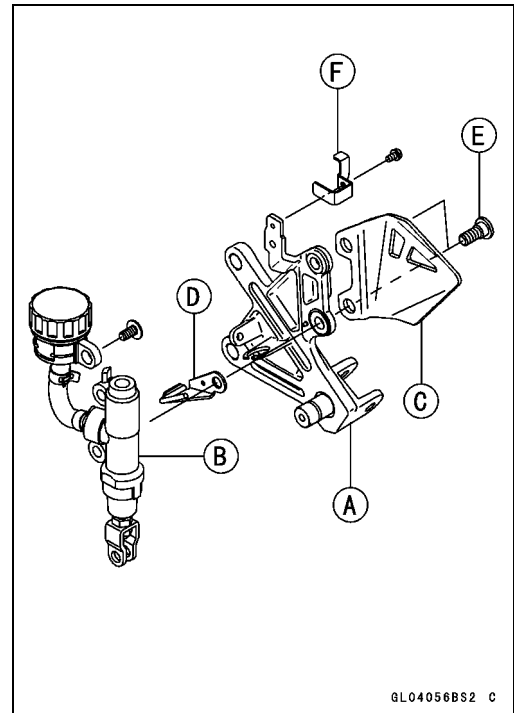
**Torque - Rear Master Cylinder Mounting Bolts [E]: 25 N·m
(2.5 kgf·m, 18 ft·lb)**

- Run the exhaust butterfly valve cables to the cable guide.
- Fit the small hole of the cable guide and projection of the footpeg bracket.

- Install the footpeg bracket to the frame.

**Torque - Front Footpeg Bracket Bolts: 25 N·m (2.5 kgf·m,
18 ft·lb)**

- Install the rear brake reservoir cap stopper [F].
- Run the exhaust butterfly valve cables to the stopper.
- Install the removed parts (see appropriate chapters).



GL04056BS2 C

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.
- Unscrew the caliper mounting bolts [D], and detach the caliper [E] from the disc.

NOTICE

Do not loosen the caliper assembly bolts [F]. Take out only the caliper mounting bolts for caliper removal. Loosening the caliper assembly bolts will cause brake fluid leakage.

- Unscrew the banjo bolt and remove the brake hose from the caliper (see Brake Hose and Pipe Replacement in the Periodic Maintenance chapter).

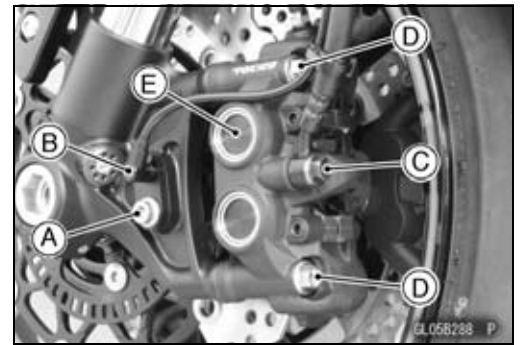
NOTICE

Immediately wash away any brake fluid that spills.

NOTE

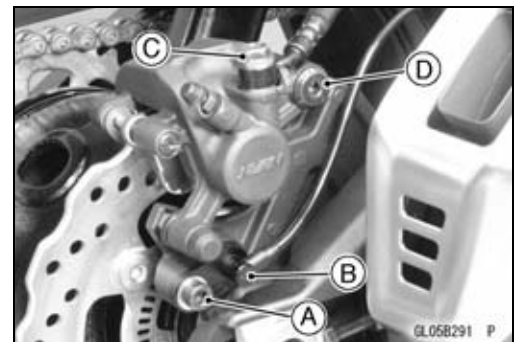
○If the caliper is to be disassembled after removal and if compressed air is not available, disassemble the caliper before the brake hose is removed (see Caliper Rubber Parts Replacement in the Periodic Maintenance chapter).

- Remove the collars [A] from the fork leg.



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 caliper holder pin [D].
- Remove the rear wheel (see Rear Wheel Removal in the Wheels/Tires chapter).



12-16 BRAKES

Calipers

- Unscrew the banjo bolt and remove the brake hose from the caliper (see Brake Hose and Pipe Replacement in the Periodic Maintenance chapter).

NOTICE

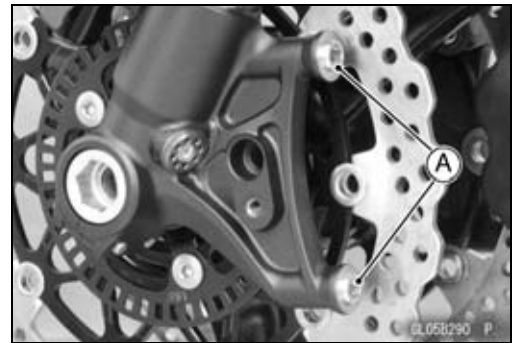
Immediately wash away any brake fluid that spills.

NOTE

- *If the caliper is to be disassembled after removal and if compressed air is not available, disassemble the caliper before the brake hose is removed (see Caliper Rubber Parts Replacement in the Periodic Maintenance chapter).*

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.
- 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

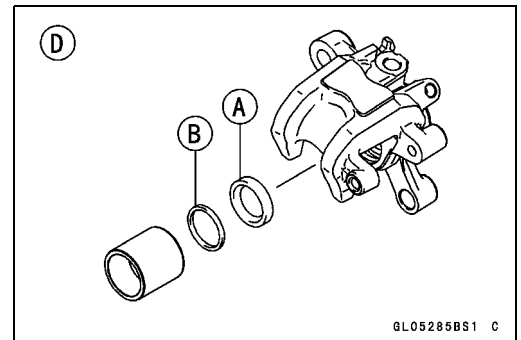
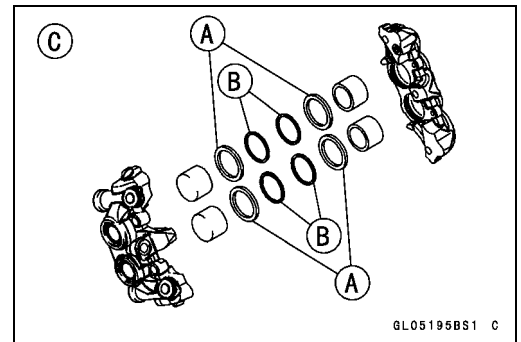
- Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Calipers

Caliper Fluid Seal Damage

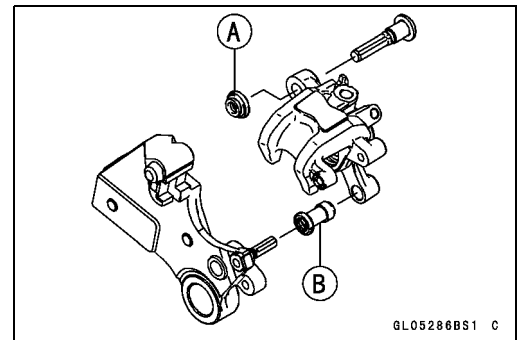
The fluid seal (piston seal) [A] is placed around the piston to maintain clearance between the pad and the disc. If the seal is in a poor condition, it could lead the pad to wear excessively or the brake to drag, which may cause the temperature of the discs or the brake fluid to increase.

- 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.
 - Front Caliper [C]
 - Rear Caliper [D]



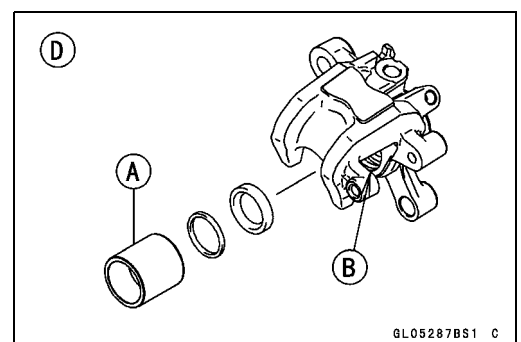
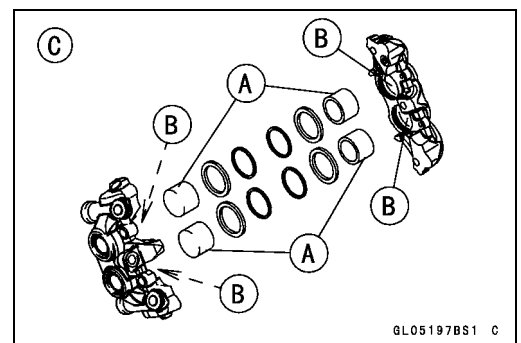
Rear Caliper Dust Boot and Friction Boot Damage

- 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.



Caliper Piston and Cylinder Damage

- Visually inspect the pistons [A] and cylinder surfaces [B].
- ★ Replace the caliper if the cylinder and piston are badly scored or rusty.
 - Front Caliper [C]
 - Rear Caliper [D]



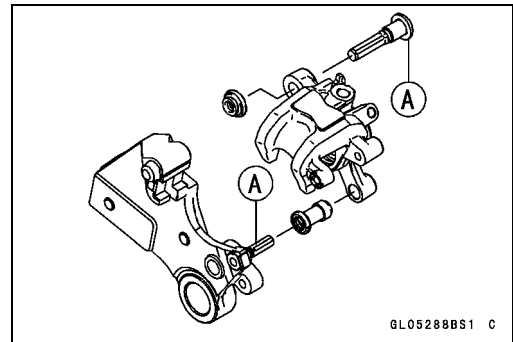
12-18 BRAKES

Calipers

Rear Caliper Holder Shaft Wear

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.

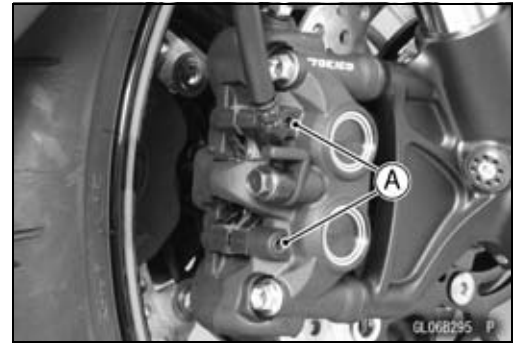
- Check to see that the caliper holder shafts are not badly worn or stepped, and that the rubber friction boots are not damaged.
- ★ If the rubber friction boot is damaged, replace the rubber friction boot. To replace the friction boot, remove the pads and the caliper bracket.
- ★ If the caliper holder shaft is damaged, replace the caliper bracket.



Brake Pads

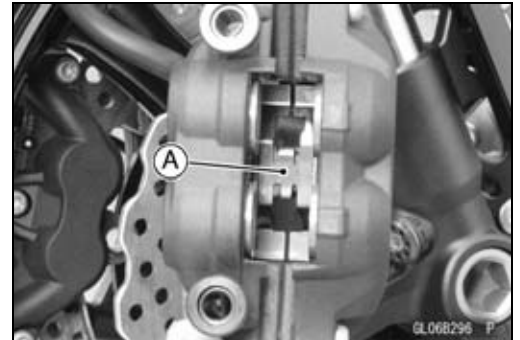
Front Brake Pad Removal

- Loosen the pad pins [A].
- Remove the front caliper with the hose installed (see Front Caliper Removal).
- Remove:
 - Pad Pins
 - Brake Pads



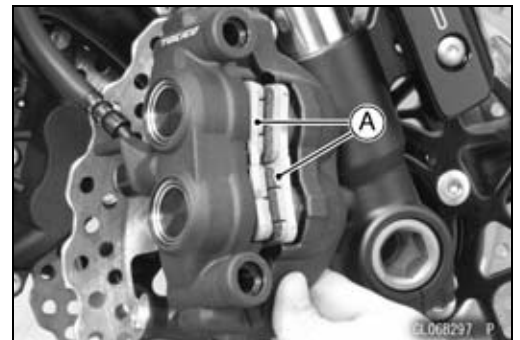
Front Brake Pad Installation

- 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 as shown in the figure.
- Install the pad pins while pushing the brake pads lightly.
- Tighten the pad pins temporarily.
- Install the front caliper (see Caliper Installation).
- Tighten:

Torque - Front Brake Pad Pins: 15 N·m (1.5 kgf·m, 11 ft·lb)

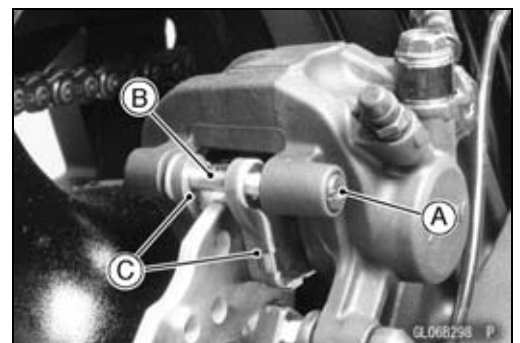


⚠ WARNING

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.

Rear Brake Pad Removal

- Remove:
 - Pad Pin Plug [A]
 - Pad Pin [B]
 - Brake Pads [C]



12-20 BRAKES

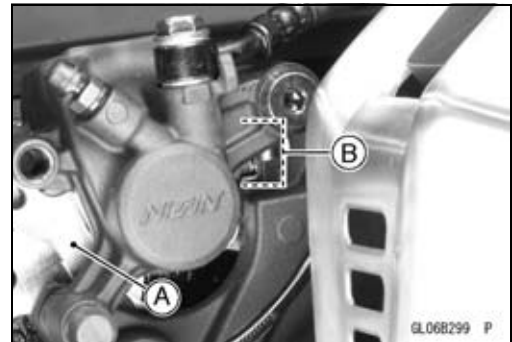
Brake Pads

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 holder.
- 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: 2.5 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.

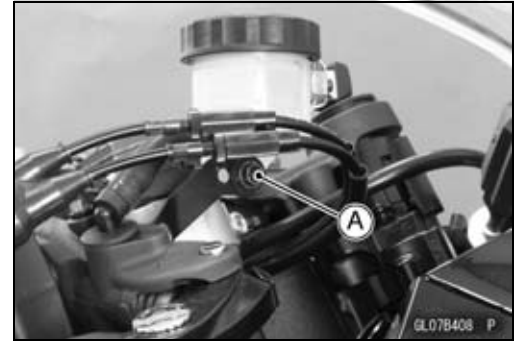
Brake Pad Wear Inspection

- Refer to the Brake Pad Wear Inspection in the Periodic Maintenance chapter.

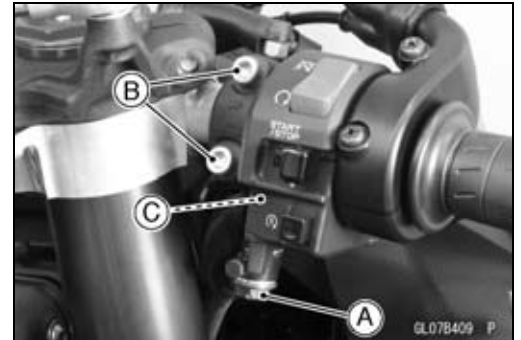
Master Cylinder

Front Master Cylinder Removal

- Remove the reservoir mounting bolt and nut [A].



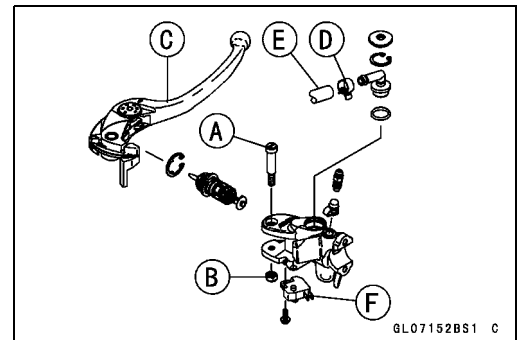
- Unscrew the banjo bolt [A] and remove the brake hose from the master cylinder (see Brake Hose and Pipe Replacement in the Periodic Maintenance chapter).
- Unscrew the clamp bolts [B], and take off the master cylinder as an assembly with the reservoir, brake lever, and front brake light switch installed.
- Disconnect the front brake light switch connector [C].



NOTICE

Immediately wash away any brake fluid that spills.

- Remove:
 - Brake Lever Pivot Bolt [A] and Locknut [B]
 - Brake Lever [C]
 - Clamp [D] (Slide Out)
 - Brake Hose [E]
 - Front Brake Light Switch [F]



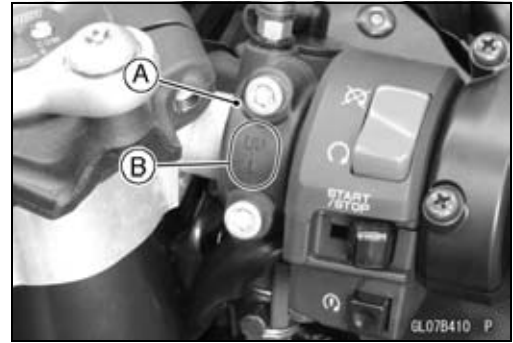
Front Master Cylinder Installation

- Apply silicone grease to the sliding surface of the brake lever pivot bolt.
- Tighten:
 - Torque - Brake Lever Pivot Bolt: 1.2 N·m (0.12 kgf·m, 11 in·lb)**
 - Brake Lever Pivot Bolt Nut: 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)**

12-22 BRAKES

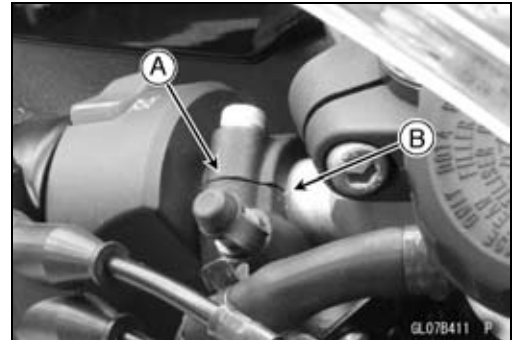
Master Cylinder

- 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 in the figure.
- Replace the washers that are on each side of the hose fitting with new ones.
- 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.

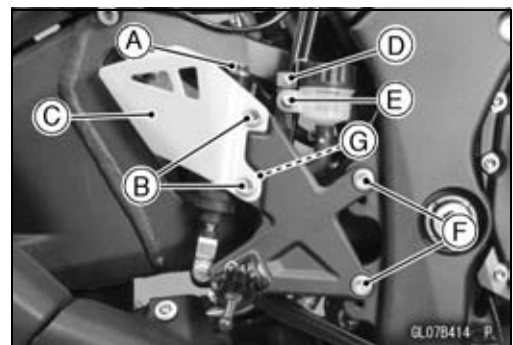


Rear Master Cylinder Removal

- Unscrew the brake hose banjo bolt [A] and remove the brake hose (see Brake Hose and Pipe Replacement in the Periodic Maintenance chapter).

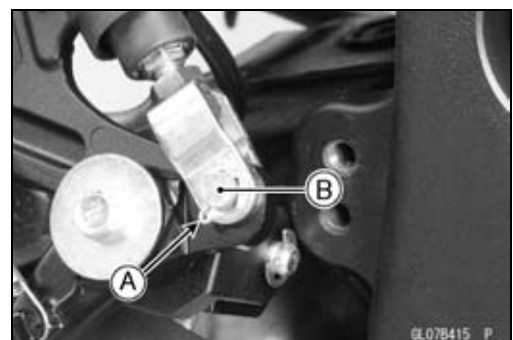
- Remove:

Rear Master Cylinder Mounting Bolts [B]
Foot Guard [C]
Screw and Stopper [D]
Bolt [E]
Front Footpeg Bracket Bolts [F]
Cable Guide [G]



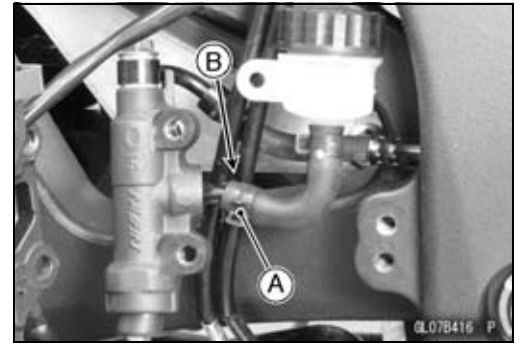
- Remove:

Cotter Pin [A]
Joint Pin [B]



Master Cylinder

- Slide the clamp [A].
- Pull off the reservoir hose lower end [B], and drain the brake fluid into a container.



Rear Master Cylinder Installation

- Replace the washers that are on each side of hose fitting with new ones.
- Tighten:
 - Torque - Brake Hose Banjo Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)**
- Install the master cylinder, the bracket and other parts (see Brake Pedal Installation).
- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

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.

12-24 BRAKES

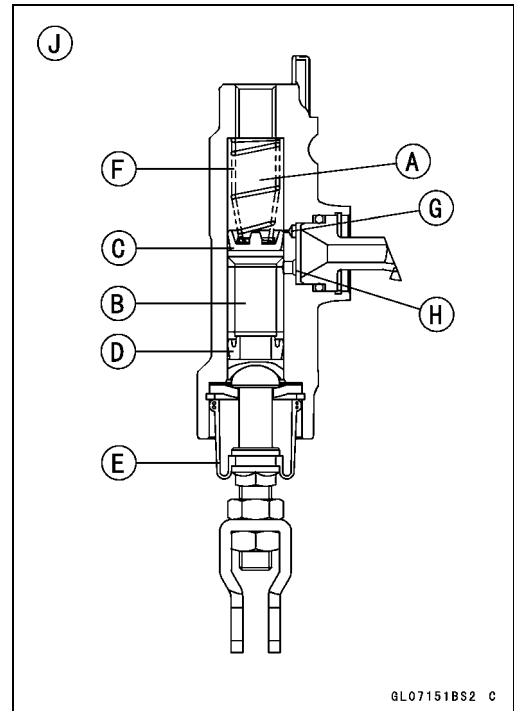
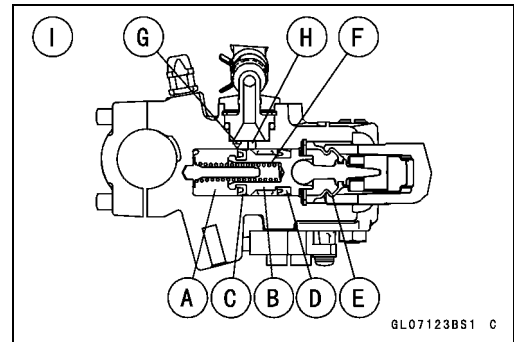
Master Cylinder

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]

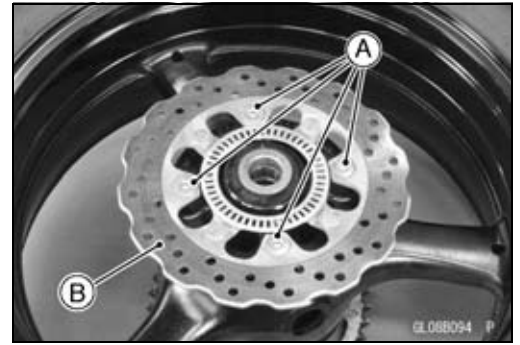
Rear Master Cylinder [J]



Brake Disc

Brake Disc Removal

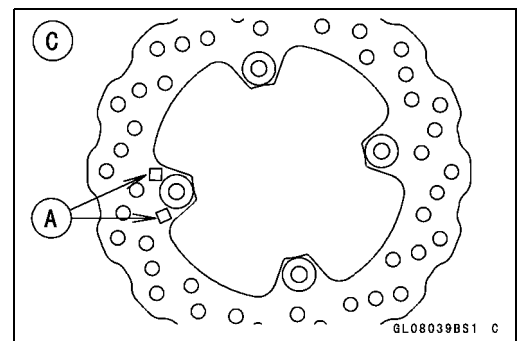
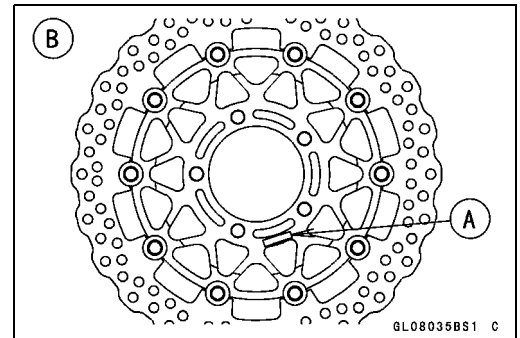
- Remove the wheels (see Front/Rear Wheel Removal in the Wheels/Tires chapter).
- Unscrew the mounting bolts [A], and take off the disc [B].



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]
- 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 Disc Thickness

Standard:

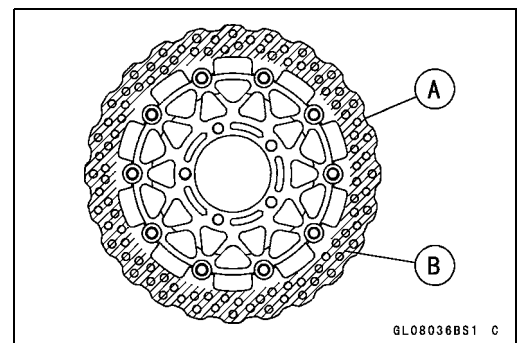
Front 5.3 ~ 5.7 mm (0.21 ~ 0.22 in.)

Rear 4.8 ~ 5.2 mm (0.19 ~ 0.20 in.)

Service Limit:

Front 5.0 mm (0.20 in.)

Rear 4.5 mm (0.18 in.)



12-26 BRAKES

Brake Disc

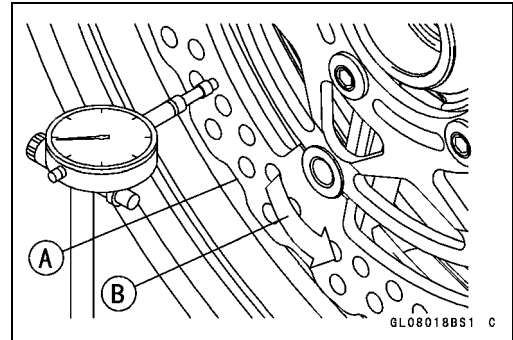
Brake Disc Warp Inspection

- Raise the wheel off the ground with the 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 in the figure and measure disc runout, while turning [B] the wheel by hand.
- ★ If runout exceeds the service limit, replace the disc.



Disc Runout

Standard: TIR 0.15 mm (0.006 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.

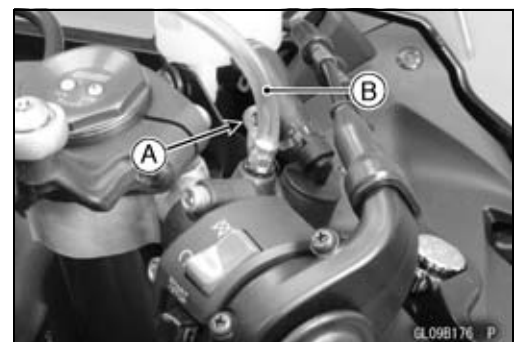
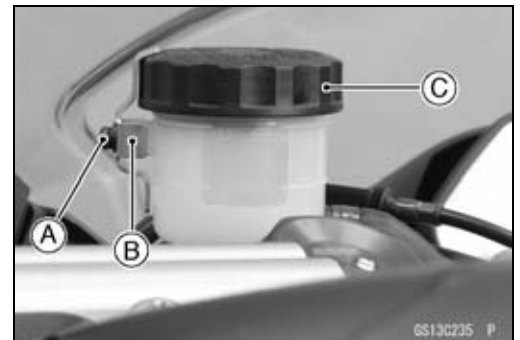
⚠ WARNING

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]
 - 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.
- Open the rubber cap [A] 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.



12-28 BRAKES

Brake Fluid

- 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].

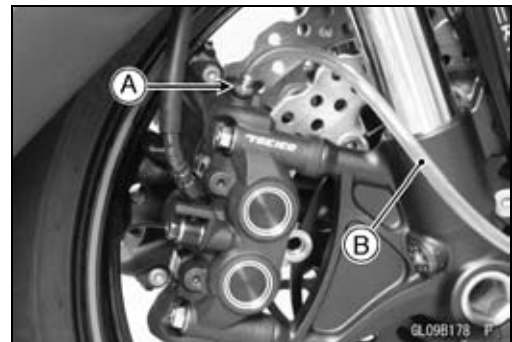
NOTE

○ *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.



- 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].

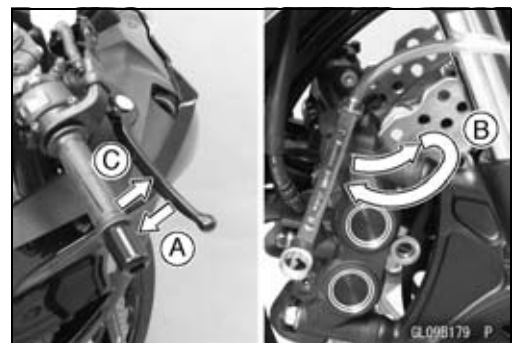
NOTE

○ *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.*

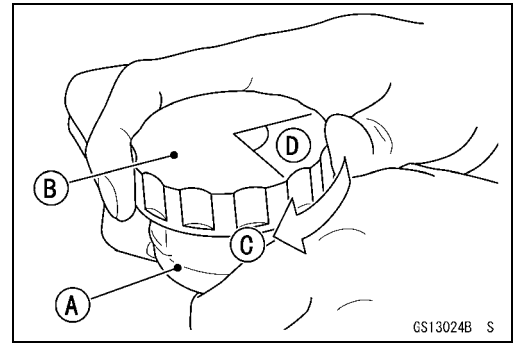
○ *Front Brake: First bleeding the right caliper then repeat the above steps for the left caliper.*

- Remove the clear plastic hose.
- Install:
 - Diaphragm
 - Diaphragm Plate
 - Front Brake Reservoir Cap



Brake Fluid

- 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].



12-30 BRAKES

Brake Fluid

- Install the stopper and screw.
- 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)**
- 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.

WARNING

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

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

Brake 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.

12-32 BRAKES

KIBS (Equipped Models)

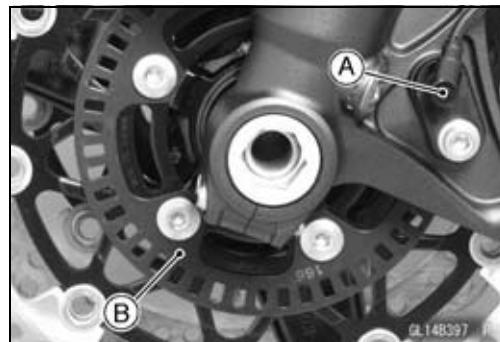
Parts Location

NOTE

○The front and rear wheel rotation sensors and rotors are standard parts of this motorcycle.

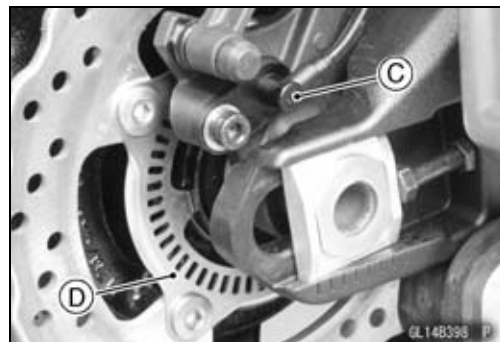
Front Wheel Rotation Sensor [A]

Front Wheel Rotation Sensor Rotor [B]



Rear Wheel Rotation Sensor [C]

Rear Wheel Rotation Sensor Rotor [D]



ABS Indicator Light (LED) [E]

KIBS Indicator Light (Yellow LED with KIBS Symbol) [F]

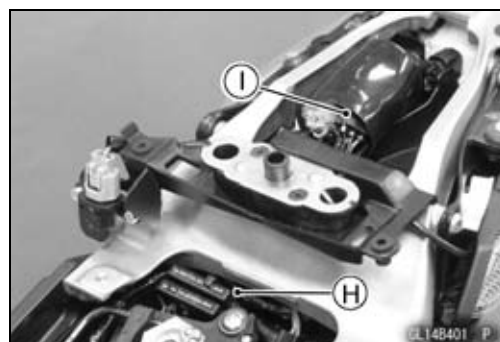


KIBS Hydraulic Unit [G]



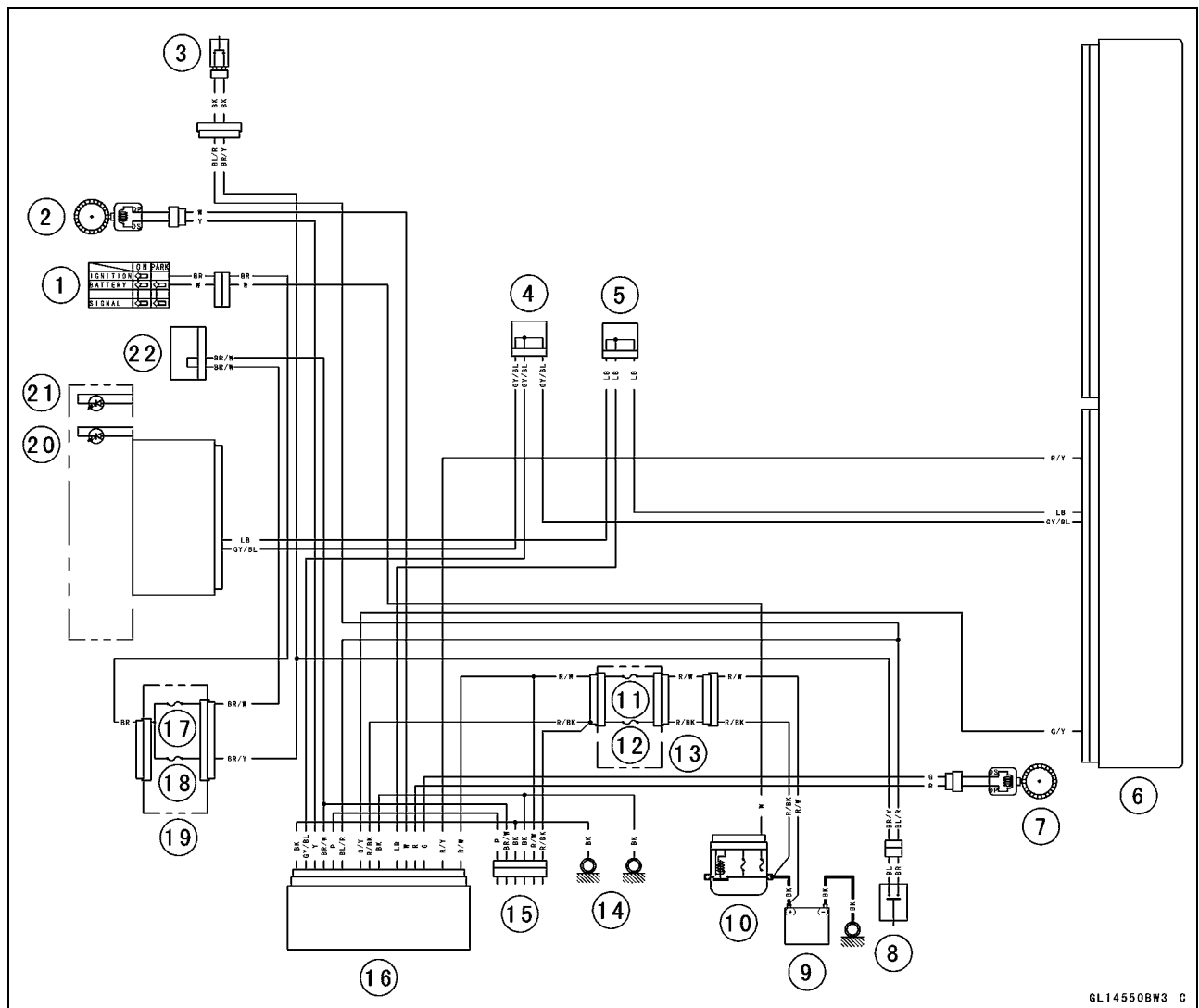
Fuse Box 3 [H]

KIBS Kawasaki Self-Diagnosis System Connector [I]



KIBS (Equipped Models)

KIBS System Circuit



- | | |
|--------------------------------|---|
| 1. Ignition Switch | 12. KIBS Solenoid Valve Relay Fuse 20 A |
| 2. Front Wheel Rotation Sensor | 13. Fuse Box 3 |
| 3. Front Brake Light Switch | 14. Frame Grounds |
| 4. Joint Connector C | 15. KIBS Kawasaki Self-diagnosis System Connector |
| 5. Joint Connector D | 16. KIBS Hydraulic Unit |
| 6. ECU | 17. Ignition Fuse 15 A |
| 7. Rear Wheel Rotation Sensor | 18. Brake Light/Horn Fuse 10 A |
| 8. Rear Brake Light Switch | 19. Fuse Box 1 |
| 9. Battery 12 V 8.6 Ah | 20. KIBS Indicator Light (LED) with KIBS Symbol |
| 10. Main Fuse 30 A | 21. ABS Indicator Light (LED) |
| 11. KIBS Motor Relay Fuse 30 A | 22. Joint Connector F |

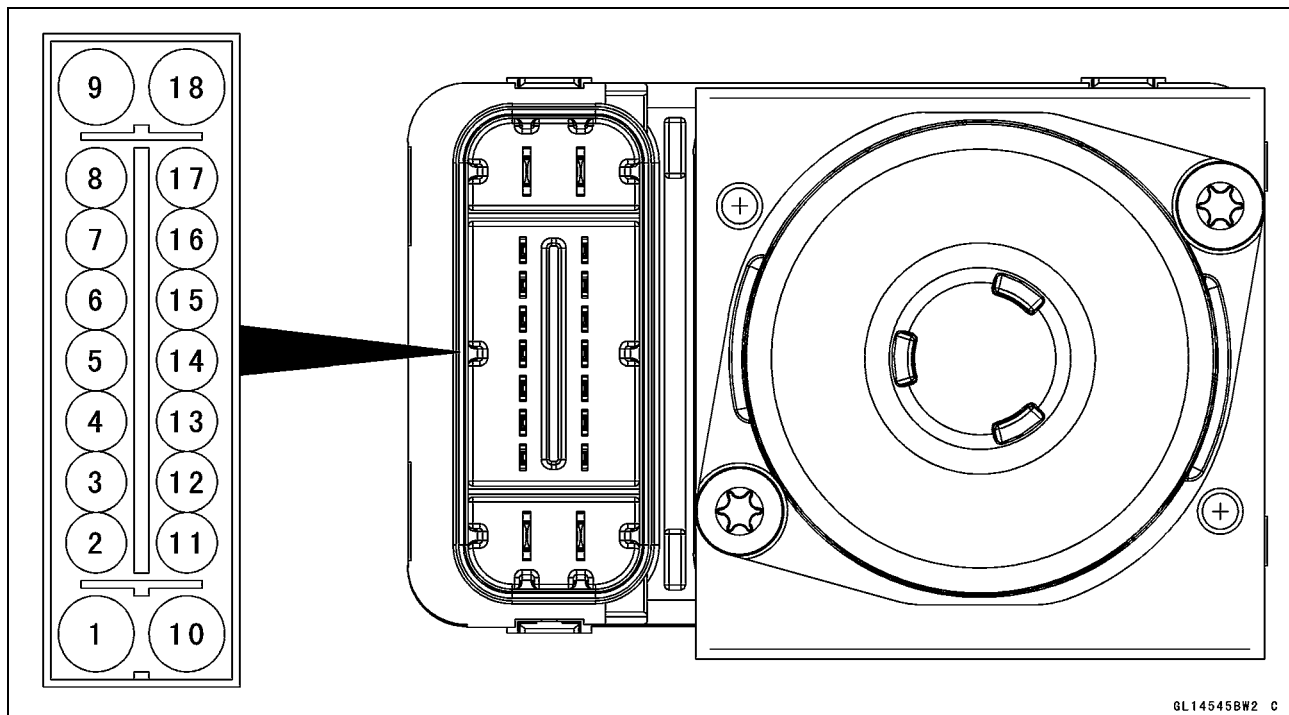
○Color Codes:

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		

12-34 BRAKES

KIBS (Equipped Models)

KIBS Hydraulic Unit Terminal Names



GL14545BW2 C

1. Ground: BK
2. CAN Communication Line (High): GY/BL
3. Front Wheel Rotation Sensor Signal Input: Y
4. Power Supply: BR/W
5. KIBS 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: R
14. Rear Wheel Rotation Sensor Signal Input: G
15. Unused
16. Rear Wheel Rotation Sensor Signal Output: R/Y
17. Unused
18. Power Supply to ABS Motor Relay: R/W

KIBS (Equipped Models)

KIBS Servicing Precautions

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

- This KIBS 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 KIBS hydraulic unit.
- To prevent damage to the KIBS 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 to ON while any of the KIBS electrical connectors are disconnected. The KIBS hydraulic unit memorizes service codes.
- Do not spray water on the electrical parts, KIBS parts, connectors, leads and wiring.
- If a transceiver is installed on the motorcycle, make sure that the operation of the KIBS is not influenced by electric wave radiated from the antenna. Locate the antenna as far as possible away from the KIBS hydraulic unit.
- Whenever the KIBS electrical connections are to be disconnected, first turn off the ignition switch.
- The KIBS 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 KIBS parts cannot be disassembled. Even if a fault is found, do not try to disassemble and repair the KIBS parts, replace it.
- The KIBS has many brake lines, pipes, and leads. And the KIBS 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.

- Connect the KIBS Kawasaki Self-Diagnosis System connector cover to the original position when the cover is disconnected.

KIBS Kawasaki Self-Diagnosis System Connector Color (Main Harness Side): Black

KDS Connector Color (Main Harness Side): White

NOTICE

When the KDS connector cover with a lead is connected to the KIBS Kawasaki Self-Diagnosis System connector by mistake, the fuse of the KIBS blows and its function will not work.

12-36 BRAKES

KIBS (Equipped Models)

⚠ 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 KIBS 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

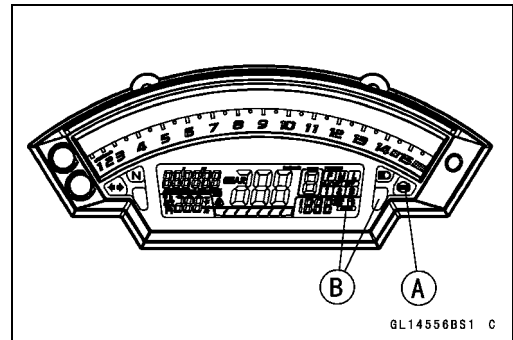
Do not ride the motorcycle with air in the brake line, or the KIBS could malfunction.

- The ABS indicator light (LED) [A] and KIBS indicator light (LED)/KIBS 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 KIBS 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 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 KIBS operates, the KIBS 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 KIBS is operating normally.
- Service codes detected once by the KIBS hydraulic unit will be memorized in the KIBS 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 ABS and KIBS indicator lights (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 KIBS operates normally (The reaction force generated is felt in the brake lever and pedal.). This completes the final inspection.



KIBS (Equipped Models)

KIBS Troubleshooting Outline

When an abnormality in the system occurs, the ABS indicator light (LED) and KIBS 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 KIBS 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 KIBS hydraulic unit ECU and FI ECU are not erased to preserve the problem history.

When, due to a malfunction, the ABS and KIBS indicator lights (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 KIBS 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 KIBS and DFI are operating normally, the ABS indicator light (LED) and KIBS 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 to OFF to go off the indicator light and the KIBS warning symbol.

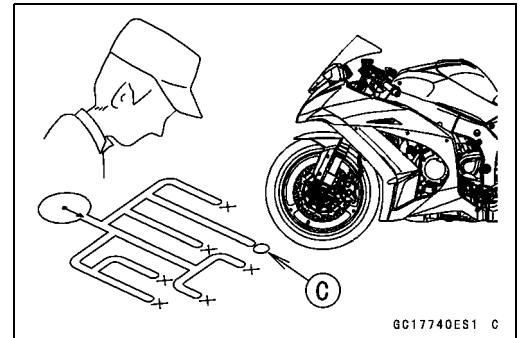
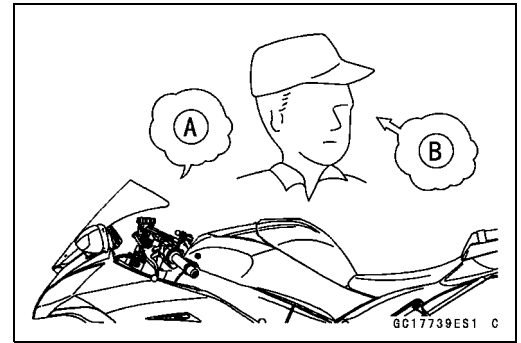
- After continuous riding on a rough road.
- When the engine is started with the stand raised and the transmission engaged, and the rear wheel turns.
- When accelerating so abruptly that the front wheel leaves the ground.
- When the KIBS has been subjected to strong electrical interference.
- When tire 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 KIBS troubleshooting work consists of confirming continuity of the wiring. The KIBS parts are assembled and adjusted by the manufacturer, so there is no need to disassemble or repair them. Replace the KIBS 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 KIBS hydraulic unit connector to the suspected faulty KIBS part, using the hand tester.

Special Tool - Hand Tester: 57001-1394



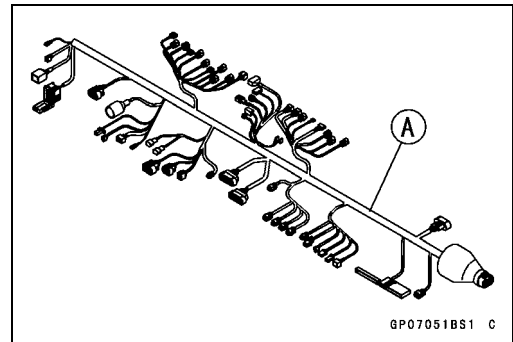
12-38 BRAKES

KIBS (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 hand tester between the ends of the leads.

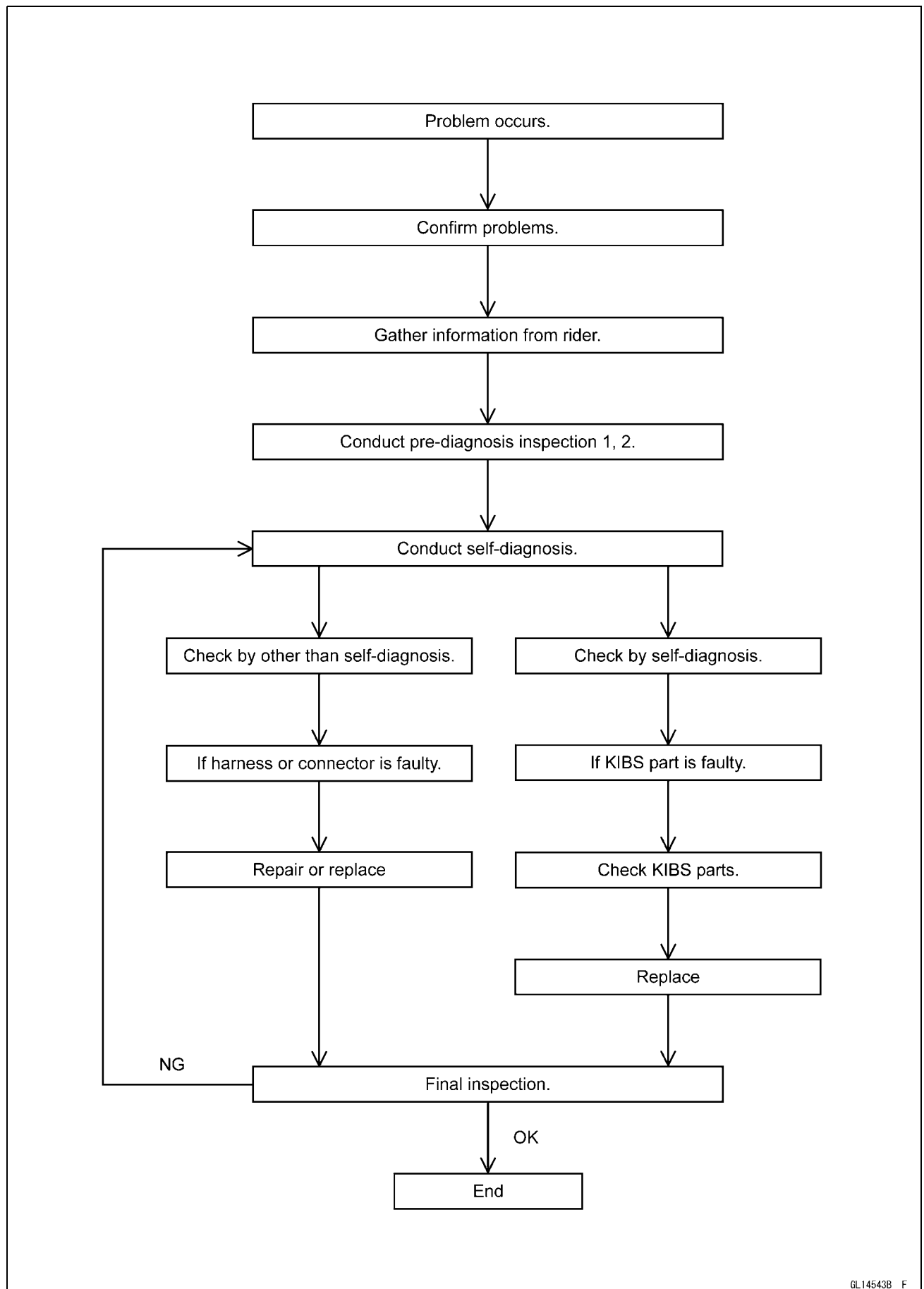
Special Tool - Hand Tester: 57001-1394

- Set the tester to the $\times 1 \Omega$ range, and read the tester.
- ★ If the tester does not read 0Ω , the lead is defective. Replace the main harness [A] if necessary.
- Narrow down suspicious parts and close in on the faulty KIBS part by repeating the continuity tests.
- ★ If no abnormality is found in the wiring or connectors, the KIBS parts are the next likely suspects. Check each part one by one.
- ★ If an abnormality is found, replace the affected KIBS part.



KIBS (Equipped Models)

KIBS Diagnosis Flow Chart



12-40 BRAKES

KIBS (Equipped Models)

Inquiries to Rider

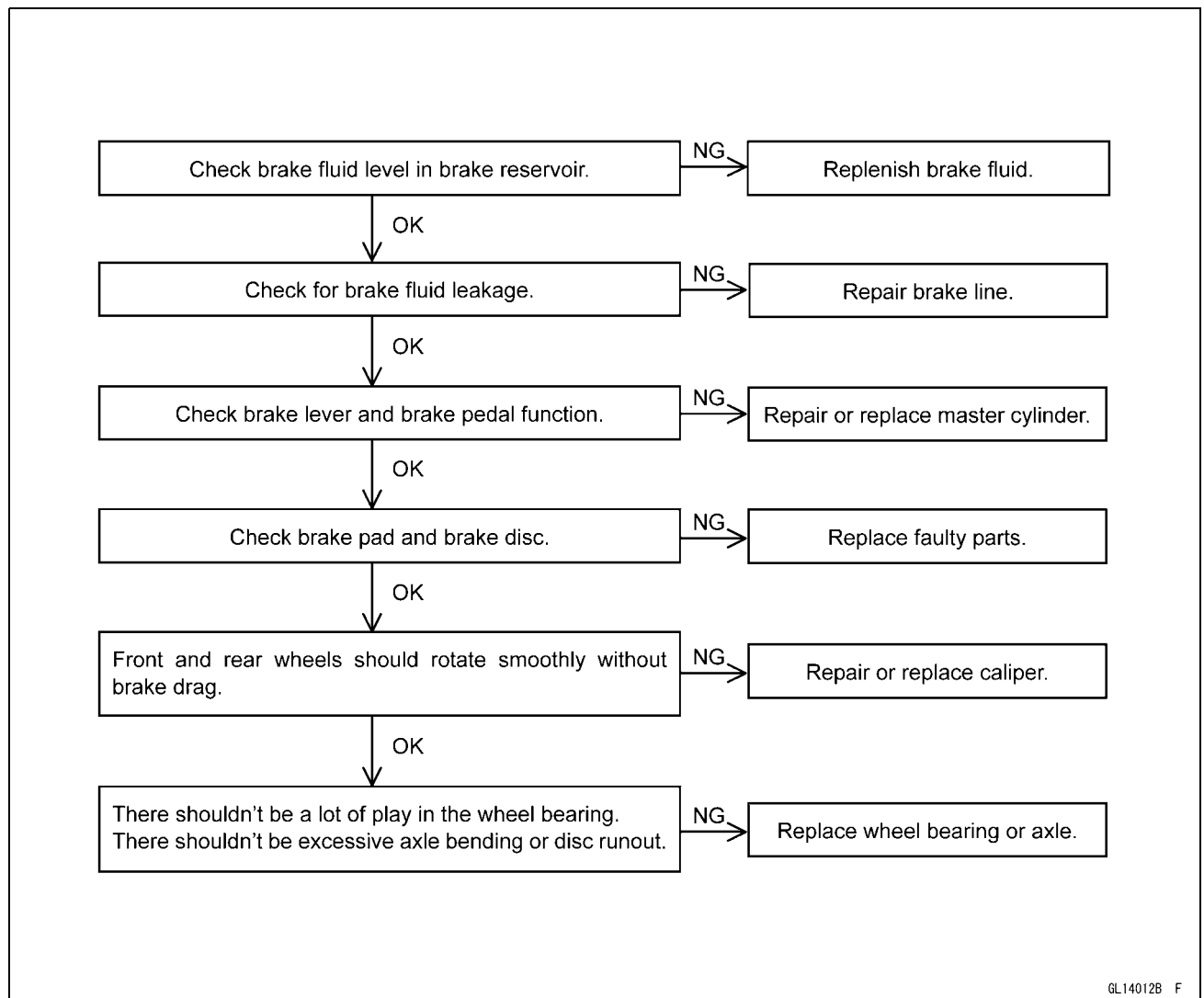
- Each rider reacts to problems in different ways, so it is important to confirm what kind of condition the rider is dissatisfied with.
- Try to find out exactly what problem occurs under exactly what conditions by asking the rider; knowing this information may help you reproduce the problem in the shop.
- The diagnosis sheet will help prevent you from overlooking any keys, so always use it.

Sample Diagnosis Sheet

Rider name:		Registration No. (license plate No.):	
Year of initial registration:		Model:	
Engine No.:		Frame No.:	
Date problem occurred:		Frequency:	
Weather:		Mileage:	
Phenomenon	<input type="checkbox"/> Brake lever vibration or noise		
	<input type="checkbox"/> Pedal vibration or noise		
	<input type="checkbox"/> Indicator light blinks		
	<input type="checkbox"/> Indicator light remains lit up		
	<input type="checkbox"/> Braking distance too long		
	<input type="checkbox"/> Abnormal brake lever movement		
	<input type="checkbox"/> Abnormal pedal movement		
	<input type="checkbox"/> KIBS not working		
<input type="checkbox"/> KIBS works but indicator light doesn't light up			
<input type="checkbox"/> KIBS operating too frequently			
Engine conditions at problem	<input type="checkbox"/> At start-up <input type="checkbox"/> After starting <input type="checkbox"/> At 5 000 r/min (rpm) or more		
Road conditions	<input type="checkbox"/> Slippery road (<input type="checkbox"/> snow, <input type="checkbox"/> gravel, <input type="checkbox"/> other) <input type="checkbox"/> Rough surface <input type="checkbox"/> Other		
Driving conditions	<input type="checkbox"/> High-speed cornering <input type="checkbox"/> Driving 10 km/h (6 mph) or above <input type="checkbox"/> Driving below 10 km/h (6 mph) <input type="checkbox"/> When stopping <input type="checkbox"/> When turning		
Brake application	<input type="checkbox"/> Gradual <input type="checkbox"/> Abrupt		
Other conditions	<input type="checkbox"/> Large brake lever stroke <input type="checkbox"/> Large pedal stroke		

KIBS (Equipped Models)

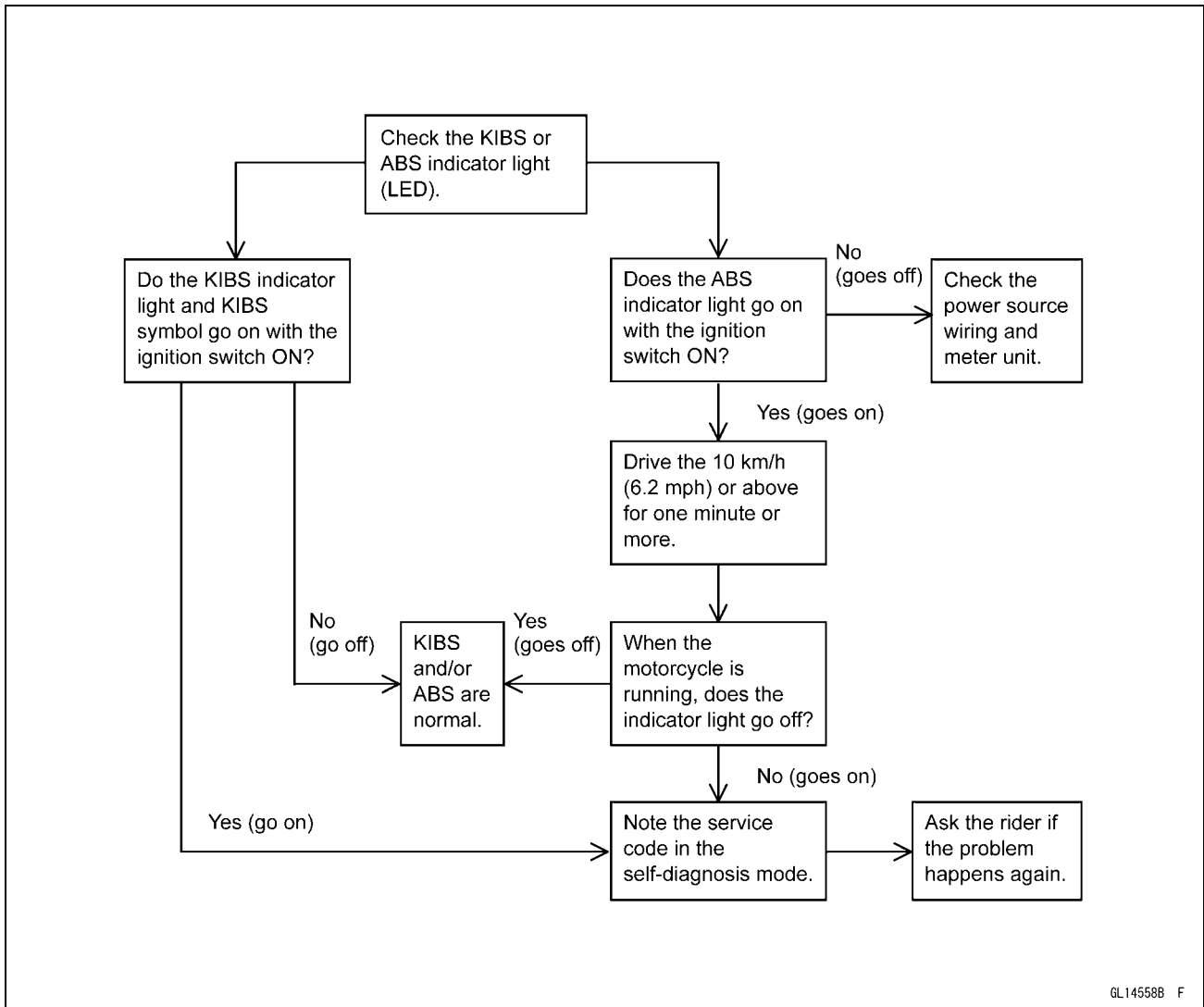
Pre-Diagnosis Inspection 1



12-42 BRAKES

KIBS (Equipped Models)

Pre-Diagnosis Inspection 2



Self-diagnosis Outline

Refer to the Self-Diagnosis System chapter for the self-diagnosis or service code.

KIBS (Equipped Models)

ABS and KIBS Indicator Lights (LED) Inspection

○ In this model, the ABS indicator light (LED) [A] and KIBS indicator light (LED) [B] go on or blink by the data sent from the KIBS hydraulic unit.

- Refer to the Meter Unit Inspection in the Electrical System chapter.

ABS and KIBS Indicator Lights (LED) Function

Status	Brake Condition	ABS Indicator Light (Yellow)	KIBS Indicator Light (Yellow)	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 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).

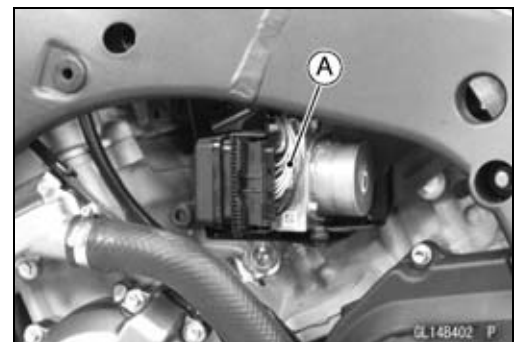
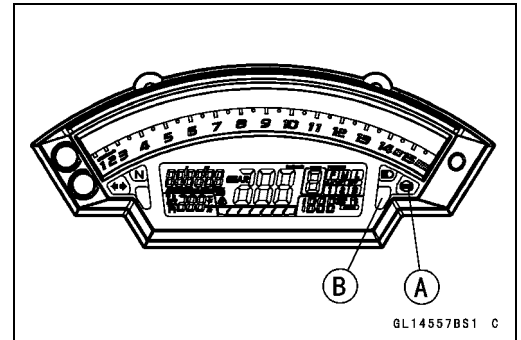
KIBS Hydraulic Unit Removal

NOTICE

The KIBS 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 KIBS 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)
 - 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)
 - Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)



12-44 BRAKES

KIBS (Equipped Models)

- Remove:
 - Bolts [A]
 - Cover [B]
- Clear the projection [C] from the bracket.
- Clean the KIBS hydraulic unit.

NOTICE

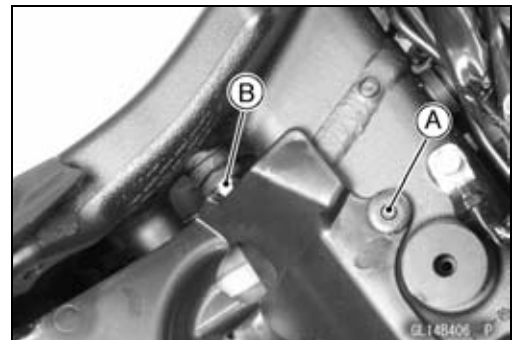
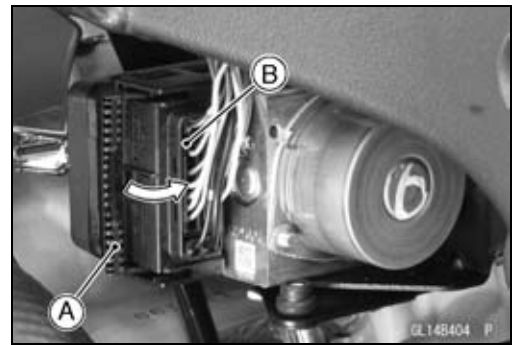
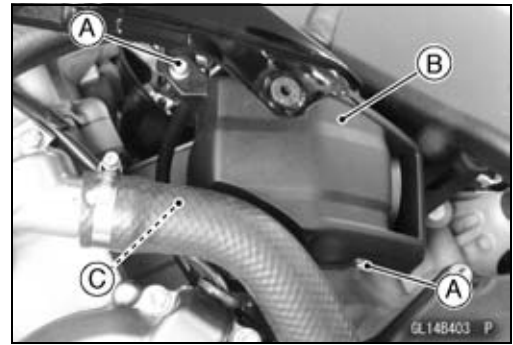
Clean all fittings on the KIBS hydraulic unit and the rear master cylinder because dirt around the banjo bolts could contaminate the brake fluid in the line during removal/installation.

Spread over a shop towel around the KIBS hydraulic unit before removing the brake line so that brake fluid does not leak on the parts.

- Pull the lever [A] backward to disconnect the KIBS hydraulic unit connector [B].

- Remove the bolts [A].

- Remove:
 - Quick Rivet [A]
 - Bolt [B]

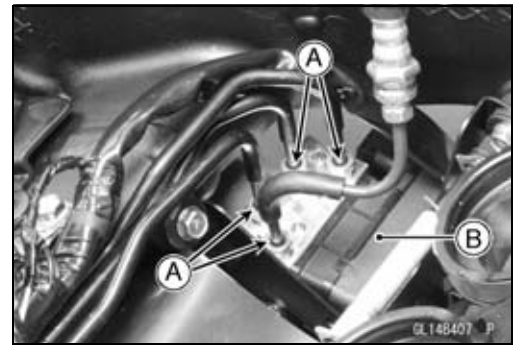


KIBS (Equipped Models)

- Loosen the brake pipe joint nuts [A].
- Take the KIBS hydraulic unit [B] together with the bracket off the brake pipes.

NOTICE

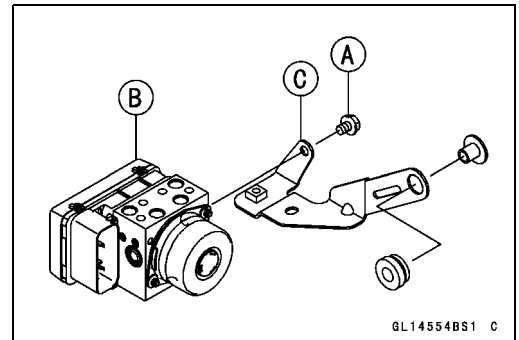
Brake fluid quickly ruins painted plastic surfaces; any spilled fluid should be completely washed away immediately.



- Remove the bolt [A].
- Take the KIBS hydraulic unit [B] off the bracket [C].

NOTICE

The KIBS hydraulic unit has been adjusted and set with precision at the factory. Do not try to disassemble and repair the KIBS hydraulic unit.

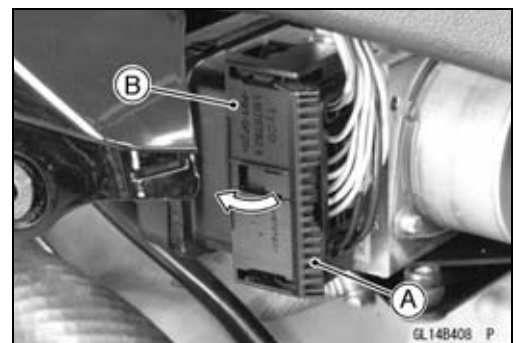


KIBS Hydraulic Unit Installation

NOTICE

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

- Installation is the reverse of removal. Note the followings.
 - Pull the lever [A] forward to connect the KIBS 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.



KIBS Hydraulic Unit Inspection

- Remove the KIBS hydraulic unit (see KIBS Hydraulic Unit Removal).
- Visually inspect the connector terminals [A].
- ★ Replace the KIBS hydraulic unit or main harness if either of the terminals are cracked, bent, or otherwise damaged.
- ★ If the KIBS hydraulic unit connector is clogged with mud or dust, blow it off with compressed air.
- Visually inspect the KIBS hydraulic unit.
- ★ Replace the KIBS hydraulic unit if any of them are cracked, or otherwise damaged.



12-46 BRAKES

KIBS (Equipped Models)

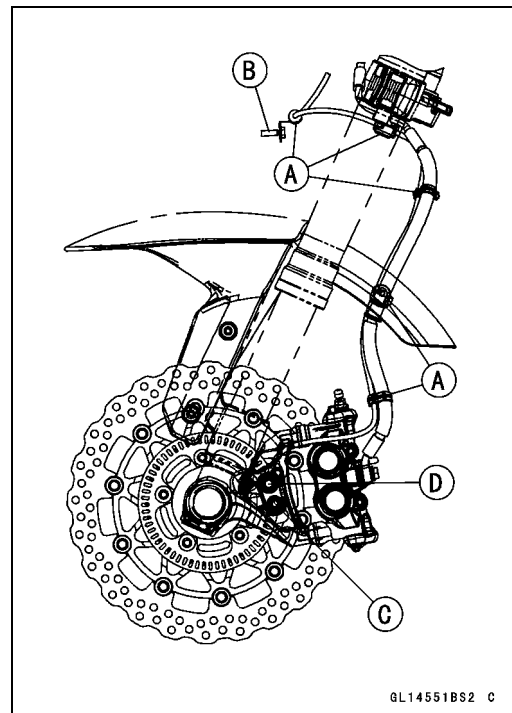
Front Wheel Rotation Sensor Removal

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.

- Remove:
 - Right Upper Inner Fairing (see Upper Inner Fairing Removal in the Frame chapter)
 - Connector [A] (Disconnect)

- Clear the sensor lead from the clamps [A].
- Headlight Mounting Bolt [B]
- Remove:
 - Bolt [C]
 - Front Wheel Rotation Sensor [D]



Front Wheel Rotation Sensor Installation

- Installation is the reverse of removal.
- Run the lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

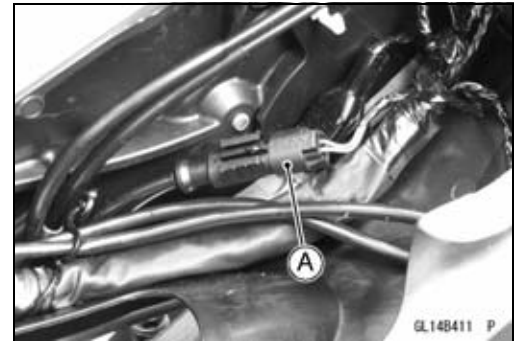
KIBS (Equipped Models)

Rear Wheel Rotation Sensor Removal

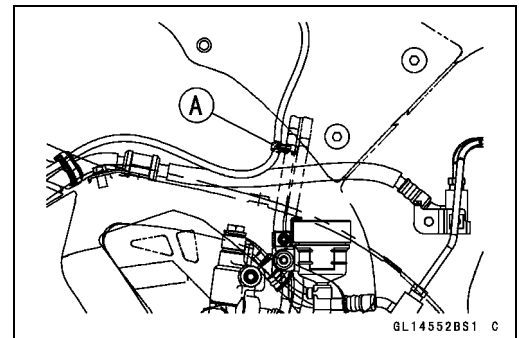
NOTICE

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.

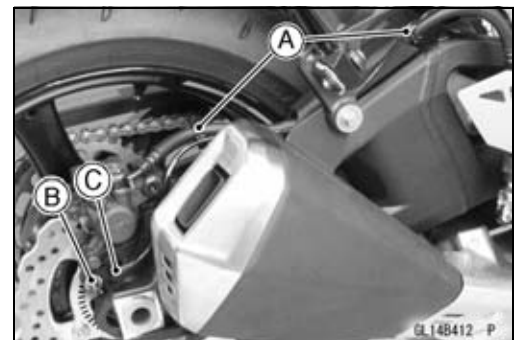
- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
 - Connector [A] (Disconnect)



- Clear the sensor lead from the clamp [A].



- Clear the sensor lead from the clamps [A].
- Remove:
 - Bolt [B]
 - Rear Wheel Rotation Sensor [C]



Rear Wheel Rotation Sensor Installation

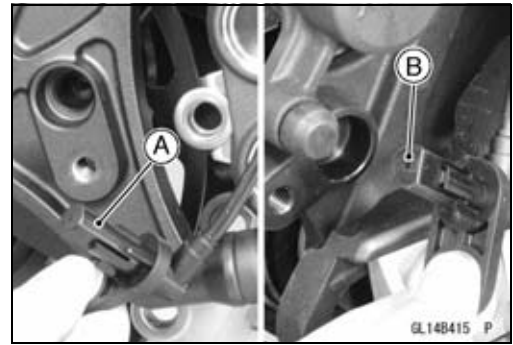
- Installation is the reverse of removal.
- Route the lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

12-48 BRAKES

KIBS (Equipped Models)

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.



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:

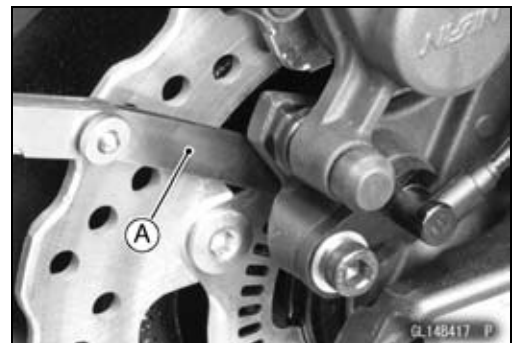
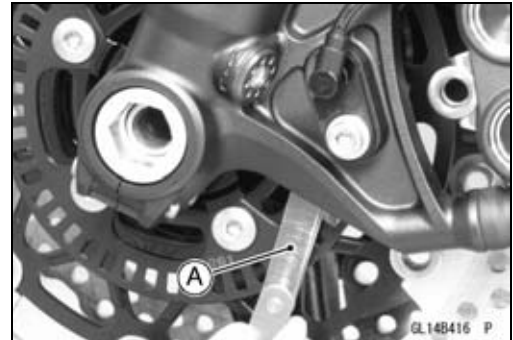
Front 0.4 ~ 1.6 mm (0.02 ~ 0.06 in.)

Rear 0.4 ~ 1.6 mm (0.02 ~ 0.06 in.)

NOTE

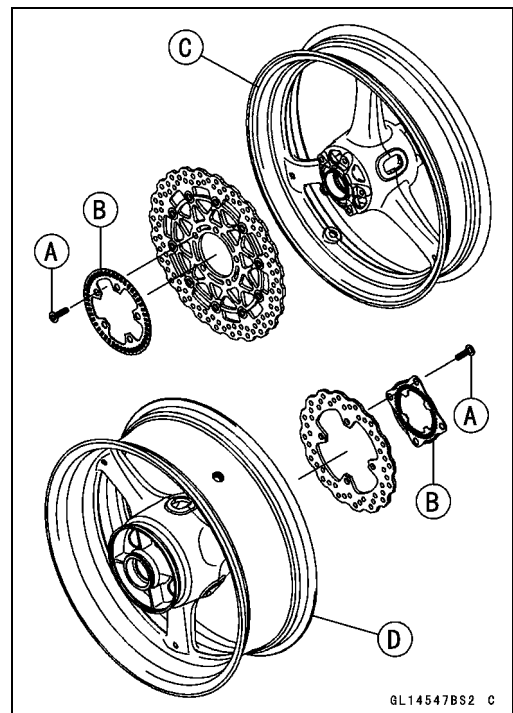
○ The sensor air gap cannot be adjusted.

- ★ 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).



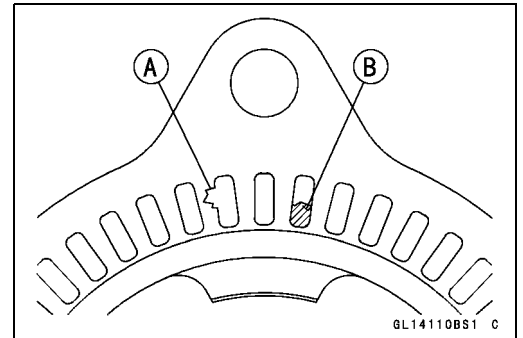
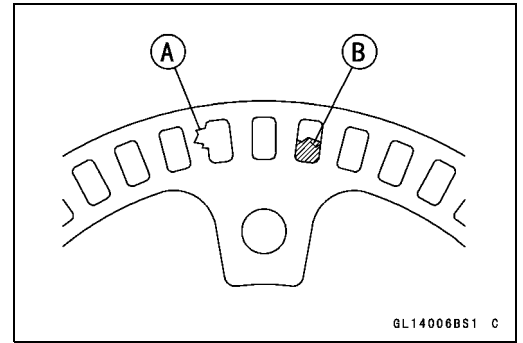
Wheel Rotation Sensor Rotor Inspection

- 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]



KIBS (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.



KIBS Solenoid Valve Relay Fuse (20 A) Removal

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

KIBS Motor Relay Fuse (30 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 KIBS Solenoid Valve Relay Fuse (20 A)/KIBS Motor Relay Fuse (30 A) Removal).
- Refer to the Fuse Inspection in the Electrical System chapter.

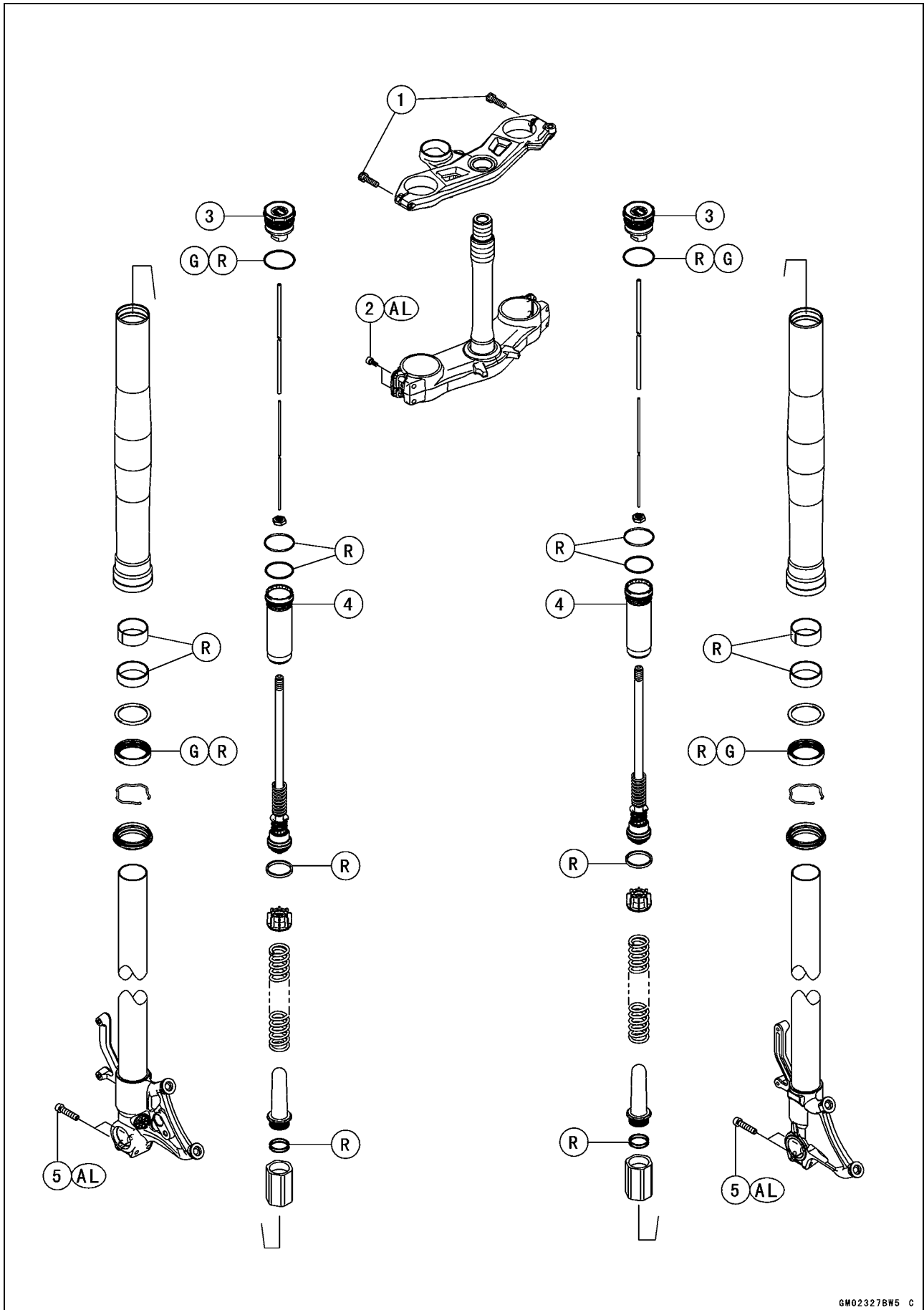
Suspension

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13-2 SUSPENSION

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Fork Clamp Bolts (Upper)	20	2.0	15	
2	Front Fork Clamp Bolts (Lower)	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

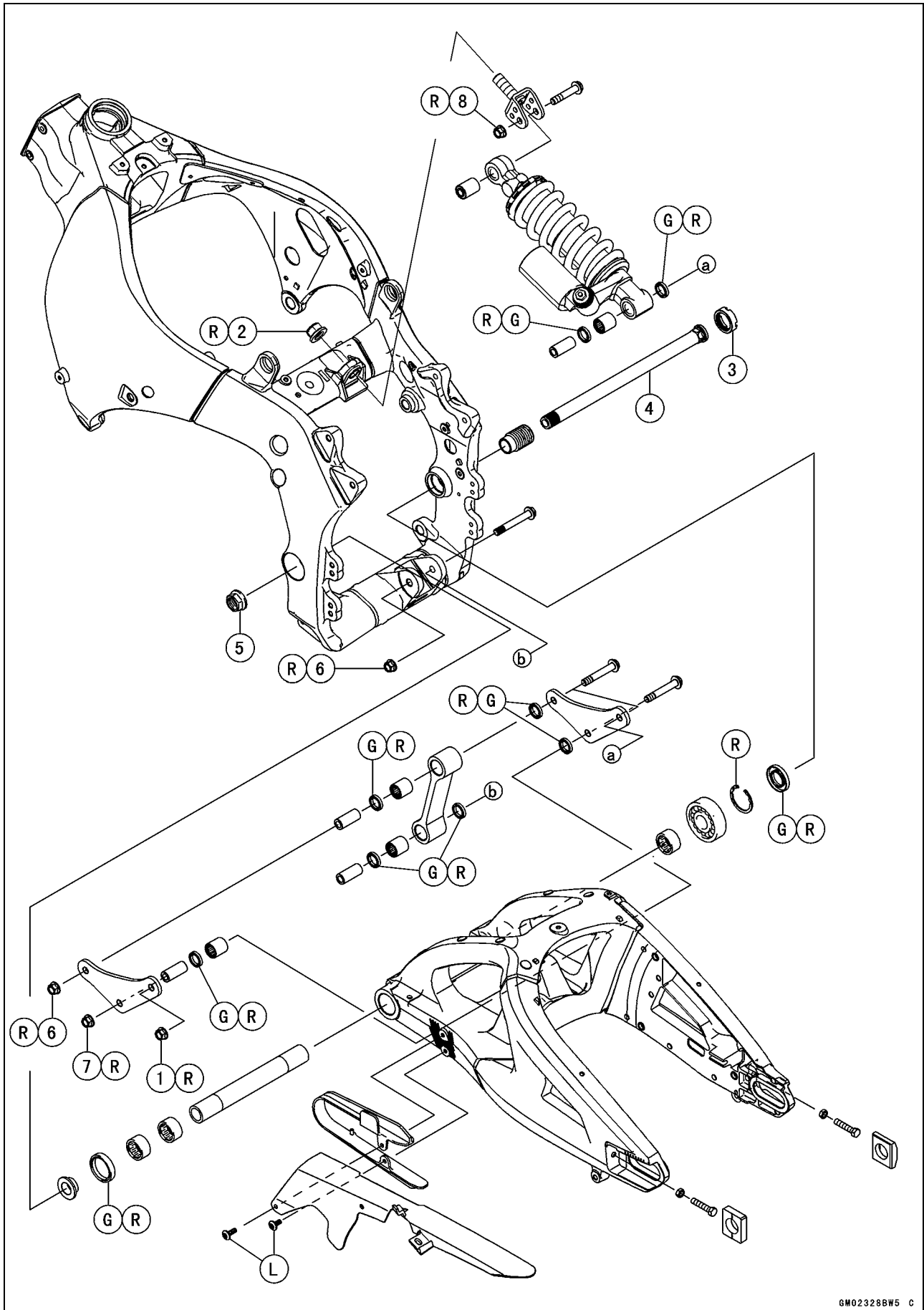
AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque.

G: Apply grease.

R: Replacement Parts

13-4 SUSPENSION

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Rear Shock Absorber Nut (Lower)	34	3.5	25	R
2	Rear Shock Absorber Bracket Nut	59	6.0	44	R
3	Swingarm Pivot Adjusting Collar Locknut	98	10.0	72	
4	Swingarm Pivot Shaft	20	2.0	15	
5	Swingarm Pivot Shaft Nut	108	11.0	80	
6	Tie-Rod Nuts	34	3.5	25	R
7	Rocker Arm Nut	34	3.5	25	R
8	Rear Shock Absorber Nut (Upper)	34	3.5	25	R

G: Apply grease.

L: Apply a non-permanent locking agent.

R: Replacement Parts

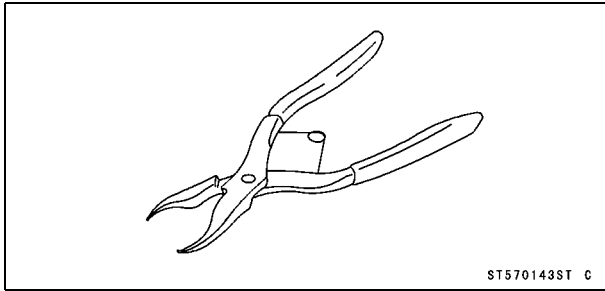
13-6 SUSPENSION

Specifications

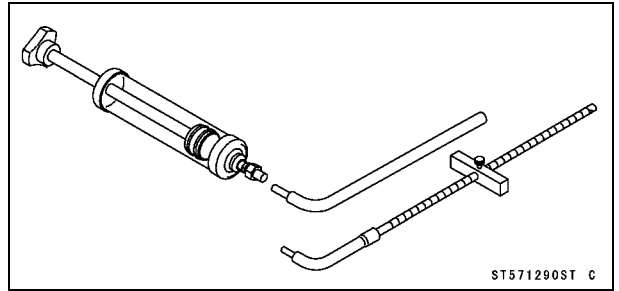
Item	Standard
Front Fork (Per One Unit) Fork Inner Tube Diameter Air Pressure Rebound Damper Setting Compression Damper Setting Fork Spring Preload Setting Fork Oil: Recommended Oil Amount Fork Oil Level Fork Spring Free Length	$\phi 43$ mm (1.7 in.) Atmospheric pressure (Non-adjustable) 3 3/4 turns out from the fully clockwise position (Usable Range: 0 \longleftrightarrow 5 1/2 turns out) 4 1/2 turns out from the fully clockwise position (Usable Range: 0 \longleftrightarrow 7 turns out) 6 turns in from the fully counterclockwise position (Usable Range: 0 \longleftrightarrow 15 turns in) SHOWA SS-19 or equivalent Approx. 420 mL (14.2 US oz.) (when changing oil) 495 \pm 2.5 mL (16.7 \pm 0.085 US oz.) (after disassembly and completely dry) 85 \pm 2 mm (3.35 \pm 0.08 in.) (fully compressed, below from the top of outer tube) 238 mm (9.37 in.) (Service Limit: 233 mm (9.17 in.))
Rear Shock Absorber Rebound Damper Setting Compression Damper Setting: High Speed Low Speed Spring Preload Setting Position: Standard Usable Range Gas Pressure	1 3/4 turns out from the fully clockwise position (Usable Range: 0 \longleftrightarrow 3 turns out) 1 3/4 turns out from the fully clockwise position (Usable Range: 0 \longleftrightarrow 5 turns out) 1 3/4 turns out from the fully clockwise position (Usable Range: 0 \longleftrightarrow 5 turns out) Spring length: 162 mm (6.38 in.) Spring length: 157 ~ 170 mm (6.18 ~ 6.69 in.) (stronger to weaker) 980 kPa (10.0 kgf/cm ² , 142 psi, Non-adjustable)

Special Tools

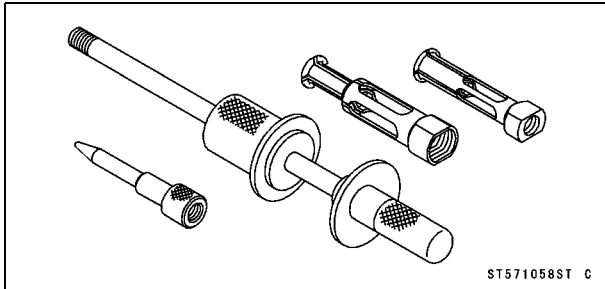
Inside Circlip Pliers:
57001-143



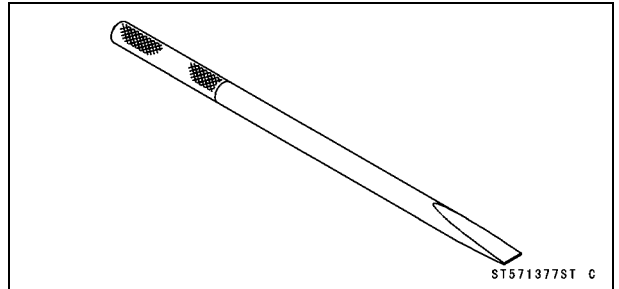
Fork Oil Level Gauge:
57001-1290



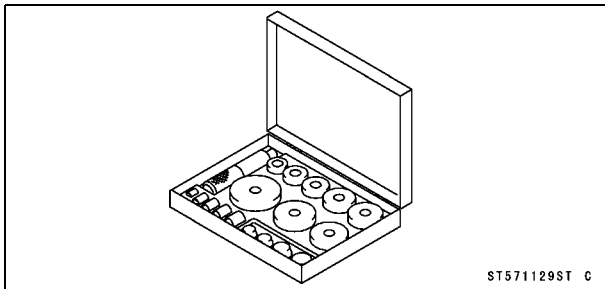
Oil Seal & Bearing Remover:
57001-1058



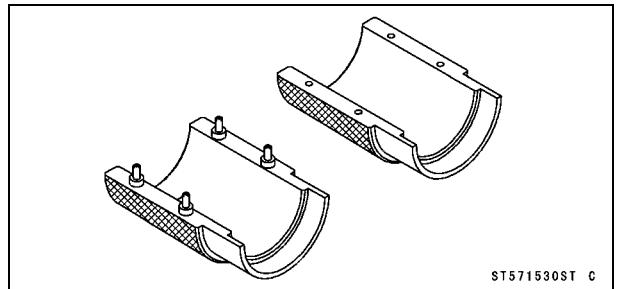
Bearing Remover Shaft, $\phi 13$:
57001-1377



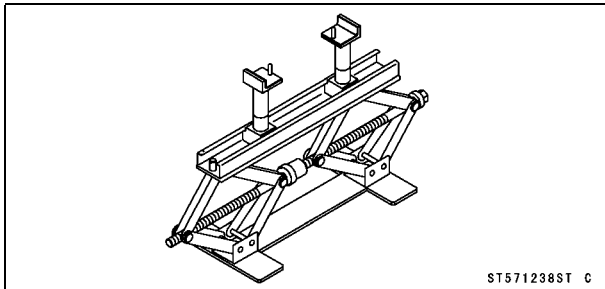
Bearing Driver Set:
57001-1129



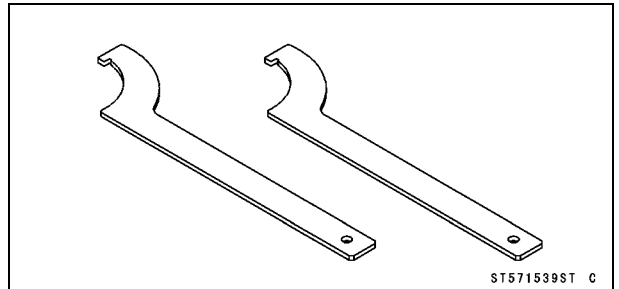
Fork Oil Seal Driver, $\phi 43$:
57001-1530



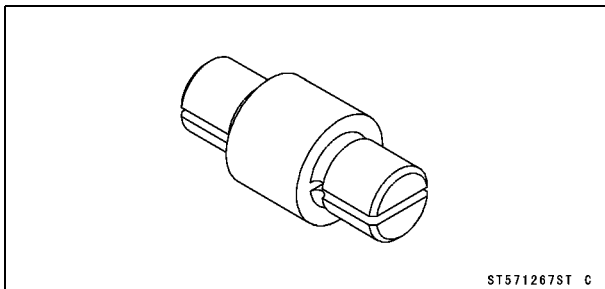
Jack:
57001-1238



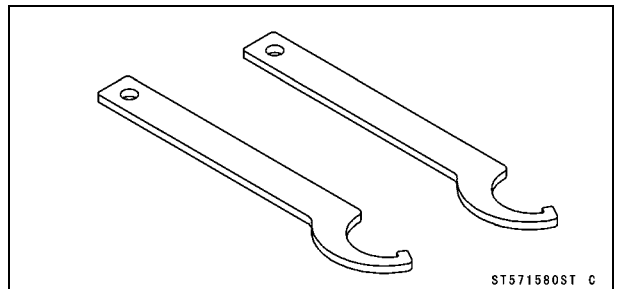
Hook Wrench T=3.2 R37:
57001-1539



Bearing Remover Head, $\phi 15 \times \phi 17$:
57001-1267



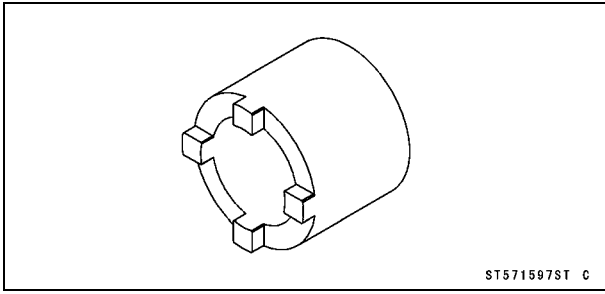
Hook Wrench R=35:
57001-1580



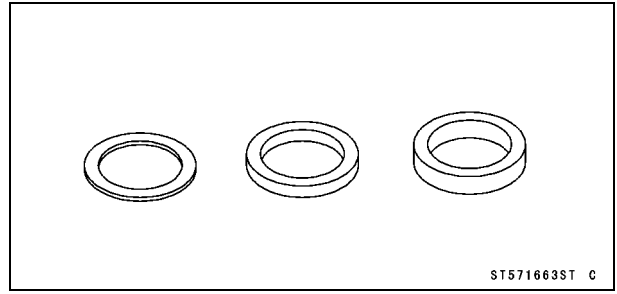
13-8 SUSPENSION

Special Tools

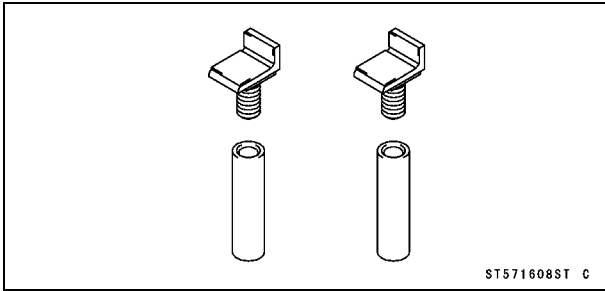
Swingarm Pivot Nut Wrench:
57001-1597



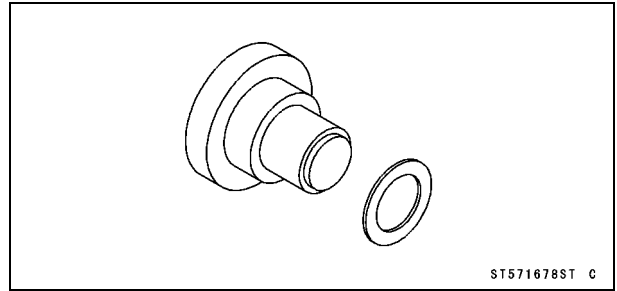
Spacer ϕ 28:
57001-1663



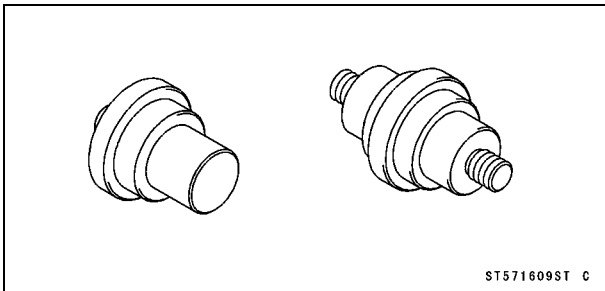
Jack Attachment:
57001-1608



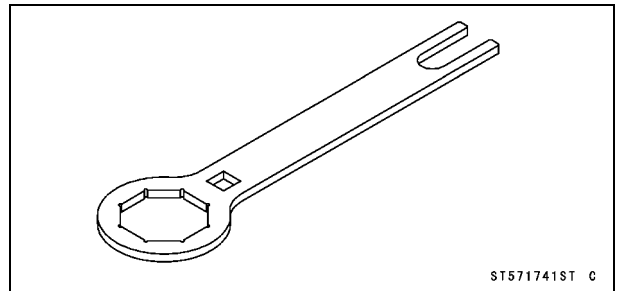
Needle Bearing Driver, ϕ 20 & Spacer, ϕ 28:
57001-1678



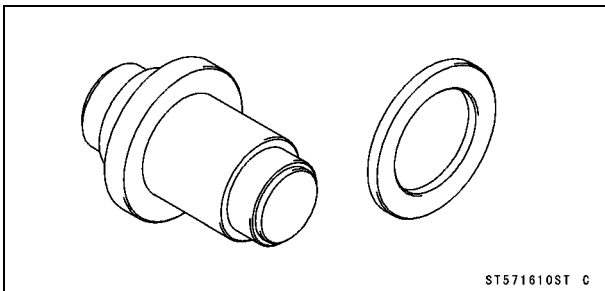
Needle Bearing Driver, ϕ 17/ ϕ 18:
57001-1609



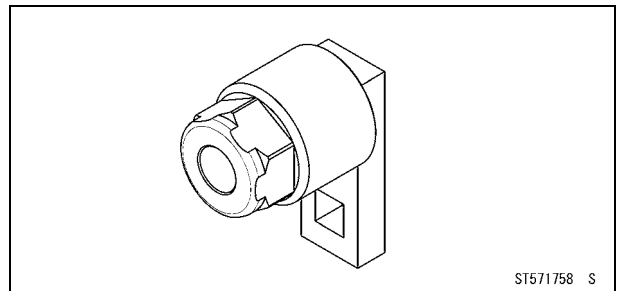
Top Plug Wrench (45 mm):
57001-1741



Needle Bearing Driver, ϕ 28:
57001-1610



Rod Guide Case Wrench, 35 mm:
57001-1758



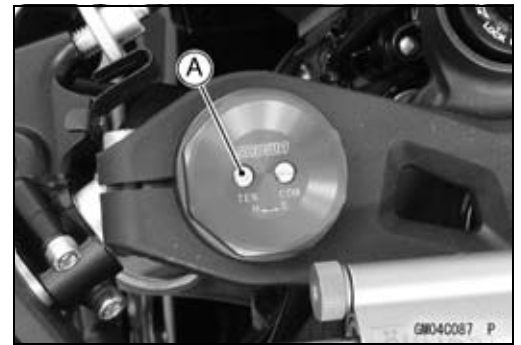
Front Fork

Rebound Damping Force Adjustment

- To adjust the rebound damping force, turn the rebound damping adjuster [A].
- The standard adjuster setting is the **3 3/4 turns out** from the fully clockwise position.

⚠ WARNING

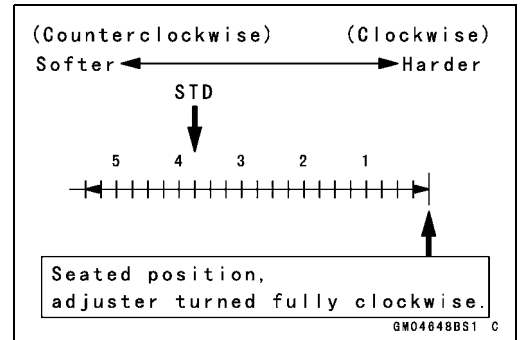
If both adjusters are not adjusted equally, handling may be impaired and a hazardous condition may result. Be sure the adjusters are set equally.



- 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

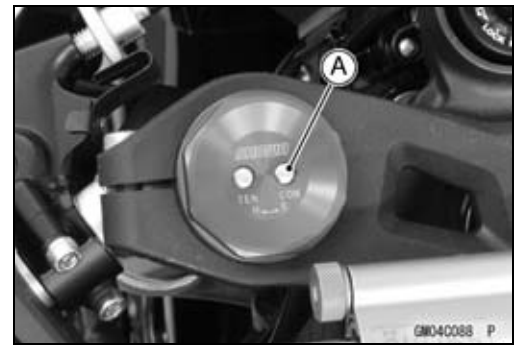


Compression Damping Force Adjustment

- To adjust the compression damping force, turn the compression damping adjuster [A].
- The standard adjuster setting is the **4 1/2 turns out** from the fully clockwise position.

⚠ WARNING

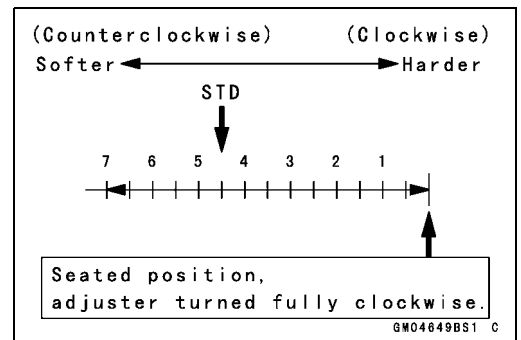
If both adjusters are not adjusted equally, handling may be impaired and a hazardous condition may result. Be sure the adjusters are set equally.



- 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



13-10 SUSPENSION

Front Fork

Spring Preload Adjustment

- To adjust the spring preload, turn the spring preload adjuster [A].
- The standard adjuster setting is the **6 turns in** from the fully counterclockwise position.

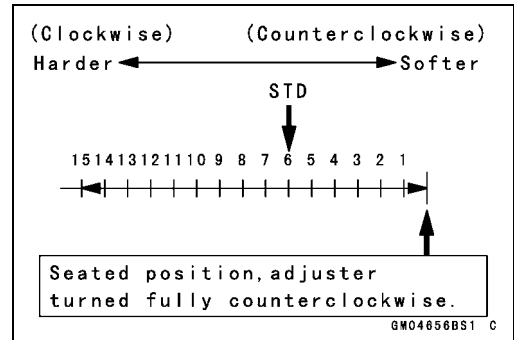
⚠ WARNING

If both adjusters are not adjusted equally, handling may be impaired and a hazardous condition may result. Be sure the adjusters are set equally.

- 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
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
15 turns in	Strong	Hard	Heavy	Bad	High



Front Fork Removal (Each Fork Leg)

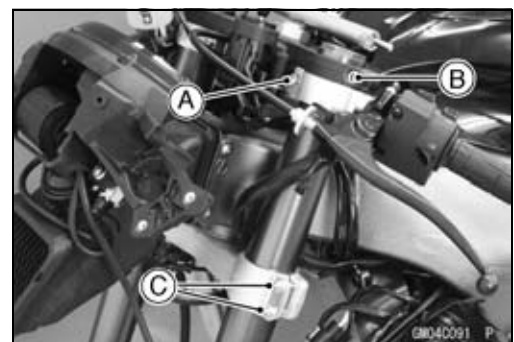
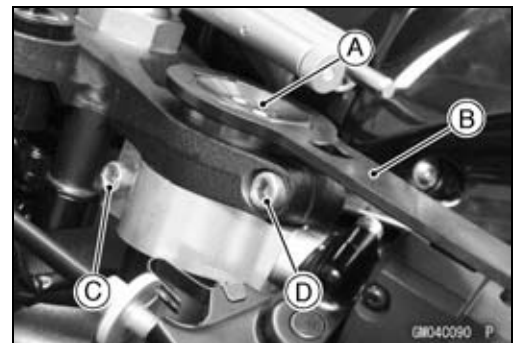
- ★ Loosen the front fork top plug [A] beforehand if the fork leg is to be disassembled.

Special Tool - Top Plug Wrench (45 mm) [B]: 57001-1741

NOTE

- Loosen the top plug after loosening the handlebar clamp bolt [C] and upper front fork clamp bolt [D].

- Remove:
 - 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)
- 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 plug end [A] as shown in the figure.
 - 11 mm (0.43 in.) [B]
 - Steering Stem Head [C]
- Tighten:
 - Torque - Front Fork Clamp Bolts (Lower): 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:

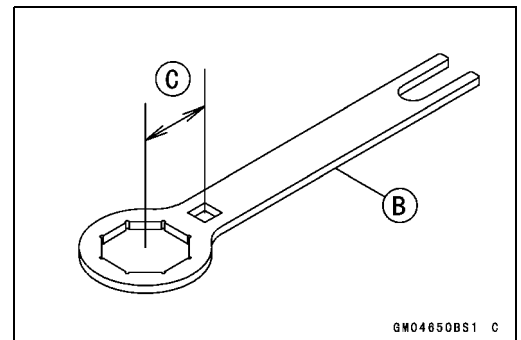
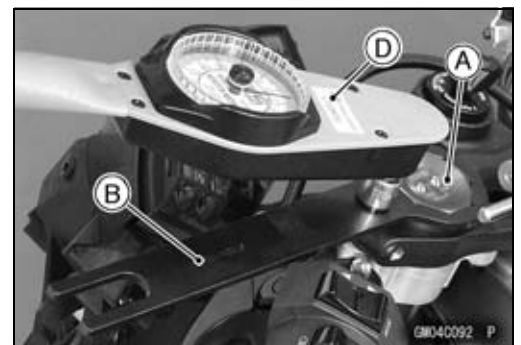
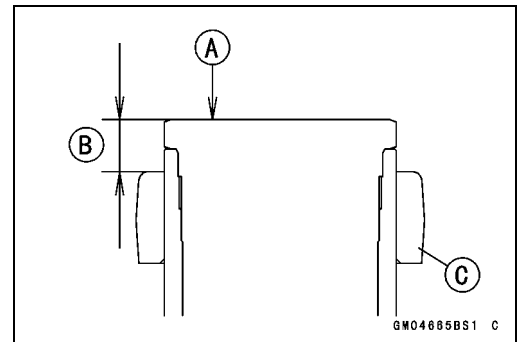
$$a \times b \div (b + c) = d$$

- [a] Specified torque
- [b] Length from center of square hole to grip point
- [c] Offset = 44 mm
- [d] Tightening torque

For an example:

$$35 \text{ N}\cdot\text{m} \times 310 \div (310 + 44) = 31 \text{ N}\cdot\text{m}$$

- Tighten:
 - Torque - Front Fork Clamp Bolts (Upper): 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)



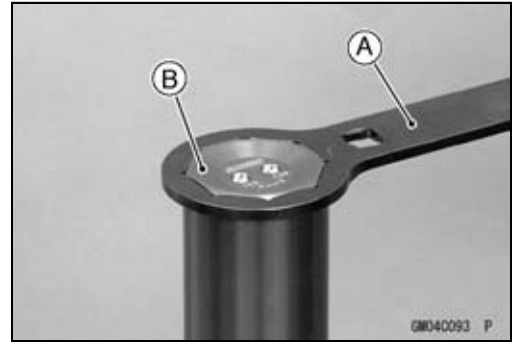
13-12 SUSPENSION

Front Fork

Front Fork Oil Change

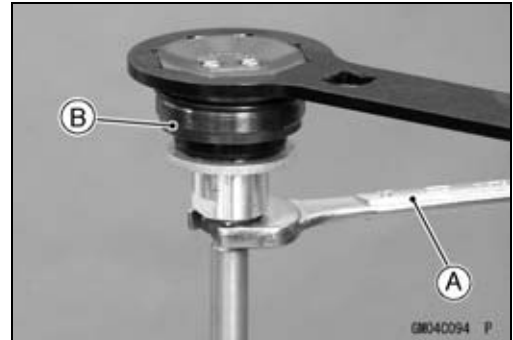
- Remove the front fork (see Front Fork Removal (Each Fork Leg)).
- Turn the spring preload adjuster fully counterclockwise for removing the piston rod assy easily.
- Hold the inner tube lower end in a vise.
- Using the wrench [A], unscrew the top plug [B] out of the outer tube.

Special Tool - Top Plug Wrench (45 mm): 57001-1741

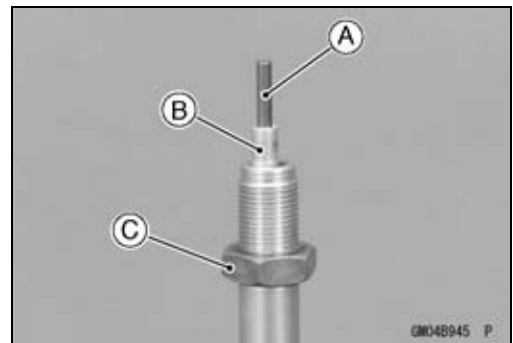


- Holding the piston rod nut with a wrench [A], remove the top plug [B] from the piston rod.

Special Tool - Top Plug Wrench (45 mm): 57001-1741

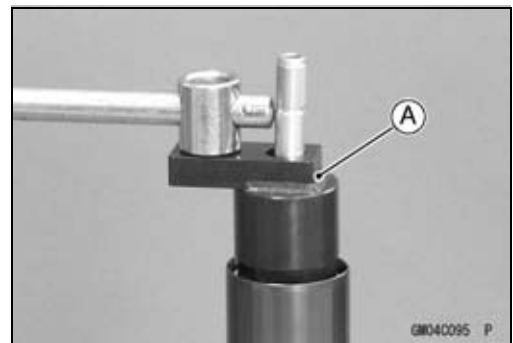


- Remove:
 - Rebound Damping Adjuster Rod (Inside) [A]
 - Compression Damping Adjuster Rod (Outside) [B]
 - Piston Rod Nut [C]



- Using the rod guide case wrench [A], remove the piston rod guide case from the inner tube.

Special Tool - Rod Guide Case Wrench, 35 mm: 57001-1758



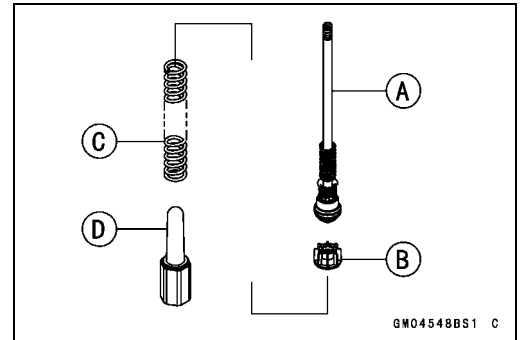
NOTICE

A socket of piston rod guide case is shallow (4 mm) and therefore be sure to check that the wrench (Special Tool: 57001-1758) is securely seated on the piston rod guide case.

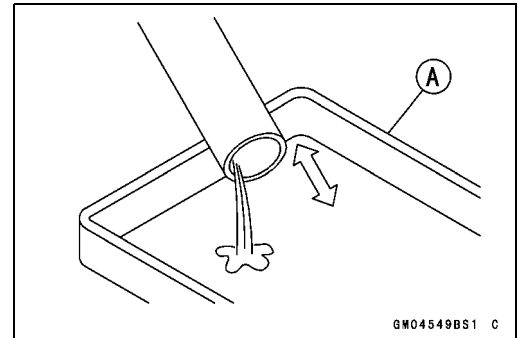
When loosening the piston rod guide case. If the wrench is not securely seated on it, the piston rod guide case may brake.

Front Fork

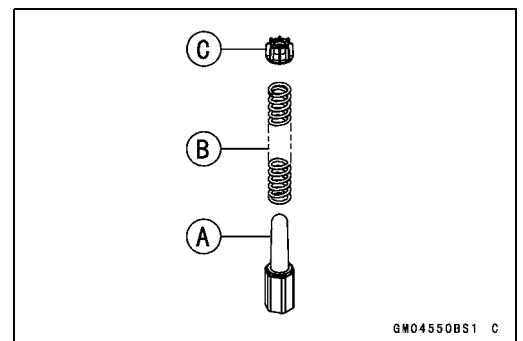
- Remove:
 - Piston Rod Assy [A]
 - Collar [B]
 - Fork Spring [C]
 - Fork Spring Guide [D]



- Drain the fork oil into a suitable container [A].
- Pump the inner tube up and down at least ten times to expel the oil from the fork.



- Install:
 - Collar [A]
 - Fork Spring [B]
 - Fork Spring Guide [C]



- 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].

Fork Oil

Recommended Oil:

SHOWA SS-19 or equivalent

Amount (Per Side):

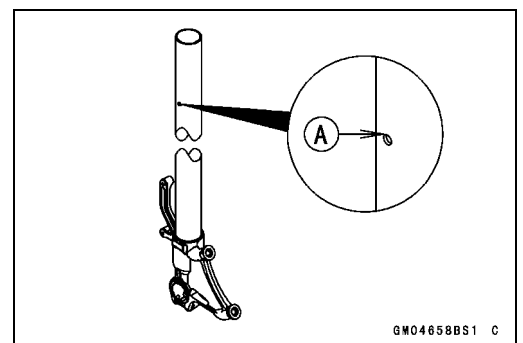
When changing oil:

Approx. 420 mL (14.2 US oz.)

After disassembly and completely dry (Total):

495 ±2.5 mL (16.7 ±0.085 US oz.)

- Move the inner tube up and down more than ten times in order to expel the air from the fork oil.



13-14 SUSPENSION

Front Fork

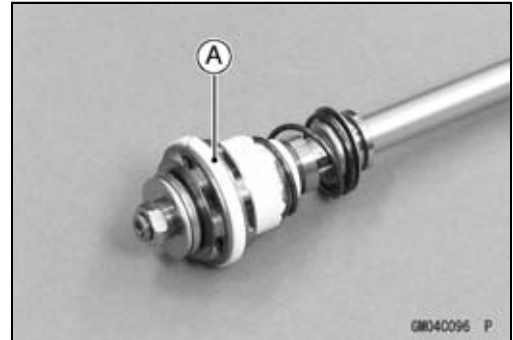
- Insert the piston rod assy into the inner tube.

NOTE

○Lifting the outer tube, and insert the piston rod assy.

NOTICE

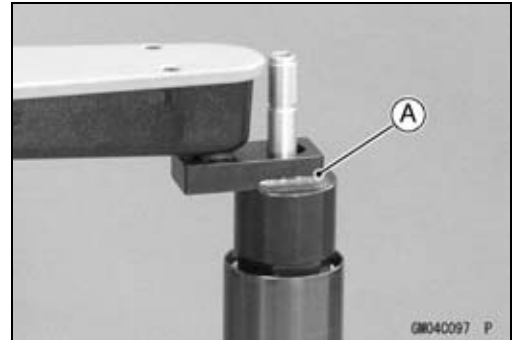
When inserting, be careful not to damage the piston ring [A].



- 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, 35 mm: 57001-1758

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: 57001-1758) [A] you reduce the torque to about 93% of the specified value [84 N·m (8.6 kgf·m, 62 ft·lb)] due to the offset [B] of the wrench square hole.
- This torque value [84 N·m (8.6 kgf·m, 62 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 to the center of the coupling square.
- To obtain the correct tightening torque with your torque wrench, you need to calculate as follows.

Formula:

$$a \times b \div (b + c) = d$$

[a] Specified torque

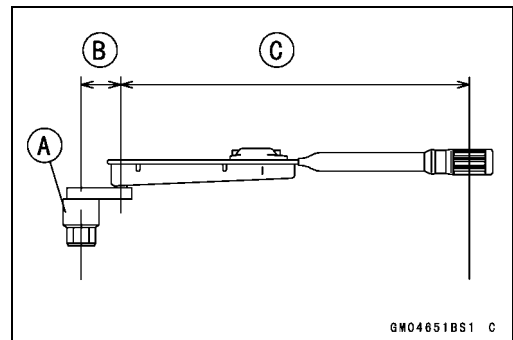
[b] Length from center of square hole to grip point

[c] Offset = 30 mm

[d] Tightening torque

For an example:

$$90 \text{ N}\cdot\text{m} \times 450 \div (450 + 30) = 84 \text{ N}\cdot\text{m}$$



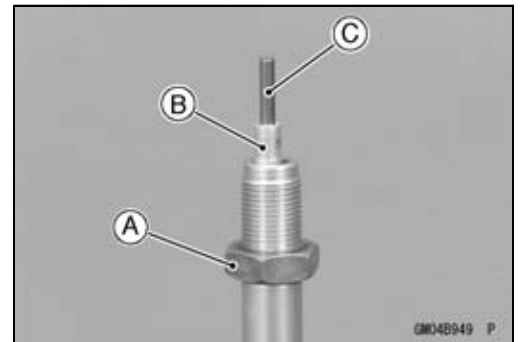
NOTICE

A socket of piston rod guide case is shallow (4 mm) and therefore be sure to check that the wrench (Special Tool: 57001-1758) 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.

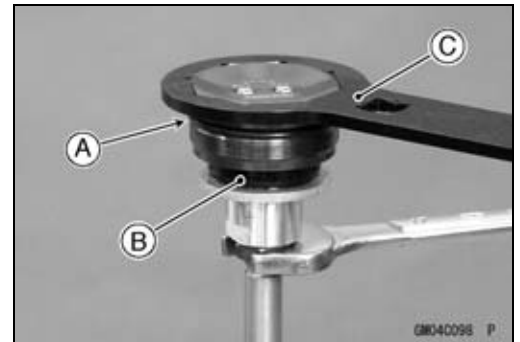
Front Fork

- Install the piston rod nut [A] until it is bottomed.
- Install:
 - Compression Damping Adjuster Rod (Outside) [B]
 - Rebound Damping Adjuster Rod (Inside) [C]

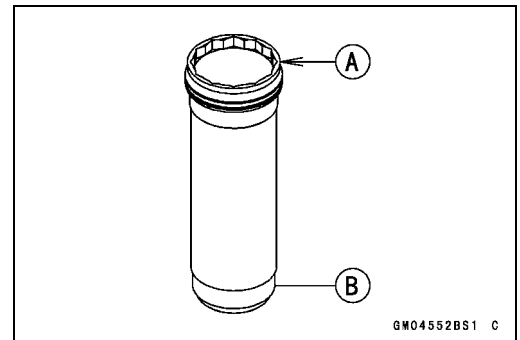


- Replace the O-ring [A] with a new one.
- Apply grease to the new O-ring.
- Install the top plug [B] to the piston rod.
- Holding the top plug with the wrench [C], tighten the piston rod nut against the top plug.

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.

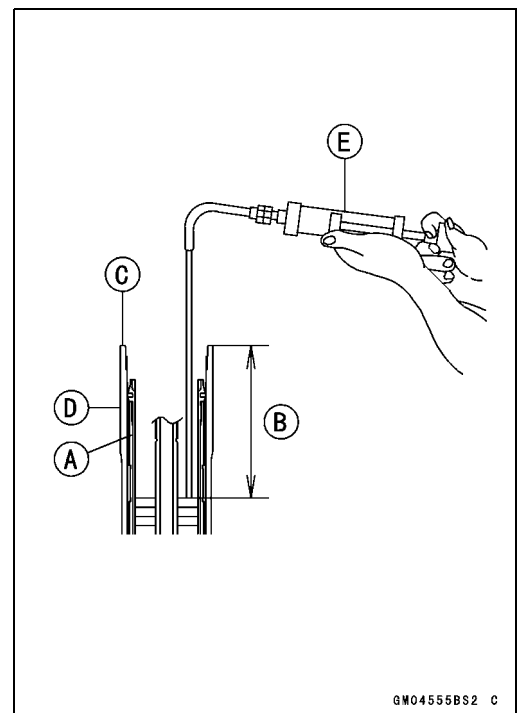
Fork Oil Level (fully compressed)
Standard: 85 ±2 mm (3.35 ±0.08 in.)

NOTE

- After more than 10 minutes, oil level is 76 ±2 mm (2.99 ±0.08 in.).
- 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.



13-16 SUSPENSION

Front Fork

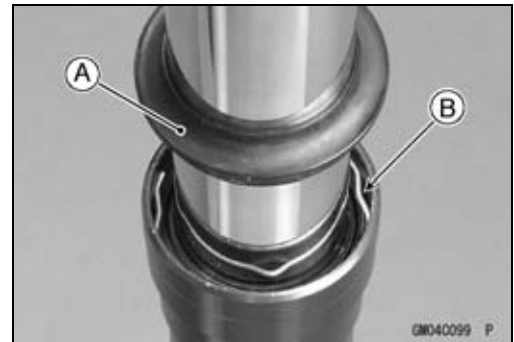
- Lift the outer tube.
- Using the wrench, tighten the top plug temporary.
Special Tool - Top Plug Wrench (45 mm): 57001-1741
- Install the front fork (see Front Fork Installation (Each Fork Leg)).

NOTE

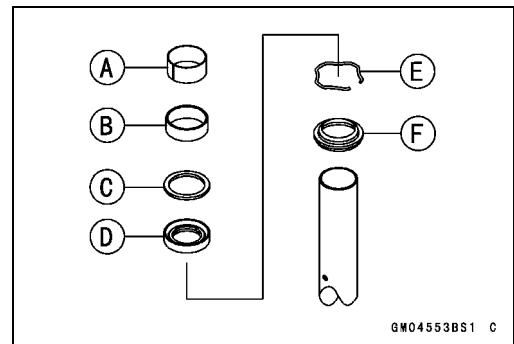
○After installing the front fork, adjust the spring preload and damping force correctly.

Front Fork Disassembly

- Remove the front fork (see Front Fork Removal (Each Fork Leg)).
- Drain the fork oil (see Front Fork Oil Change).
- Take the dust seal [A] off the outer tube.
- Remove the retaining ring [B].
- Separate the outer tube from the inner tube.

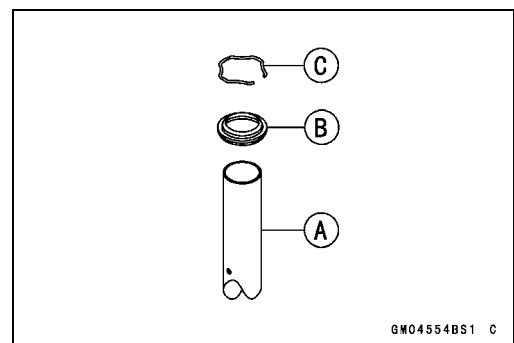


- Remove the following parts from the inner tube.
 - Slide Bushing [A]
 - Guide Bushing [B]
 - Washer [C]
 - Oil Seal [D]
 - Retaining Ring [E]
 - Dust Seal [F]



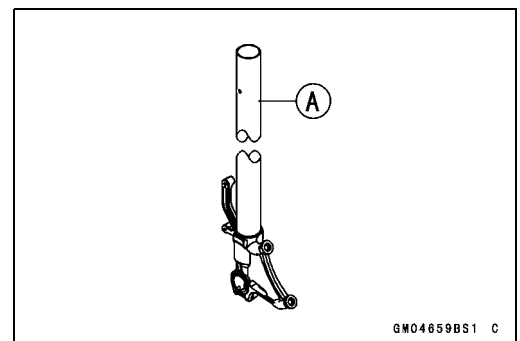
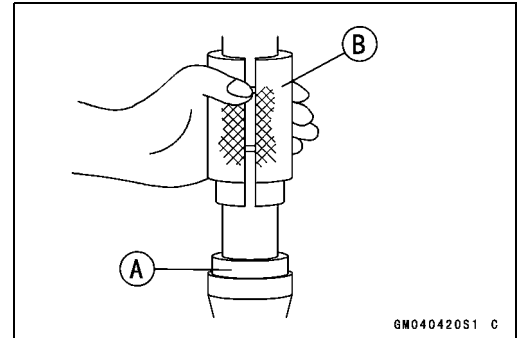
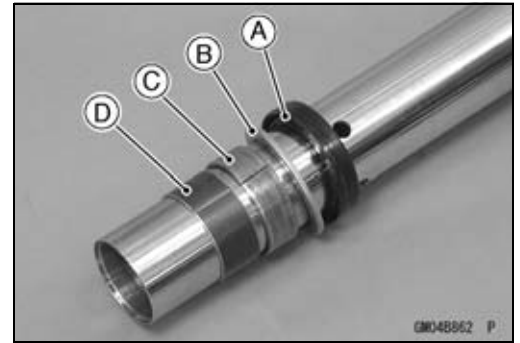
Front Fork Assembly

- Replace the following parts with new ones.
 - Slide Bushing
 - Guide Bushing
 - Oil Seal
- Install the following parts to the inner tube [A].
 - Dust Seal [B]
 - Retaining Ring [C]



Front Fork

- Apply grease to the oil seal lips.
 - Install the oil seal [A] so that the stamp side faces lower side.
 - Install the washer [B] so that the chamfer side faces upper side.
 - 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.
- 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, ϕ 43: 57001-1530**
- Install the retaining ring and dust seal.
 - Pour in the specified type of oil (see Front Fork Oil Change).



Inner Tube Inspection

- Visually inspect the inner tube [A], and repair any damage.
- Nick or rust damage can sometimes be repaired by using a wet-stone to remove sharp edges or raised areas which cause seal damage.
- ★ If the damage is not repairable, replace the inner tube. Since damage to the inner tube damages the oil seal, replace the oil seal whenever the inner tube is repaired or replaced.

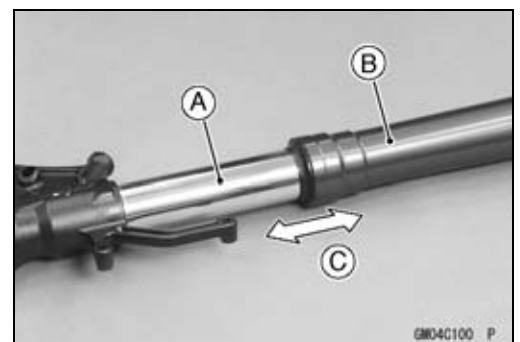
NOTICE

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.

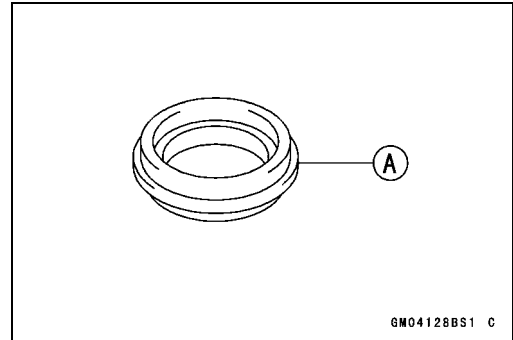


13-18 SUSPENSION

Front Fork

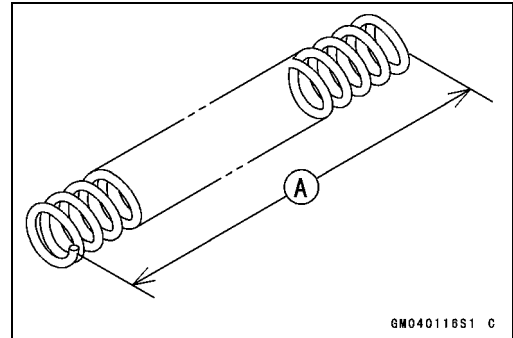
Dust Seal Inspection

- Inspect the dust seals [A] for any signs of deterioration or damage.
- ★ Replace it if necessary.



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: 238 mm (9.37 in.)

Service Limit: 233 mm (9.17 in.)

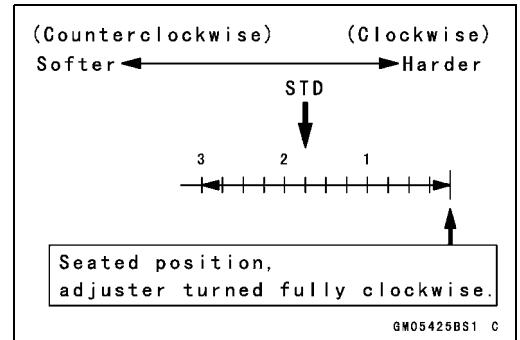
Rear Shock Absorber

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 3/4 turns out** from the fully clockwise position.

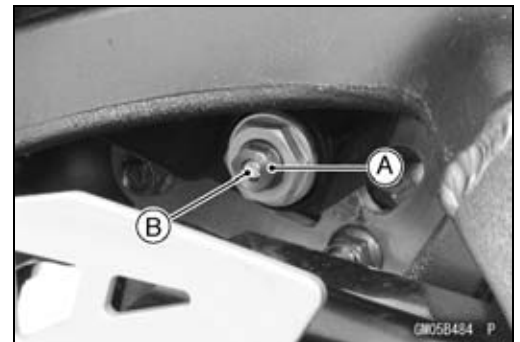
Rebound Damping Force Adjustment

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

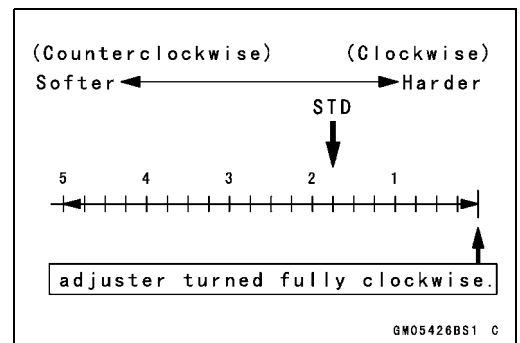
- There are two adjustments you can make to the compression damping force.
 - High Speed Compression Damping Adjuster [A]
 - Low Speed Compression Damping Adjuster [B]



- To adjust the high speed compression damping force, turn the outside damping adjuster with a wrench to the desired position.
- The standard adjuster setting is the **1 3/4 turns out** from the fully clockwise position.

High Speed Compression Damping Force Adjustment

Adjuster Position	Damping Force	Setting	Load	Road
5 turns out	Weak	Soft	Light	Good
↑	↑	↑	↑	↑
↓	↓	↓	↓	↓
0	Strong	Hard	Heavy	Bad



NOTE

- When turning the high speed compression damping force adjuster (outside), turn the low speed compression damping force adjuster (inside) too. But, the low speed compression damping force (setting position) dose not change.

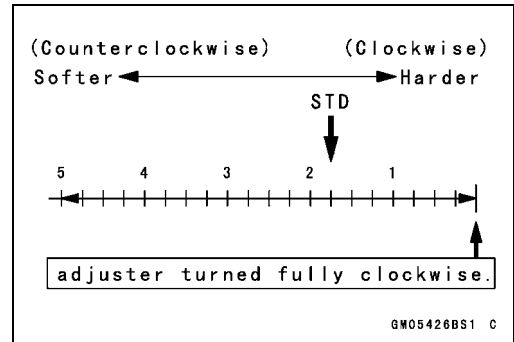
13-20 SUSPENSION

Rear Shock Absorber

- To adjust the low speed compression damping force, turn the inside damping adjuster with a flat-head screwdriver to the desired position.
- The standard adjuster setting is the **1 3/4 turns out** from the fully clockwise position.

Low Speed Compression Damping Force Adjustment

Adjuster Position	Damping Force	Setting	Load	Road
5 turns out	Weak	Soft	Light	Good
↑	↑	↑	↑	↑
↓	↓	↓	↓	↓
0	Strong	Hard	Heavy	Bad



Spring Preload Adjustment

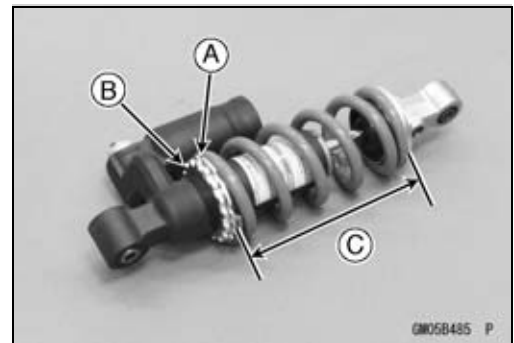
- Remove the rear shock absorber from the frame (see Rear Shock Absorber Removal).
- Loosen the locknut and turn out the adjusting nut to free the spring.

Special Tools - Hook Wrench T=3.2 R37: 57001-1539
Hook Wrench R=35: 57001-1580

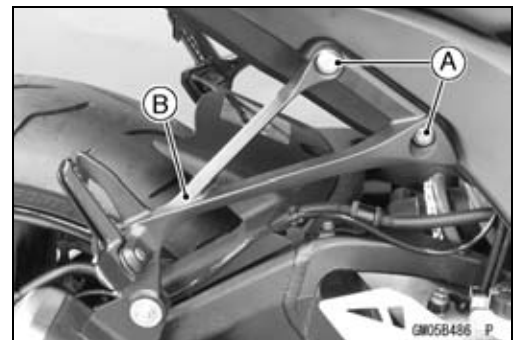
- To adjust the spring preload, turn in the adjusting nut [A] to the desired position and tighten the locknut [B].
 Spring Length [C]

Spring Preload Setting

Standard: Spring length 162 mm (6.38 in.)
Usable Range: Spring length 157 ~ 170 mm (6.18 ~ 6.69 in.)



- Remove the bolts [A] and rear footpeg bracket [B] (both sides) for easily adjustment.



Rear Shock Absorber

- 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 R=35: 57001-1580

- ★ If the spring action feels too soft or too stiff, adjust it.

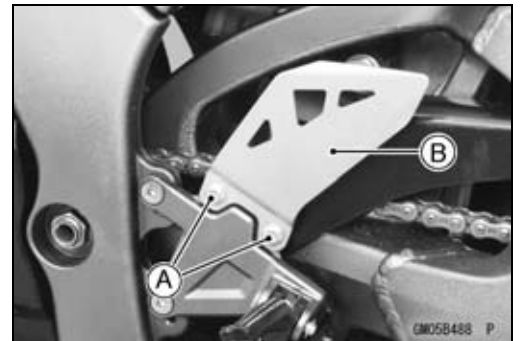
Spring Adjustment

Adjuster Position	Damping Force	Setting	Load	Road	Speed
157 mm (6.18 in.)	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
170 mm (6.69 in.)	Strong	Hard	Heavy	Bad	High



Rear Shock Absorber Removal

- Remove:
 - Lower Fairings (see Lower Fairing Removal in the Frame chapter)
 - Fuel Tank (see Fuel Tank Removal in the Fuel System chapter)
 - Bolts [A] (Both Sides)
 - Foot Guard [B] (Both Sides)



- Squeeze the brake lever slowly and hold it with a band [A].

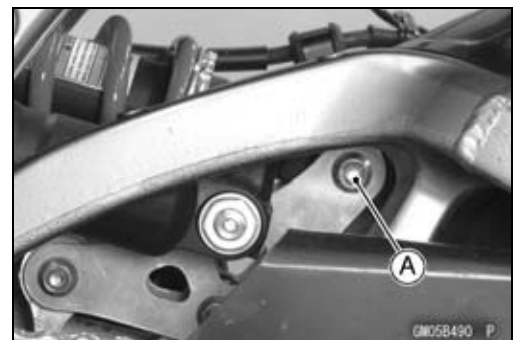
⚠ WARNING
Be sure to hold the front brake when removing the shock absorber, or the motorcycle may fall over. It could cause an accident and injury.



- Raise the rear wheel off the ground with the jack.

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

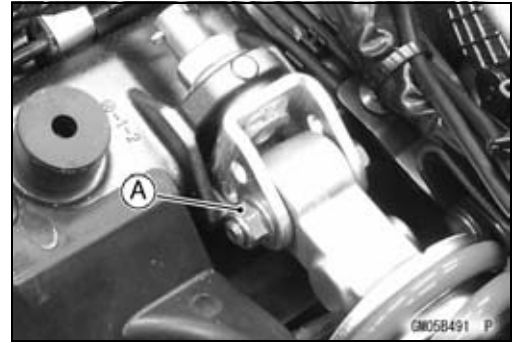
- Remove:
 - Lower Rear Shock Absorber Nut and Bolt [A]



13-22 SUSPENSION

Rear Shock Absorber

- Remove:
 - Upper Rear Shock Absorber Nut and Bolt [A]
- Remove the rear shock absorber upward.

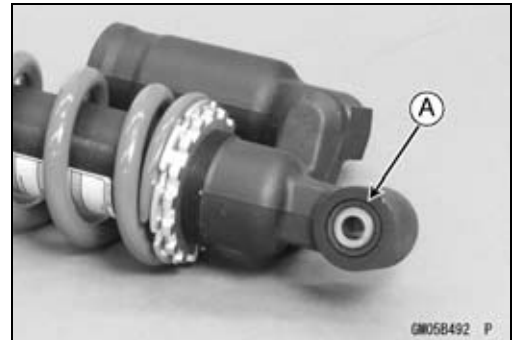


Rear Shock Absorber Installation

- Replace the rear shock absorber nuts and tie-rod nuts with new ones.
- Tighten:
 - Torque - Rear Shock Absorber Nuts: 34 N·m (3.5 kgf·m, 25 ft·lb)
 - Tie-Rod Nuts: 34 N·m (3.5 kgf·m, 25 ft·lb)

Rear Shock Absorber Inspection

- Remove the rear shock absorber (see Rear Shock Absorber Removal).
- Visually inspect the following items.
 - Smooth Stroke
 - Oil Leakage
 - Crack or Dent
- ★ If there is any damage to the rear shock absorber, replace it.
- Visually inspect the rubber bushing [A].
- ★ If it show any signs of damage, replace it.

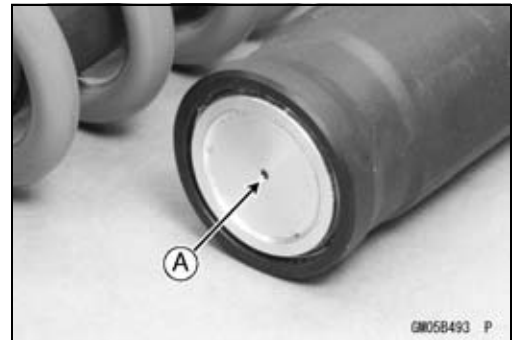


Rear Shock Absorber Scrapping

⚠ 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.

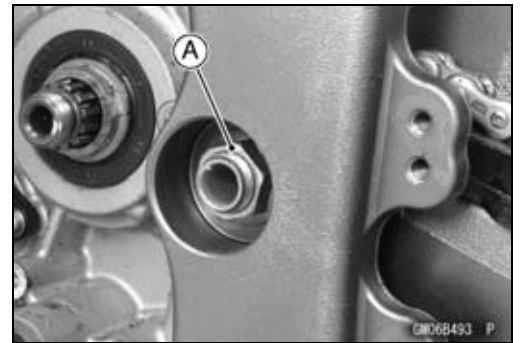
Swingarm

Swingarm Removal

- Remove:
 - Rear Wheel (see Rear Wheel Removal in the Wheels/Tires chapter)
 - Mud Guard with Rear Brake Hose (see Mud Guard Removal in the Frame chapter)
 - Rocker Arm (see Rocker Arm Removal)
- Remove:
 - Brake Hose Clamp Bolt [A]

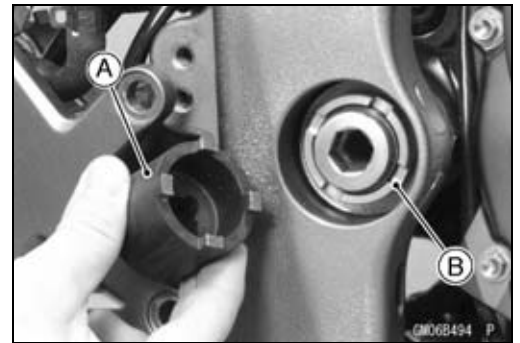


- Unscrew the swingarm pivot shaft nut [A].

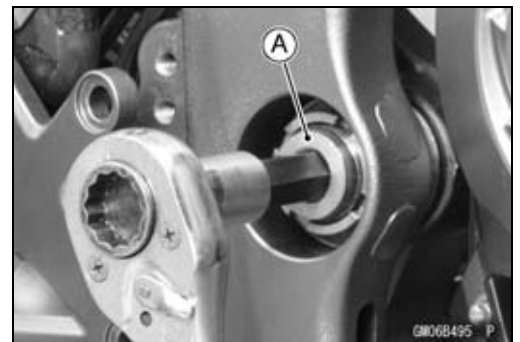


- Using the swingarm pivot nut wrench [A], loosen the swingarm pivot adjusting collar locknut [B].

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.

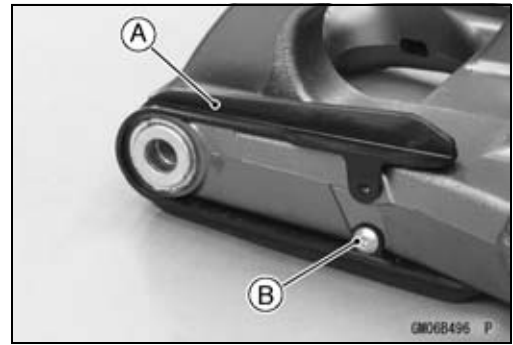


13-24 SUSPENSION

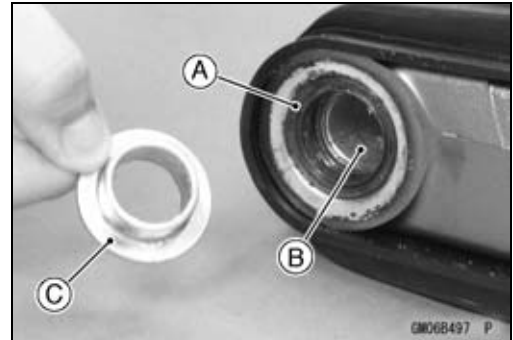
Swingarm

Swingarm Installation

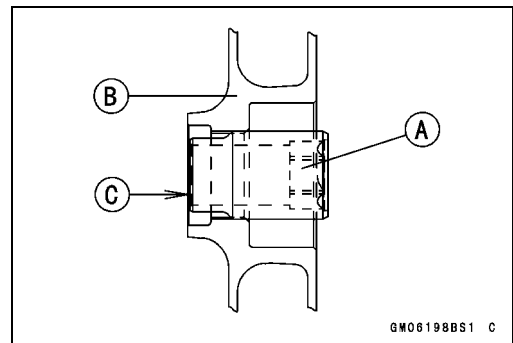
- Visually inspect the chain guide [A].
- ★ Replace the chain guide if it shows any signs of abnormal wear or damage.
- Apply a non-permanent locking agent to the threads of the chain guide bolt [B].



- 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].

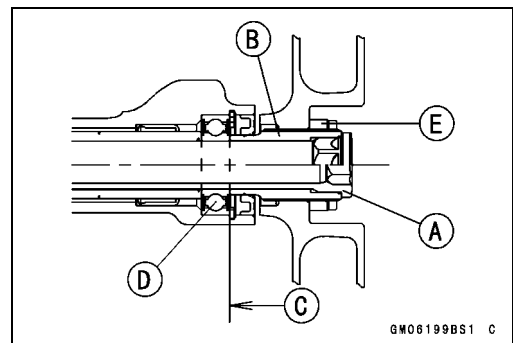
Special Tool - Swingarm Pivot Nut Wrench: 57001-1597

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, 80 ft·lb)

- Install the removed parts (see appropriate chapters).

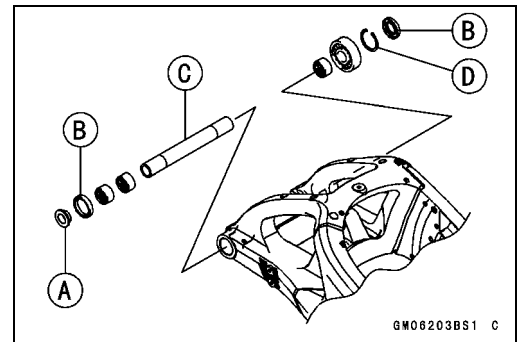


Swingarm

Swingarm Bearing Removal

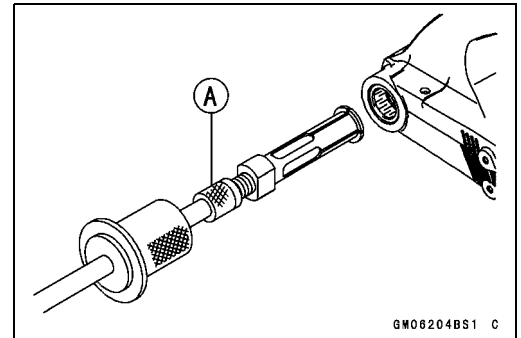
- Remove:
 - Swingarm (see Swingarm Removal)
 - Collar [A]
 - Oil Seals [B]
 - Sleeve [C]
 - Circlip [D] (Right Side)

Special Tool - Inside Circlip Pliers: 57001-143



- Remove the ball bearing and needle bearings.

Special Tool - Oil Seal & Bearing Remover [A]: 57001-1058



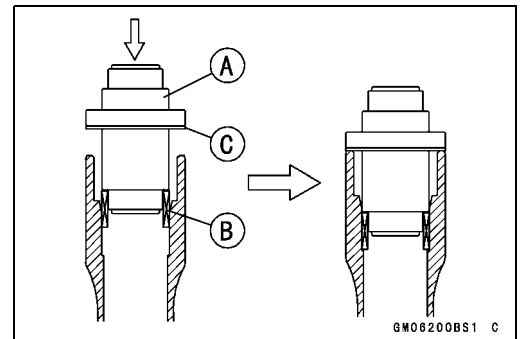
Swingarm Bearing Installation

- Replace the needle bearings, ball bearing, grease seals and circlip with new ones.
- Install the needle bearings, ball bearing, grease seals and circlip as shown in the figure.

- Insert the needle bearing driver [A] into the needle bearing [B] and press the needle bearing into the housing until the driver contacts the end surface of the housing.

NOTE

- For a bearing of the left side, select the pressing side of the needle bearing driver according to its pressing depth.
- When pressing in the needle bearings of the left side, adjust the pressing depth with the spacer [C].
- Install the needle bearings so that the marked side faces out.



Special Tools - Bearing Driver Set: 57001-1129
Needle Bearing Driver, ϕ 28: 57001-1610
Spacer ϕ 28: 57001-1663
Needle Bearing Driver, ϕ 20 & Spacer, ϕ 28 (Spacer): 57001-1678

- Press in the ball bearing until it bottomed.

Special Tool - Bearing Driver Set: 57001-1129

- Install the circlip.

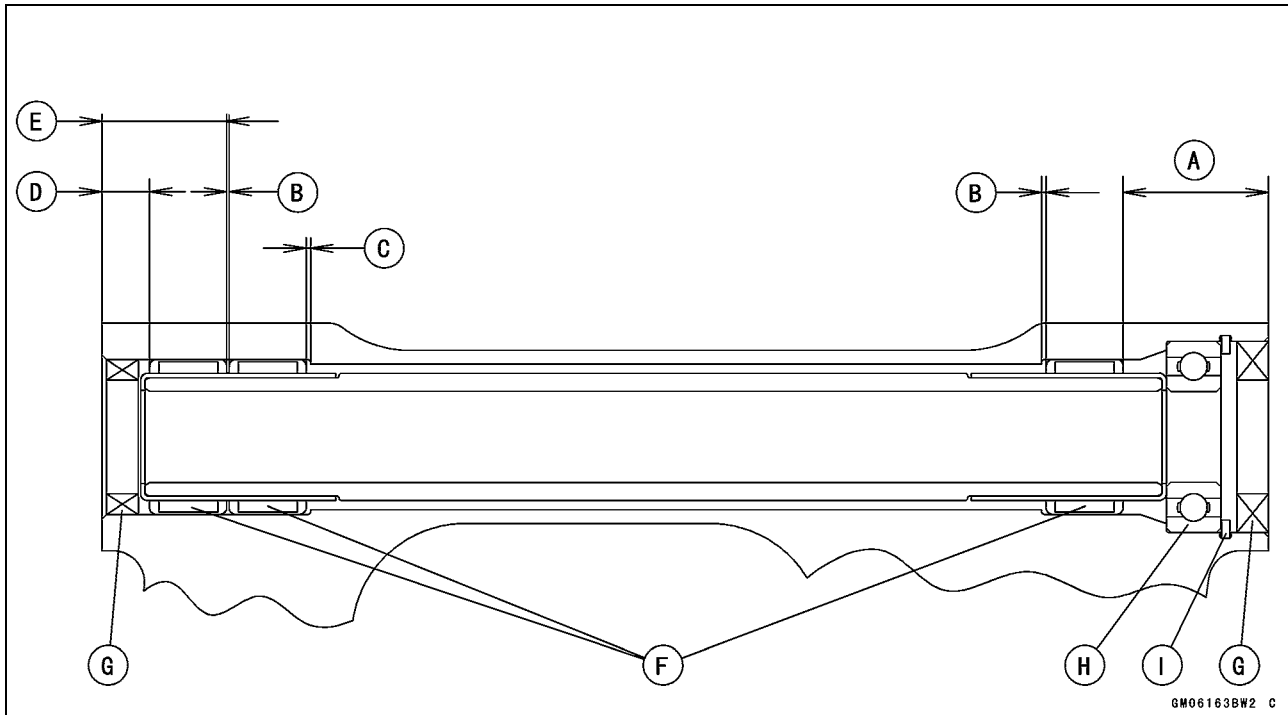
Special Tool - Inside Circlip Pliers: 57001-143

- Press in the grease seals so that seal surface is flushed with the end of housing.

Special Tool - Bearing Driver Set: 57001-1129

13-26 SUSPENSION

Swingarm



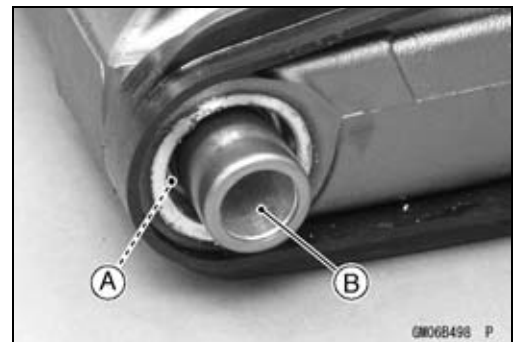
- 32 mm (1.26 in.) [A]
- 1 mm (0.04 in.) [B]
- 1.5 mm (0.06 in.) [C]
- 9.5 mm (0.37 in.) [D]
- 27.5 mm (1.08 in.) [E]
- Needle Bearings [F]
- Grease Seals [G]
- Ball Bearing [H]
- Circlip [I]

Swingarm Bearing, Sleeve Inspection

NOTICE

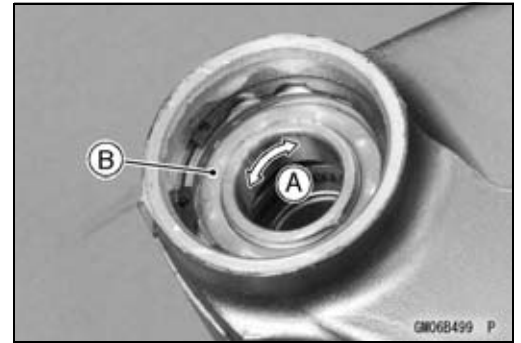
Do not remove the bearings for inspection. Removal may damage them.

- 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 signs of abnormal wear, discoloration, or damage, replace them as a set.



Swingarm

- 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

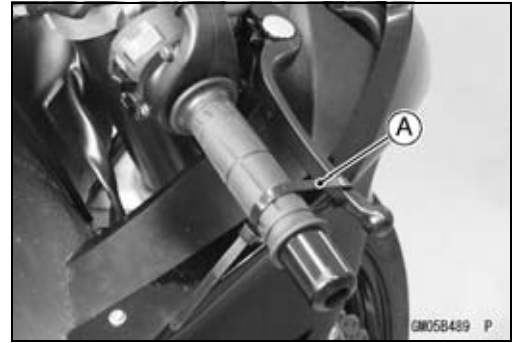
- Since the bearing are packed with grease and sealed, lubrication is not required.

13-28 SUSPENSION

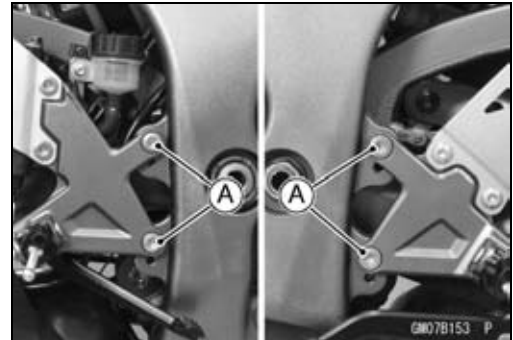
Tie-Rod, Rocker Arm

Tie-Rod Removal

- Squeeze the brake lever slowly and hold it with a band [A].



- Remove the front footpeg bracket bolts [A].

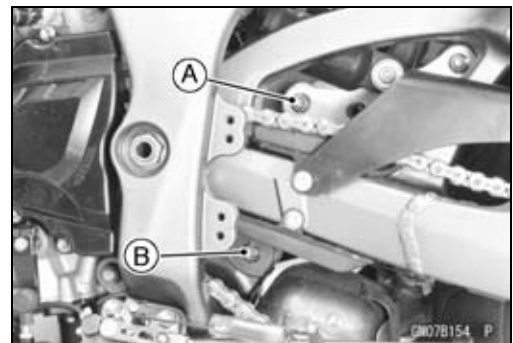


- Raise the rear wheel off the ground with the jack (see Rear Shock Absorber Removal).

Special Tools - Jack: 57001-1238

Jack Attachment: 57001-1608

- Remove:
 - Upper Tie-Rod Bolt and Nut [A]
 - Lower Tie-Rod Bolt and Nut [B]
 - Tie-Rod



Tie-Rod Installation

- Replace the tie-rod nuts with new ones.
- Apply grease to the inside of the grease seals.
- Install the tie-rod.
- Tighten:

Torque - Tie-Rod Nuts: 34 N·m (3.5 kgf·m, 25 ft·lb)

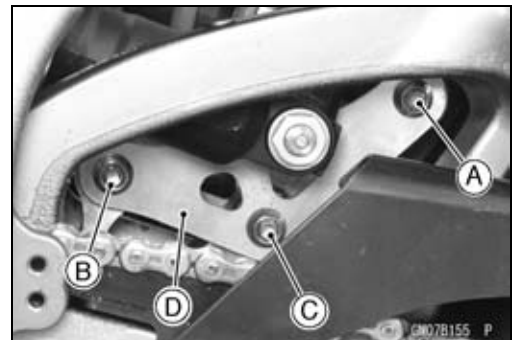
Rocker Arm Removal

- Squeeze the brake lever slowly and hold it with a band.
- Remove the front footpeg bracket bolts.
- Raise the rear wheel off the ground with the jack (see Rear Shock Absorber Removal).

Special Tools - Jack: 57001-1238

Jack Attachment: 57001-1608

- Remove:
 - Lower Rear Shock Absorber Bolt and Nut [A]
 - Upper Tie-Rod Bolt and Nut [B]
 - Rocker Arm Bolt and Nut [C]
 - Rocker Arm [D] (Both Sides)



Tie-Rod, Rocker Arm

Rocker Arm Installation

- Replace the tie-rod nut, rear shock absorber nut and rocker arm nut with new ones.
- Apply grease to the inside of the oil seals.
- Tighten:

Torque - Rocker Arm Nut: 34 N·m (3.5 kgf·m, 25 ft·lb)

Tie-Rod Nuts: 34 N·m (3.5 kgf·m, 25 ft·lb)

Rear Shock Absorber Nut (Lower): 34 N·m (3.5 kgf·m, 25 ft·lb)

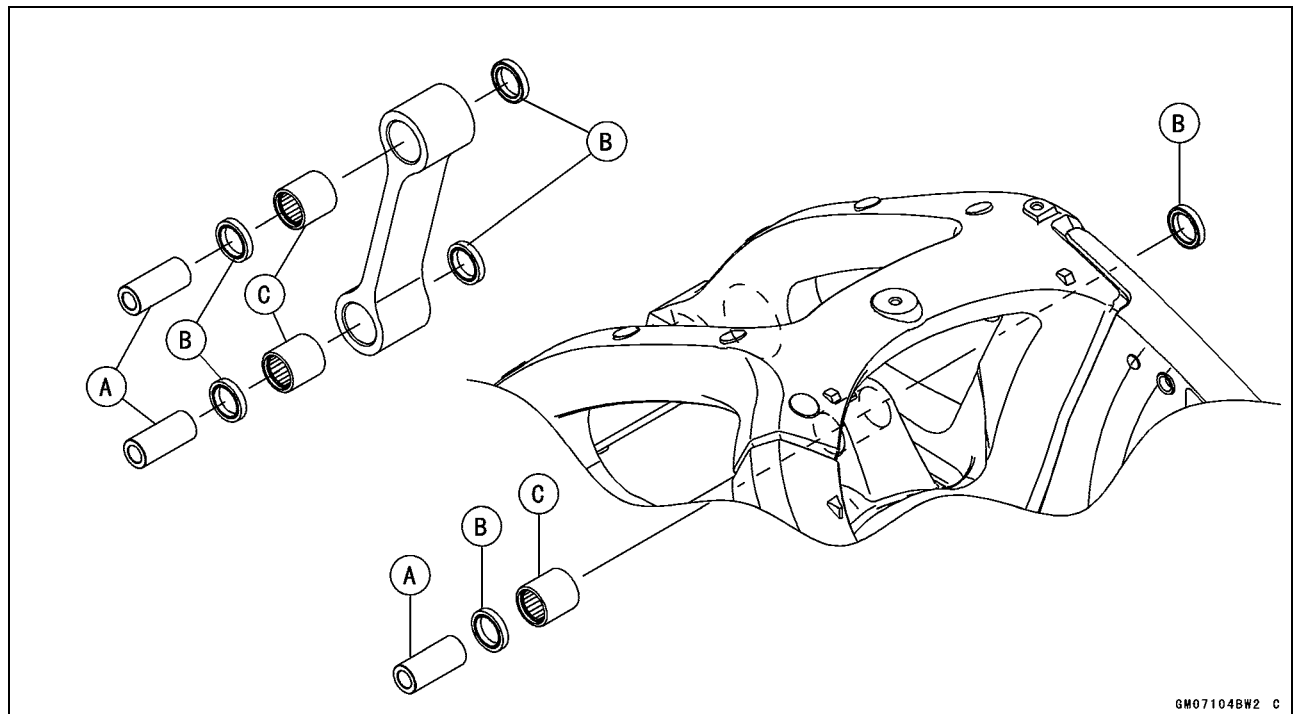
- Install the removed parts (see appropriate chapters).

Tie-Rod and Rocker Arm Bearing Removal

- Remove:
 - Tie-Rod (see Tie-Rod Removal)
 - Rocker Arms (see Rocker Arm Removal)
 - Swingarm (see Swingarm Removal)
 - Sleeves [A]
 - Oil Seals [B]
- Remove the needle bearings [C], using the bearing remover head and bearing remover shaft.

Special Tools - Bearing Remover Head, $\phi 15 \times \phi 17$: 57001-1267

Bearing Remover Shaft, $\phi 13$: 57001-1377



13-30 SUSPENSION

Tie-Rod, Rocker Arm

Tie-Rod and Rocker Arm Bearing Installation

- Replace the needle bearings [A] 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 in the figure.
- Screw the needle bearing driver into the driver holder.
- Insert the needle bearing driver into the needle bearing and press the needle bearing.

NOTE

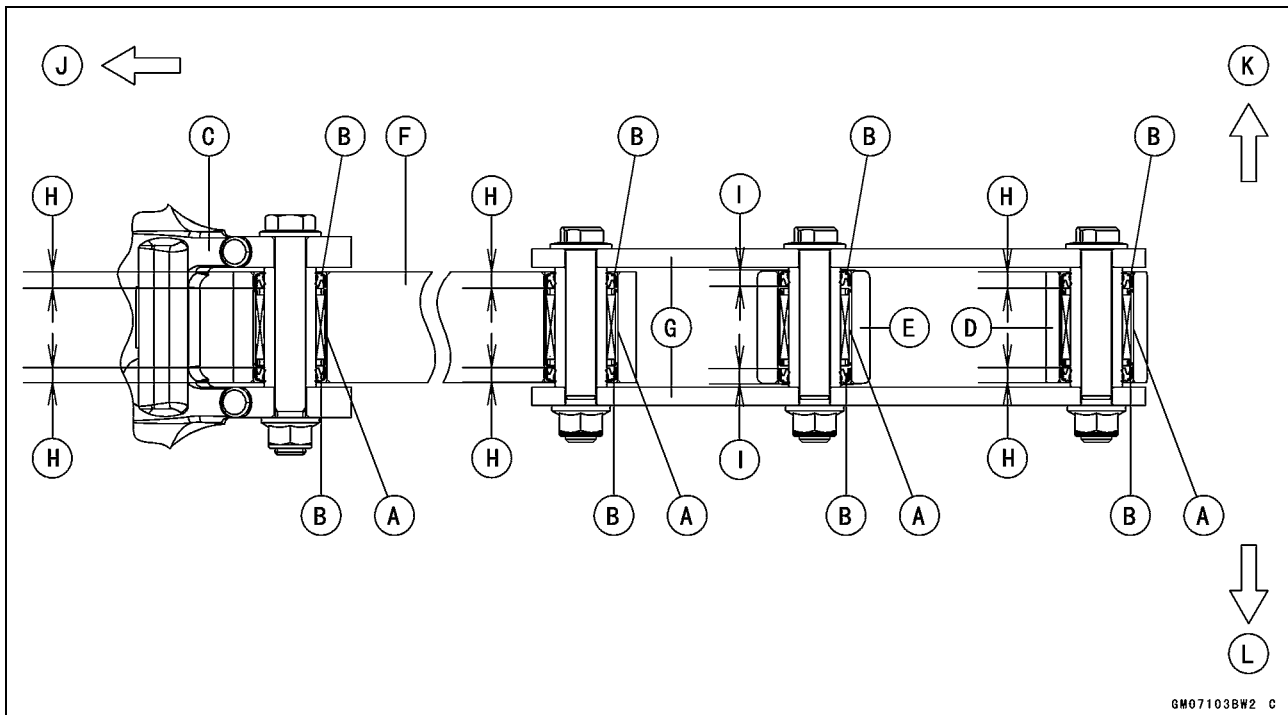
- For a bearing of inner diameter $\phi 17$, select the pressing side of the needle bearing driver according to its pressing depth.

Special Tools - Bearing Driver Set: 57001-1129

Needle Bearing Driver, $\phi 17/\phi 18$: 57001-1609

NOTE

- Install the needle bearings so that the marked side faces in.



- Needle Bearings [A]
- Oil Seals [B]
- Frame [C]
- Rear Shock Absorber [D]
- Swingarm [E]
- Tie-rod [F]
- Rocker Arms [G]
- 5.5 mm (0.22 in.) [H]
- 5.9 mm (0.23 in.) [I]
- Front [J]
- Right Side [K]
- Left Side [L]

Tie-Rod, Rocker Arm

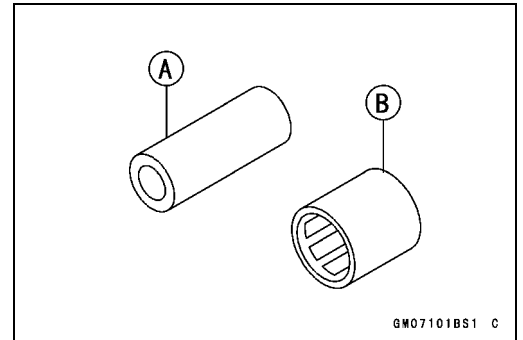
Rocker Arm/Tie-Rod Bearing, Sleeve Inspection**NOTICE**

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.



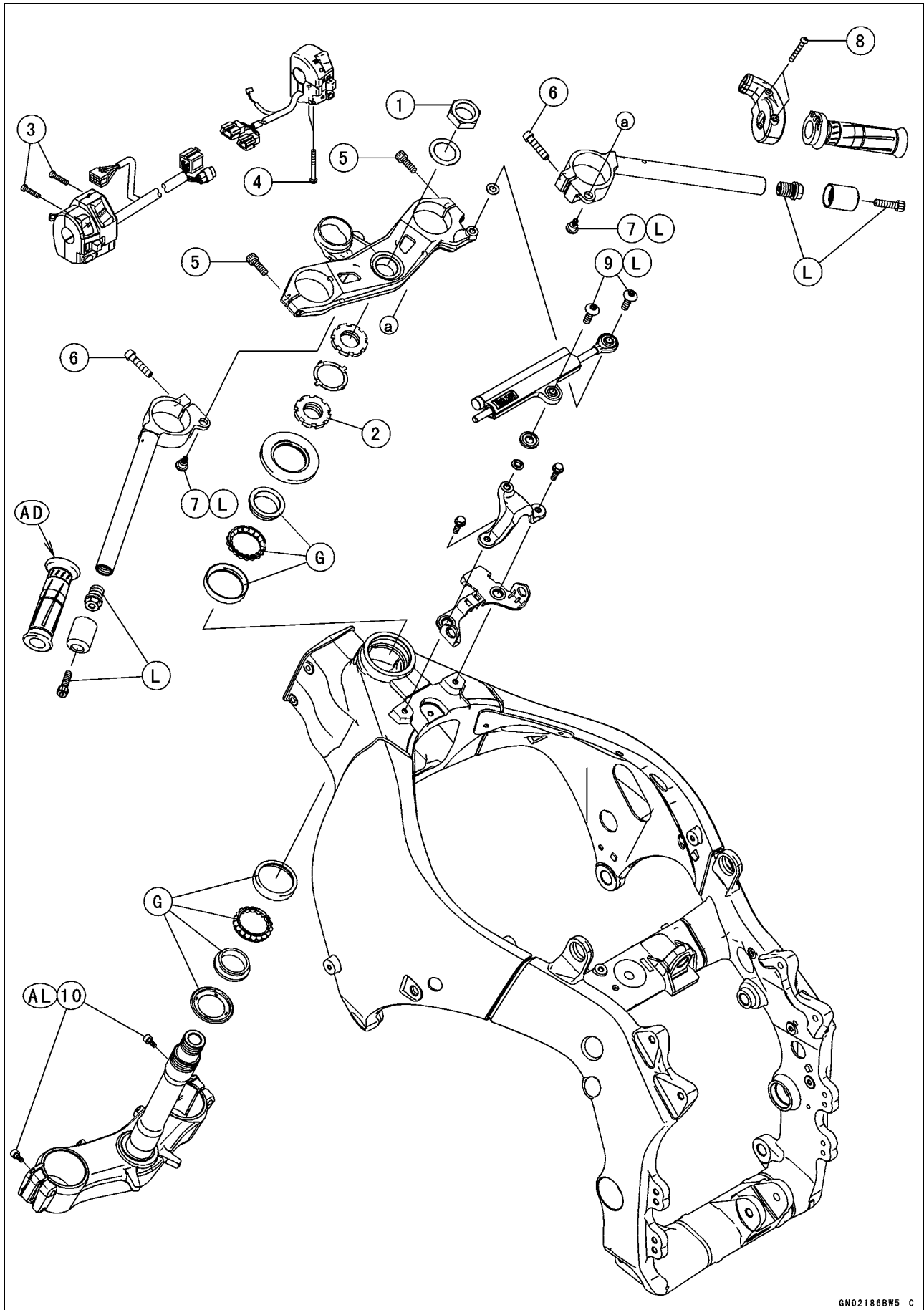
Steering

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14-2 STEERING

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Steering Stem Head Nut	78	8.0	58	
2	Steering Stem Nut	20	2.0	15	
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	Front Fork Clamp Bolts (Upper)	20	2.0	15	
6	Handlebar Clamp Bolts	25	2.5	18	
7	Handlebar Positioning Bolts	9.8	1.0	87 in·lb	L
8	Throttle Case Screws	3.5	0.36	31 in·lb	
9	Steering Damper Mounting Bolts	11	1.1	97 in·lb	L
10	Front Fork Clamp Bolts (Lower)	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.

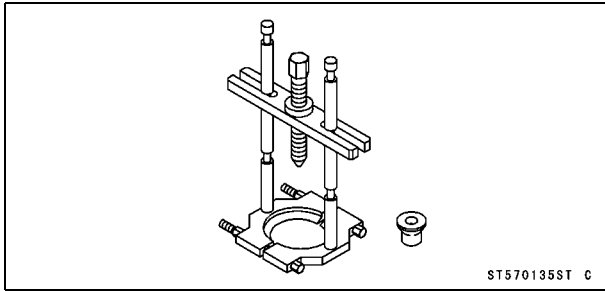
14-4 STEERING

Specifications

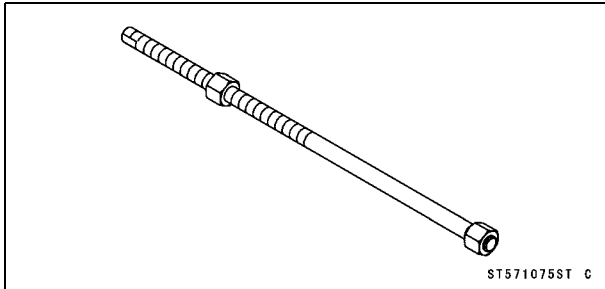
Item	Standard
Steering Damper Damper Setting	18th click from the first click of the fully clockwise position (Usable Range: 0 ↔ 18 Clicks)

Special Tools

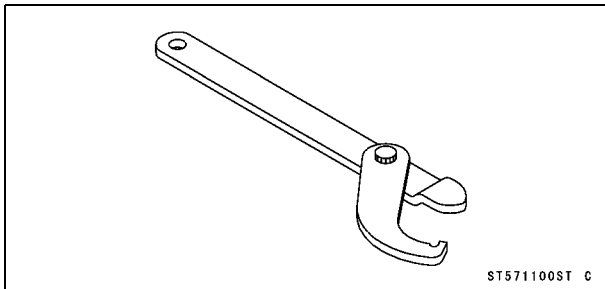
Bearing Puller:
57001-135



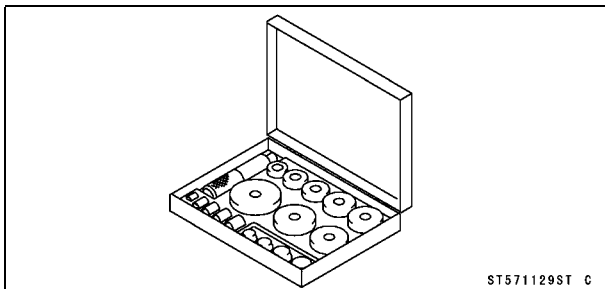
Head Pipe Outer Race Press Shaft:
57001-1075



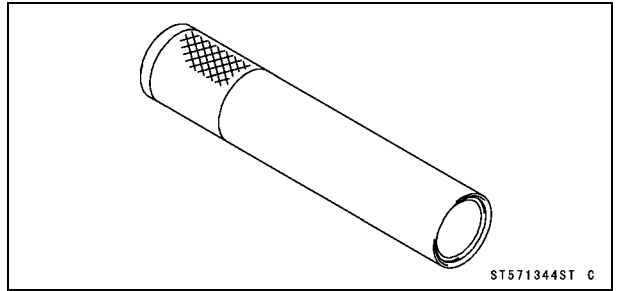
Steering Stem Nut Wrench:
57001-1100



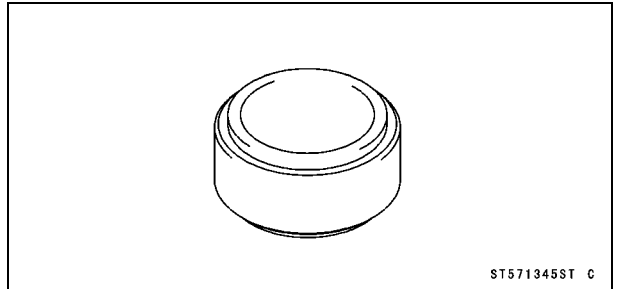
Bearing Driver Set:
57001-1129



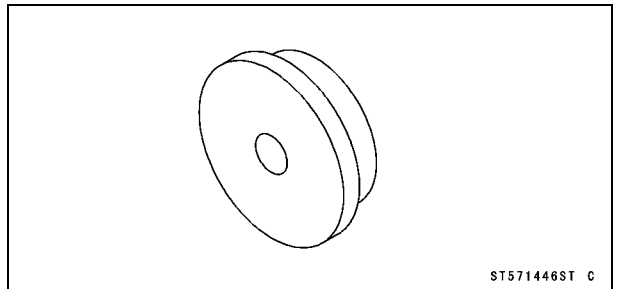
Steering Stem Bearing Driver, $\phi 42.5$:
57001-1344



Steering Stem Bearing Driver Adapter, $\phi 41.5$:
57001-1345



Head Pipe Outer Race Driver, $\phi 55$:
57001-1446



14-6 STEERING

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.

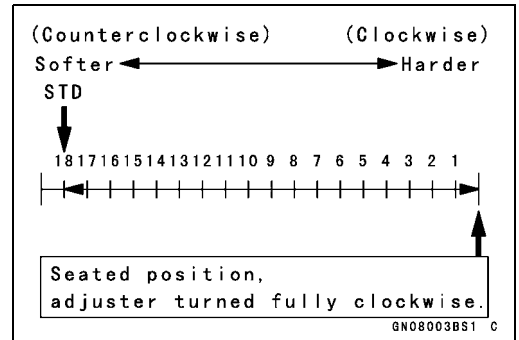
Steering Damper

Damping Force Adjustment

- To adjust the damping force, turn the damping adjuster [A] until you feel a click.
- The standard adjuster setting is the **18th click** from the 1st of the fully clockwise position. If the damping feels too soft or too stiff, adjust it in accordance with the following table.

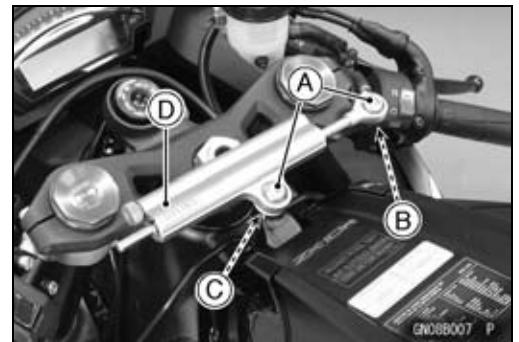
Damping Force Adjustment

Adjuster Position	Damping Force	Setting
18	Weak	Soft
↑	↑	↑
↓	↓	↓
0	Strong	Hard



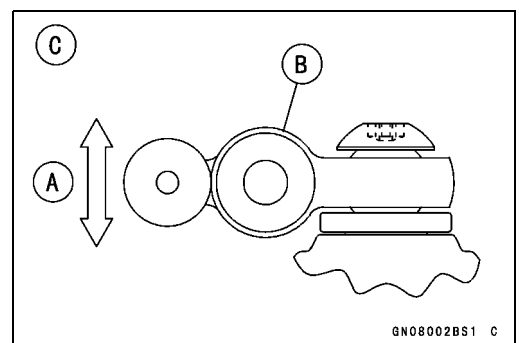
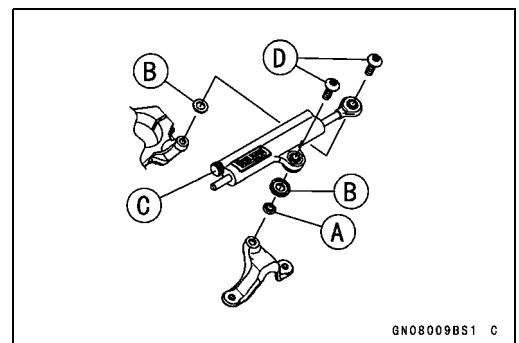
Steering Damper Removal

- Remove:
 - Steering Damper Mounting Bolts (TORX Bolts) [A]
 - Washer [B]
 - Washer and Collar [C]
 - Steering Damper [D]



Steering Damper Installation

- Install the following parts as shown in the figure.
 - Collar [A]
 - Washers [B]
 - Steering Damper [C]
- Apply a non-permanent locking agent to the threads of the steering damper mounting bolts (TORX bolts) [D].
- Tighten:
 - Torque - Steering Damper Mounting Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)**
- After tightening the steering damper mounting bolts, confirm that there is play [A] in the steering damper [B].
 - Left Side View [C]



Steering Damper Oil Leak Inspection

- Refer to the Steering Damper Oil Leak Inspection in the Periodic Maintenance chapter.

14-8 STEERING

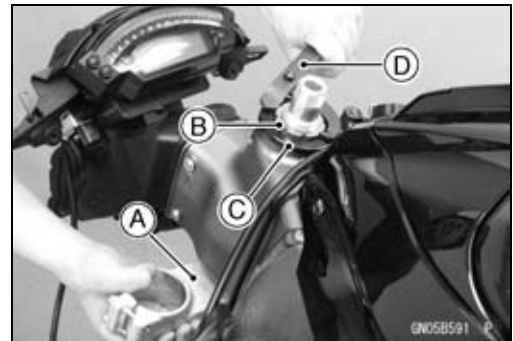
Steering Stem

Stem, Stem Bearing Removal

- Remove:
 - Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
 - Front Fender (see Front Fender Removal in the Frame chapter)
 - Front Wheel (see Front Wheel Removal in the Wheels/Tires chapter)
 - Steering Stem Head with Handlebars (see Handlebar Removal)
 - Front Forks (see Front Fork Removal in the Suspension chapter)
 - Brake Hose Fitting Bolt (see Brake Hose and Pipe Replacement in the Periodic Maintenance chapter)
- 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.



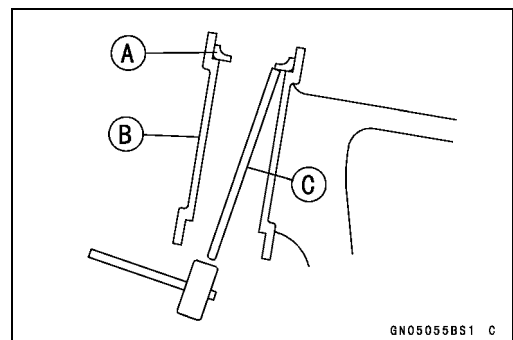
- Pushing up the stem base [A], and remove the steering stem nut [B] with stem cap [C].
 - Special Tool - Steering Stem Nut Wrench [D]: 57001-1100**
- Remove:
 - Steering Stem
 - Upper Ball Bearing Inner Race and Ball Bearing



- 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.

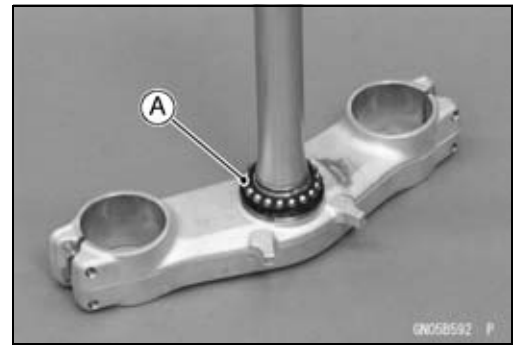
NOTE

○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.



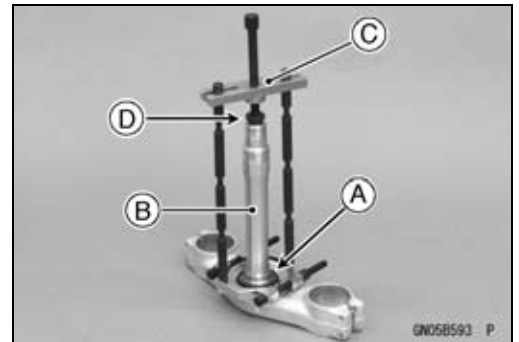
Steering Stem

- 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] and adapter [D].

Special Tool - Bearing Puller: 57001-135



Stem, Stem Bearing Installation

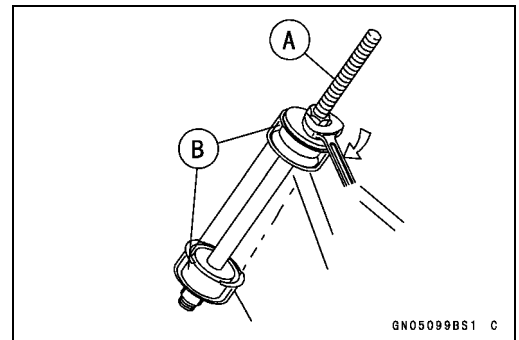
- Replace the bearing outer races with new ones.
- Drive them into the head pipe at the same time.

Special Tools - Head Pipe Outer Race Press Shaft [A]: 57001-1075

Head Pipe Outer Race Driver, $\phi 55$ [B]: 57001-1446

or Bearing Driver Set: 57001-1129

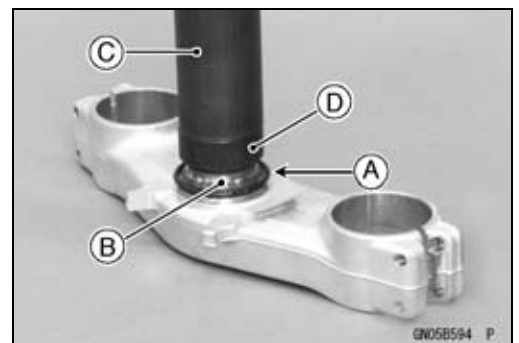
- Apply grease to the outer races.



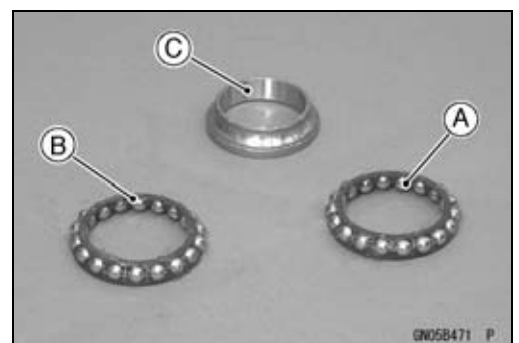
- Replace the bearing inner races and oil seal with new ones.
- Apply grease to the oil seal.
- Install the oil seal [A] on the steering stem, and drive the lower ball bearing inner race [B] applied the grease onto the stem.

Special Tools - Steering Stem Bearing Driver, $\phi 42.5$ [C]: 57001-1344

Steering Stem Bearing Driver Adapter, $\phi 41.5$ [D]: 57001-1345



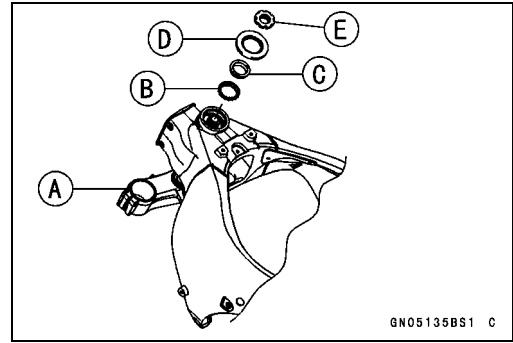
- Apply grease to the lower ball bearing [A], and install it onto the steering stem.
- The lower and upper ball bearings are identical.
- Apply grease to the upper ball bearing [B] and inner race [C].



14-10 STEERING

Steering Stem

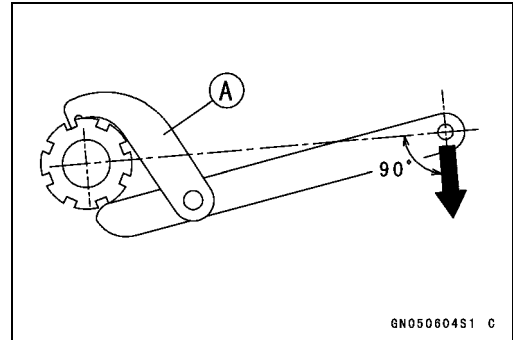
- Install the steering stem [A] through the head pipe and install the upper bearing [B] and inner race [C] on it.
- Install:
 - Stem Cap [D]
 - Steering Stem Nut [E]



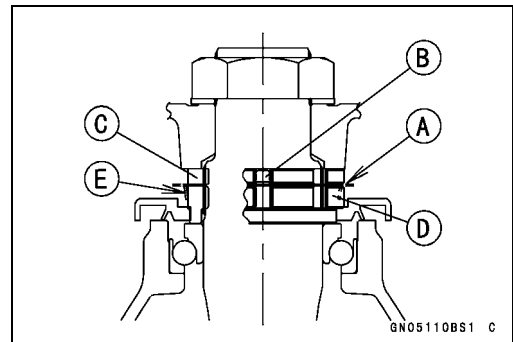
- Settle the bearings in place as follows.
- Tighten the steering stem nut with **55 N·m (5.6 kgf·m, 41 ft·lb)** of torque first, and loosen it a fraction of a turn until it turns lightly. Afterward tighten it again with specified torque using a steering stem nut wrench [A].
- Check that there is no 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: 20 N·m (2.0 kgf·m, 15 ft·lb)



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



Steering Stem

- Install the stem head.
- Install the washer, and temporary tighten the stem head nut.
- Install the front forks (see Front Fork Installation in the Suspension chapter).

NOTE

- Tighten the front fork clamp bolts (upper) first, next the stem head nut, last the front fork clamp bolts (lower).
- Tighten the two lower front fork clamp bolts alternately two times to ensure even tightening torque.

Torque - Front Fork Clamp Bolts (Upper): 20 N·m (2.0 kgf·m, 15 ft·lb)

Steering Stem Head Nut: 78 N·m (8.0 kgf·m, 58 ft·lb)

Front Fork Clamp Bolts (Lower): 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).

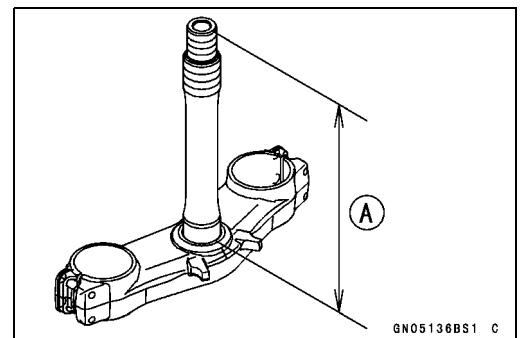
- Install the removed parts (see appropriate chapters).

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.



Stem Cap Deterioration, Damage Inspection

- ★ Replace the stem cap if its oil seal [A] shows damage.



14-12 STEERING

Handlebar

Handlebar Removal

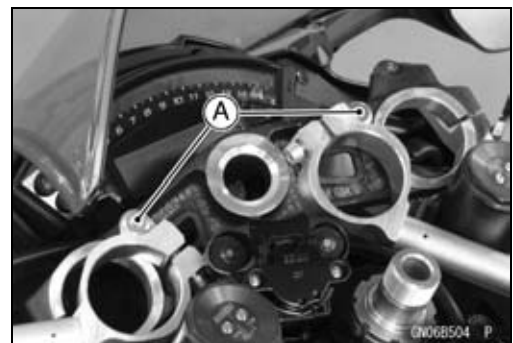
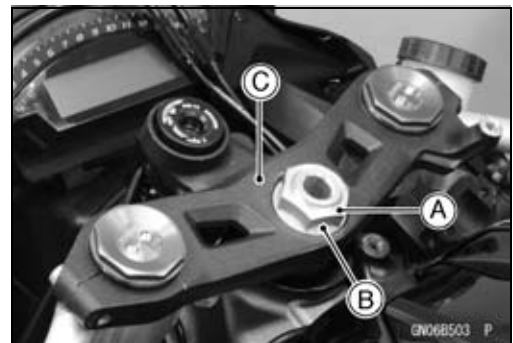
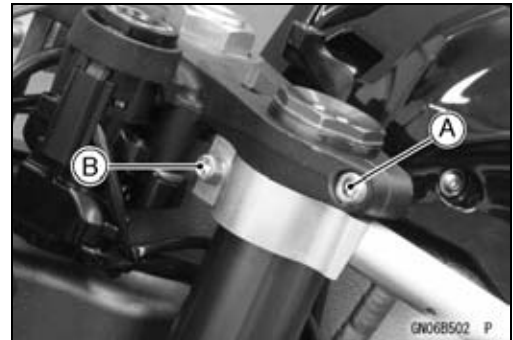
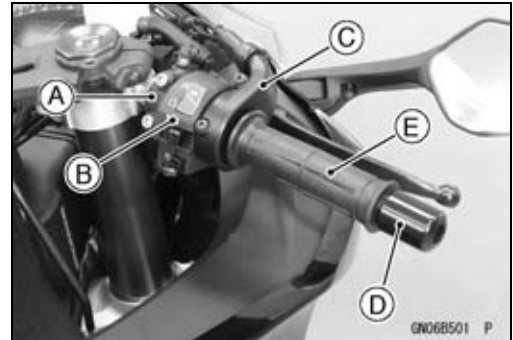
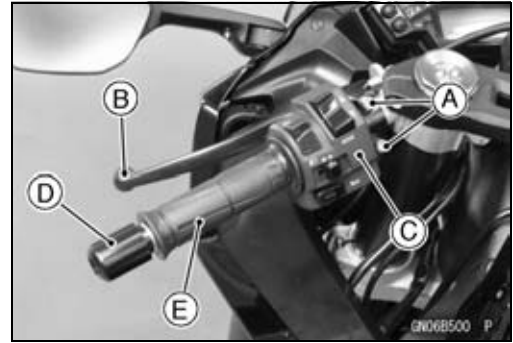
- Remove:
 - Steering Damper (see Steering Damper Removal)
 - Clutch Lever Clamp Bolts [A]
 - Clutch Lever Assembly [B]
 - Left Switch Housing [C]
 - Handlebar Weight [D]
 - Left Handlebar Grip [E]

- 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 Nut [A] and Washer [B]
 - 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.

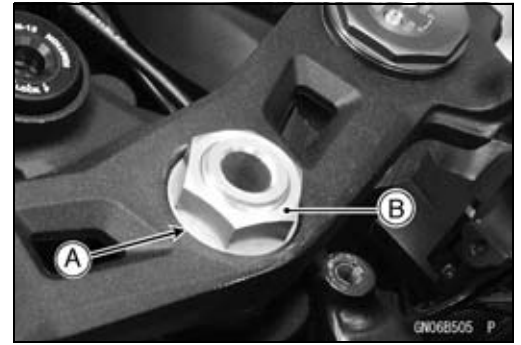
Torque - Handlebar Positioning Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Install the steering stem head with handlebars.
- Install the washer [A] and steering stem head nut [B].
- Tighten:

Torque - Steering Stem Head Nut: 78 N·m (8.0 kgf·m, 58 ft·lb)

Front Fork Clamp Bolts (Upper): 20 N·m (2.0 kgf·m, 15 ft·lb)

Handlebar Clamp Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)



NOTE

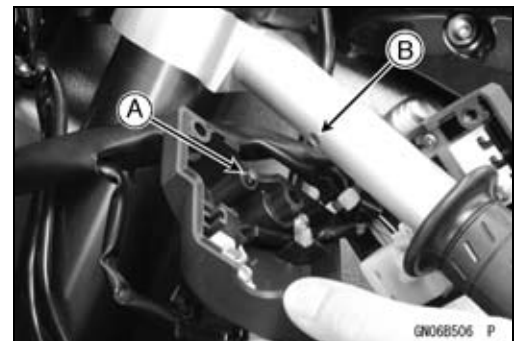
- Tighten the steering stem head bolt before tightening the upper front fork clamp bolts and handlebar clamp bolts.

⚠ 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).

- 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.

Torque - Switch Housing Screws: 3.5 N·m (0.36 kgf·m, 31 in·lb)

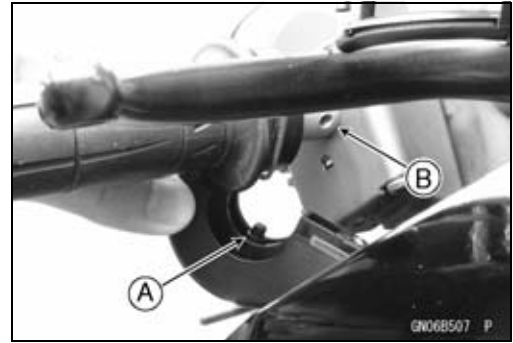


14-14 STEERING

Handlebar

- Install the throttle cable tips.
- Install the throttle case.
- Fit the projection [A] into a hole [B] in the handlebar.
- Tighten:

Torque - Throttle Case Screws: 3.5 N·m (0.36 kgf·m, 31 in·lb)



- Install:
 - Clutch Lever Assembly (see Clutch Lever Installation in the Clutch chapter)
 - Front Master Cylinder (see Front Master Cylinder Installation in the Brakes chapter)
 - Steering Damper (see Steering Damper Installation)

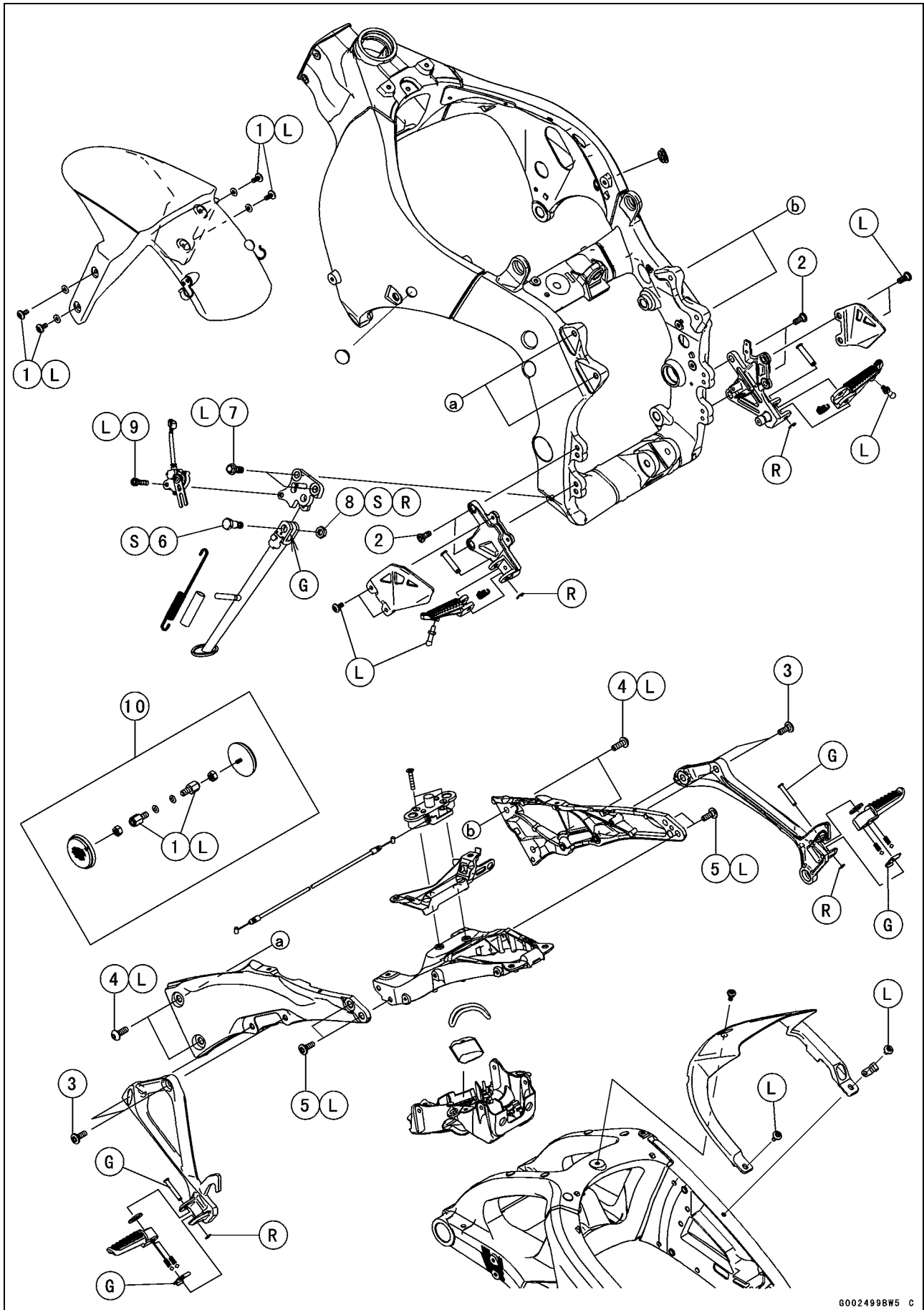
Frame

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15-2 FRAME

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	L
2	Front Footpeg Bracket Bolts	25	2.5	18	
3	Rear Footpeg Bracket Bolts	25	2.5	18	
4	Rear Frame Front Bolts	44	4.5	32	L
5	Rear Frame Rear Bolts	25	2.5	18	L
6	Sidestand Bolt	44	4.5	32	S
7	Sidestand Bracket Bolts	49	5.0	36	L
8	Sidestand Nut	29	3.0	21	R, S
9	Sidestand Switch Bolt	8.8	0.90	78 in·lb	L

10. US, CA, CAL and AU Models

G: Apply grease.

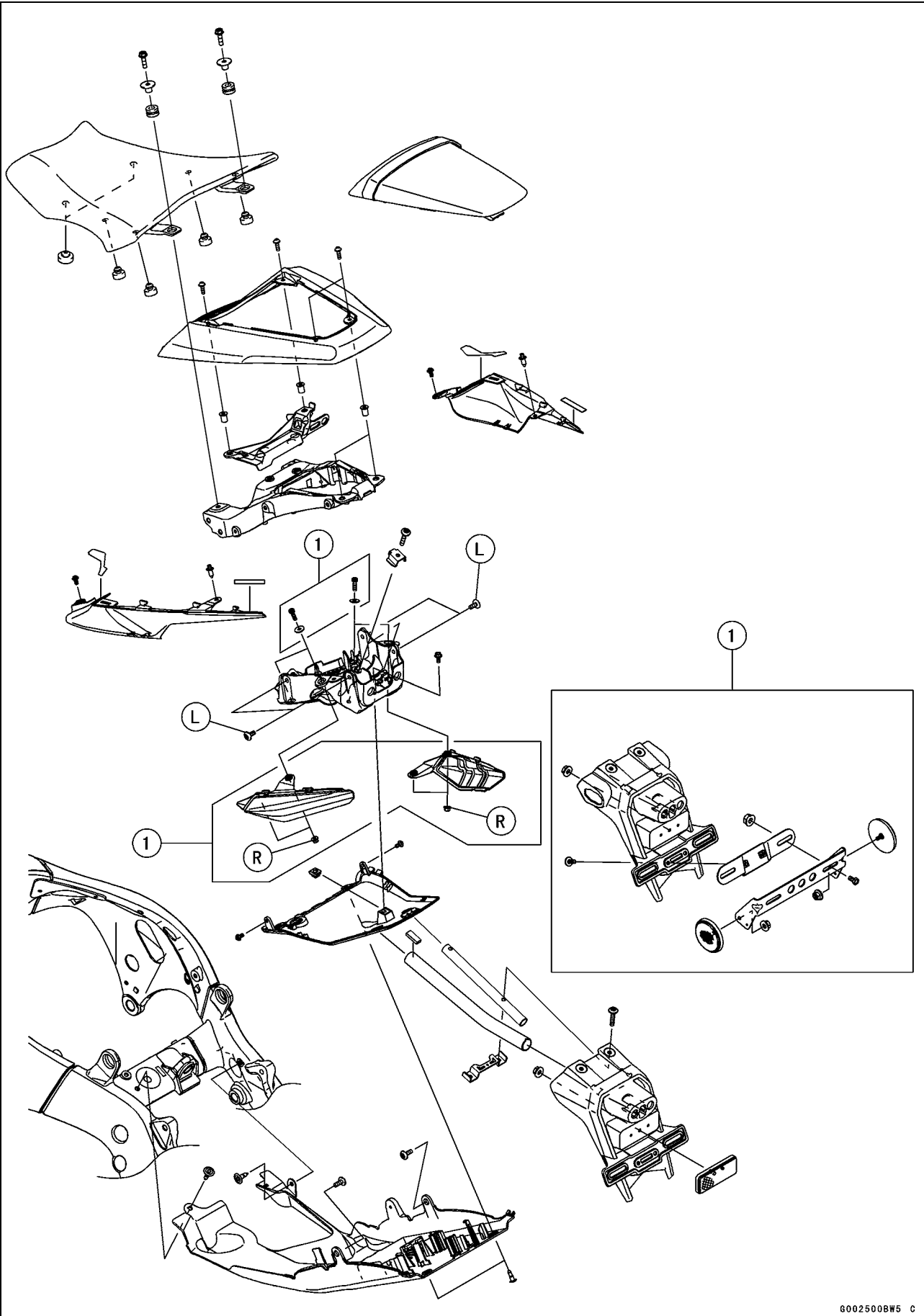
L: Apply a non-permanent locking agent.

R: Replacement Parts

S: Follow the specified tightening sequence.

15-4 FRAME

Exploded View

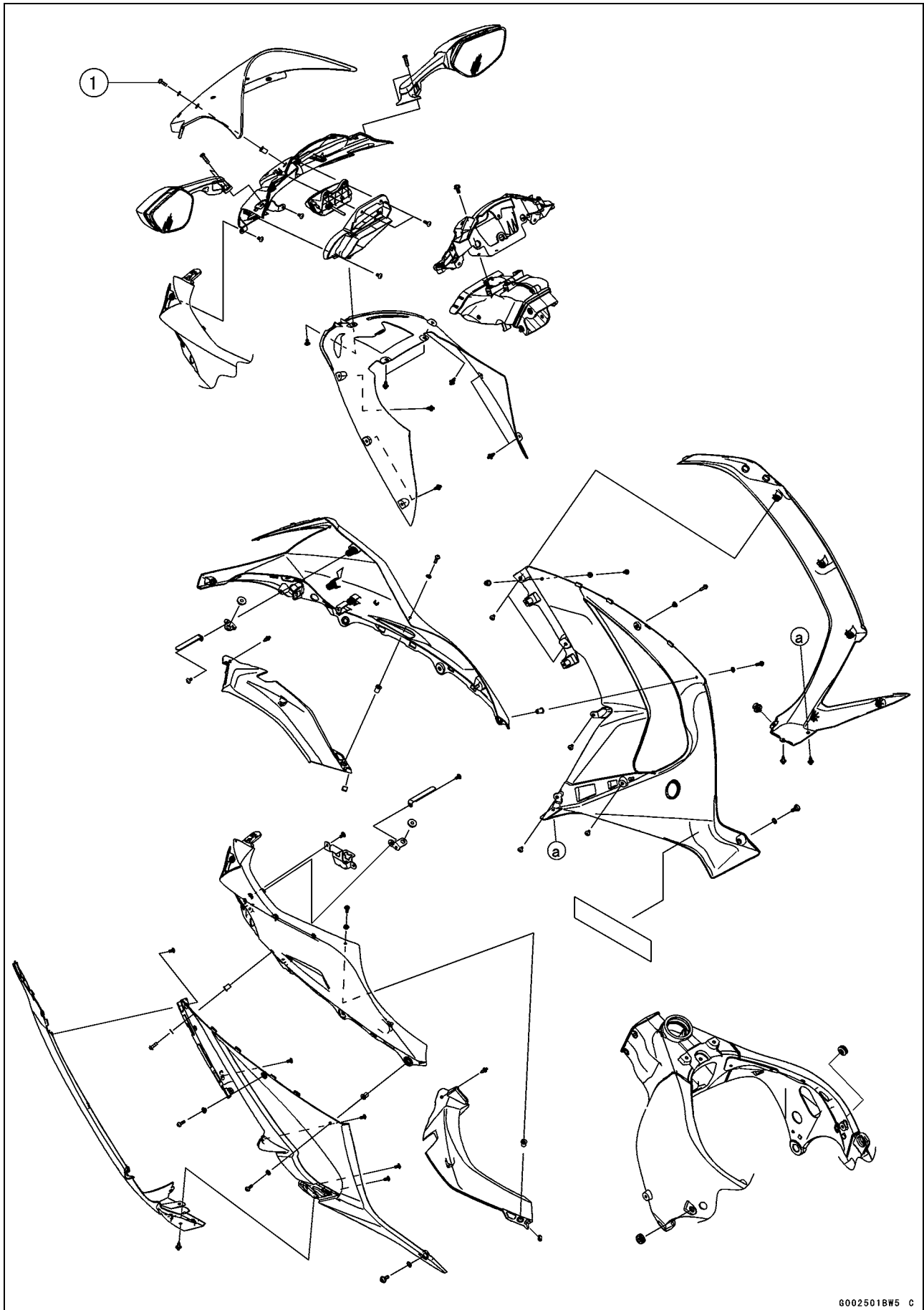


Exploded View

- 1. US, CA and CAL Models
- L: Apply a non-permanent locking agent.
- R: Replacement Parts

15-6 FRAME

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Windshield Mounting Bolts	1.2	0.12	11 in·lb	

15-8 FRAME

Seats

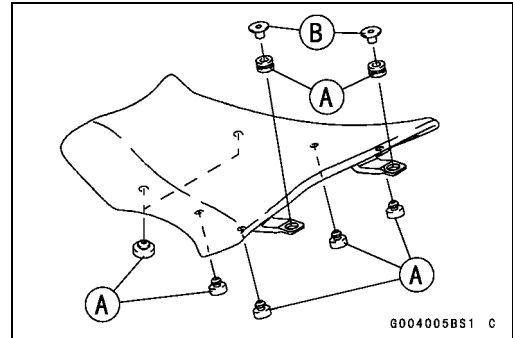
Front Seat Removal

- Remove:
 - Rear Seat (see Rear Seat Removal)
 - Upper Seat Cover (see Seat Cover Removal)
- Remove the front seat bolts [A].
- Remove the front seat backward to clear the seat hooks.

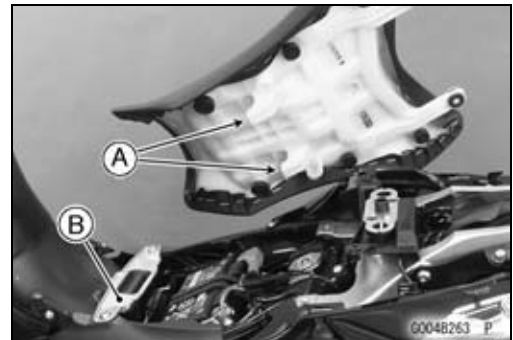


Front Seat Installation

- Installation is the reverse of removal. Note the following.
- Check that the dampers [A] are in place on the front seat.
- Install the collars [B] as shown in the figure.

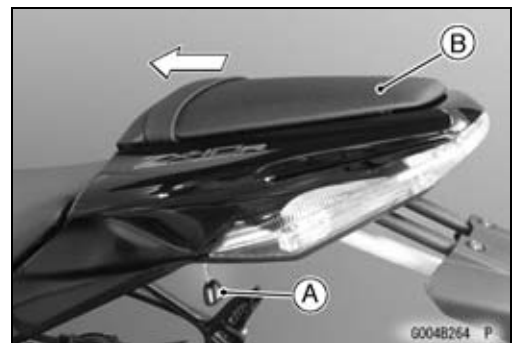


- Place the seat hooks [A] under the fuel tank bracket [B].



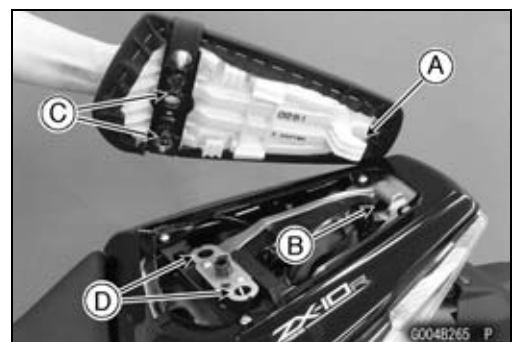
Rear Seat Removal

- Insert the ignition key [A] into the seat lock as shown in the figure.
- Pull up the seat [B] upward while turning the key clockwise, and remove it forward.



Rear Seat Installation

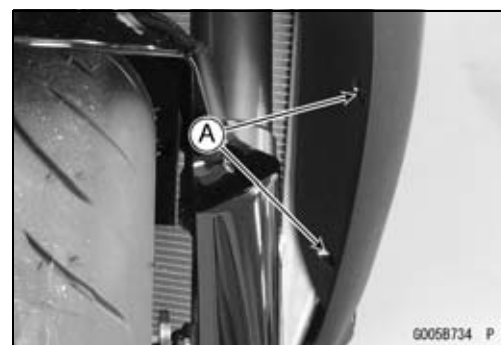
- Place the seat hook [A] to the slot [B] under the rear frame rear.
- Insert the seat latches [C] into the latch holes [D].
- Push down the seat until the lock clicks.



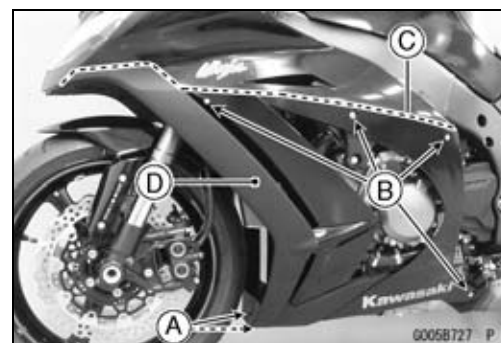
Fairings

Lower Fairing Removal

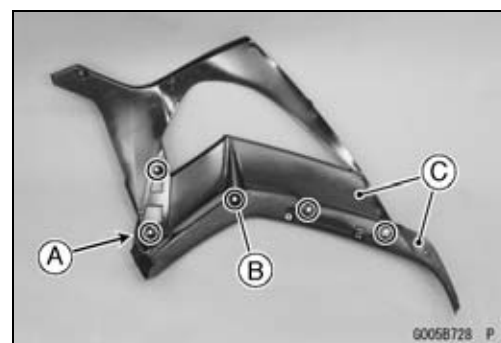
- Remove the quick rivets [A].



- Remove:
 - Quick Rivets [A]
 - Bolts [B]
- Pull up the core by the flat-head screwdriver (–), and then remove the quick rivet.
- Clear the hook portions on the upper edges [C] from the slots, and remove the left lower fairing [D].
- While pulling down the rear part of the fairing, clear the front side hooks.

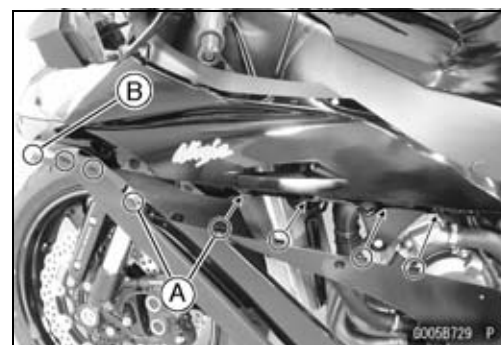


- Remove:
 - Quick Rivet [A]
 - Bolts [B]
- Separate the lower fairings [C].
- Remove the right lower fairing in the same way.



Lower Fairing Installation

- Installation is the reverse of removal. Note the following.
 - Insert the hook portions [A] into the slots.
 - Insert the front hook [B] first, then insert the remainder sequentially.



Upper Fairing Assembly Removal

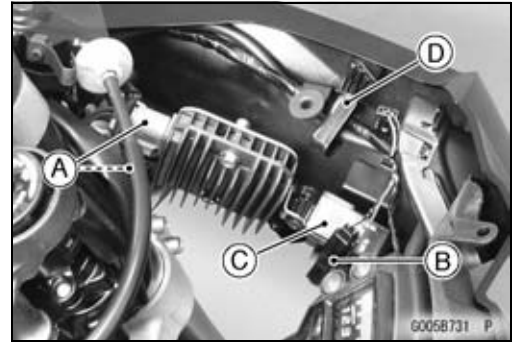
- Remove:
 - Lower Fairings (see Lower Fairing Removal)
 - Center Inner Fairing (see Center Inner Fairing Removal)
 - Upper Inner Fairings (see Upper Inner Fairing Removal)
 - Windshield (see Windshield Removal)
- Disconnect the front turn signal light lead connector [A] (both sides).
- Remove the bolts [B] and the rear view mirror [C] (both sides).



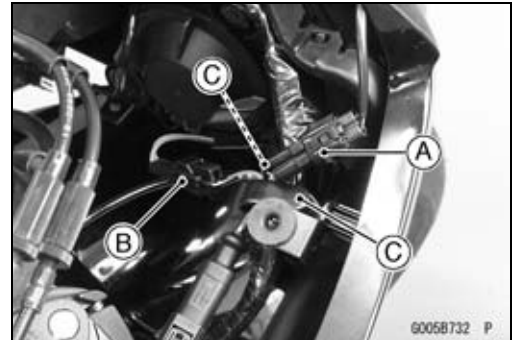
15-10 FRAME

Fairings

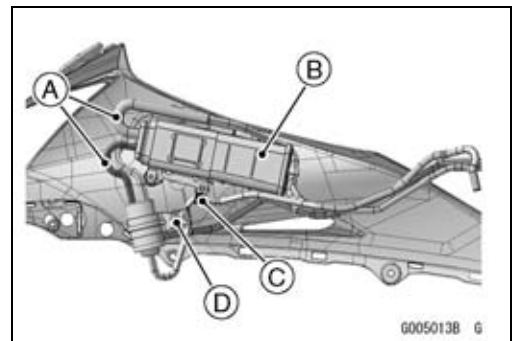
- Disconnect:
 - Regulator/Rectifier Connectors [A]
 - Headlight Lead Connector [B]
- Remove the fuse box [C].
- Open the clamp [D].



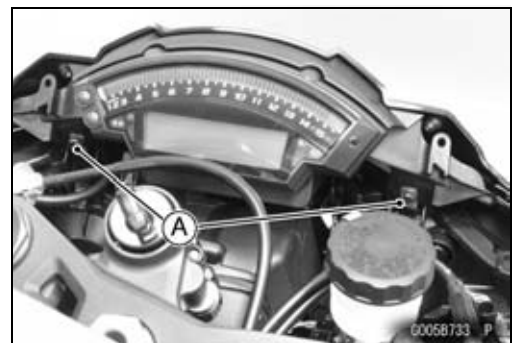
- Disconnect:
 - City Light Lead Connector [A]
 - Headlight Lead Connector [B]
- Open the clamps [C].



- For models equipped with an evaporative emission control system, note the following.
 - Take the hoses [A] off the canister [B].
 - Open the clamp [C].
 - Remove the quick rivet [D].



- Remove the bolts [A], and take off the upper fairing assembly.



Upper Fairing Assembly Installation

- Installation is the reverse of removal. Note the following.
 - Run the hoses, leads and harness correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Fairings

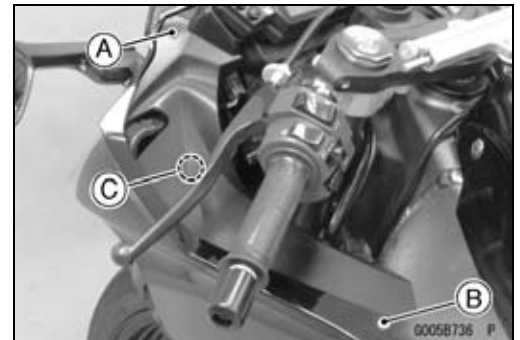
Upper Fairing Assembly Disassembly

- Remove:
 - Upper Fairing Assembly (see Upper Fairing Assembly Removal)
 - Headlight (see Headlight Removal/Installation in the Electrical System chapter)
 - City Light (LED) (see City Light (LED) Removal/Installation in the Electrical System chapter)
- Remove the screws [A], and separate each parts.



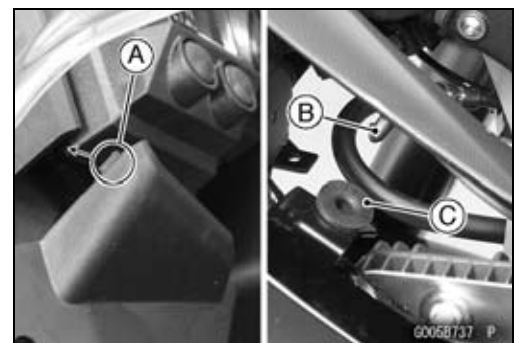
Upper Inner Fairing Removal

- Remove:
 - Quick Rivet [A]
 - Bolt [B]
- Clear the projection [C] from the hole and remove the upper inner fairing.



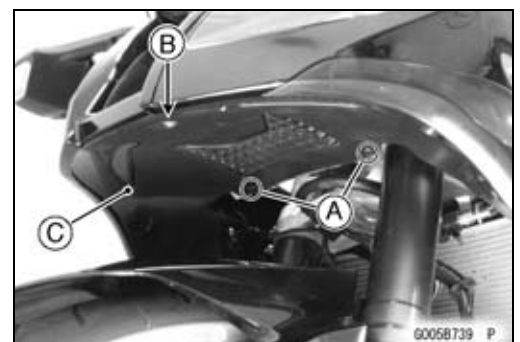
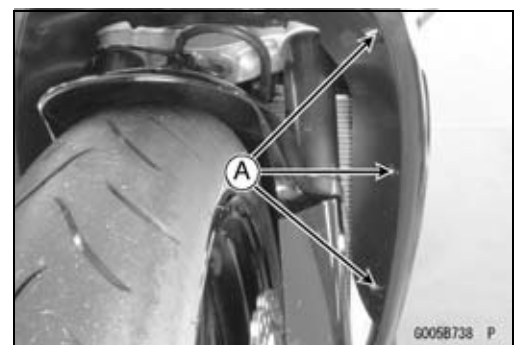
Upper Inner Fairing Installation

- Installation is the reverse of removal. Note the following.
 - Place the tab [A] under the cover as shown in the figure.
 - Insert the projection [B] into the grommet [C].



Center Inner Fairing Removal

- Remove:
 - Quick Rivets [A] (Both Sides)
 - Screw [B]
- Bring the center inner fairing [C] backward to clear the front edge while lift up the upper fairing edges lightly.

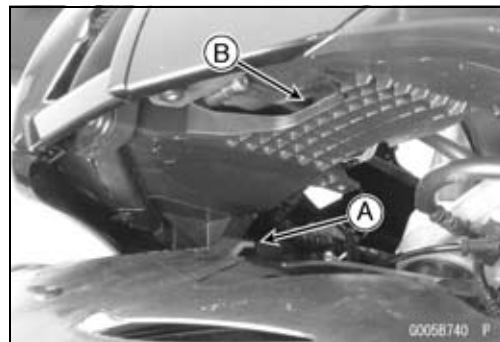


15-12 FRAME

Fairings

Center Inner Fairing Installation

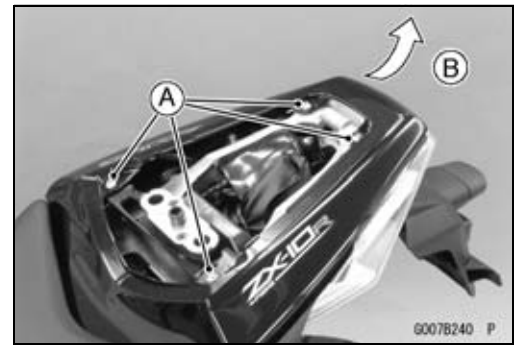
- Installation is the reverse of removal. Note the following.
- Insert the hook portion [A] of the center inner fairing into the slot [B].



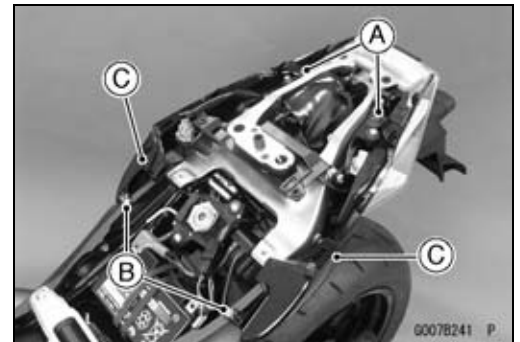
Seat Covers

Seat Cover Removal

- Remove:
 - Rear Seat (see Rear Seat Removal)
- Remove the bolts [A].
- Remove the upper seat cover backward [B] to clear the hook portions.

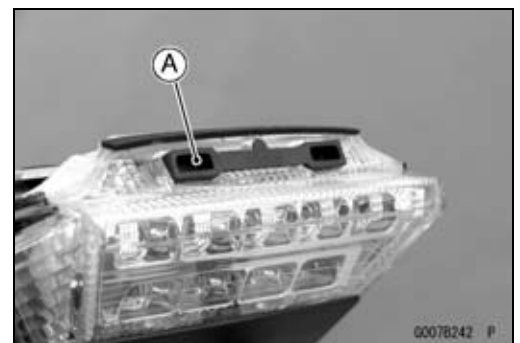


- Remove:
 - Front Seat (see Front Seat Removal)
 - Quick Rivets [A]
 - Bolts [B]
 - Seat Covers [C]

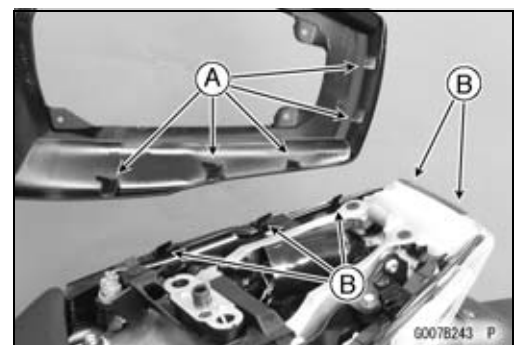


Seat Cover Installation

- Installation is the reverse of removal. Note the following.
 - Install the damper [A] as shown in the figure.



- Fit the hook portions [A] to the slots and hooks [B].

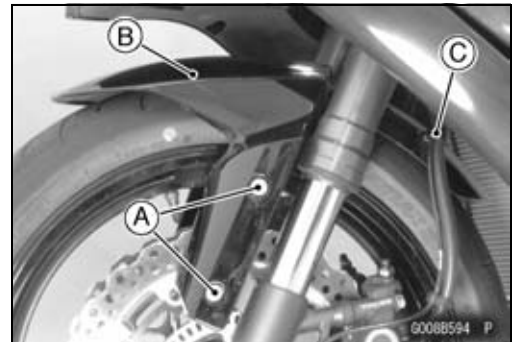


15-14 FRAME

Fenders

Front Fender Removal

- Remove:
 - Bolts [A] with Washers (Both Sides)
 - Reflectors (Both Sides, US, CA, CAL and AU Models)
 - Front Fender [B]
- Take the brake hose off the clamp [C] (both sides).

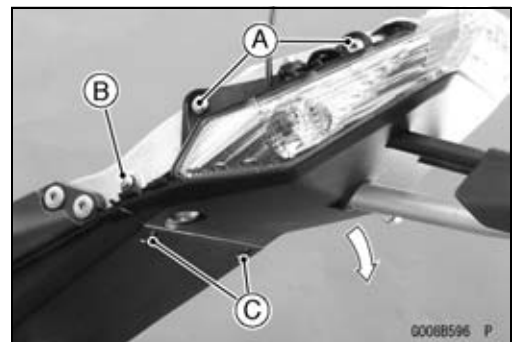
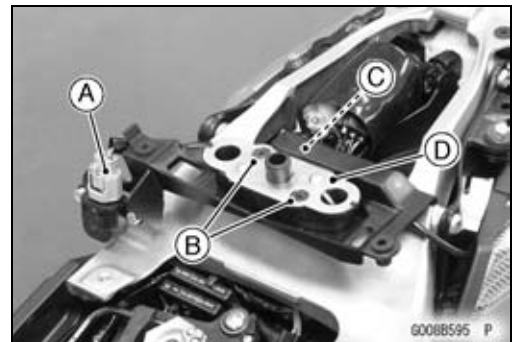


Front Fender Installation

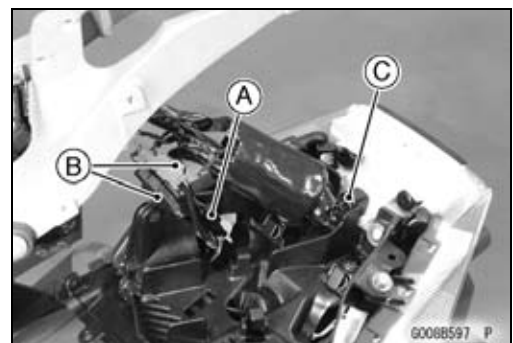
- Apply a non-permanent locking agent to the front fender mounting bolts.
- Tighten:
 - Torque - Front Fender Mounting Bolts: 3.9 N·m (0.40 kgf·m, 35 in·lb)

Flap and Rear Fender Rear Removal

- Remove:
 - Front and Rear Seat (see Front/Rear Seat Removal)
 - Seat Covers (see Seat Cover Removal)
 - Vehicle-down Sensor Connector [A]
 - Screws [B]
 - Clear the seat lock cable [C] from the seat lock unit [D].
 - Take off the seat lock unit and the bracket.
-
- Remove:
 - Bolts [A] (Both Sides)
 - Bolt [B] (Both Sides)
 - Quick Rivets [C]
 - Pull the flap and rear fender rear off the rear fender front.

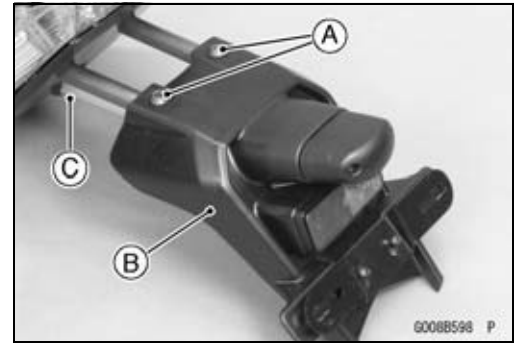


- Disconnect:
 - License Plate Light Lead Connector [A]
 - Rear Turn Signal Light Lead Connectors [B]
 - Tail/Brake Light Connector [C]

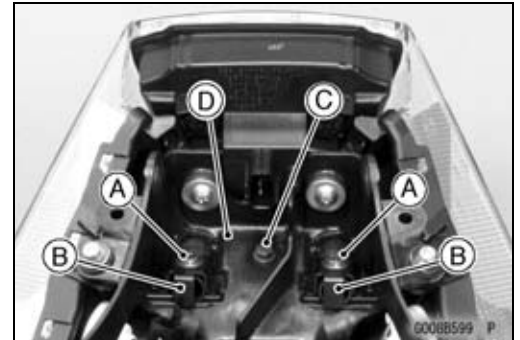


Fenders

- Remove:
Bolts [A] and Bracket
Flap [B]
Lower Pipe [C]

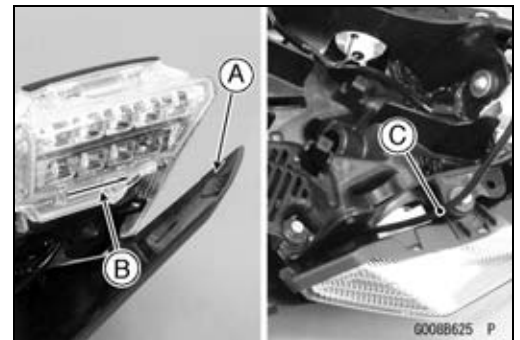


- Remove the bolts [A] and the brackets [B].
- Pull out the upper pipes.
- Remove the bolt [C], and take off the rear fender rear from the tool kit case [D].

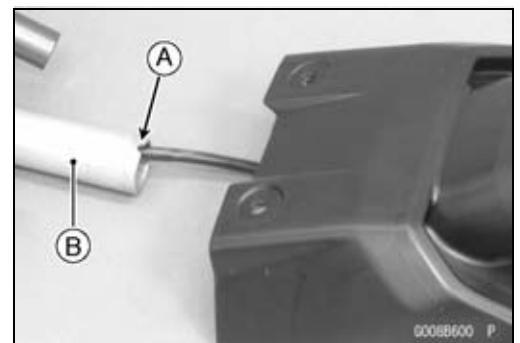


Flap and Rear Fender Rear Installation

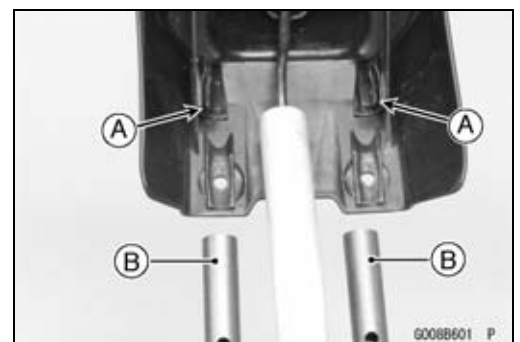
- Installation is the reverse of removal. Note the following.
 - Fit the tab [A] to the slot [B].
 - Run the seat lock cable [C] between the tool kit case and the turn signal light as shown in the figure.



- Turn the notch [A] of the lower pipe [B] toward up.



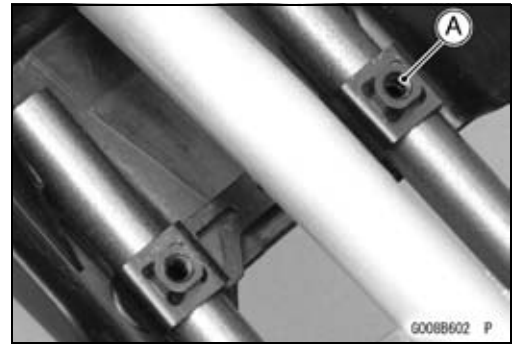
- Insert the tabs [A] into the upper pipes [B].



15-16 FRAME

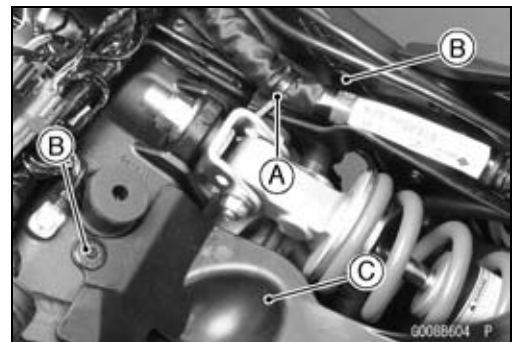
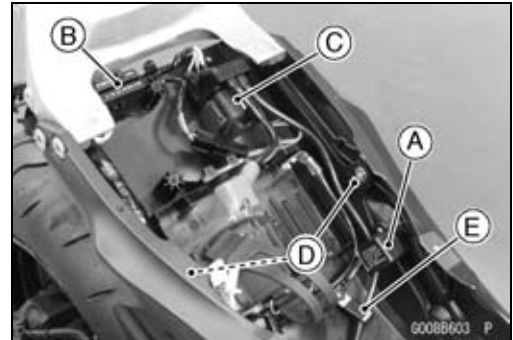
Fenders

○ Install the bracket [A] on the upper pipes as shown in the figure.



Rear Fender Front Removal

- Remove:
 - Flap and Rear Fender Rear (see Flap and Rear Fender Rear Removal)
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
 - Battery (see Battery Removal in the Electrical System chapter)
 - Exhaust Butterfly Valve Actuator (see Exhaust Butterfly Valve Actuator Removal in the Self-Diagnosis System chapter)
 - Turn Signal Relay [A]
 - Fuse Box [B]
 - Starter Relay [C]
 - Bolts [D]
- Clear the cable from the clamp [E].
- Clear the harness from the clamp [A].
- Remove:
 - Quick Rivets [B]
 - Rear Fender Front [C]



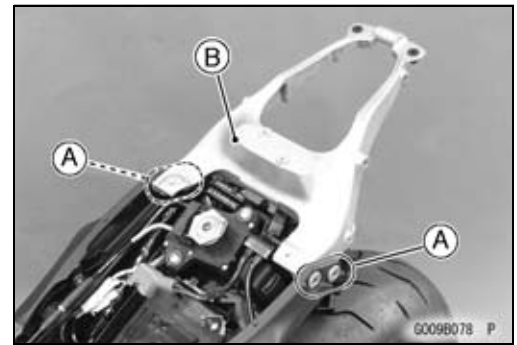
Rear Fender Front Installation

- Installation is the reverse of removal. Note the following.
- Run the harness, cables and leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Frame

Rear Frame Rear Removal

- Remove:
 - Flap and Rear Fender Rear (see Flap and Rear Fender Rear Removal)
 - Rear Frame Rear Bolts [A]
 - Rear Frame Rear [B]



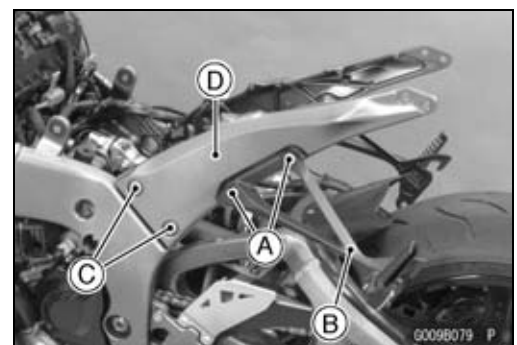
Rear Frame Rear Installation

- Apply a non-permanent locking agent to the threads of the rear frame rear bolts and tighten them.

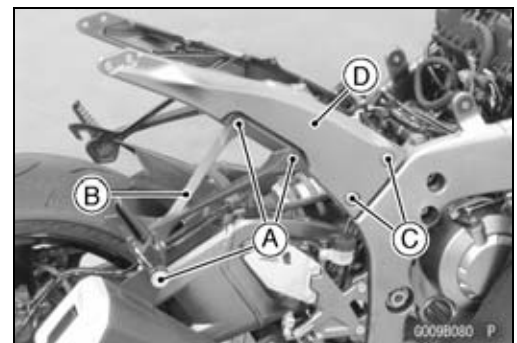
Torque - Rear Frame Rear Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

Rear Frame Front Removal

- Remove:
 - Rear Frame Rear (see Rear Frame Rear Removal)
 - Rear Fender Front (see Rear Fender Front Removal)
 - Rear Footpeg Bracket Bolts [A]
 - Rear Footpeg Bracket [B]
 - Rear Frame Front Bolts [C]
 - Left Rear Frame Front [D]



- Remove:
 - Rear Footpeg Bracket Bolts [A]
 - Rear Footpeg Bracket [B]
 - Rear Frame Front Bolts [C]
 - Right Rear Frame Front [D]



Rear Frame Front Installation

- Apply a non-permanent locking agent to the threads of the rear frame front bolts and tighten them.

Torque - Rear Frame Front Bolts: 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

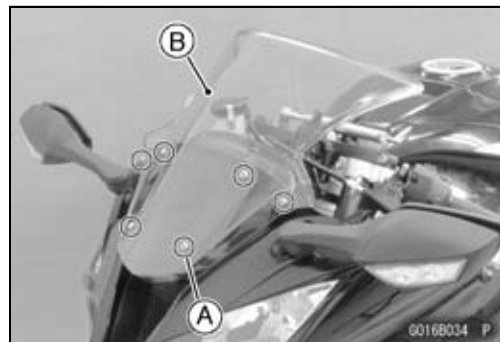
A repaired frame may fail in use, possibly causing an accident resulting in injury or death. If the frame is bent, dented, cracked, or warped, replace it.

15-18 FRAME

Windshield

Windshield Removal

- Remove:
 - Bolts [A] and Washers
 - Windshield [B]



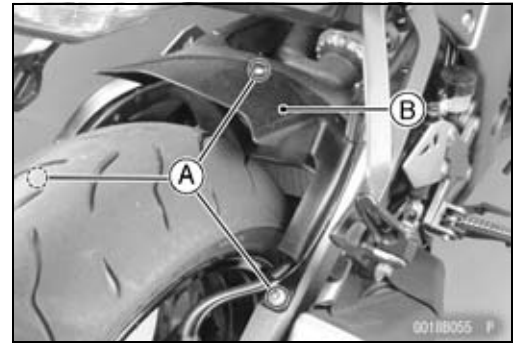
Windshield Installation

- Tighten:
 - Torque - Windshield Mounting Bolts: 1.2 N·m (0.12 kgf·m, 11 in·lb)

Guard

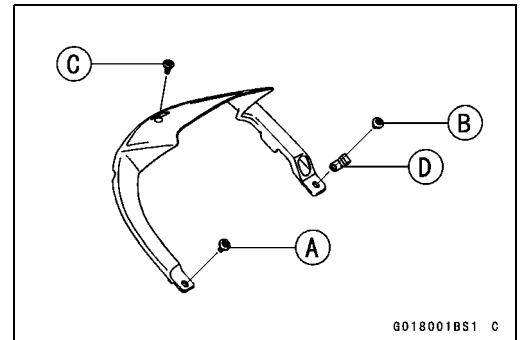
Mud Guard Removal

- Remove:
 - Mud Guard Mounting Bolts [A]
 - Clamp (Right Side)
 - Brake Hose Banjo Bolt of Rear Caliper Side (see Rear Caliper Removal in the Brakes chapter)
 - Mud Guard [B]



Mud Guard Installation

- Installation is the reverse of removal. Note the following.
 - Run the hose and lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
 - Check the brake line.
 - Apply a non-permanent locking agent to the threads of the mud guard mounting bolts [A, B], and tighten them securely.
 - Mud Guard Mounting Bolt [A]: M6 × 14 mm (0.55 in.)
 - Mud Guard Mounting Bolt [B]: M6 × 10 mm (0.39 in.)
 - Mud Guard Mounting Bolt [C]: M6
 - Clamp [D] (Right Side)



15-20 FRAME

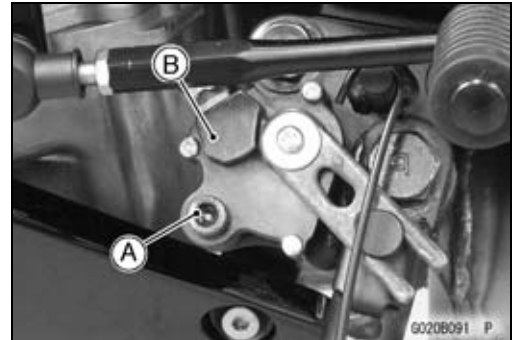
Sidestand

Sidestand Removal

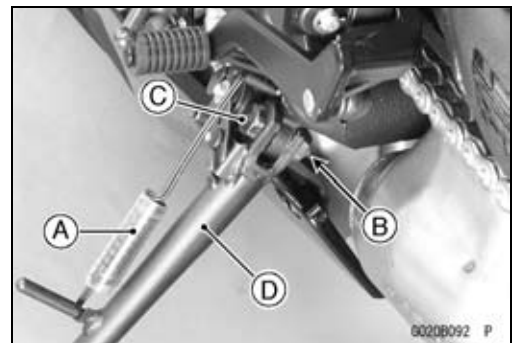
- Raise the rear wheel off the ground with the stand [A].



- Remove:
 - Sidestand Switch Bolt [A]
 - Sidestand Switch [B]



- Remove:
 - Spring [A]
 - Sidestand Nut [B]
 - Sidestand Bolt [C]
 - Sidestand [D]



Sidestand Installation

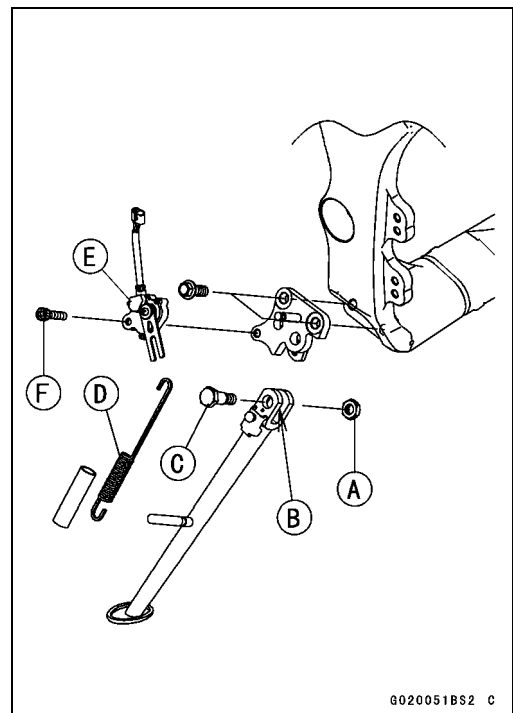
- Replace the sidestand nut [A] with a new one.
- Apply grease to the sliding areas [B].
- Tighten the sidestand bolt [C] first, and then the sidestand nut.

Torque - Sidestand Bolt: 44 N·m (4.5 kgf·m, 32 ft·lb)

Sidestand Nut: 29 N·m (3.0 kgf·m, 21 ft·lb)

- Install the spring [D] as shown in the figure.
- Install the sidestand switch [E].
- Apply a non-permanent locking agent to the threads of the sidestand switch bolt [F], and tighten it.

Torque - Sidestand Switch Bolt: 8.8 N·m (0.90 kgf·m, 78 in·lb)



Footpeg

Footpeg Height Adjustment

○ The front footpeg can be adjusted within 2 positions in height to suit the rider's preference.

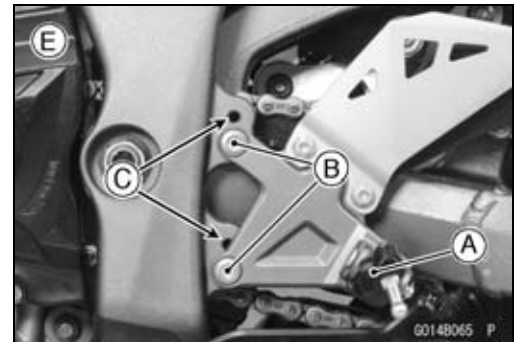
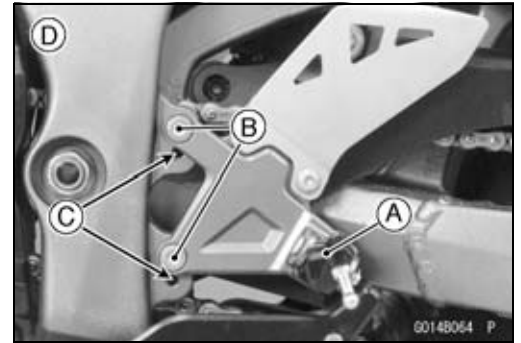
Footpeg [A]

Bolts [B]

Bolt Holes [C]

Footpeg Position 1 [D]

Footpeg Position 2 [E]

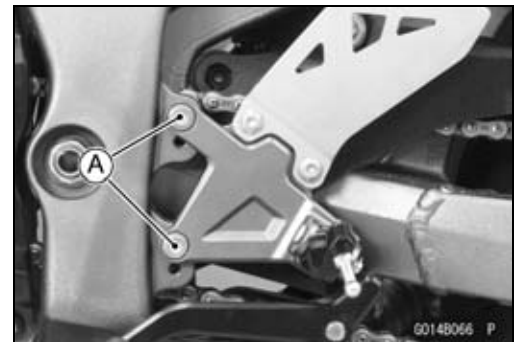


- Remove the bolts [A].
- Adjust the footpeg height.

NOTE

○ Install the front footpegs with same height on both sides.

- Tighten:
Torque - Front Footpeg Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)



Electrical System

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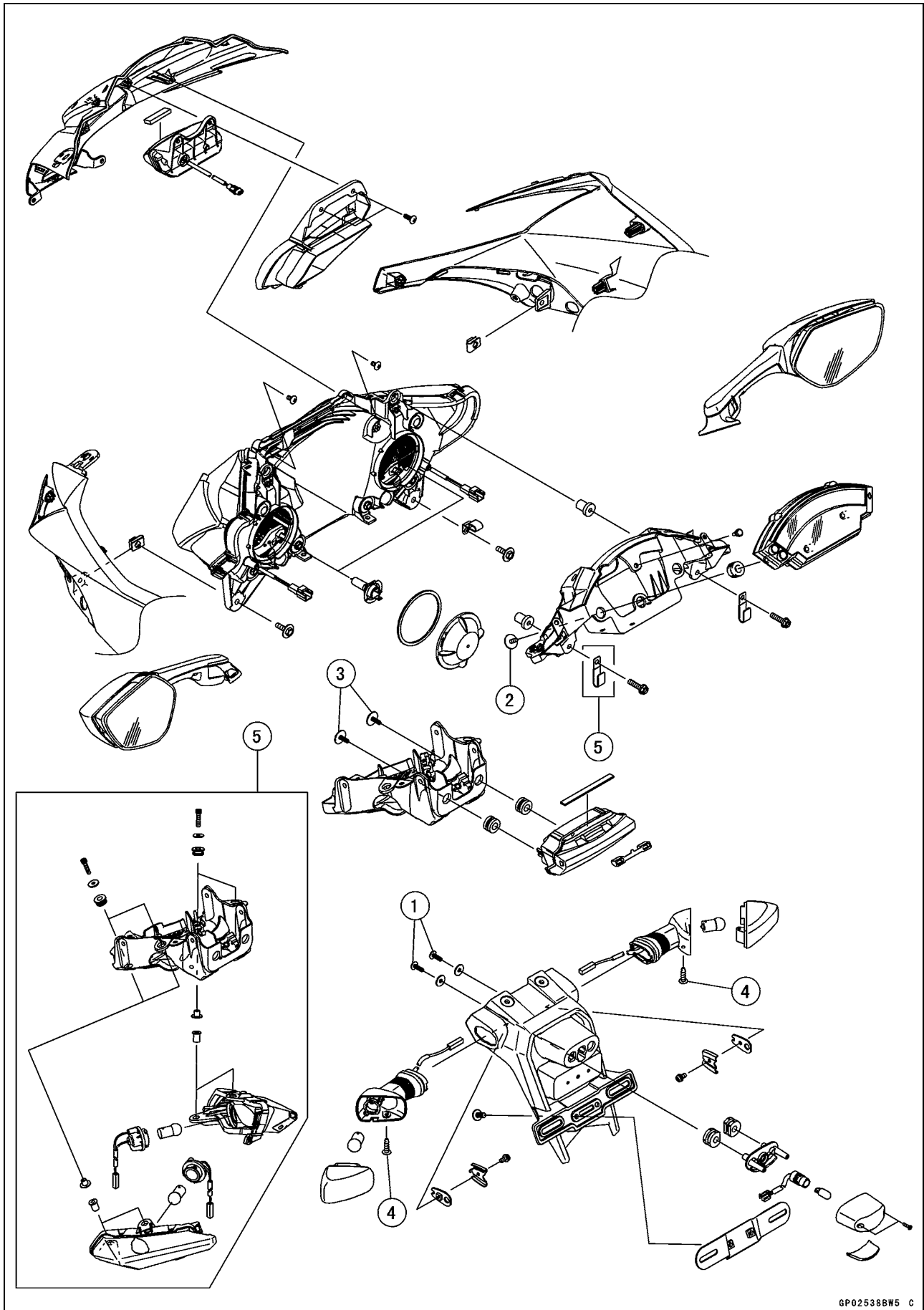
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16-4 ELECTRICAL SYSTEM

Exploded View



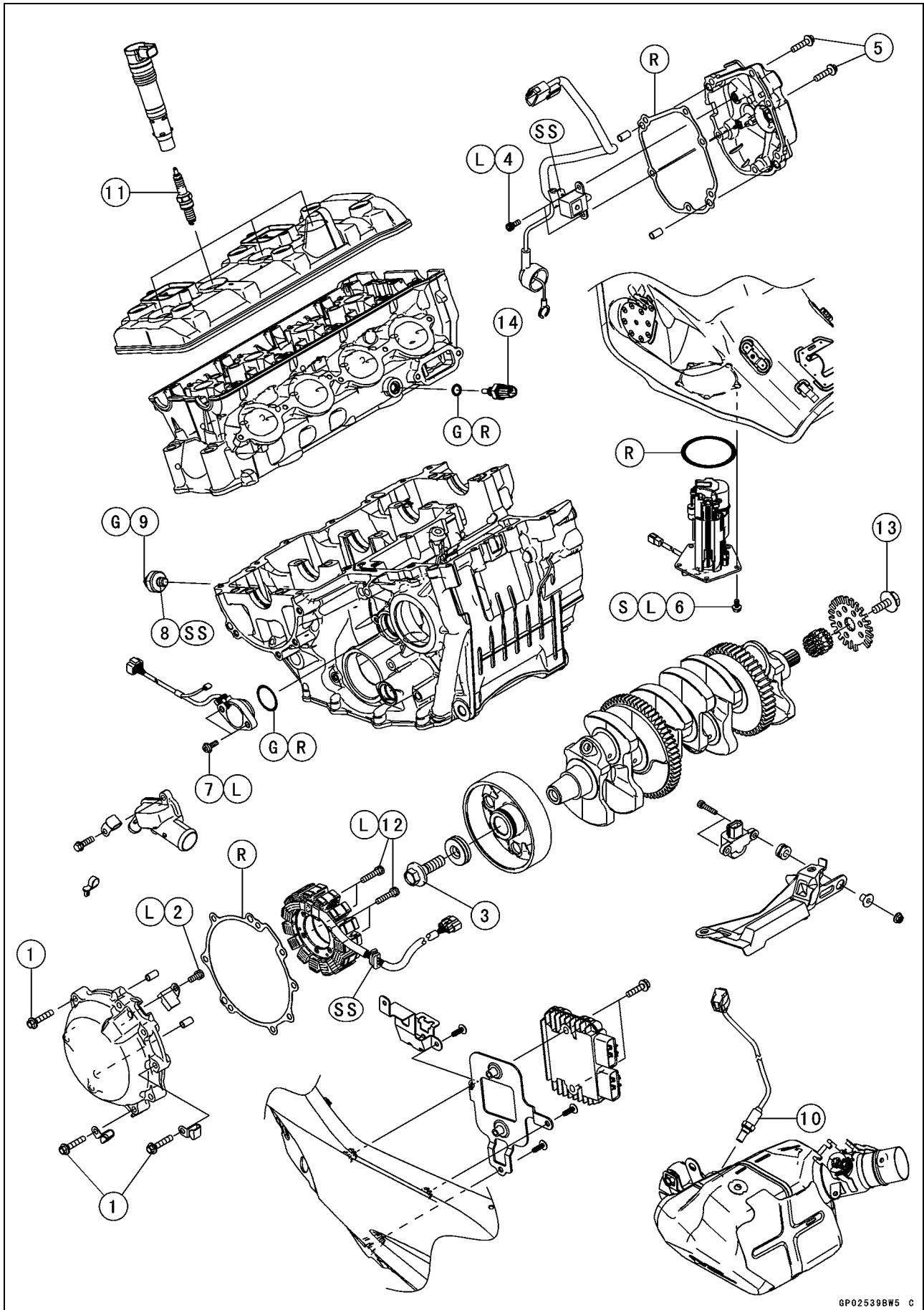
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	License Plate Light Mounting Screws	1.2	0.12	11 in·lb	
2	Meter Unit Mounting Screws	1.2	0.12	11 in·lb	
3	Tail/Brake Light Mounting Screws	1.2	0.12	11 in·lb	
4	Rear Turn Signal Light Lens Screws	1.0	0.10	8.9 in·lb	

5. Other than US, CA, and CAL Models

16-6 ELECTRICAL SYSTEM

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Alternator Cover Bolts	9.8	1.0	87 in·lb	
2	Alternator Lead Holding Plate Bolt	9.8	1.0	87 in·lb	L
3	Alternator Rotor Bolt	155	15.8	114	
4	Crankshaft Sensor Bolts	5.9	0.60	52 in·lb	L
5	Crankshaft Sensor Cover Bolts	9.8	1.0	87 in·lb	
6	Fuel Pump Bolts	9.8	1.0	87 in·lb	L, S
7	Gear Position Switch Screws	2.9	0.30	26 in·lb	L
8	Oil Pressure Switch	15	1.5	11	SS
9	Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	G
10	Oxygen Sensor (Equipped Models)	25	2.5	18	
11	Spark Plugs	13	1.3	115 in·lb	
12	Stator Coil Bolts	12	1.2	106 in·lb	L
13	Timing Rotor Bolt	39	4.0	29	
14	Water Temperature Sensor	12	1.2	106 in·lb	

G: Apply grease.

L: Apply a non-permanent locking agent.

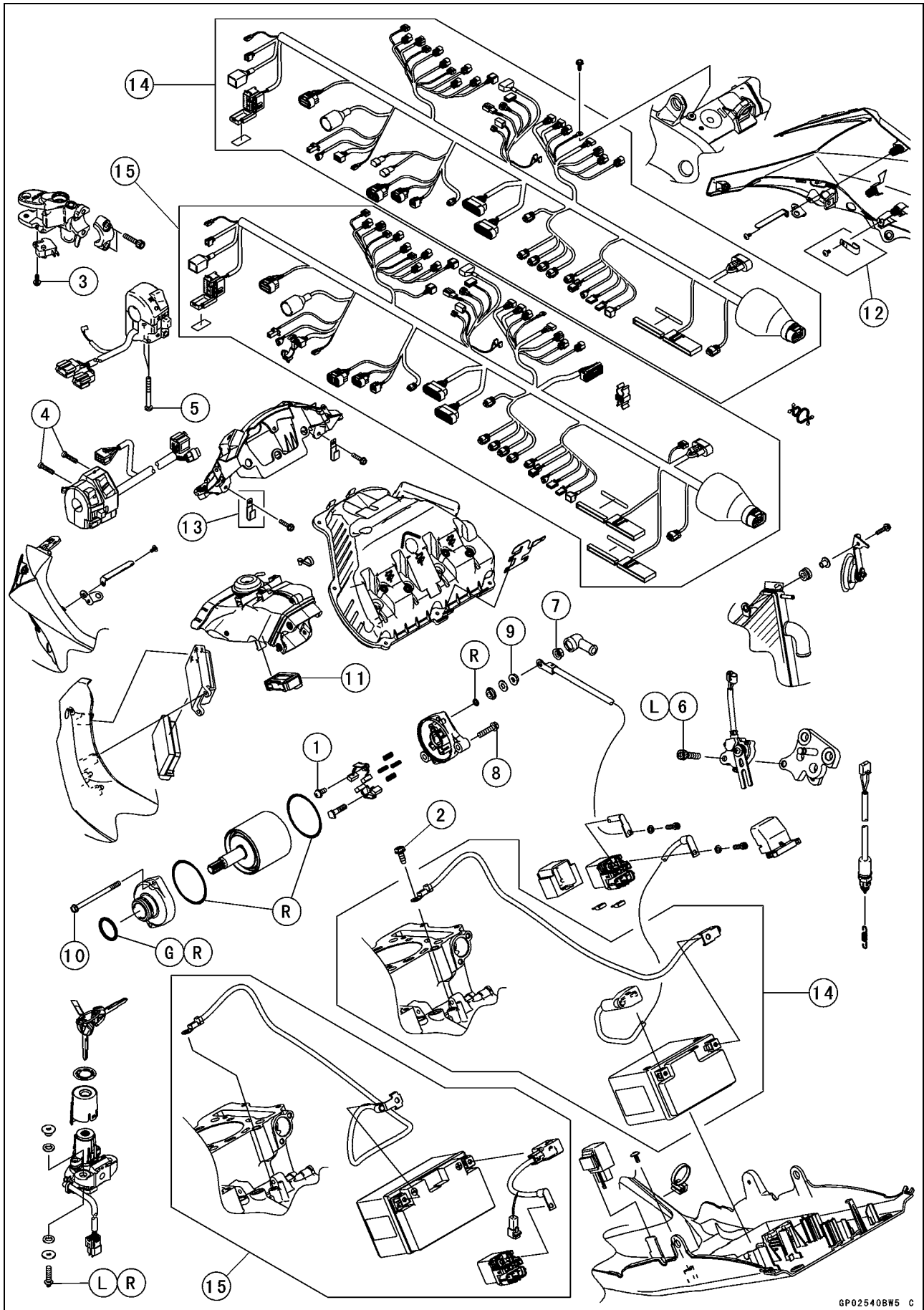
R: Replacement Parts

S: Follow the specified tightening sequence.

SS: Apply silicone sealant.

16-8 ELECTRICAL SYSTEM

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Brush Holder Screw	3.8	0.39	34 in·lb	
2	Engine Ground Terminal Bolt	9.8	1.0	87 in·lb	
3	Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
4	Left Switch Housing Screws	3.5	0.36	31 in·lb	
5	Right Switch Housing Screws	3.5	0.36	31 in·lb	
6	Sidestand Switch Bolt	8.8	0.90	78 in·lb	L
7	Starter Motor Cable Terminal Nut	5.9	0.60	52 in·lb	
8	Starter Motor Mounting Bolts	9.8	1.0	87 in·lb	
9	Starter Motor Terminal Locknut	11	1.1	97 in·lb	
10	Starter Motor Through Bolts	5.0	0.51	44 in·lb	

11. Immobilizer Amplifier (Equipped Models)

12. Other than CAL and SEA Models

13. Other than US, CA and CAL Models

14. ZX1000J Models

15. ZX1000K Models

G: Apply grease.

L: Apply a non-permanent locking agent.

R: Replacement Parts

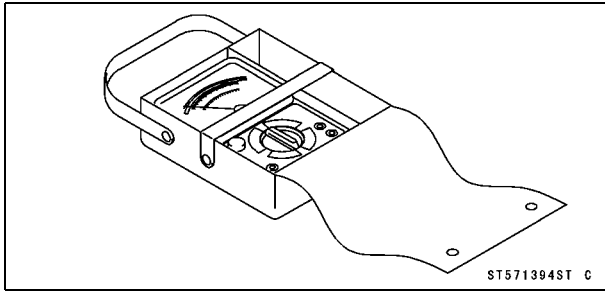
16-10 ELECTRICAL SYSTEM

Specifications

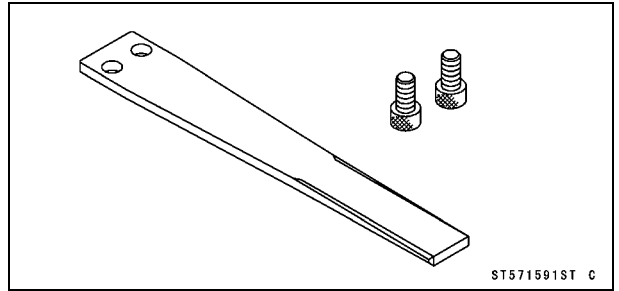
Item	Standard
Battery Type Model Name: ZX1000J Model ZX1000K Model Capacity: ZX1000J Model ZX1000K Model Voltage	Sealed Battery (Wet) YTZ7S (F) YTZ10S 12 V 6 Ah 12 V 8.6 Ah 12.8 V or more
Charging System Type Alternator Output Voltage Stator Coil Resistance Charging Voltage (Regulator/Rectifier Output Voltage)	Three-phase AC 49.6 V or more at 4 000 r/min (rpm) 0.11 ~ 0.17 Ω at 20°C (68°F) 14.2 ~ 15.2 V
Ignition System Crankshaft Sensor: Resistance Peak Voltage Stick Coil: Primary Winding Resistance Secondary Winding Resistance Primary Peak Voltage Spark Plug: Type Gap	376 ~ 564 Ω 1.9 V or more 0.85 ~ 1.15 Ω 5.0 ~ 6.8 k Ω 100 V or more NGK CR9EIA-9 0.8 ~ 0.9 mm (0.031 ~ 0.035 in.)
Electric Starter System Starter Motor: Brush Length	12.05 mm (0.4744 in.) [Service Limit: 6.55 mm (0.258 in.)]
Air Switching Valve Resistance	20 ~ 24 Ω at 20°C (68°F)
Air Intake Solenoid Valve Resistance	22 ~ 26 Ω at 20°C (68°F)
Meter Unit CAN Communication Line Resistance	122 ~ 126 Ω at meter connector
Switches and Sensors Rear Brake Light Switch Timing Oil Pressure Switch Connections Water Temperature Sensor Resistance Gear Position Switch Resistance	ON after about 10 mm (0.39 in.) of pedal travel When engine is stopped: ON When engine is running: OFF in the text in the text

Special Tools and Sealant

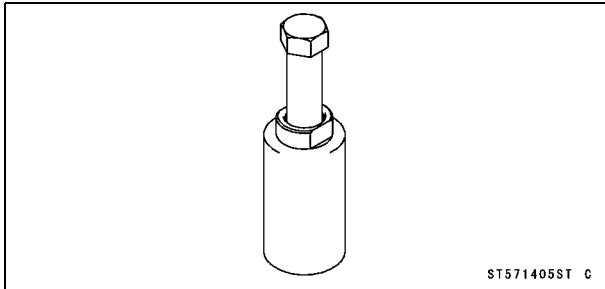
**Hand Tester:
57001-1394**



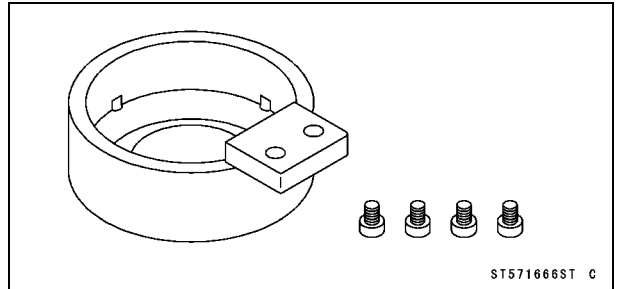
**Grip:
57001-1591**



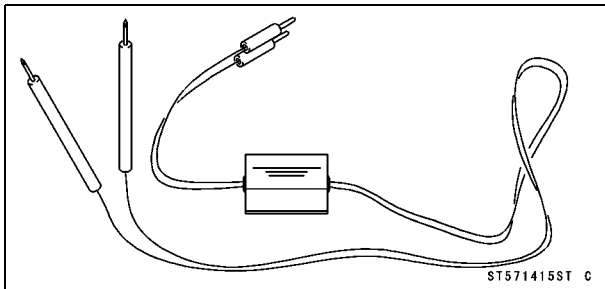
**Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5:
57001-1405**



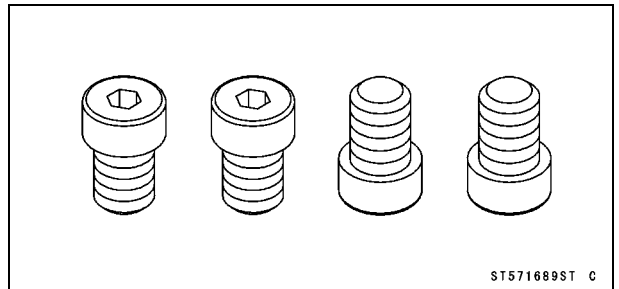
**Rotor Holder:
57001-1666**



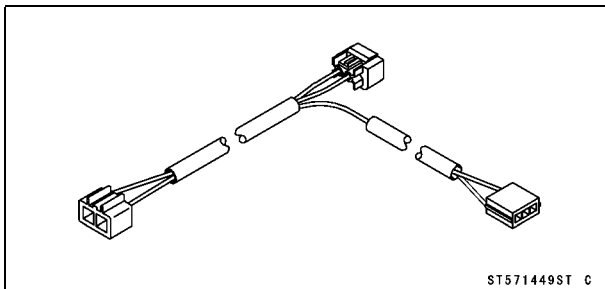
**Peak Voltage Adapter:
57001-1415**



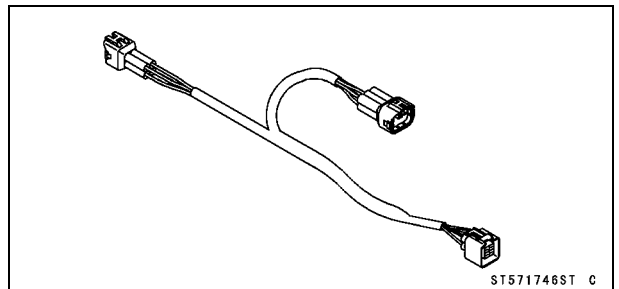
**Rotor Holder Attachment:
57001-1689**



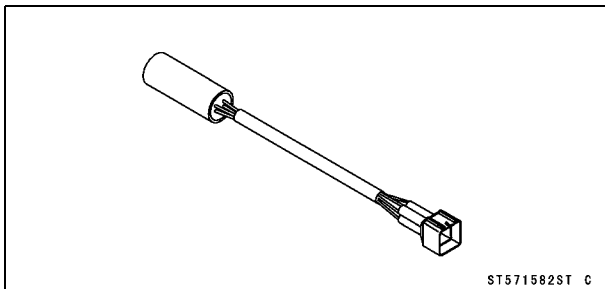
**Lead Wire - Peak Voltage Adapter:
57001-1449**



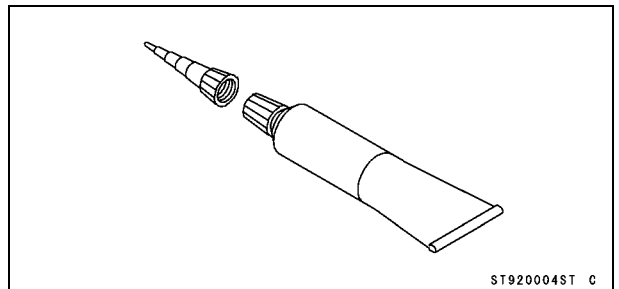
**Key Registration Adapter:
57001-1746**



**Key Registration Unit:
57001-1582**



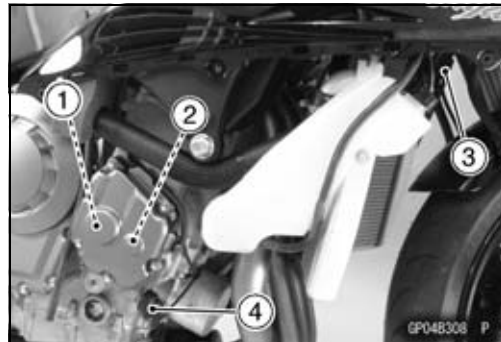
**Liquid Gasket, TB1211F:
92104-0004**



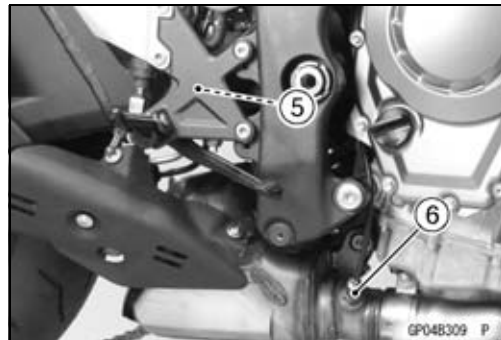
16-12 ELECTRICAL SYSTEM

Parts Location

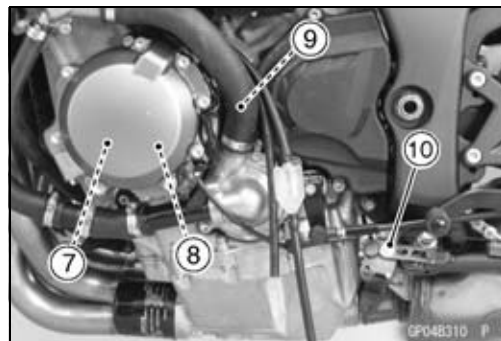
1. Timing Rotor
2. Crankshaft Sensor
3. Horn
4. Oil Pressure Switch



5. Rear Brake Light Switch
6. Oxygen Sensor (Equipped Models)



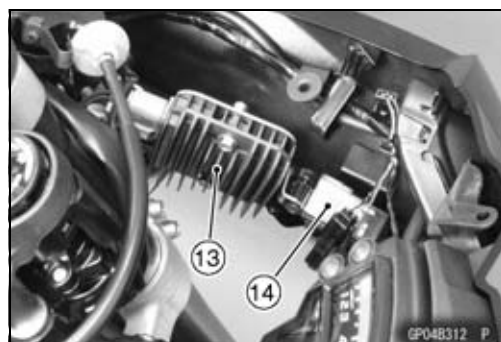
7. Alternator
8. Stator Coil
9. Gear Position Switch
10. Sidestand Switch



11. Immobilizer Amplifier (Equipped Models)
12. Radiator Fan Motor

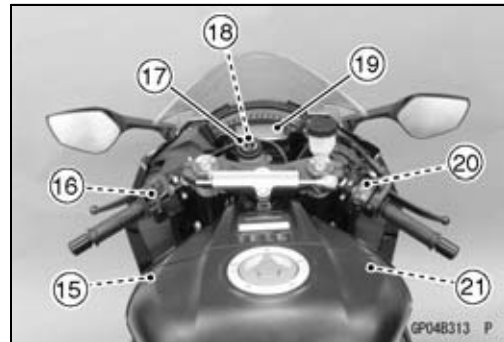


13. Regulator/Rectifier
14. Fuse Box 1

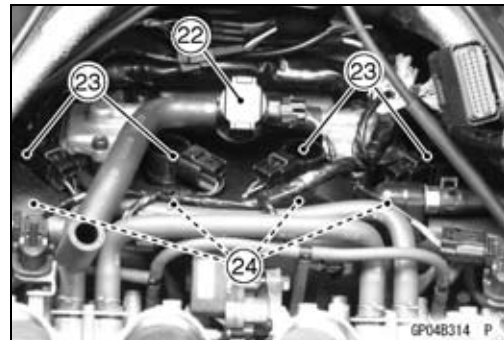


Parts Location

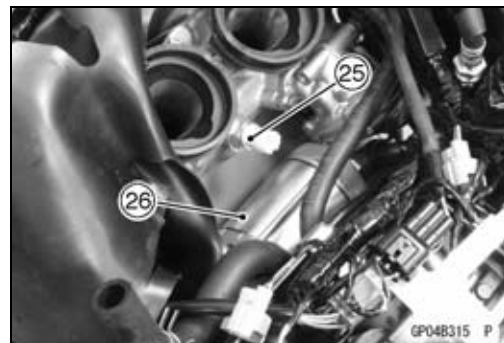
- 15. Relay Box
- 16. Starter Lockout Switch
- 17. Ignition Switch
- 18. Immobilizer Antenna (Equipped Models, Included in Ignition Switch)
- 19. Meter Unit
- 20. Front Brake Light Switch
- 21. ECU



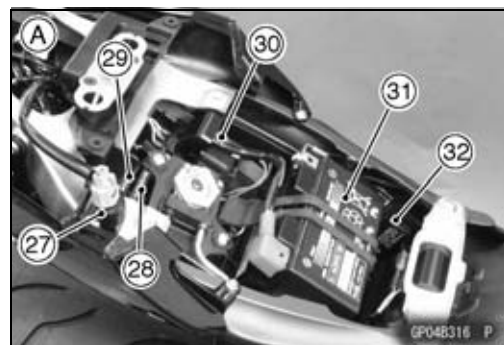
- 22. Air Switching Valve
- 23. Stick Coils
- 24. Spark Plugs



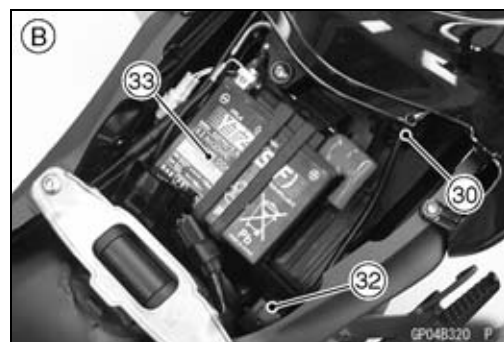
- 25. Water Temperature Sensor
- 26. Starter Motor



- 27. Vehicle-down Sensor
- 28. Fuse Box 2
- 29. Fuse Box 3 (KIBS Equipped Models)
- 30. Starter Relay
- 31. Battery 12 V 6 Ah
- 32. Turn Signal Relay
- A. ZX1000K Model



- 33. Battery 12 V 8.6 Ah
- B. ZX1000J Model



16-14 ELECTRICAL SYSTEM

Parts Location

34. Fuel Reserve Switch (Included in Fuel Pump)

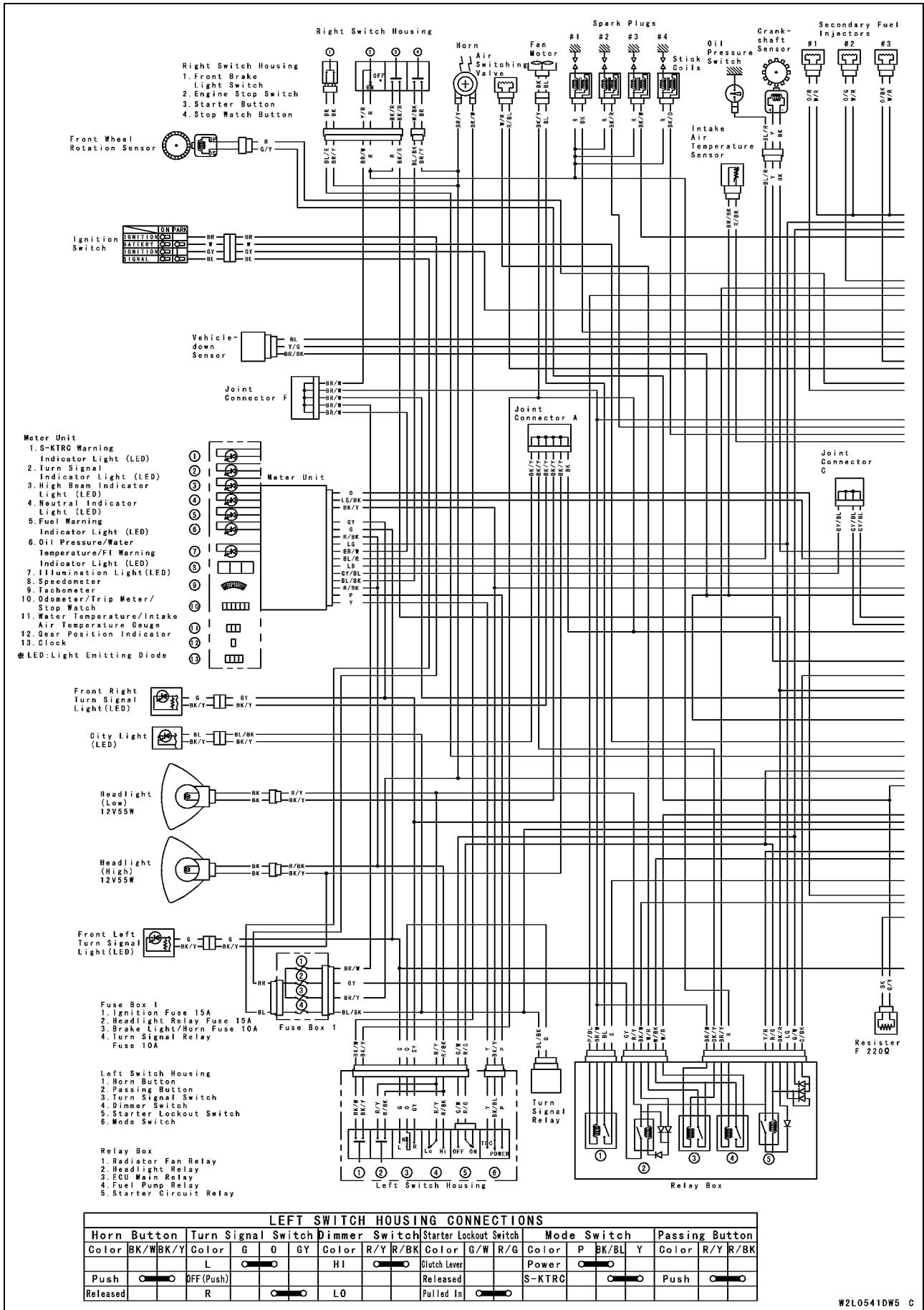


Wiring Diagram (US, CA and CAL without KIBS Models)

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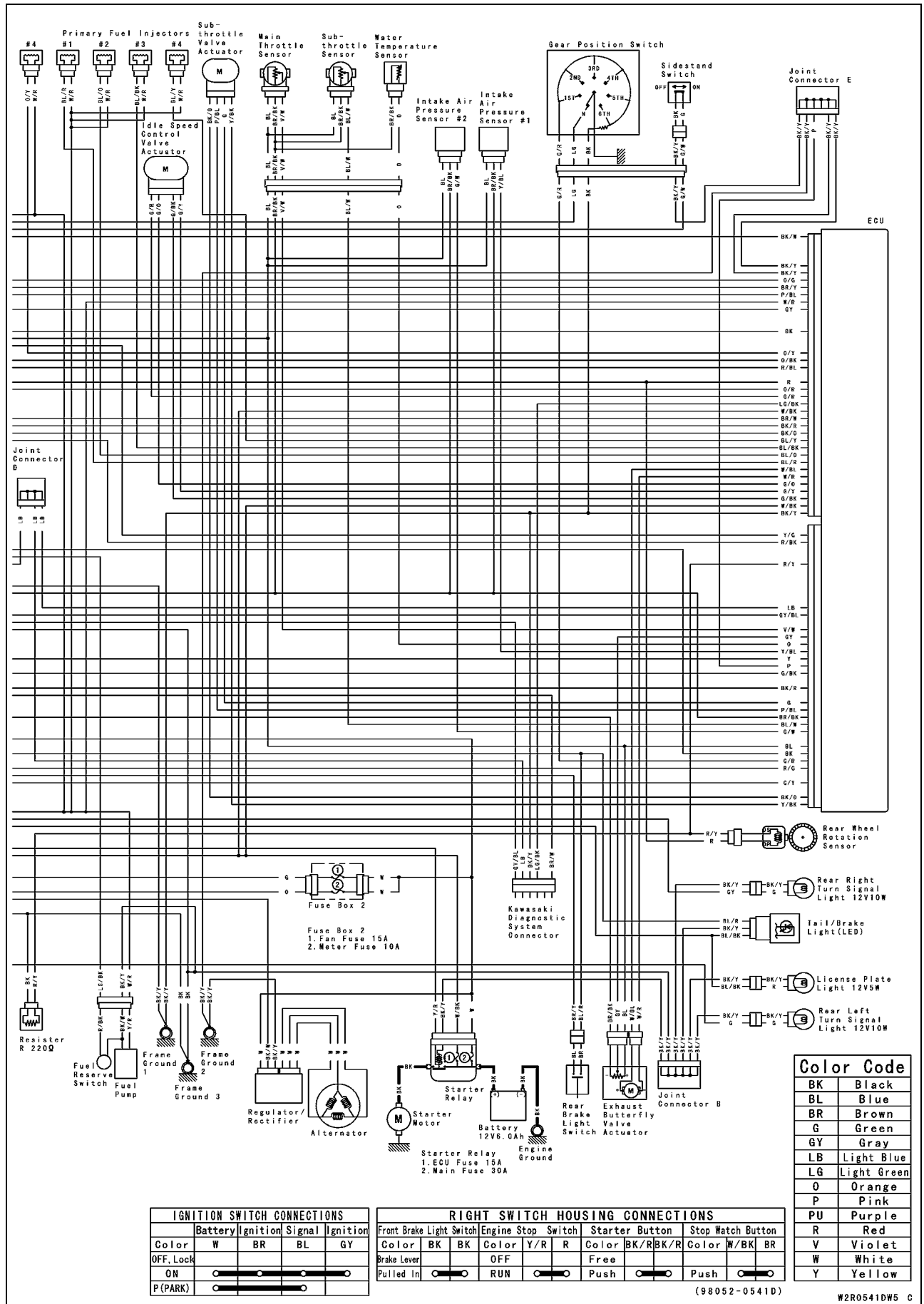
16-16 ELECTRICAL SYSTEM

Wiring Diagram (US, CA and CAL without KIBS Models)



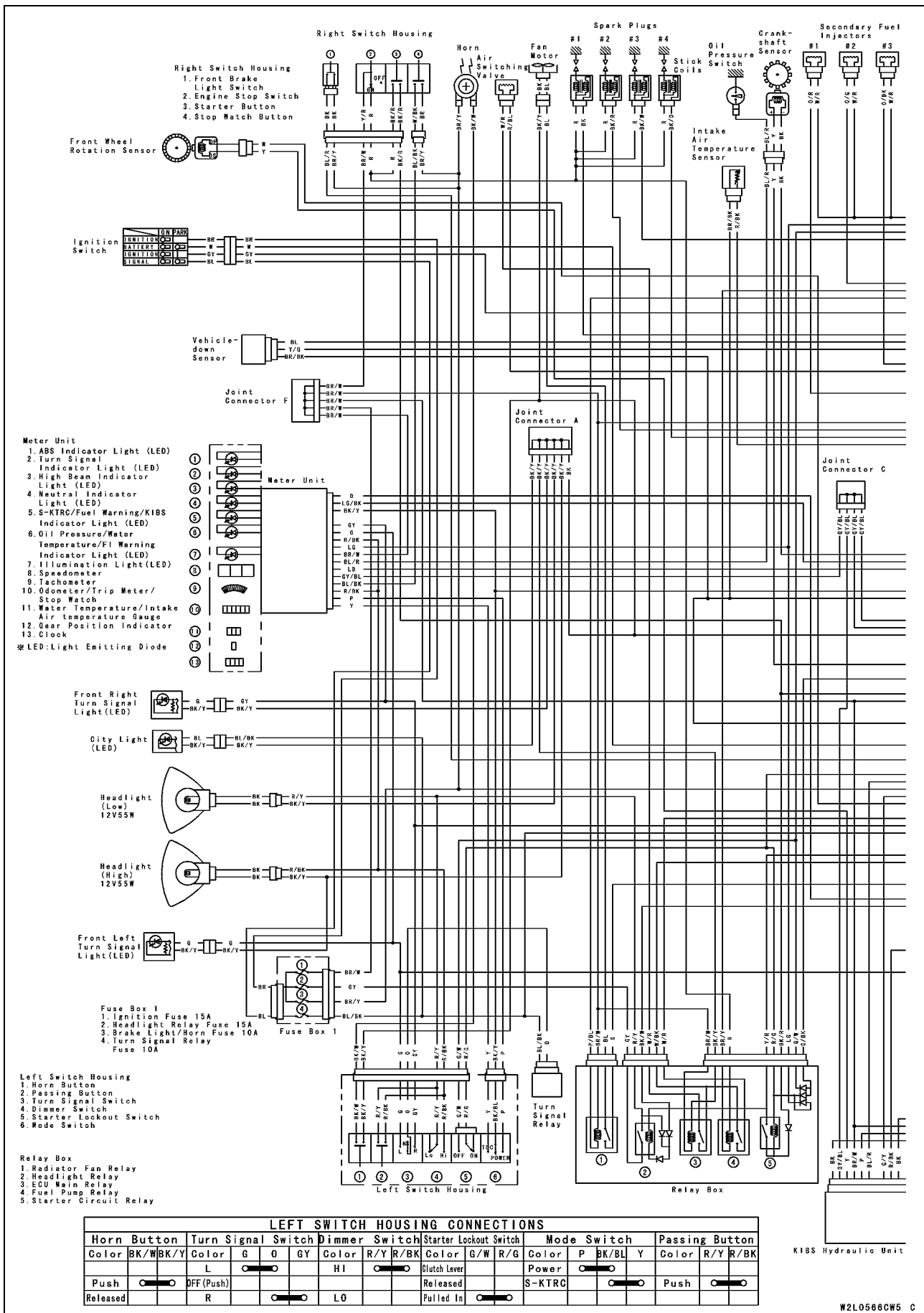
ELECTRICAL SYSTEM 16-17

Wiring Diagram (US, CA and CAL without KIBS Models)

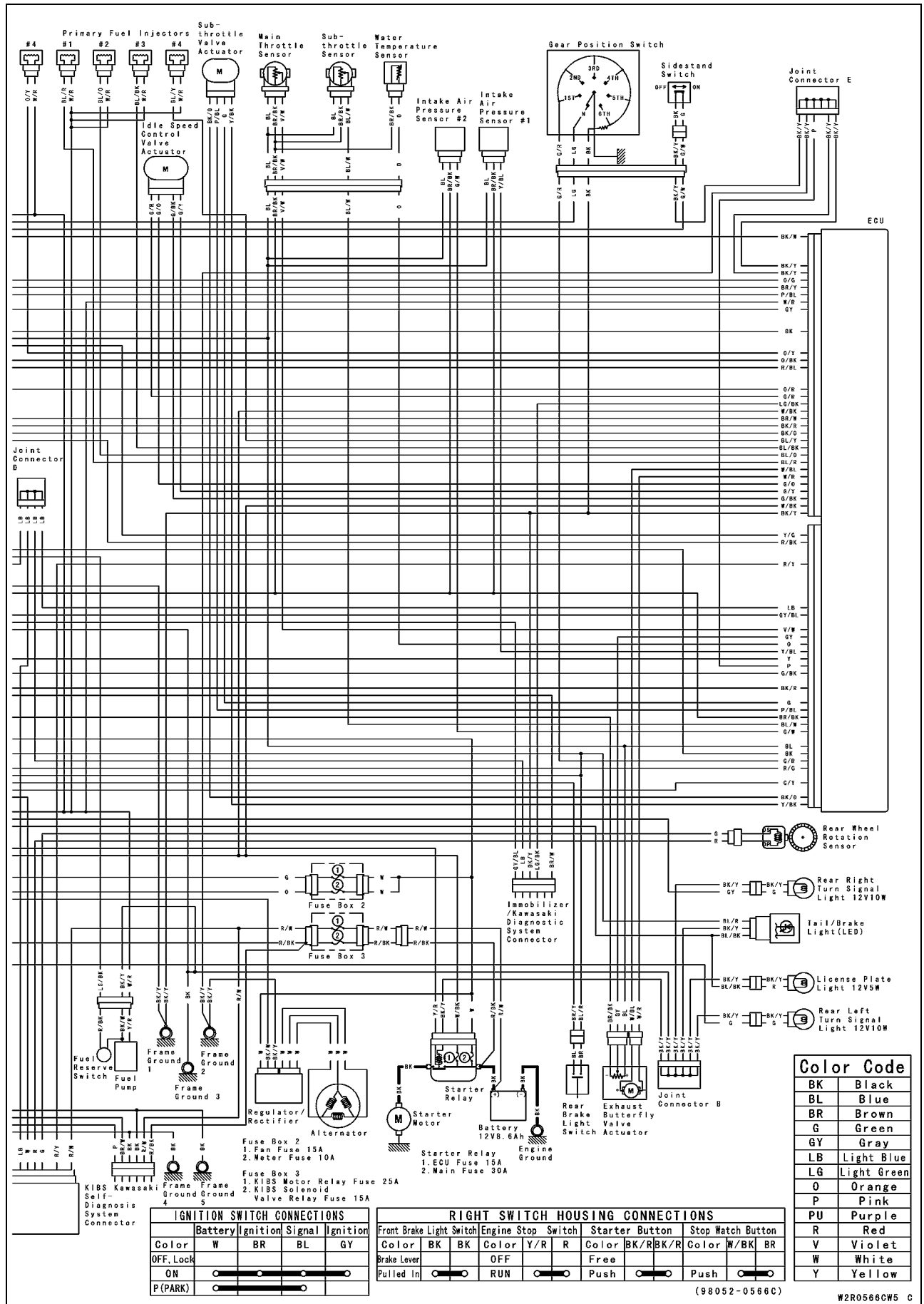


16-18 ELECTRICAL SYSTEM

Wiring Diagram (US, CA and CAL with KIBS Models)

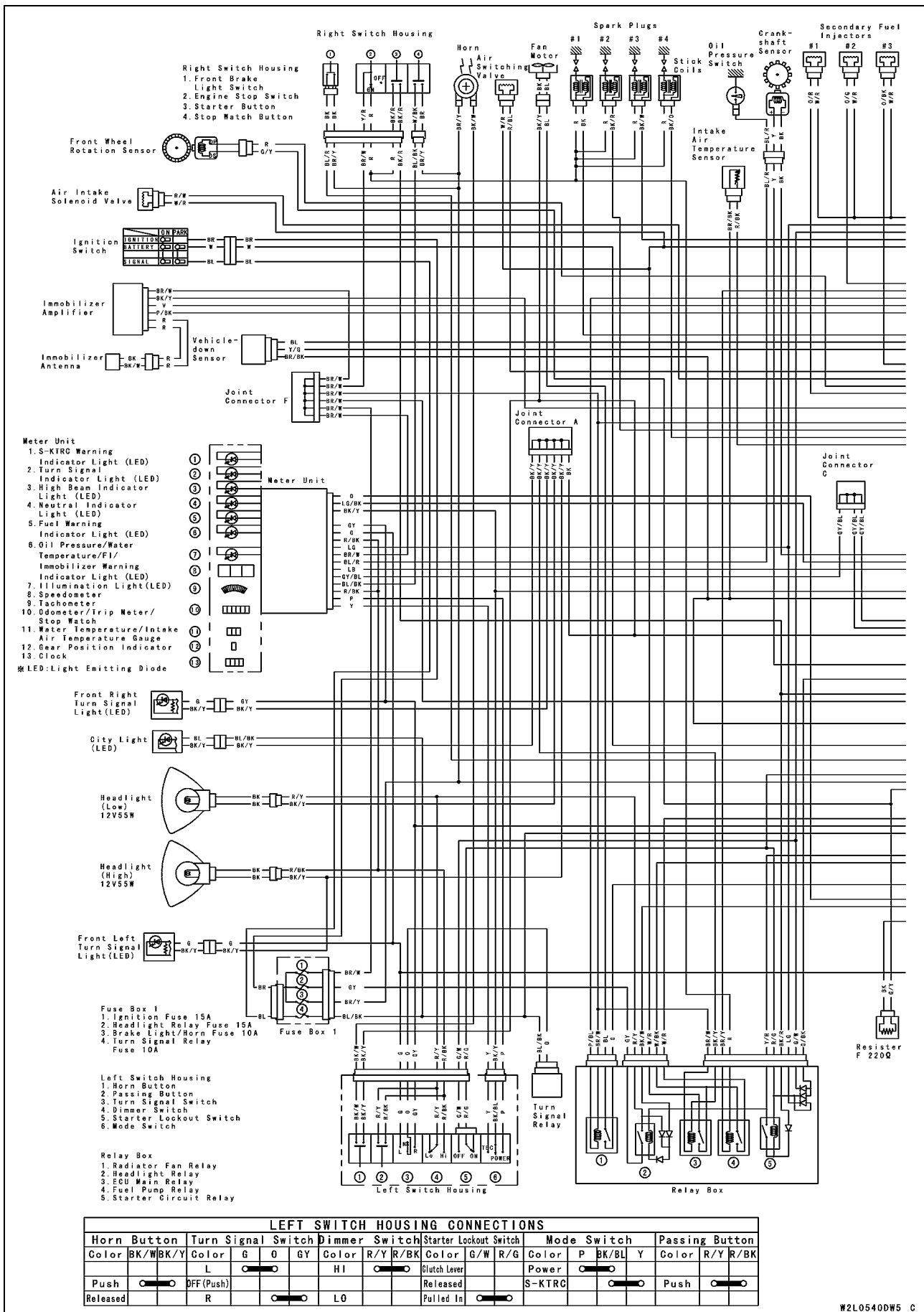


Wiring Diagram (US, CA and CAL with KIBS Models)



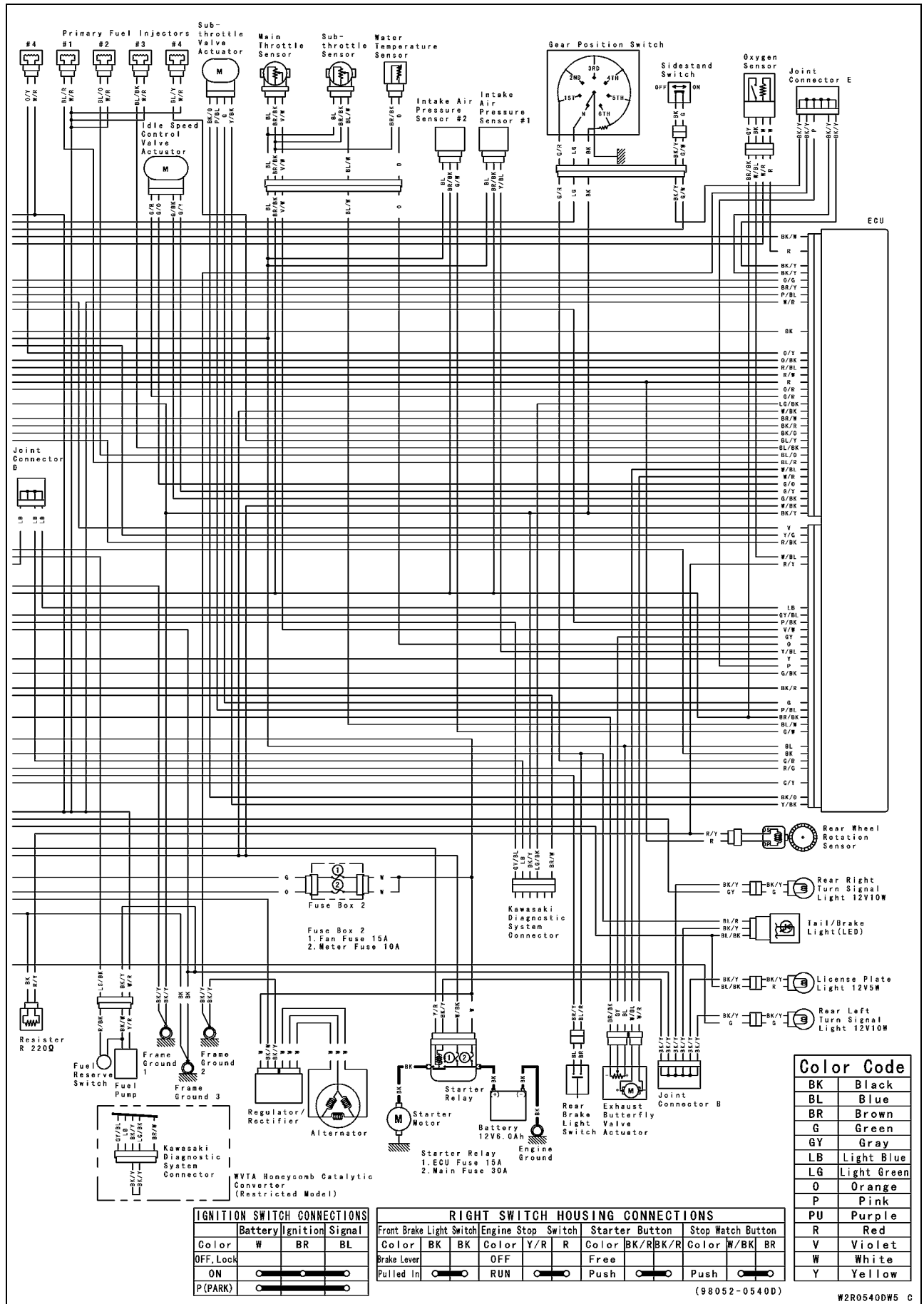
16-20 ELECTRICAL SYSTEM

Wiring Diagram (Other than US, CA and CAL without KIBS Models)



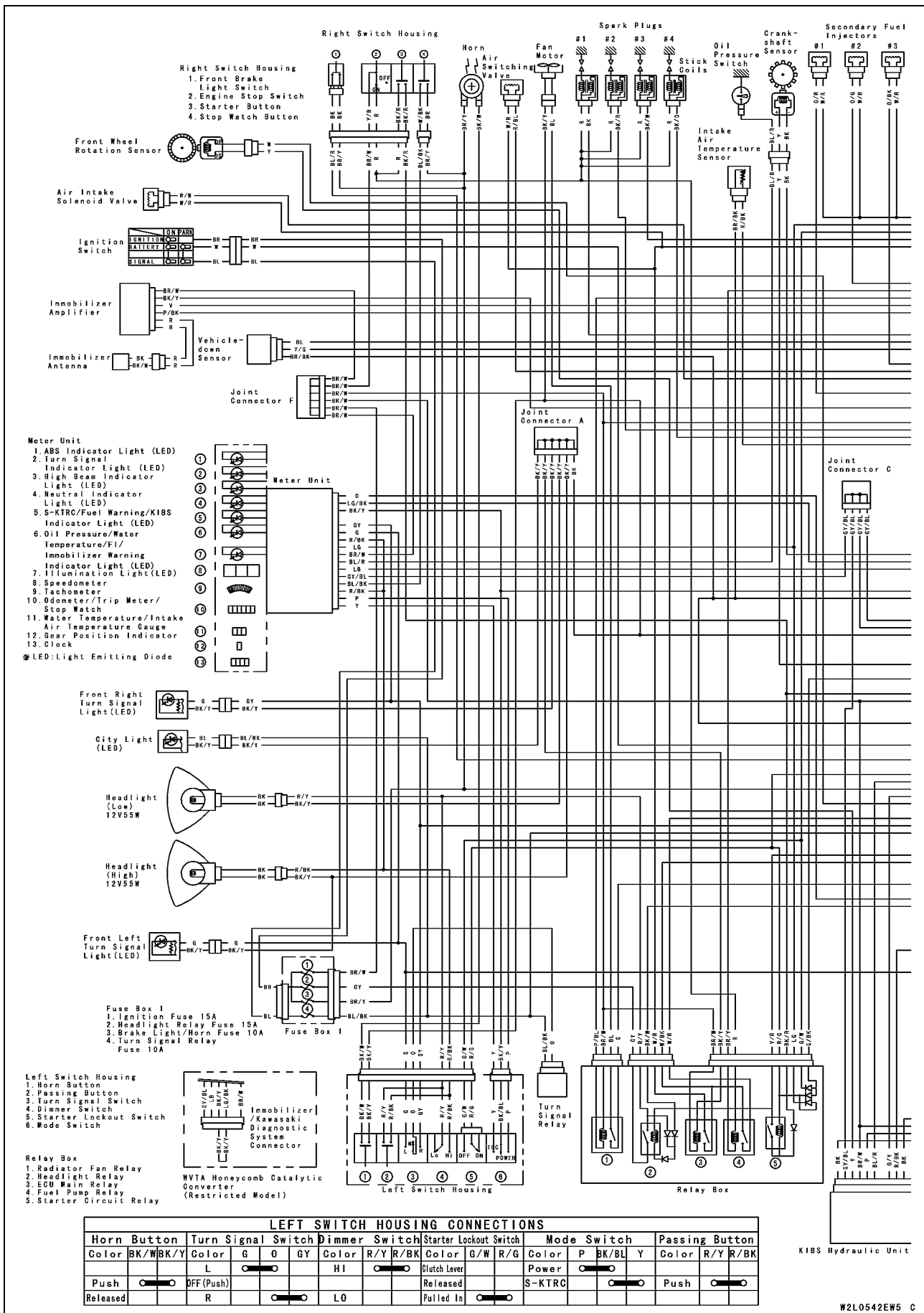
ELECTRICAL SYSTEM 16-21

Wiring Diagram (Other than US, CA and CAL without KIBS Models)



16-22 ELECTRICAL SYSTEM

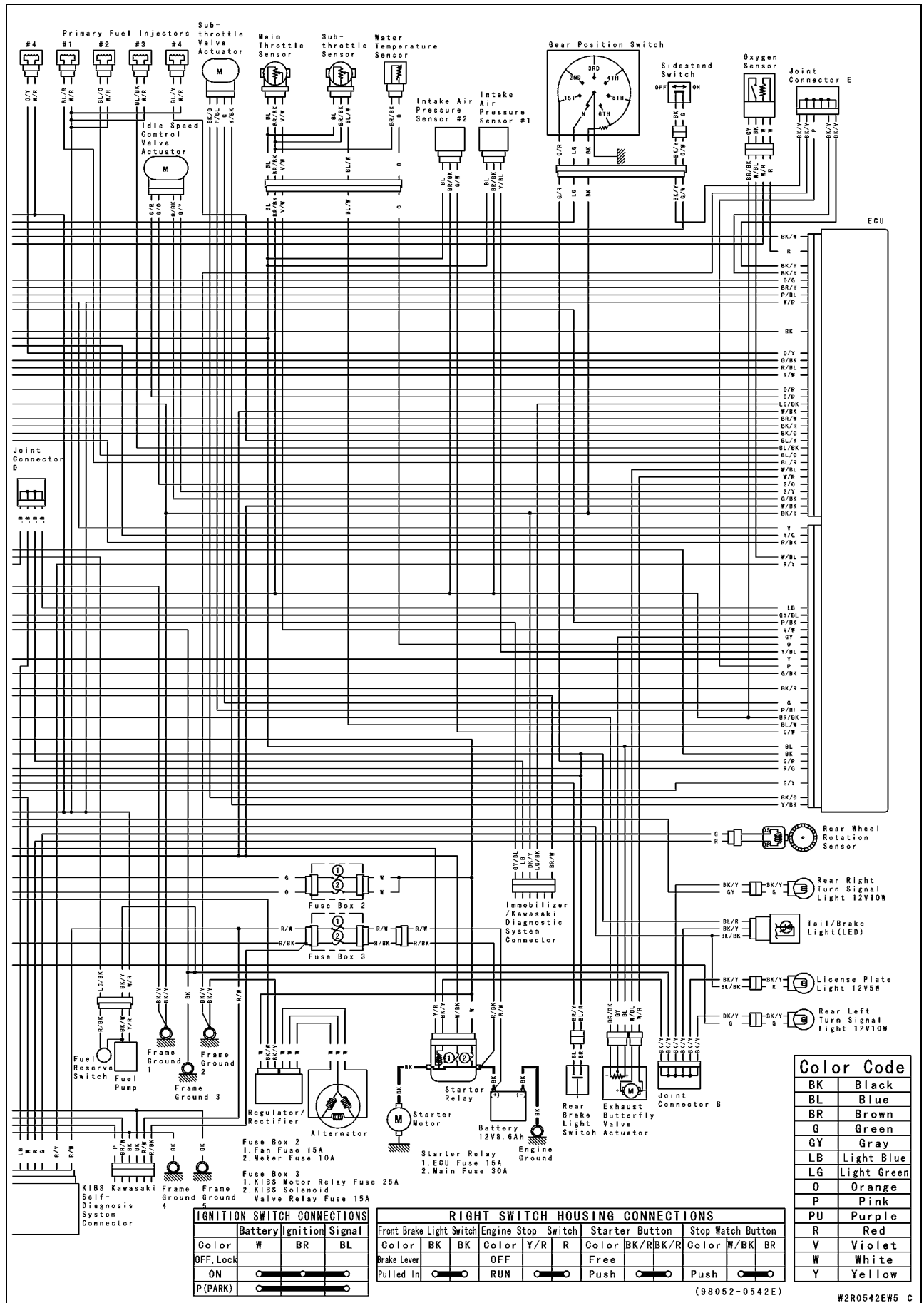
Wiring Diagram (Other than US, CA and CAL with KIBS Models)



LEFT SWITCH HOUSING CONNECTIONS									
Horn Button	Turn Signal	Switch Dimmer	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
Push	L			HI	Glutch Lever	Power			Push
Released	R			LO	Released	S-KTRC			

ELECTRICAL SYSTEM 16-23

Wiring Diagram (Other than US, CA and CAL with KIBS Models)



16-24 ELECTRICAL SYSTEM

Precautions

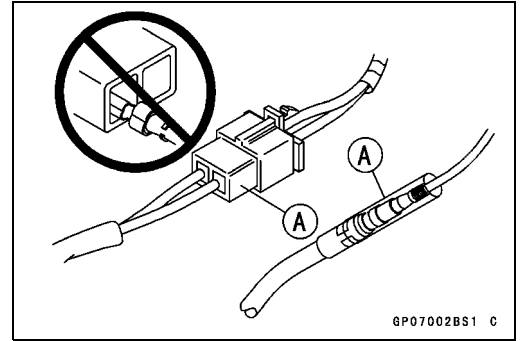
There are a number of important precautions that are musts when servicing electrical systems. Learn and observe all the rules below.

- 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

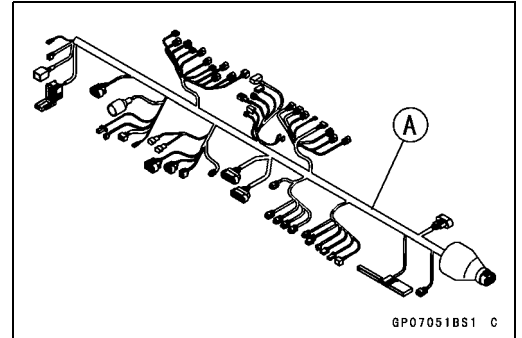
- Visually inspect the wiring for signs of burning, fraying, etc.
- ★ If any wiring is poor, replace the damaged wiring.
- Pull each connector [A] apart and inspect it for corrosion, dirt, and damage.
- ★ If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.



- Check the wiring for continuity.
- Use the wiring diagram to find the ends of the lead which is suspected of being a problem.
- Connect the hand tester between the ends of the leads.

Special Tool - Hand Tester: 57001-1394

- Set the tester to the $\times 1 \Omega$ range, and read the tester.
- ★ If the tester does not read 0Ω , the lead is defective. Replace the lead or the wiring harness [A] if necessary.



16-26 ELECTRICAL SYSTEM

Battery

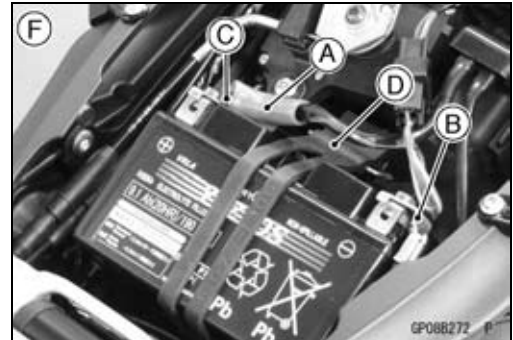
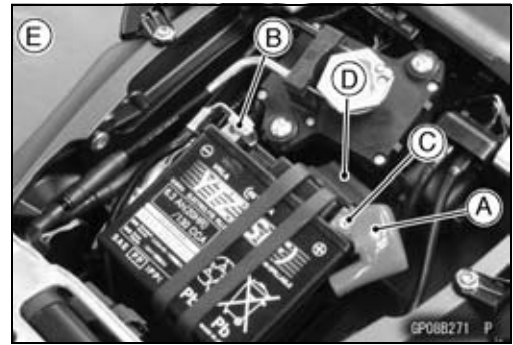
Battery Removal

- 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] and the battery.
ZX1000J Model [E]
ZX1000K Model [F]

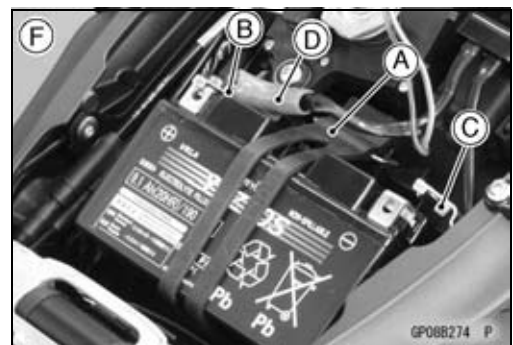
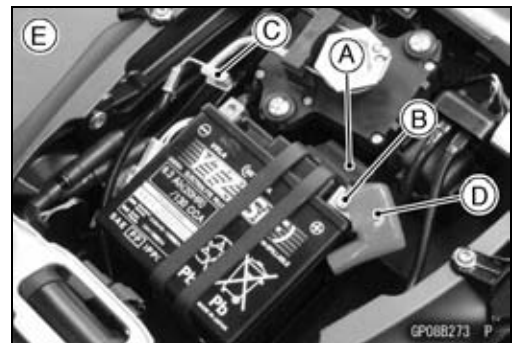


Battery Installation

- 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].
ZX1000J Model [E]
ZX1000K Model [F]

NOTICE

If each battery cable is not correctly disconnected or connected, sparks can arise at electrical connections, causing damage to electrical and DFI parts.



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.
Give refresh charge for 5 to 10 hours with charge current shown in the text (see Refreshing Charge).
When a fast charge is inevitably required, do it following precisely the maximum charge current and time conditions.

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).

⚠ 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 medial 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 seat (see Seat Removal in the Frame chapter).
- Disconnect the battery terminals.

NOTICE

Be sure to disconnect the negative (–) cable first.

- 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, refresh charge is not required, however, if the read is below the 12.8 V, refresh charge is required.

Battery Terminal Voltage

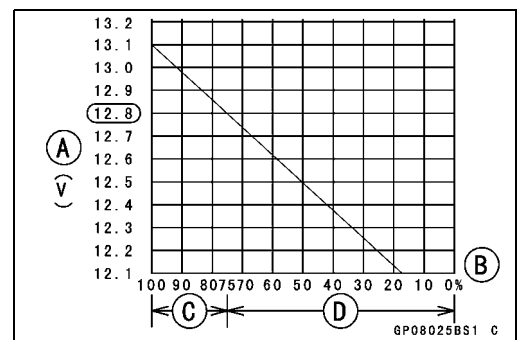
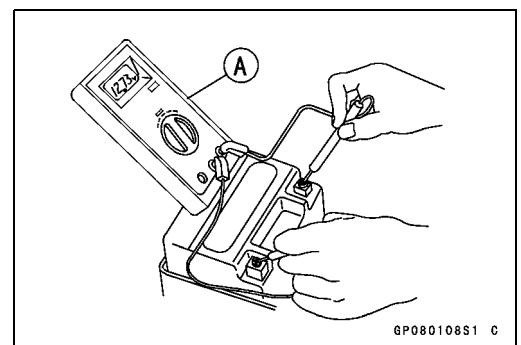
Standard: 12.8 V or more

Terminal Voltage (V) [A]

Battery Charge Rate (%) [B]

Good [C]

Refresh charge is required [D]



16-28 ELECTRICAL SYSTEM

Battery

Refreshing Charge

- Remove the battery (see Battery Removal).
- Do refresh charge by following method according to the battery terminal voltage.

⚠ WARNING

This battery is sealed type. Charge with current and time as stated below.

Terminal Voltage: 12.0 ~ 12.7 V

Standard Charge (see following chart):

ZX1000J: 0.6 A × 5 ~ 10 h

ZX1000K: 0.9 A × 5 ~ 10 h

Quick Charge

ZX1000J: 3 A × 5 ~ 1 h

ZX1000K: 4.5 A × 1 h

NOTICE

If possible, do not quick charge. If quick charge is done unavoidably, do standard charge later on.

Terminal Voltage: 12 V or lower

Charging Method: 0.6 A × 20 h

Kawasaki-recommended chargers:

Battery Mate 150-9

OptiMate PRO 4-S/PRO S/PRO 2

Yuasa MB-2040/2060

Christie C10122S

- If the recommend chargers are not available, use equivalent one.

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]

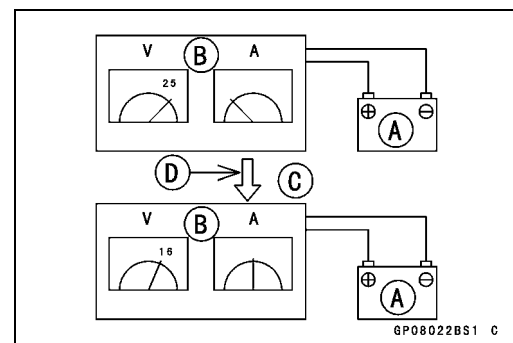
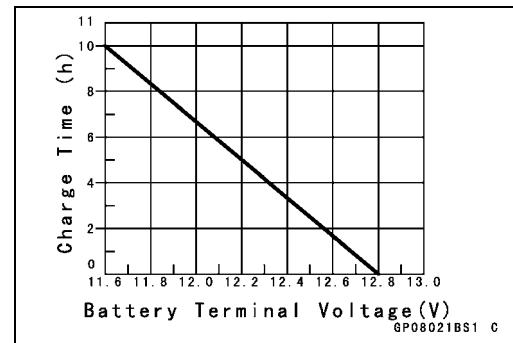
Battery Charger [B]

Standard Value [C]

Current starts to flow [D].

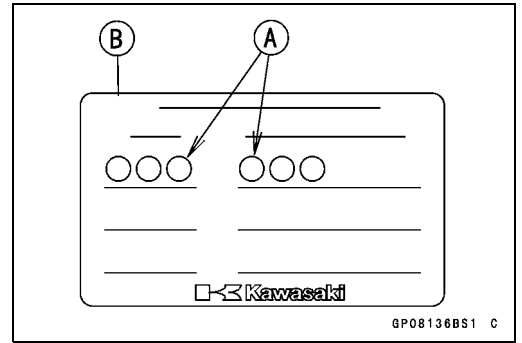
- Determine the battery condition.
- Determine the battery condition left for 30 minutes after completion of the charge by measuring the terminal voltage according to the table below.

Criteria	Judgement
12.8 V or higher	Good
12.1 ~ 12.7 V	Charge insufficient → Recharge
12.0 V or lower	Unserviceable → Replace



Battery

- After recharging, record [A] the charging date and the name of person in charge of this job to the battery recharging record label [B] if necessary.

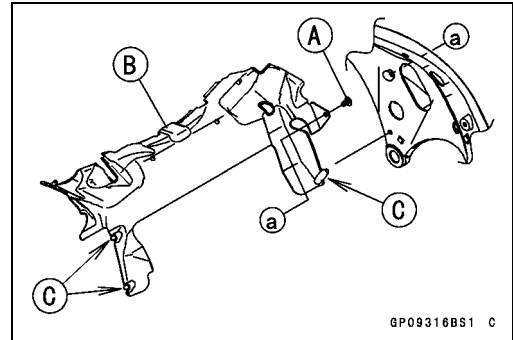


16-30 ELECTRICAL SYSTEM

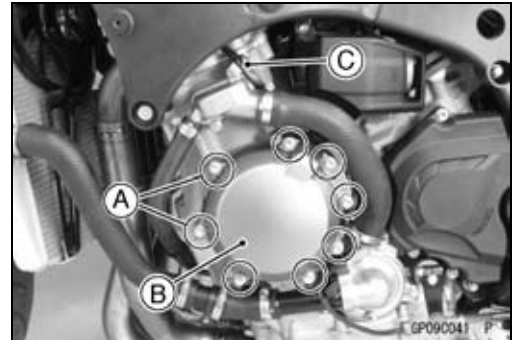
Charging System

Alternator Cover Removal

- Remove:
 - Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
 - Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter)
 - Bolt [A]
- Bring the heat insulator plate [B] forward.
- Clear the projections [C] from the main frame.



- Remove:
 - Bolts [A]
 - Alternator Cover [B]
- Open the clamp [C].



Alternator Cover Installation

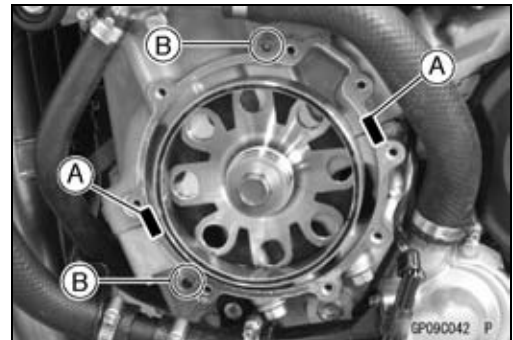
- Apply silicone sealant to the alternator lead grommet and crankcase halves mating surface [A] on the front and rear sides of the cover mount.

Sealant - Liquid Gasket, TB1211F: 92104-0004

- Using a high-flash point solvent, clean off any oil or dirt that may be on the silicon sealant coating area. Dry them with a clean cloth.
- Check that dowel pins [B] are in place on the crankcase.
- Replace the alternator cover gasket with a new one.
- Tighten:

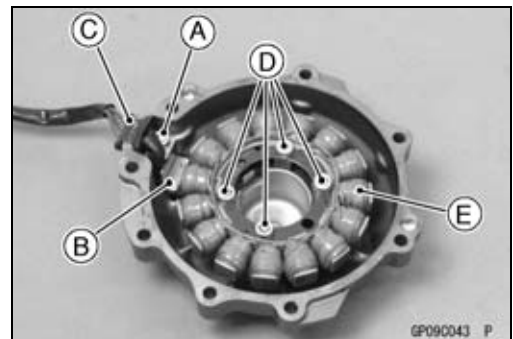
Torque - Alternator Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- 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)
 - 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)

- Apply silicone sealant to the circumference of the alternator lead grommet [A], and fit the grommet into the notch of the cover securely.

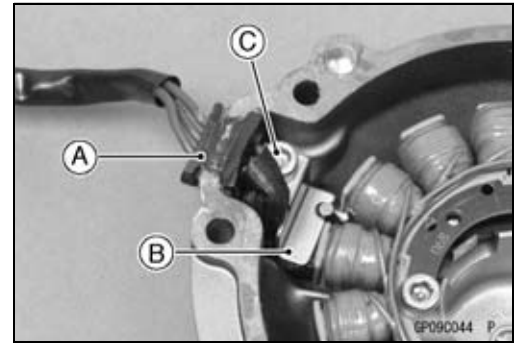
Sealant - Liquid Gasket, TB1211F: 92104-0004

- Using a high-flash point solvent, clean off any oil or dirt that may be on the silicon sealant coating area. Dry them with a clean cloth.

- 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 suitable washer or plate [B].

Special Tools - Grip [C]: 57001-1591

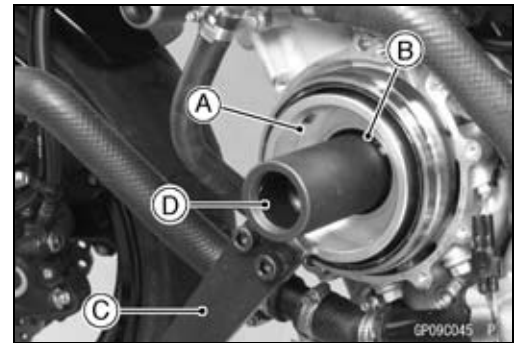
Rotor Holder: 57001-1666

Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5 [D]: 57001-1405

Rotor Holder Attachment: 57001-1689

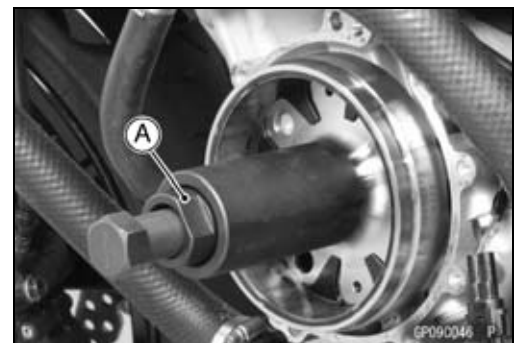
- Remove the rotor bolt and washer.
- Using the flywheel puller [A], remove the alternator rotor from the crankshaft.

Special Tool - Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5: 57001-1405



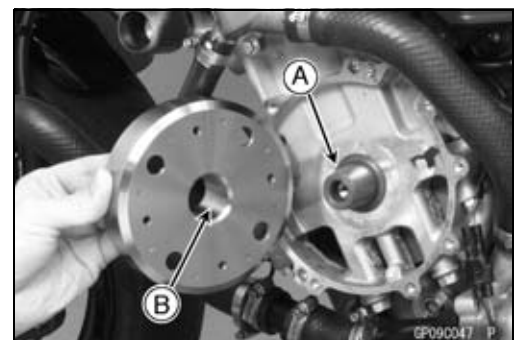
NOTICE

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.



16-32 ELECTRICAL SYSTEM

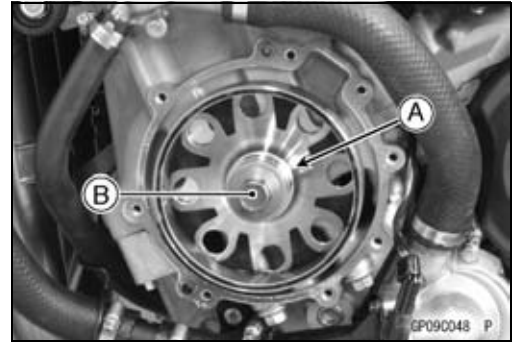
Charging System

- 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.

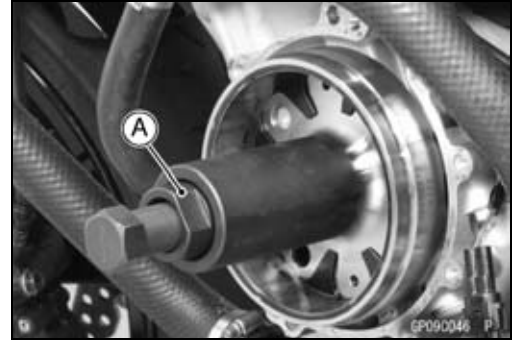
- Install the rotor bolt [B] and tighten it with 70 N·m (7.0 kgf·m, 52 ft·lb) of torque.



- 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 while holding the alternator rotor steadily with the holder [A] and suitable washer or plate [B].

Special Tools - Grip [C]: 57001-1591

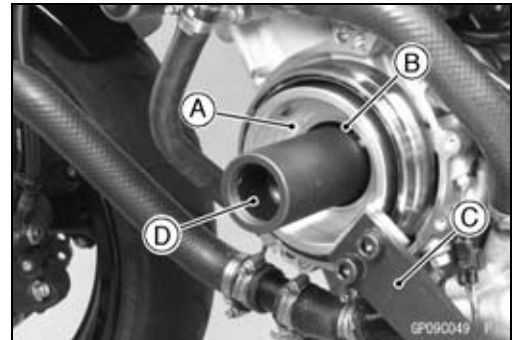
Rotor Holder: 57001-1666

Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5 [D]: 57001-1405

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).



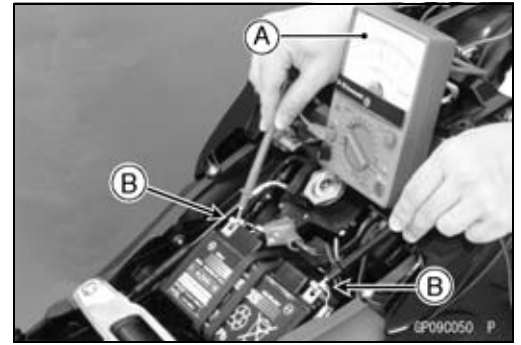
Charging System

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 the hand tester [A] to the battery terminals [B].

Special Tool - Hand Tester: 57001-1394

- Start the engine, and note the voltage readings at various engine speeds with the headlight turned on and then turned off (To turn off the headlight, disconnect the headlight connector.). The readings should show nearly battery voltage when the engine speed is low, and, as the engine speed rises, the readings should also rise. But they must be kept under the specified voltage.



Charging Voltage

Tester Range	Connections		Reading
	Tester (+) to	Tester (-) to	
DC 25 V	Battery (+)	Battery (-)	14.2 ~ 15.2 V

- Turn off the ignition switch to stop the engine, and disconnect the hand tester.
- ★ If the charging voltage is kept between the values given in the table, the charging system is considered to be working normally.
- ★ If the charging voltage is much higher than the values specified in the table, the regulator/rectifier is defective or the regulator/rectifier leads are loose or open.
- ★ If the charging voltage does not rise as the engine speed increases, then the regulator/rectifier is defective or the alternator output is insufficient for the loads. Check the alternator and regulator/rectifier to determine which part is defective.

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.

16-34 ELECTRICAL SYSTEM

Charging System

- To check the alternator output voltage, do the following procedures.
- Turn the ignition switch to OFF.
- Remove the left upper inner fairing (see Upper Inner Fairing Removal in the Frame chapter).
- Disconnect the alternator lead connector [A].
- Connect the hand tester as shown in the table 1.

Special Tool - Hand Tester: 57001-1394

- Start the engine.
- Run it at the rpm given in the table 1.
- Note the voltage readings (total 3 measurements).

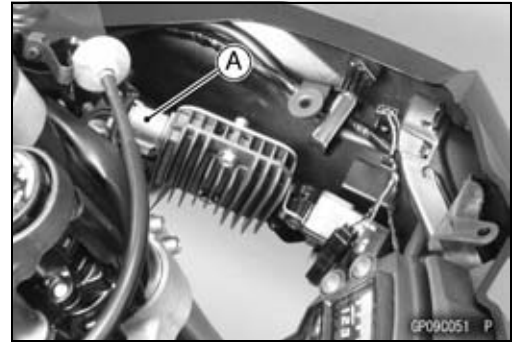


Table 1 Alternator Output Voltage at 4 000 r/min (rpm)

Tester Range	Connections		Reading
	Tester (+) to	Tester (-) to	
AC 250 V	One W lead	Another W lead	49.6 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 hand tester as shown in the table 2.

Special Tool - Hand Tester: 57001-1394

- Note the readings (total 3 measurements).

Table 2 Stator Coil Resistance at 20°C (68°F)

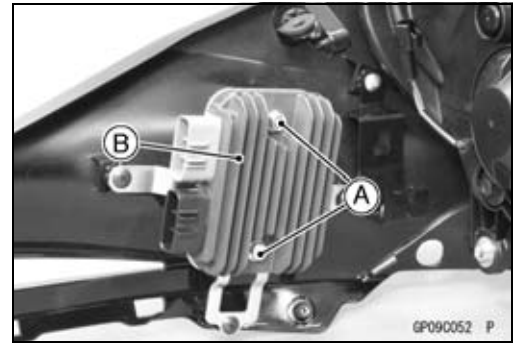
Tester Range	Connections		Reading
	Tester (+) to	Tester (-) to	
× 1 Ω	One W lead	Another W lead	0.11 ~ 0.17 Ω

- ★ If there is more resistance than shown in the table, or no hand tester reading (infinity) for any two leads, the stator has an open lead and must be replaced. Much less than this resistance means the stator is shorted, and must be replaced.
- Using the highest resistance range of the hand tester, measure the resistance between each of the white leads and chassis ground.
- ★ Any hand 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

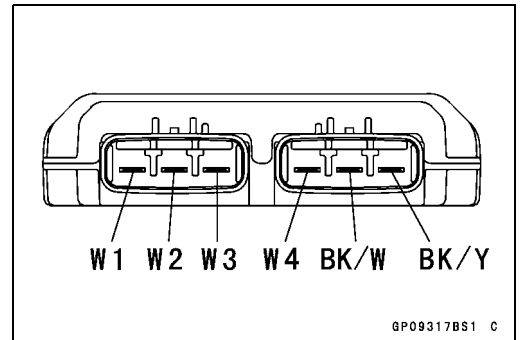
- Remove:
 - Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
 - Right Inner Fairing (see Inner Fairing Removal in the Frame chapter)
 - Bolts [A]
 - Regulator/Rectifier [B]



- Set the hand tester to the $\times 1 \text{ k}\Omega$ 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: $\text{k}\Omega$)

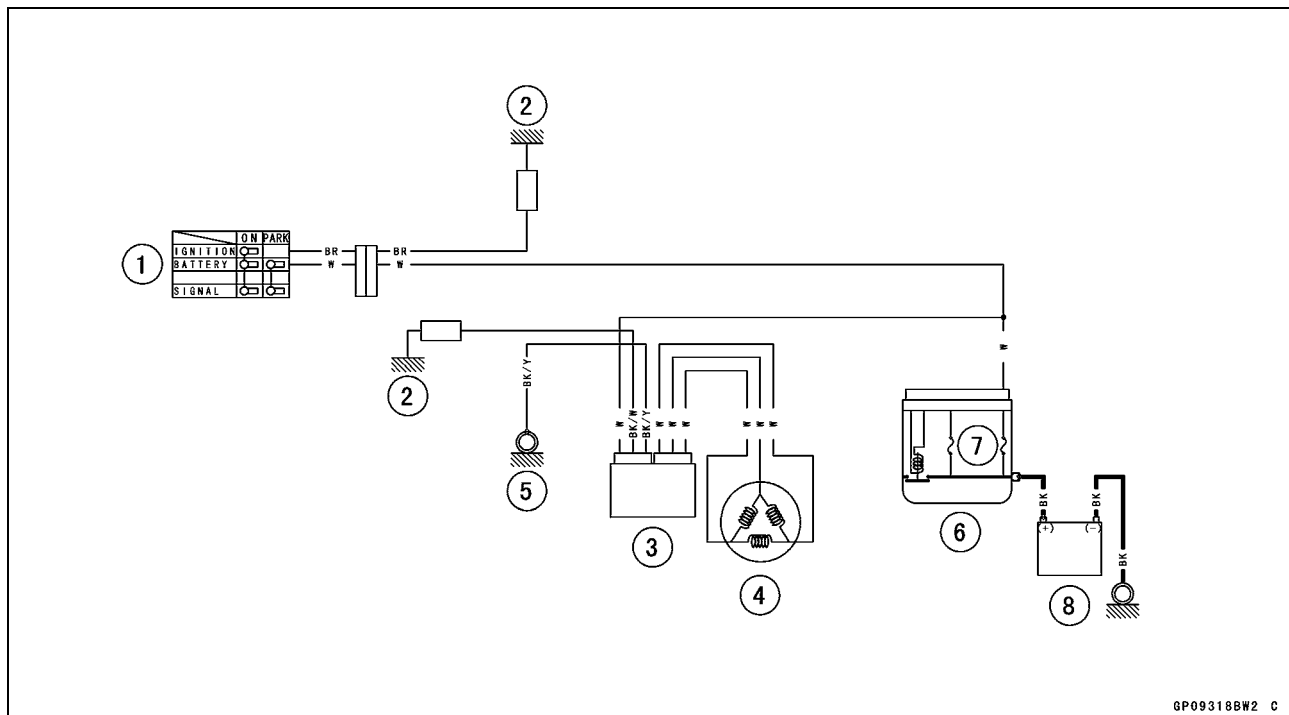
		Tester (+) Lead Connection					
		W1	W2	W3	W4	BK/W	BK/Y
(-)*	W1	-	∞	∞	3 ~ 11	∞	∞
	W2	∞	-	∞	3 ~ 11	∞	∞
	W3	∞	∞	-	3 ~ 11	∞	∞
	W4	∞	∞	∞	-	∞	∞
	BK/W	∞	∞	∞	3 ~ 11	-	∞
	BK/Y	3 ~ 11	3 ~ 11	3 ~ 11	6 ~ 18	3 ~ 11	-

(-)*: Tester (-) Lead Connection

16-36 ELECTRICAL SYSTEM

Charging System

Charging System Circuit



GP09318BW2 C

1. Ignition Switch
2. Load
3. Regulator/Rectifier
4. Alternator
5. Frame Ground
6. Starter Relay
7. Main Fuse 30 A
8. Battery

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.

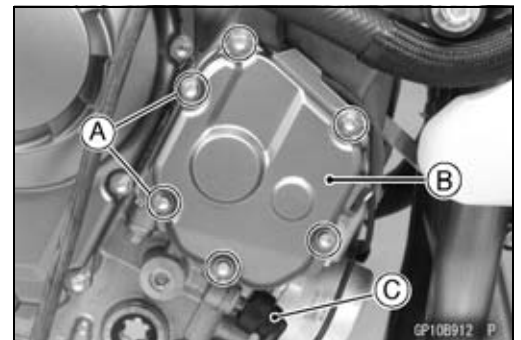
Do not install the battery backwards. The negative side is grounded. This is to prevent damage to the ECU.

Crankshaft Sensor Removal

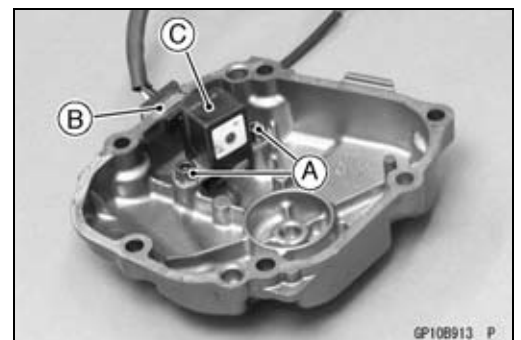
- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
 - Crankshaft Sensor Lead Connector [A]



- Remove:
 - Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
 - Bolts [A]
 - Crankshaft Sensor Cover [B] and Gasket
 - Oil Pressure Switch Terminal [C]



- Remove:
 - Bolts [A]
 - Crankshaft Sensor Lead Grommet [B]
 - Crankshaft Sensor [C]



16-38 ELECTRICAL SYSTEM

Ignition System

Crankshaft Sensor Installation

- Apply a non-permanent locking agent to the crankshaft sensor bolts [A].
- Tighten:

Torque - Crankshaft Sensor Bolts: 5.9 N·m (0.60 kgf·m, 52 in·lb)

- Apply silicone sealant 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

- Using a high-flash point solvent, clean off any oil or dirt that may be on the silicon sealant coating area. Dry them with a clean cloth.

- 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).
- Set the hand tester [A] to the $\times 10 \Omega$ range and connect it to the crankshaft sensor lead connector [B].

Special Tool - Hand Tester: 57001-1394

Crankshaft Sensor Resistance

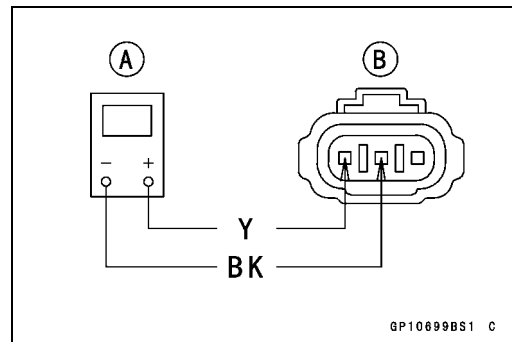
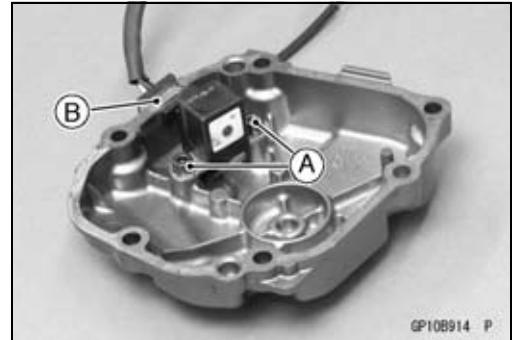
Connections:

Meter (+) → Y lead

Meter (-) → BK lead

Standard: 376 ~ 564 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.



Ignition System

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).
- Set the hand tester [B] to the DC 10 V range, and connect it peak voltage adapter.

Special Tools - Hand Tester: 57001-1394

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		Hand Tester
Y lead	←	R lead	→	(+)
BK lead	←	BK lead	→	(-)

- Turn the engine stop switch to run position.
- Turn the ignition switch to ON.
- Pushing the starter button, turn the engine 4 ~ 5 seconds with the transmission in neutral to measure the peak voltage.
- Repeat the measurements 5 times or more times.

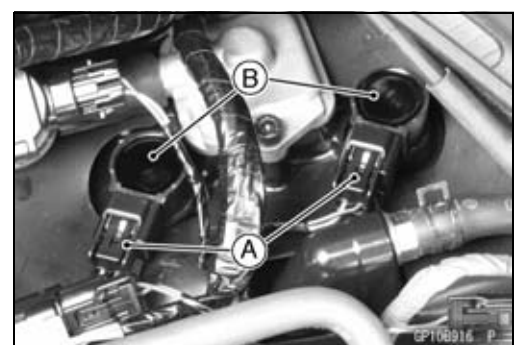
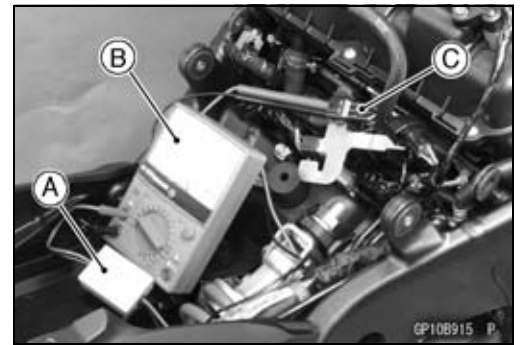
Crankshaft Sensor Peak Voltage

Standard: 1.9 V or more

- ★ If the reading is less than the standard, inspect the crankshaft sensor (see Crankshaft Sensor Inspection).

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.

16-40 ELECTRICAL SYSTEM

Ignition System

Stick Coil Installation

- Apply a thin coat of grease [A] to the stick coils for easy installation.
- Insert the stick coils so that the coil heads align with the lines [B] 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

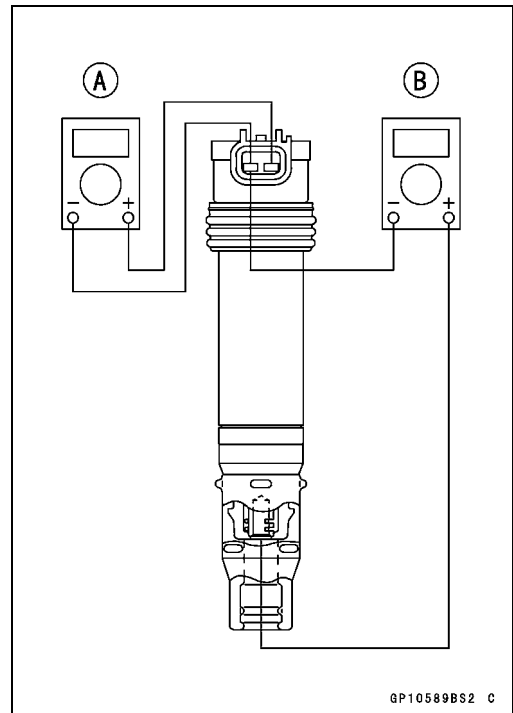
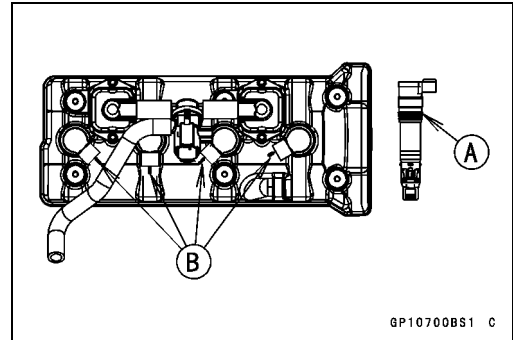
- Remove the stick coils (see Stick Coil Removal).
- Measure the primary winding resistance [A] as follows.
 - Connect the hand tester between the coil terminals.
 - Set the tester to the $\times 1 \Omega$ range, and read the tester.
- Measure the secondary winding resistance [B] as follows.
 - Connect the tester between the plug terminal and (-) coil terminal.
 - Set the tester to the $\times 1 \text{ k}\Omega$ range and read the tester.

Stick Coil Winding Resistance

Primary Windings: **0.85 ~ 1.15 Ω**

Secondary Windings: **5.0 ~ 6.8 $\text{k}\Omega$**

★ If the tester does not read as specified, replace the coil.



Ignition System

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.
- Connect the ECU to the harness.
- 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 the hand tester [D] which is set to the DC 250 V range.
- 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 - Hand Tester: 57001-1394

Peak Voltage Adapter: 57001-1415

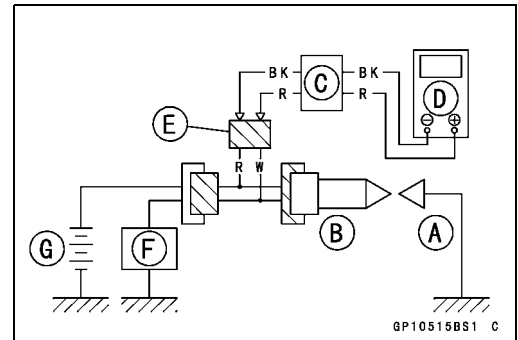
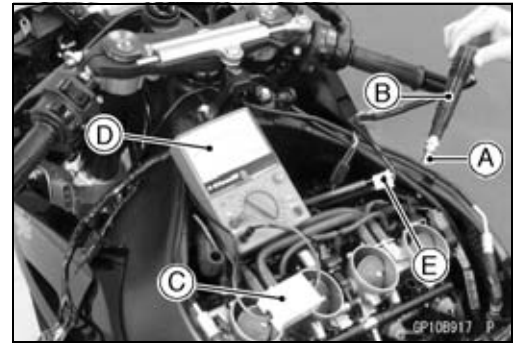
Type: KEK-54-9-B

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 to 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: 100 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.

16-42 ELECTRICAL SYSTEM

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: 0.8 ~ 0.9 mm (0.031 ~ 0.035 in.)

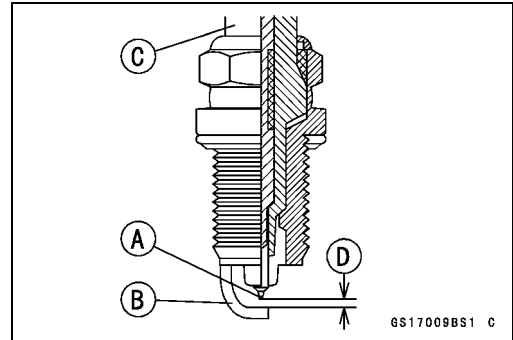
- Use the standard spark plug or its equivalent.

Standard Spark Plug

Type: NGK CR9EIA-9

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 to ON and push the starter button.
- Then the starter motor should not turn when the starter system circuit is normality.
- ★ If the engine is start, 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 to ON and push the starter button.
- Then the starter motor should turn when the starter system circuit is normality.
- ★ If the starter motor is 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

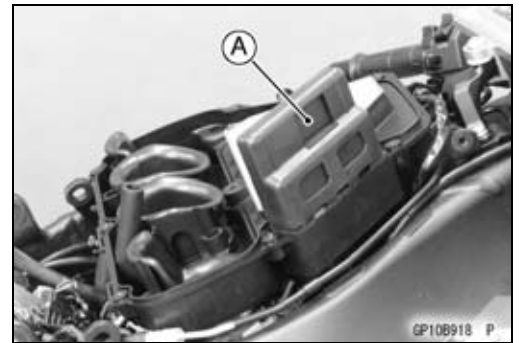
Sidestand → Up

- 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].

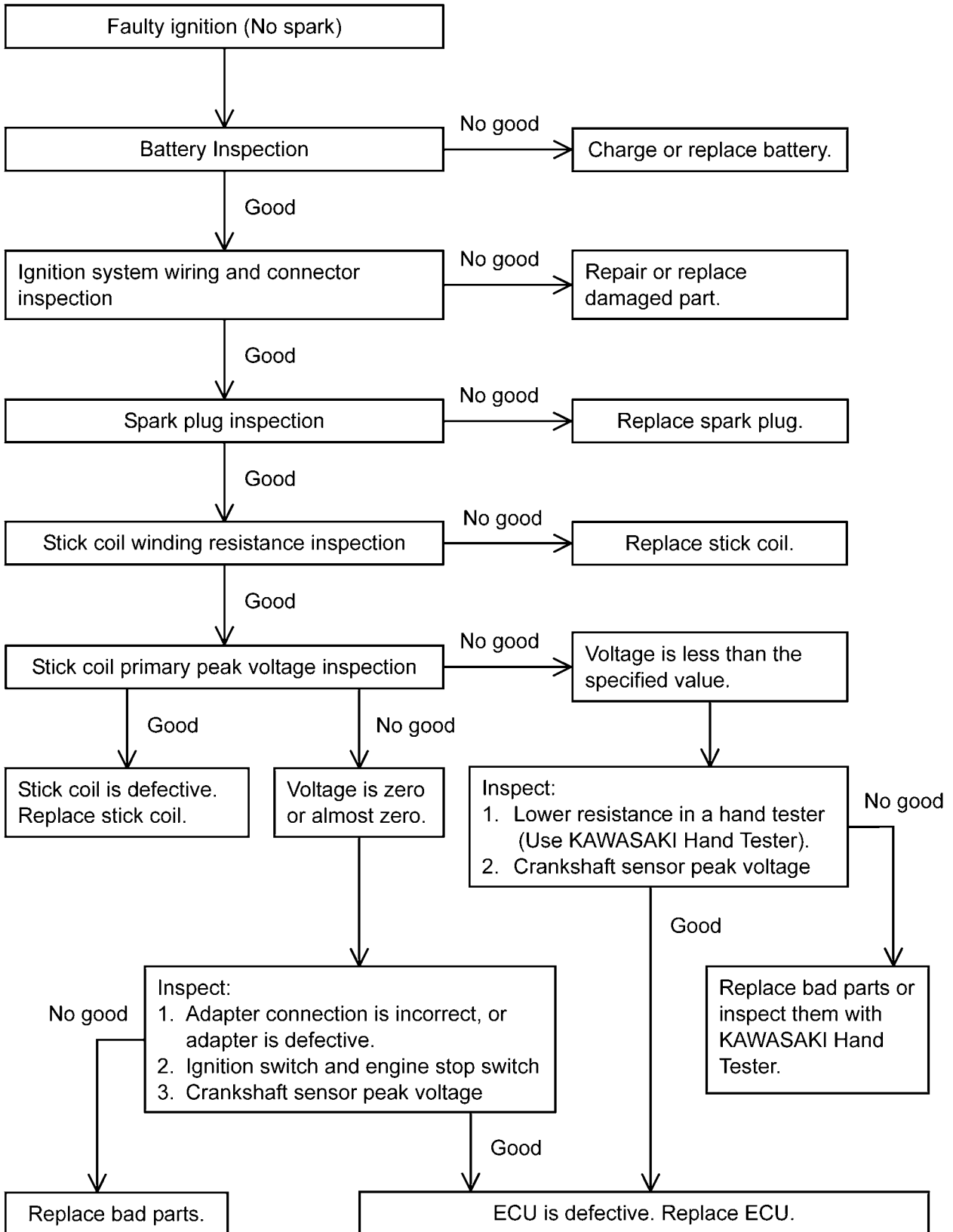
- Refer to the following items.
 - Interlock Operation Inspection (see Interlock Operation Inspection)
 - Ignition System Troubleshooting (see Ignition System section)
 - ECU Power Supply Inspection (see ECU Power Supply Inspection in the Fuel System (DFI) chapter)



16-44 ELECTRICAL SYSTEM

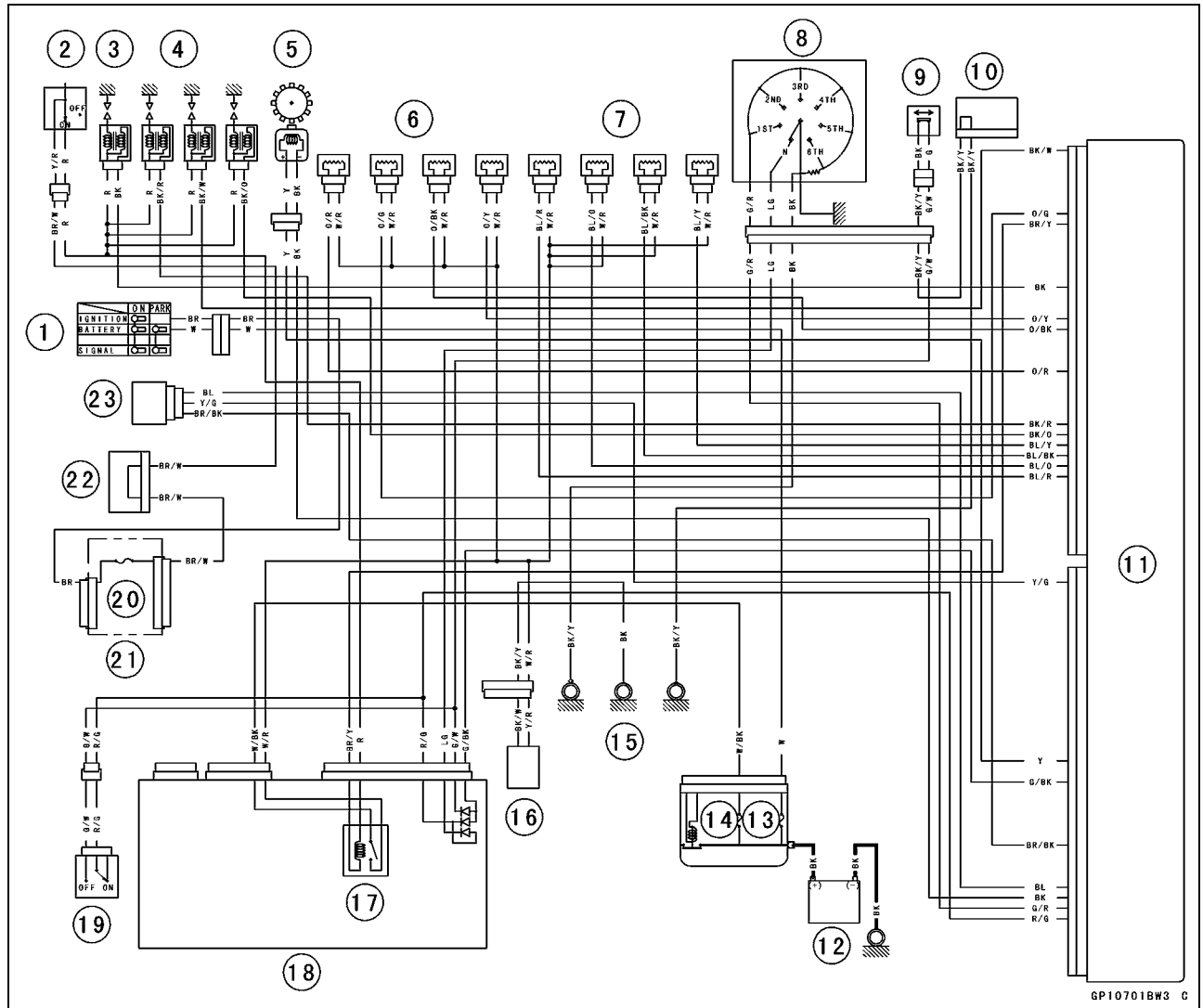
Ignition System

Ignition System Troubleshooting



Ignition System

Ignition System Circuit



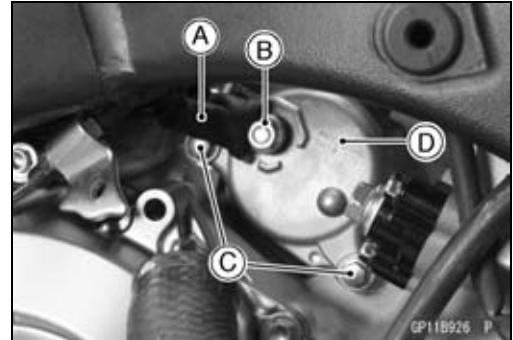
1. Ignition Switch
2. Engine Stop Switch
3. Stick Coils
4. Spark Plugs
5. Crankshaft Sensor
6. Primary Fuel Injectors
7. Secondary Fuel Injectors
8. Gear Position Switch
9. Sidestand Switch
10. Joint Connector E
11. ECU
12. Battery
13. Main Fuse 30 A
14. ECU Fuse 15 A
15. Frame Grounds
16. Fuel Pump
17. Fuel Pump Relay
18. Relay Box
19. Starter Lockout Switch
20. Ignition Fuse 15 A
21. Fuse Box 1
22. Joint Connector F
23. Vehicle-down Sensor

16-46 ELECTRICAL SYSTEM

Electric Starter System

Starter Motor Removal

- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove:
 - Thermostat (see Thermostat Removal in the Cooling System chapter)
- Slide out the rubber cap [A].
- Remove:
 - Starter Motor Cable Terminal Nut [B]
 - Starter Motor Mounting Bolts [C]
 - Starter Motor [D]

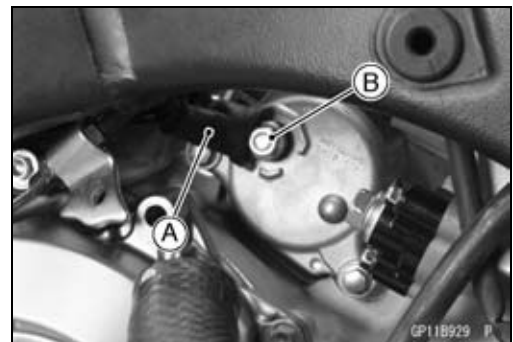


Starter Motor Installation

NOTICE

Do not tap the starter motor shaft or body. Tapping the shaft or body could damage the motor.

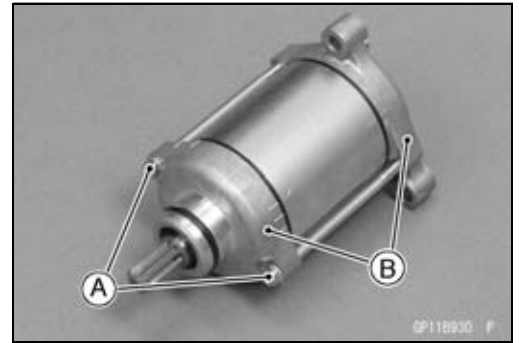
- Clean the starter motor legs [A] and crankcase where the starter motor is ground.
- Replace the O-ring [A] with a new one.
- Apply grease to the new O-ring.
- Tighten:
 - Torque - Starter Motor Mounting Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)**
- Install the starter motor cable [A] as shown in the figure.
- Tighten:
 - Torque - Starter Motor Cable Terminal Nut [B]: 5.9 N·m (0.60 kgf·m, 52 in·lb)**
- Slide back the rubber cap to the original position.



Electric Starter System

Starter Motor Disassembly

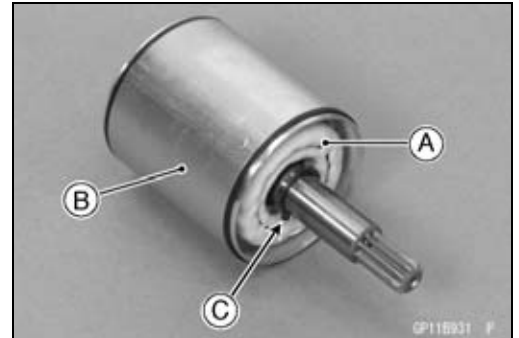
- Remove the starter motor (see Starter Motor Removal).
- Take off the starter motor through bolts [A] and remove the both end covers [B].



- Pull out the armature [A] out of the yoke [B].

NOTE

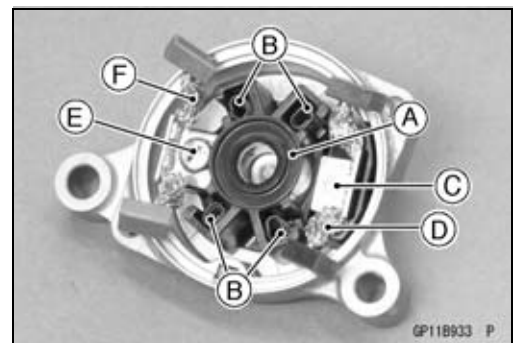
○Do not remove the circlip [C] from the shaft.



- Remove the starter motor terminal locknut [A].

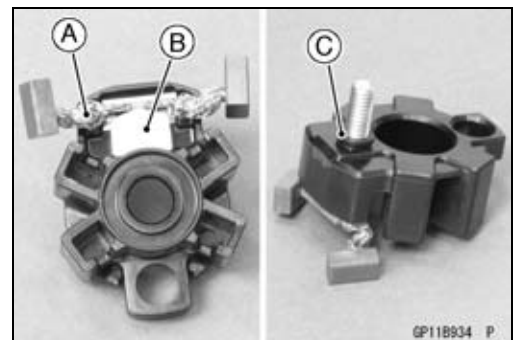


- Pull out the brushes from the brush holder [A].
- Remove:
 - Brush Springs [B]
 - Starter Motor Terminal [C] and O-ring
 - Positive Brush Assy [D]
 - Screw [E]
 - Negative Brush Assy [F]
 - Brush Holder



Starter Motor Assembly

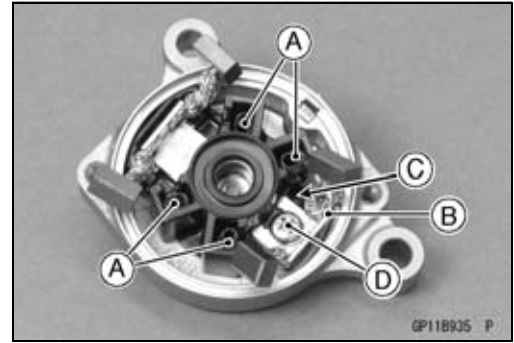
- Install the positive brush assy [A] and the starter motor terminal [B] as shown in the figure.
- Replace the O-ring [C] with a new one, and install it.



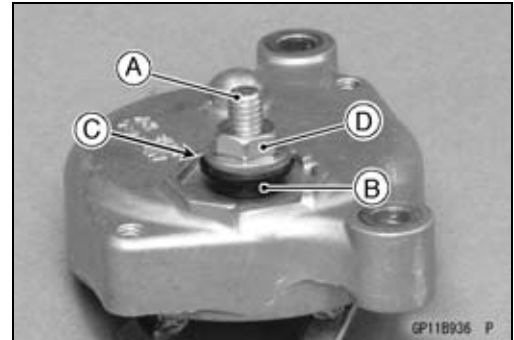
16-48 ELECTRICAL SYSTEM

Electric Starter System

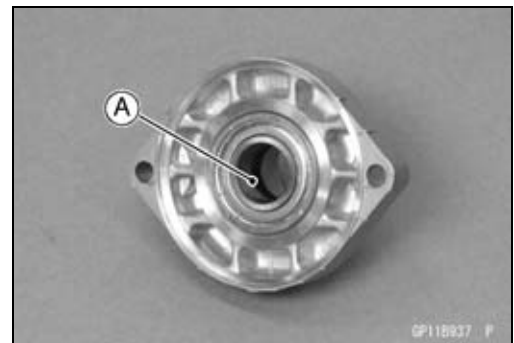
- Install:
 - Brush Springs [A]
 - Negative Brush Assy [B]
- Turn the stopper side [C] to inside.
- Tighten:
 - Torque - Brush Holder Screw: 3.8 N·m (0.39 kgf·m, 34 in·lb)**
- Install the brushes onto the brush springs.



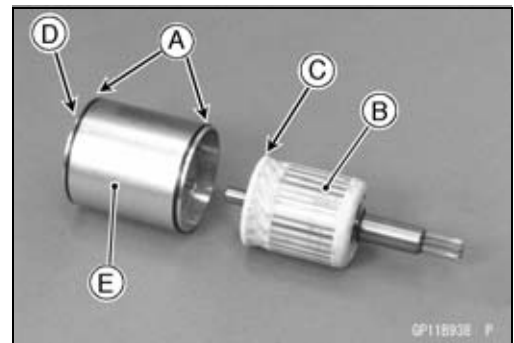
- Install the following parts to the starter motor terminal [A].
 - Collar [B]
 - Washer [C]
 - Starter Motor Terminal Locknut [D]
- Turn the flange of the collar to the locknut as shown in the figure.
- Tighten:
 - Torque - Starter Motor Terminal Locknut: 11 N·m (1.1 kgf·m, 97 in·lb)**



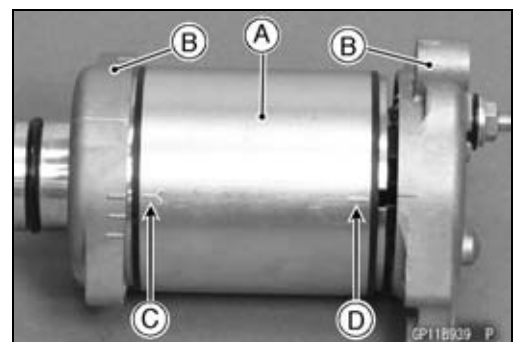
- Apply thin coat of grease to the oil seal [A].



- Replace the O-rings [A] with new ones.
- Insert the armature [B] so that commutator side [C] faces hollow side [D] of the yoke [E].



- Assemble the yoke [A] and the end covers [B] as shown in the figure.
 - “Y” Mark [C]
 - “I” Mark [D]



Electric Starter System

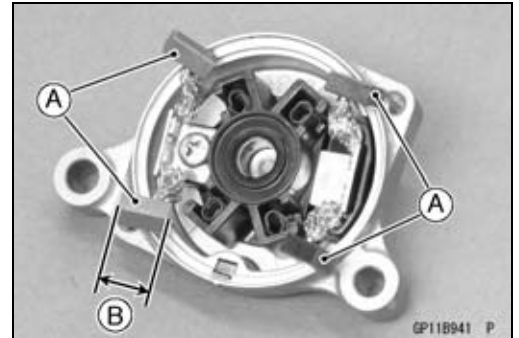
- Tighten:
Torque - Starter Motor Through Bolts [A]: 5.0 N·m (0.51 kgf·m, 44 in·lb)



Brush Inspection

- Measure the length of each brush [A].
- ★ If any is worn down to the service limit, replace the brush assy.

Starter Motor Brush Length [B]
Standard: 12.05 mm (0.4744 in.)
Service Limit: 6.55 mm (0.258 in.)



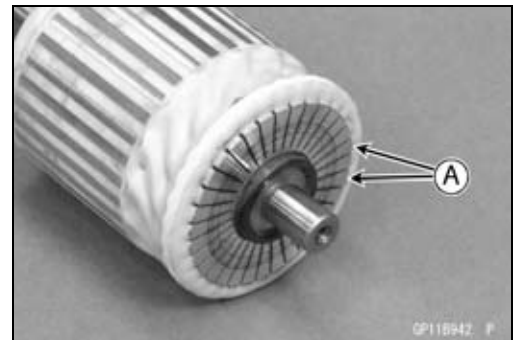
Commutator Cleaning and Inspection

- Clean the metallic debris off the between commutator segments [A].

NOTE

○ Do not use emery or sand paper on the commutator.

- Check the commutator for damage or abnormal wear.
- ★ Replace the starter motor with a new one if there is any damage or wear.
- Visually inspect the commutator segments for discoloration.
- ★ Replace the starter motor with a new one if discoloration is noticed.

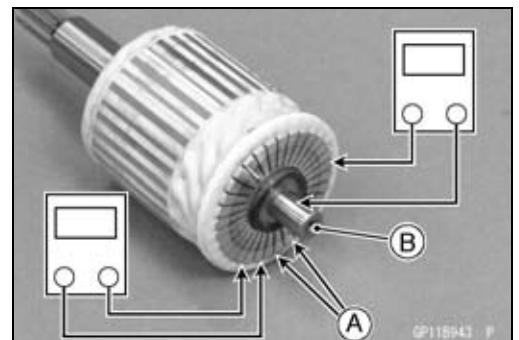


Armature Inspection

- Using the $\times 1 \Omega$ hand tester range, measure the resistance between any two commutator segments [A].

Special Tool - Hand Tester: 57001-1394

- ★ If there is a high resistance or no reading (∞) between any two segments, a winding is open and the starter motor must be replaced.
- Using the highest hand tester range, measure the resistance between the segments and the shaft [B].
- ★ If there is any reading at all, the armature has a short and the starter motor must be replaced.



NOTE

○ Even if the foregoing checks show the armature to be good, it may be defective in some manner not readily detectable with the hand tester. If all other starter motor and starter motor circuit components check good, but the starter motor still does not turn over or only turns over weakly, replace the starter motor with a new one.

16-50 ELECTRICAL SYSTEM

Electric Starter System

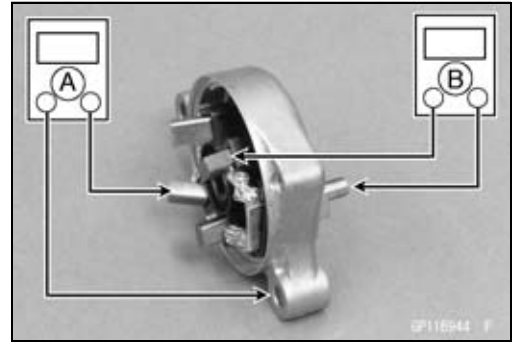
Brush Lead Inspection

- Using the $\times 1 \Omega$ hand tester range, measure the resistance as shown.

Right-hand End Cover and Negative Brushes [A]
Terminal Bolt and Positive Brushes [B]

Special Tool - Hand Tester: 57001-1394

- ★ If there is not close to zero ohms, the brush lead has an open. Replace the brush plate assy.



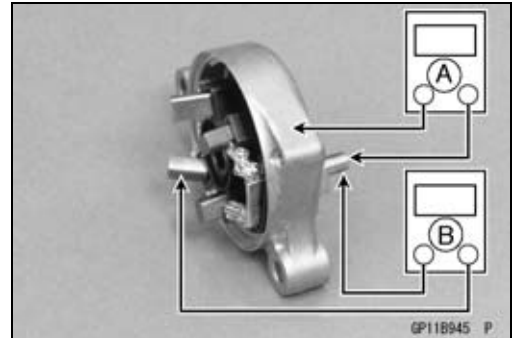
Right-hand End Cover Inspection

- Using the highest hand tester range, measure the resistance as shown.

Terminal Bolt and Right-hand End Cover [A]
Terminal Bolt and Negative Brushes [B]

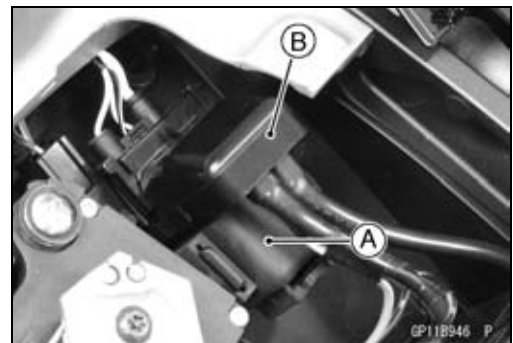
Special Tool - Hand Tester: 57001-1394

- ★ If there is any reading, the brush assy and/or terminal bolt assy have a short. Replace the starter motor.



Starter Relay Inspection

- Remove the front seat (see Front Seat Removal in the Frame chapter).
- Remove the battery negative (-) cable from the battery negative (-) terminal (see Battery Removal).
- Take the starter relay [A] off the rear fender.
- Remove the cover [B].



- Remove:
Starter Motor Cable [A] and Spring Washer
Battery Positive (+) Cable [B] and Spring Washer
- Disconnect the connector [C].



- Connect the hand tester [A] and 12 V battery [B] to the starter relay [C] as shown in the figure.

Special Tool - Hand Tester: 57001-1394

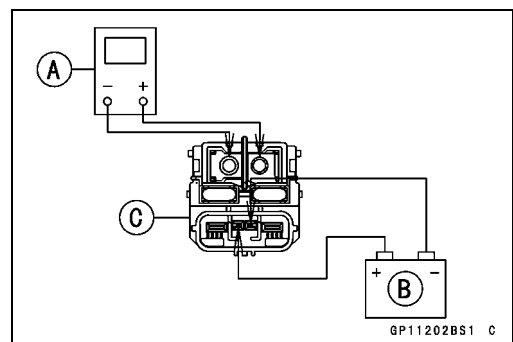
- ★ If the relay does not work as specified, the relay is defective. Replace the relay.

Testing Relay

Tester Range: $\times 1 \Omega$ range

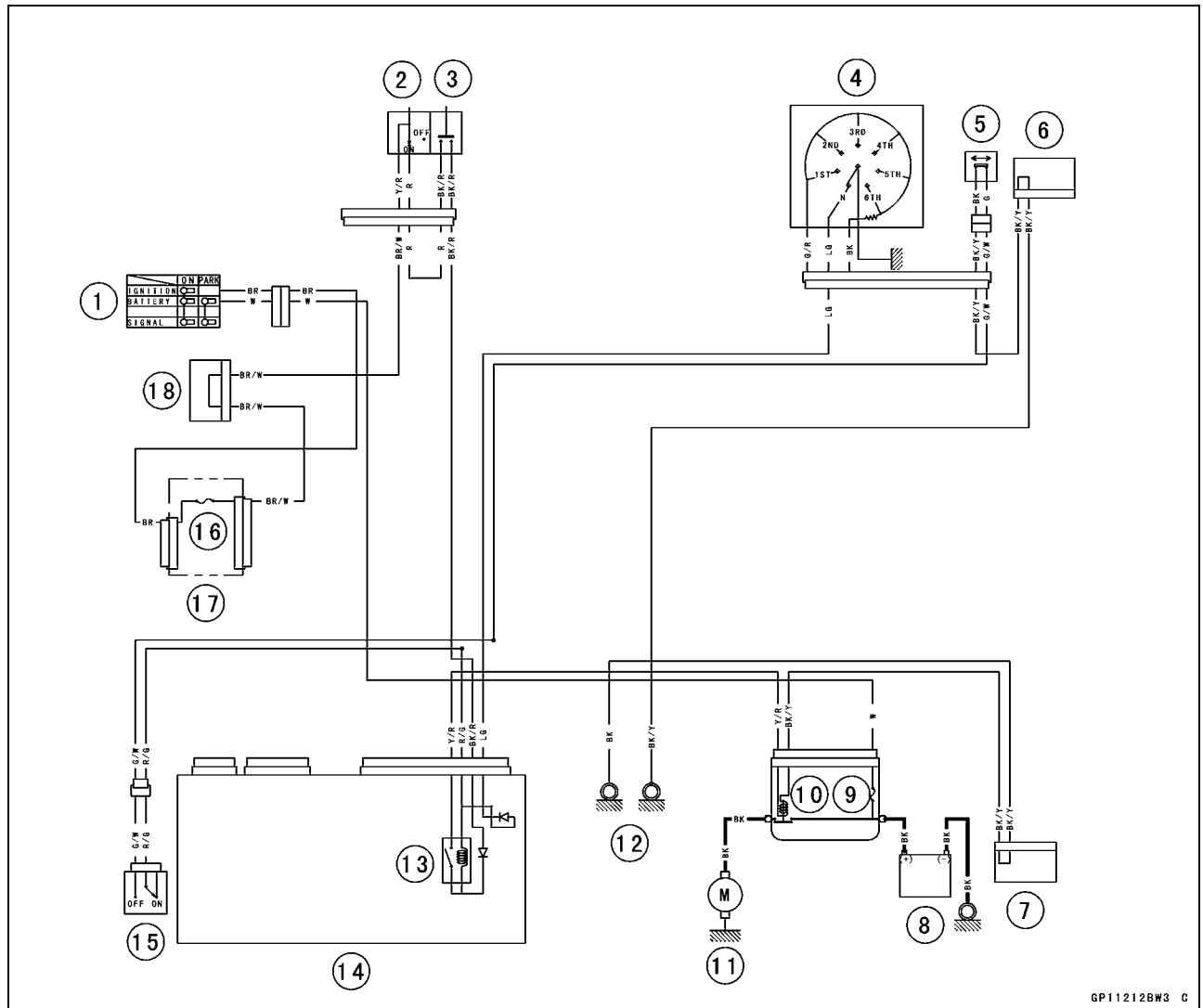
Criteria: When battery is connected $\rightarrow 0 \Omega$

When battery is disconnected $\rightarrow \infty \Omega$



Electric Starter System

Electric Starter Circuit



GP11212BW3 C

1. Ignition Switch
2. Engine Stop Switch
3. Starter Button
4. Gear Position Switch
5. Sidestand Switch
6. Joint Connector E
7. Joint Connector B
8. Battery
9. Main Fuse 30 A
10. Starter Relay
11. Starter Motor
12. Frame Grounds
13. Starter Circuit Relay
14. Relay Box
15. Starter Lockout Switch
16. Ignition Fuse 15 A
17. Fuse Box 1
18. Joint Connector F

16-52 ELECTRICAL SYSTEM

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

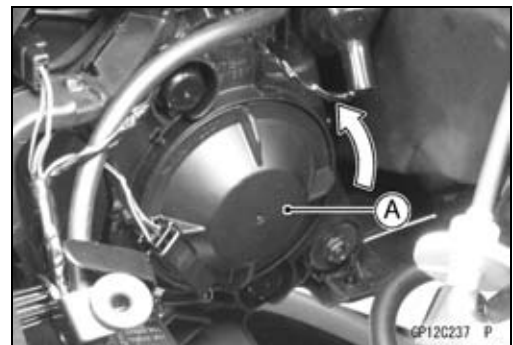
- Refer to the Headlight Aiming Inspection in the Periodic Maintenance chapter.

Headlight Beam Vertical Adjustment

- Refer to the Headlight Aiming Inspection in the Periodic Maintenance chapter.

Headlight Bulb Replacement

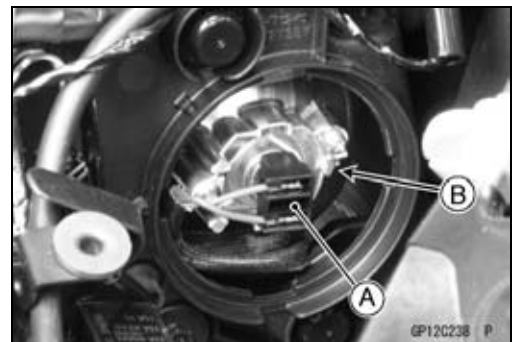
- Turn the cover [A] counterclockwise, and remove it.



- Disconnect the headlight connector [A].
- Open the clamp [B], and remove the bulb.

NOTICE

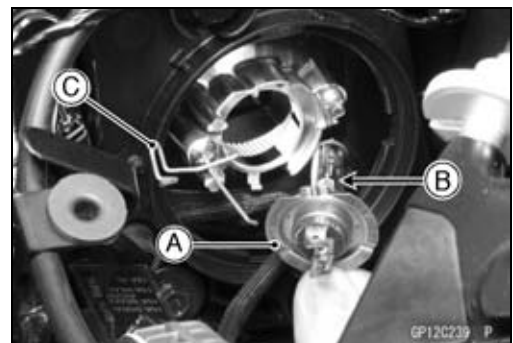
When handling the quartz-halogen bulb, never touch the glass portion with bare hands. Always use a clean cloth. Oil contamination from hands or dirty rags can reduce bulb life or cause the bulb to explode.



NOTE

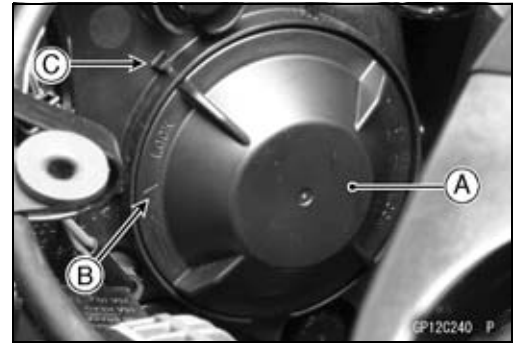
○Clean off any contamination that inadvertently gets on the bulb with alcohol or soap and water solution.

- Replace the headlight bulb with a new one.
- Install the new bulb [A].
- Turn the tab [B] upward.
- Install the clamp [C].



Lighting System

- Connect the headlight connector.
 - Install the cover [A], and turn it clockwise until the mark [B] aligns to the projection [C].
 - After installation, adjust the headlight aim (see Headlight Aiming Inspection in the Periodic Maintenance chapter).
- Another Bulb: Repeat the above steps.



Headlight Removal/Installation

- Remove:
 - Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
- Remove:
 - Bolts [A]
 - Screws [B]
 - Headlight [C]

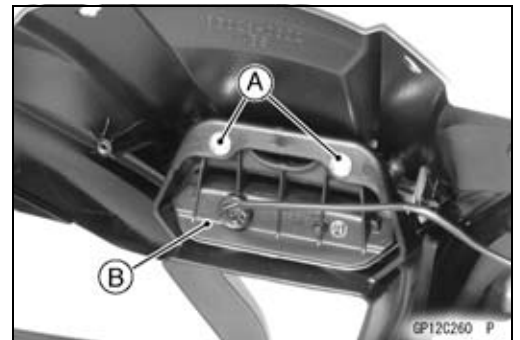
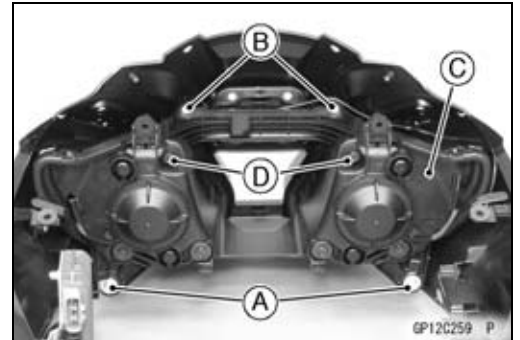
NOTE

○ Do not remove the bolts [D] because the reflector in the headlight comes off.

- Installation is the reverse of removal.

City Light (LED) Removal/Installation

- Remove:
 - Upper Fairing Assembly (see Upper Fairing Assembly Removal in the Frame chapter)
 - Headlight (see Headlight Removal)
- Remove the screws [A], and take the city light [B] off the upper fairing assembly.
- Installation is the reverse of removal.



Tail/Brake Light (LED) Removal/Installation

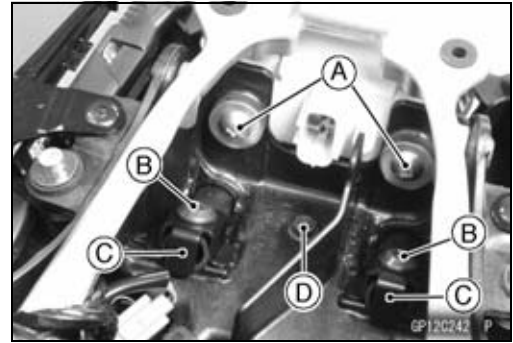
- Remove:
 - Upper Seat Cover (see Seat Cover Removal in the Frame chapter)
- Disconnect the tail/brake light connector [A].



16-54 ELECTRICAL SYSTEM

Lighting System

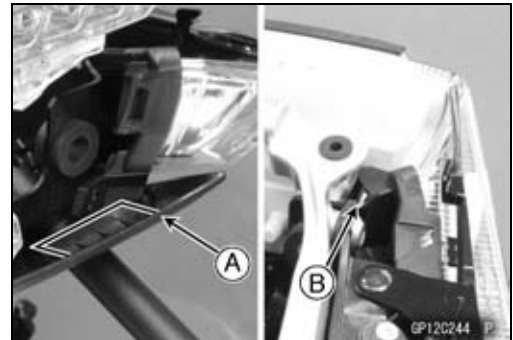
- Remove:
 - Tail/Brake Light Mounting Screws [A]
 - Bolts [B] and Brackets [C]
 - Bolt [D]



- Remove the tail/brake light [A].
- Bring down the rear fender rear [B] lightly to clear the hook [C] from the tail/brake light.

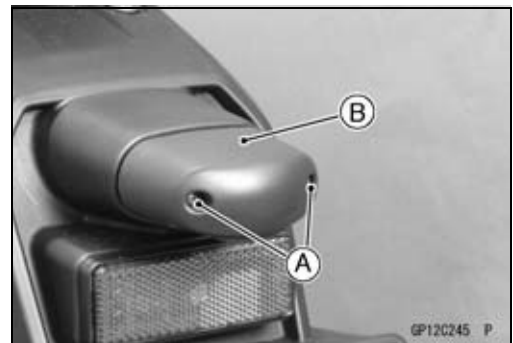


- Installation is the reverse of removal. Note the following.
- Fit the hook [A] to the tail/brake light.
- Fit the tab [B] of the tail/brake light as shown in the figure (both sides).
- Tighten:
 - Torque - Tail/Brake Light Mounting Screws: 1.2 N·m (0.12 kgf·m, 11 in·lb)



License Plate Light Bulb Replacement

- Remove:
 - Screws [A]
 - License Plate Light Cover [B]

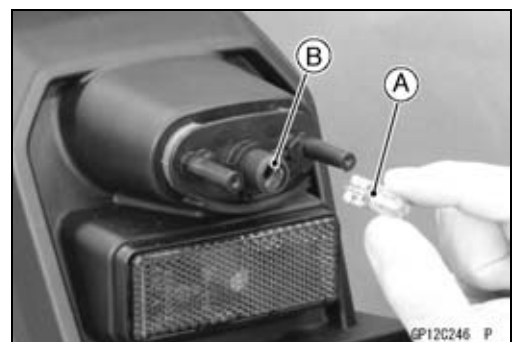


- Pull the bulb [A] out of the socket [B].

NOTICE

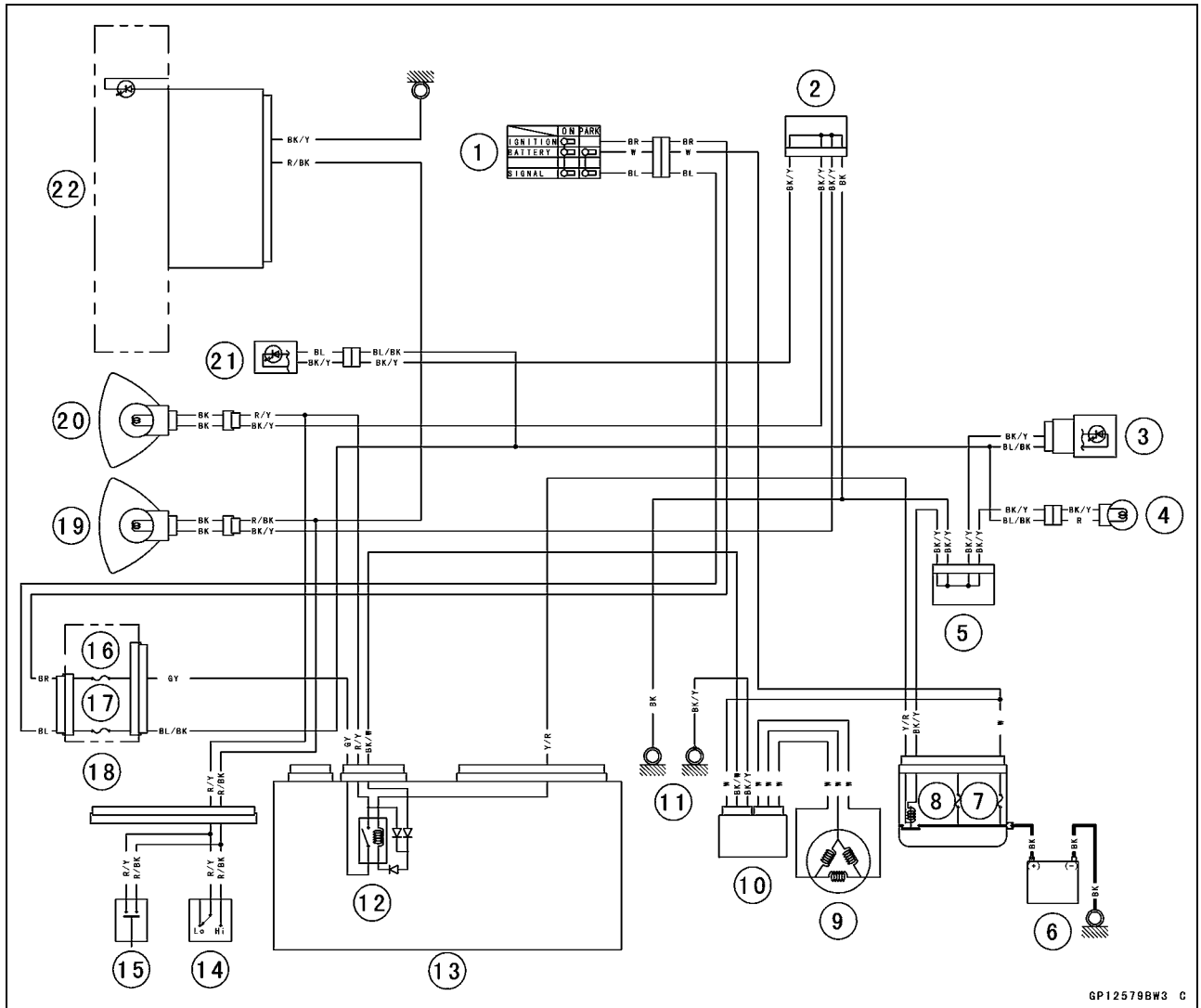
Do not turn the bulb. Pull the bulb out to prevent damage to the bulb. Do not use bulb rated for greater wattage than the specified value.

- Replace the bulb with a new one.
- Install the removed parts.



Lighting System

Headlight/Tail Light Circuit



GP12579BW3 C

1. Ignition Switch
2. Joint Connector A
3. Tail/Brake Light (LED)
4. License Plate Light 12 V 5 W
5. Joint Connector B
6. Battery
7. Main Fuse 30 A
8. Starter Relay
9. Alternator
10. Regulator/Rectifier
11. Frame Grounds
12. Headlight Circuit Relay
13. Relay Box
14. Dimmer Switch
15. Passing Button
16. Headlight Relay Fuse 15 A
17. Turn Signal Relay Fuse 10 A
18. Fuse Box #1
19. Headlight (HI) 12 V 55 W
20. Headlight (LO) 12 V 55 W
21. City Light (LED)
22. High Beam Indicator Light (LED)

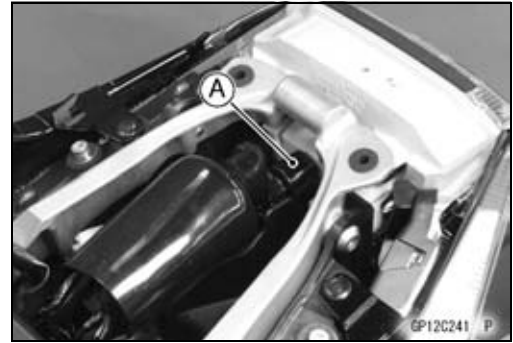
16-56 ELECTRICAL SYSTEM

Lighting System

Rear Turn Signal Light Bulb Replacement

Other than US, CA and CAL Models

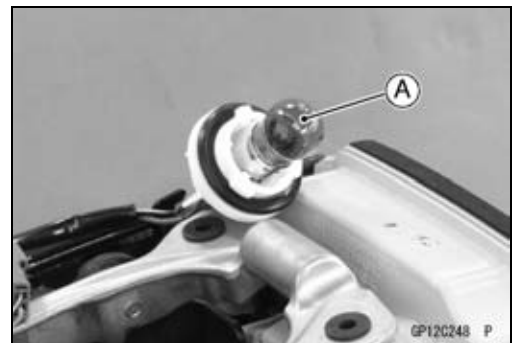
- Remove the upper seat cover (see Seat Cover Removal in the Frame chapter).
- Disconnect the tail/brake light connector [A].



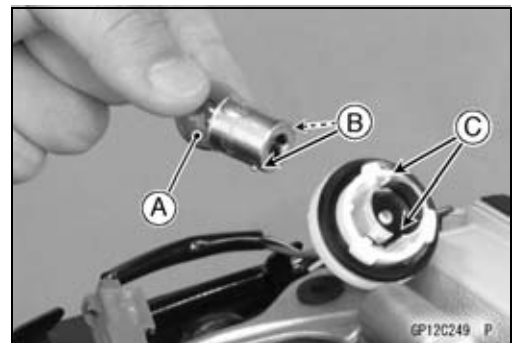
- Turn the socket [A] counterclockwise and remove the socket together with the bulb.



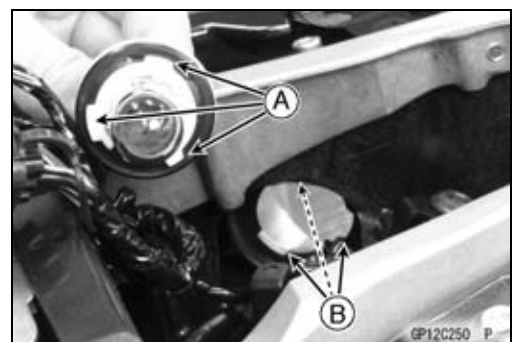
- Push and turn the turn signal light bulb [A] counterclockwise and remove it.
- Replace the bulb with a new one.



- Insert the new bulb [A] by aligning its pins [B] with the grooves [C] in the socket, and turn the bulb clockwise securely.



- Fit the tabs [A] of the socket into the grooves [B] of the turn signal light housing.
- Turn the socket clockwise.
- Another Bulb: Repeat the above steps.



Lighting System

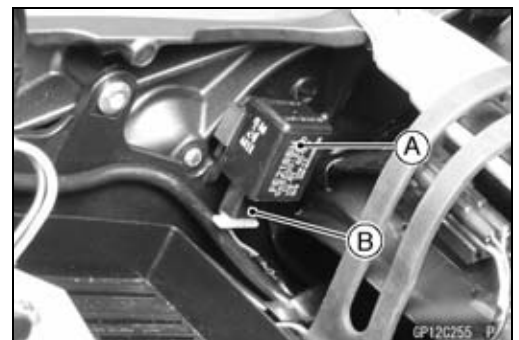
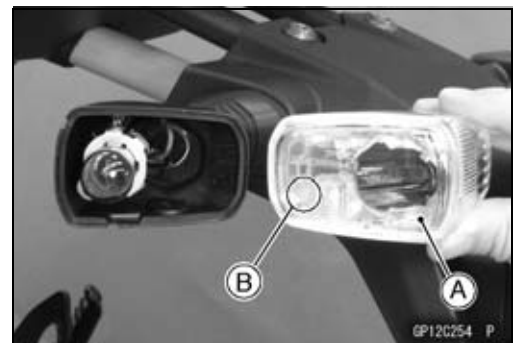
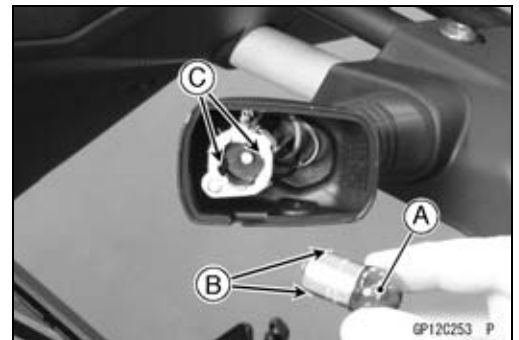
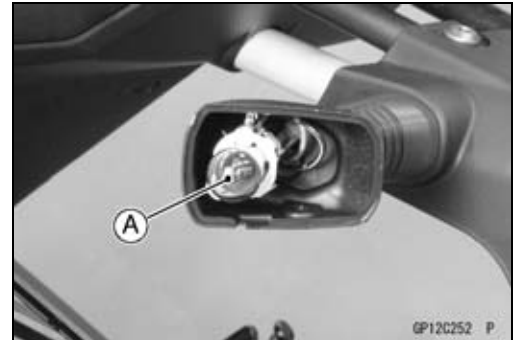
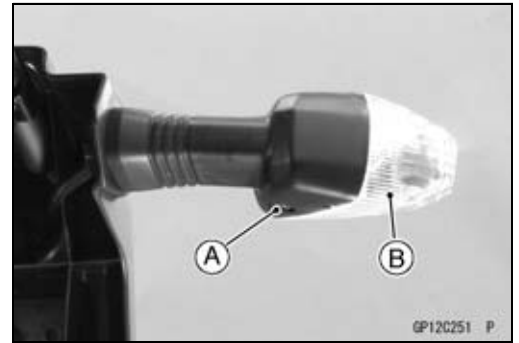
US, CA and CAL Models

- Remove:
 - Screw [A]
 - Rear Turn Signal Light Lens [B]

- Push and turn the turn signal light bulb [A] counterclockwise and remove it.
- Replace the bulb with a new one.

- Insert the new bulb [A] by aligning its pins [B] with the grooves [C] in the socket, and turn the bulb clockwise securely.

- Install the lens [A].
 - Check that the "R" (Right) or "L" (Left) mark [B].
 - Tighten:
 - Torque - Rear Turn Signal Light Lens Screws: 1.0 N·m (0.10 kgf·m, 8.9 in·lb)
 - Another Bulb: Repeat the above steps.



Turn Signal Relay Inspection

- Remove the battery (see Battery Removal).
- Take the turn signal relay [A] off the rear fender.
- Disconnect the connector [B].

16-58 ELECTRICAL SYSTEM

Lighting System

- Connect one 12 V battery and turn signal lights as indicated in the figure, and count how many times the lights blink for one minute.

Turn Signal Relay [A]

Turn Signal Lights [B]

12 V Battery [C]

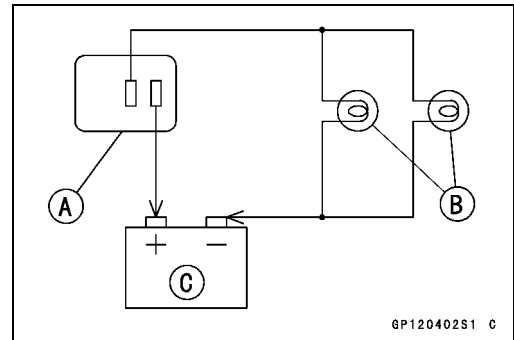
- ★ If the lights do not blink as specified, replace the turn signal relay.

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

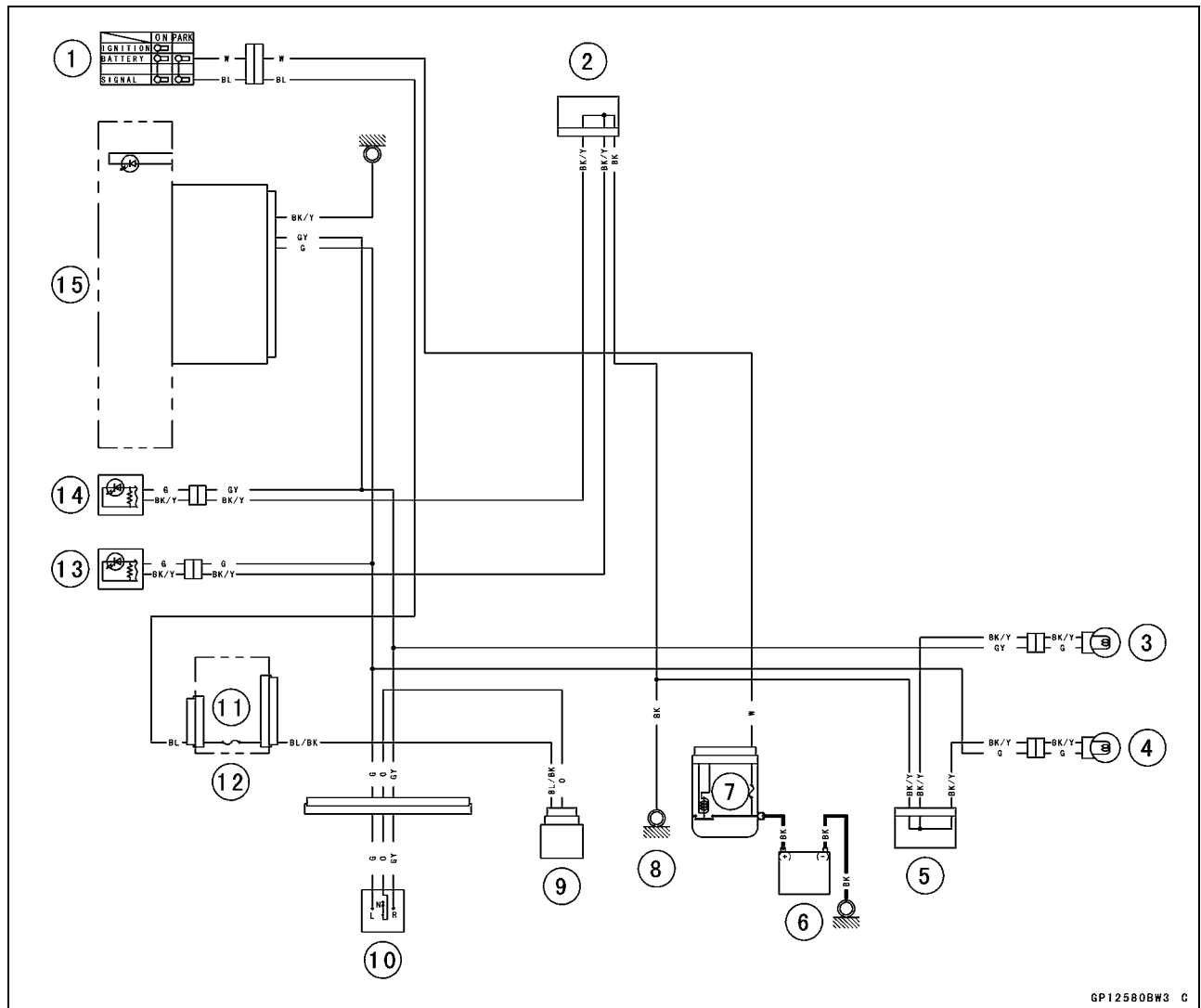
(*): Cycle(s) per minute

(**): Corrected to "one light burned out".



Lighting System

Turn Signal Light Circuit



GP12580BW3 C

1. Ignition Switch
2. Joint Connector A
3. Rear Right Turn Signal Light 12 V 10 W
4. Rear Left Turn Signal Light 12 V 10 W
5. Joint Connector B
6. Battery
7. Main Fuse 30 A
8. Frame Ground
9. Turn Signal Relay
10. Turn Signal Switch
11. Turn Signal Relay Fuse 10 A
12. Fuse Box 1
13. Front Left Turn Signal Light (LED)
14. Front Right Turn Signal Light (LED)
15. Turn Signal Indicator Light (LED)

16-60 ELECTRICAL SYSTEM

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

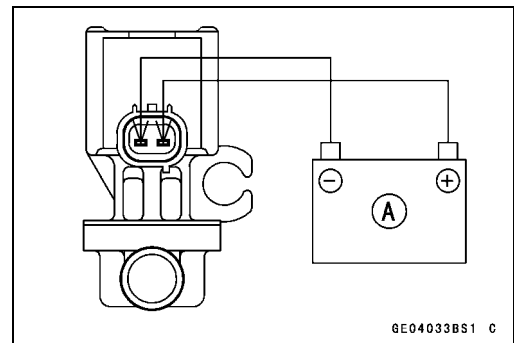
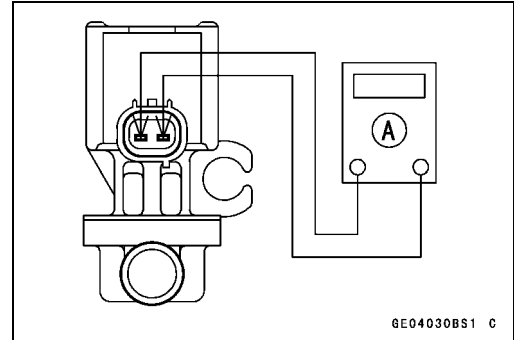
- Remove the air switching valve (see Air Switching Valve Removal in the Engine Top End chapter).
- Set the hand tester [A] to the $\times 1 \Omega$ range and connect it to the air switching valve terminals as shown in the figure.

Special Tool - Hand Tester: 57001-1394

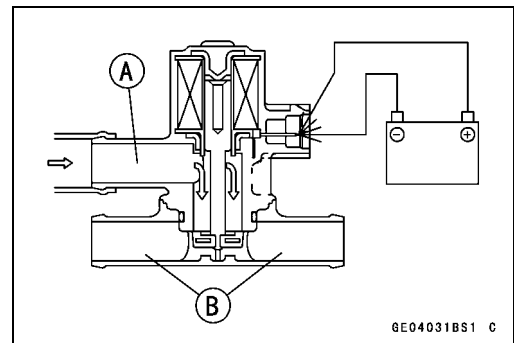
Air Switching Valve Resistance

Standard: 20 ~ 24 Ω at 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 in the figure.



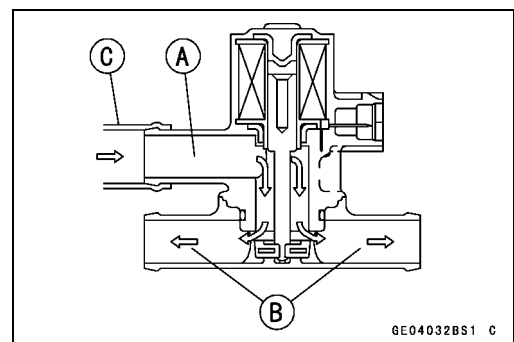
- Blow the air to the inlet air duct [A], and make sure does not flow the blown air from the outlet air ducts [B].



- Disconnect the 12 V battery.
- Blow the air to the inlet air duct [A] again, and make sure flow the blown air from the outlet air ducts [B].
- ★ If the air switching valve does not operate as described, replace it with a new one.

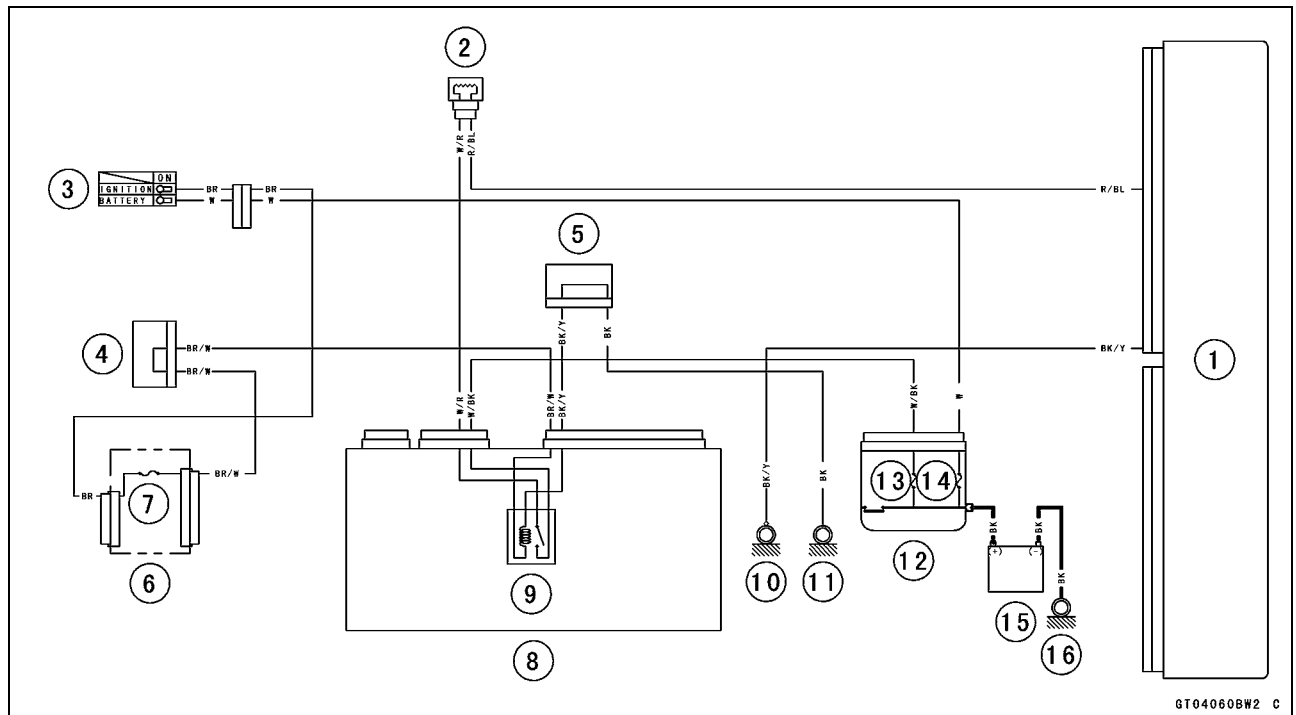
NOTE

- To check air flow through the air switching valve, just blow through the air switching valve hose (inlet side) [C].



Air Switching Valve

Air Switching Valve Circuit



GT04060BW2 C

1. ECU
2. Air Switching Valve
3. Ignition Switch
4. Joint Connector F
5. Joint Connector A
6. Fuse Box 1
7. Ignition Fuse 15 A
8. Relay Box
9. ECU Main Relay
10. Frame Ground 1
11. Frame Ground 3
12. Starter Relay
13. ECU Fuse 15 A
14. Main Fuse 30 A
15. Battery
16. Engine Ground

16-62 ELECTRICAL SYSTEM

Air Intake Solenoid Valve

Air Intake Solenoid Valve Operation Test

- Start the engine and run it at idle speed.
- Check the air intake valve [A] as follows.
 - When the engine is running, the air intake valve is lifting up.
 - If the throttle is opened quickly when the engine speed is low, the air intake valve drops down.
- ★ If the valve does not operate properly, check the air intake solenoid valve hoses for leak.
- ★ If there are no leaks, check the air intake solenoid valve.



Air Intake Solenoid Valve Unit Test

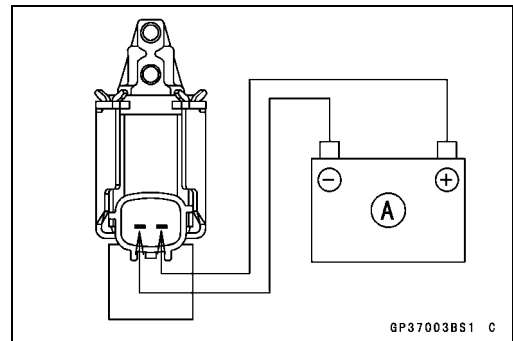
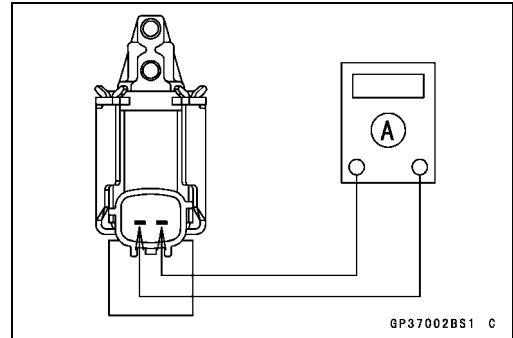
- Remove the air intake solenoid valve (see Air Intake Solenoid Valve Removal in the Fuel System (DFI) chapter).
- Set the hand tester [A] to the $\times 1 \Omega$ range and connect it to the air intake solenoid valve terminals as shown in the figure.

Special Tool - Hand Tester: 57001-1394

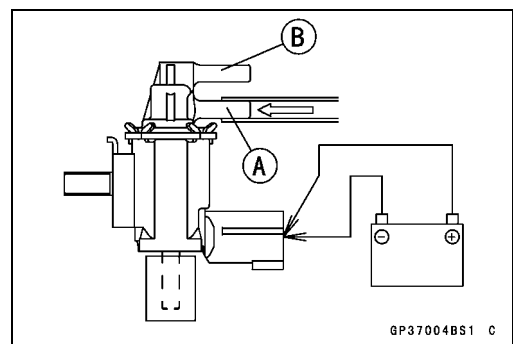
Air Intake Solenoid Valve Resistance

Standard: 22 ~ 26 Ω at 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 intake solenoid valve terminals as shown in the figure.



- Blow the air to the inlet air duct [A], and make sure does not flow the blown air from the outlet air duct [B].

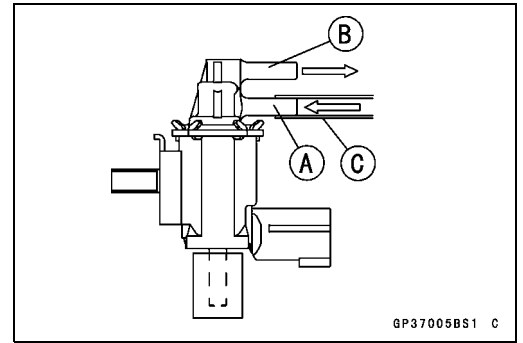


Air Intake Solenoid Valve

- Disconnect the 12 V battery.
- Blow the air to the inlet air duct [A] again, and make sure flow the blown air from the outlet air duct [B].
- ★ If the air intake solenoid valve does not operate as described, replace it with a new one.

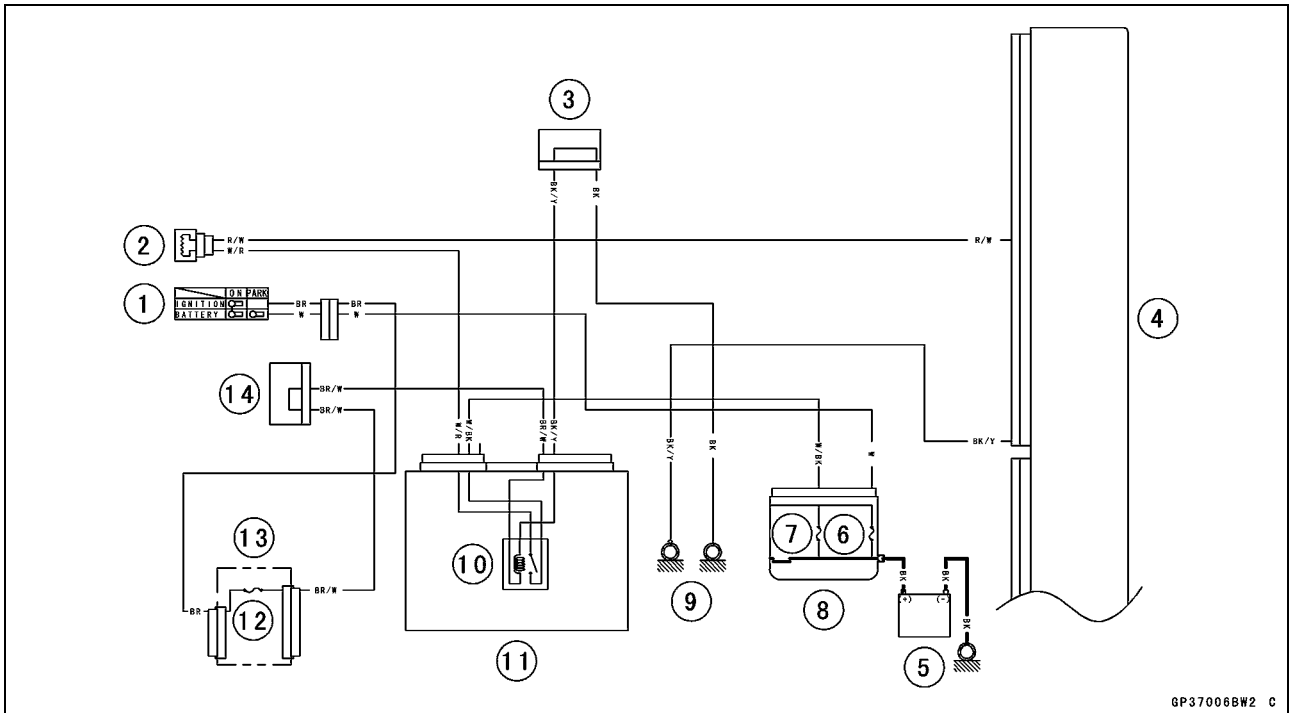
NOTE

○ To check air flow through the air intake solenoid valve, just blow through the air intake solenoid valve hose (inlet side) [C].



GP37005BS1 C

Air Intake Solenoid Valve Circuit



GP37006BW2 C

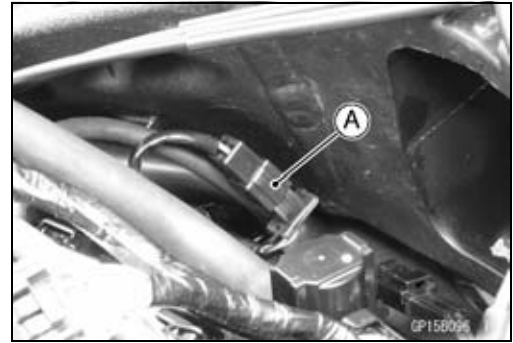
1. Ignition Switch
2. Air Intake Solenoid Valve
3. Joint Connector A
4. ECU
5. Battery
6. Main Fuse 30 A
7. ECU Fuse 15 A
8. Starter Relay
9. Frame Grounds
10. ECU Main Relay
11. Relay Box
12. Ignition Fuse 15 A
13. Fuse Box 1
14. Joint Connector F

16-64 ELECTRICAL SYSTEM

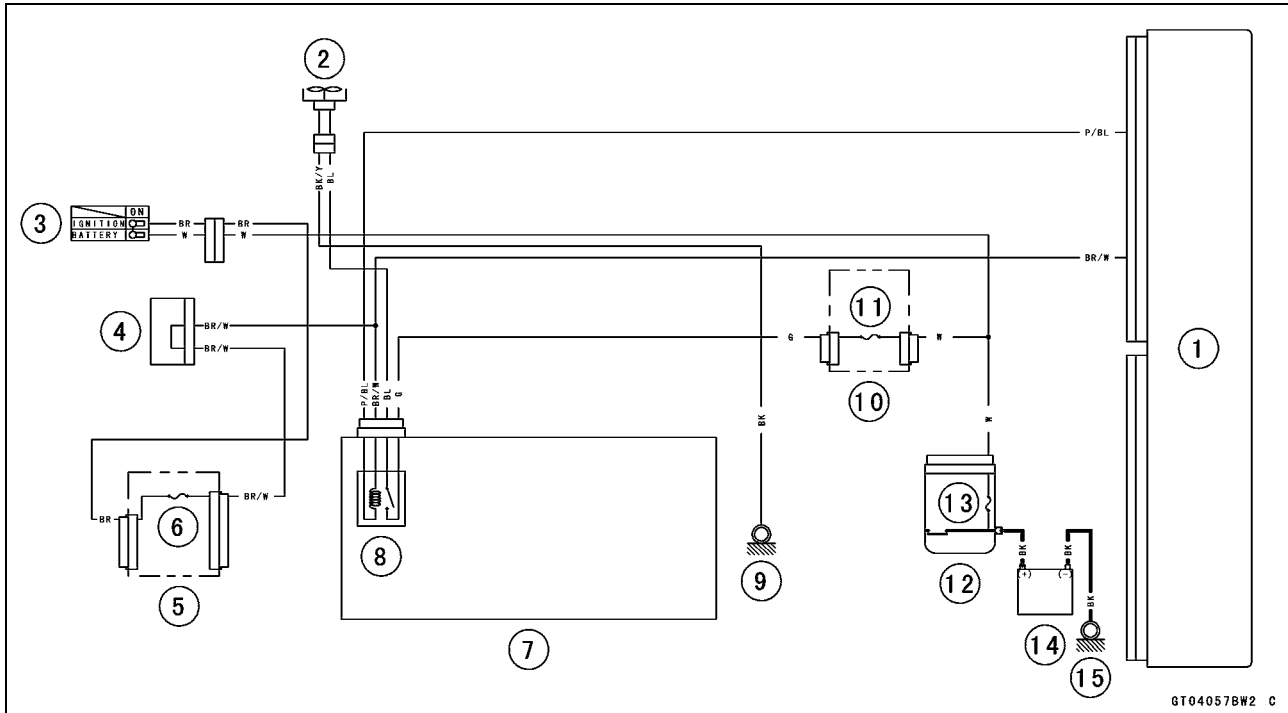
Radiator Fan System

Fan Motor Inspection

- Remove the air cleaner housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter).
- Disconnect the connector [A].
- 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



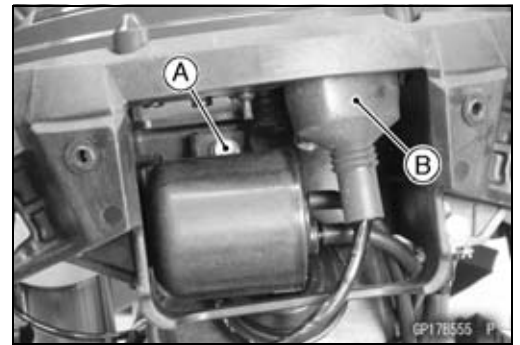
GT04057BW2 C

1. ECU
2. Fan Motor
3. Ignition Switch
4. Joint Connector F
5. Fuse Box 1
6. Ignition Fuse 15 A
7. Relay Box
8. Radiator Fan Relay
9. Frame Ground
10. Fuse Box 2
11. Fan Fuse 15 A
12. Starter Relay
13. Main Fuse 30 A
14. Battery
15. Engine Ground

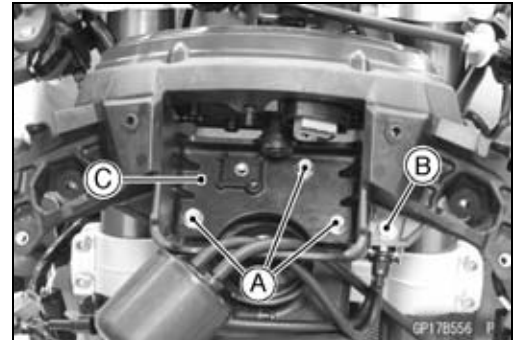
Meter, Gauge, Indicator Unit

Meter Unit Removal/Installation

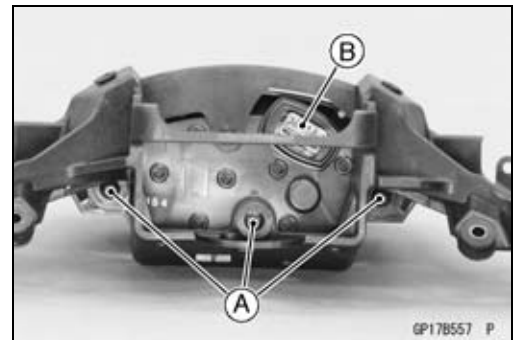
- Remove the upper fairing assembly (see Upper Fairing Assembly Removal in the Frame chapter).
- Remove the bolt [A] (other than US, CA and CAL models).
- Slide back the dust cover and disconnect the meter unit connector [B].



- Remove:
 - Bolts [A]
 - Nut [B] (other than US, CA and CAL models)
 - Meter Bracket [C]



- Remove:
 - 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. Note the following.
 - Run the lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
 - Tighten:
 - Torque - Meter Unit Mounting Screws: 1.2 N·m (0.12 kgf·m, 11 in·lb)

Meter Unit Disassembly

NOTICE

Do not disassemble the meter unit, because the individual parts of meter unit are damaged.

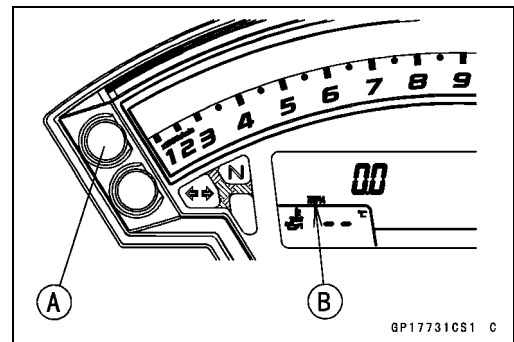
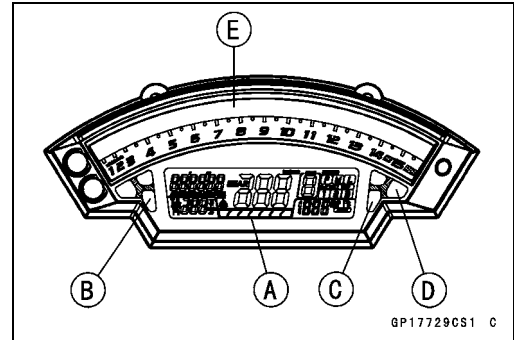
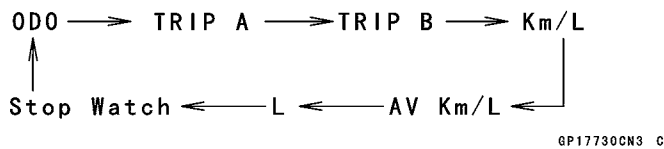
16-66 ELECTRICAL SYSTEM

Meter, Gauge, Indicator Unit

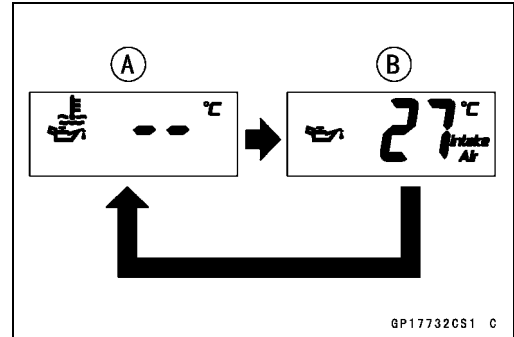
Meter Operation Inspection

Check 1-1: Switching Inspection

- Turn the ignition switch to ON and check the following.
 - The all LCD segments [A] appear for 3 seconds.
 - The warning indicator light (Red LED) [B] goes on for 3 seconds and then goes off in a moment after that goes off.
 - The warning indicator light (Yellow LED) [C] goes on for 3 seconds.
 - The fuel level (ZX1000J models) or ABS (ZX1000K models) warning indicator light (LED) [D] goes on.
 - The tachometer (LED) [E] blinks 3 times.
- ★ If the meter does not work, replace the meter unit.
- Refer to the Meter Unit Inspection for other indicator lights (LED) inspection.
- By pushing the upper button [A] each time, check that the display [B] changes as follows.
- This display is ordinary indication.

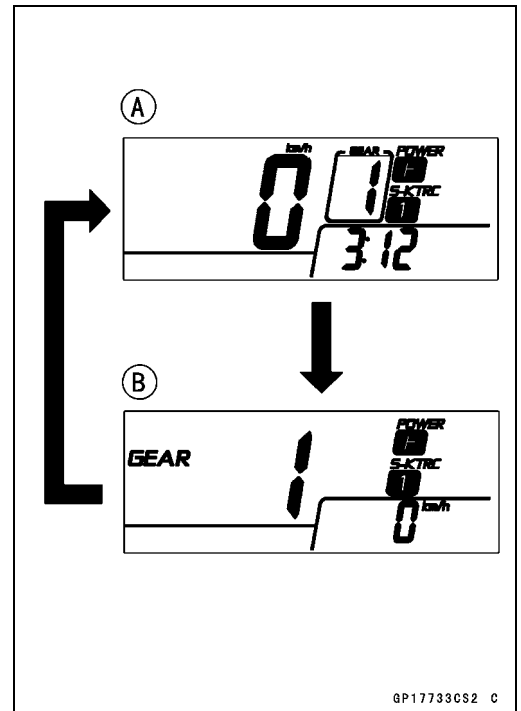


- By pushing the lower button each time, check that the display changes water temperature [A] and intake air temperature [B].
- ★ If the meter does not work, replace the meter unit.



Meter, Gauge, Indicator Unit

- Indicate the Stop Watch mode.
- By pushing the upper button each time, check that the display position changes as shown.
- ★ If meter does not work, replace the meter unit.
 - Normal Mode [A]
 - Race Mode [B]

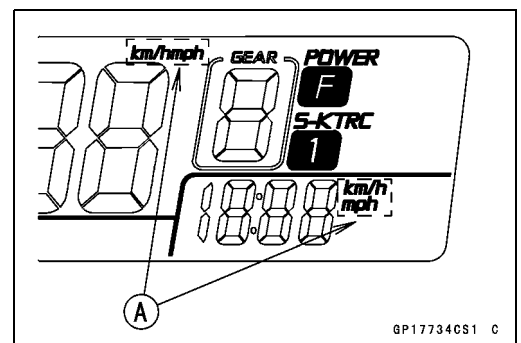


- Indicate the ODO mode.
- Check that the display [A] change to the “km/h” and “mph” display each time by pushing the lower button while upper button pushed in.

NOTE

○ Mile/Km Display can alternate between English and metric modes (mile and km) in the digital meter. Make sure that km or mile according to local regulations is correctly displayed before riding.

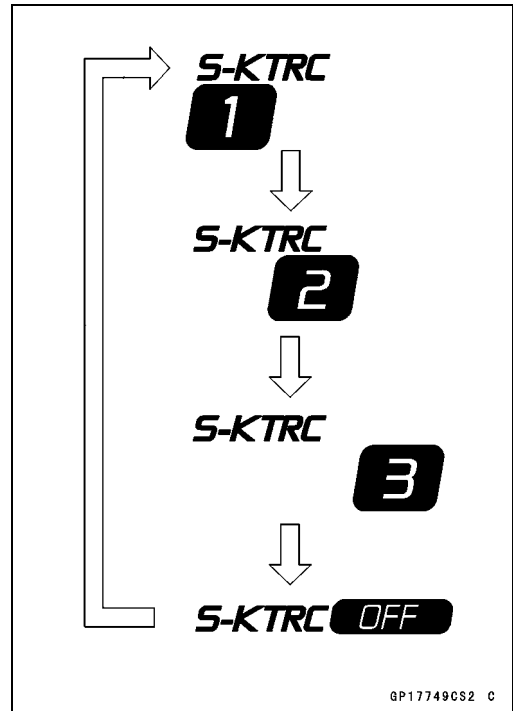
- ★ If the display function does not work, replace the meter unit.



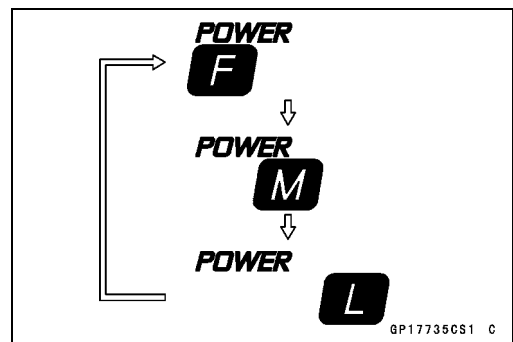
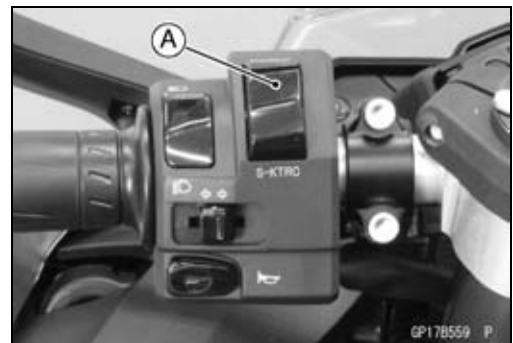
16-68 ELECTRICAL SYSTEM

Meter, Gauge, Indicator Unit

- By pushing (0.3 ~ 0.4 seconds) the S-KTRC button [A] at the left handlebar switch housing each time, check that the S-KTRC indicator symbol changes to going on.
- ★ If the indicator symbol does not work, check the following parts.
 - S-KTRC Button (see Switch Inspection)
 - Wiring (see Meter Unit Circuit)
- ★ If the above parts is good, replace the meter unit and/or ECU.



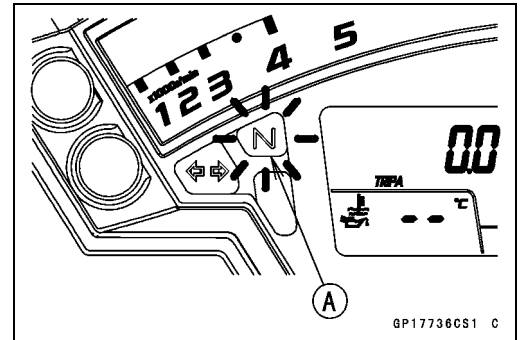
- By pushing (0.3 ~ 0.4 seconds) the power mode button [A] at the left handlebar switch housing each time, check that the power mode symbol changes to going on.
- ★ If the display function does not work, check the following parts.
 - Power Mode Button (see Switch Inspection)
 - Wiring (see Meter Unit Circuit)
- ★ If the above parts is good, replace the meter unit and/or ECU.



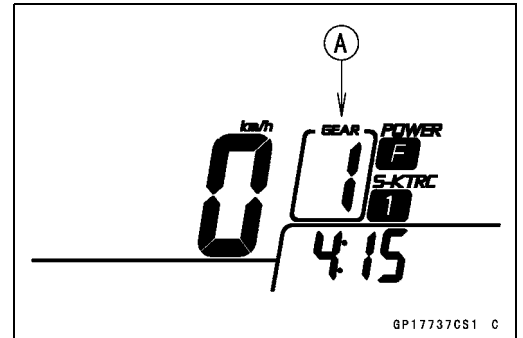
Meter, Gauge, Indicator Unit

Check 1-2: Gear Position Indication Inspection

- Turn the ignition switch to ON.
- The 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 neutral indicator light (LED) goes off.
(This illustration shows normal mode.)
- 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 is good, replace the meter unit and/or ECU.



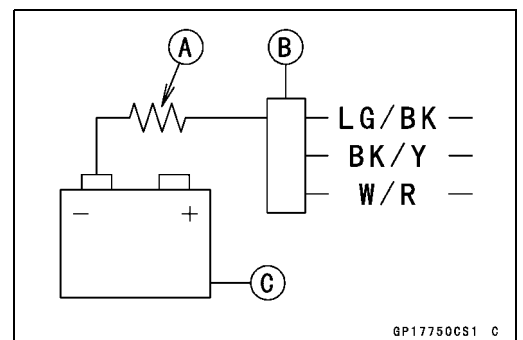
Meter System Inspection

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

- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
- Connect the resistor(s) [A] (about 50 to 100 Ω) between the fuel pump connector terminal [B] of the main harness side and the battery negative (-) terminal [C] as shown.



16-70 ELECTRICAL SYSTEM

Meter, Gauge, Indicator Unit

- Turn the ignition switch to ON.
- After about 5 seconds, the meter indicate the following.

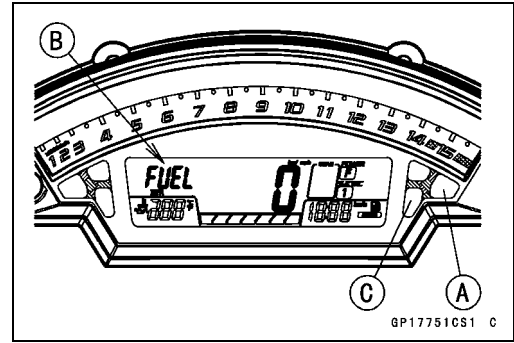
For ZX1000J Models

Fuel Level Warning Indicator Light (LED) [A] goes on
“FUEL” blinks [B]

For ZX1000K Models

Warning Indicator Light (Yellow LED) [C] goes on
FUEL Warning Symbol goes on
“FUEL” blinks [B]

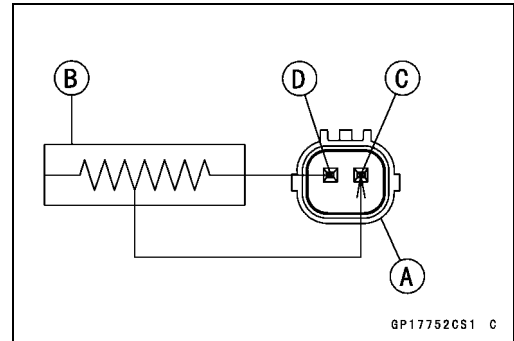
- ★ If the display and indicator light (LED) function does not work, replace the meter unit.



Check 2-3: Intake Air Temperature Inspection

- Disconnect the intake air temperature sensor connector [A] (see Intake Air Temperature Sensor Removal in the Self-Diagnosis System chapter).
- Connect the variable rheostat [B] to the R/BK lead [C] and BR/BK lead [D] terminals.

	Resistance (kΩ)	
	5.4 ~ 6.6	0.29 ~ 0.39
Temperature	0 (°C)	80 (°C)
	32 (°F)	176 (°F)



- Turn the ignition switch to ON.
- Read the temperature in the display.
- The display range is -20 ~ 140°C (-4 ~ 284°F).
- ★ If the temperature is out of the range, the indication fixes the minimum value or maximum value.
- When the speed is 20 km/h (12 mph) or less and rising the temperature, the indication fixes the value of just before the indication.
- ★ If the display function does not work, check the wiring (see Meter Unit Circuit).
- ★ If the wiring is good, replace the meter assembly.

Meter, Gauge, Indicator Unit

Meter Unit Inspection

- Remove the meter unit (see Meter Unit Removal).
 - [1] Battery (+)
 - [2] Fuel Reserve Switch
 - [3] Ground (-)
 - [4] Unused
 - [5] Right Turn Signal Indicator Light (LED) (+)
 - [6] Left Turn Signal Indicator Light (LED) (+)
 - [7] High Beam Indicator Light (LED) (+)
 - [8] Neutral Indicator Light (LED) (-)
 - [9] Ignition (+)
 - [10] Warning Indicator Light (Red LED, for Oil Pressure Warning) (-)
 - [11] CAN Communication Line (Low)
 - [12] CAN Communication Line (High)
 - [13] Stop Watch (+)
 - [14] Lap Time (+)
 - [15] Power Mode Button (+)
 - [16] S-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

- Set the hand tester [A] to the $\times 1 \Omega$ range and connect it to the terminal [11] and [12] in the meter unit.

Special Tool - Hand Tester: 57001-1394

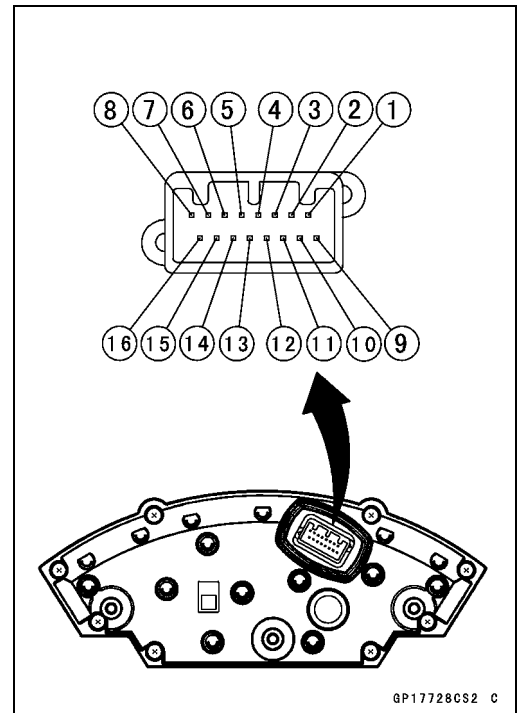
CAN Communication Line Resistance (at Meter Unit)

Standard: 122 ~ 126 Ω

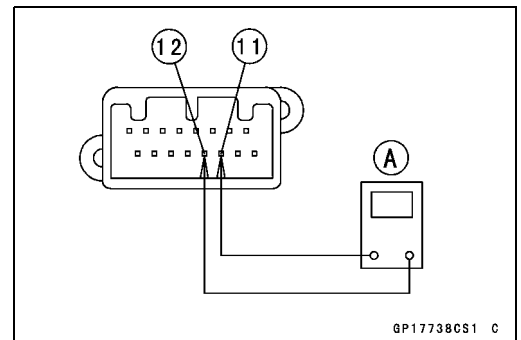
- ★ If the tester reading is not specified, replace the meter unit.

Check 3-2: Meter Unit Power Supply Check

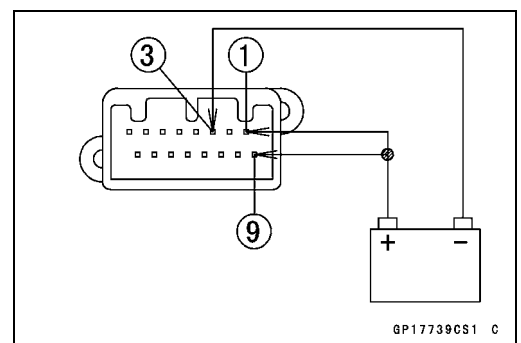
- Using the auxiliary leads, the 12 V battery to the meter unit connector as follows.
 - Connect the battery positive (+) terminal to the terminal [1] [9].
 - Connect the battery negative (-) terminal to the terminal [3].



GP17728CS2 C



GP17738CS1 C

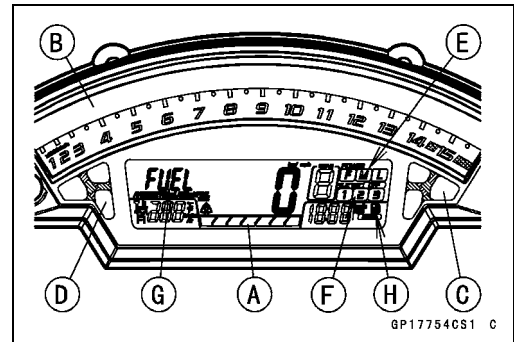


GP17739CS1 C

16-72 ELECTRICAL SYSTEM

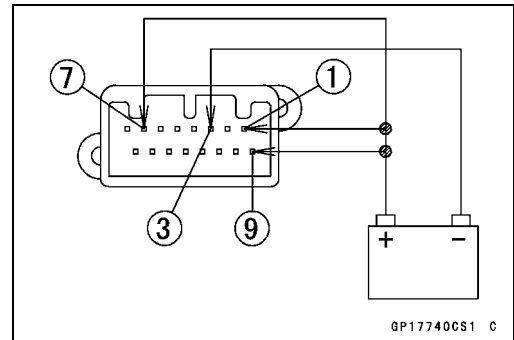
Meter, Gauge, Indicator Unit

- Check the following items.
- The all LCD segments [A] appear for 3 seconds.
- The tachometer (LED) [B] blinks 3 times.
- For ZX1000J models, the fuel level warning indicator light (LED) [C] and warning indicator light (Red LED) [D] go on.
- For ZX1000K models, the ABS indicator light (LED) [C] and warning indicator light (Red LED) [D] go on.
- The following items blinks.
 - Power Mode Indicator [E]
 - S-KTRC Mode indicator [F]
 - “FUEL” Segment [G]
 - Fuel Level Warning Symbol [H] (ZX1000K models)
- ★ If the meter unit does not work, replace the meter unit.

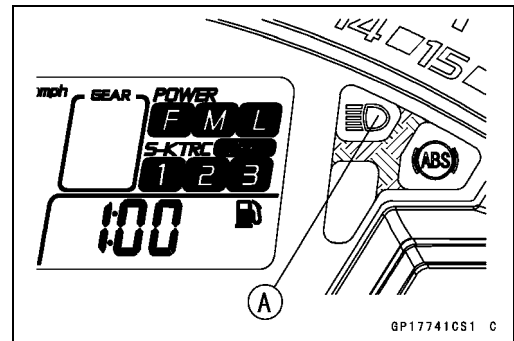


Check 3-3: High Beam Indicator Light (LED) Inspection

- Connect the leads in the same circuit as Check 3-2.
- Connect the terminal [7] to the battery (+) terminal.

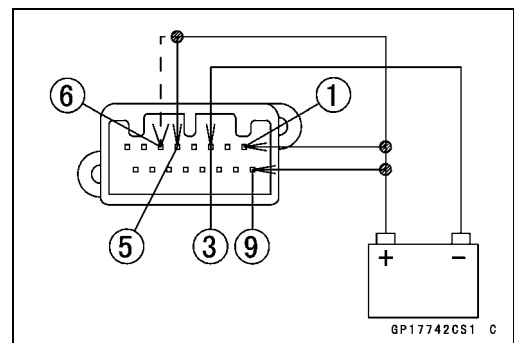


- Check that the high beam indicator light (LED) [A] goes on.
- ★ If the indicator light does not go on, replace the meter unit.



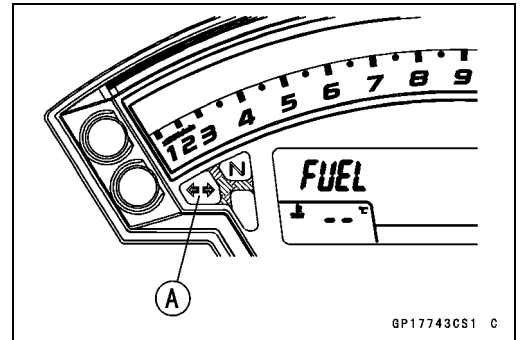
Check 3-4: Turn Signal Indicator Light (LED) Inspection

- Connect the leads in the same circuit as Check 3-2.
- Connect the terminal [5] to the battery (+) terminal.
- Connect the terminal [6] to the battery (+) terminal.



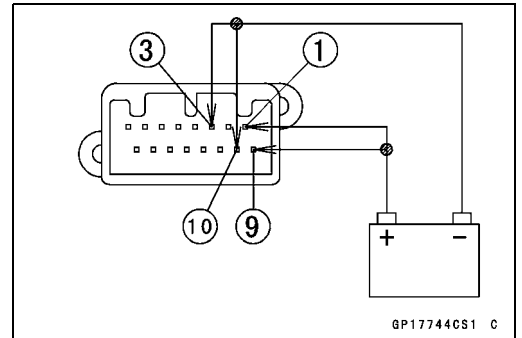
Meter, Gauge, Indicator Unit

- Check that the turn signal indicator light (LED) [A] goes on.
- ★ If the indicator light does not go on, replace the meter unit.

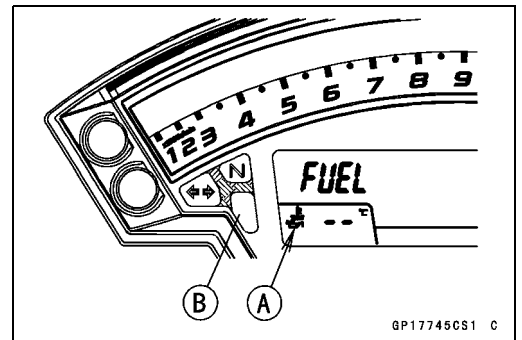


Check 3-5: Warning Indicator Light (Red LED) (Oil Pressure Warning) Inspection

- Connect the leads in the same circuit as Check 3-2.
- Connect the terminal [10] to the battery (-) terminal.

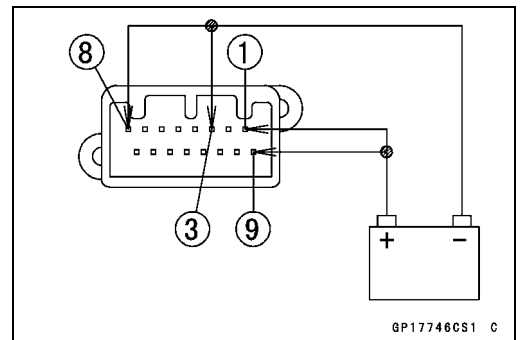


- Check that the oil pressure warning symbol [A] and the warning indicator light (Red LED) [B] go on.
- ★ If the indicator light does not go on, replace the meter unit.

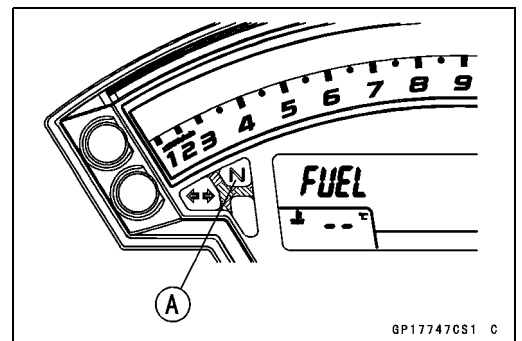


Check 3-6: Neutral Indicator Light (LED) Inspection

- Connect the leads in the same circuit as Check 3-2.
- Connect the terminal [8] to the battery (-) terminal.



- Check that the neutral indicator light (LED) [A] goes on.
- ★ If the indicator light does not go on, replace the meter unit.

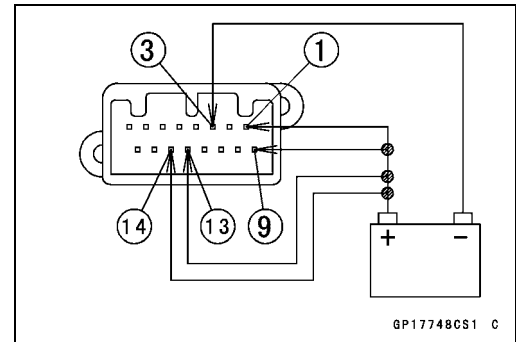


16-74 ELECTRICAL SYSTEM

Meter, Gauge, Indicator Unit

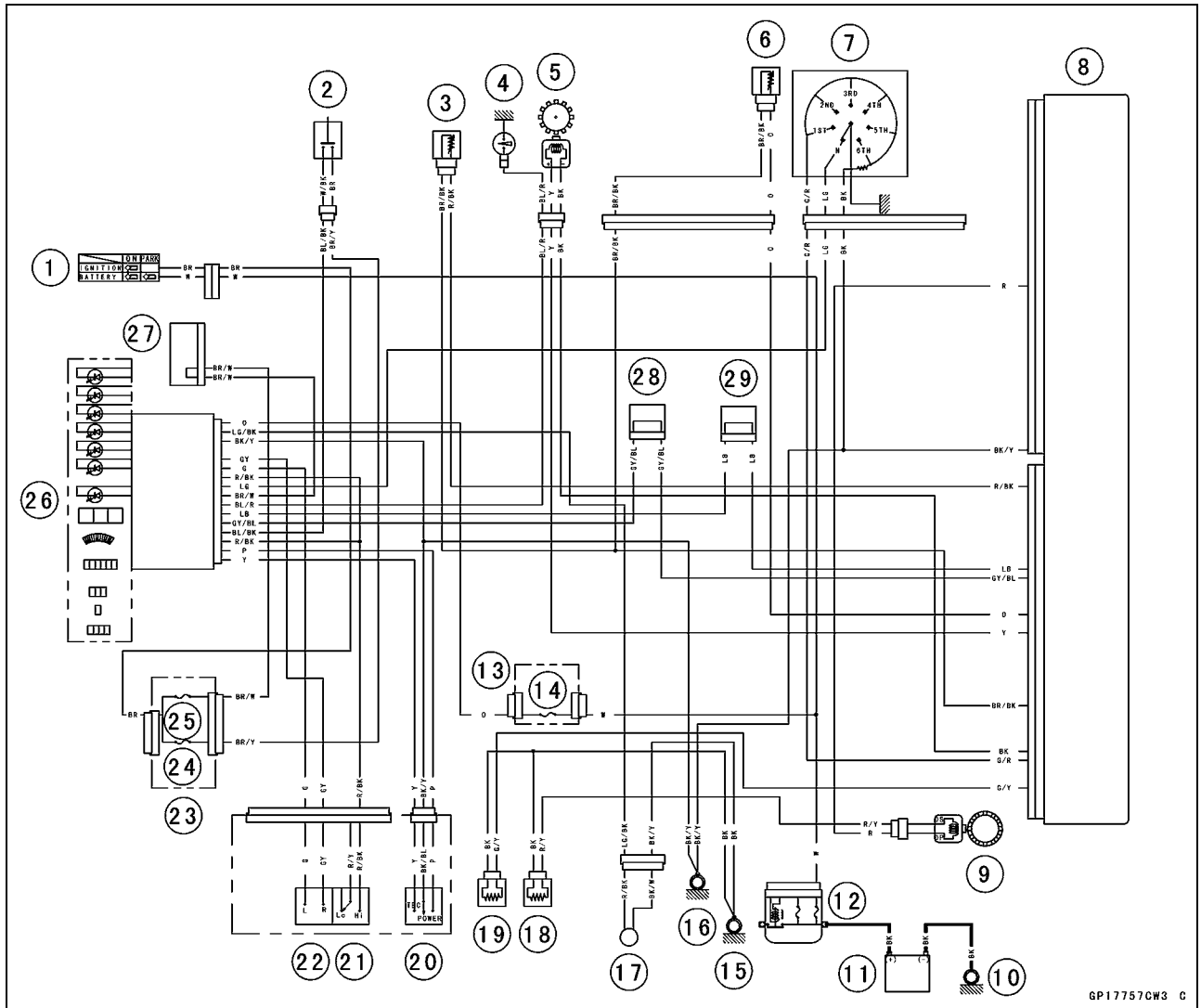
Check 3-7 Stop Watch Inspection

- Connect the leads in the same circuit as Check 3-2.
 - By pushing the upper button each time to set the stop watch mode.
 - Connect the insulated auxiliary lead processed insulation to the terminal [13] as shown in the figure, then stop watch start to count.
 - While count the stop watch, connect the auxiliary lead to the terminal [14] as shown in the figure, then indicate the counted lap time during 10 seconds.
- ★ If the display function does not work, replace the meter unit.



Meter, Gauge, Indicator Unit

Meter Unit Circuit (ZX1000J Models)



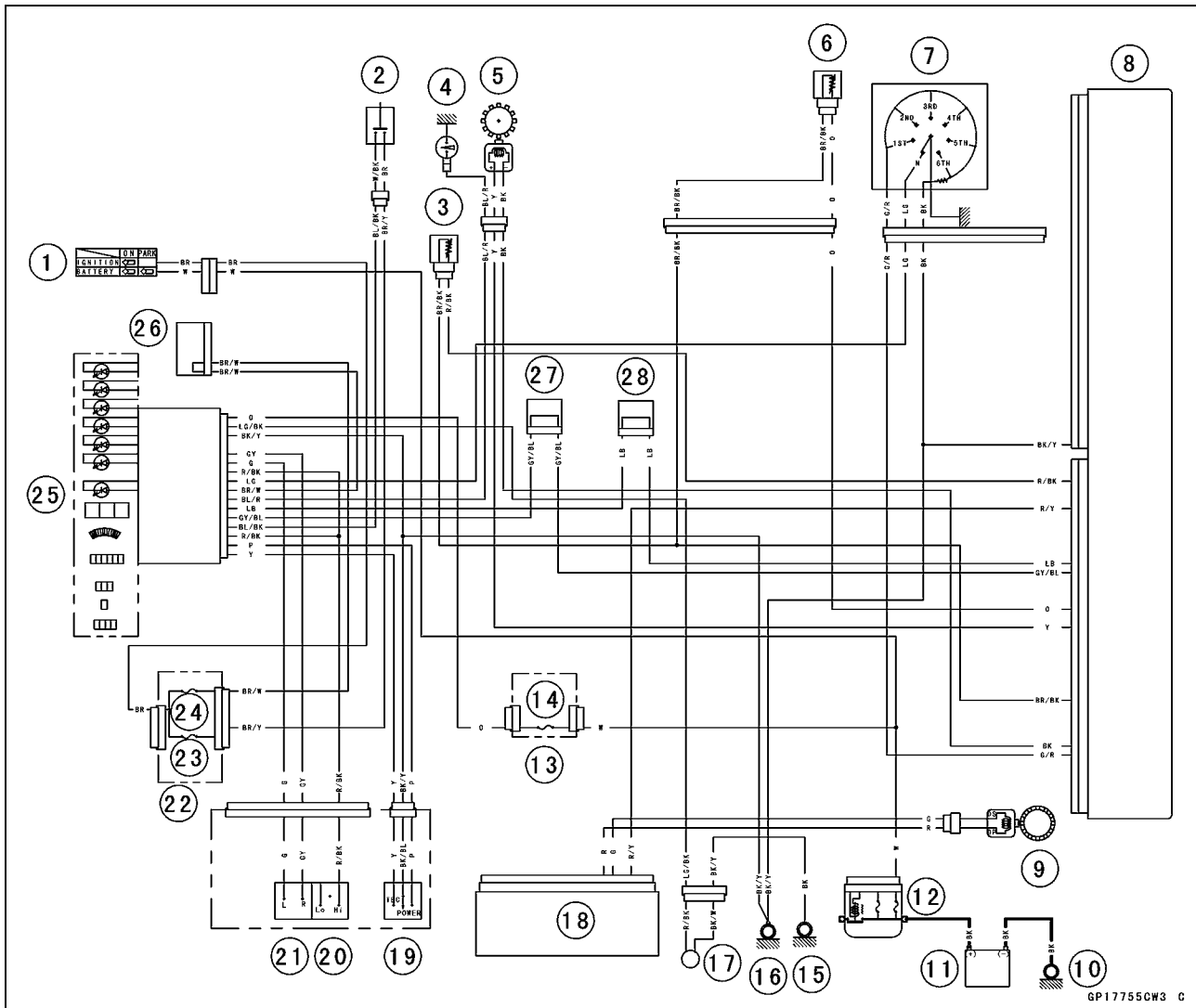
GP17757CW3 C

- | | |
|----------------------------------|--------------------------------|
| 1. Ignition Switch | 16. Frame Ground 1 |
| 2. Stop Watch Button | 17. Fuel Reserve Switch |
| 3. Intake Air Temperature Sensor | 18. Resister R 220 Ω |
| 4. Oil Pressure Switch | 19. Resister F 220 Ω |
| 5. Crankshaft Sensor | 20. Mode Switch |
| 6. Water Temperature Sensor | 21. Dimmer Switch |
| 7. Gear Position Switch | 22. Turn Signal Switch |
| 8. ECU | 23. Fuse Box 1 |
| 9. Rear Wheel Rotation Sensor | 24. Brake Light/Horn Fuse 10 A |
| 10. Engine Ground | 25. Ignition Fuse 15 A |
| 11. Battery 12 V 6 Ah | 26. Meter Unit |
| 12. Main Fuse 30 A | 27. Joint Connector F |
| 13. Fuse Box 2 | 28. Joint Connector C |
| 14. Meter Fuse 10 A | 29. Joint Connector D |
| 15. Frame Ground 3 | |

16-76 ELECTRICAL SYSTEM

Meter, Gauge, Indicator Unit

Meter Unit Circuit (ZX1000K Models)



GP1775CW3 C

- | | |
|----------------------------------|--------------------------------|
| 1. Ignition Switch | 15. Frame Ground 3 |
| 2. Stop Watch Button | 16. Frame Ground 1 |
| 3. Intake Air Temperature Sensor | 17. Fuel Reserve Switch |
| 4. Oil Pressure Switch | 18. KIBS Hydraulic Unit |
| 5. Crankshaft Sensor | 19. Mode Switch |
| 6. Water Temperature Sensor | 20. Dimmer Switch |
| 7. Gear Position Switch | 21. Turn Signal Switch |
| 8. ECU | 22. Fuse Box 1 |
| 9. Rear Wheel Rotation Sensor | 23. Brake Light/Horn Fuse 10 A |
| 10. Engine Ground | 24. Ignition Fuse 15 A |
| 11. Battery 12 V 8.6 Ah | 25. Meter Unit |
| 12. Main Fuse 30 A | 26. Joint Connector F |
| 13. Fuse Box 2 | 27. Joint Connector C |
| 14. Meter Fuse 10 A | 28. Joint Connector D |

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 warning indicator light (Red 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 Upper and Lower 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 user 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 user key is lost, the user should go to his dealer to invalidate the lost key registration in the ECU.
10. When the all user keys are lost, the user should go to his dealer and have a new ECU installed and register the user keys.

NOTE

○No.9 and 10 are strongly recommended to the customer to ensure security of the motorcycle.

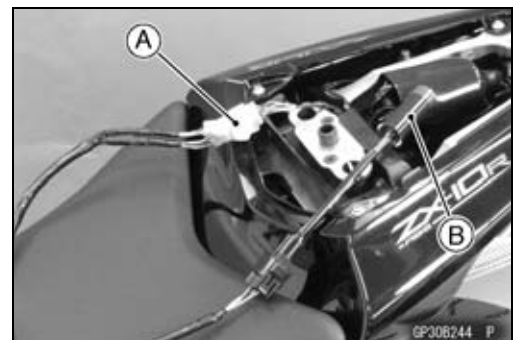
Key Registration

Case 1: When the user key has been lost or additional spare user key is required.

- Prepare a new spare user key.
- Cut the key in accordance with the shape of the current user 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 in the figure.

Special Tools - Key Registration Unit: 57001-1582

Key Registration Adapter: 57001-1746



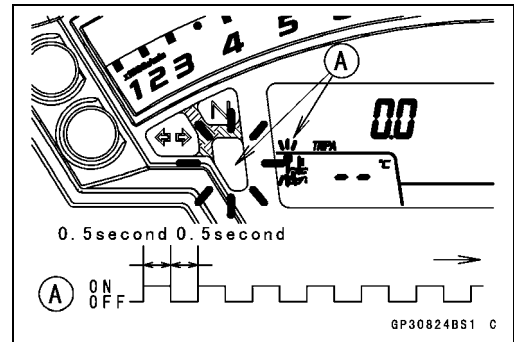
16-78 ELECTRICAL SYSTEM

Immobilizer System (Equipped Models)

- Insert the registered user key to the ignition switch and turn it to ON.

Verified

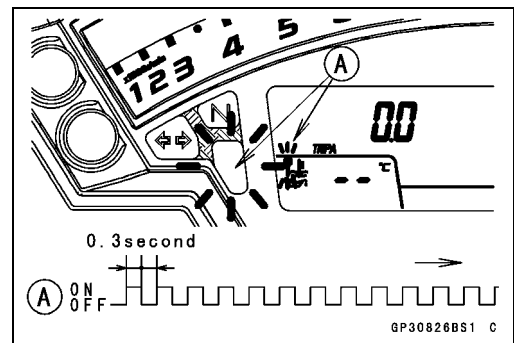
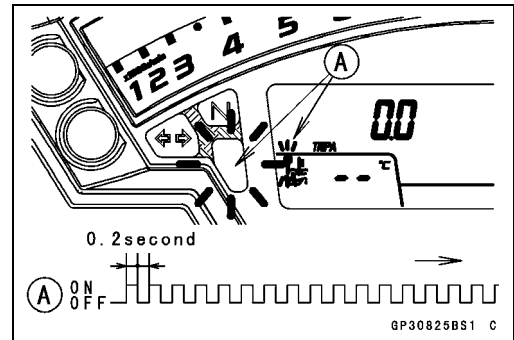
- The warning indicator light (Red LED) and immobilizer warning symbol [A] blinks to display the registration mode (go to the next step).



Not Verified

- The warning indicator light (Red LED) and immobilizer warning symbol [A] blinks to display the collation error (refer to the following failure illustrations).
Immobilizer Amplifier Failure

Registered User Key Collation Error



- Turn the registered user key to OFF and remove the registered user key.
- ★ If there are other registered user keys, they should all do the procedure above.
- The warning indicator light (Red LED) and immobilizer symbol [A] blinks continuously to display that the ECU is in the registration mode for 15 seconds.

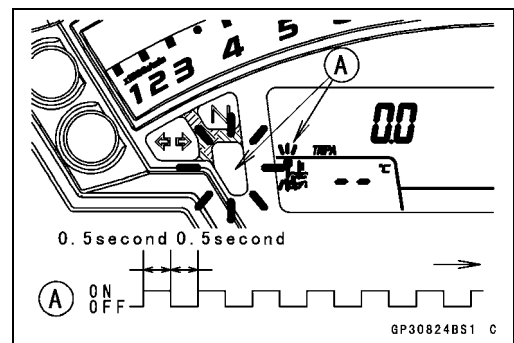
NOTE

- Insert next key and turn ON within 15 seconds after previous key is turned OFF and removed otherwise registration mode will be ended and the warning indicator light (Red LED) and immobilizer symbol stops blinking.
- To return to the registration mode start the registered user key(s) verification procedure. This applies to all user key registration.

- Insert the user key 1 to the ignition switch and turn it to ON.

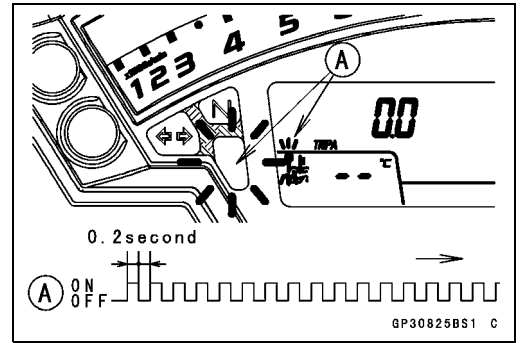
NOTE

- Keep the other user key away from the immobilizer antenna.

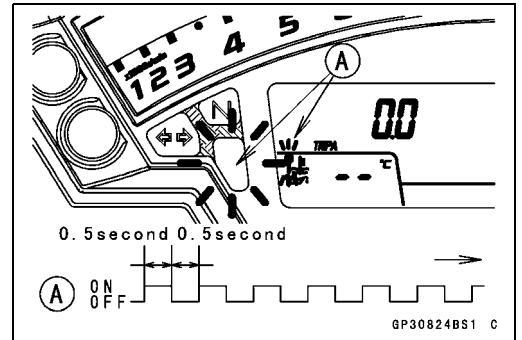


Immobilizer System (Equipped Models)

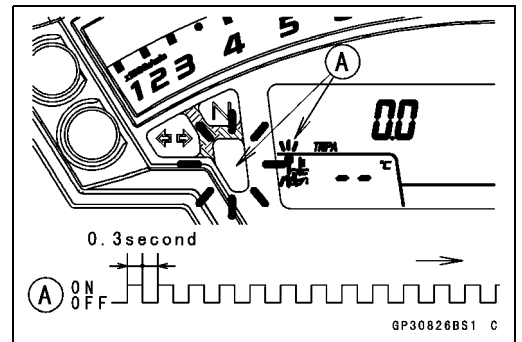
- If there is any problem in the registration, the warning indicator light (Red LED) and immobilizer warning symbol [A] blinks to display the collation error.
Immobilizer Amplifier Failure



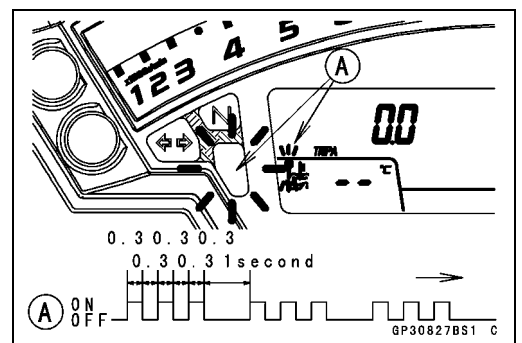
When Registered User Key is Inserted.



User Key Collation Error



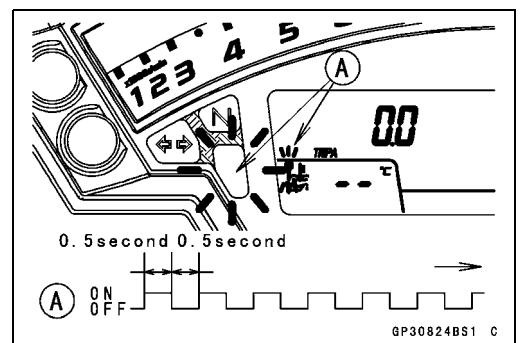
- The user key 1 is successfully registered in the ECU.
- The warning indicator light (Red LED) and immobilizer warning symbol [A] blinks 3 times and stops for 1 second and then repeats this cycle.



- Turn the user key 1 to OFF and remove the user key 1.
- The warning indicator light (Red LED) and immobilizer warning symbol [A] blinks to display the registration mode.

NOTE

- Turn OFF the ignition switch and wait for the period of 15 seconds or more. The registration mode automatically finishes and the warning indicator light (Red LED) and immobilizer warning symbol will switch off.
- This procedure registered the registered user key and one user key.
- Continue with the procedure to register the second and later keys before the 15 seconds period has elapsed.

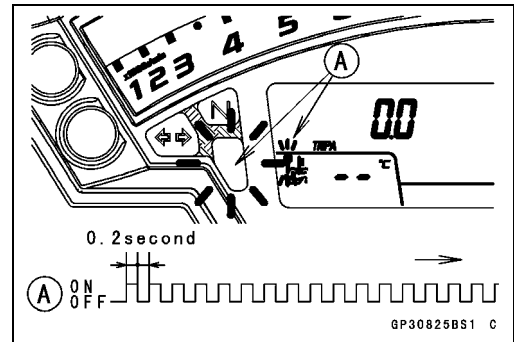


- Insert the user key 2 to the ignition switch and turn it to ON.

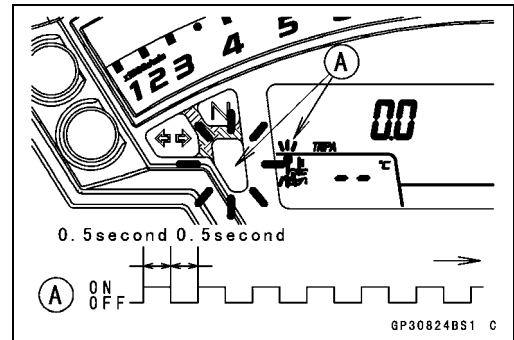
16-80 ELECTRICAL SYSTEM

Immobilizer System (Equipped Models)

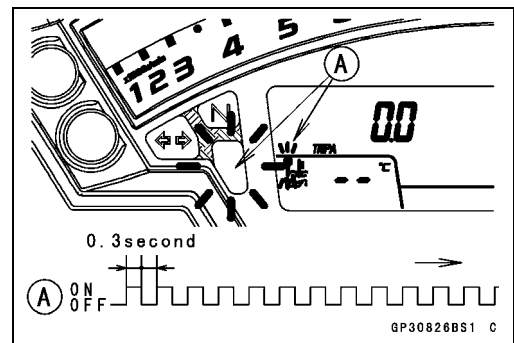
○If there is any problem in the registration, the warning indicator light (Red LED) and immobilizer warning symbol [A] blinks to display the collation error.
 Immobilizer Amplifier Failure



When Registered User Key is Inserted.



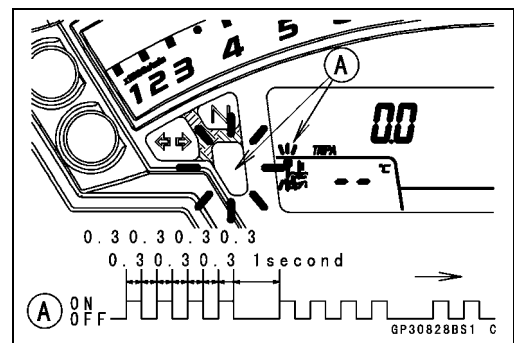
User Key Collation Error



- The user key 2 is registered in the ECU.
- The warning indicator light (Red LED) and immobilizer warning symbol [A] blinks 4 times and stops for 1 second and then repeats this cycle.
- This procedure has registered the registered and 2 user keys.
- Continue with the procedure to register an additional one user key.

NOTE

○The ECU can store up the five key codes.



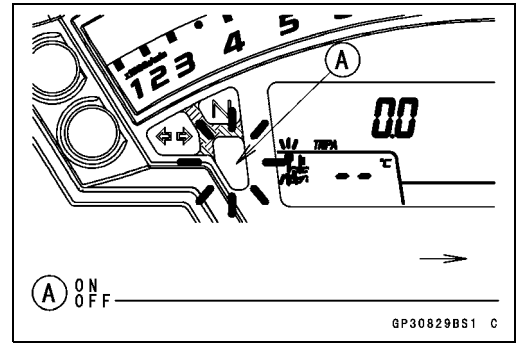
User Key Indicator Light and Symbol Blinks

	Indicator Light and Symbol Blinks	Indicator Light and Symbol Stop	Remarks
User Key 3	5 times	1 seconds	Repeat

- Turn OFF the ignition switch and wait for period of more than 15 seconds.
- The registration mode automatically ends.

Immobilizer System (Equipped Models)

- The warning indicator light (Red LED) goes off [A].



- Remove the key registration unit, key registration adapter and install the immobilizer/Kawasaki diagnostic system connector cap.

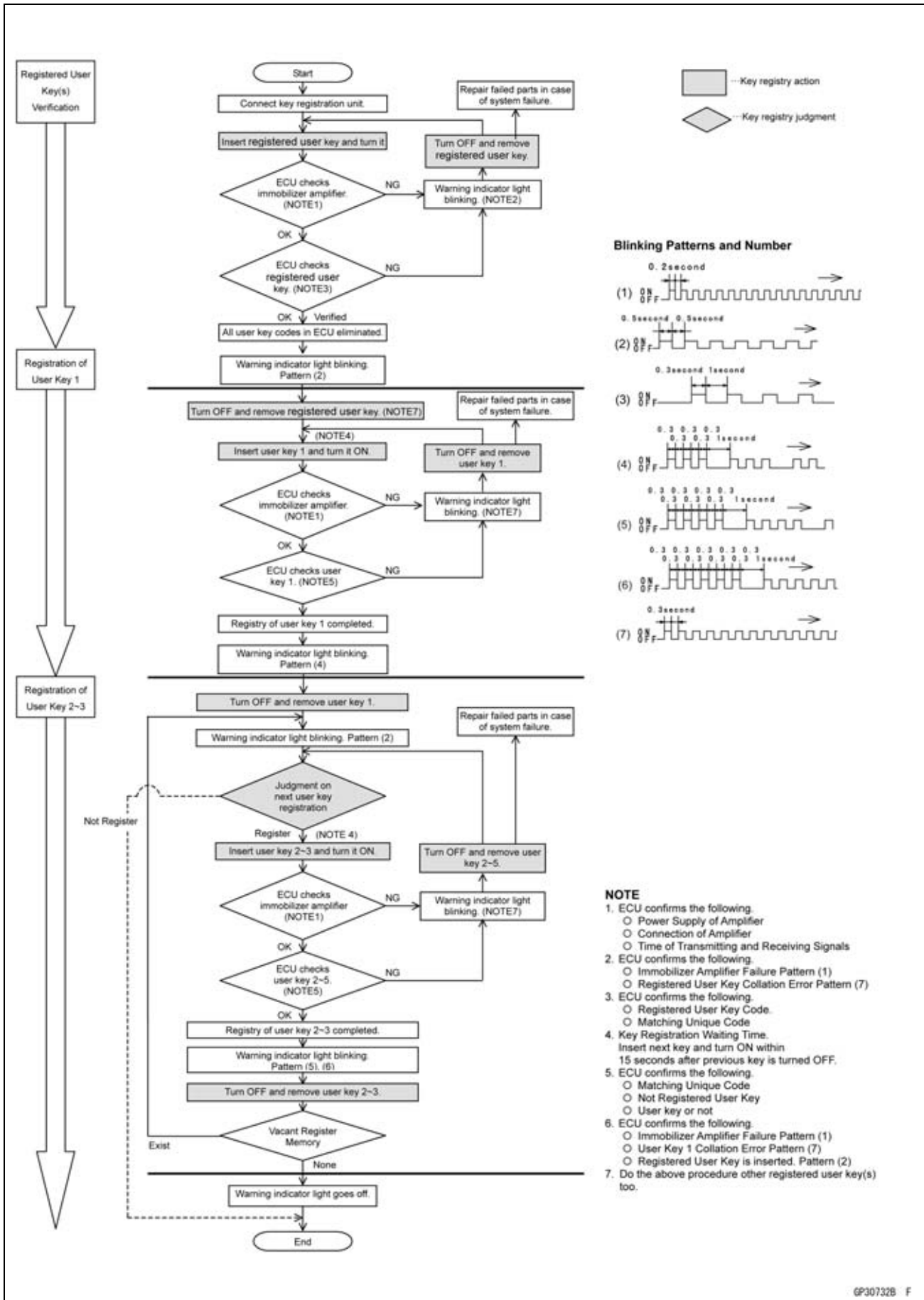
NOTE

- Turn the ignition switch to ON with the registered user key.
- Check that the engine can be started using all registered user keys.

16-82 ELECTRICAL SYSTEM

Immobilizer System (Equipped Models)

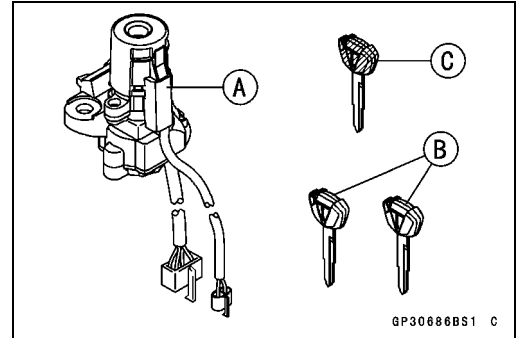
Spare User Key Registration Flow Chart



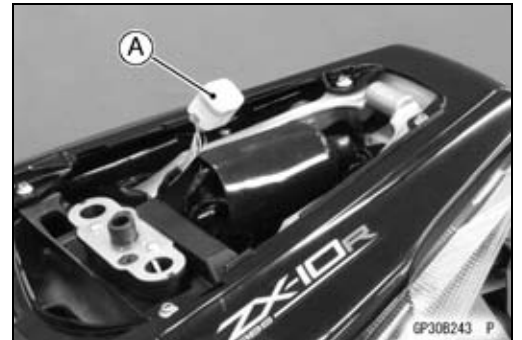
Immobilizer System (Equipped Models)

Case 2: When the ignition switch is faulty and to be replaced.

- Prepare a new ignition switch [A] and two new user keys [B].
- These parts are available as a set. Prepare the current registered user key [C].



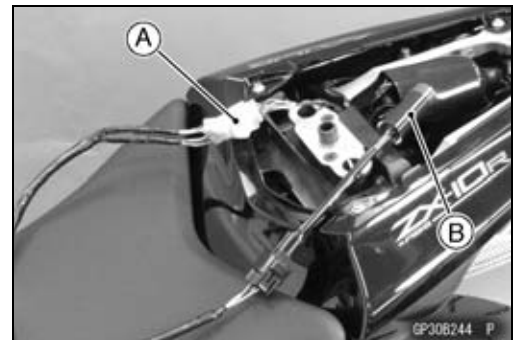
- Remove:
 - Ignition Switch (see Immobilizer System Parts Replacement)
 - Rear Seat (see Rear Seat Removal in the Frame chapter)
- Remove the immobilizer/Kawasaki diagnostic system connector cap [A].



- Connect the key registration unit [A] and key registration adapter [B].

Special Tools - Key Registration Unit: 57001-1582
Key Registration Adapter: 57001-1746

- Temporary connect the following parts.
 - ECU
 - Relay Box
 - Intake Air Temperature Sensor

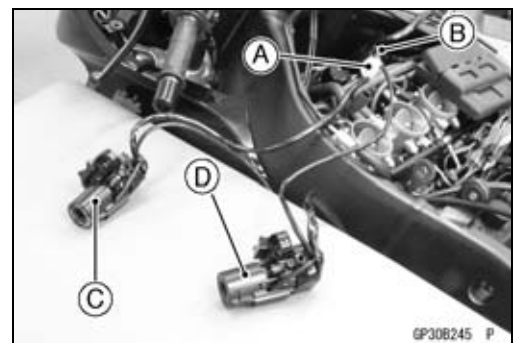


- Connect:
 - New Ignition Switch Lead Connector [A]
 - Immobilizer Antenna Lead Connector [B]

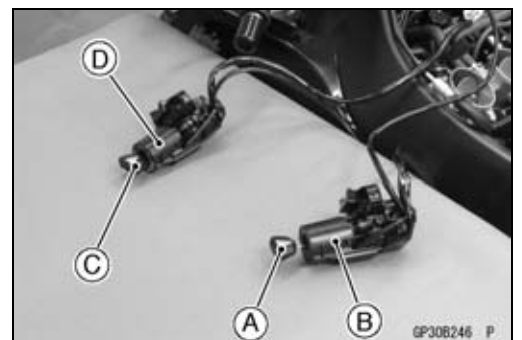
NOTE

○ Keep the ignition switches more than 15 cm (5.9 in.).

[C] New Ignition Switch
 [D] Current Ignition Switch



- Insert the current registered user key [A] at the current ignition switch [B].
- Insert the new user key 1 [C] to the new ignition switch [D] and turn it to ON.

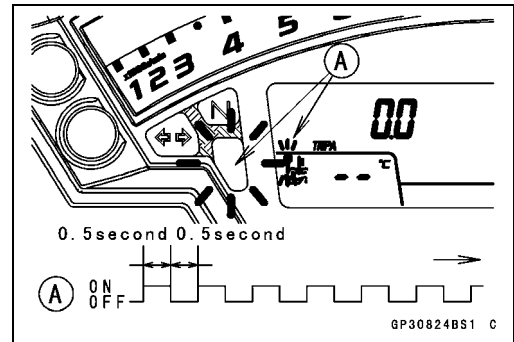


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Immobilizer System (Equipped Models)

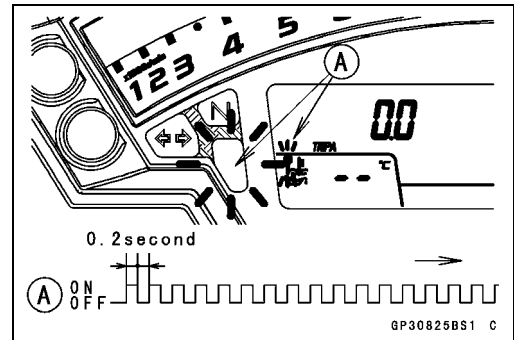
Verified

○The warning indicator light (Red LED) and immobilizer warning symbol [A] blinks to display the ECU is in the registration mode (go to the next step).

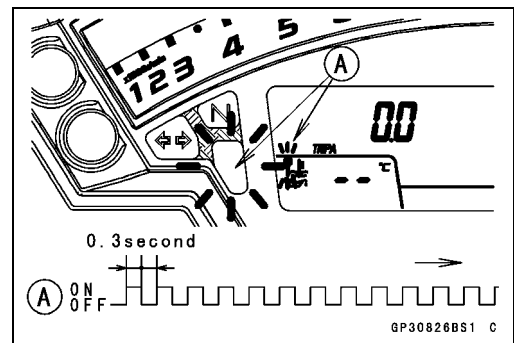


Not Verified

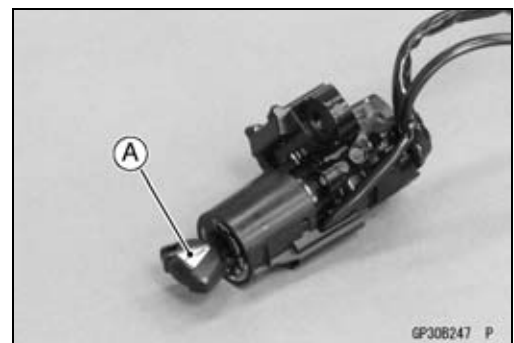
○The warning indicator light (Red LED) and immobilizer warning symbol [A] blinks to display the collation error.
Immobilizer Amplifier Failure



Registered User Key Collation Error



- Turn OFF and remove the new user key 1.
- Disconnect the immobilizer antenna connector, then connect the antenna connector of the new ignition switch.
- Insert the user key 1 [A] again into the new ignition switch and turn it to ON.

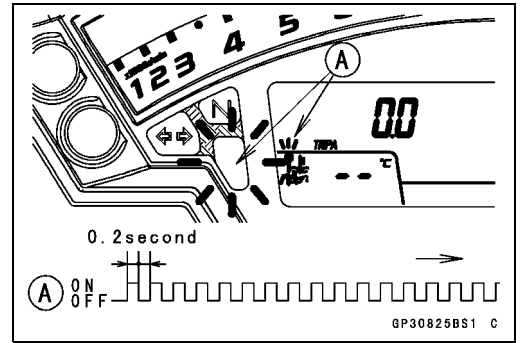


NOTE

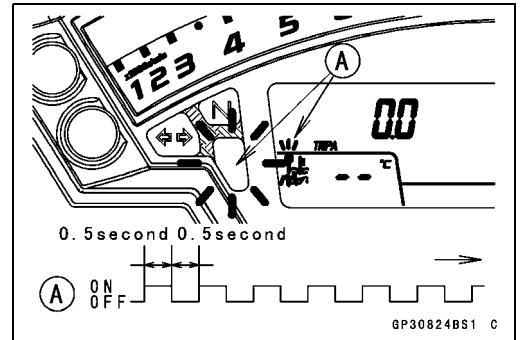
- Insert the next key and turn ON within 15 seconds after previous key is turned OFF and removed otherwise registration mode will be ended and the warning indicator light (Red LED) and immobilizer warning symbol stops blinking.
- To return to the registration mode start the registered user key verification procedure. This applies to all user key registration.
- Keep other user keys away from the ignition switch.

Immobilizer System (Equipped Models)

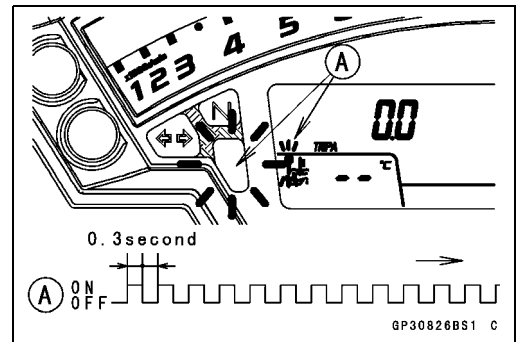
- If there is any problem in the registration, the warning indicator light (Red LED) and immobilizer warning symbol [A] blinks to display the collation error.
Immobilizer Amplifier Failure



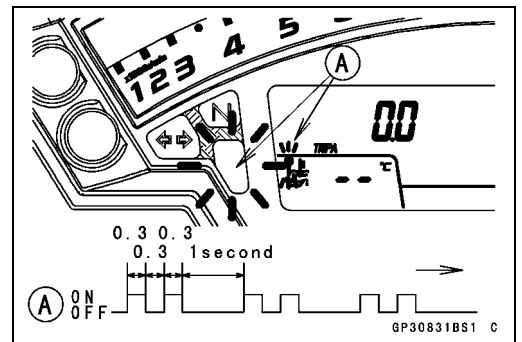
When Registered User Key is Inserted.



User Key Collation Error



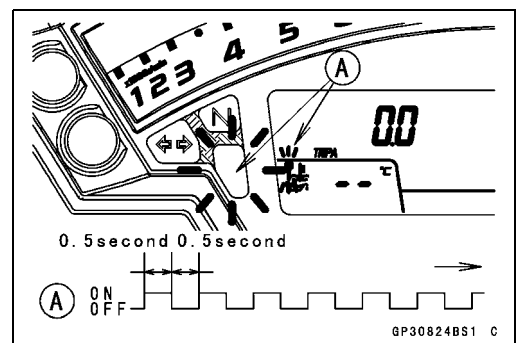
- The user key 1 is successfully registered in the ECU.
- The warning indicator light (Red LED) and immobilizer warning symbol [A] blinks 2 times and stops for 1 second and then repeats this cycle to indicate successful registering of user key 1.



- Turn OFF and remove user key 1.
- The warning indicator light (Red LED) and immobilizer warning symbol [A] blinks to display the registration mode.

NOTE

- Turn OFF the ignition switch and wait for the period more than 15 seconds. The registration mode automatically ends and warning indicator light (Red LED) goes off.
- This procedure has , registered the registered user key and one user key.
- Continue the procedure to program the second and later keys.

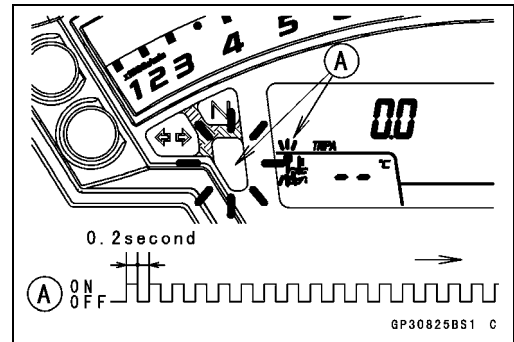


- Insert the user key 2 to the ignition switch and turn it to ON.

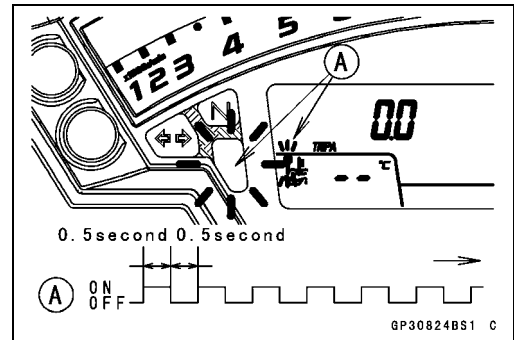
16-86 ELECTRICAL SYSTEM

Immobilizer System (Equipped Models)

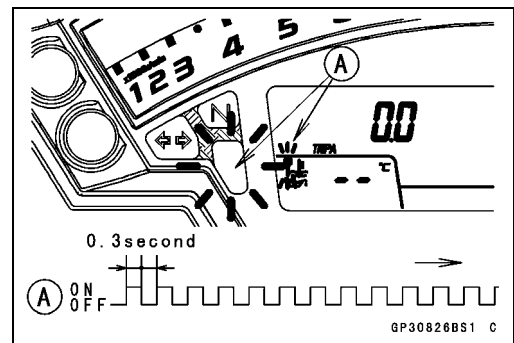
○ If there is any problem in the registration, the warning indicator light (Red LED) and immobilizer warning symbol [A] blinks to display the collation error.
Immobilizer Amplifier Failure



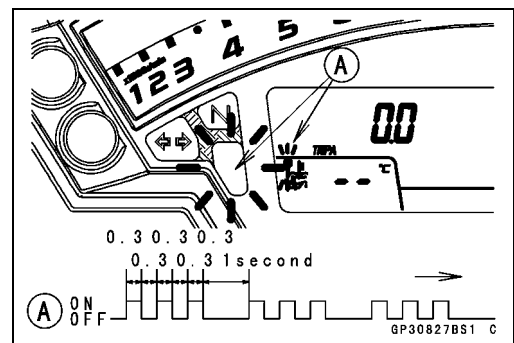
When Registered User Key is Inserted.



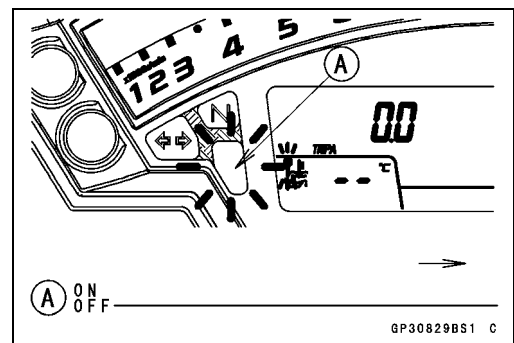
User Key Collation Error



- The user key 2 is successfully registered in the ECU.
- The warning indicator light (Red LED) and immobilizer warning symbol [A] blinks 3 times and stops for 1 second and then repeat this cycle to indicate successful programming of user key 2.
- Turn OFF the ignition switch and wait for period more than 15 seconds.
- The registration mode automatically ends.



- The warning indicator light (Red LED) goes off [A].



Immobilizer System (Equipped Models)

- 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 user key.
- Check that the engine can be started using all registered user keys.

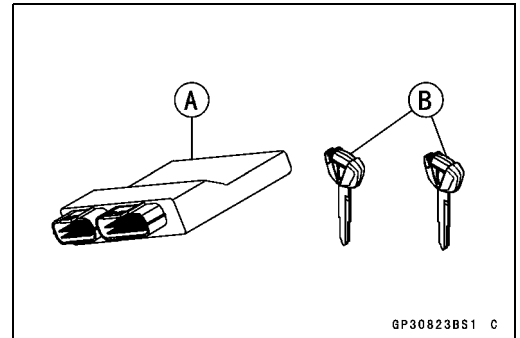
- Install the new ignition switch (see Immobilizer System Parts Replacement).

Case 3: When the ECU is faulty and has to be replaced.

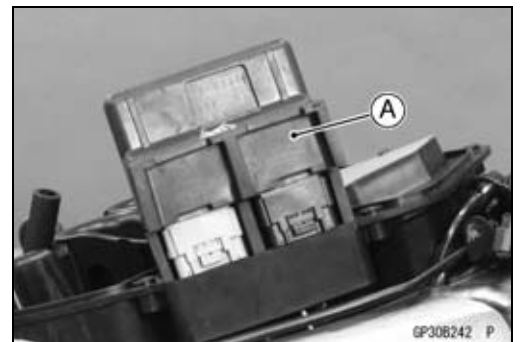
- Prepare a new ECU [A] and current registered user key(s) [B].

NOTE

- The key registration unit is not required.
- After replacing the ECU, be sure to register the 2 user keys. If the 2 keys are not registered, the engine can not be started.



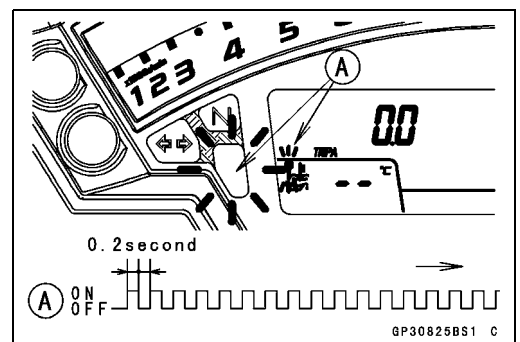
- Replace the ECU [A] (see ECU Removal/Installation in the Fuel System (DFI) chapter).



- Insert the current registered user key into the ignition switch and turn it to ON.

- If there is any problem in the registration, the warning indicator light (Red LED) and immobilizer warning symbol [A] blinks to display the collation error.

Immobilizer Amplifier Failure

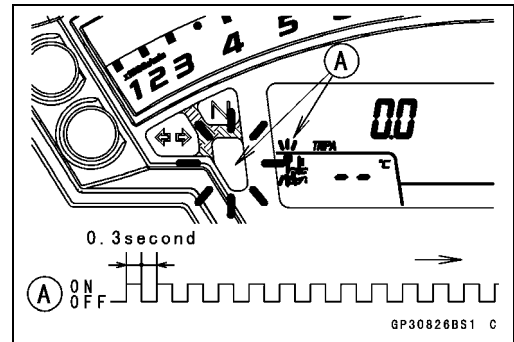


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Immobilizer System (Equipped Models)

Registered User Key Collation Error

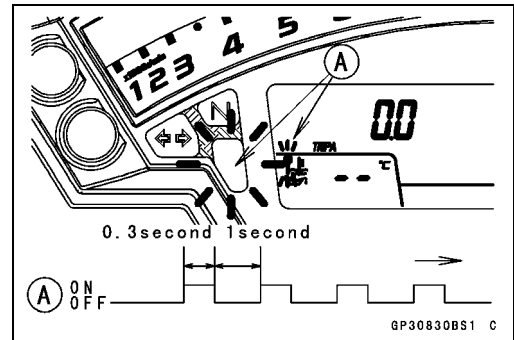
- The registered user key is registered in the ECU.
- The warning indicator light (Red LED) and immobilizer warning symbol [A] blinks 1 time and stops for 1 second and the repeats this cycle to indicate successful registration of the registered user key.



- Turn OFF the registered user key and remove it.
- The warning indicator light (Red LED) and immobilizer warning symbol [A] blinks to display the registration mode.

NOTE

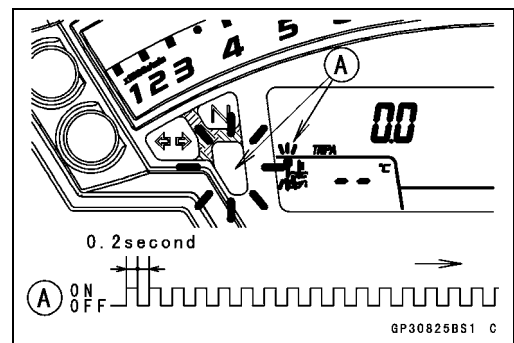
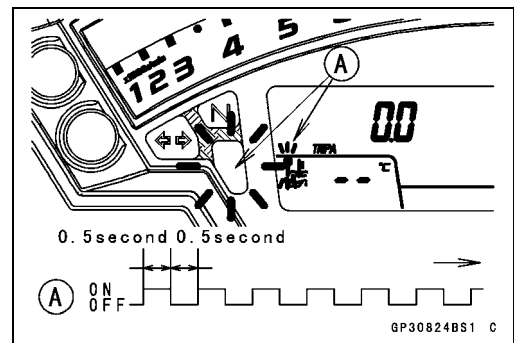
- Insert next key and turn ON within 15 seconds after previous key is turned OFF and removed otherwise registration mode will be ended and the warning indicator light (Red LED) goes off.
- To return to the registration mode start the registered user key verification procedure. This applies to all user key registration.



- Insert the other remaining registered user key to the ignition switch and turn it to ON.

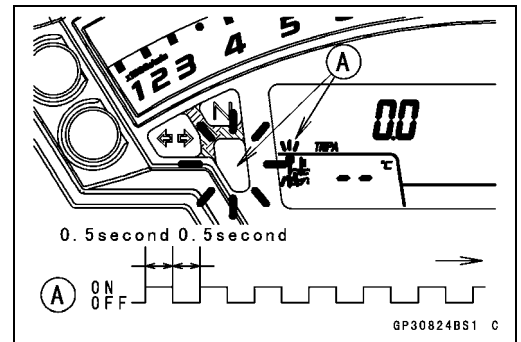
NOTE

- Keep the other user keys away from the immobilizer antenna.
 - If there is any problem in the registration, the warning indicator light (Red LED) and immobilizer warning symbol [A] blinks to display the collation error.
- Immobilizer Amplifier Failure

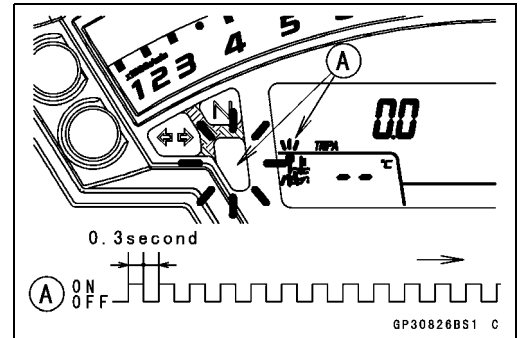


Immobilizer System (Equipped Models)

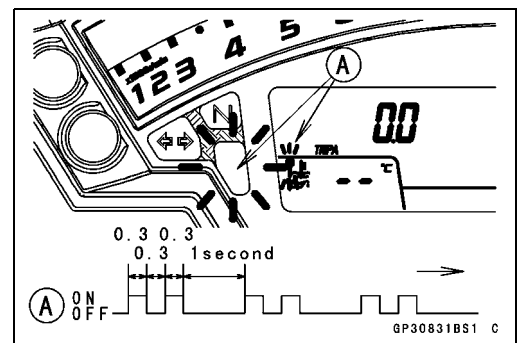
When Registered User Key is Inserted.



User Key Collation Error



- The other remaining user key is registered in the ECU.
- The warning indicator light (Red LED) and immobilizer warning symbol [A] blinks 2 times and stops for 1 second and then repeats this cycle to indicate successful registration of user key 1.

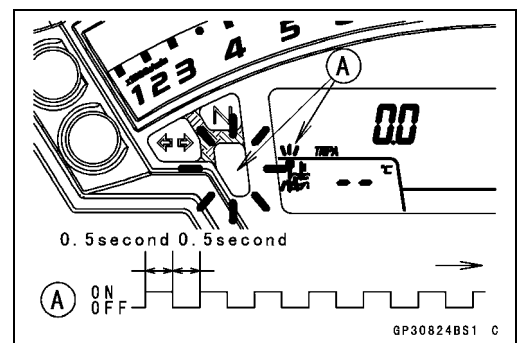


- Turn OFF and remove the other remaining user key.
- The warning indicator light (Red LED) and immobilizer warning symbol [A] blinks to display the registration mode codes.

NOTE

- Insert next key and turn ON within 15 seconds after previous key is turned OFF and removed otherwise registration mode will be ended and the warning indicator light (Red LED) goes off.
- To return to the registration mode start the registered user key verification procedure. This applies to all user key registration.

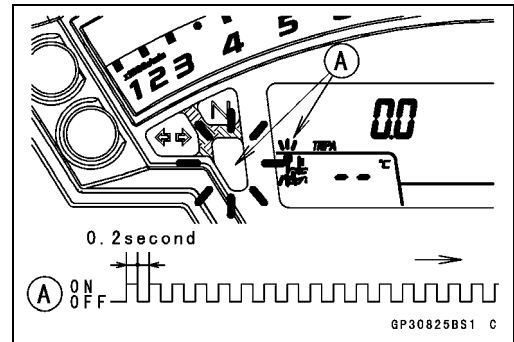
- Insert the user key 1 to the ignition switch and turn it to ON.



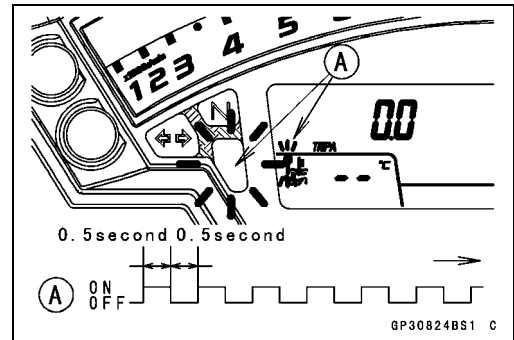
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Immobilizer System (Equipped Models)

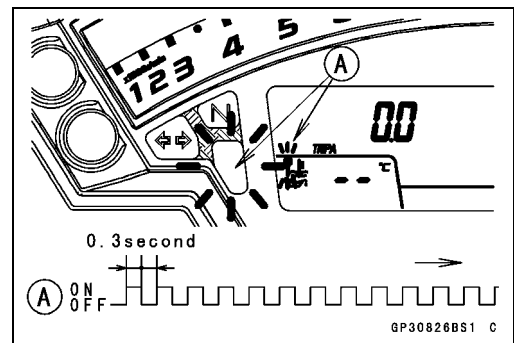
○If there is any problem in the registration, the warning indicator light (Red LED) and immobilizer warning symbol [A] blinks to display the collation error code.
Immobilizer Amplifier Failure



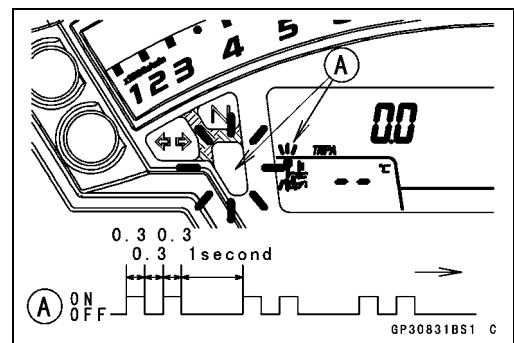
When Registered User Key is Inserted.



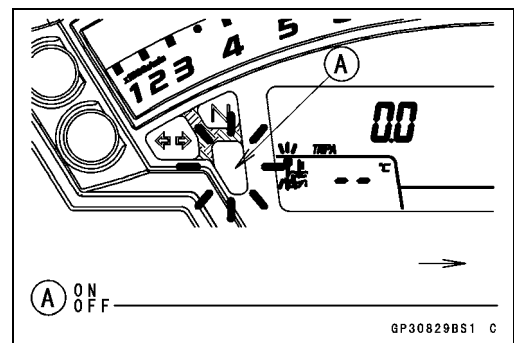
User Key Collation Error



- The user key 1 is registered in the ECU.
- The warning indicator light (Red LED) and immobilizer warning symbol [A] blinks 2 times and stops for 1 second and then repeats this cycle to indicate successful registration of user key 1.
- Turn the ignition switch to OFF and wait for period more than 15 seconds.
- The registration mode automatically ends.



- The warning indicator light (Red LED) goes off [A].



Immobilizer System (Equipped Models)

NOTE

- Turn the ignition switch to ON with the registered user key.
- Check that the engine can be started using all registered user keys.

Case 4: When all registered user keys are faulty or lost.

The all registered user keys replacement is considered very rare case. However if it is required, the following is necessary.

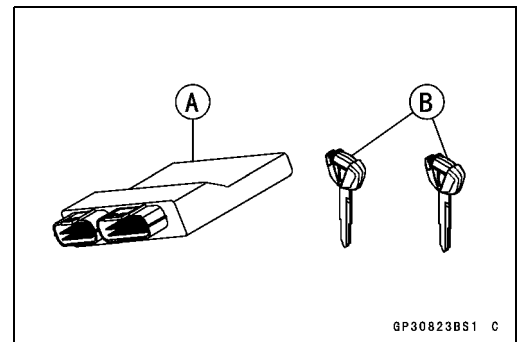
NOTE

- The ECU must be replaced with a new one because the registered user key code that is registered in the current ECU can not be rewritten.

- Prepare a new ECU [A] and 2 new user keys [B].

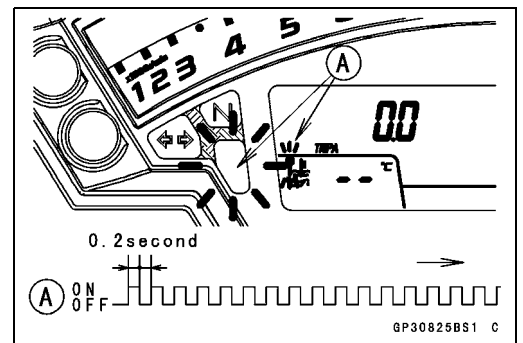
NOTE

- The key registration unit is not required.
- The key registration process is same as the electric control unit replacement.

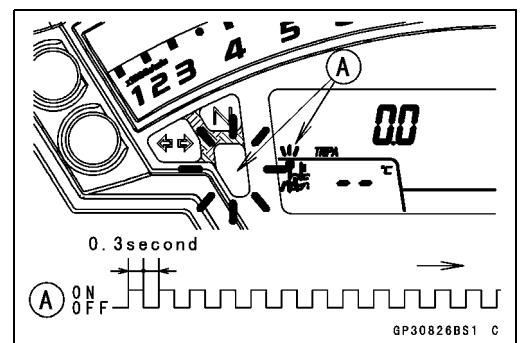


- Insert the first user key into the ignition switch and turn it ON.

- If there is any problem in the registration, the warning indicator light (Red LED) and immobilizer warning symbol [A] blinks to display the collation error.
Immobilizer Amplifier Failure



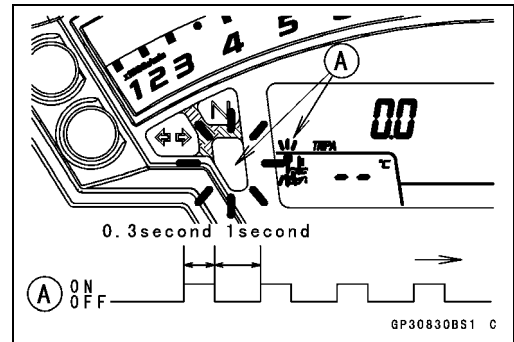
User Key Collation Error



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Immobilizer System (Equipped Models)

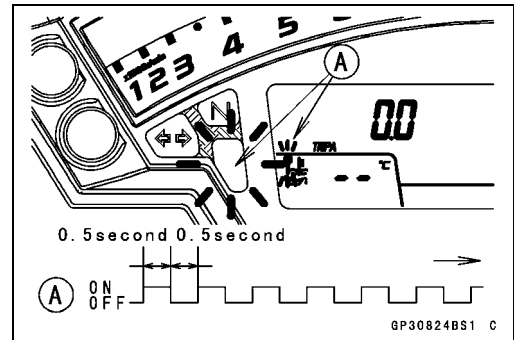
- The first user key is registered in the ECU.
- The warning indicator light (Red LED) and immobilizer warning symbol [A] blinks 1 time and stops for 1 second and the repeats this cycle to indicate successful registration of the first user key.



- Turn OFF the first user key and remove it.
- The warning indicator light (Red LED) and immobilizer warning symbol [A] blinks to display the registration mode.

NOTE

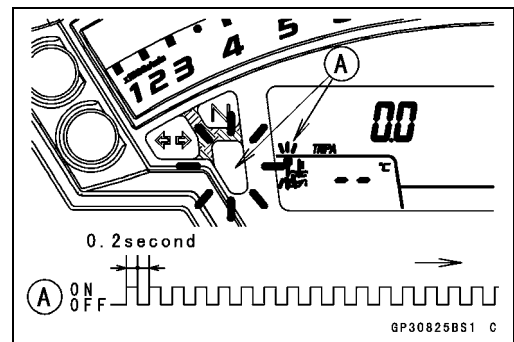
- Insert next key and turn ON within 15 seconds after previous key is turned OFF and removed otherwise registration mode will be ended and the warning indicator light (Red LED) goes off.
- To return to the registration mode start the registered user key verification procedure. This applies to all user key registration.



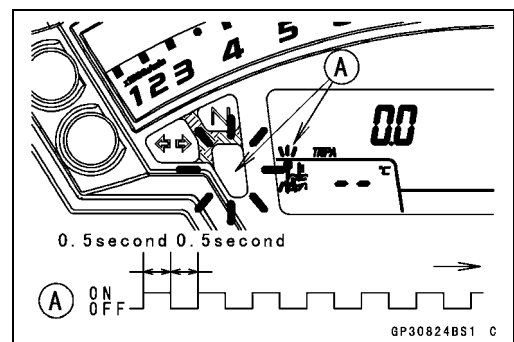
- Insert the second user key to the ignition switch and turn it ON.

NOTE

- Keep the other user keys away from the immobilizer antenna.
- If there is any problem in the registration, the warning indicator light (Red LED) and immobilizer warning symbol [A] blinks to display the collation error.
Immobilizer Amplifier Failure



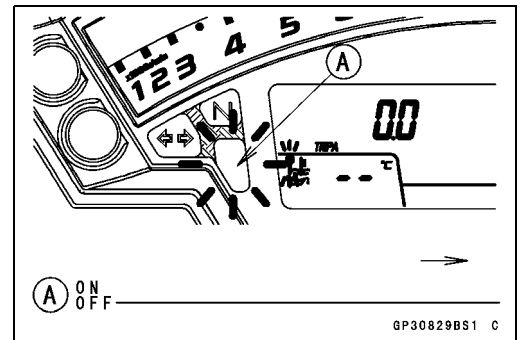
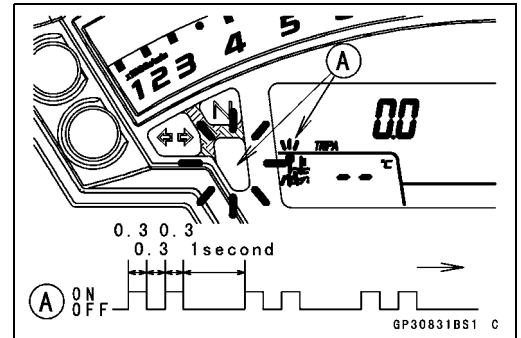
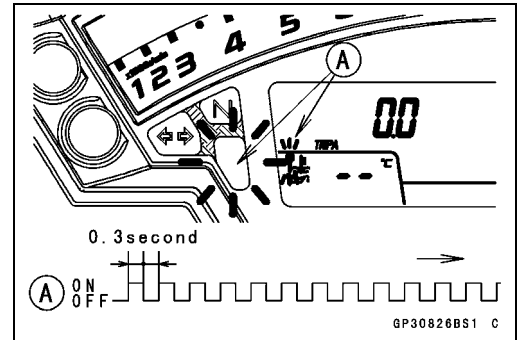
When Registered User Key is Inserted



Immobilizer System (Equipped Models)

User Key Collation Error

- The second user key is registered in the ECU.
 - The warning indicator light (Red LED) and immobilizer warning symbol [A] blinks 2 times and stops for 1 second and then repeats this cycle to indicate successful registration of second user key.
 - Turn the ignition switch to OFF and wait for period more than 15 seconds.
 - The registration mode automatically ends.
-
- Warning indicator light (Red LED) [A] goes off.



NOTE

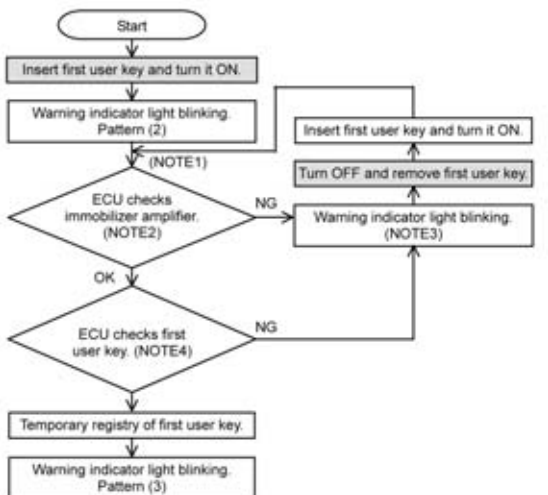
- Turn the ignition switch to ON with the registered user key.
- Check that the engine can be started using all registered user keys.

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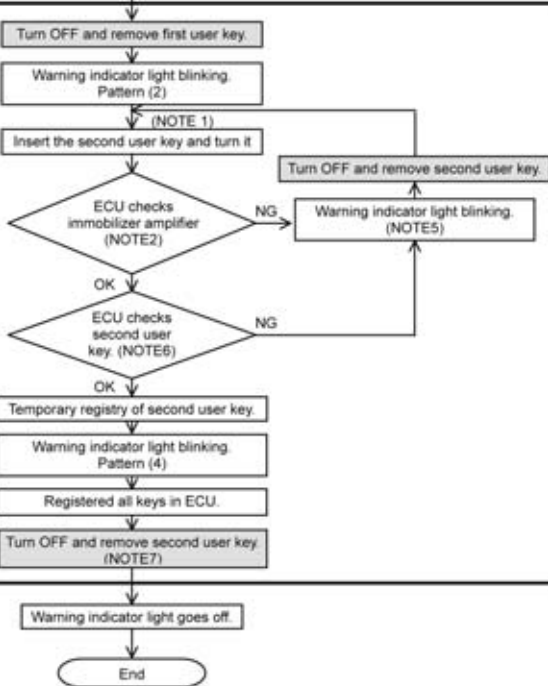
Immobilizer System (Equipped Models)

All Keys Initial Registration Flow Chart

Registration of First User Key

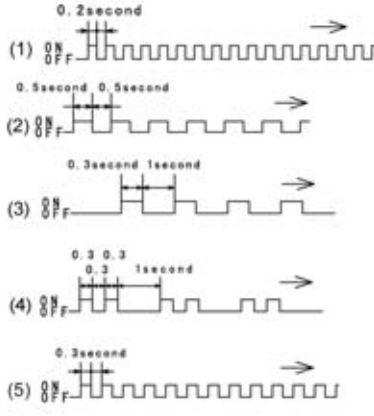


Registration of Second User



Key registry action

Blinking Patterns and Number



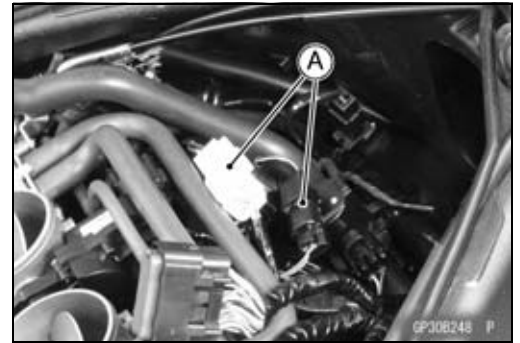
- NOTE**
- Key Substitute Time
Insert next key and turn ON within 15 seconds after previous key is turned OFF.
 - ECU confirms the following.
 - Power Supply of Amplifier
 - Connection of Amplifier
 - Time of Transmitting and Receiving Messages.
 - ECU confirms the following.
 - Immobilizer Amplifier Failure Pattern (1)
 - User Key Collation Error Pattern (5)
 - ECU confirms the following.
 - User Key or Not
 - Match the Unique Code
 - ECU confirms the following.
 - Immobilizer Amplifier Failure Pattern (1)
 - Second User Key Collation Error Pattern (5)
 - Registered User Key is Inserted Pattern (2)
 - ECU confirms the following.
 - User Key or Not.
 - Match the Unique Code
 - Not Registered User Key
 - When the ECU-registered key is turned "OFF", ECU keeps the power "ON" for two seconds. And then, in two seconds after the key is "OFF", ECU turns the power "OFF".

Immobilizer System (Equipped Models)

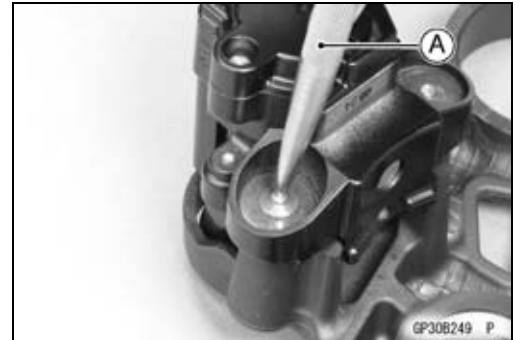
Immobilizer System Parts Replacement

Ignition Switch Replacement

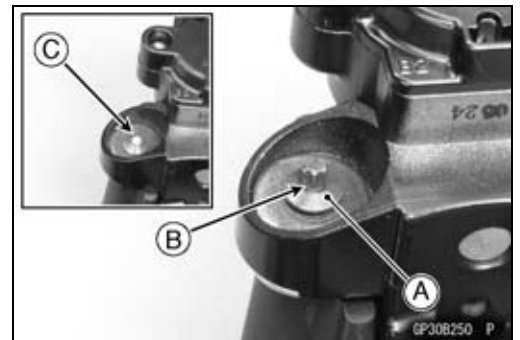
- Remove:
 - Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter)
 - Disconnect the lead connectors [A].



- Remove:
 - Steering Stem Head (see Stem, Stem Bearing 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.

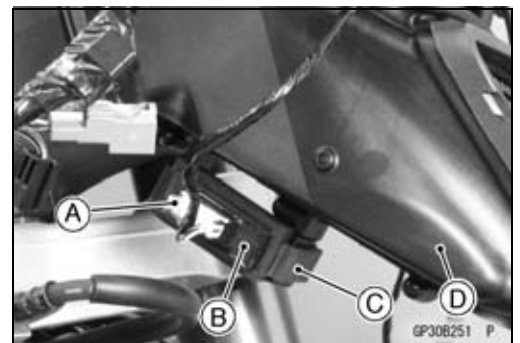


- Register the more than two user keys (see key Registration).
- Tighten a new Torx bolt [A] until the bolt head [B] is broken [C].
- Run the leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).



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 air intake duct [D].



ECU Replacement

- Refer to the ECU Removal/Installation in the Fuel System (DFI) chapter.

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Immobilizer System (Equipped Models)

Immobilizer Relational Parts Replacement Chart

		Failed or Lost Part			
		User Key	Ignition Switch	Amplifier	ECU
*	User Key	●	○		
	Ignition Switch		●		
	Amplifier			●	
	ECU	○			●

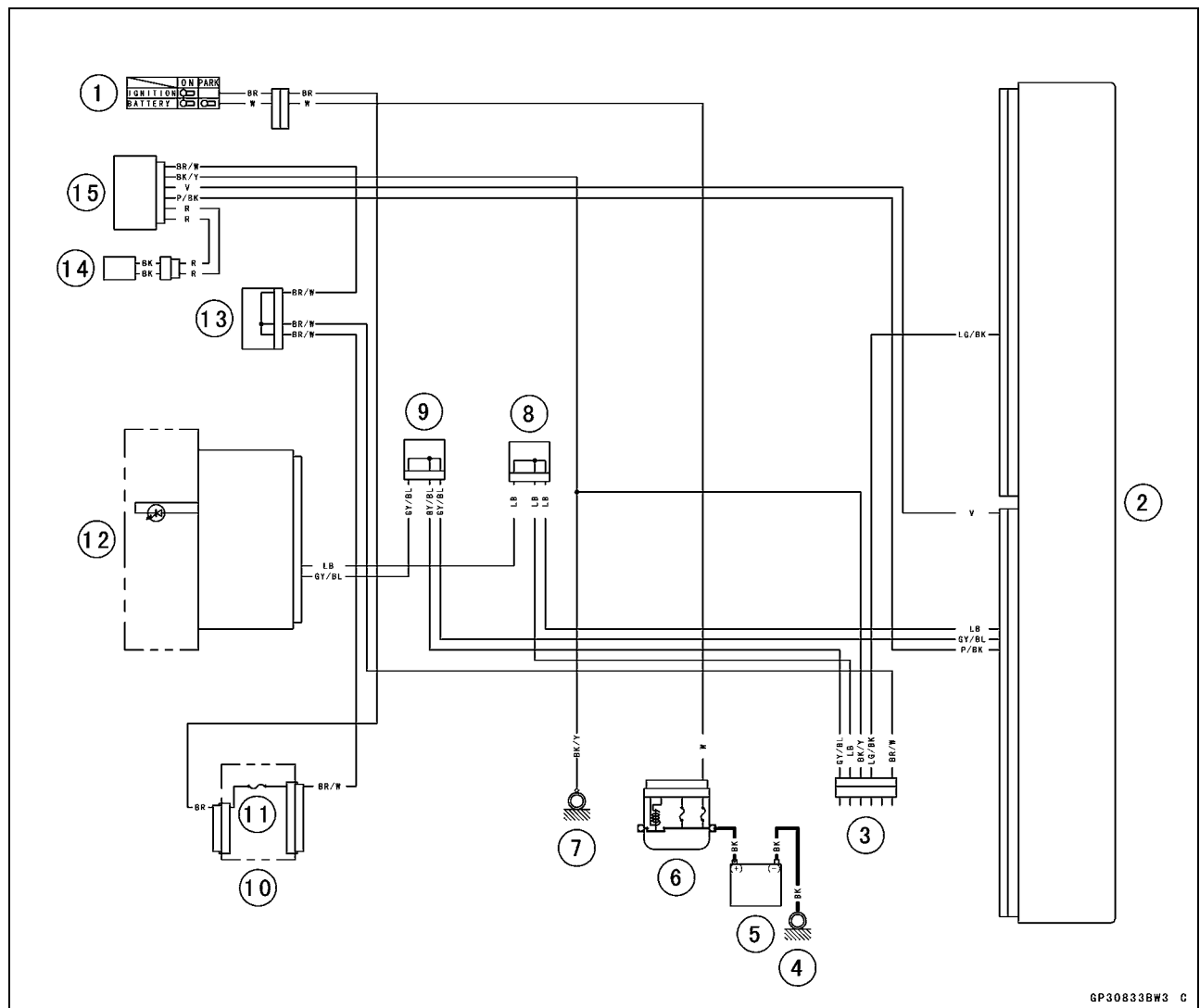
*	Replacement Part
●	Main Replacement Part
○	Additional Replacement Part

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



GP30833BW3 C

1. Ignition Switch
2. ECU
3. Kawasaki Diagnostic System/immobilizer Connector
4. Engine Ground
5. Battery
6. Main Fuse 30 A
7. Frame Ground 1
8. Joint Connector D
9. Joint Connector C
10. Fuse Box 1
11. Ignition Fuse 15 A
12. Meter Unit
13. Joint Connector F
14. Immobilizer Antenna
15. Immobilizer Amplifier

16-98 ELECTRICAL SYSTEM

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 hand tester, check to see that only the connections shown in the table have continuity.

Special Tool - Hand Tester: 57001-1394

○ 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.

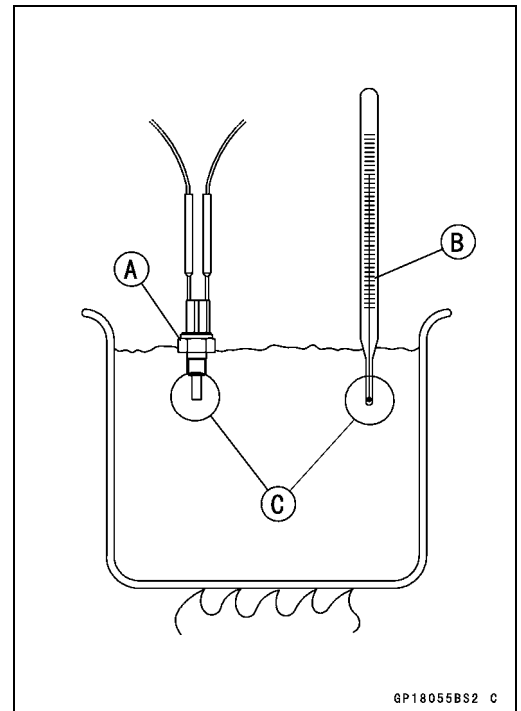
Switches and Sensors

Water Temperature Sensor Inspection

- Remove the water temperature sensor (see Water Temperature Sensor Removal/Installation in the Fuel System (DFI) 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 the hand tester, measure the internal resistance of the sensor.
- ★ If the hand tester 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).
- Disconnect the fuel pump lead connector [A].



- 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].

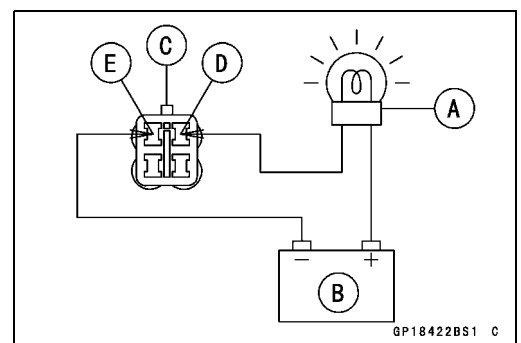
Connections:

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.



16-100 ELECTRICAL SYSTEM

Switches and Sensors

- 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.

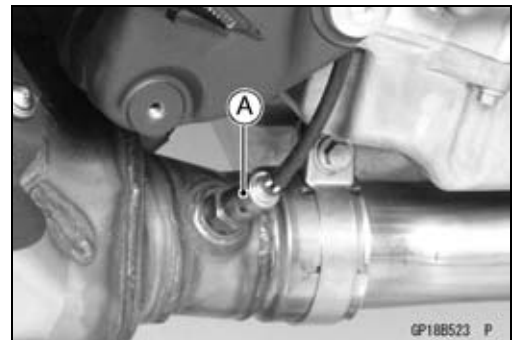
Oxygen Sensor Removal (Equipped Models)

- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
 - Right Lower Fairing (see Lower Fairing Removal in the Frame 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.

- Remove the oxygen sensor [A].

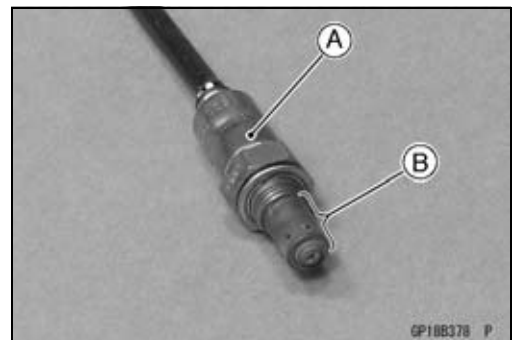


Oxygen Sensor Installation (Equipped Models)

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).



Switches and Sensors

Oxygen Sensor Inspection (Equipped Models)

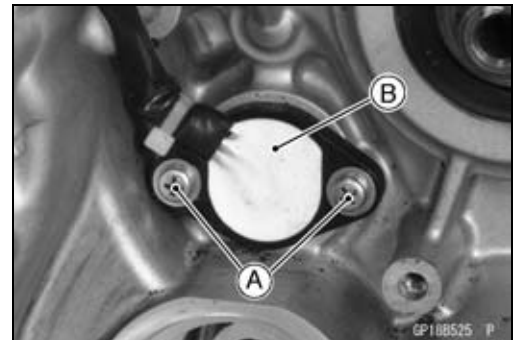
- Refer to the Oxygen Sensor Inspection in the Self-Diagnosis System chapter.

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:
 - Oil Pump (see Oil pump Removal in the Engine Lubrication System chapter)
 - Engine Sprocket (see Engine Sprocket Removal in the Final Drive chapter)
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
- Disconnect the connector [A].
- Remove:
 - Screws [A]
 - Gear Position Switch [B]



- Remove the pins [A] and springs from the shift drum.

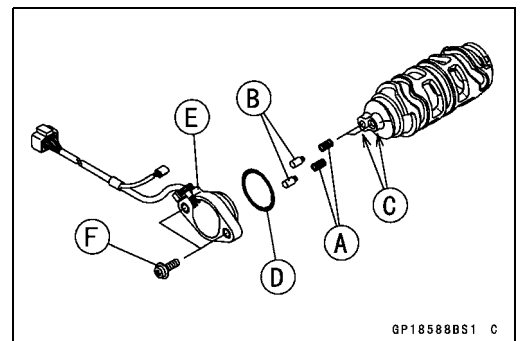


Gear Position Switch Installation

- 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].
- Apply a non-permanent locking agent to the threads of the gear position switch screws [F].
- Tighten:

Torque - Gear Position Switch Screws: 2.9 N·m (0.30 kgf·m, 26 in·lb)

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



16-102 ELECTRICAL SYSTEM

Switches and Sensors

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].

- Set the hand tester [A] to the $\times 1 \text{ k}\Omega$ or $\times 100 \Omega$ range and connect it 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]

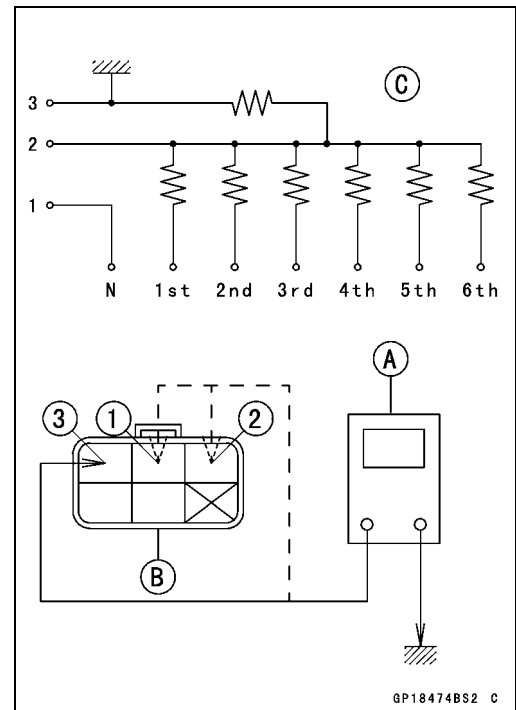
- [1] LG Lead
- [2] G/R Lead
- [3] BK Lead

Special Tool - Hand Tester: 57001-1394

Gear Position Switch Resistance

Gear Position	Connections		
	[1]-Ground	[2]-Ground	[3]-Ground
Neutral	about 0 Ω	8.64 ~ 9.54 k Ω	about 0 Ω
1st	–	3.00 ~ 3.32 k Ω	about 0 Ω
2nd	–	1.71 ~ 1.89 k Ω	about 0 Ω
3rd	–	1.07 ~ 1.19 k Ω	about 0 Ω
4th	–	695 ~ 769 Ω	about 0 Ω
5th	–	430 ~ 476 Ω	about 0 Ω
6th	–	248 ~ 274 Ω	about 0 Ω

★If the tester reading is not as specified, replace the gear position switch with a new one.



Relay Box

Relay Box Removal

- Remove the left fuel tank cover (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Disconnect the connectors.
- Pull out the relay box from the rubber protector.

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 the hand tester and one 12 V battery to the relay box as shown in the figure (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 hand 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.

16-104 ELECTRICAL SYSTEM

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

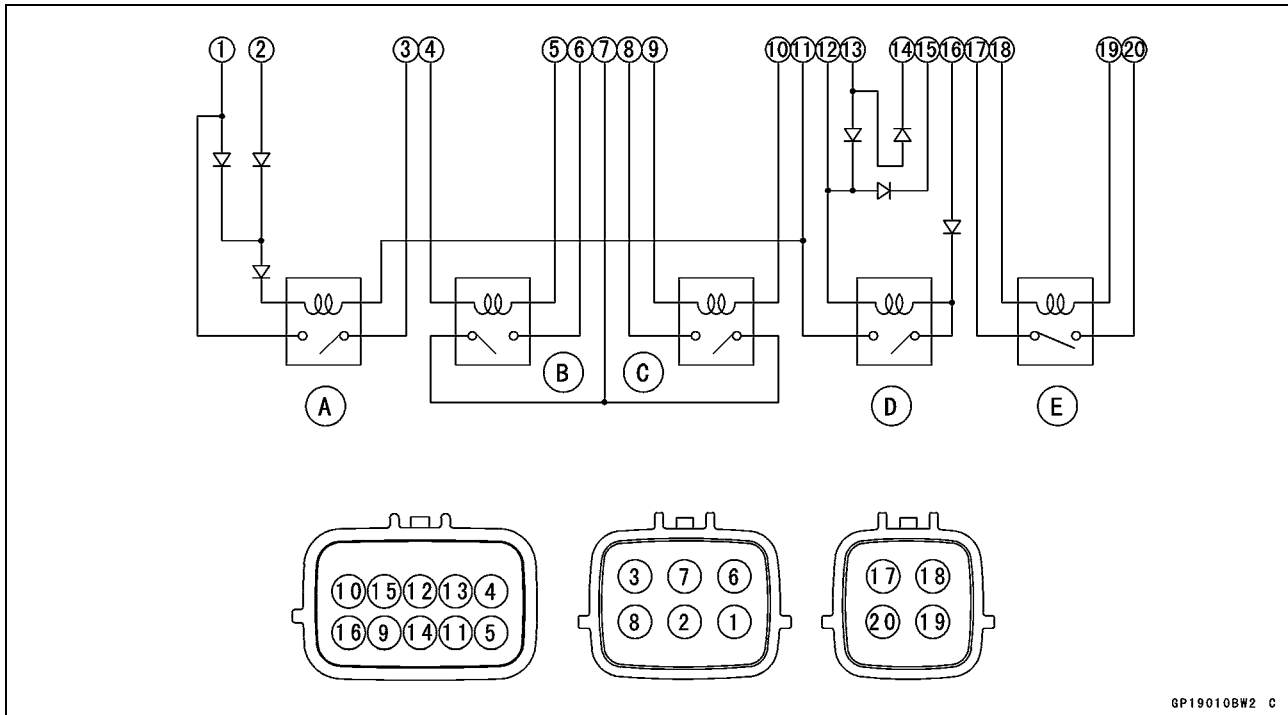
Tester Connection	1-11, 2-11, 12-13, 12-15, 12-16, 13-14, 13-15
-------------------	---

★ 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



GP190108W2 C

- 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

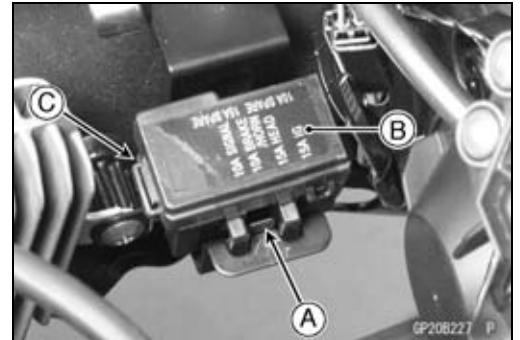
- Take the starter relay off the rear fender (see Starter Relay Inspection).
- Remove the starter relay cover.
- Take the fuses [A] off the starter relay with needle nose pliers.



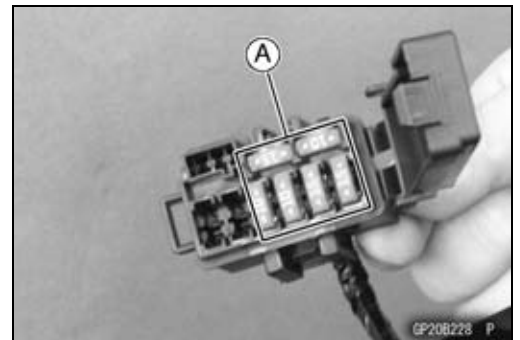
Fuse Box Fuse Removal

Fuse Box 1

- Remove the left upper inner fairing (see Upper Inner Fairing Removal in the Frame chapter).
- Unlock the hook [A] to take off the fuse box 1 [B].
- Unlock the hook [C] to lift up the lid.

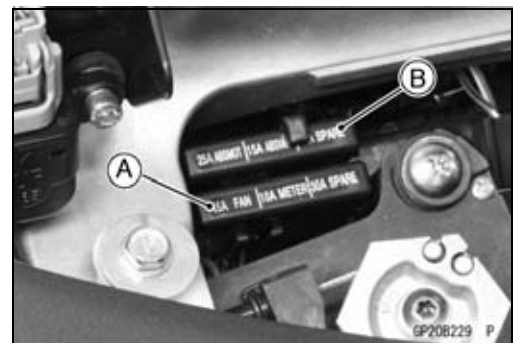


- Pull the fuses [A] straight out of the fuse box 1 with needle nose pliers.

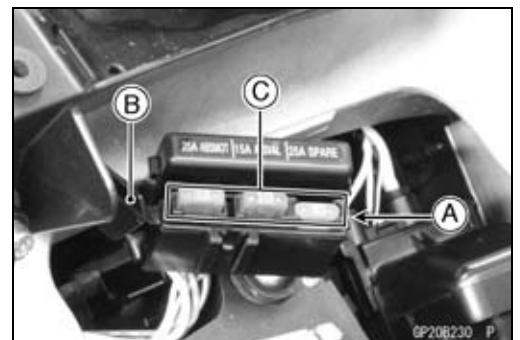


Fuse Box 2

- Remove the upper seat cover (see Seat Cover Removal in the Frame chapter).
- Take the fuse box 2 [A] off the rear fender.
Fuse Box 3 [B] (KIBS Equipped Model)



- Unlock the hook [A] to lift up the lid [B].
- Pull the fuses [C] straight out of the fuse box 2 with needle nose pliers.



16-106 ELECTRICAL SYSTEM

Fuse

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 Inspection

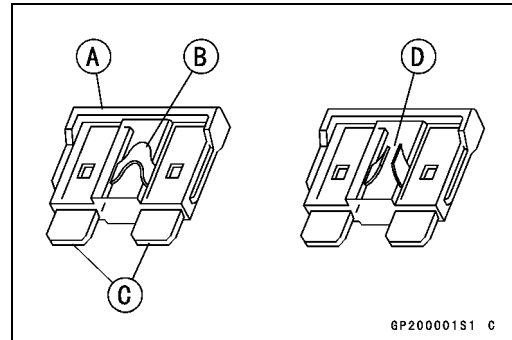
- Remove the fuse.
- Inspect the fuse element.
- ★ If it is blown out, replace the fuse. Before replacing a blown fuse, always check the amperage in the affected circuit. If the amperage is equal to or greater than the fuse rating, check the wiring and related components for a short circuit.

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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17-4 SELF-DIAGNOSIS SYSTEM

Specifications

Item	Standard
Digital Fuel Injection System	
Main Throttle Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	DC 0.64 ~ 0.68 V at idle throttle opening DC 3.89 ~ 4.09 V at full throttle opening (for reference)
Resistance	4 ~ 6 k Ω
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 2.44 ~ 2.69 V at 25°C (77°F)
Resistance	5.4 ~ 6.6 k Ω at 0°C (32°F) 0.29 ~ 0.39 k Ω at 80°C (176°F)
Water Temperature Sensor:	
Output Voltage	About DC 2.80 ~ 2.97 V at 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 0.8 ~ 1.0 V at subthrottle valve full close position (for reference) DC 4.28 ~ 4.32 V at subthrottle valve full open position
Resistance	4 ~ 6 k Ω
Subthrottle Valve Actuator:	
Resistance	About 6.3 ~ 9.5 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 at 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 k Ω
Immobilizer Antenna (Equipped Models):	
Resistance	About 3.0 ~ 4.6 Ω
Exhaust Butterfly Valve Actuator:	
Resistance	5 ~ 200 Ω (for reference)

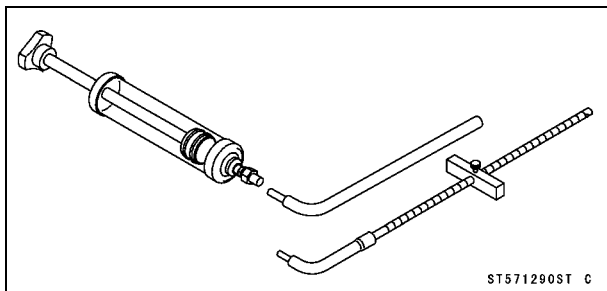
Specifications

Idle Speed Control Valve Actuator: Resistance	64 ~ 96 Ω
Input Voltage	About DC 9 ~ 11 V and then 1 V or About DC 9 ~ 11 V
KIBS System (Equipped Models)	
Wheel Rotation 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 k Ω

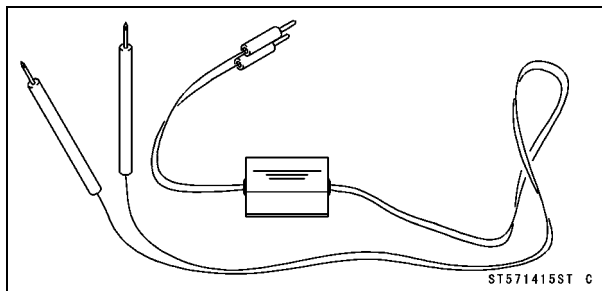
17-6 SELF-DIAGNOSIS SYSTEM

Special Tools

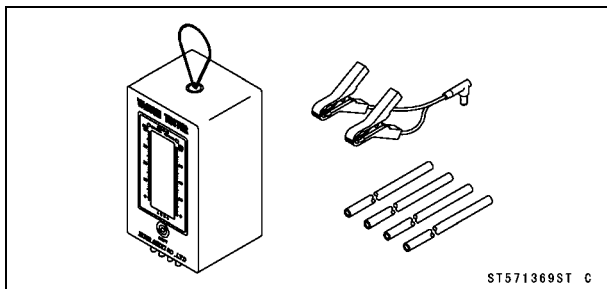
Fork Oil Level Gauge:
57001-1290



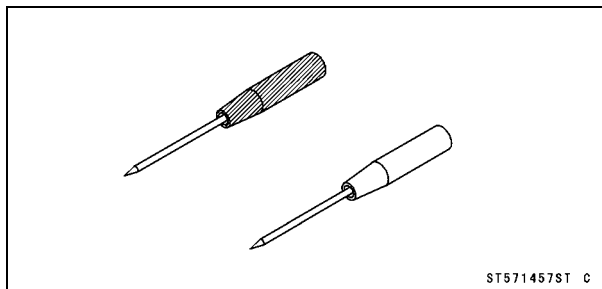
Peak Voltage Adapter:
57001-1415



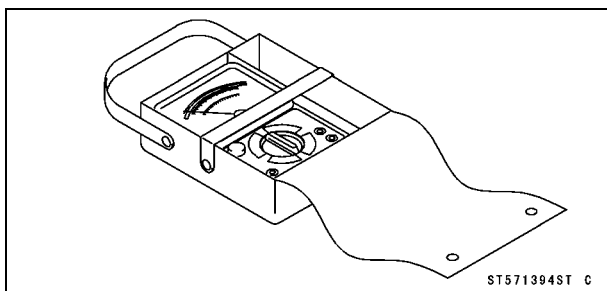
Vacuum Gauge:
57001-1369



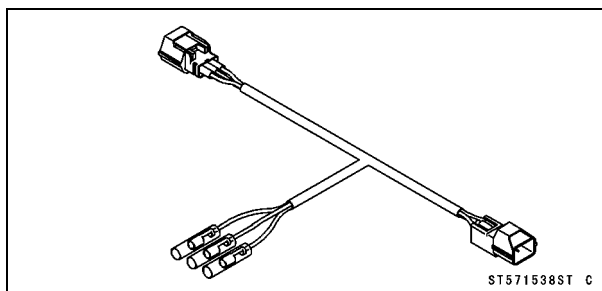
Needle Adapter Set:
57001-1457



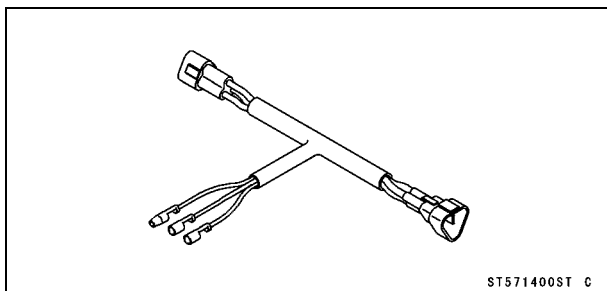
Hand Tester:
57001-1394



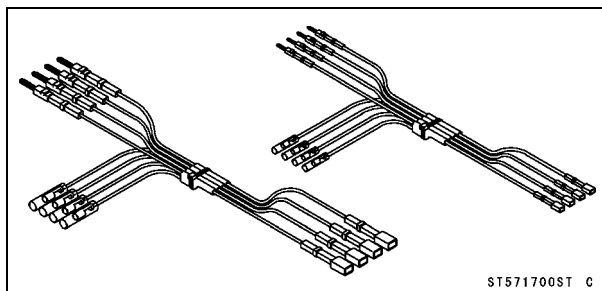
Throttle Sensor Setting Adapter:
57001-1538



Throttle Sensor Setting Adapter #1:
57001-1400



Measuring Adapter:
57001-1700



Self-Diagnosis

Self-Diagnosis Outline

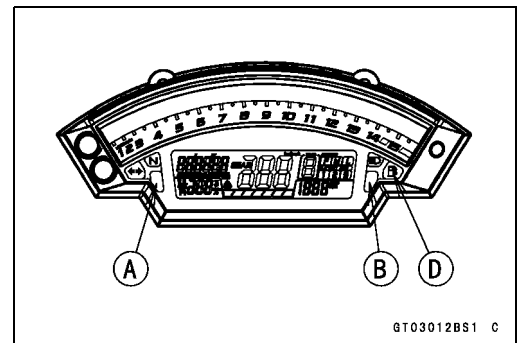
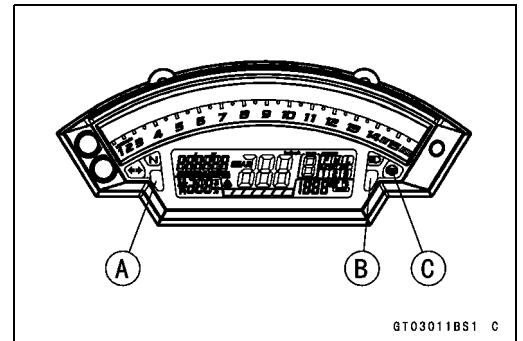
The self-diagnosis system is monitoring the following mechanisms.

- DFI System and Ignition System
- S-KTRC System
- Immobilizer System (Equipped Models)
- KIBS and ABS (Equipped Models)

The following warning indicator lights (LED) are used for symbols of below table.

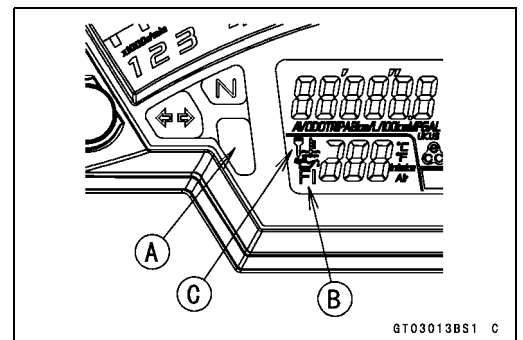
LED Color	Warning Indicator Symbols
Red [A]	Oil Pressure FI Water Temperature Immobilizer (Equipped Models)
Yellow [B]	S-KTRC Fuel (KIBS Equipped Models) KIBS (Equipped Models)
Yellow	ABS [C] (Equipped Models)
Yellow	Fuel [D] (other than KIBS Equipped Models)

The self-diagnosis system has two modes and can be switched to another mode by operating the meter unit.

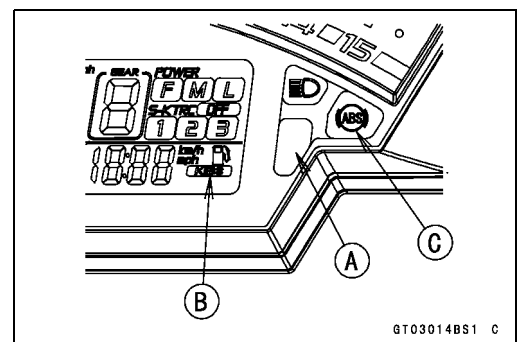


User Mode

The ECU notifies the rider of troubles in DFI system, ignition system, S-KTRC system and immobilizer system (equipped models) by lighting or blinking the warning indicator light (LED) [A], FI warning symbol [B] and immobilizer warning symbol [C] when DFI, ignition, S-KTRC and immobilizer system parts are faulty, and initiates fail-safe function. In case of serious troubles, ECU stops the injection and ignition operations.



For KIBS and ABS system (equipped models), the KIBS hydraulic unit notifies the rider of troubles in KIBS and ABS system by lighting or blinking the KIBS warning indicator light (LED) [A] KIBS warning symbol [B] and ABS warning indicator light (LED) [C] when KIBS and ABS parts are faulty, and initiates fail-safe function.

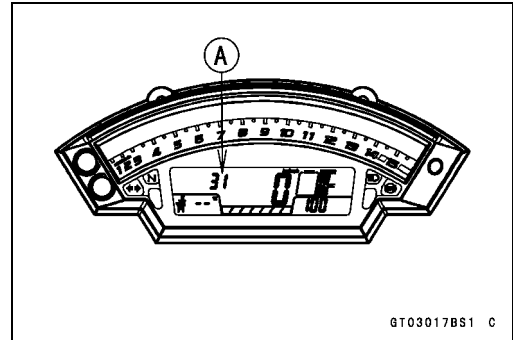


17-8 SELF-DIAGNOSIS SYSTEM

Self-Diagnosis

Dealer Mode

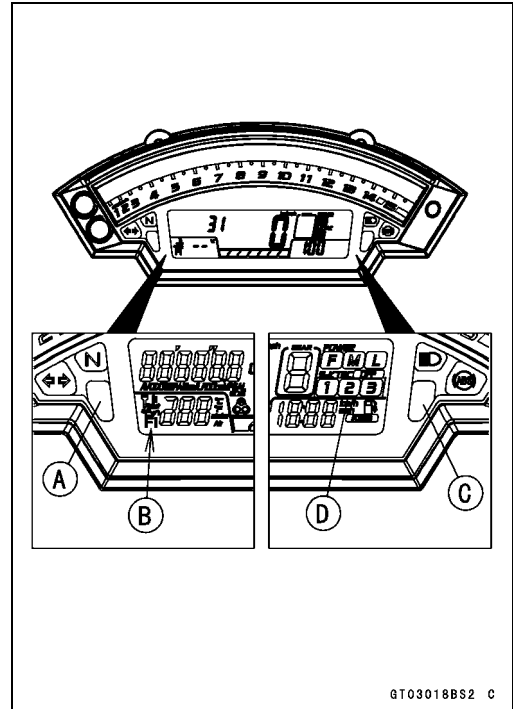
The LCD (Liquid Crystal Display) displays the service code(s) [A] to show the problem(s) which the above system has at the moment of diagnosis.



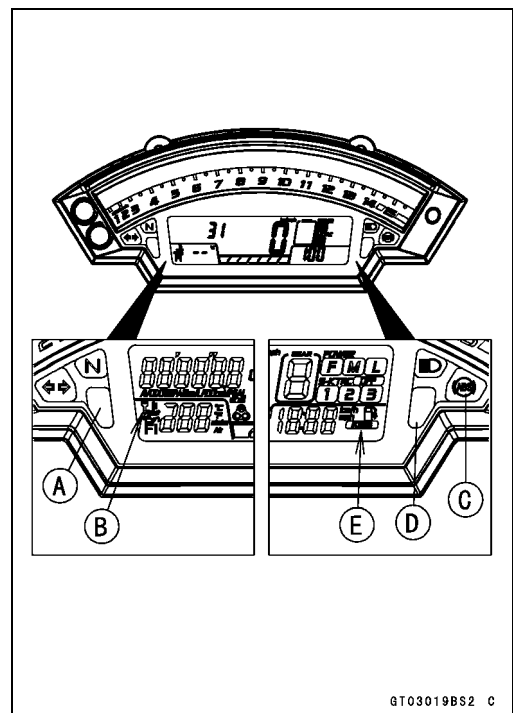
Self-Diagnosis Procedures

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 to ON.
- When a problem occurs with DFI system and ignition system, the warning indicator light (LED) [A] goes on and FI warning symbol [B] are displayed on the LCD (Liquid Crystal Display) to alert the rider.
- For models equipped with S-KTRC system, the warning indicator light (LED) [C] goes on and S-KTRC symbols [D] are alternately displayed on the LCD, when a problem occurs in the system.

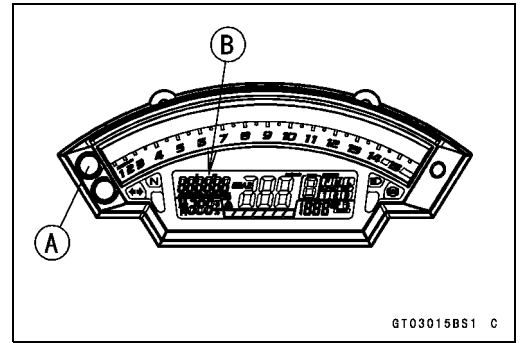


- When a problem occurs with immobilizer system (equipped models), the warning indicator light (LED) [A] blinks and immobilizer warning symbol [B] is displayed on the LCD.
- For models equipped with ABS system (equipped models), the warning indicator light (LED) [C] goes on, when a problem occurs in the system. However, when the warning indicator light (LED) goes off after the motorcycle runs at 20 km/h (12 mph) or above for one minute or more, the ABS is normal.
- For models equipped with KIBS system (equipped models), the warning indicator light (LED) [D] goes on and KIBS symbol [E] are displayed on the LCD, when a problem occurs in the system.

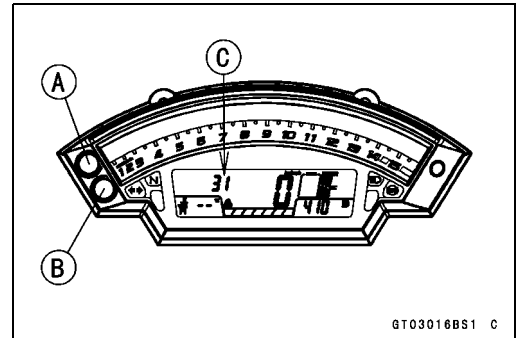


Self-Diagnosis

- Push the upper button [A] to display the odometer [B].



- Push the upper button [A] and lower button [B] for more than two seconds.
- The service code [C] 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.)

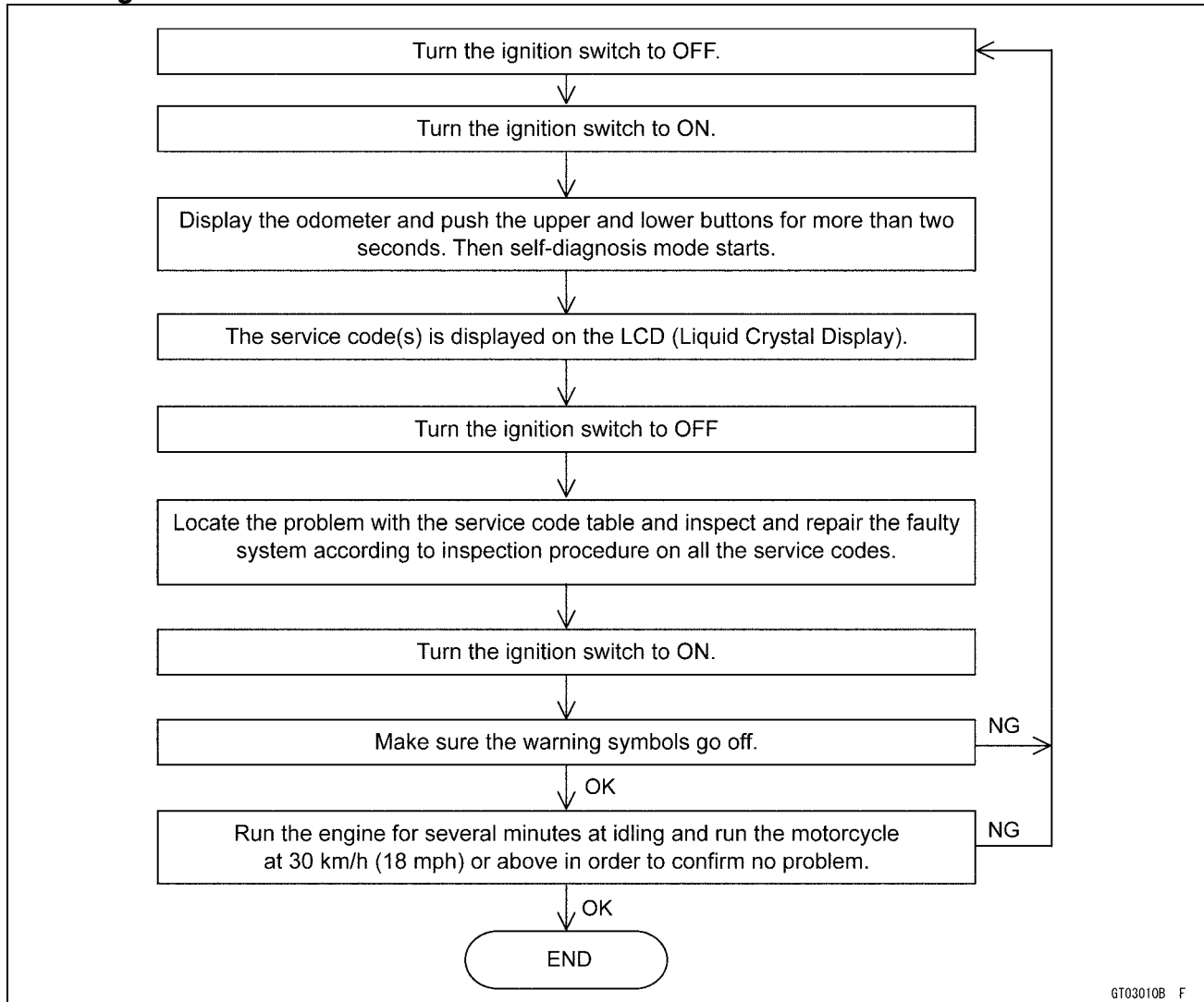


- Any of the following procedures ends self-diagnosis.
 - When the service code is displayed on the LCD, push the upper button and lower buttons for more than two seconds. The display will return to the odometer.
 - When the ignition switch is turned to OFF.

17-10 SELF-DIAGNOSIS SYSTEM

Self-Diagnosis

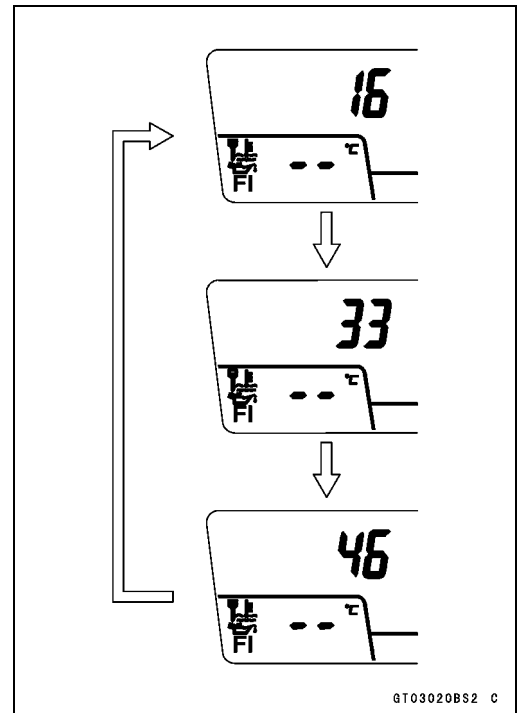
Self-Diagnosis Flow Chart



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 to OFF or upper button and lower button are pushed for more than two seconds.
- The order of the system's appearing is the order of DFI System, Immobilizer System (equipped models), S-KTRC System, KIBS and ABS (equipped models).
- For example, if three problems occurred in the order of 46, 16, 33, the service codes are displayed (each two seconds) from the lowest number in the order listed as shown below.
(16 → 33 → 46) → (16 → 33 → 46) → → …… (repeated)
- If the no problem or when the repair has been done, warning indicator light (LED) and warning symbol go off and service code is not displayed.



Service Code Erasing

- When repair has been done, warning indicator light (LED) and warning symbol go off and service code are not displayed.
- ★But the service codes stored in memory of the ECU are not erased to preserve the problem history. In this model, the problem history can not be erased. However, the memories of the KIBS and ABS system service codes can be erased using the KDS 3 version kit.

Service Code Table

○The service codes of the immobilizer, KIBS and ABS systems appear to each system equipped models.

Service Code	System	Problems
11	FI/S-KTRC	Main throttle sensor malfunction, wiring open or short
12	FI/S-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/S-KTRC	Intake air pressure sensor #2 malfunction, wiring open or short
21	FI/S-KTRC	Crankshaft sensor malfunction, wiring open or short
24	FI/S-KTRC	Rear wheel rotation sensor malfunction, wiring open or short
25	FI/S-KTRC	Gear position switch malfunction, wiring open or short
27	FI/S-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/S-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/S-KTRC	ECU communication error

17-12 SELF-DIAGNOSIS SYSTEM

Self-Diagnosis

Service Code	System	Problems
46	FI/S-KTRC	Fuel pump relay malfunction, relay is stuck
51	FI/S-KTRC	Stick coil #1 malfunction, wiring open or short
52	FI/S-KTRC	Stick coil #2 malfunction, wiring open or short
53	FI/S-KTRC	Stick coil #3 malfunction, wiring open or short
54	FI/S-KTRC	Stick coil #4 malfunction, wiring open or short
56	FI	Radiator fan relay malfunction, wiring open or short
62	FI/S-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)
1b	KIBS	KIBS hydraulic unit communication error (Equipped Models)
1C	FI/S-KTRC	Idle Speed Control Valve Actuator malfunction, wiring open or short
2d	FI	Air Intake Solenoid Valve malfunction, wiring open or short (Equipped Models)
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	KIBS 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	KIBS 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	KIBS	CAN communication (transmission)/CAN bus monitor malfunction
b 58	KIBS	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

Self-Diagnosis

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.

Backups

- The ECU takes the following measures to prevent engine damage when the DFI, ignition, S-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 0.64 ~ 4.06 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 = 150 ~ 800 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 = - 30 ~ + 120°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 = 150 ~ 800 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 S-KTRC control.
25	Gear Position Switch	Output Voltage 0.2 ~ 4.8 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 S-KTRC control.
31	Vehicle -down Sensor	Output Voltage 0.2 ~ 4.8 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.

17-14 SELF-DIAGNOSIS SYSTEM

Self-Diagnosis

Service Codes	Parts or Function	Output Signal Usable Range or Criteria	Backups by ECU
32	Subthrottle Sensor	Output Voltage 0.8 ~ 4.32 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.
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	User Key (Equipped Models)	The user 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.	–
46	Fuel Pump Relay	When the fuel pump relay is ON, battery monitor voltage is 5 V or more.	–
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.

Self-Diagnosis

Service Codes	Parts or Function	Output Signal Usable Range or Criteria	Backups by ECU
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.
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.
1b	KIBS	The KIBS hydraulic unit sends the data (for status of KIBS hydraulic unit) to the meter unit and ECU through the CAN communication line.	If the communication data is not sent, the ECU stops the S-KTRC control.
1C	ISC Actuator	The actuator operates open and close of the bypass passage by the pulse signal from the ECU.	If the ISC actuator fails (the signal is out to the usable range, wiring short or open), the ECU stops the current to the actuator.
2d	Air Intake Solenoid Valve (Equipped Models)	The air intake solenoid valve controls the flow of the intake 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.

17-16 SELF-DIAGNOSIS SYSTEM

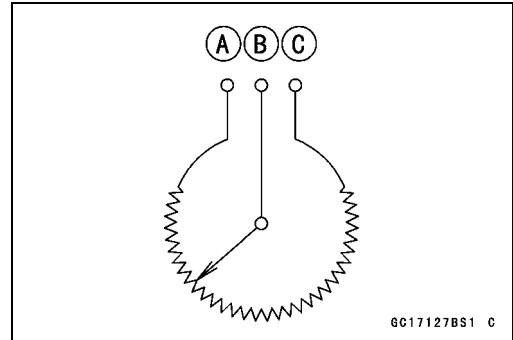
Main Throttle Sensor (Service Code 11)

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]: V/W

Ground Terminal [C]: BR/BK



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.

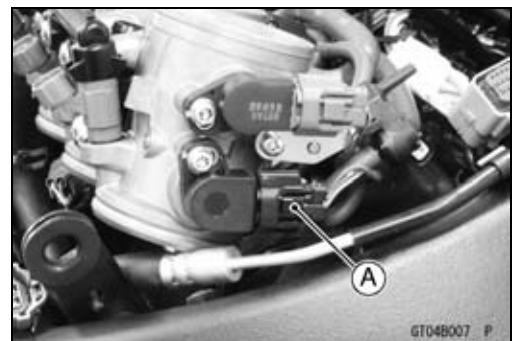


Main Throttle Sensor Input Voltage Inspection

NOTE

○Be sure the battery is fully charged.

- Turn the ignition switch to OFF.
- Remove the throttle body assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter).
- Do not disconnect the connectors of the throttle body assy.
- 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 BR/BK) lead

- Measure the input voltage with the engine stopped and with the connector joined.
- Connect the following parts to harness connectors temporarily.
 - ECU
 - Intake Air Temperature Sensor
- Turn the ignition switch to ON.

Input Voltage

Standard: DC 4.75 ~ 5.25 V

- Turn the ignition switch to 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.

Special Tool - Hand Tester: 57001-1394

○ Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection

ECU Connector [A] ↔

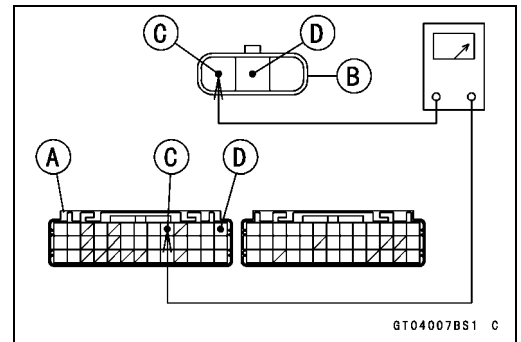
Main Throttle Sensor Connector [B]

BL lead (ECU terminal 9) [C]

BR/BK 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).



Main Throttle Sensor Resistance Inspection

- Turn the ignition switch to OFF.
- Measure the main throttle sensor resistance in the same way as input voltage inspection, note the following.
- Disconnect the throttle sensor setting adapter [A] from the connector of the main harness side.

Special Tool - Throttle Sensor Setting Adapter: 57001-1538

○ Connect the setting adapter [B] to the sensor connector only.

○ Connect a digital meter [A] to the setting adapter [B].
Main Throttle Sensor [C]

Main Throttle Sensor Resistance

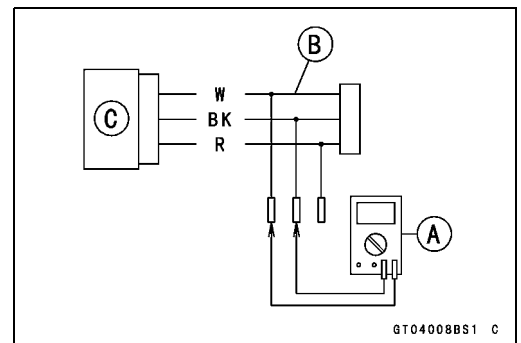
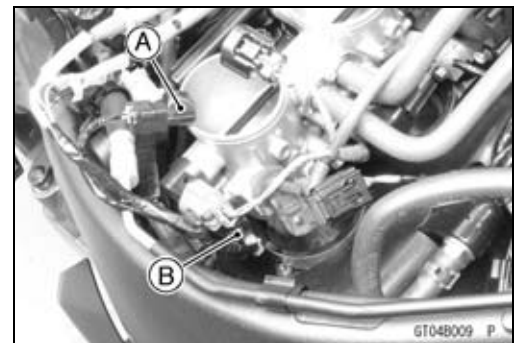
Connections to Adapter:

W (sensor BL) lead ↔ BK (sensor BR/BK) lead

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).



17-18 SELF-DIAGNOSIS SYSTEM

Main Throttle Sensor (Service Code 11)

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 V/W) lead

Digital Meter (-) → BK (sensor BR/BK) lead

- Install the following parts temporarily.
 - Throttle Body Assy (see Throttle Body Assy Installation in the Fuel System (DFI) chapter)
 - 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)

- 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).

Throttle Sensor Setting Adapter [A]

Idle Speed

Standard: 1 100 ±50 r/min (rpm)



Main Throttle Sensor (Service Code 11)

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

Output Voltage

Standard: DC 0.64 ~ 0.68 V at idle throttle opening

DC 3.89 ~ 4.09 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.

$$0.64 \times 4.75 \div 5.00 = 0.61 \text{ V}$$

$$0.68 \times 4.75 \div 5.00 = 0.65 \text{ V}$$

Thus, the valid range is 0.61 ~ 0.65 V

- Turn the ignition switch to 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.

Special Tool - Hand Tester: 57001-1394

- Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection

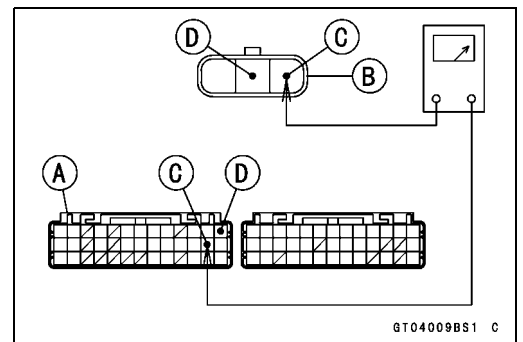
ECU Connector [A] ↔

Main Throttle Sensor Connector [B]

V/W lead (ECU terminal 25) [C]

BR/BK lead (ECU terminal 13) [D]

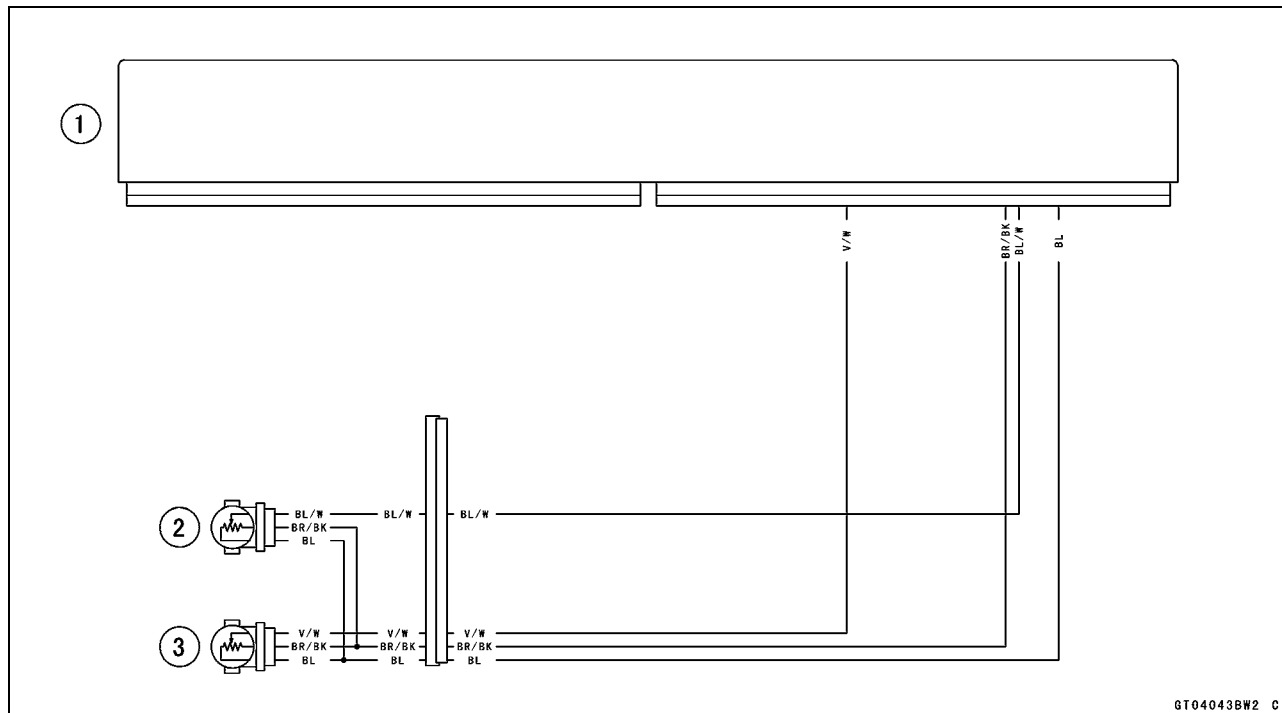
- ★ If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).
- ★ If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).



17-20 SELF-DIAGNOSIS SYSTEM

Main Throttle Sensor (Service Code 11)

Main Throttle Sensor Circuit



- 1. ECU
- 2. Subthrottle Sensor
- 3. Main Throttle Sensor

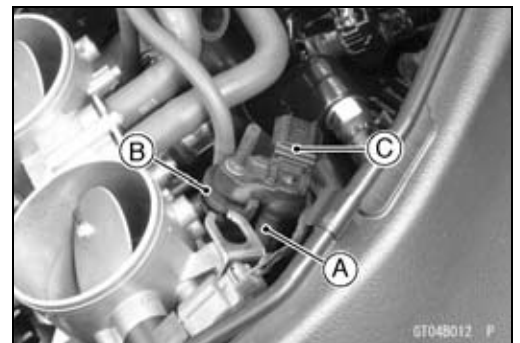
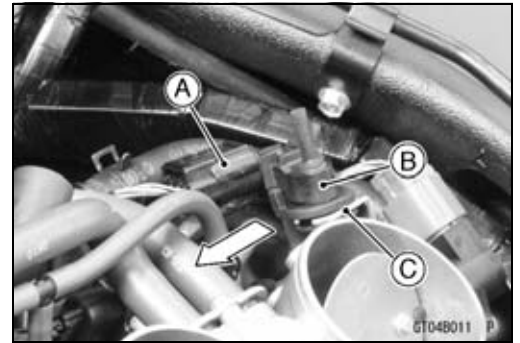
Intake Air Pressure Sensor #1 (Service Code 12)

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)
 - Intake Air Pressure Sensor #1 Connector [A]
- Remove the intake air pressure sensor #1 [B] from the bracket [C].
- Remove the vacuum hose [A] and rubber damper [B] from the intake air pressure sensor #1 [C].

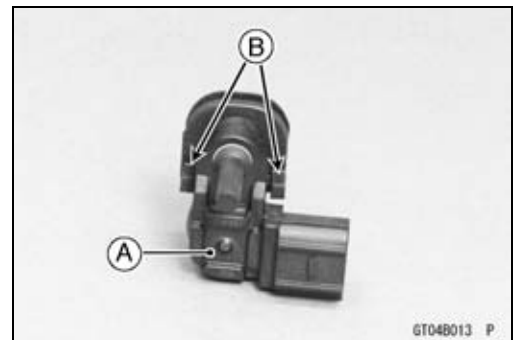


Intake Air Pressure Sensor #1 Installation

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] as shown in the figure.



17-22 SELF-DIAGNOSIS SYSTEM

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 to 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 BR/BK) lead

- Measure the intake voltage with the engine stopped and with the connector joined.
- Turn the ignition switch to ON.

Input Voltage

Standard: DC 4.75 ~ 5.25 V

- Turn the ignition switch to 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.

Special Tool - Hand Tester: 57001-1394

- Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection

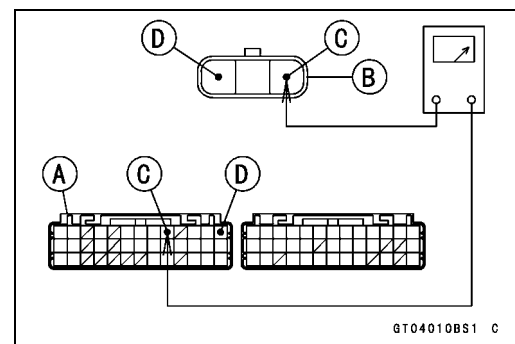
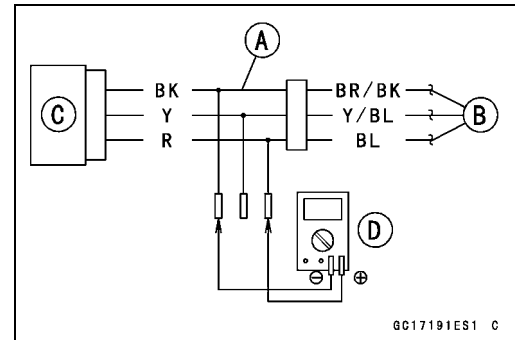
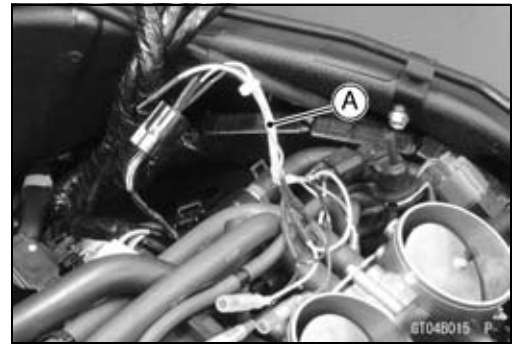
ECU Connector [A] ↔

Intake Air Pressure Sensor #1 Connector [B]

BL lead (ECU terminal 9) [C]

BR/BK lead (ECU terminal 13) [D]

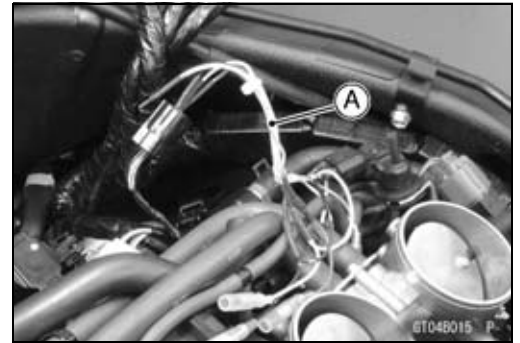
- ★ If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection in the Fuel System (DFI) chapter).
- ★ If the ground and power supply are good, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).



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

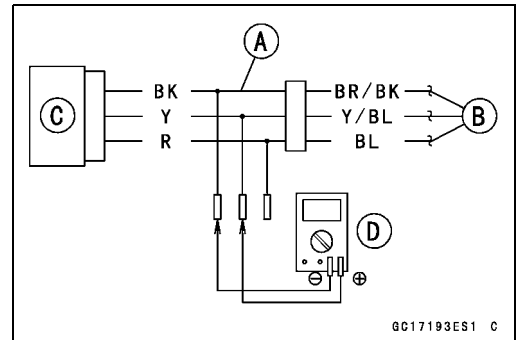


Special Tool - Measuring Adapter: 57001-1700

Intake Air Pressure Sensor #1 Output Voltage Connections to Adapter:

- Digital Meter (+) → Y (sensor Y/BL) lead
- Digital Meter (-) → BK (sensor BR/BK) lead

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



Output Voltage

Usable Range: DC 3.80 ~ 4.20 V at standard atmospheric pressure (101.32 kPa, 76 cmHg)

NOTE

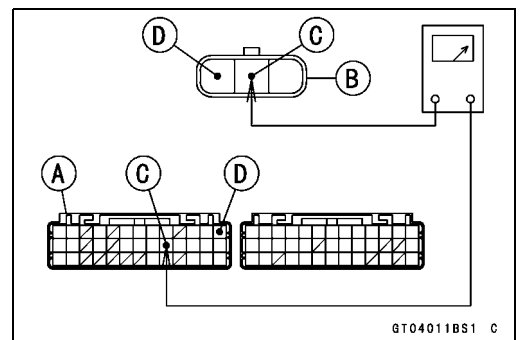
- The output voltage changes according to local atmospheric pressure.
- Turn the ignition switch to OFF.
- ★ If the reading is out of the usable range, replace the sensor.
- ★ If the reading is within the usable range, remove the ECU and check the wiring for continuity between main harness connector.

Special Tool - Hand Tester: 57001-1394

- Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection

- ECU Connector [A] ↔ Intake Air Pressure Sensor #1 Connector [B]
- Y/BL lead (ECU terminal 22) [C]
- BR/BK lead (ECU terminal 13) [D]



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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 BR/BK) lead**

- Turn the ignition switch to 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
- PI: Local Atmospheric Pressure (Absolute) measured by a barometer
- Pv: Vacuum Pressure (Absolute) of Throttle Body
- Vv: Sensor Output Voltage (V)

then

$$Pv = PI - Pg$$

For example, suppose the following data is obtained:

- Pg = 8 cmHg (Vacuum Gauge Reading)
- PI = 70 cmHg (Barometer Reading)
- Vv = 3.2 V (Digital Meter Reading)

then

$$Pv = 70 - 8 = 62 \text{ cmHg (Absolute)}$$

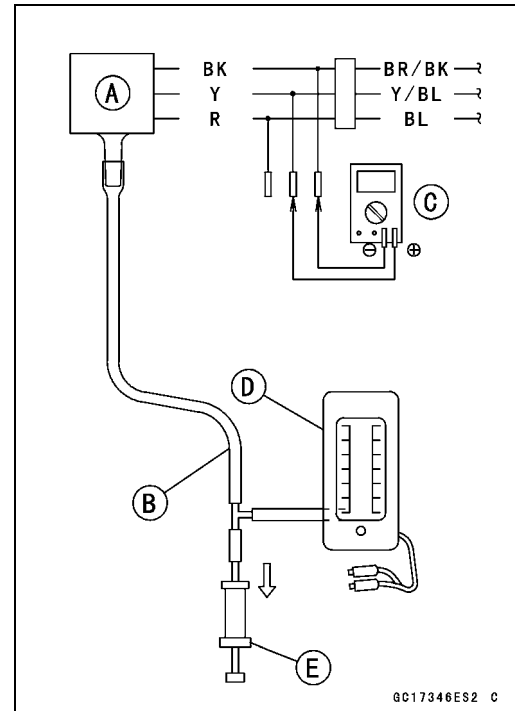
Plot this Pv (62 cmHg) at a point [1] on the chart and draw a vertical line through the point. Then, you can get the usable range [2] of the sensor output voltage.

$$\text{Usable range} = 3.08 \sim 3.48 \text{ V}$$

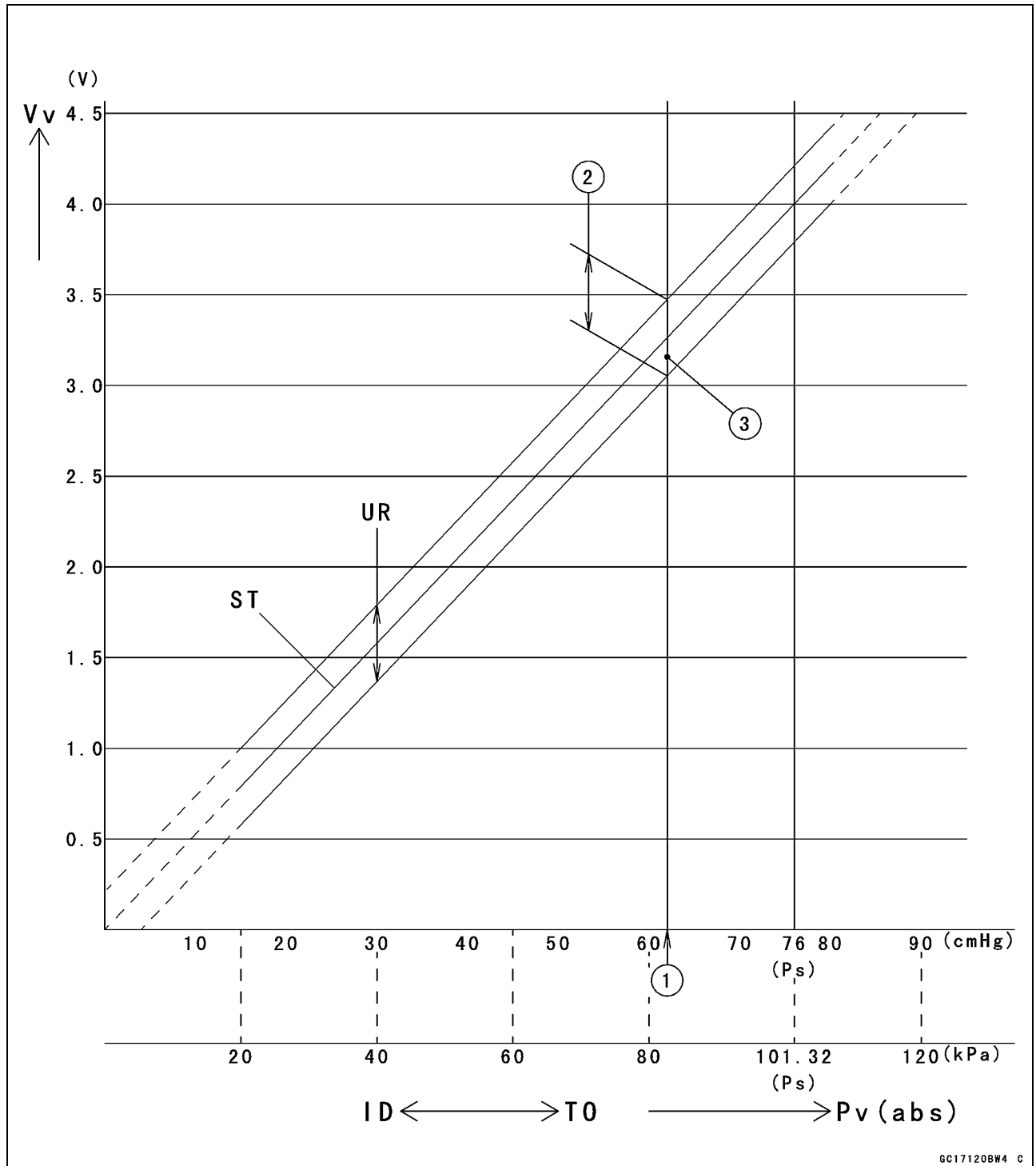
Plot Vv (3.2 V) on the vertical line. → Point [3].

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)

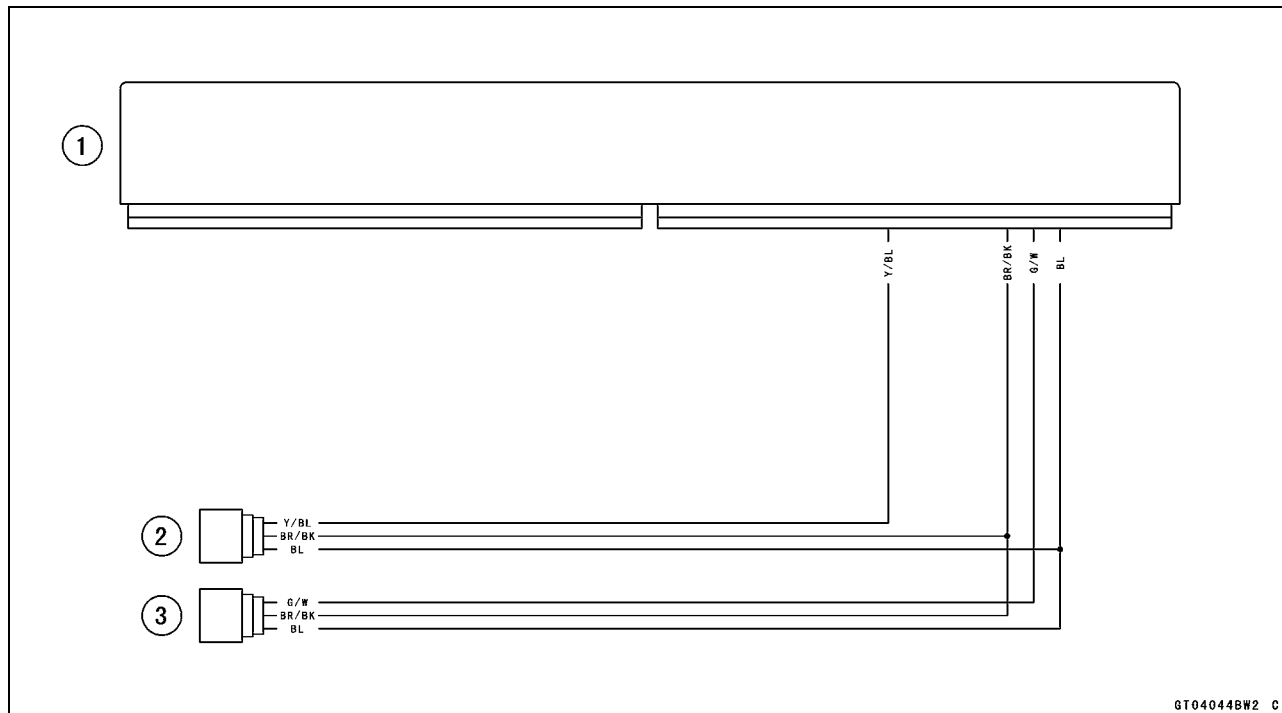


- ID: Idling
- Ps: Standard Atmospheric Pressure (Absolute)
- Pv: Throttle Vacuum Pressure (Absolute)
- ST: Standard of Sensor Output Voltage (V)
- TO: Throttle Full Open
- UR: Usable Range of Sensor Output Voltage (V)
- Vv: Intake Air Pressure Sensor #1 Output Voltage (V) (Digital Meter Reading)

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Intake Air Pressure Sensor #1 (Service Code 12)

Intake Air Pressure Sensor #1 Circuit



GT04044BW2 C

1. ECU
2. Intake Air Pressure Sensor #1
3. Intake Air Pressure Sensor #2

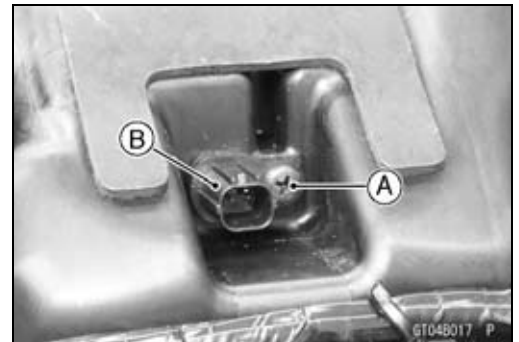
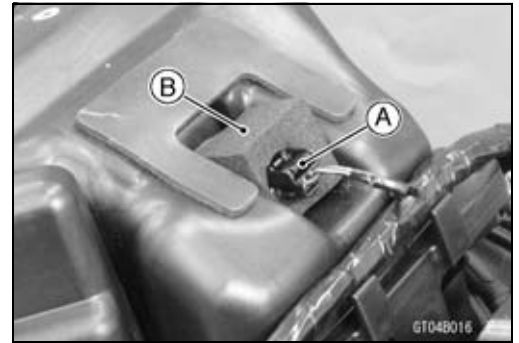
Intake Air Temperature Sensor (Service Code 13)

Intake Air Temperature Sensor Removal

NOTICE

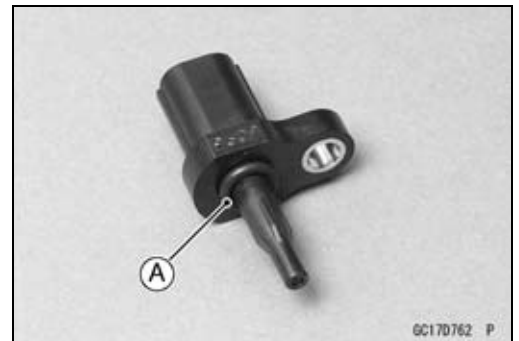
Never drop the intake air temperature sensor especially on a hard surface. Such a shock to the sensor can damage it.

- 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 the damper [B].
- 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.
- Tighten:
 - Torque - Intake Air Temperature Sensor Screw: 0.8 N·m (0.08 kgf·m, 7 in·lb)
- Install the damper and connect the connector.



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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 to 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 in the figure.

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 BR/BK) lead

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

Output Voltage

Standard: About DC 2.44 ~ 2.69 V at 25°C (77°F)

NOTE

○The output voltage changes according to the intake air temperature.

- Turn the ignition switch to 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.

Special Tool - Hand Tester: 57001-1394

- Disconnect the ECU and sensor connectors.

Wiring Inspection

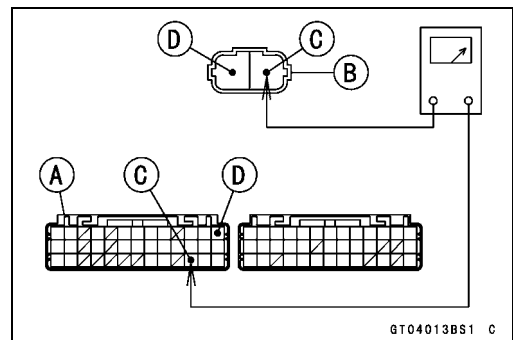
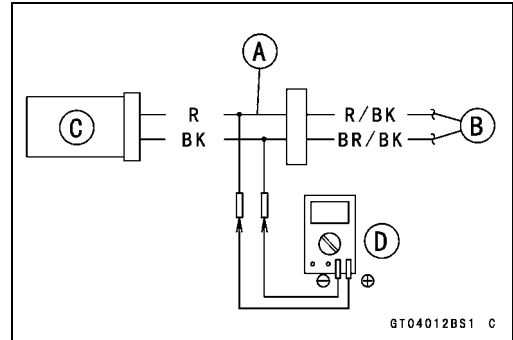
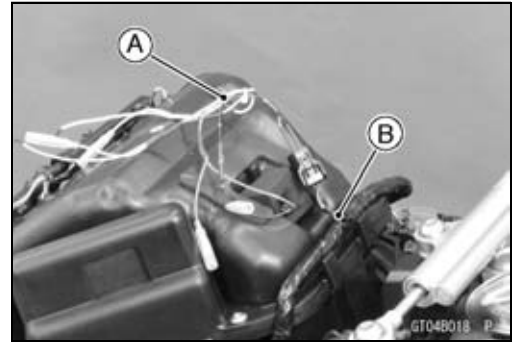
ECU Connector [A] ↔

Intake Air Temperature Sensor Connector [B]

R/BK lead (ECU terminal 37) [C]

BR/BK lead (ECU terminal 13) [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.

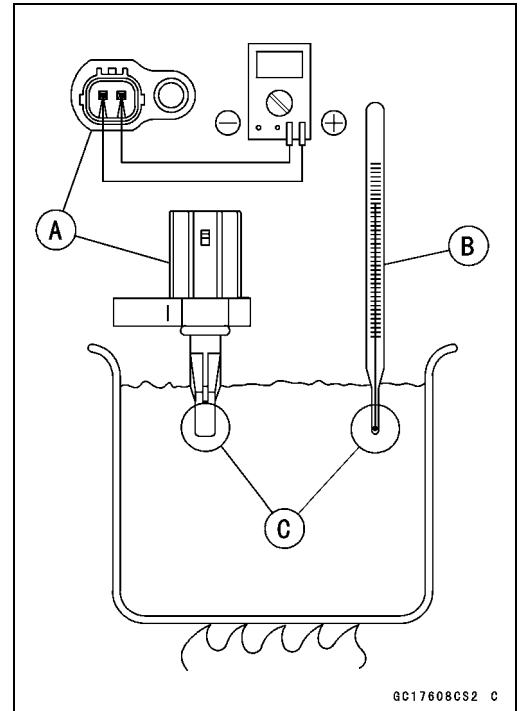
- Place the container over a source of heat and gradually raise the temperature of the oil while stirring the oil gently for even temperature.
- Using a digital meter, measure the internal resistance of the sensor across the terminals at the temperatures shown in the following.

Intake Air Temperature Sensor Resistance

Standard: 5.4 ~ 6.6 kΩ at 0°C (32°F)

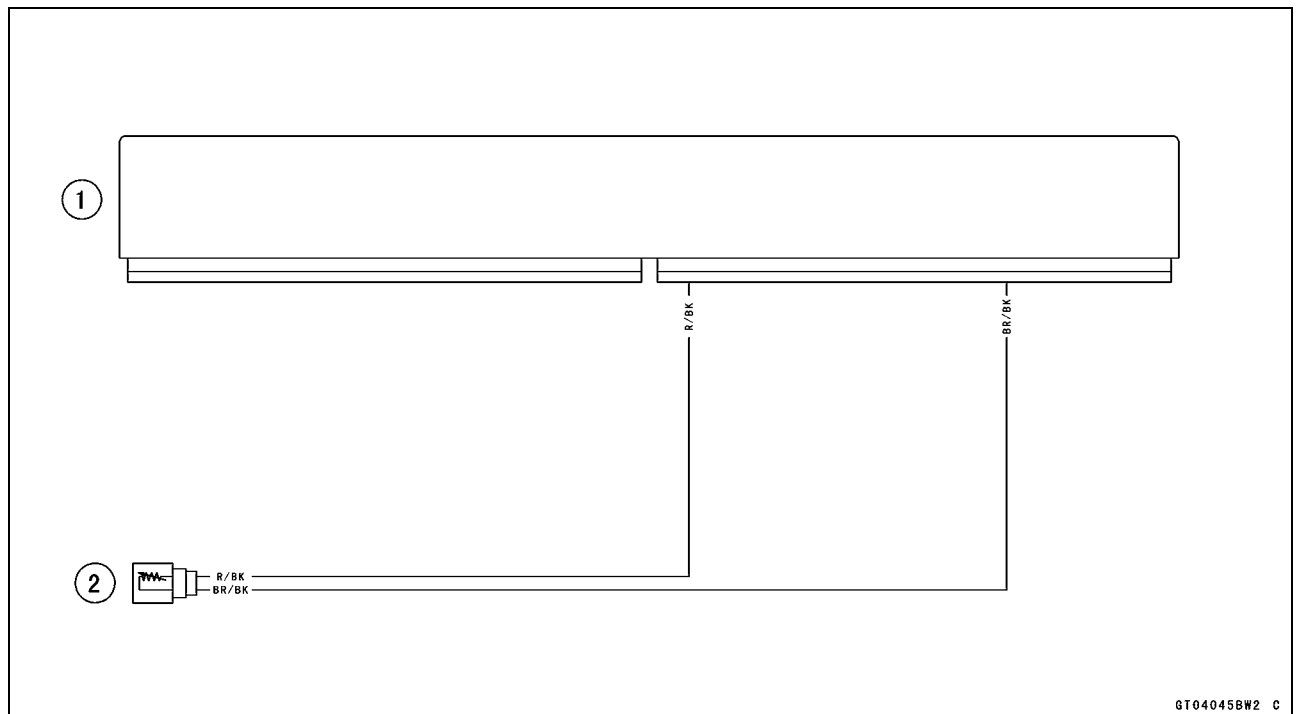
0.29 ~ 0.39 kΩ at 80°C (176°F)

- ★ 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).



GC17608CS2 C

Intake Air Temperature Sensor Circuit



GT04045BW2 C

1. ECU
2. Intake Air Temperature Sensor

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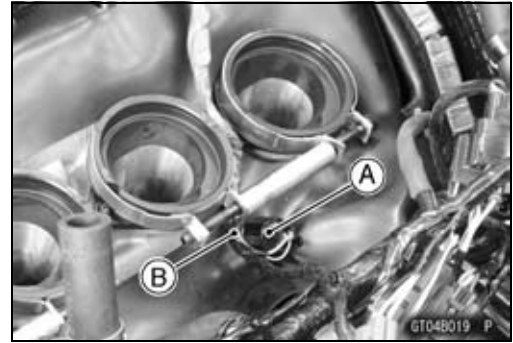
Water Temperature Sensor (Service Code 14)

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).
- Remove:
 - Connector [A]
 - Water Temperature Sensor [B] with O-ring
- Replace the O-ring with a new one and apply grease to it.
- 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).

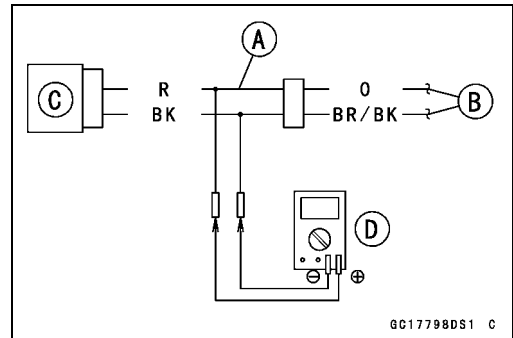


Water Temperature Sensor Output Voltage Inspection

NOTE

○Be sure the battery is fully charged.

- Turn the ignition switch to 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 in the figure.
 - 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 O) lead

Digital Meter (-) → BK (sensor BR/BK) lead

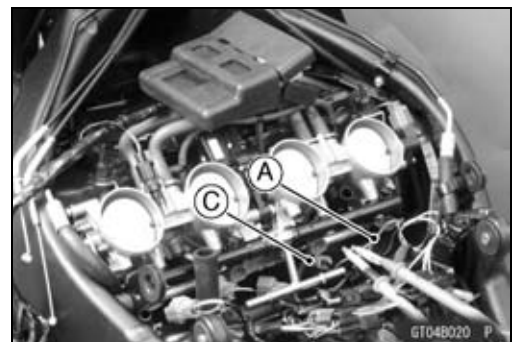
- Connect the connectors of the following parts temporarily.
 - ECU
 - Intake Temperature Sensor
 - Throttle Body Assy Connectors
- Measure the output voltage with the engine stopped and the connector joined.
- Turn the ignition switch to ON.

Output Voltage

Standard: About DC 2.80 ~ 2.97 V at 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 to 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.

Special Tool - Hand Tester: 57001-1394

- Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection

ECU Connector [A] ←→

Water Temperature Sensor Connector [B]

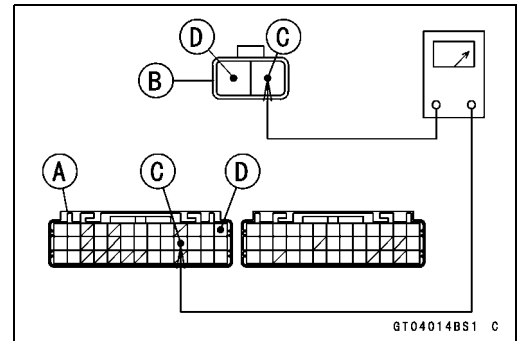
O lead (ECU terminal 23) [C]

BR/BK lead (ECU terminal 13) [D]

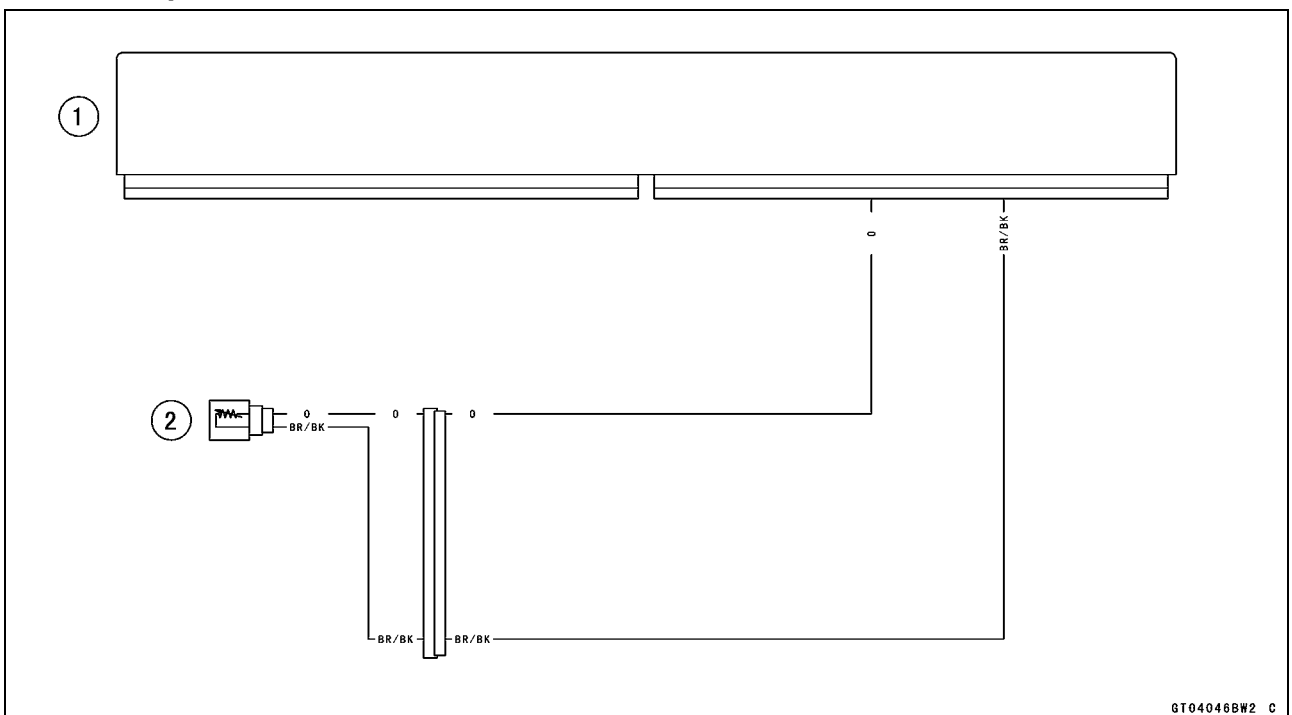
- ★ If the wiring is good, check the water temperature sensor resistance (see Water Temperature Sensor Resistance Inspection).

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 Temperature Sensor

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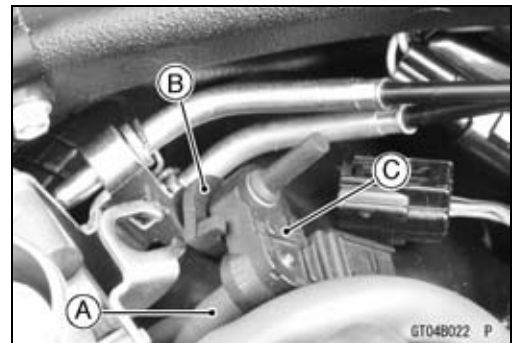
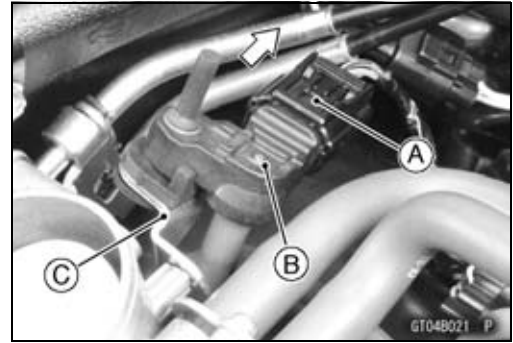
Intake Air Pressure Sensor #2 (Service Code 16)

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)
 - Intake Air Pressure Sensor #2 Connector [A]
- Remove the intake air pressure sensor #2 [B] from the bracket [C].
- Remove the vacuum hose [A] and rubber damper [B] from the intake air pressure sensor #2 [C].

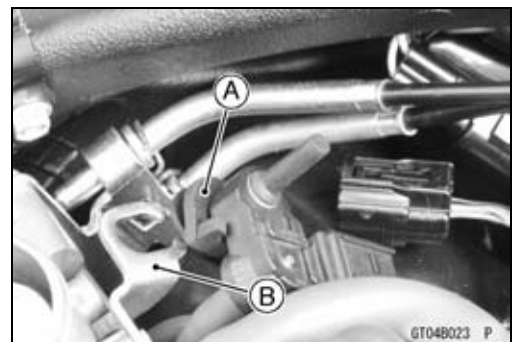
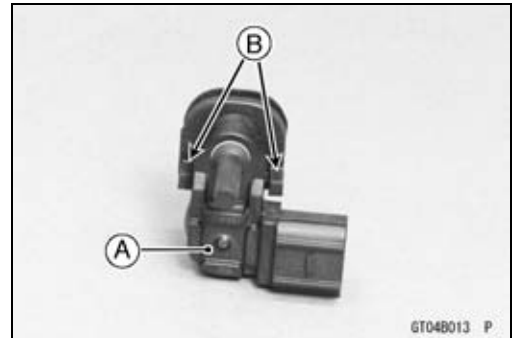


Intake Air Pressure Sensor #2 Installation

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] as shown in the figure.



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 to 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 BR/BK) lead

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

Input Voltage

Standard: DC 4.75 ~ 5.25 V

- Turn the ignition switch to 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.

Special Tool - Hand Tester: 57001-1394

- Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection

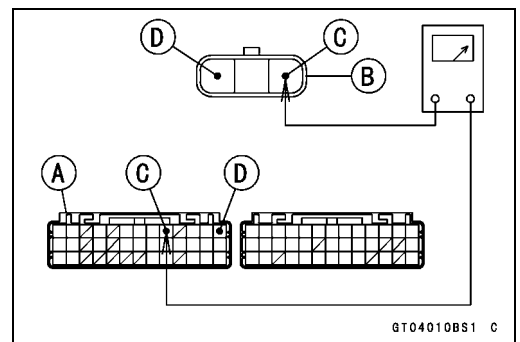
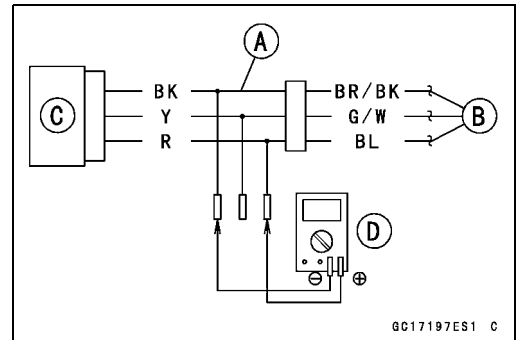
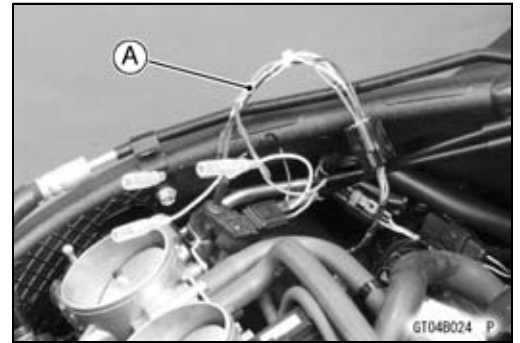
ECU Connector [A] ↔

Intake Air Pressure Sensor #2 Connector [B]

BL lead (ECU terminal 9) [C]

BR/BK 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).



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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 BR/BK) lead

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

Special Tool - Hand Tester: 57001-1394

- Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection

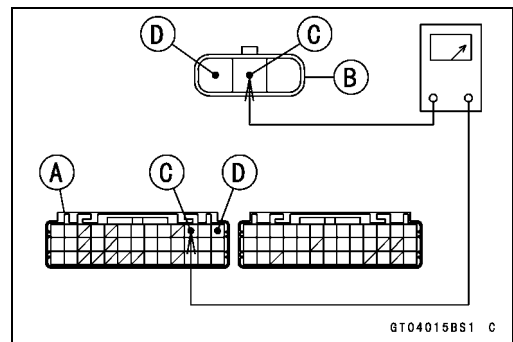
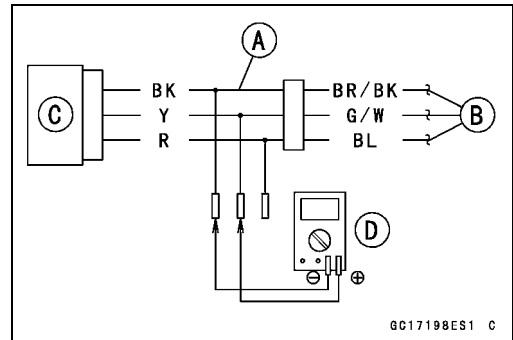
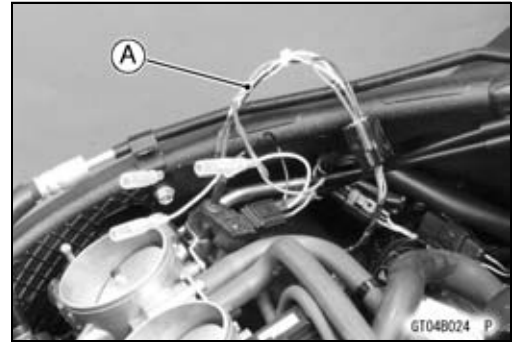
ECU Connector [A] ↔

Intake Air Pressure Sensor #2 Connector [B]

G/W lead (ECU terminal 11) [C]

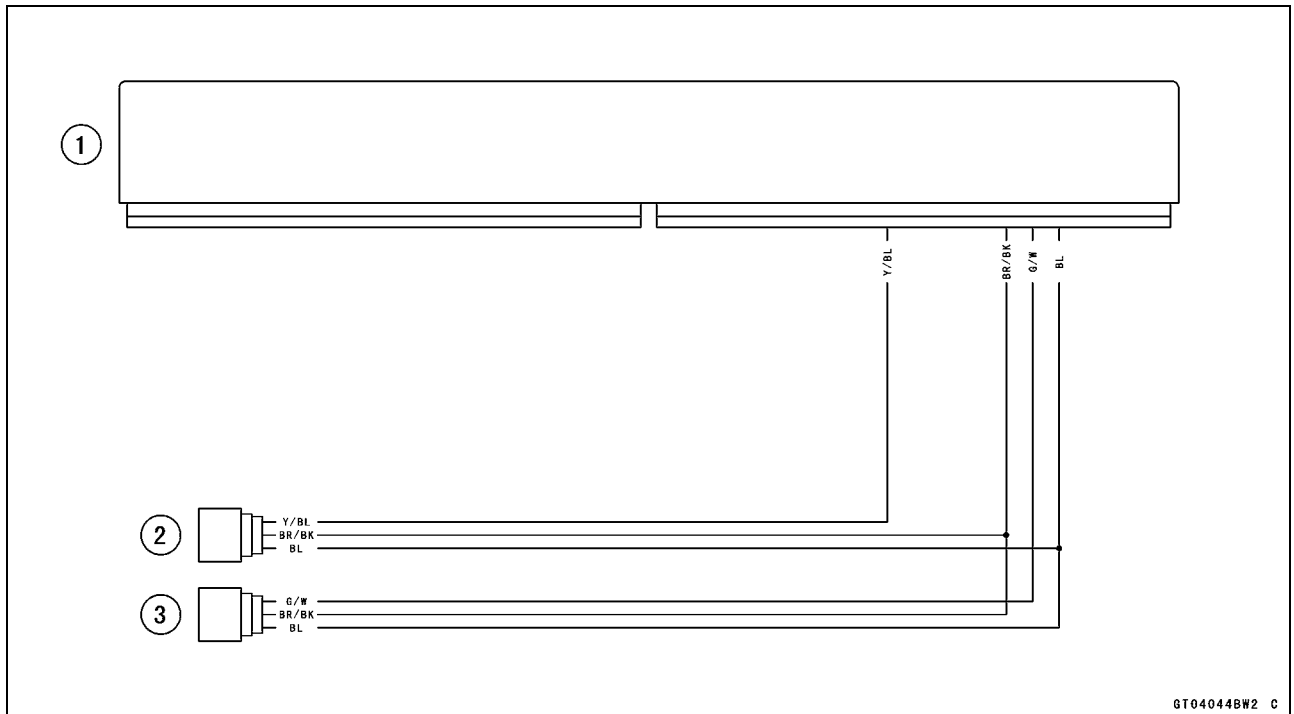
BR/BK lead (ECU terminal 13) [D]

- ★ 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



GT04044BW2 C

- 1. ECU
- 2. Intake Air Pressure Sensor #1
- 3. Intake Air Pressure Sensor #2

17-36 SELF-DIAGNOSIS SYSTEM

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.

Special Tool - Hand Tester: 57001-1394

- Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection

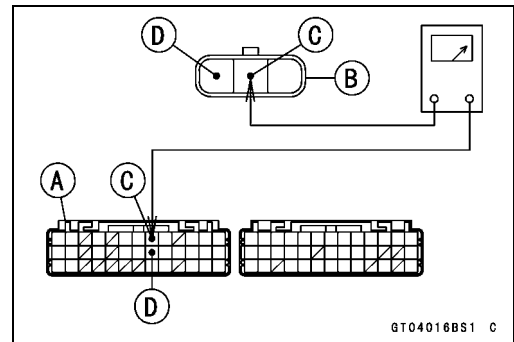
ECU Connector [A] ←→

Crankshaft Sensor Connector [B]

BK lead (ECU terminal 8) [C]

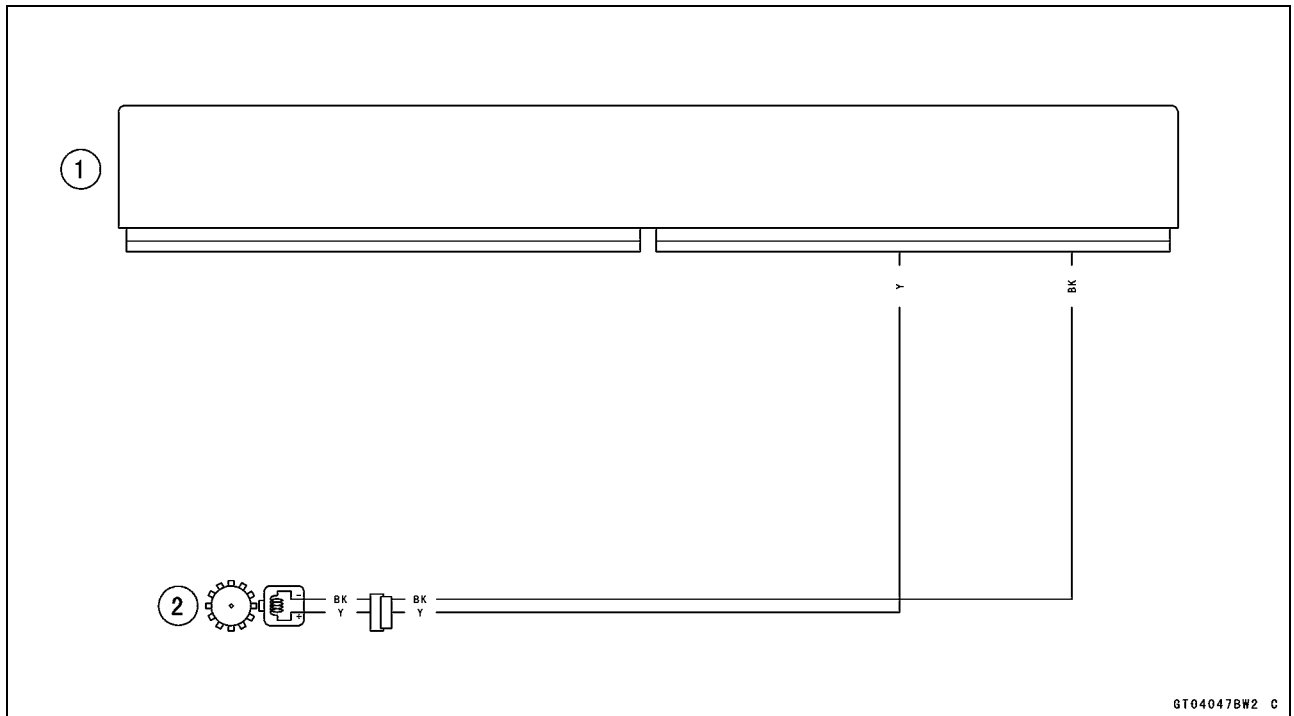
Y lead (ECU terminal 21) [D]

- ★ 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 (Service Code 21)

Crankshaft Sensor Circuit



- 1. ECU
- 2. Crankshaft Sensor

17-38 SELF-DIAGNOSIS SYSTEM

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 KIBS hydraulic unit (KIBS equipped models). For other than KIBS equipped models, the signal is sent directly to the ECU.
- The ECU uses the rear wheel rotation sensor signal for motorcycle speed and S-KTRC control.
- The service code 24 is detected with the ECU.
- When the service code 24 and following service codes (for KIBS) 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)
 - Front and Rear Wheel Rotation Sensor Lead Connectors
 - KIBS Hydraulic Unit Connector (see KIBS Hydraulic Unit Removal in the Brakes chapter)
- For KIBS equipped models, check the wiring for continuity between harness connectors.

Special Tool - Hand Tester: 57001-1394

Wiring Continuity Inspection

ECU Connector [A] ← →

KIBS Hydraulic Unit Connector [B]

R/Y lead (ECU terminal 34, KIBS Hydraulic Unit terminal 16) [C]

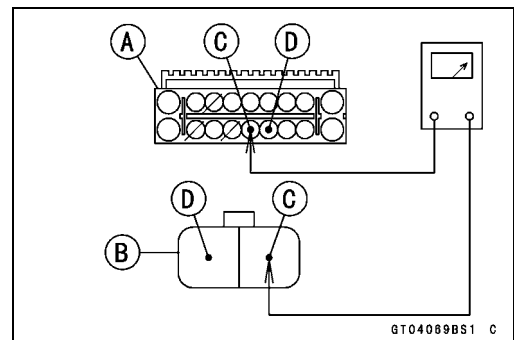
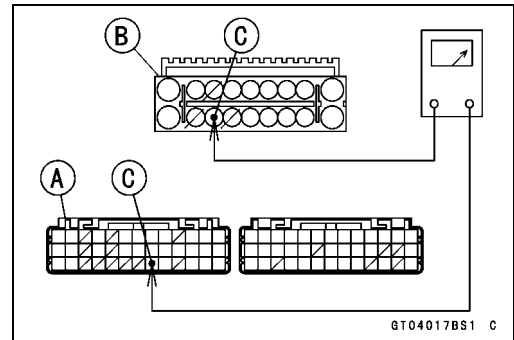
Wiring Continuity Inspection

KIBS Hydraulic Unit Connector [A] ← →

Rear Wheel Rotation Sensor Connector [B]

G lead (KIBS Hydraulic Unit Connector terminal 14) [C]

R lead (KIBS Hydraulic Unit Connector terminal 13) [D]



Rear Wheel Rotation Sensor Signal (Service Code 24)

- For other than KIBS equipped models, check the wiring for continuity between harness connectors and resistance.

Special Tool - Hand Tester: 57001-1394

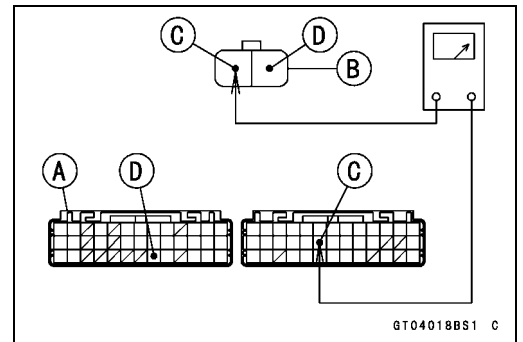
Wiring Continuity Inspection

ECU Connector [A] ← →

Rear Wheel Rotation Sensor Connector [B]

R lead (ECU terminal 58) [C]

R/Y lead (ECU terminal 34) [D]



Rear Resistor Resistance (in Main Harness)

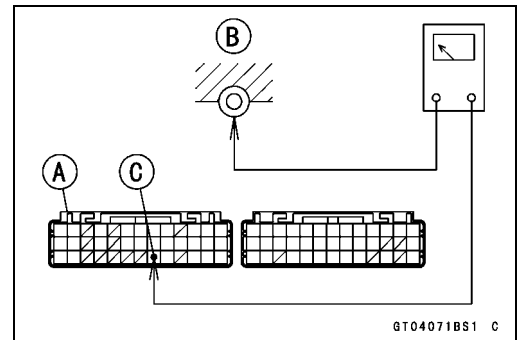
Connections:

ECU Connector [A] ← → Ground [B]

R/Y lead (ECU terminal 34) [C]

Standard: 209 ~ 231 Ω

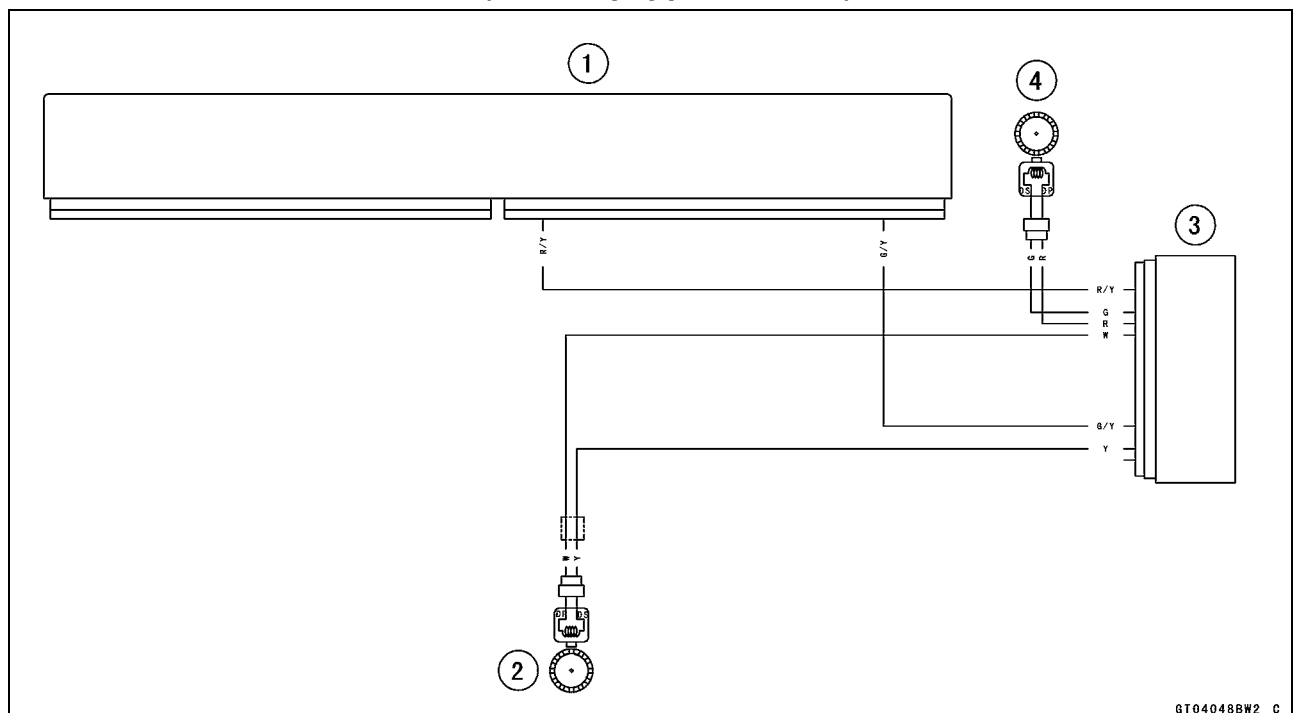
- ★ If the resistance is out of the standard, replace the main harness.



- ★ If the wiring and resistance are 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 (KIBS Equipped Models)

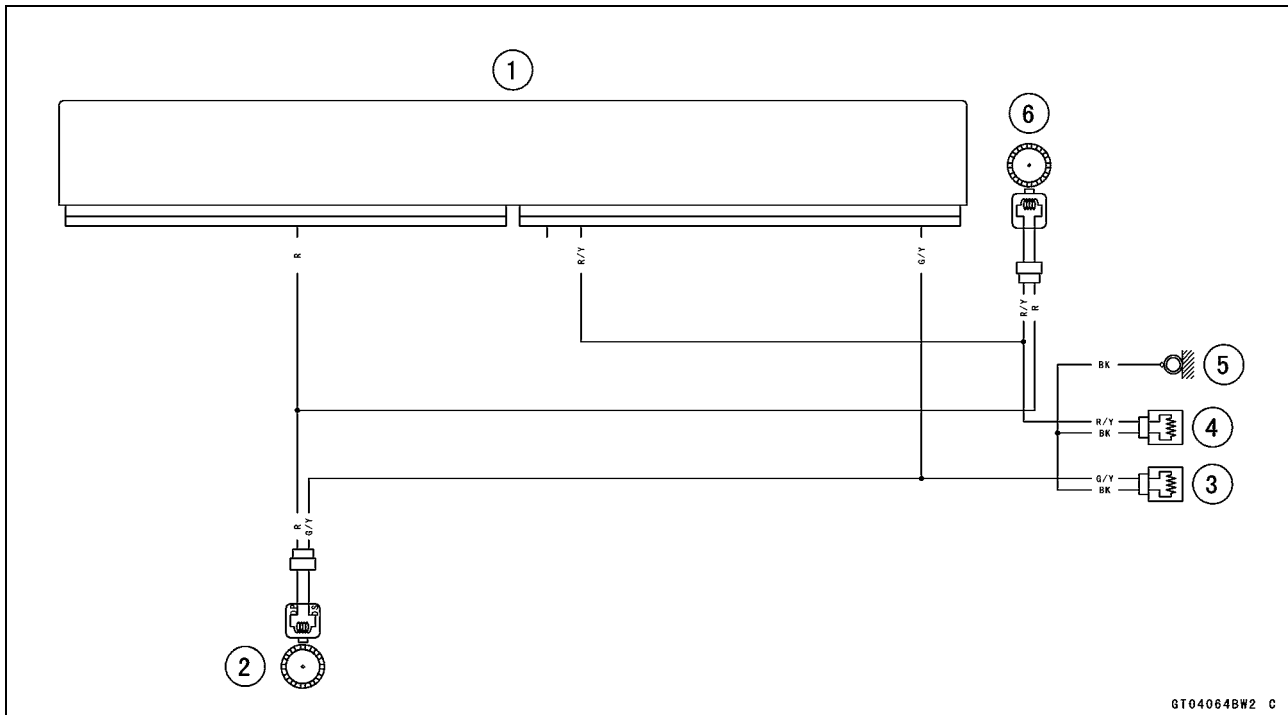


- ECU
- Front Wheel Rotation Sensor
- KIBS Hydraulic Unit
- Rear Wheel Rotation Sensor

17-40 SELF-DIAGNOSIS SYSTEM

Rear Wheel Rotation Sensor Signal (Service Code 24)

Wheel Rotation Sensor Circuit (other than KIBS Equipped Models)



1. ECU
2. Front Wheel Rotation Sensor
3. Resistor F 220 Ω
4. Resistor R 220 Ω
5. Frame Ground 3
6. Rear 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 to 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 in the figure.
 - 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.

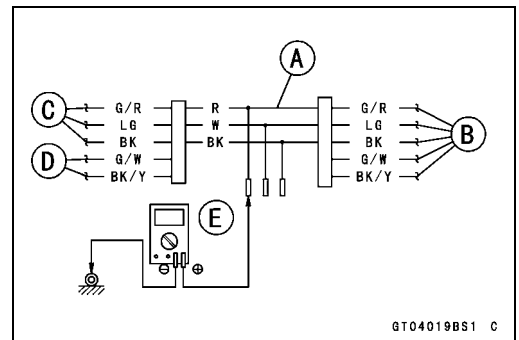
Gear Position Switch Output Voltage

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 to 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

17-42 SELF-DIAGNOSIS SYSTEM

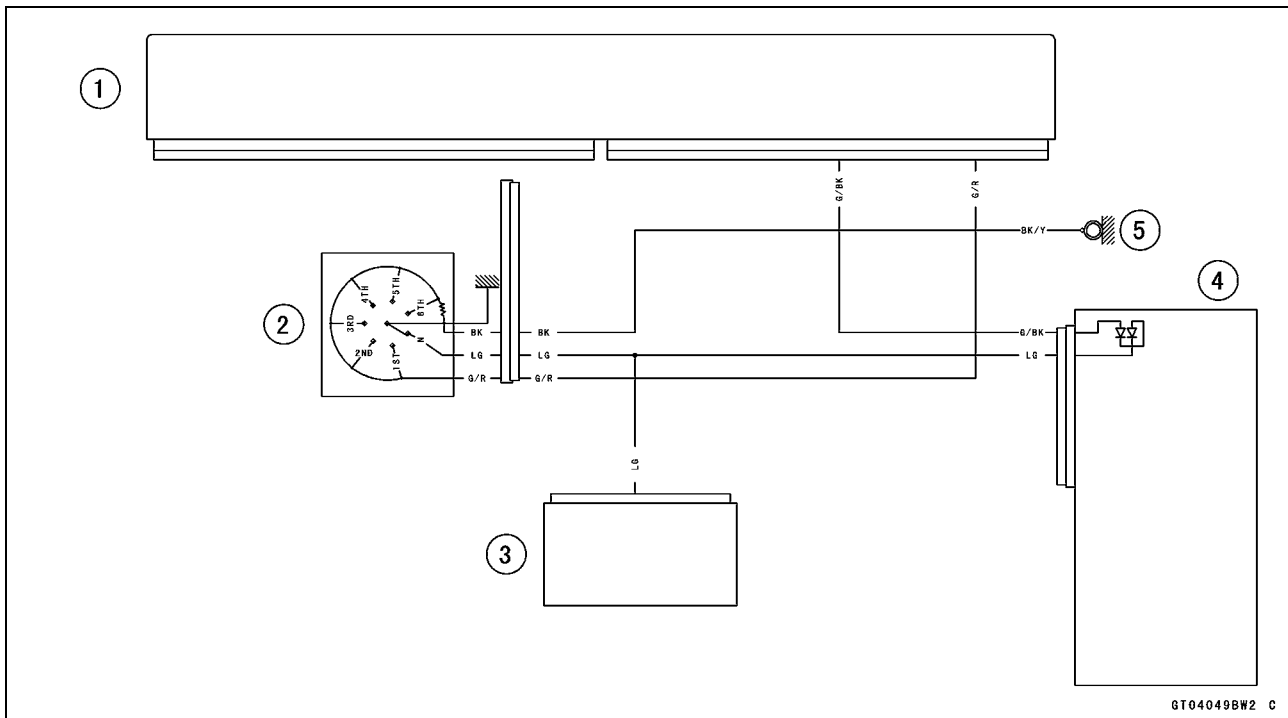
Gear Position Switch (Service Code 25)

- Turn the ignition switch to OFF.
- ★ If the reading is out of the standard, check the wiring for continuity, using the wiring diagram in this section.

Special Tool - Hand Tester: 57001-1394

- ★ 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



GT04049B*2 C

1. ECU
2. Gear Position Switch
3. Meter Unit
4. Relay Box
5. Frame Ground 1

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 KIBS hydraulic unit (KIBS equipped models). For other than KIBS 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.
- When the service code 27 and following service codes (for KIBS) 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 and Rear Wheel Rotation Sensor Lead Connectors
 - KIBS Hydraulic Unit Connector (see KIBS Hydraulic Unit Removal in the Brakes chapter)
- For KIBS equipped models, check the wiring for continuity between harness connectors.

Special Tool - Hand Tester: 57001-1394

Wiring Continuity Inspection

ECU Connector [A] ← →

KIBS ABS Hydraulic Unit Connector [B]

G/Y lead (ECU terminal 4, KIBS Hydraulic Unit terminal 8) [C]

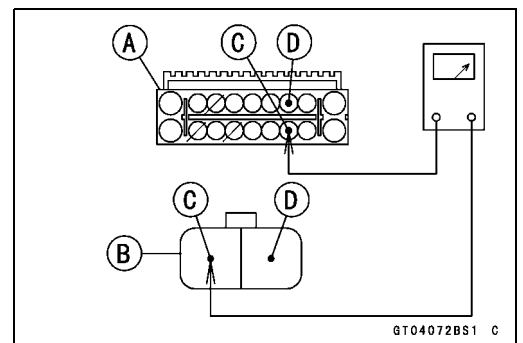
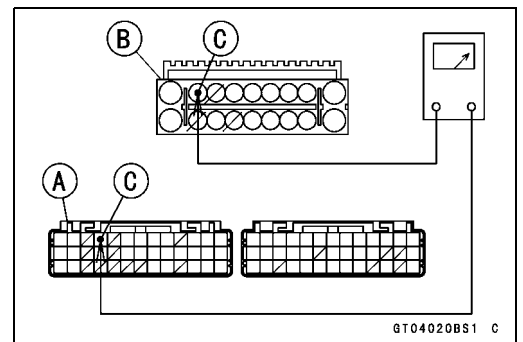
Wiring Continuity Inspection

KIBS Hydraulic Unit Connector [A] ← →

Front Wheel Rotation Sensor Connector [B]

W lead (KIBS Hydraulic Unit Connector terminal 12) [C]

Y lead (KIBS Hydraulic Unit Connector terminal 3) [D]



17-44 SELF-DIAGNOSIS SYSTEM

Front Wheel Rotation Sensor Signal (Service Code 27)

- For other than KIBS equipped models, check the wiring for continuity between harness connectors.

Special Tool - Hand Tester: 57001-1394

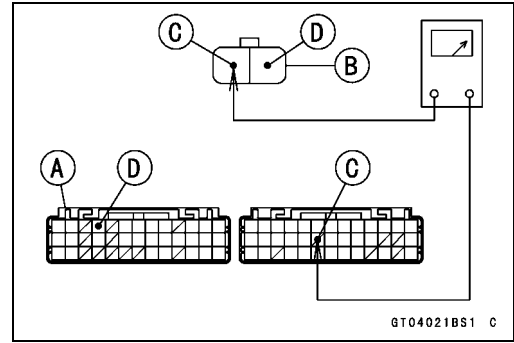
Wiring Continuity Inspection

ECU Connector [A] ← →

Front Wheel Rotation Sensor Connector [B]

R lead (ECU terminal 58) [C]

G/Y lead (ECU terminal 4) [D]



Front Resistor Resistance (in Main Harness)

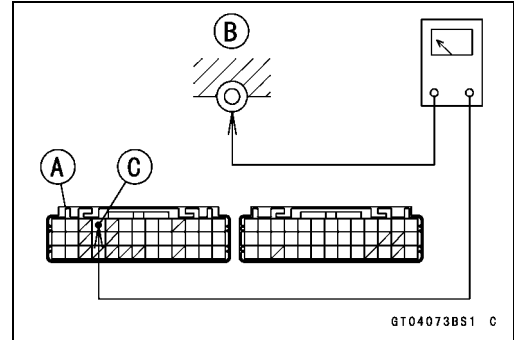
Connections:

ECU Connector [A] ← → Ground [B]

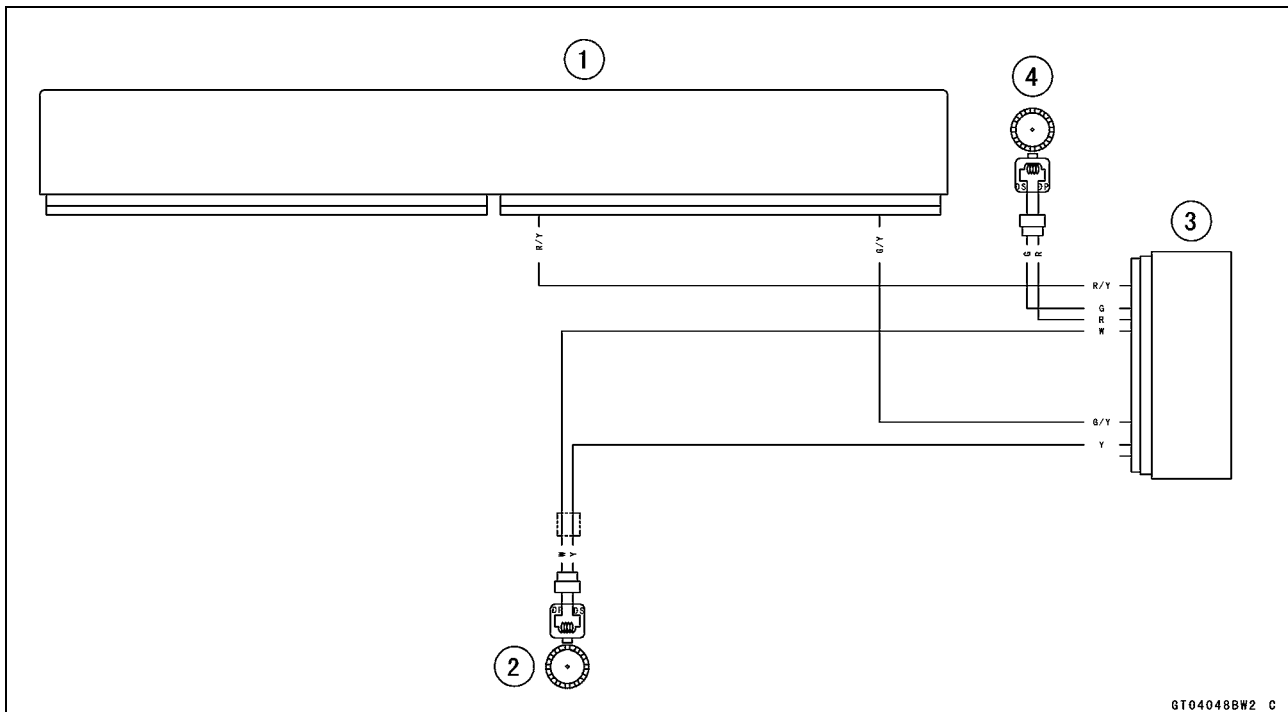
G/Y lead (ECU terminal 4) [C]

Standard: 209 ~ 231 Ω

- ★ If the resistance is out of the standard, replace the main harness.
- ★ 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).



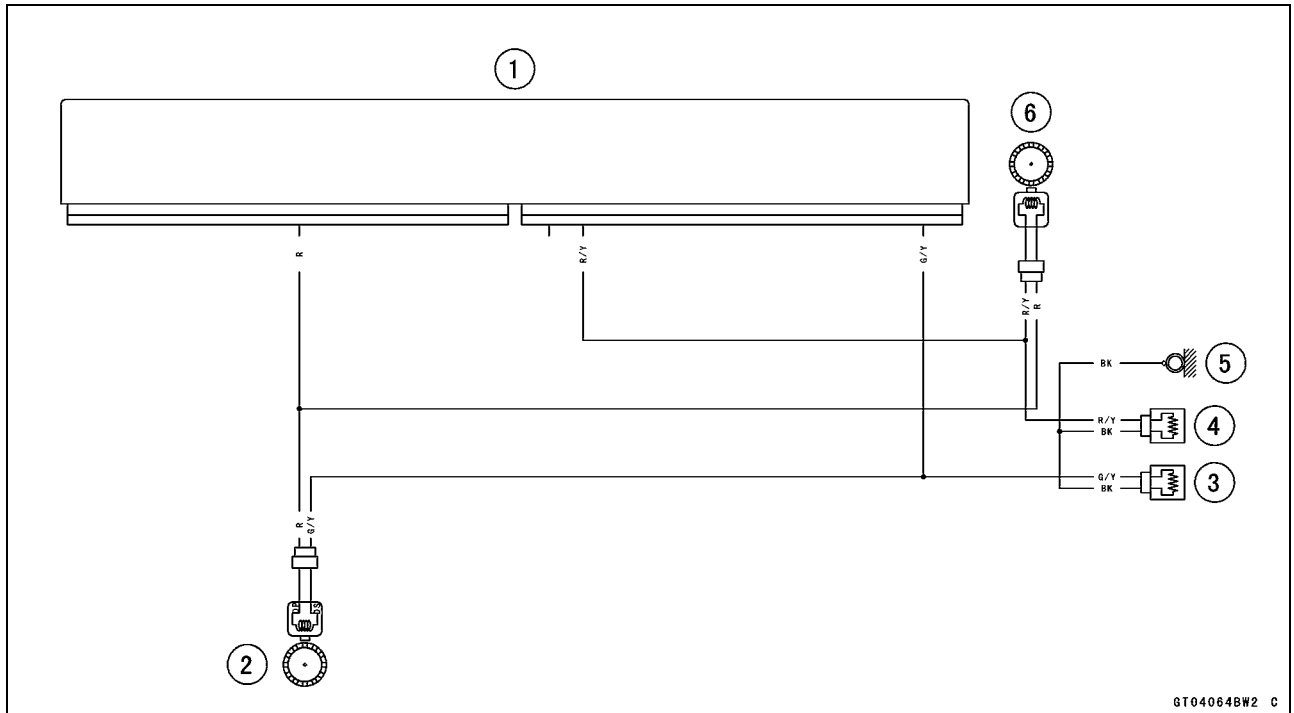
Wheel Rotation Sensor Circuit (KIBS Equipped Models)



1. ECU
2. Front Wheel Rotation Sensor
3. KIBS Hydraulic Unit
4. Rear Wheel Rotation Sensor

Front Wheel Rotation Sensor Signal (Service Code 27)

Wheel Rotation Sensor Circuit (other than KIBS Equipped Models)



1. ECU
2. Front Wheel Rotation Sensor
3. Resistor F 220 Ω
4. Resistor R 220 Ω
5. Frame Ground 3
6. Rear Wheel Rotation Sensor

17-46 SELF-DIAGNOSIS SYSTEM

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]

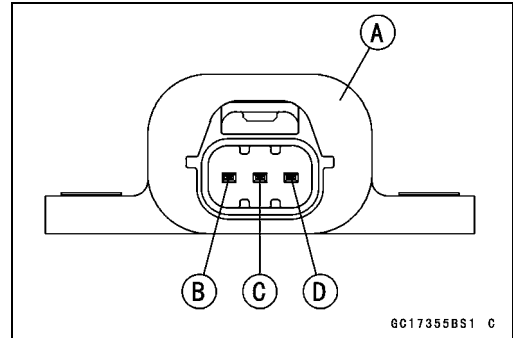
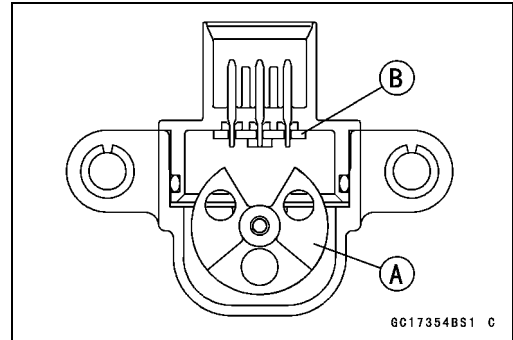
When the motorcycle is down, the ignition switch is left ON. If the starter button is pushed, the electric starter turns but the engine does not start. To start the engine again, raise the motorcycle, turn the ignition switch to OFF, and then turn it to ON.

Vehicle-down Sensor [A]

Ground Terminal [B]: BR/BK

Output Terminal [C]: Y/G

Input Terminal [D]: BL

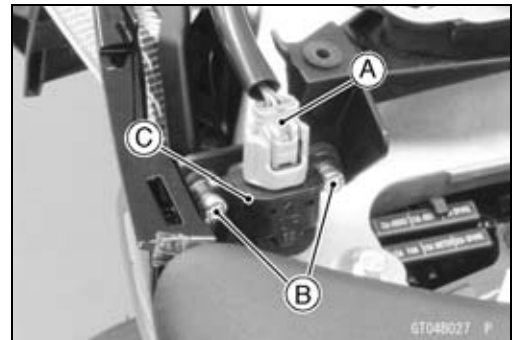


Vehicle-down Sensor Removal

NOTICE

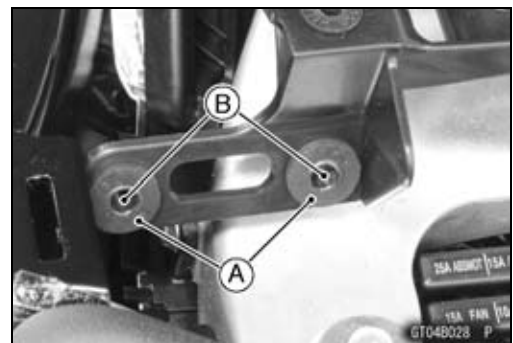
Never drop the vehicle-down sensor especially on a hard surface. Such a shock to the sensor can damage it.

- Remove:
 - Rear Seat (see Rear Seat Removal in the Frame chapter)
 - Upper Seat Cover (see Seat Cover Removal in the Frame chapter)
 - Connector [A]
 - Bolts [B] and Nuts
 - Vehicle-down Sensor [C]



Vehicle-down Sensor Installation

- Be sure to install the rubber dampers [A] and collars [B] on the bracket.

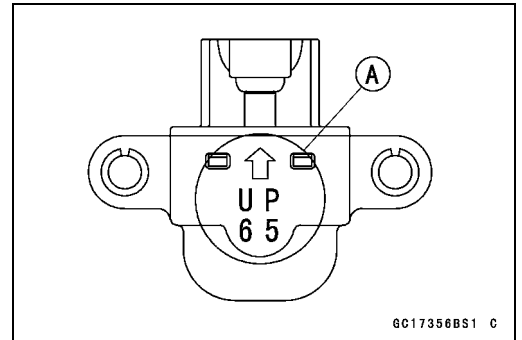


Vehicle-down Sensor (Service Code 31)

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

⚠ 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

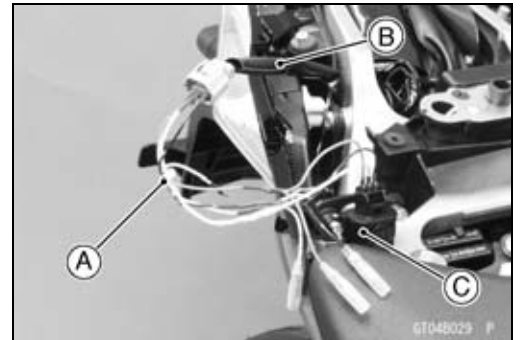
NOTE

○ Be sure the battery is fully charged.

- Turn the ignition switch to OFF.
- Disconnect the vehicle-down sensor connector and connect the measuring adapter [A] between these connectors as shown in the figure.

Main Harness [B]

Vehicle-down Sensor [C]



Special Tool - Measuring Adapter: 57001-1700

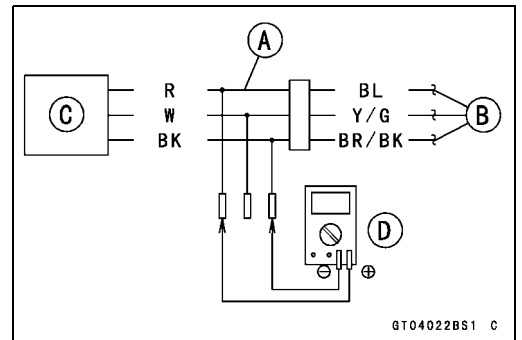
- Connect a digital meter [D] to the measuring adapter leads.

Vehicle-down Sensor Input Voltage

Connections to Adapter:

Digital Meter (+) → R (sensor BL) lead

Digital Meter (-) → BK (sensor BR/BK) lead



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

Input Voltage

Standard: DC 4.75 ~ 5.25 V

- Turn the ignition switch to OFF.
- ★ If the reading is within the standard, check the output voltage (see Vehicle-down 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.

Special Tool - Hand Tester: 57001-1394

○ Disconnect the ECU and sensor connectors.

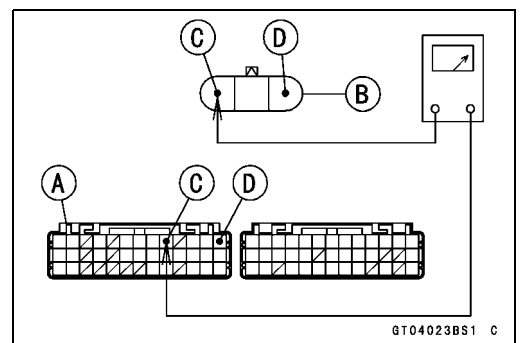
Wiring Continuity Inspection

ECU Connector [A] ↔

Vehicle-down Sensor Connector [B]

BL lead (ECU terminal 9) [C]

BR/BK 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).

17-48 SELF-DIAGNOSIS SYSTEM

Vehicle-down Sensor (Service Code 31)

Vehicle-down Sensor Output Voltage Inspection

- Remove the vehicle-down sensor.
- Connect the measuring adapter [A] to the vehicle-down sensor connectors as shown in the figure.

Special Tool - Measuring Adapter: 57001-1700

Main Harness [B]

Vehicle-down Sensor [C]

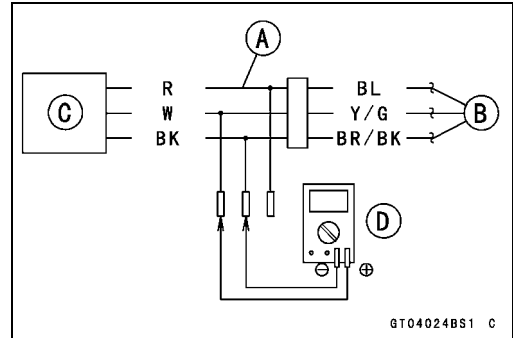
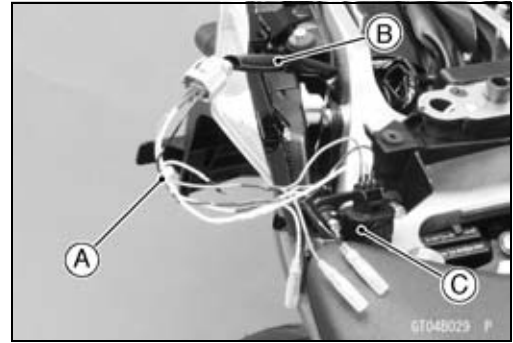
- Connect a digital meter [D] to the measuring adapter leads.

Vehicle-down Sensor Output Voltage

Connections to Adapter:

Digital Meter (+) → W (sensor Y/G) lead

Digital Meter (-) → BK (sensor BR/BK) lead



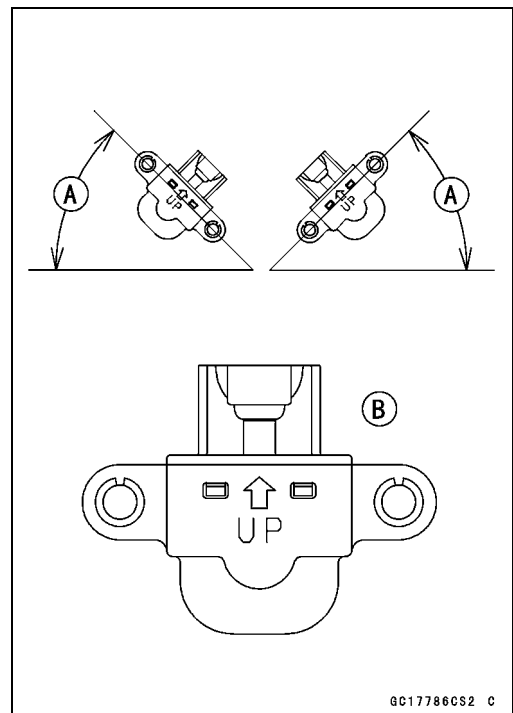
- Hold the sensor vertically.
- Measure the output voltage with the engine stopped, and with the connector joined.
- Turn the ignition switch to ON.
- Tilt the sensor 60 ~ 70° or more [A] right or left, then hold the sensor almost vertical with the arrow mark pointed up [B], and measure the output voltage.

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 to OFF.
- ★ If the reading is out of the standard, replace the sensor.



Vehicle-down Sensor (Service Code 31)

★ If the reading is within the standard, remove the ECU and check the wiring for continuity between main harness connectors.

Special Tool - Hand Tester: 57001-1394

○ Disconnect the ECU and sensor connectors.

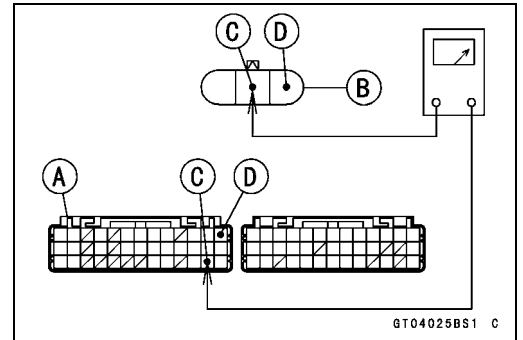
Wiring Continuity Inspection

ECU Connector [A] ←→

Vehicle-down Sensor Connector [B]

Y/G lead (ECU terminal 38) [C]

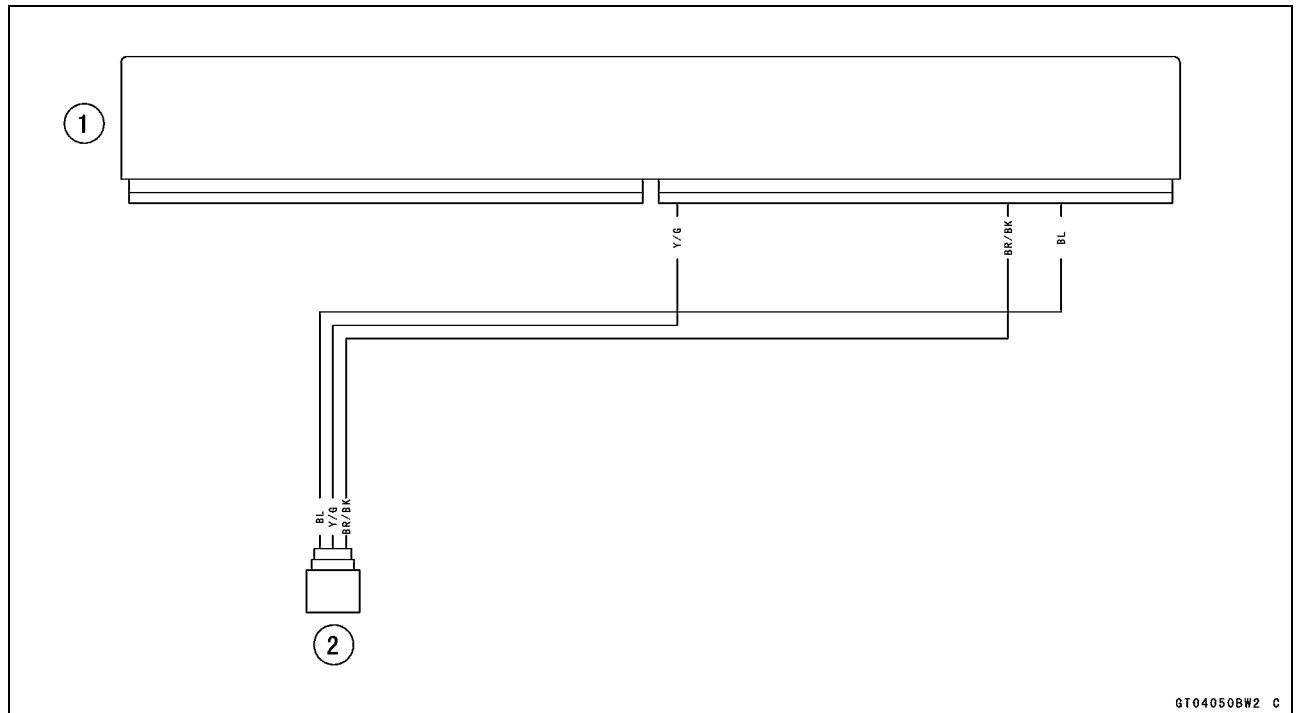
BR/BK lead (ECU terminal 13) [D]



★ 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).

Vehicle-down Sensor Circuit



- 1. ECU
- 2. Vehicle-down Sensor

17-50 SELF-DIAGNOSIS SYSTEM

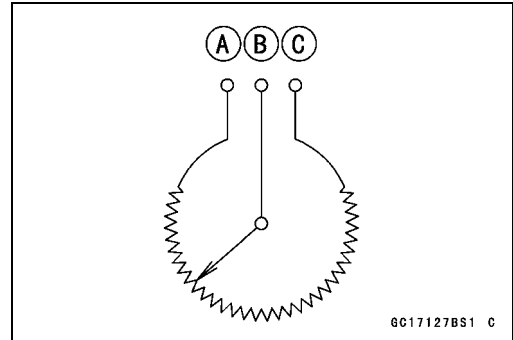
Subthrottle Sensor (Service Code 32)

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]: BR/BK



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 to 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

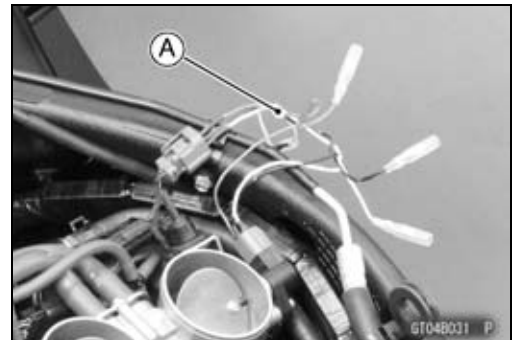
Digital Meter (-) → BK (sensor BR/BK) lead

- Measure the input voltage with the engine stopped and with the connector joined.
- Connect the following parts to harness connectors temporarily.
 - ECU
 - Intake Air Temperature Sensor
- Turn the ignition switch to ON.

Input Voltage

Standard: DC 4.75 ~ 5.25 V

- Turn the ignition switch to 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.

Special Tool - Hand Tester: 57001-1394

○ Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection

ECU Connector [A] ↔

Subthrottle Sensor Connector [B]

BL lead (ECU terminal 9) [C]

BR/BK 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).

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

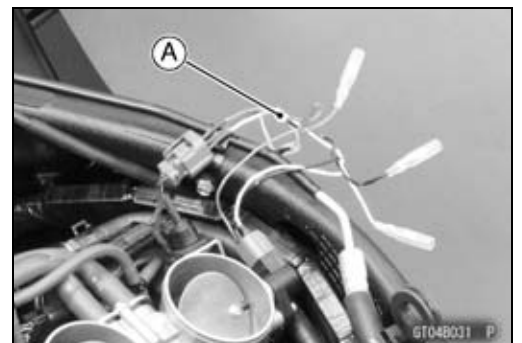
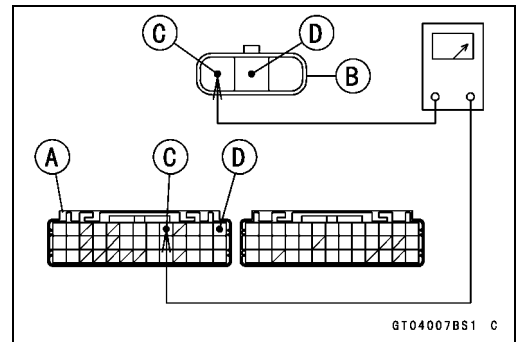
Subthrottle Sensor Output Voltage

Connections to Adapter:

Digital Meter (+) → R (sensor BL/W) lead

Digital Meter (-) → BK (sensor BR/BK) lead

● Disconnect the subthrottle valve actuator connector [A].



17-52 SELF-DIAGNOSIS SYSTEM

Subthrottle Sensor (Service Code 32)

- Measure the output voltage with the engine stopped with the connector joined.
- Connect the following parts to harness connectors temporarily.
 - ECU
 - Intake Air Temperature Sensor
- Turn the ignition switch to ON.
- Measure the output voltage when the subthrottle valves are fully opened by hand.

Output Voltage

Standard: DC 0.8 ~ 1.0 V at subthrottle valve full close position (for reference)

DC 4.28 ~ 4.32 V at subthrottle valve full open position

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.

$$0.8 \times 4.75 \div 5.00 = 0.76 \text{ V}$$

$$1.0 \times 4.75 \div 5.00 = 0.95 \text{ V}$$

Thus, the valid range is 0.76 ~ 0.95 V

- Turn the ignition switch to 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.

Special Tool - Hand Tester: 57001-1394

- Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection

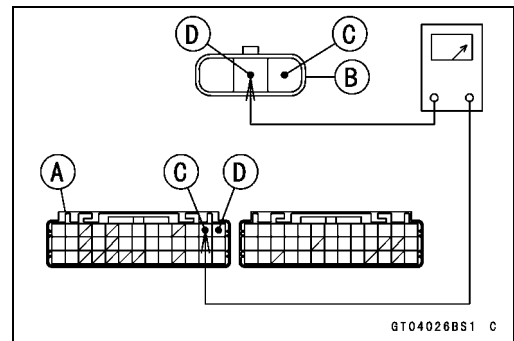
ECU Connector [A] ←→

Subthrottle Sensor Connector [B]

BL/W lead (ECU terminal 12) [C]

BR/BK 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).



Subthrottle Sensor (Service Code 32)

Subthrottle Sensor Resistance Inspection

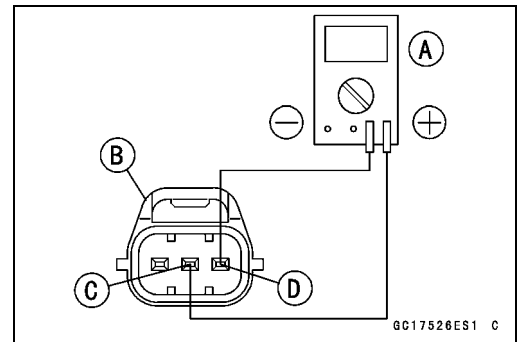
- Turn the ignition switch to OFF.
- Disconnect the subthrottle sensor connector.
- Connect a digital meter [A] to the subthrottle sensor connector [B].
- Measure the subthrottle sensor resistance.

Subthrottle Sensor Resistance

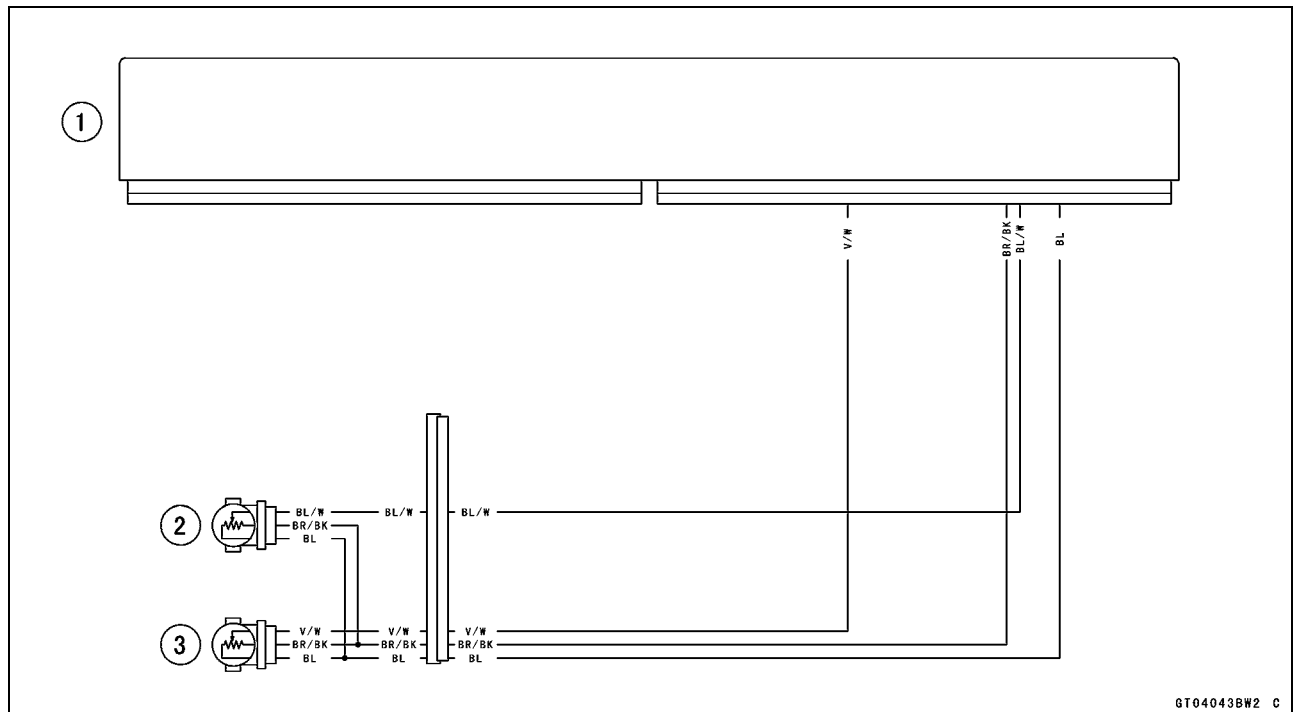
Connections: BL lead [C] ↔ BR/BK lead [D]

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. Subthrottle Sensor
3. Main Throttle Sensor

17-54 SELF-DIAGNOSIS SYSTEM

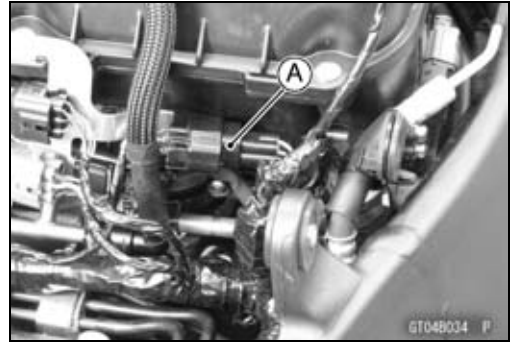
Oxygen Sensor - not activated (Service Code 33, Equipped Models)

Oxygen Sensor Removal/Installation

- Refer to the Oxygen Sensor Removal/Installation (Equipped Models) in the Electrical System chapter.

Oxygen Sensor Inspection

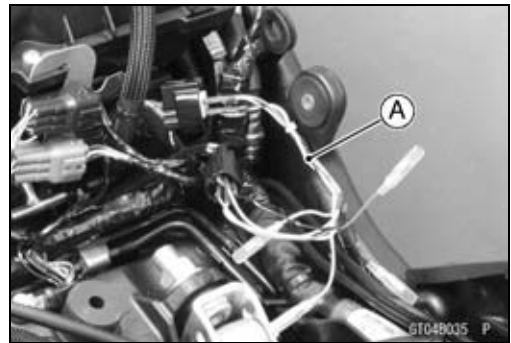
- Remove:
 - Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
 - Oxygen Sensor Lead Connector [A]



- 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.

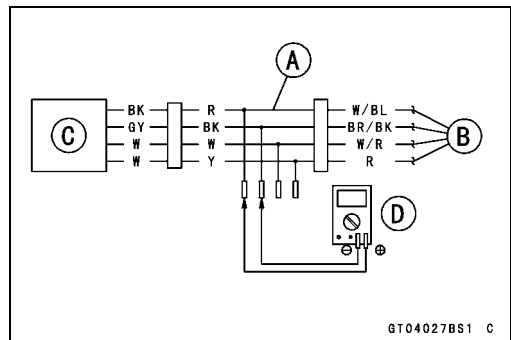


Oxygen Sensor Output Voltage

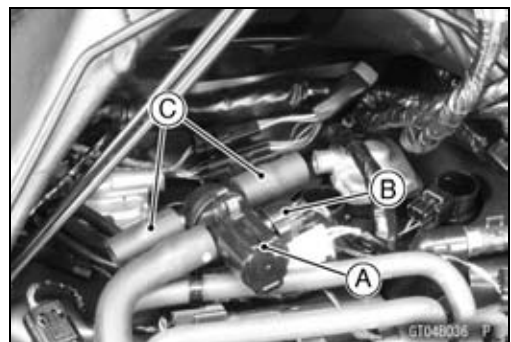
Connections to Adapter:

Digital Meter (+) → R (sensor BK) lead

Digital Meter (-) → BK (sensor GY) lead

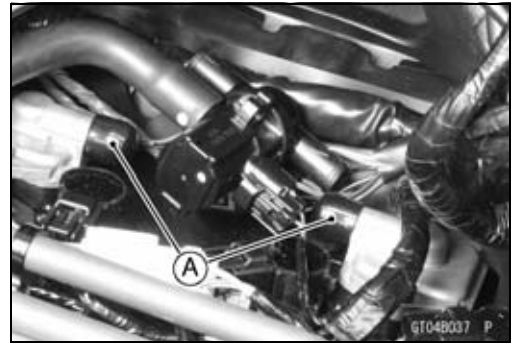


- Remove the air switching valve [A] (see Air Switching Valve Removal in the Engine Top End chapter).
- Do not disconnect the air switching valve connector [B].
- Remove the hoses [C].

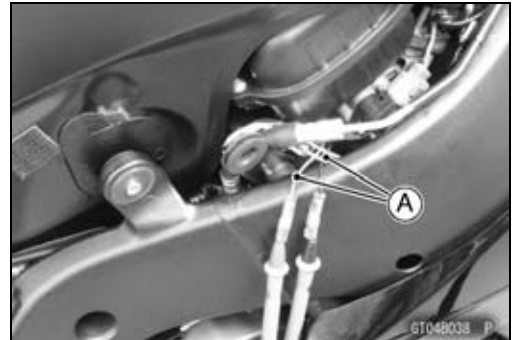


Oxygen Sensor - not activated (Service Code 33, Equipped Models)

- Install the suitable plugs [A] on the fitting of the air suction valve covers, and shut off the secondary air.
- 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)

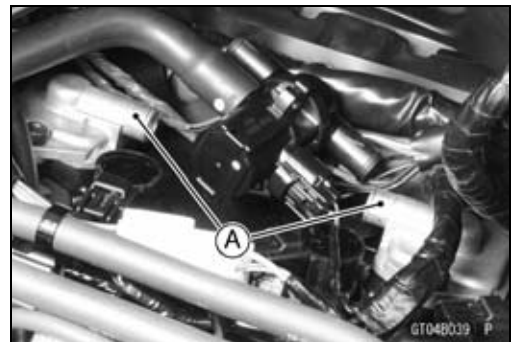


- Warm up the engine thoroughly until the radiator fan starts.
- Measure the output voltage with the connector joined.
 - Measuring Adapter [A]



Output Voltage (with Plugs, Rich)
Standard: DC 0.8 V or more

- Turn the ignition switch to 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.

- 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)

- 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 to OFF.

17-56 SELF-DIAGNOSIS SYSTEM

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.

Special Tool - Hand Tester: 57001-1394

○ Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection

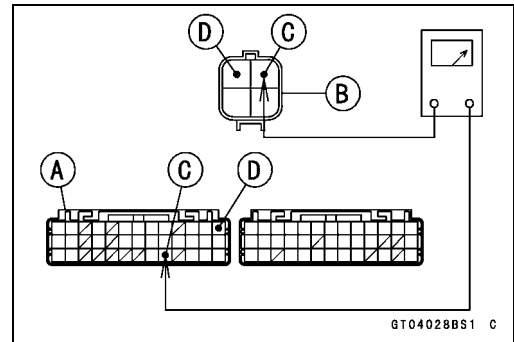
ECU Connector [A] ←→

Oxygen Sensor Connector [B]

W/BL lead (ECU terminal 35) [C]

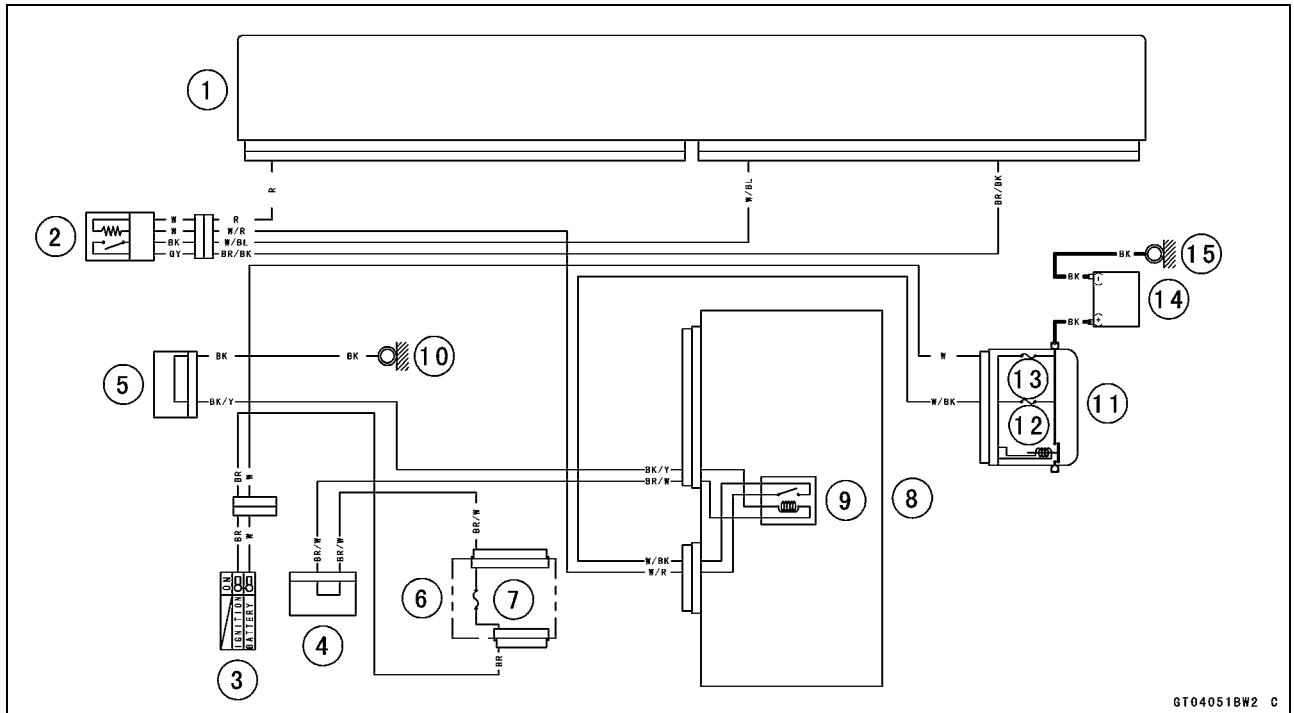
BR/BK lead (ECU terminal 13) [D]

- ★ 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 - not activated (Service Code 33, Equipped Models)

Oxygen Sensor Circuit



GT04051BW2 C

1. ECU
2. Oxygen Sensor
3. Ignition Switch
4. Joint Connector F
5. Joint Connector A
6. Fuse Box 1
7. Ignition Fuse 15 A
8. Relay Box
9. ECU Main Relay
10. Frame Ground 3
11. Starter Relay
12. ECU Fuse 15 A
13. Main Fuse 30 A
14. Battery
15. Engine Ground

17-58 SELF-DIAGNOSIS SYSTEM

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 to OFF.
- Remove the front seat (see Front Seat Removal in the Frame chapter).
- Remove the screws [A] and the exhaust butterfly valve actuator temporarily with the cables installed.

- 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 to ON.

Input Voltage

Standard: DC 4.75 ~ 5.25 V

- Turn the ignition switch to 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

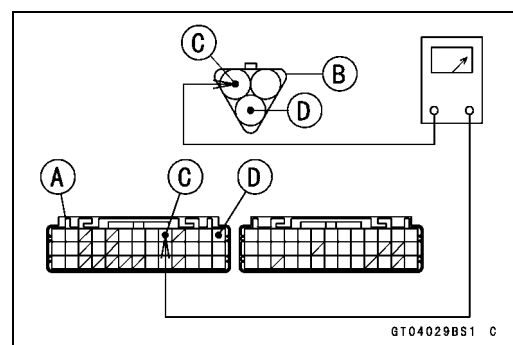
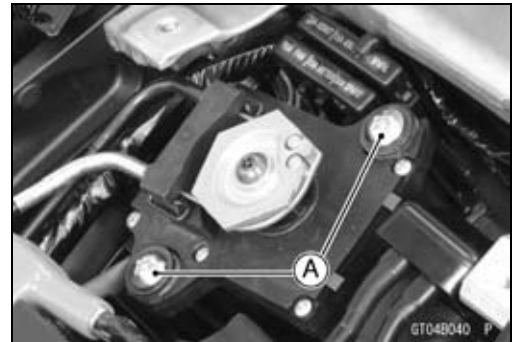
ECU Connector [A] ←→

Exhaust Butterfly Valve Actuator Sensor Connector [B]

BL lead (ECU terminal 9) [C]

BR/BK 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 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] (see Exhaust Butterfly Valve Actuator Sensor Output Voltage Inspection)
 - 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 to ON.

Output Voltage

Standard: DC 3.46 ~ 3.76 V at pulley original position

- Turn the ignition switch to 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

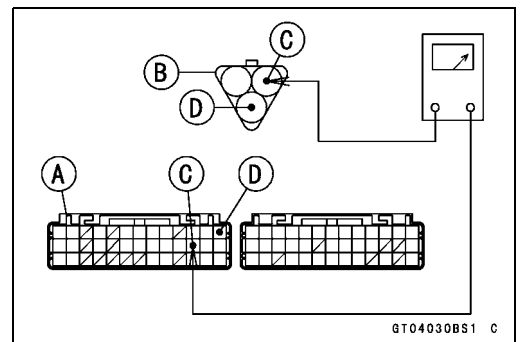
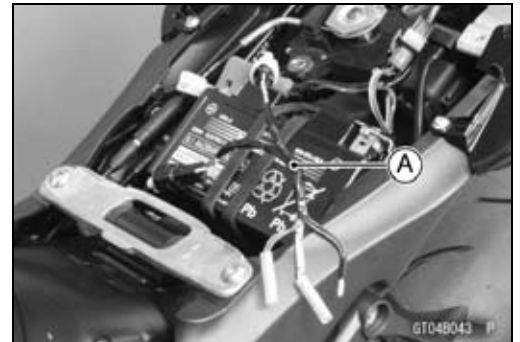
ECU Connector [A] ←→

Exhaust Butterfly Valve Actuator Sensor Connector [B]

GY lead (ECU terminal 24) [C]

BR/BK 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).

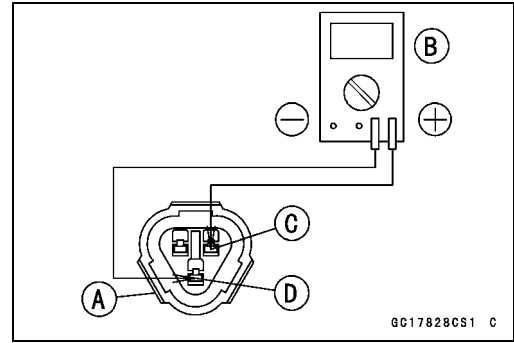


17-60 SELF-DIAGNOSIS SYSTEM

Exhaust Butterfly Valve Actuator Sensor (Service Code 34)

Exhaust Butterfly Valve Actuator Sensor Resistance Inspection

- Turn the ignition switch to 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.



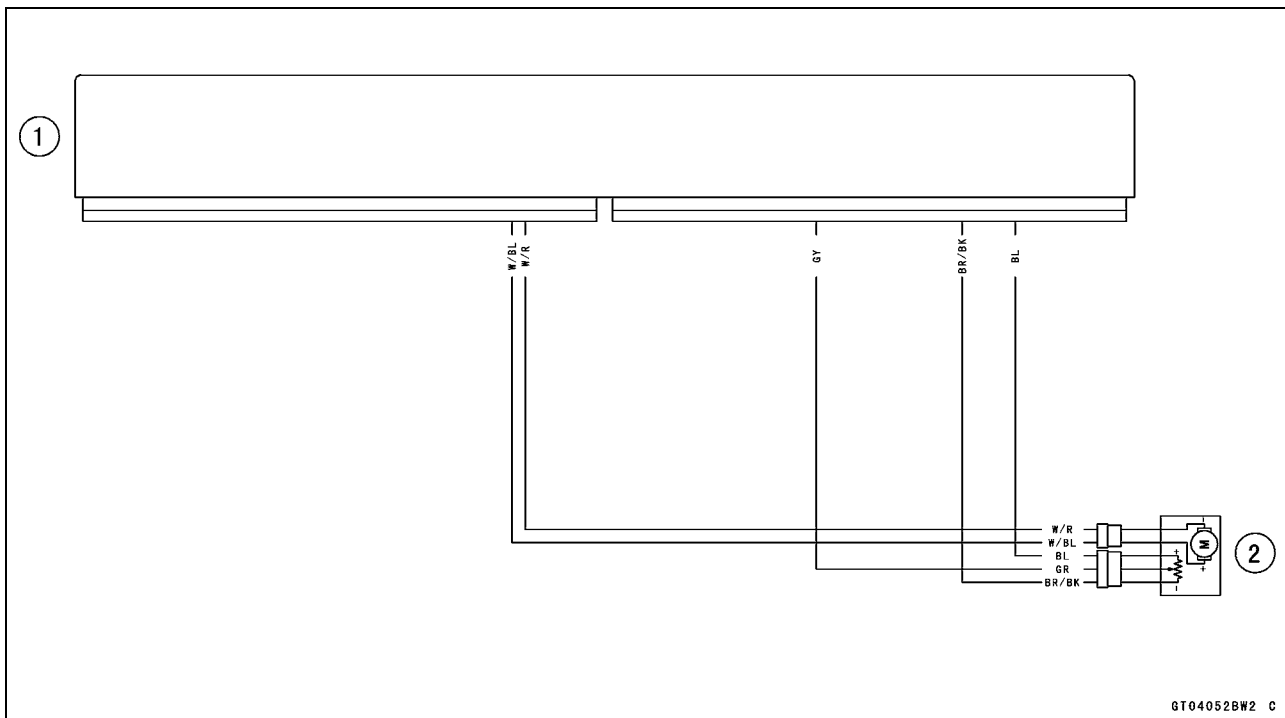
Exhaust Butterfly Valve Actuator Sensor Resistance

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

Immobilizer Amplifier (Service Code 35, Equipped Models)

Antenna Resistance Inspection

- Turn the ignition switch to OFF.
- Remove the air cleaner housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter).
- Disconnect the antenna lead connector [A].
- 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 antenna (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 to OFF.
- Remove the upper fairing (see Upper Fairing 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/Y lead

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

Input Voltage

Standard: Battery Voltage

- Turn the ignition switch to 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).



17-62 SELF-DIAGNOSIS SYSTEM

Blank Key Detection (Service Code 36, Equipped Models)

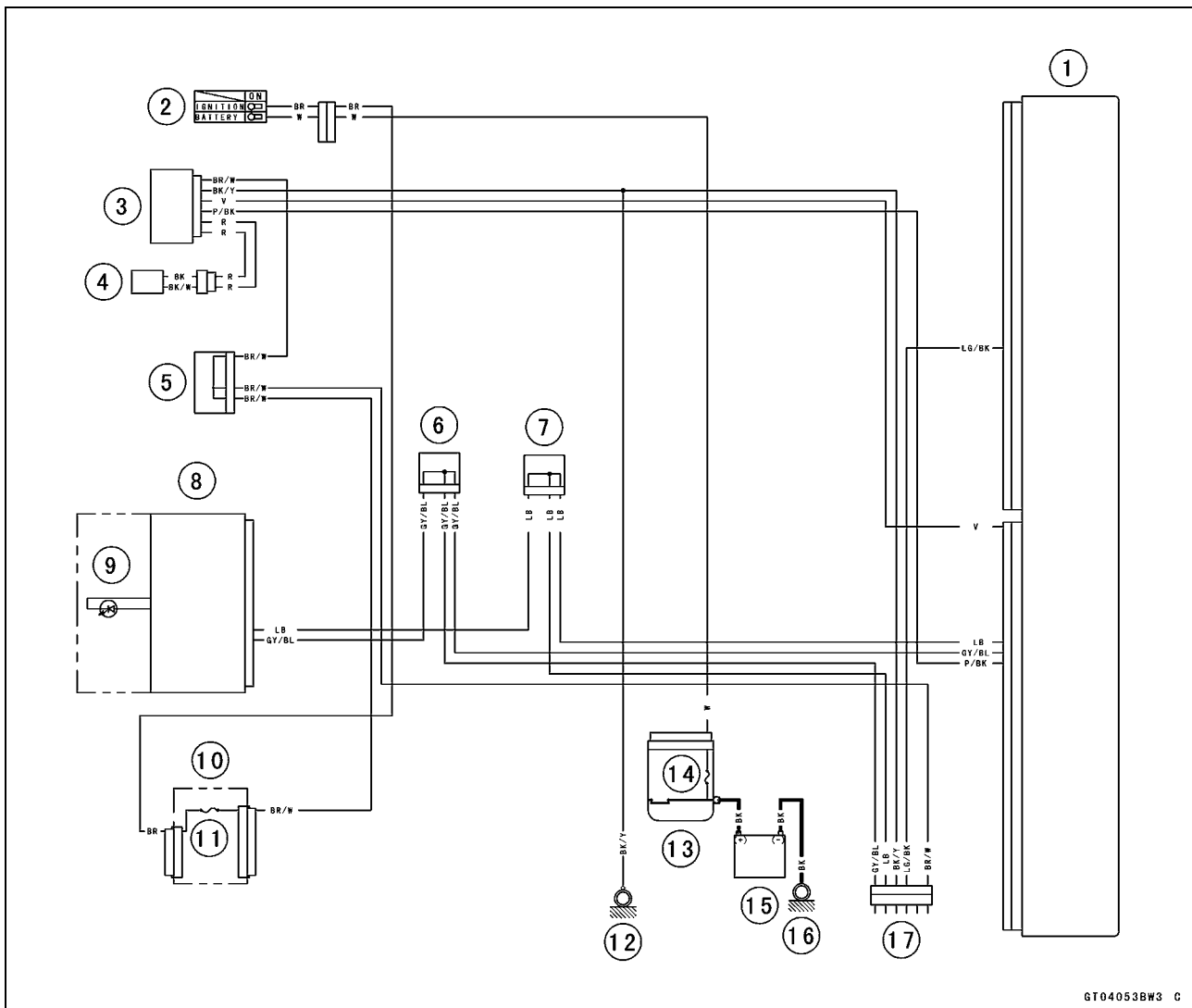
- This code appears in the following conditions.
- The transponder [A] in the user key is malfunction.
- When the spare key of unregistration is used.
- When the user key is registered in the registered ECU.
- Therefore, the service code 36 will disappear when the above issue is solved.



User Key Inspection

- Register the user 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



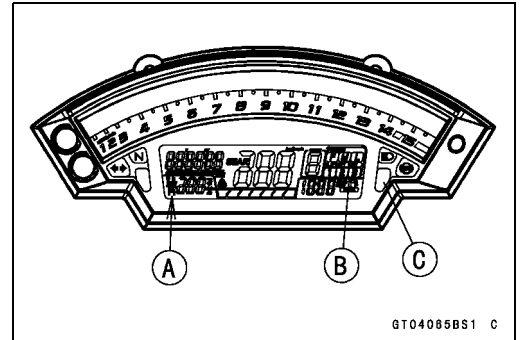
GT04053B#3 C

- | | | |
|--------------------------|--|--|
| 1. ECU | 8. Meter Unit | 13. Starter Relay |
| 2. Ignition Switch | 9. Oil Pressure/Water Temperature/FI/Immobilizer Warning Indicator LED | 14. Main Fuse 30 A |
| 3. Immobilizer Amplifier | 10. Fuse Box 1 | 15. Battery |
| 4. Immobilizer Antenna | 11. Ignition Fuse 15 A | 16. Engine Ground |
| 5. Joint Connector F | 12. Frame Ground | 17. Kawasaki Diagnostic System/Immobilizer Connector |
| 6. Joint Connector C | | |
| 7. Joint Connector D | | |

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 10 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 blinks the following items besides the FI warning symbol [A].
 Power Mode and S-KTRC Symbols [B]
 Yellow Color LED [C]



- 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.

Special Tool - Hand Tester: 57001-1394

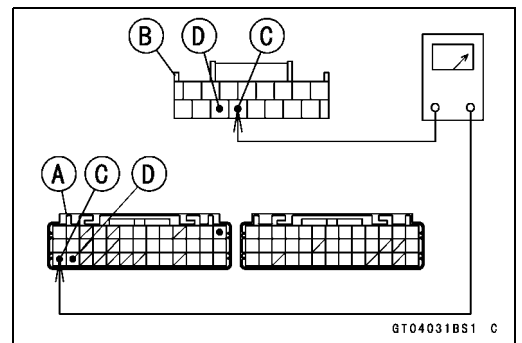
Wiring Inspection

ECU Connector [A] ↔ Meter Unit Connector [B]

GY/BL lead (ECU terminal 27) [C]

LB lead (ECU terminal 28) [D]

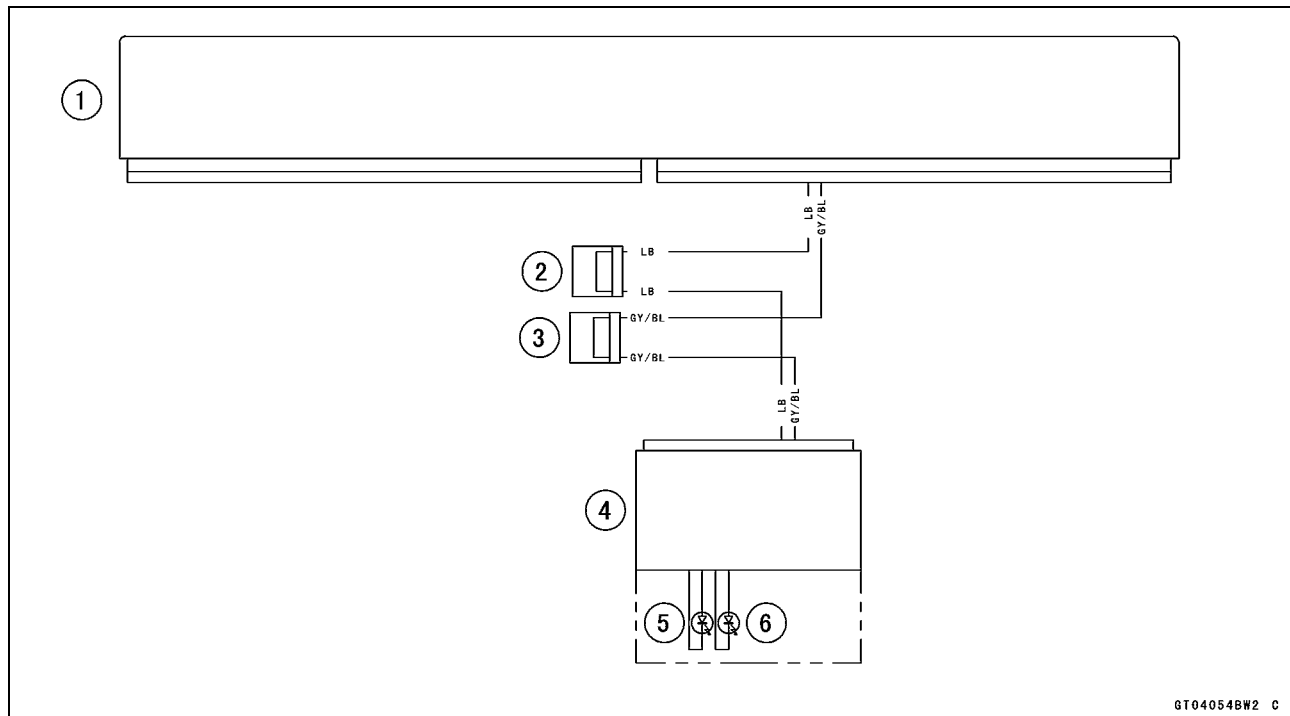
- ★ If the wiring is good, check the meter unit (see Meter Unit Inspection in the Electrical System chapter).
- ★ If the meter unit is normal, replace the ECU (see ECU Removal/Installation).



17-64 SELF-DIAGNOSIS SYSTEM

ECU Communication Error (Service Code 39)

ECU Communication Line Circuit

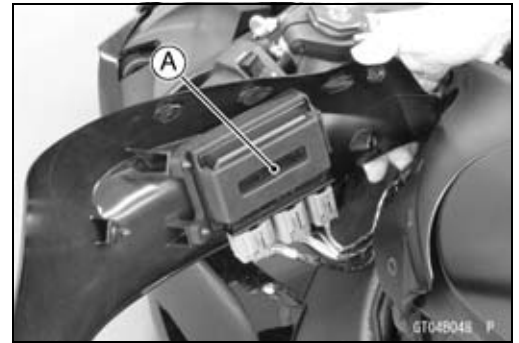


1. ECU
2. Joint Connector D
3. Joint Connector C
4. Meter Unit
5. Warning Indicator Light (LED, Yellow)
6. Warning Indicator Light (LED, Red)

Fuel Pump Relay (Service Code 46)

Fuel Pump Relay Removal/Installation

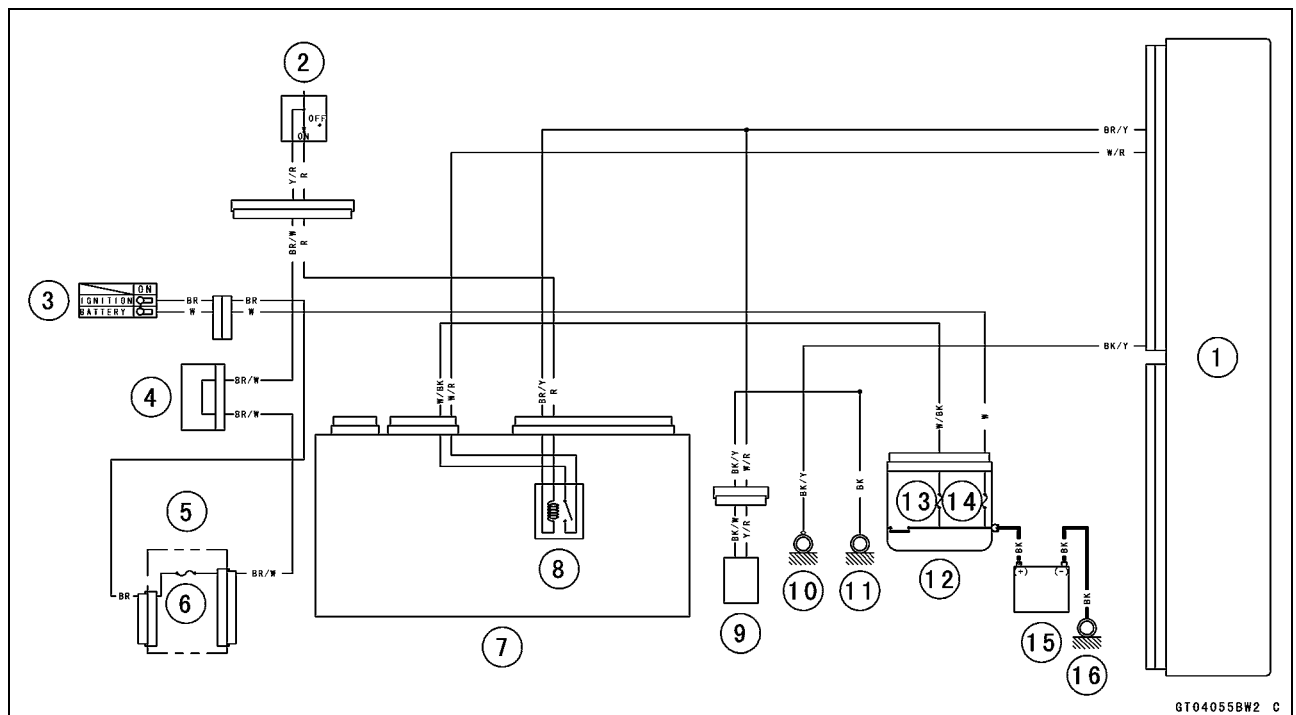
- The fuel pump relay is built in the relay box [A].
- Refer to the Relay Box Removal in the Electrical System chapter.



Fuel Pump Relay Inspection

- Refer to the Relay Circuit Inspection in the Electrical System chapter.
 - ★ If the fuel pump relay is normal, check the wiring to the fuel pump relay (see Fuel Pump Relay Circuit).
- Special Tool - Hand Tester: 57001-1394**
- ★ 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).

Fuel Pump Relay Circuit



- | | |
|-----------------------|--------------------|
| 1. ECU | 9. Fuel Pump |
| 2. Engine Stop Switch | 10. Frame Ground 1 |
| 3. Ignition Switch | 11. Frame Ground 3 |
| 4. Joint Connector F | 12. Starter Relay |
| 5. Fuse Box 1 | 13. ECU Fuse 15 A |
| 6. Ignition Fuse 15 A | 14. Main Fuse 30 A |
| 7. Relay Box | 15. Battery |
| 8. Fuel Pump Relay | 16. Engine Ground |

17-66 SELF-DIAGNOSIS SYSTEM

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 to 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 65)
- Digital Meter (-) → Frame Ground terminal

For Stick Coil #2

- Digital Meter (+) → BK/R lead (terminal 52)
- Digital Meter (-) → Frame Ground terminal

For Stick Coil #3

- Digital Meter (+) → BK/W lead (terminal 78)
- Digital Meter (-) → Frame Ground terminal

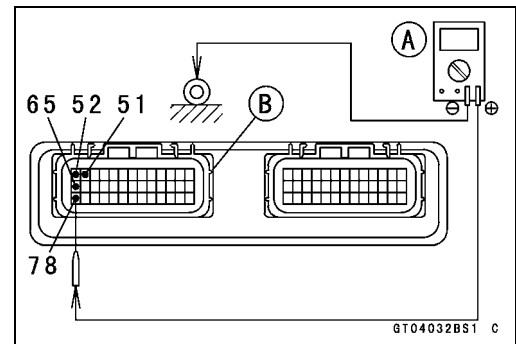
For Stick Coil #4

- Digital Meter (+) → BK/O lead (terminal 51)
- 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 to ON.

Input Voltage

Standard: Battery Voltage



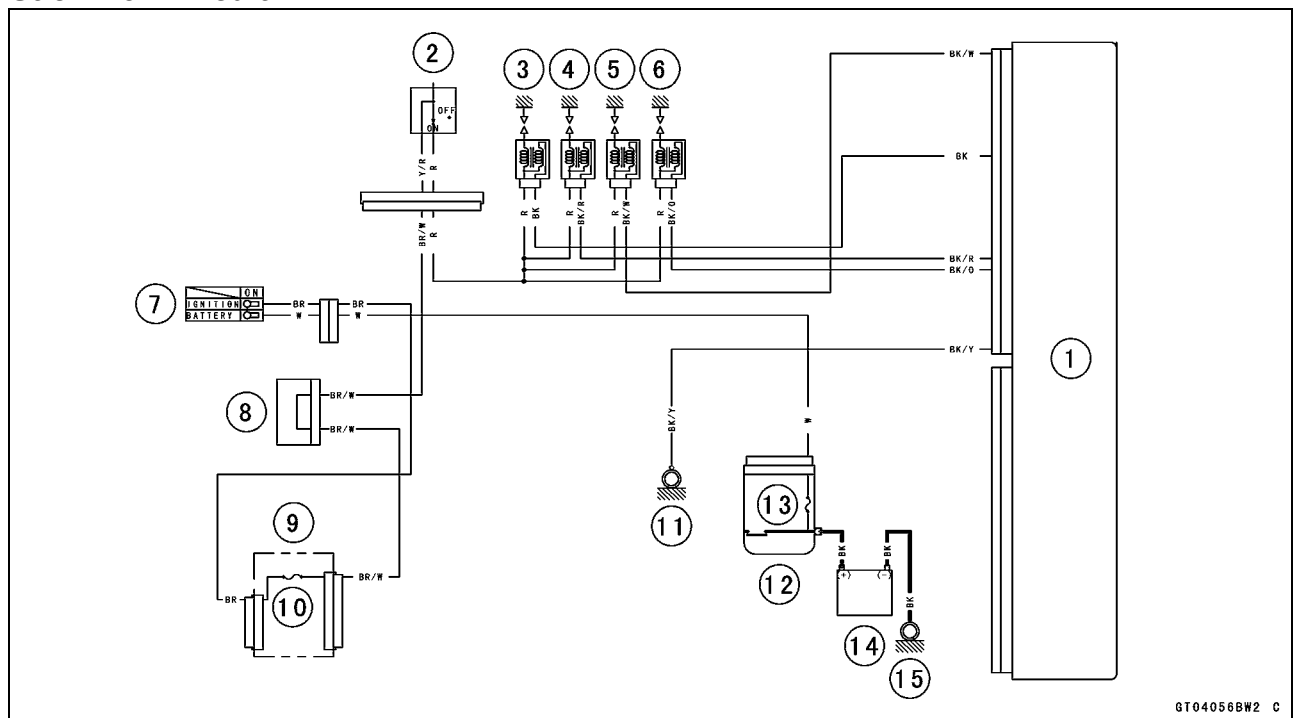
Stick Coils #1, #2, #3, #4: (Service Code 51, 52, 53, 54)

- Turn the ignition switch to OFF.
- ★ If the input voltage is out of the standard, check the wiring for continuity (see Stick Coil Circuit).

Special Tool - Hand Tester: 57001-1394

- ★ 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



GT04056BW2 C

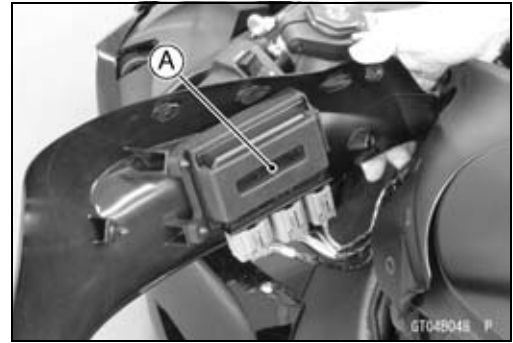
- | | |
|-----------------------|------------------------|
| 1. ECU | 9. Fuse Box 1 |
| 2. Engine Stop Switch | 10. Ignition Fuse 15 A |
| 3. Stick Coil #1 | 11. Frame Ground 1 |
| 4. Stick Coil #2 | 12. Starter Relay |
| 5. Stick Coil #3 | 13. Main Fuse 30 A |
| 6. Stick Coil #4 | 14. Battery |
| 7. Ignition Switch | 15. Engine Ground |
| 8. Joint Connector F | |

17-68 SELF-DIAGNOSIS SYSTEM

Radiator Fan Relay (Service Code 56)

Radiator Fan Relay Removal/Installation

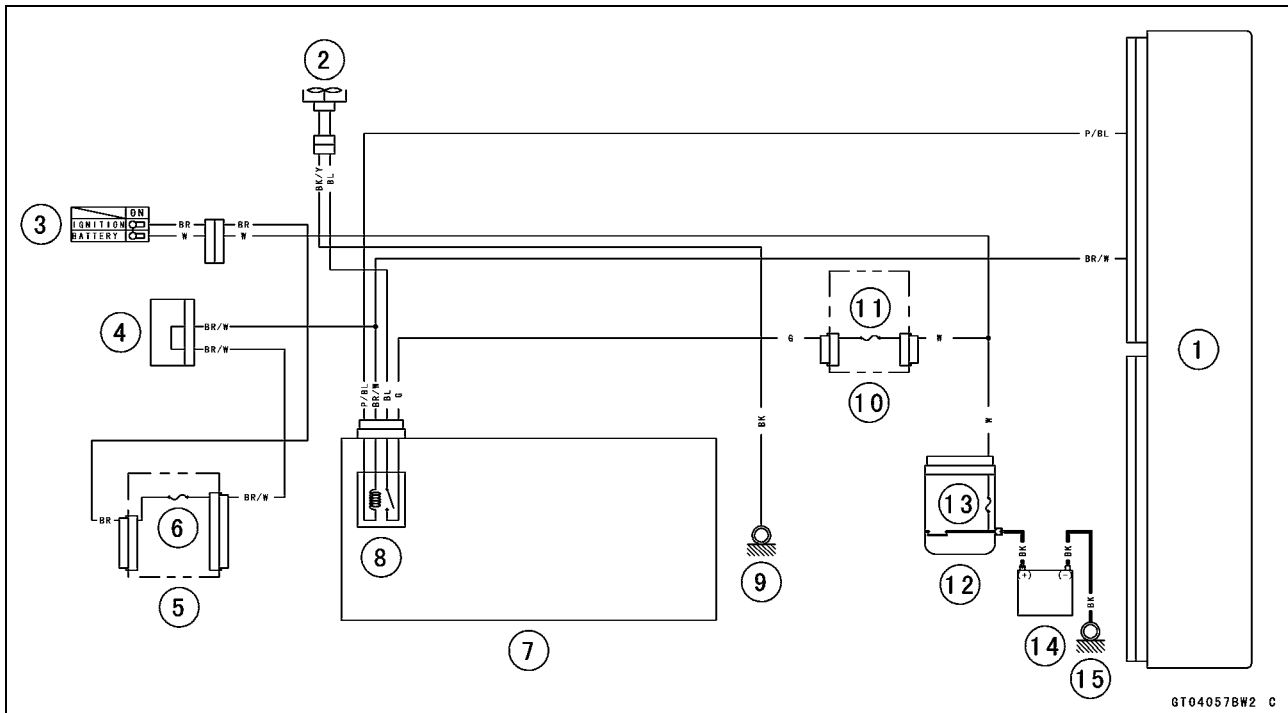
- The radiator fan relay is built in the relay box [A].
- Refer to the Relay Box Removal in the Electrical System chapter.



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.
- Special Tool - Hand Tester: 57001-1394**
- ★ 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. ECU | 9. Frame Ground 3 |
| 2. Fan Motor | 10. Fuse Box 2 |
| 3. Ignition Switch | 11. Fan Fuse 15 A |
| 4. Joint Connector F | 12. Starter Relay |
| 5. Fuse Box 1 | 13. Main Fuse 30 A |
| 6. Ignition Fuse 15 A | 14. Battery |
| 7. Relay Box | 15. Engine Ground |
| 8. Fan Relay | |

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.

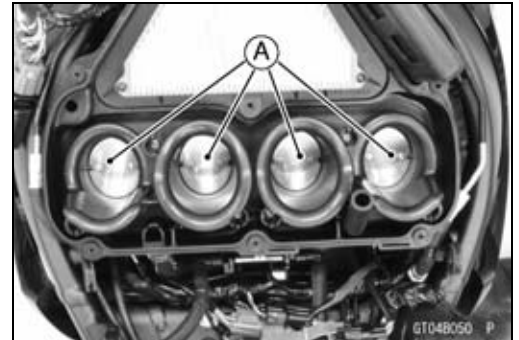


Subthrottle Valve Actuator Inspection

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 to ON.
- Check to see that all the subthrottle valves [A] open and close smoothly.
- Turn the ignition switch to 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 to OFF.
- Disconnect the subthrottle valve actuator connector [A].



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

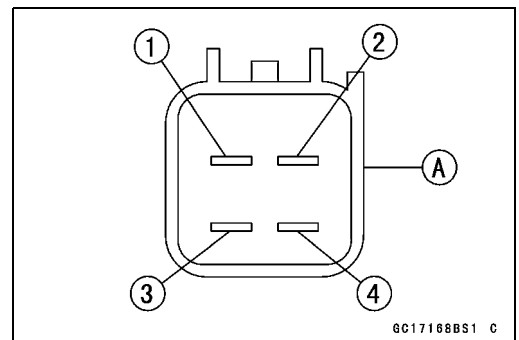
Subthrottle Valve Actuator Resistance

Connections: Y/BK lead [1] ↔ P/BL lead [2]

G lead [3] ↔ BK/O lead [4]

Standard: About 6.3 ~ 9.5 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).



17-70 SELF-DIAGNOSIS SYSTEM

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 in the figure.

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

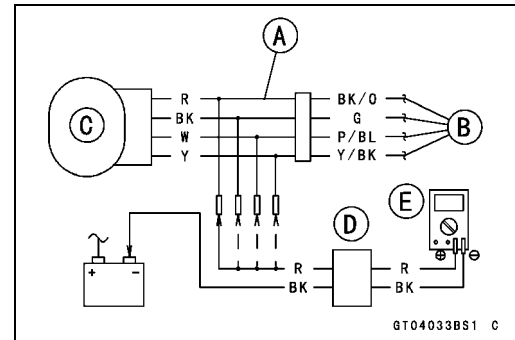
Digital Meter (-) → Battery (-) terminal

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

Special Tool - Hand Tester: 57001-1394

○ Disconnect the ECU and actuator connectors.

Wiring Continuity Inspection

ECU Connector [A] ↔

Subthrottle Valve Actuator Connector [B]

G lead (ECU terminal 15) [C]

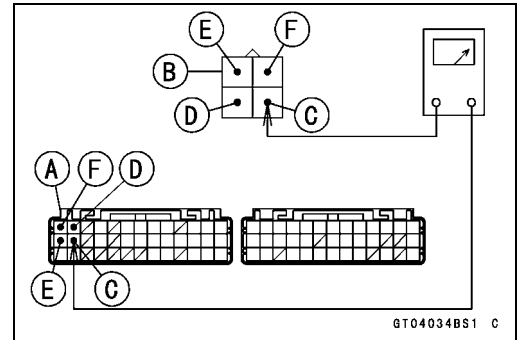
BK/O lead (ECU terminal 2) [D]

P/BL lead (ECU terminal 14) [E]

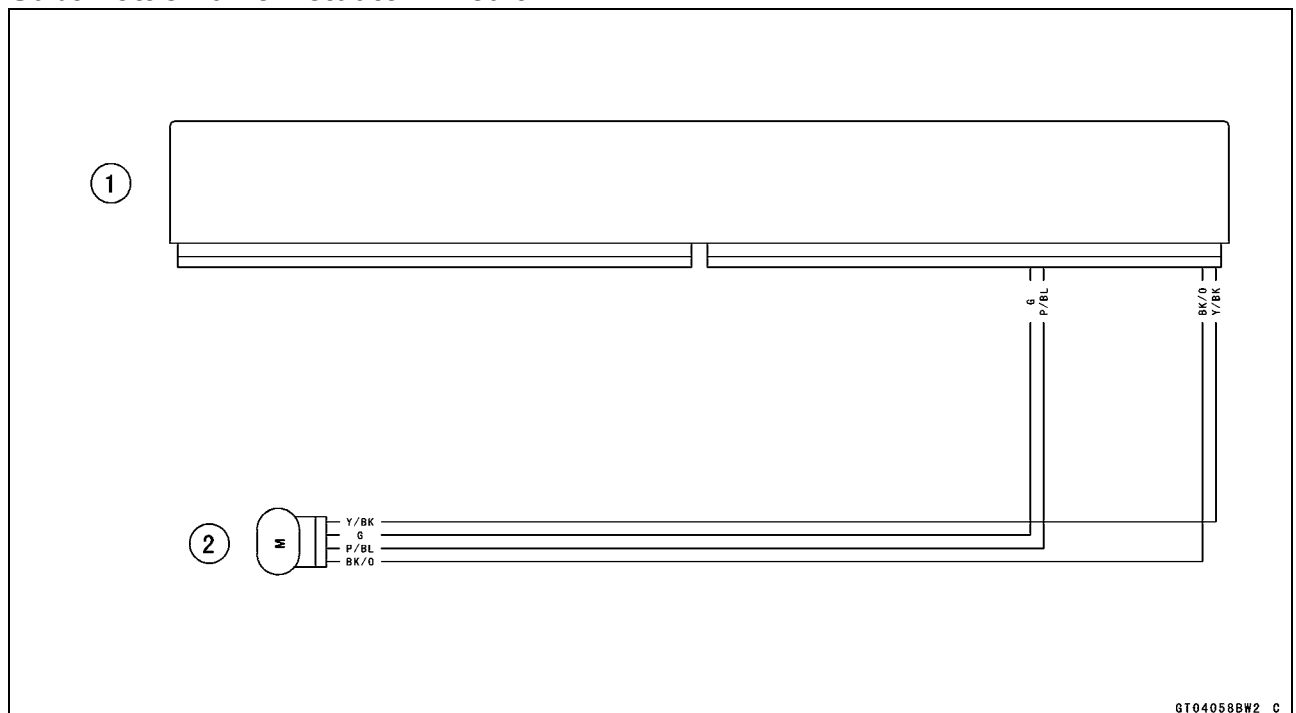
Y/BK lead (ECU terminal 1) [F]

★ 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

17-72 SELF-DIAGNOSIS SYSTEM

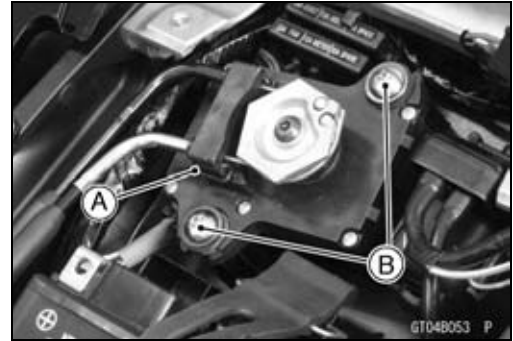
Exhaust Butterfly Valve Actuator (Service Code 63)

Exhaust Butterfly Valve Actuator Removal

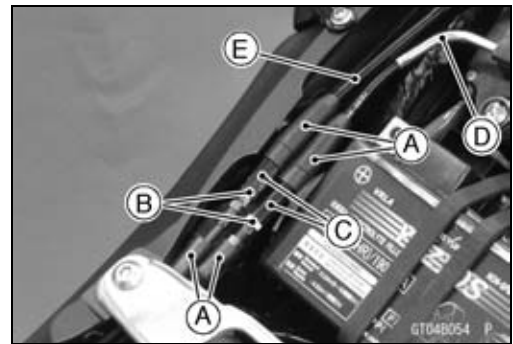
NOTICE

Never drop the exhaust butterfly valve actuator especially on a hard surface. Such a shock to the actuator can damage it.

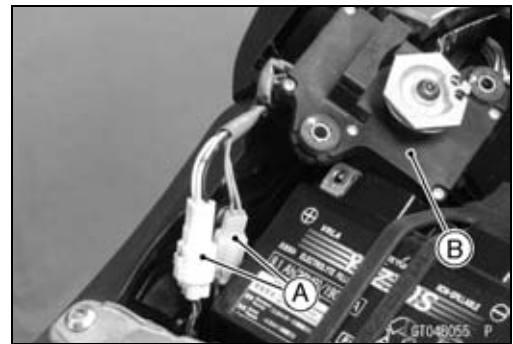
- Remove:
Front Seat (see Front Seat Removal in the Frame chapter)
Clamp [A]
Screws [B] and Washers



- Slide the covers [A] and loosen the lock nuts [B] and adjusters [C].
- Remove:
Exhaust Butterfly Valve Open Cable [D]
Exhaust Butterfly Valve Close Cable [E]



- Remove:
Connectors [A]
Exhaust Butterfly Valve Actuator [B]

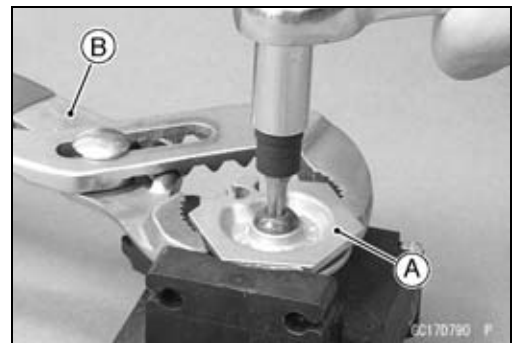


- Remove the pulley bolt while holding the pulley [A] with a suitable tool [B].

NOTICE

If the pulley bolt is removed without holding, the actuator damage will occur.

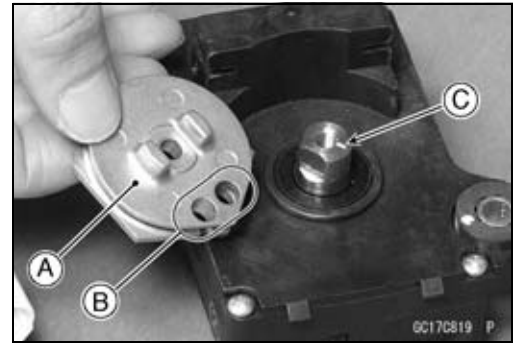
- Remove the pulley from the actuator.



Exhaust Butterfly Valve Actuator (Service Code 63)

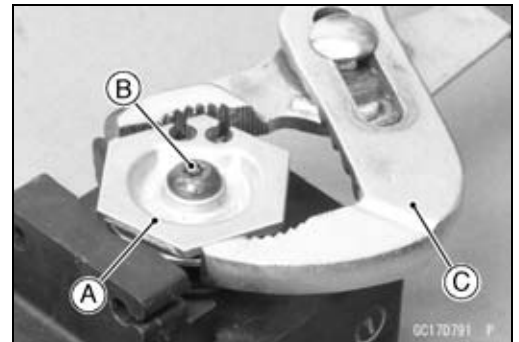
Exhaust Butterfly Valve Actuator Installation

- Install the pulley [A] on the actuator so that the hole side [B] align with the groove [C] on the shaft.



- 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)



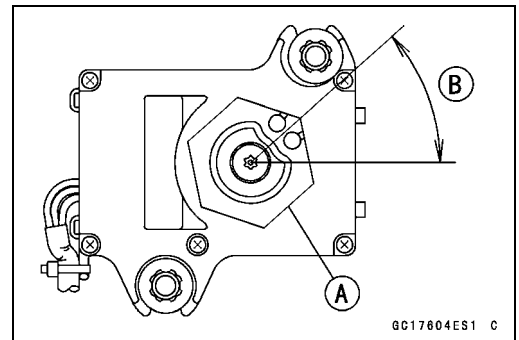
NOTICE

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 shown in the figure.
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 of shown in the figure.*



NOTICE

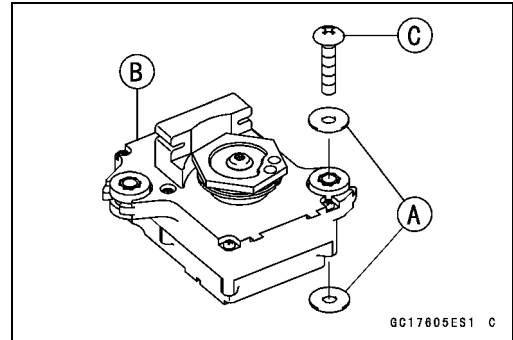
Do not correct the pulley position with the tool, forcibly. The actuator damage will occur.

- ★ If the pulley angle is wrong, adjust the angle as follows.
- Connect:
 - 2 pins Connector
 - 3 pins Connector
- Turn the ignition switch to ON.
- Confirm the pulley turns clockwise and then counterclockwise.
- The pulley stops at this side of the original position by the learning control.
- Turn the ignition switch to OFF.
- The pulley returns to the original position.
- ★ If the position is not within the specified angle above, replace the exhaust butterfly valve actuator.

17-74 SELF-DIAGNOSIS SYSTEM

Exhaust Butterfly Valve Actuator (Service Code 63)

- Be sure to install the washers [A] on the exhaust butterfly valve actuator [B].
- Tighten:
Torque - Exhaust Butterfly Valve Actuator Mounting Screws [C]: 1.2 N · m (0.12 kgf · m, 11 in·lb)
- Install the close cable first and then open cable (see Exhaust Butterfly Valve Cable Installation in the Engine Top End chapter).

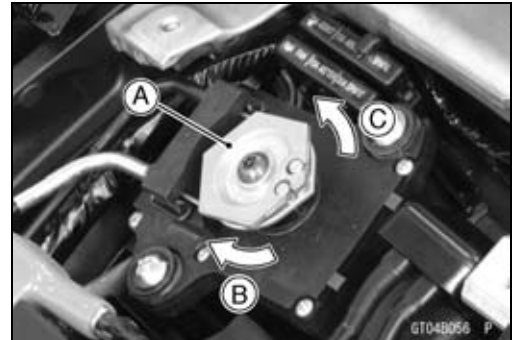


Exhaust Butterfly Valve Actuator Inspection

NOTE

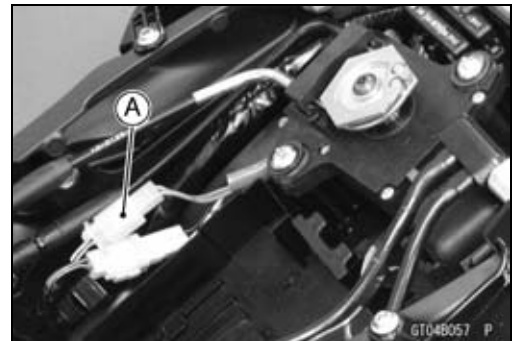
○ Be sure the battery is fully charged

- Remove the front seat (see Front Seat Removal in the Frame chapter).
- Turn the ignition switch to 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 to 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 Resistance Inspection

- Turn the ignition switch to OFF.
 - Disconnect the exhaust butterfly valve actuator lead connector (2 pins connector) [A].
 - Set the hand tester to the $\times 1 \Omega$ range and connect it to the exhaust butterfly valve actuator connector.
- Special Tool - Hand Tester: 57001-1394**
- Measure the exhaust butterfly valve actuator resistance.



Exhaust Butterfly Valve Actuator Resistance

Connections: P lead \longleftrightarrow GY lead

Standard: 5 ~ 200 Ω (for reference)

- ★ If the reading is 0 or infinity (∞) Ω , replace the exhaust butterfly valve actuator.

Exhaust Butterfly Valve Actuator (Service Code 63)

★ 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.

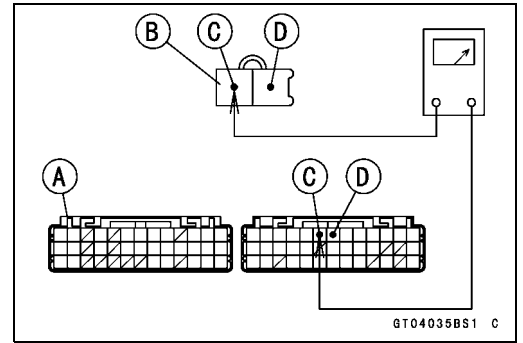
Wiring Inspection

ECU Connector [A] ↔

Exhaust Butterfly Valve Actuator Connector [B]

W/R lead (ECU terminal 45) [C]

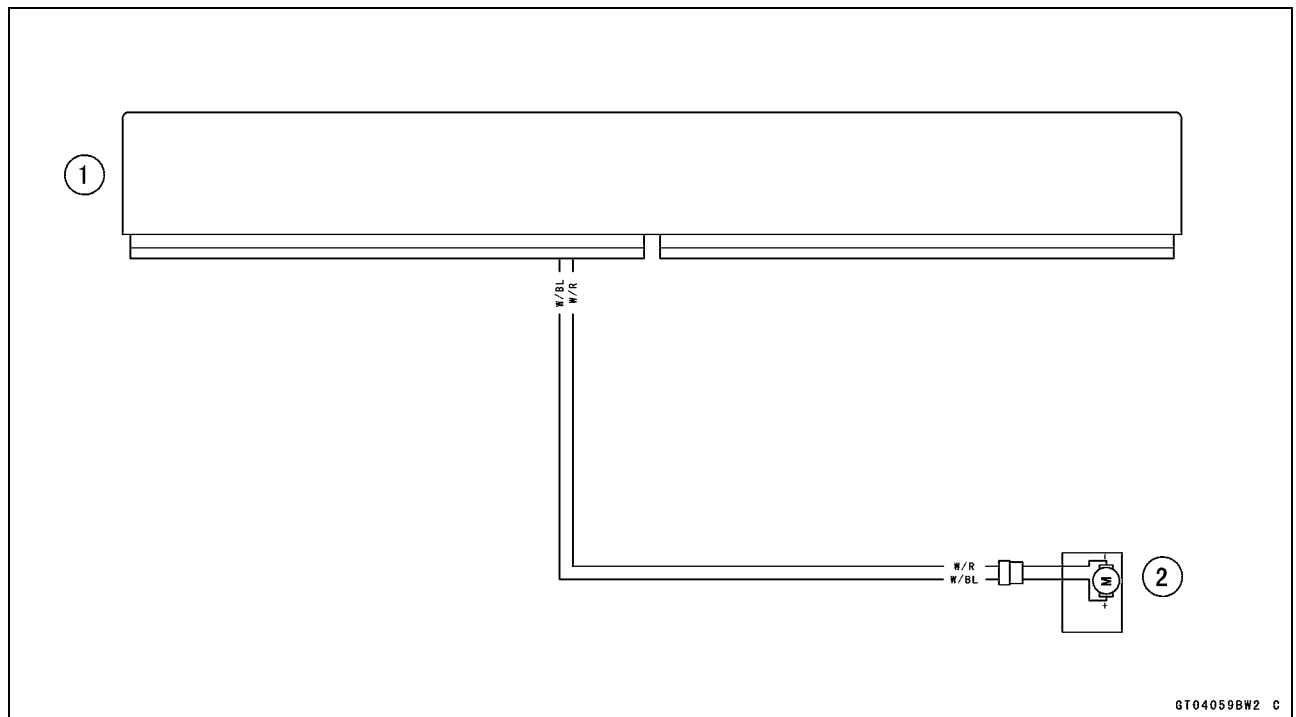
W/BL lead (ECU terminal 46) [D]



★ 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

17-76 SELF-DIAGNOSIS SYSTEM

Air Switching Valve (Service Code 64)

Air Switching Valve Removal/Installation

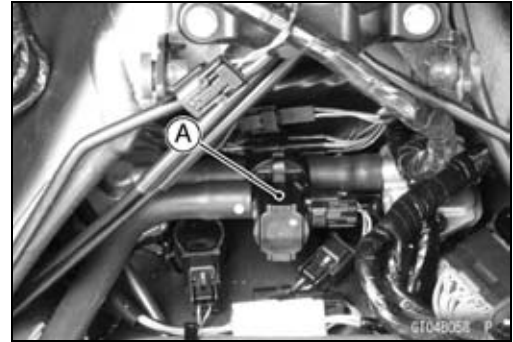
- Refer to the Air Switching Valve Removal/Installation in the Engine Top End chapter.

Air Switching Valve Inspection

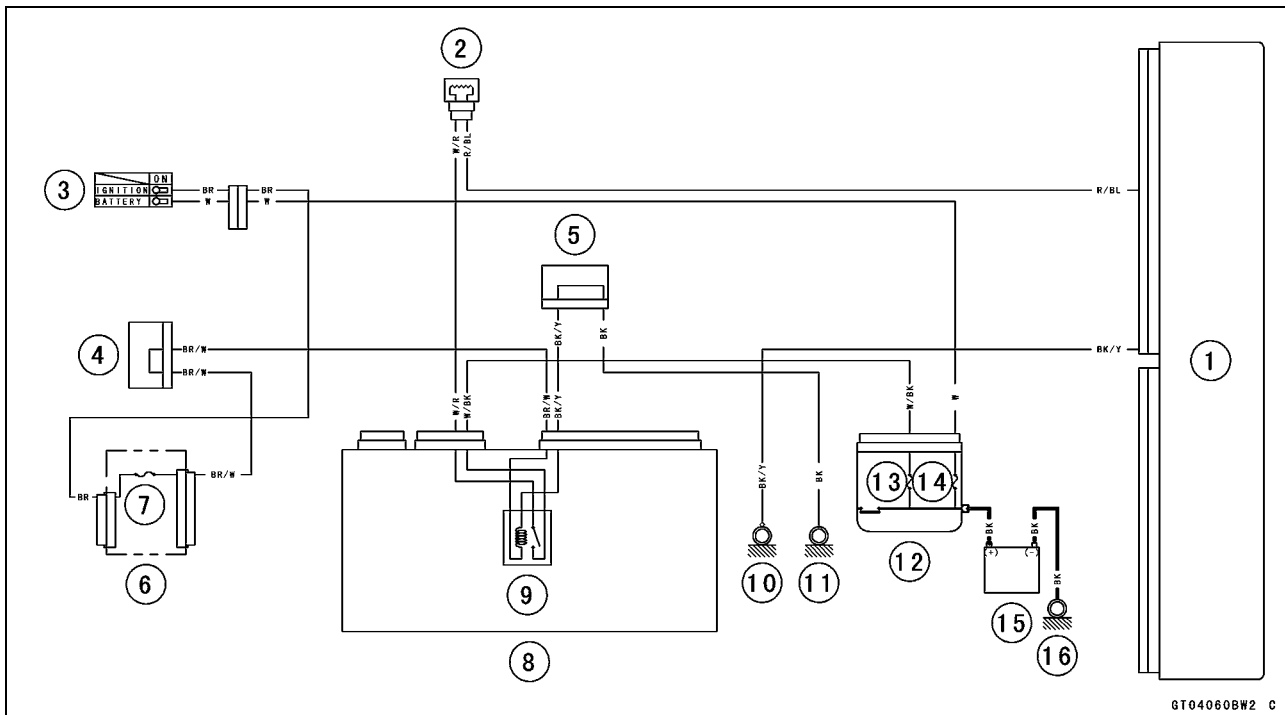
- Refer to the Air Switching Valve Unit Test in the Electrical System chapter.
- ★ If the air switching valve [A] is normal, check the wiring for continuity (see Air Switching Valve Circuit).

Special Tool - Hand Tester: 57001-1394

- ★ 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



GT040608W2 C

- | | |
|------------------------|--------------------|
| 1. ECU | 9. ECU Main Relay |
| 2. Air Switching Valve | 10. Frame Ground 1 |
| 3. Ignition Switch | 11. Frame Ground 3 |
| 4. Joint Connector F | 12. Starter Relay |
| 5. Joint Connector A | 13. ECU Fuse 15 A |
| 6. Fuse Box 1 | 14. Main Fuse 30 A |
| 7. Ignition Fuse 15 A | 15. Battery |
| 8. Relay Box | 16. Engine Ground |

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 to OFF.
- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Disconnect the oxygen sensor lead connector [A].



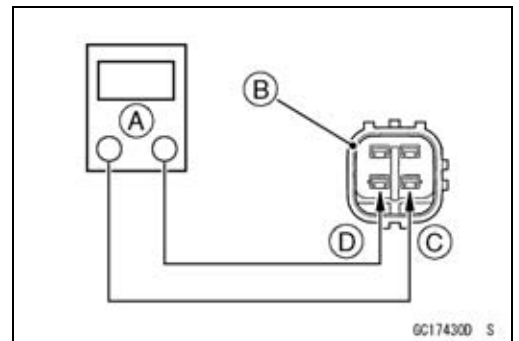
- Connect a digital meter [A] to the terminals in the oxygen sensor lead connector [B].
- Measure the oxygen sensor heater resistance.

Oxygen Sensor Heater Resistance

Connections: W lead [C] ↔ W lead [D]

Standard: 6.7 ~ 10.5 Ω at 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).



17-78 SELF-DIAGNOSIS SYSTEM

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 to 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 in the figure.

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 W/R) lead

Digital Meter (-) → Frame Ground terminal

- Measure the power source voltage with the engine stopped and with the connector joined.
- Turn the ignition switch to ON.

Power Source Voltage

Standard: Battery Voltage

- Turn the ignition switch to 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 Relay 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.

Special Tool - Hand Tester: 57001-1394

- Disconnect the ECU and sensor connectors.

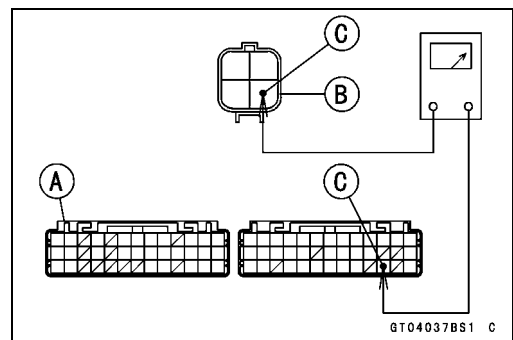
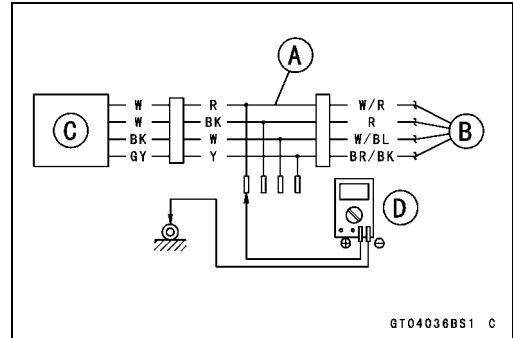
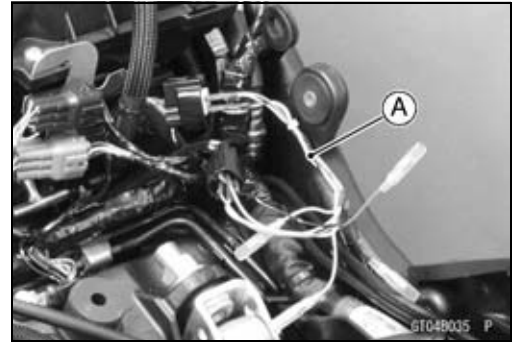
Wiring Continuity Inspection

ECU Connector [A] ↔

Oxygen Sensor Connectors [B]

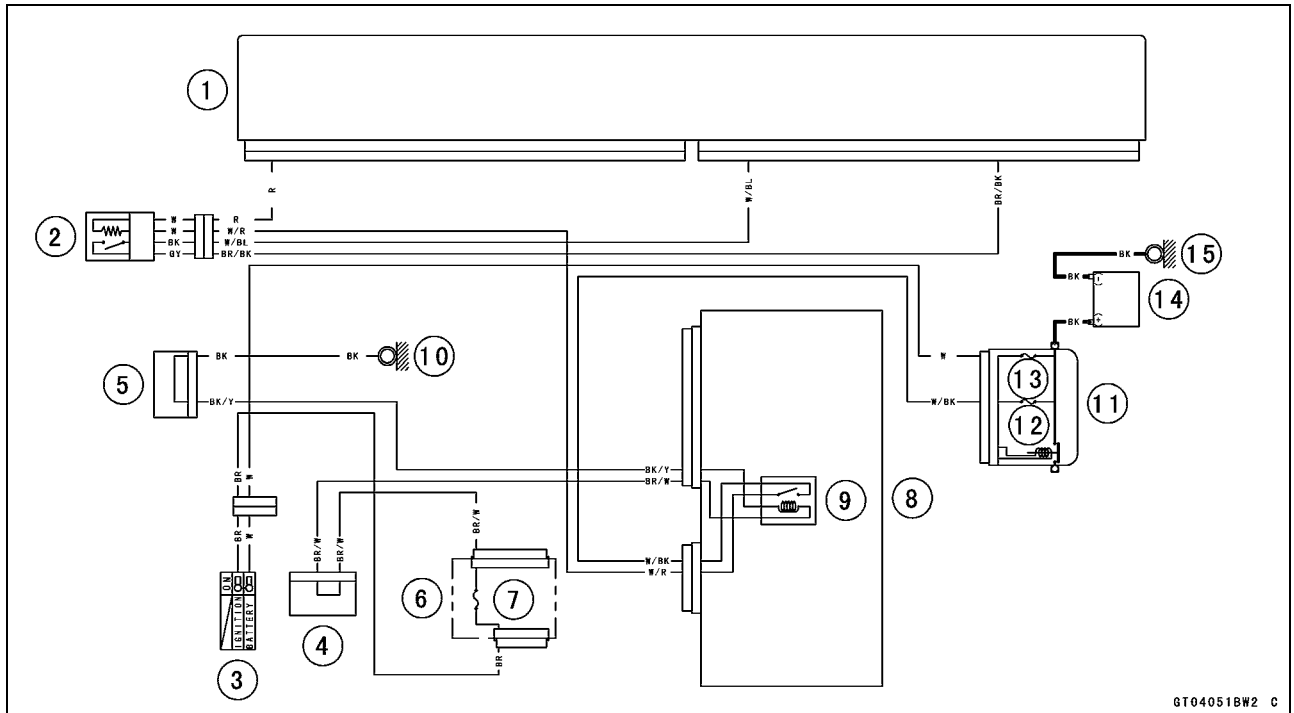
R lead (ECU terminal 76) [C]

- ★ 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



GT04051BW2 C

1. ECU
2. Oxygen Sensor
3. Ignition Switch
4. Joint Connector F
5. Joint Connector A
6. Fuse Box 1
7. Ignition Fuse 15 A
8. Relay Box
9. ECU Main Relay
10. Frame Ground 3
11. Starter Relay
12. ECU Fuse 15 A
13. Main Fuse 30 A
14. Battery
15. Engine Ground

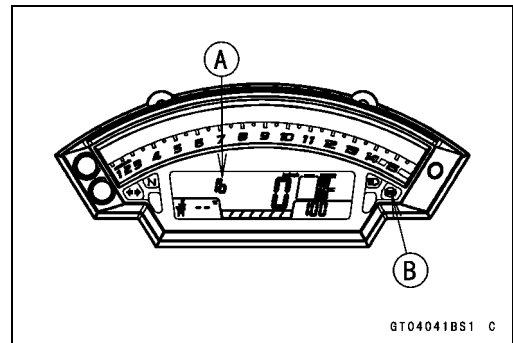
17-80 SELF-DIAGNOSIS SYSTEM

KIBS Hydraulic Unit Communication Error (Service Code 1b, KIBS Equipped Models)

KIBS Hydraulic Unit Communication Line Inspection

- When the data (for status of KIBS hydraulic unit) is not sent from the KIBS 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 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:
 - KIBS Hydraulic Unit Connector (see KIBS Hydraulic Unit Removal in the Brakes chapter)
 - Meter Unit Connector (see Meter Unit Removal in the Electrical System chapter)

Special Tool - Hand Tester: 57001-1394

Wiring Inspection

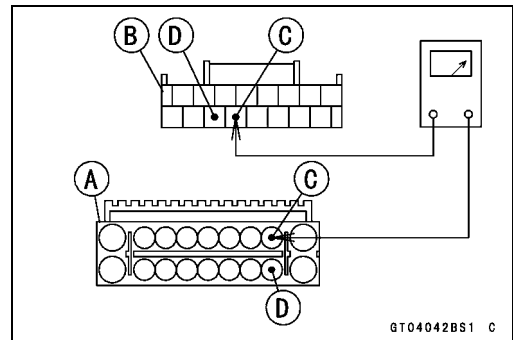
KIBS Hydraulic Unit Connector [A] ←→

Meter Unit Connector [B]

GY/BL lead (KIBS Hydraulic Unit terminal 2) [C]

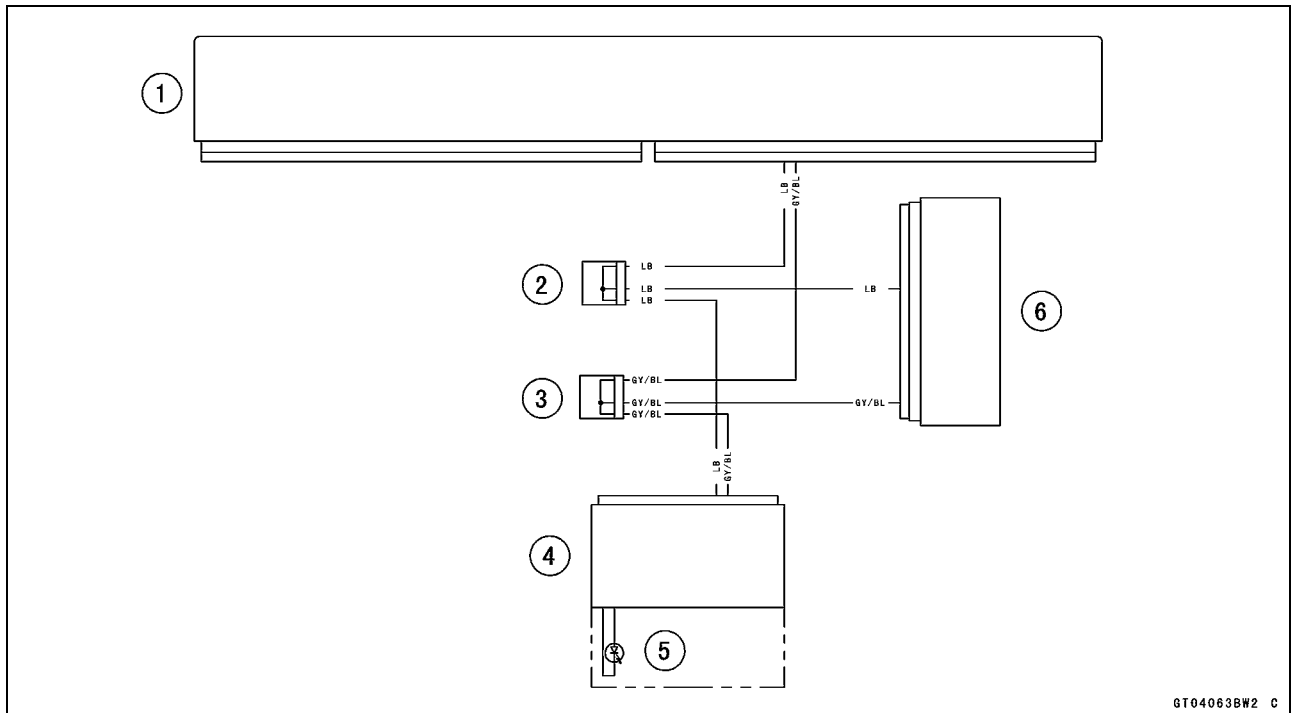
LB lead (KIBS Hydraulic Unit terminal 11) [D]

- ★ If the wiring is good, replace the KIBS hydraulic unit (see KIBS Hydraulic Unit Removal/Installation in the Brakes chapter).



KIBS Hydraulic Unit Communication Error (Service Code 1b, KIBS Equipped Models)

KIBS Hydraulic Unit Communication Line Circuit



1. ECU
2. Joint Connector D
3. Joint Connector C
4. Meter Unit
5. ABS Indicator Light (LED)
6. KIBS Hydraulic Unit

17-82 SELF-DIAGNOSIS SYSTEM

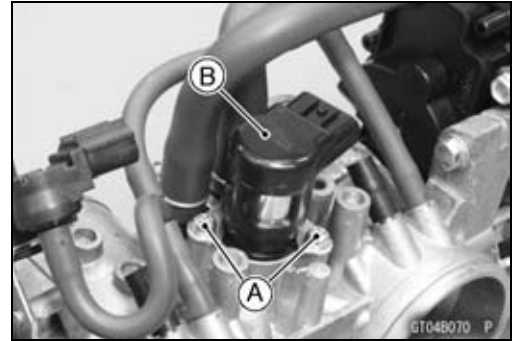
Idle Speed Control Valve Actuator (Service Code 1C)

Idle Speed Control Valve Actuator Removal

NOTICE

Never drop the idle speed control valve actuator especially on a hard surface. Such a shock to the actuator can damage it.

- Remove:
 - Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
 - Idle Speed Control Valve Actuator Retainer Screws [A]
 - Idle Speed Control Valve Actuator [B] with Retainer



Idle Speed Control Valve Actuator Installation

- Replace the O-ring [A] with a new one.
- Apply engine oil to the new O-ring.



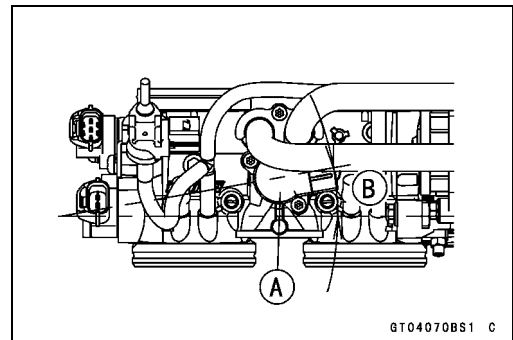
- Install the idle speed control valve [A] as shown in the figure.

10° [B]

- Tighten:

Torque - Idle Speed Control Valve Actuator Retainer Screws: 2.06 N·m (0.21 kgf·m, 18 in·lb)

- Install the removed parts.
- ★ If the idle speed control valve actuator is replaced, be sure to do the following procedures.
 - Turn the ignition switch to ON.
 - Turn the ignition switch to OFF, and wait for 2 or 3 seconds.
 - Inspect the idle speed (see Idle Speed Inspection in the Periodic Maintenance chapter).



Idle Speed Control Valve Actuator Resistance Inspection

- Turn the ignition switch to OFF.
- Remove the air cleaner housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter).
- Disconnect the idle speed control valve actuator connector [A].



Idle Speed Control Valve Actuator (Service Code 1C)

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

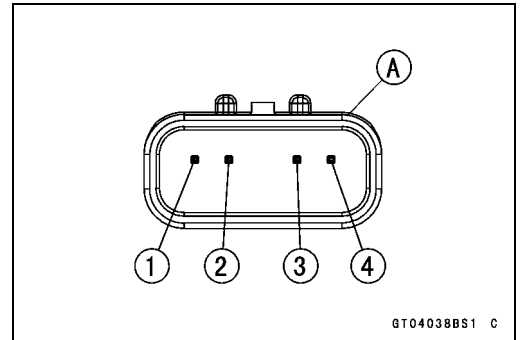
Idle Speed Control Valve Actuator Resistance

Connections: G/R lead [1] ↔ G/BK lead [4]

G/O lead [2] ↔ G/Y lead [3]

Standard: About 64 ~ 96 Ω

- ★ If the reading is out of the standard, replace the idle speed control valve actuator.
- ★ If the reading is within the standard, check the input voltage (see Idle Speed Control Valve Actuator Input Voltage Inspection).



Idle Speed Control Valve Actuator Input Voltage Inspection

NOTE

○ Be sure the battery is fully charged.

- Turn the ignition switch to OFF.
- Disconnect the idle speed control valve actuator connector and connect a suitable measuring leads [A] between these connectors as shown in the figure.
Main Harness [B]
Idle Speed Control Valve Actuator [C]
- 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

Idle Speed Control Valve Actuator Input Voltage Connections to Adapter:

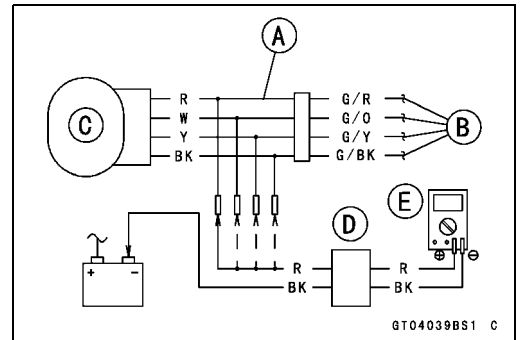
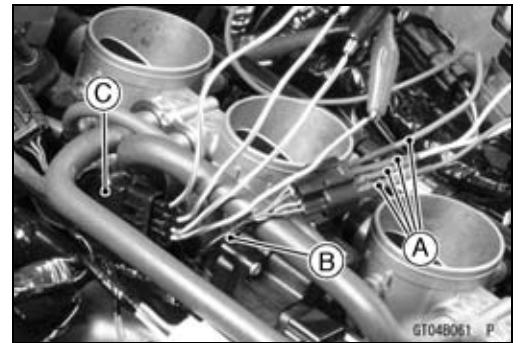
- (I) Digital Meter (+) → R (actuator G/R) lead
Digital Meter (-) → Battery (-) terminal
- (II) Digital Meter (+) → W (actuator G/O) lead
Digital Meter (-) → Battery (-) terminal
- (III) Digital Meter (+) → Y (actuator G/Y) lead
Digital Meter (-) → Battery (-) terminal
- (IV) Digital Meter (+) → BK (actuator G/BK) lead
Digital Meter (-) → Battery (-) terminal

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

Input Voltage

Standard: About DC 9 ~ 11 V and then 1 V or
About DC 9 ~ 11 V

- Turn the ignition switch to OFF.



17-84 SELF-DIAGNOSIS SYSTEM

Idle Speed Control Valve Actuator (Service Code 1C)

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

Special Tool - Hand Tester: 57001-1394

○ Disconnect the ECU and actuator connectors.

Wiring Continuity Inspection

ECU Connector [A] ←→

Idle Speed Control Valve Actuator Connector [B]

G/BK lead (ECU terminal 42) [C]

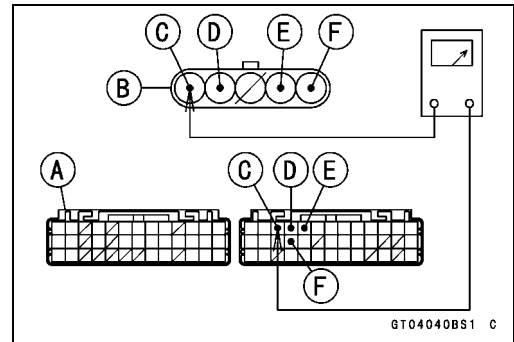
G/Y lead (ECU terminal 43) [D]

G/O lead (ECU terminal 44) [E]

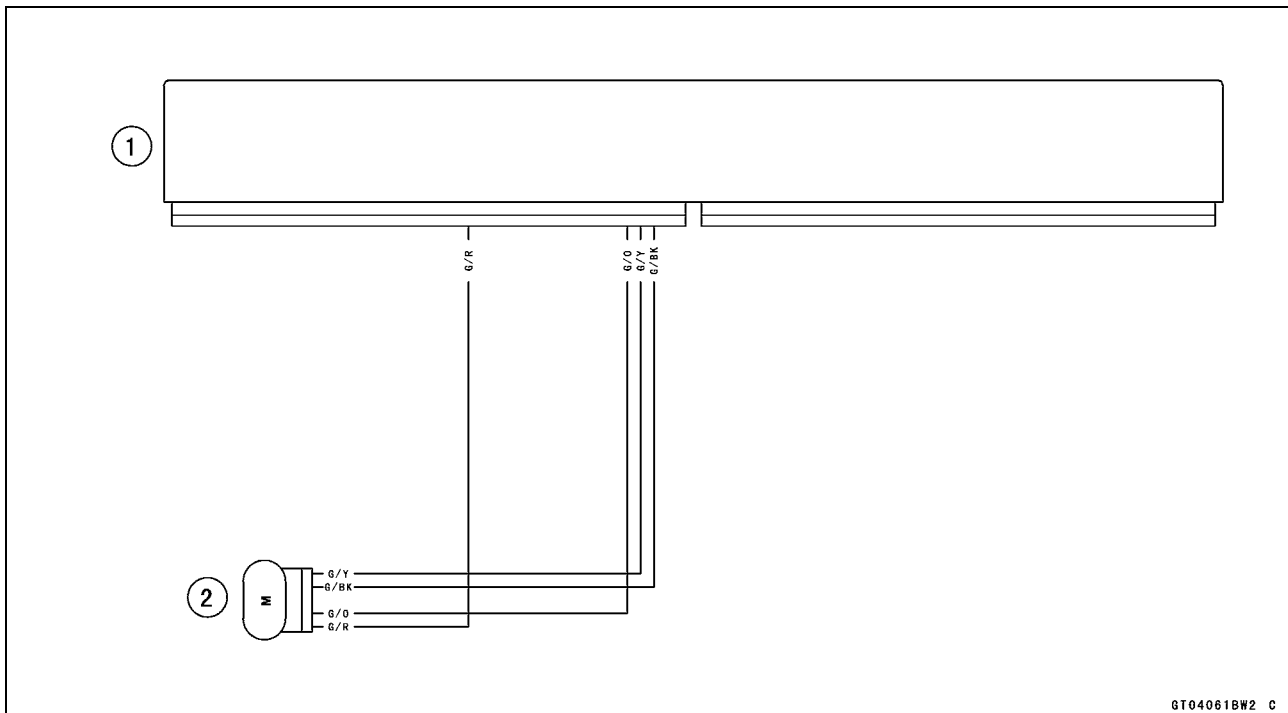
G/R lead (ECU terminal 56) [F]

★ 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).



Idle Speed Control Valve Actuator Circuit



1. ECU
2. Idle Speed Control Valve Actuator

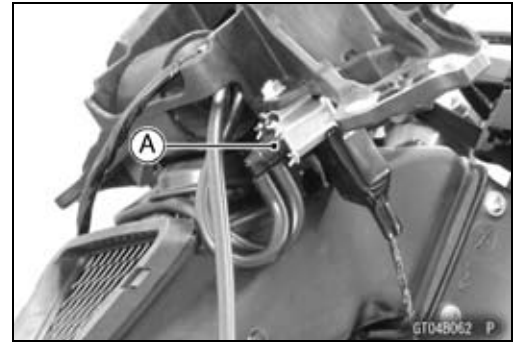
Air Intake Solenoid Valve (Service Code 2d, Equipped Models)

Air Intake Solenoid Valve Removal/Installation

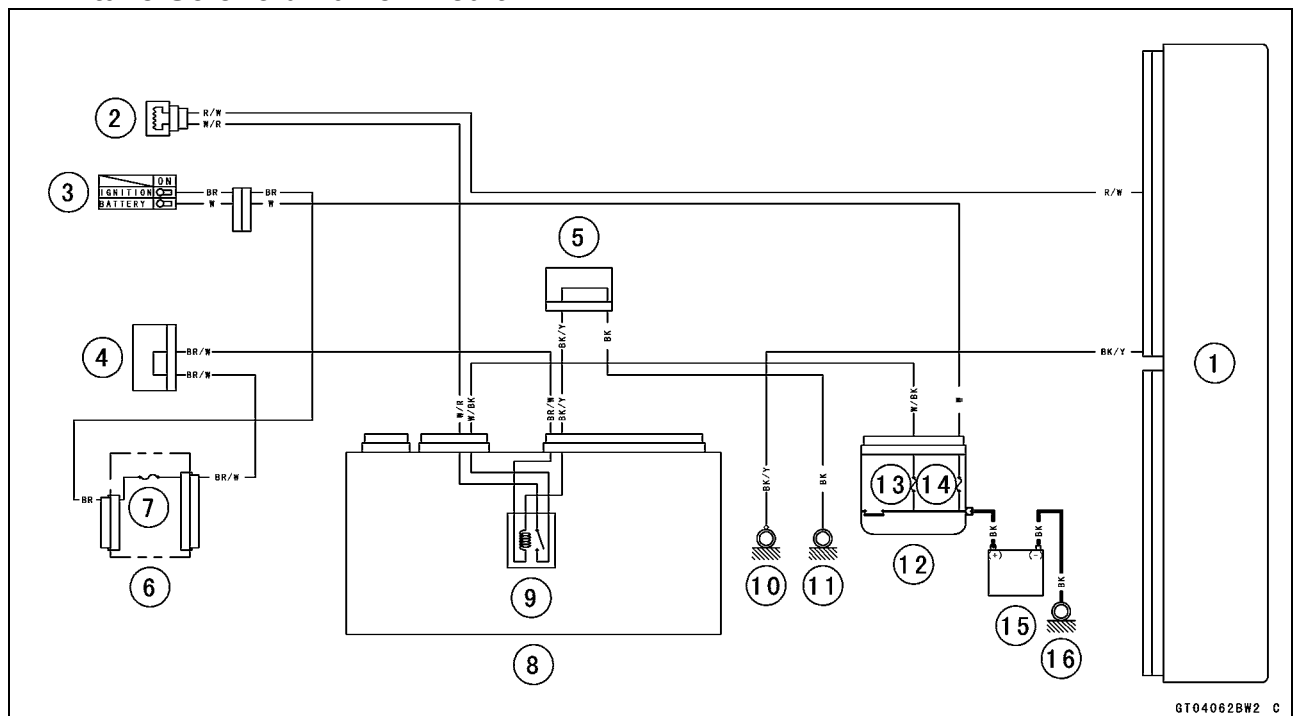
- Refer to the Air Intake Solenoid Valve Removal/Installation in the Fuel System (DFI) chapter.

Air Intake Solenoid Valve Inspection

- Refer to the Air Intake Solenoid Valve Unit Test in the Electrical System chapter.
- ★ If the air intake solenoid valve [A] is normal, check the wiring for continuity (see Air Intake Solenoid 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 Intake Solenoid Valve Circuit



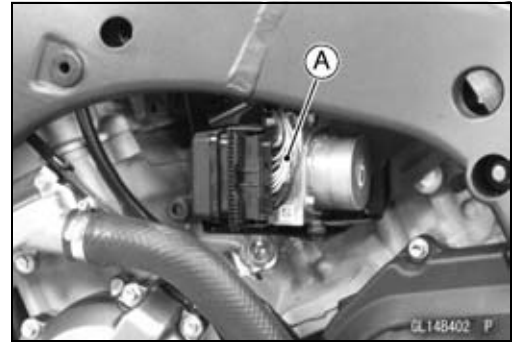
- | | |
|------------------------------|--------------------|
| 1. ECU | 9. ECU Main Relay |
| 2. Air Intake Solenoid Valve | 10. Frame Ground 1 |
| 3. Ignition Switch | 11. Frame Ground 3 |
| 4. Joint Connector F | 12. Starter Relay |
| 5. Joint Connector A | 13. ECU Fuse 15 A |
| 6. Fuse Box 1 | 14. Main Fuse 30 A |
| 7. Ignition Fuse 15 A | 15. Battery |
| 8. Relay Box | 16. Engine Ground |

17-86 SELF-DIAGNOSIS SYSTEM

KIBS Service Codes (KIBS Equipped Models)

Solenoid Valve Inspection (Service Code b 13, b 14, b 17, b 18)

- The solenoid valve is built in the KIBS 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 KIBS hydraulic unit.
- ★ If the service code does not appear, the KIBS system normal (temporary failure).



KIBS Solenoid Valve Relay Inspection (Service Code b 19)

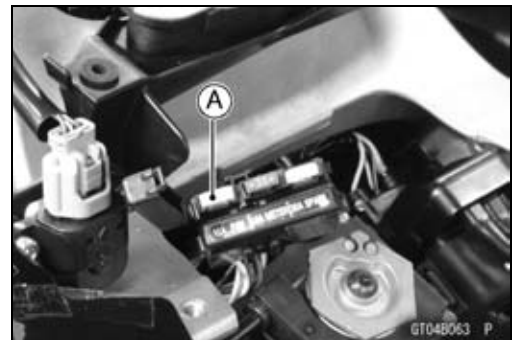
- The KIBS solenoid valve relay is built in the KIBS Hydraulic Unit. Therefore the relay cannot be checked directly.
- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).
- ★ If this service code appears even if all checks are ended, replace the KIBS hydraulic unit.
- ★ If the service code does not appear, the KIBS 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 KIBS hydraulic unit.
- ★ If the service code does not appear, the KIBS system normal (temporary failure).

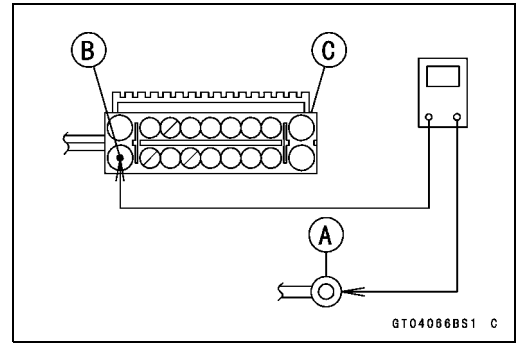
KIBS Motor Relay Inspection (Service Code b 35)

- Check the KIBS 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)
 - KIBS Hydraulic Unit Lead Connector (see KIBS Hydraulic Unit Removal in the Brakes chapter)



KIBS Service Codes (KIBS Equipped Models)

- Check the wiring continuity between the positive cable terminal [A] of the battery and R/W lead terminal [B] in the KIBS Hydraulic Unit Lead Connector [C].
- ★ If the wiring is open, replace or repair the harness (see KIBS System Circuit in the Brakes chapter).
- ★ If the wiring is good, go to next step.



- The KIBS motor relay is built in the KIBS 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 KIBS hydraulic unit.
- ★ If the service code does not appear, the KIBS 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 KIBS hydraulic unit.
- ★ If the service code does not appear, the KIBS system normal (temporary failure).



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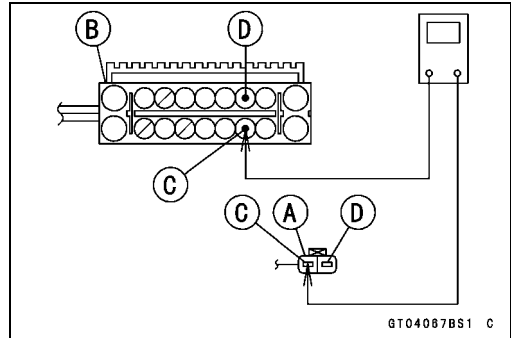
KIBS Service Codes (KIBS Equipped Models)

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 KIBS hydraulic unit lead connector (see KIBS 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]
 - KIBS Hydraulic Unit Lead Connector [B]
 - W Lead Terminals [C]
 - Y Lead terminals [D]
- ★ If the wiring is open, replace or repair the harness (see KIBS 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 KIBS hydraulic unit.
- ★ If the service code does not appear, the KIBS system normal (temporary failure).

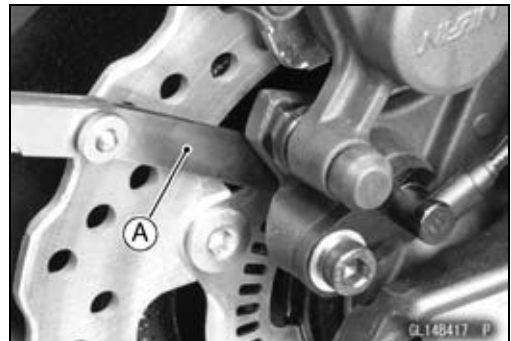
Rear Wheel Rotation Sensor Signal Abnormal (Service Code b 44)

- 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.

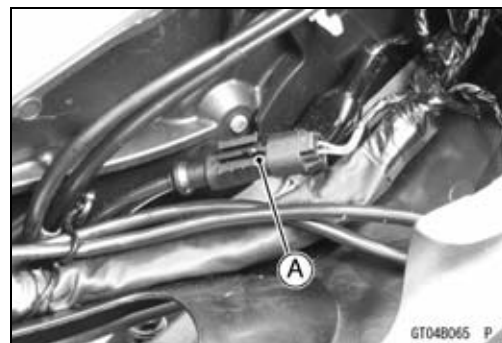


KIBS Service Codes (KIBS Equipped Models)

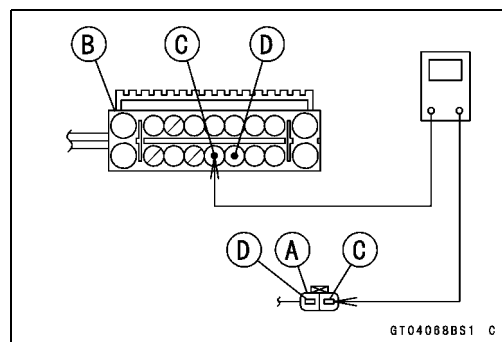
- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider in the Brakes chapter).
- ★ If this service code appears even if all checks are ended, replace the KIBS hydraulic unit.
- ★ If the service code does not appear, the KIBS system normal (temporary failure).

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 KIBS hydraulic unit lead connector (see KIBS 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]
 - KIBS Hydraulic Unit Lead Connector [B]
 - G Lead Terminals [C]
 - R Lead terminals [D]
- ★ If the wiring is open, replace or repair the harness (see KIBS 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 KIBS hydraulic unit.
- ★ If the service code does not appear, the KIBS 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 KIBS hydraulic unit.
- ★ If the service code does not appear, the KIBS system normal (temporary failure).

17-90 SELF-DIAGNOSIS SYSTEM

KIBS Service Codes (KIBS 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 KIBS hydraulic unit.
- ★ If the service code does not appear, the KIBS system normal (temporary failure).

ECU Inspection (Service Code b 55)

- This ECU is built in the KIBS 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 KIBS hydraulic unit.
- ★ If the service code does not appear, the KIBS 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)

- Remove:
 - Seat (see Seat Removal in the Frame chapter)
 - Kawasaki Diagnostic System Connector Cap [A]



- Measure the CAN communication line resistance.
 - Kawasaki Diagnostic System Connector [A]
 - GY/BL Terminal [B]
 - LB Terminal [C]

Special Tool - Hand Tester: 57001-1394

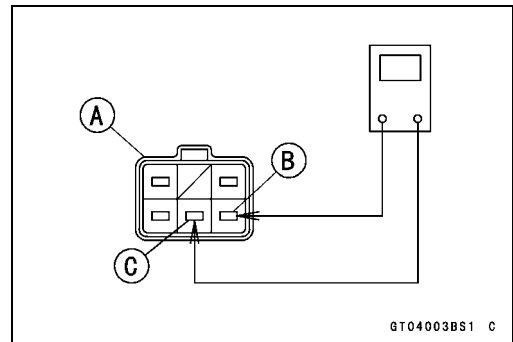
CAN Communication Line Resistance

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)



KIBS Service Codes (KIBS Equipped Models)

Check 2

- Measure the resistance between the GY/BL [A] or LB [B] terminal and ground [C].

Kawasaki Diagnostic System Connector [D]

Special Tool - Hand Tester: 57001-1394

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 KIBS hydraulic unit.

- ★ If the service code does not appear, the KIBS 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 KIBS 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 KIBS hydraulic unit.

Output Fluid Pressure Sensor (Front Brake) Offset Abnormal (Service Code b 84)

- The Output Fluid Pressure Sensor is built in the KIBS 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 KIBS hydraulic unit.

- ★ If the service code does not appear, the KIBS system normal (temporary failure).

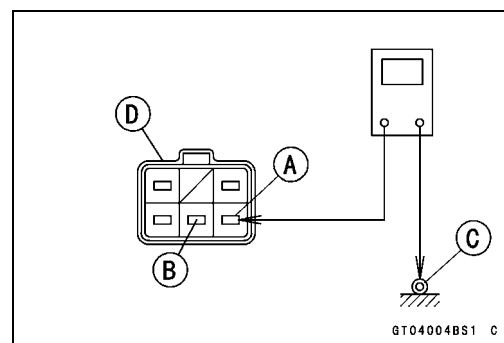
Fluid Pressure Sensor Supply Voltage Inspection (Service Code b 89)

- The Fluid Pressure Sensors are built in the KIBS 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 KIBS hydraulic unit.

- ★ If the service code does not appear, the KIBS system normal (temporary failure).



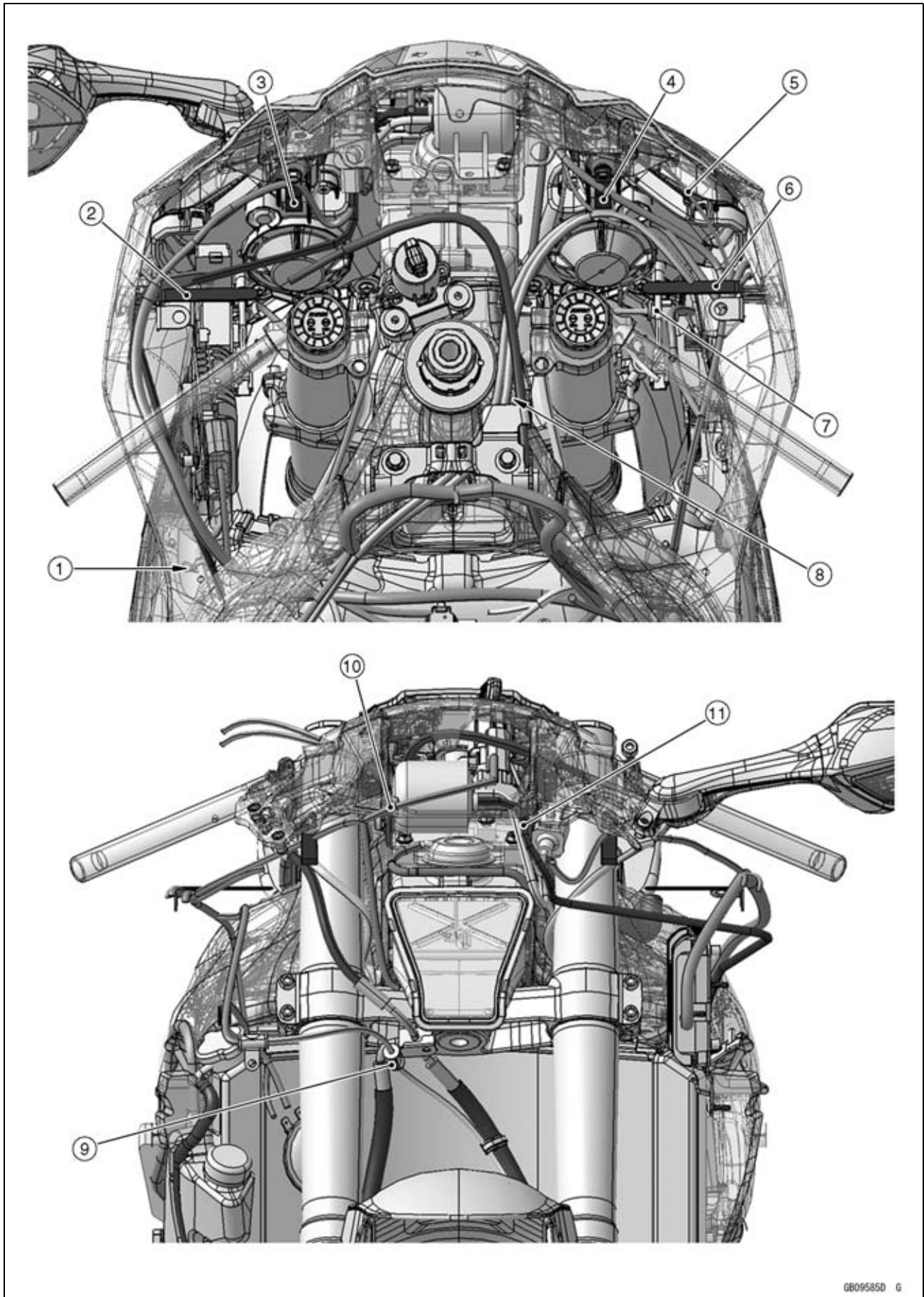
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18-2 APPENDIX

Cable, Wire, and Hose Routing

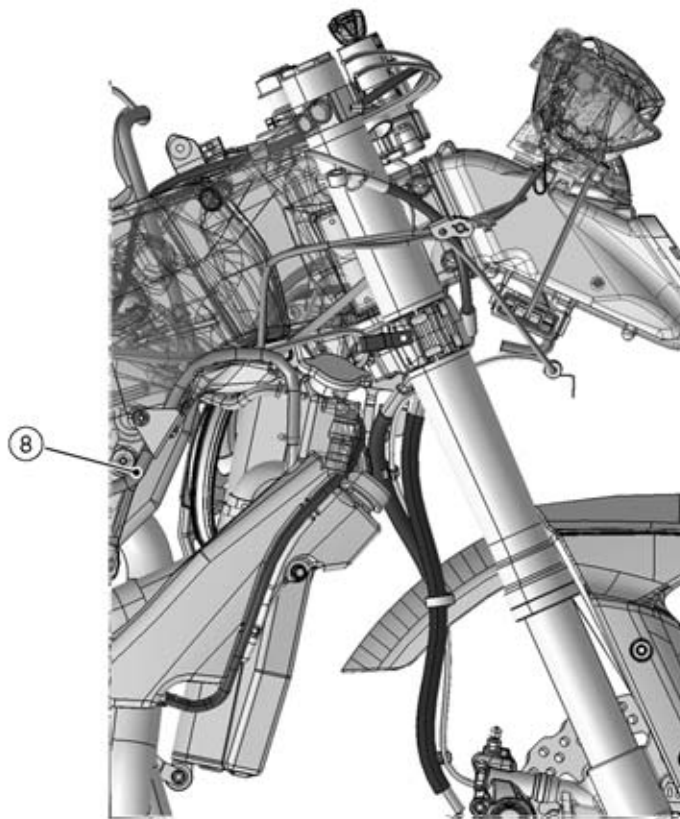
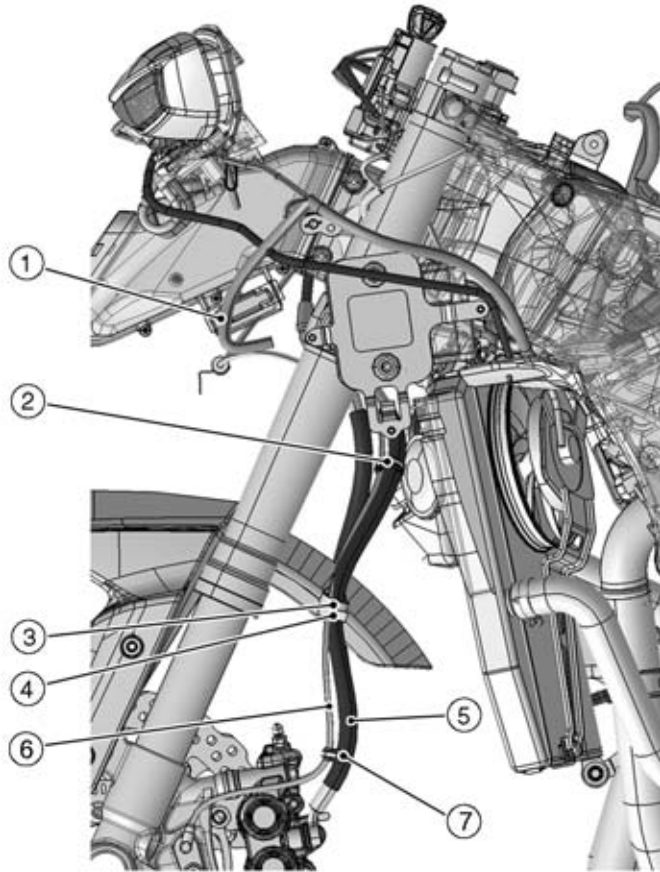


Cable, Wire, and Hose Routing

1. Clamp (Hold the alternator lead. Run it inside the installation hole of the clamp.)
2. Clamp (Bend down the clamp, and hold the main harness and the vacuum hose (equipped models).)
3. Clamp (Hold the air intake solenoid valve lead (equipped models).)
4. Clamp (Hold the meter unit lead.)
5. Run the city light lead in front of the meter bracket.
6. Clamp (Bend down the clamp, and hold the main harness and the front wheel rotation sensor lead. Place only the front wheel rotation sensor connector in back of the clamp.)
7. Clamp (Hold the damper of the front wheel rotation sensor lead.)
8. Run the throttle cable (decelerator) to right side of the throttle cable (accelerator). Do not twist the throttle cables.
9. Clamp (Hold the damper of the front wheel rotation sensor lead.)
10. Run the meter unit lead outside the meter bracket.
11. Run the vacuum hoses inside the meter bracket (equipped models).

18-4 APPENDIX

Cable, Wire, and Hose Routing

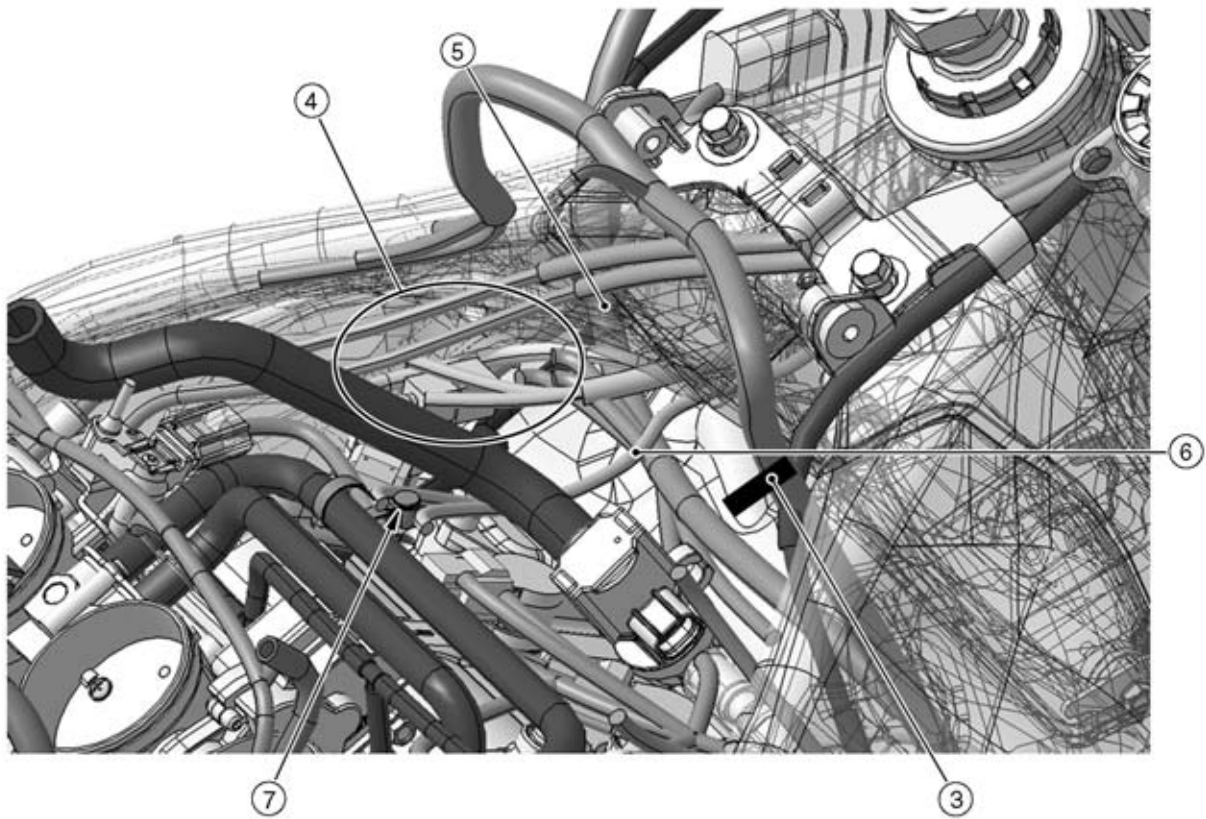
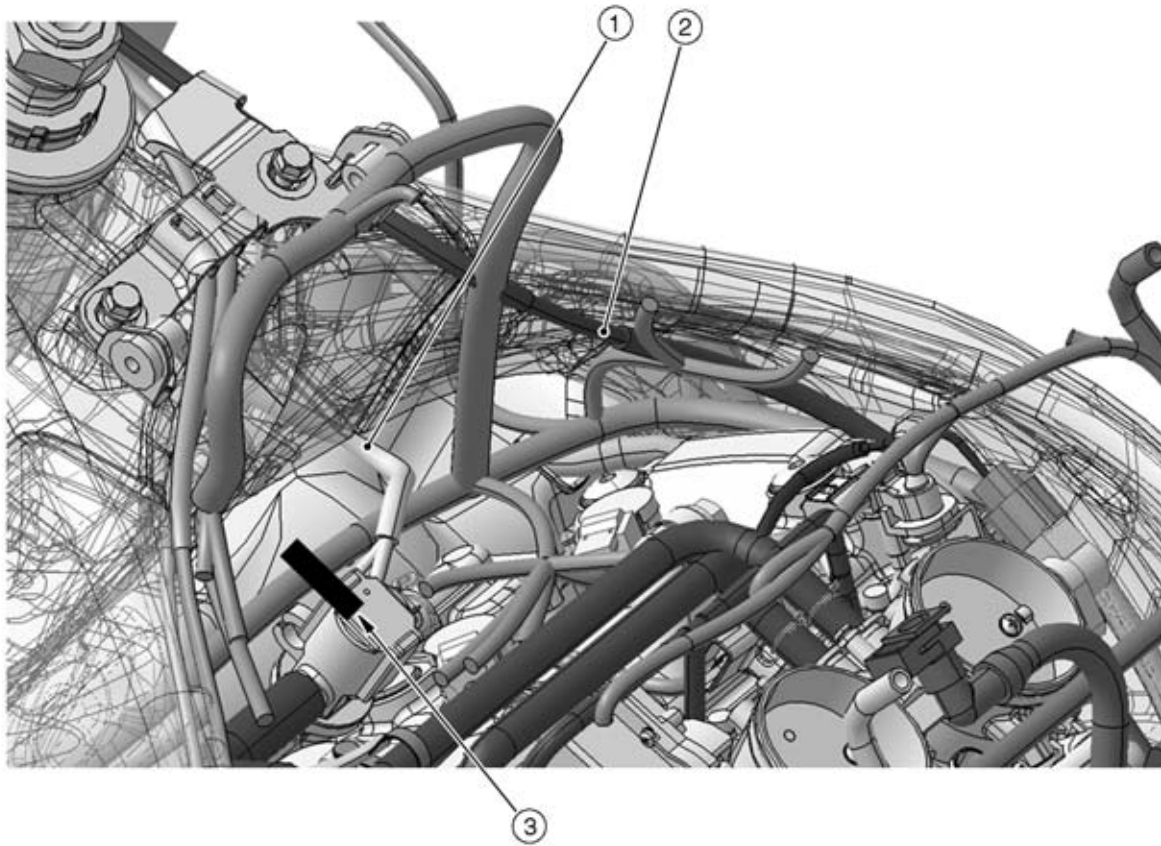


Cable, Wire, and Hose Routing

1. Run the fuse box 1 lead in front of the fuse box 1.
2. Clamp (Hold the front brake hose and the front wheel rotation sensor lead at the white painted position of the lead. Run the lead in front of the hose.)
3. Clamp (Hold the front wheel rotation sensor lead and the front brake hose. Run the lead in front of the hose.)
4. Clamp (Run the front brake hose only.)
5. Front Brake Hose
6. Front Wheel Rotation Sensor Lead
7. Clamp (Hold the front brake hose and the front wheel rotation sensor lead at the white painted position of the lead. Run the lead in front of the hose.)
8. Run the radiator hose between the heat insulation plate and the frame, and under the projection of the frame.

18-6 APPENDIX

Cable, Wire, and Hose Routing

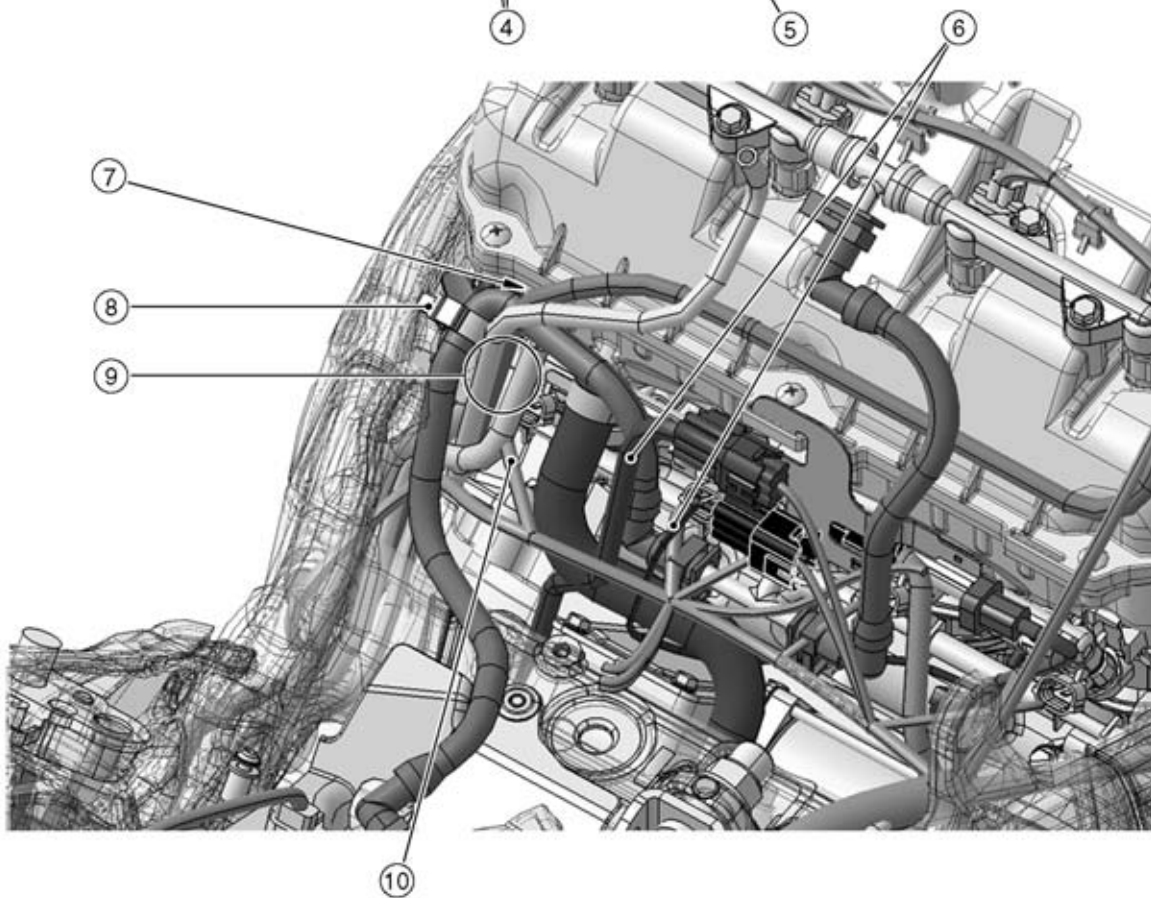
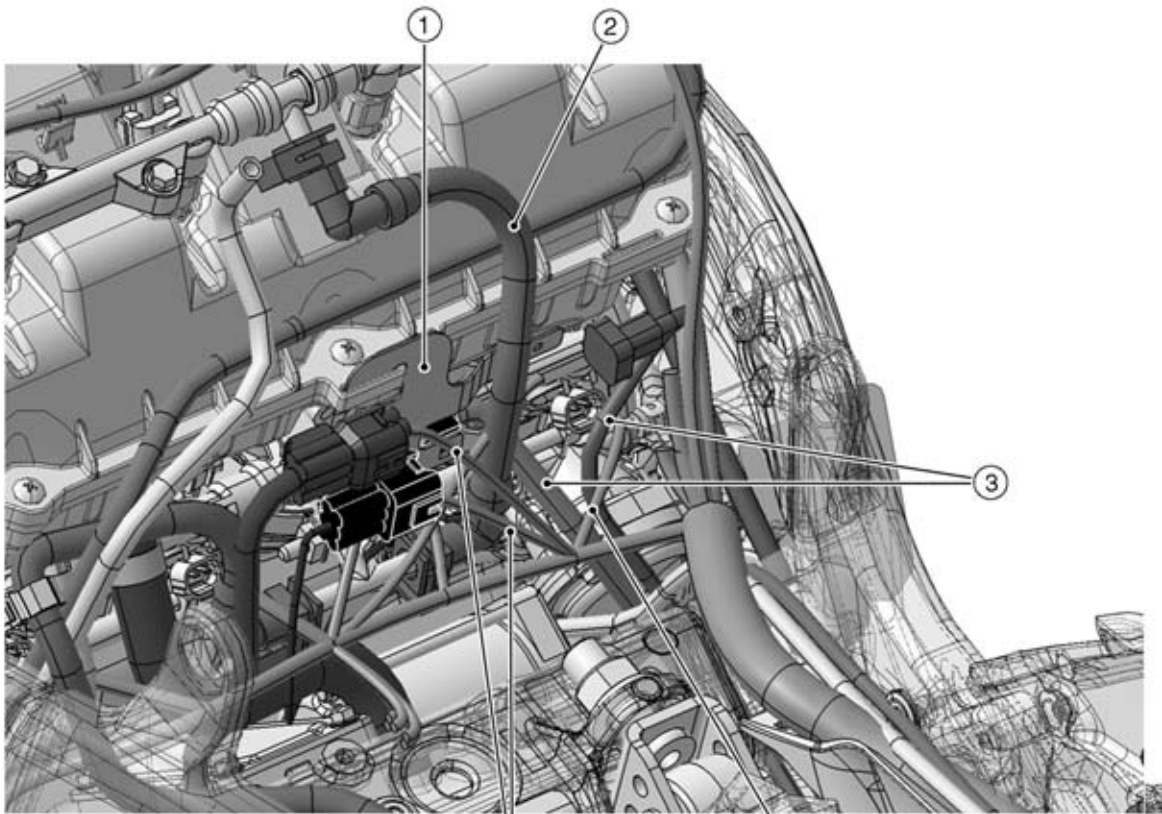


Cable, Wire, and Hose Routing

1. Run the right switch housing lead above the main harness.
2. Run the clutch cable along the frame.
3. Clamp (Hold the main harness. Turn the opening portion forward. Install it to the heat insulation plate through the heat insulation rubber plate.)
4. Keep the left switch housing lead and the radiator fan lead together as shown in the figure.
5. Run the vacuum hose under the air switching valve hose and the main harness, and run it between the frame and the heat insulation plate (equipped models).
6. Run the ignition switch lead between the air switching valve hose and the main harness.
7. Clamp (Hold the ignition switch lead and the immobilizer amplifier lead (equipped models).)

18-8 APPENDIX

Cable, Wire, and Hose Routing

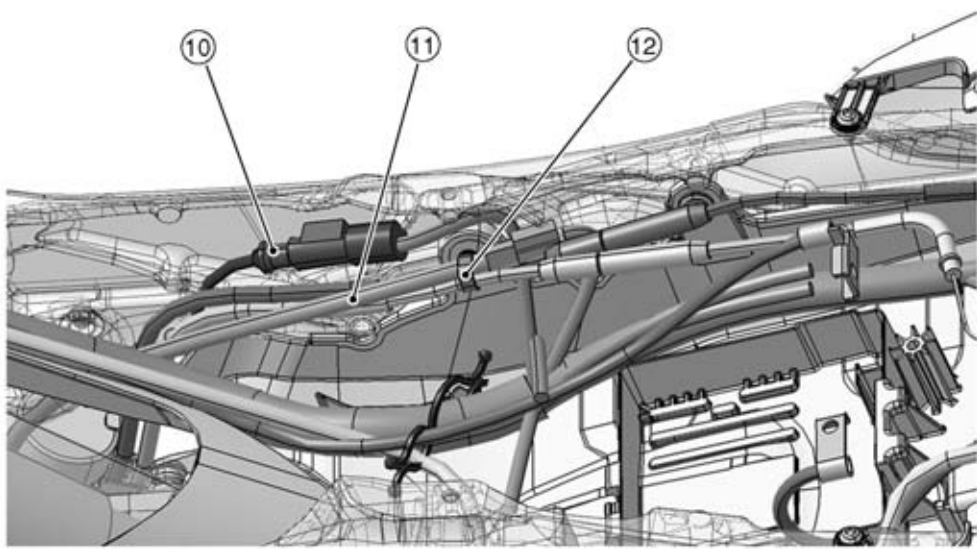
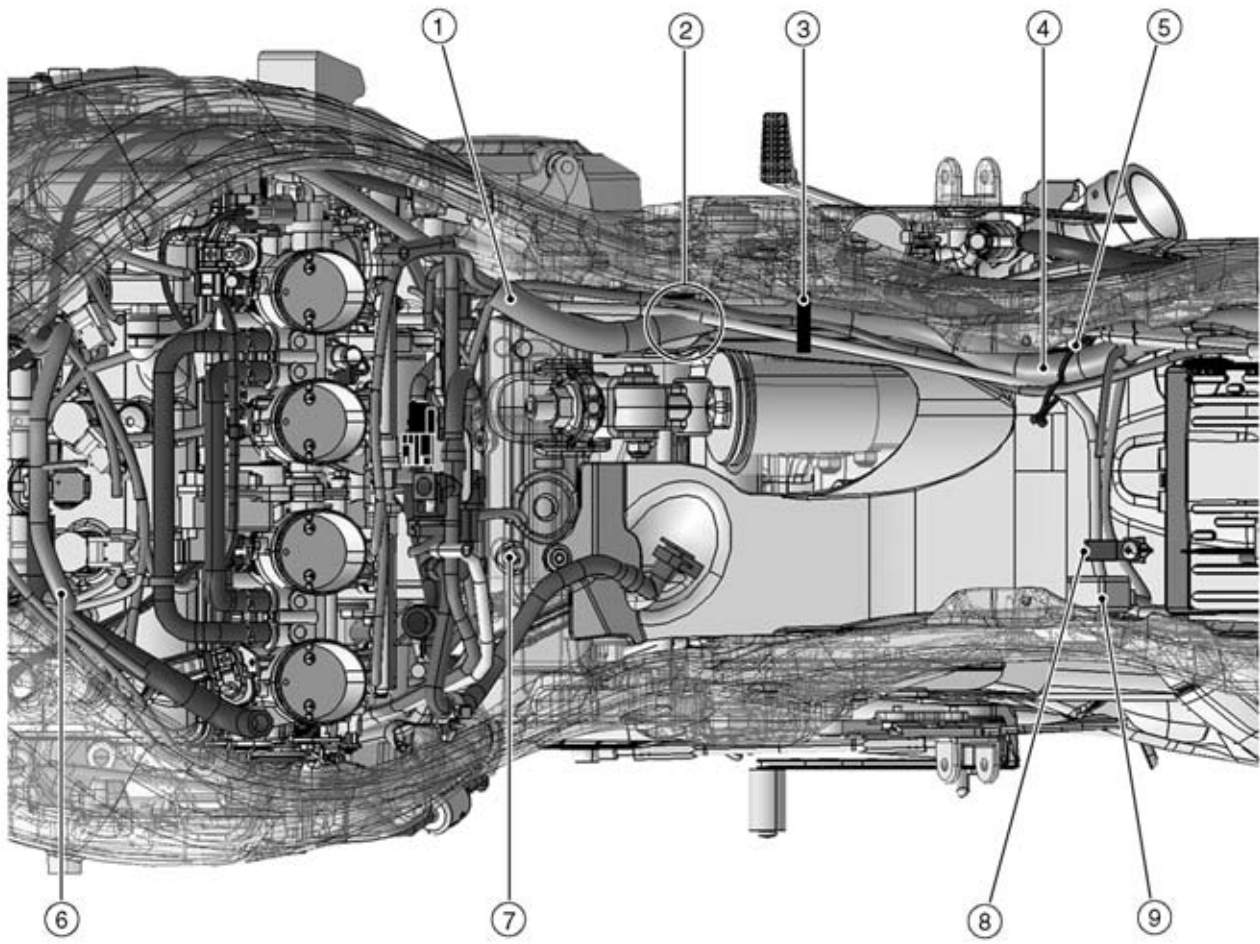


Cable, Wire, and Hose Routing

1. Connectors Bracket
2. Secondary Fuel Hose
3. Run the crankshaft sensor lead and oxygen sensor lead (equipped models) between the fuel injector lead #3 and the secondary fuel hose.
4. Run the gear position switch lead and the engine sub harness in back of the secondary fuel hose.
5. Fuel Injector Lead #4
6. Run the gear position switch lead and the engine sub harness between the fuel hose and the main harness, and run them under the crankcase breather hose.
7. Run the primary fuel hose in front of the fuel tank breather hose and the fuel drain hose.
8. Clamp (Hold the primary fuel hose.)
9. Run the fuel tank breather hose, the fuel tank drain hose and the air cleaner drain hose to left side of the fuel injector lead #1.
10. Fuel Injector Lead #1

18-10 APPENDIX

Cable, Wire, and Hose Routing

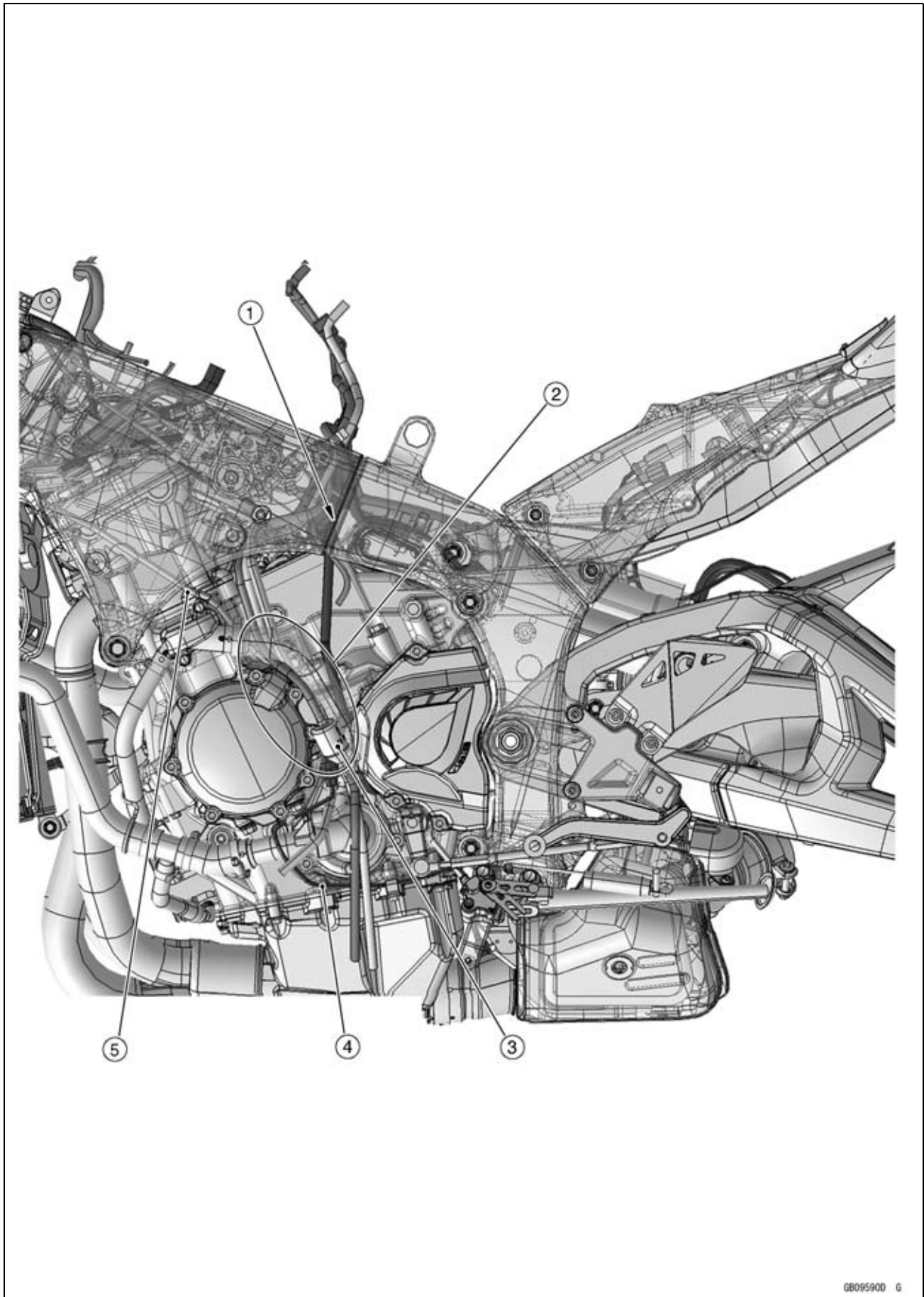


Cable, Wire, and Hose Routing

1. Run the main harness above the battery negative cable and the starter cable.
2. Run the battery negative cable and the starter cable above the main harness.
3. Clamp (Hold the main harness, the battery negative cable and the starter cable tightly. Run the main harness to right side of the leads. Cut below the tip of the band 10 mm or less.)
4. Run the main harness to left side of the rib of the rear fender.
5. Clamp (Main Harness, Battery Negative Cable and Starter Cable)
6. Clamp (Hold the white tape position of the main harness.)
7. Engine Ground Terminal Bolt (Turn the ground lead to the right side.)
8. Clamp (Hold the starter cable and the turn signal relay lead. Do not hold the battery negative cable.)
9. Turn Signal Relay
10. Run the rear wheel rotation sensor lead to right side of the exhaust butterfly valve cables, and place the connector in front of the clamp. Run the main harness side to right side of the exhaust butterfly valve cables, and in back of the clamp.
11. Run the rear brake light switch lead to left side of the exhaust butterfly valve cables, and place the connector in back of the clamp. Run the main harness side to right side of the exhaust butterfly valve cables.
12. Clamp (Hold the exhaust butterfly valve cables and rear brake light switch lead. Insert the strip of the clamp from lower side.)

18-12 APPENDIX

Cable, Wire, and Hose Routing

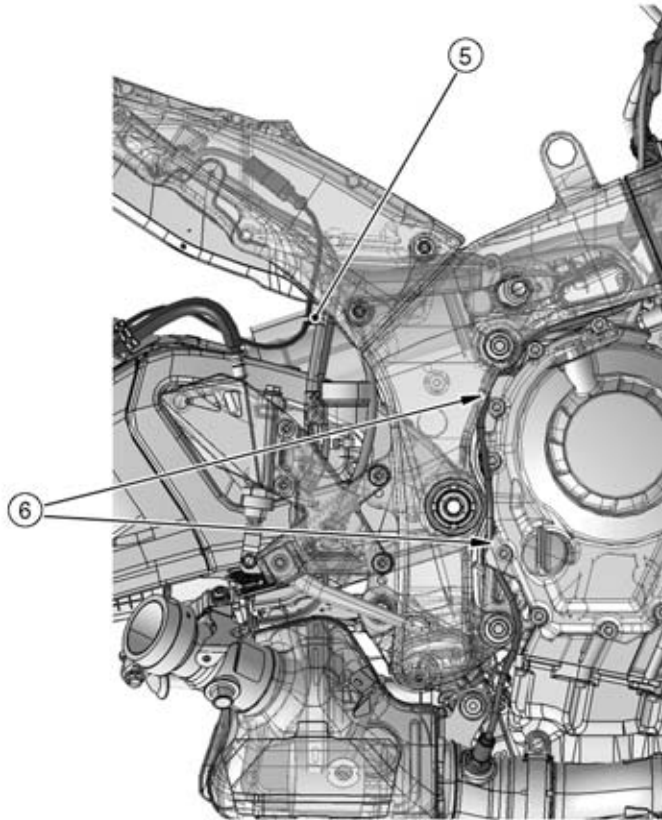
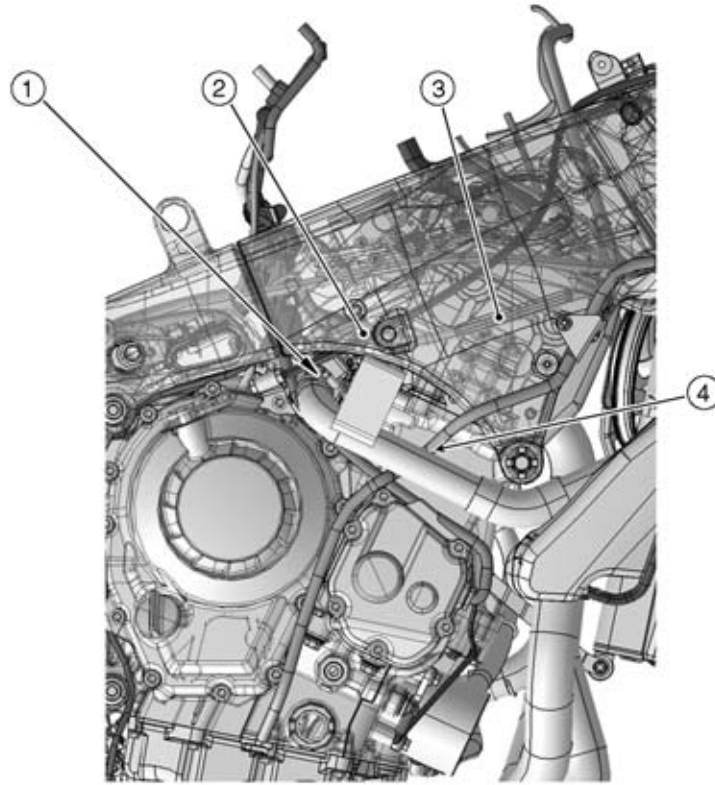


Cable, Wire, and Hose Routing

1. Run the gear position switch lead to inside of the heat insulation rubber plate, and run it under the air cleaner hose, and through the space of the part that heat insulation rubber plate matched (US, CA and CAL Models).
2. Run the fuel tank drain hose, the fuel tank breather hose and the air cleaner drain hose to inside of the water hose. Run them to outside of the alternator lead and the sidestand switch lead.
3. Fuel Tank Breather (Other than CAL and SEA Models)
4. Sidestand Switch Lead
5. Alternator Lead

18-14 APPENDIX

Cable, Wire, and Hose Routing

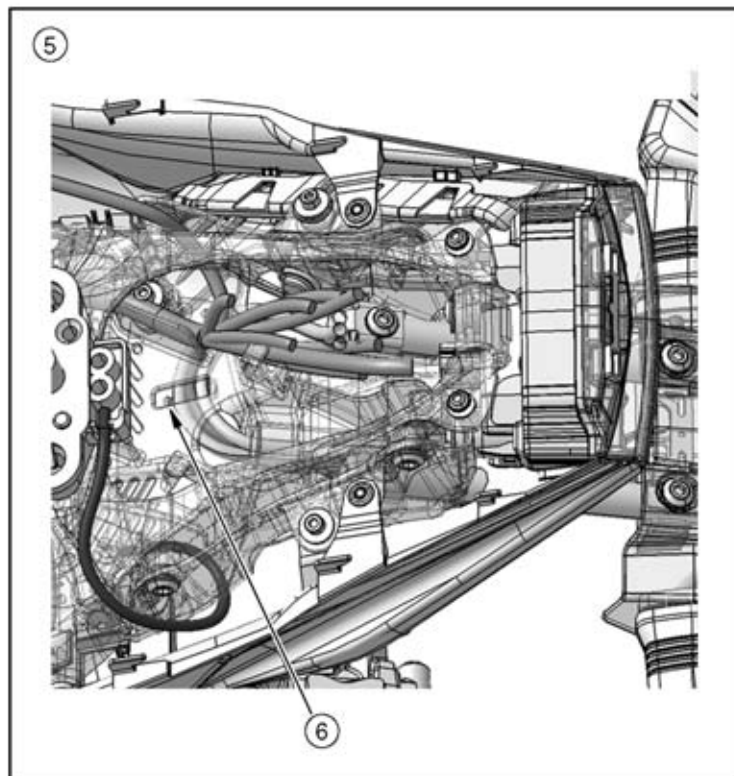
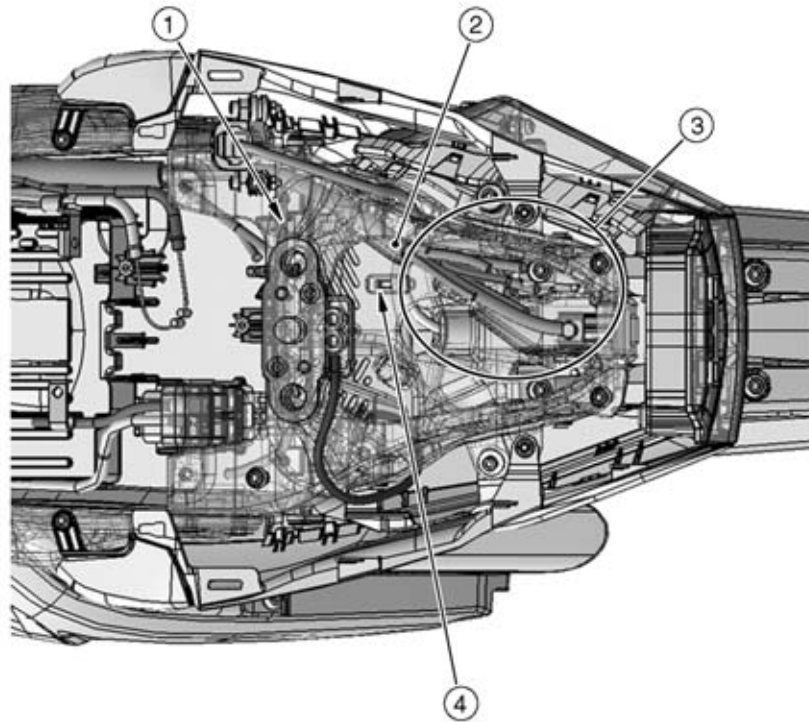


Cable, Wire, and Hose Routing

1. Hook the heat insulation rubber plate onto the water hose (US, CA and CAL Models).
2. Run the clutch cable along the frame.
3. Run the water hose above the sponge of the heat insulation rubber plate. Take care not to pinch the air bleeding hose to the sponge and the engine (US, CA and CAL Models).
4. Run the reserve tank over flow hose into the hole of the heat insulation rubber plate (US, CA and CAL Models).
5. Clamp (Hold the exhaust butterfly valve cable and the rear wheel rotation sensor lead at the white painted position of the lead.)
6. Hook the oxygen sensor lead (equipped models) to the projections of the clutch cover.

18-16 APPENDIX

Cable, Wire, and Hose Routing



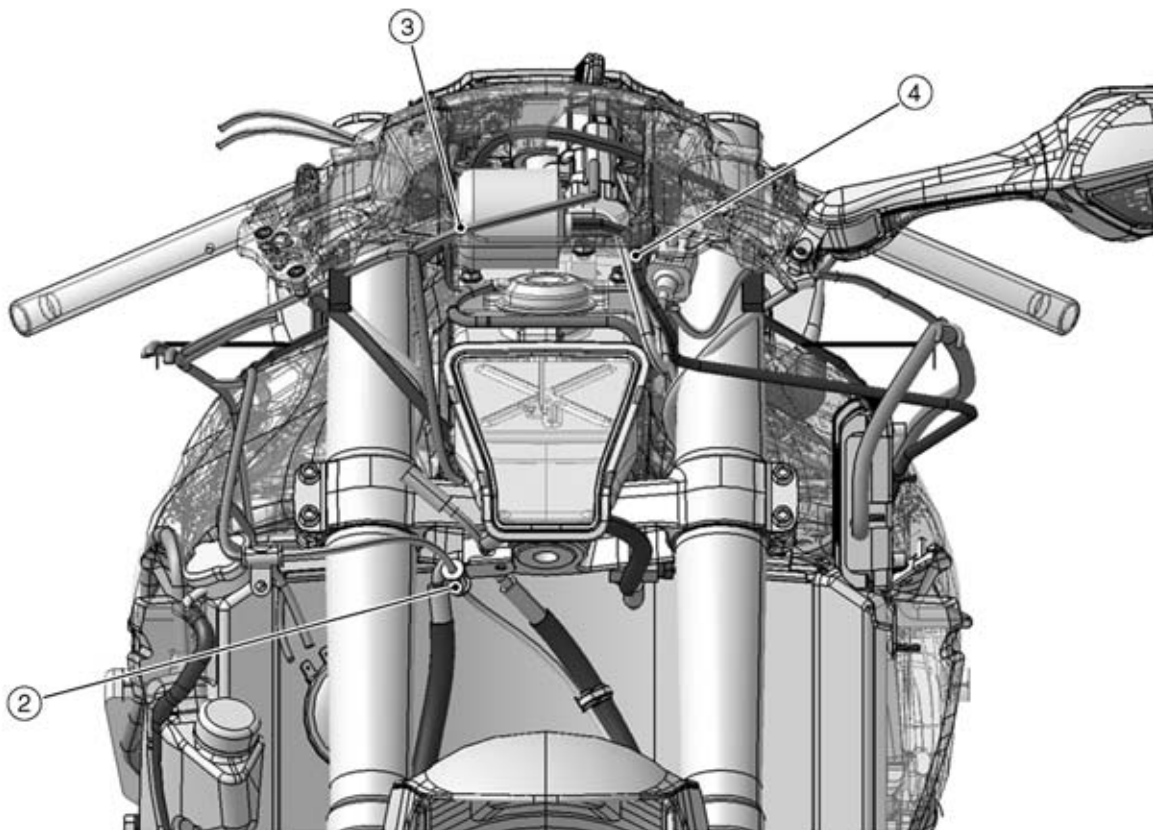
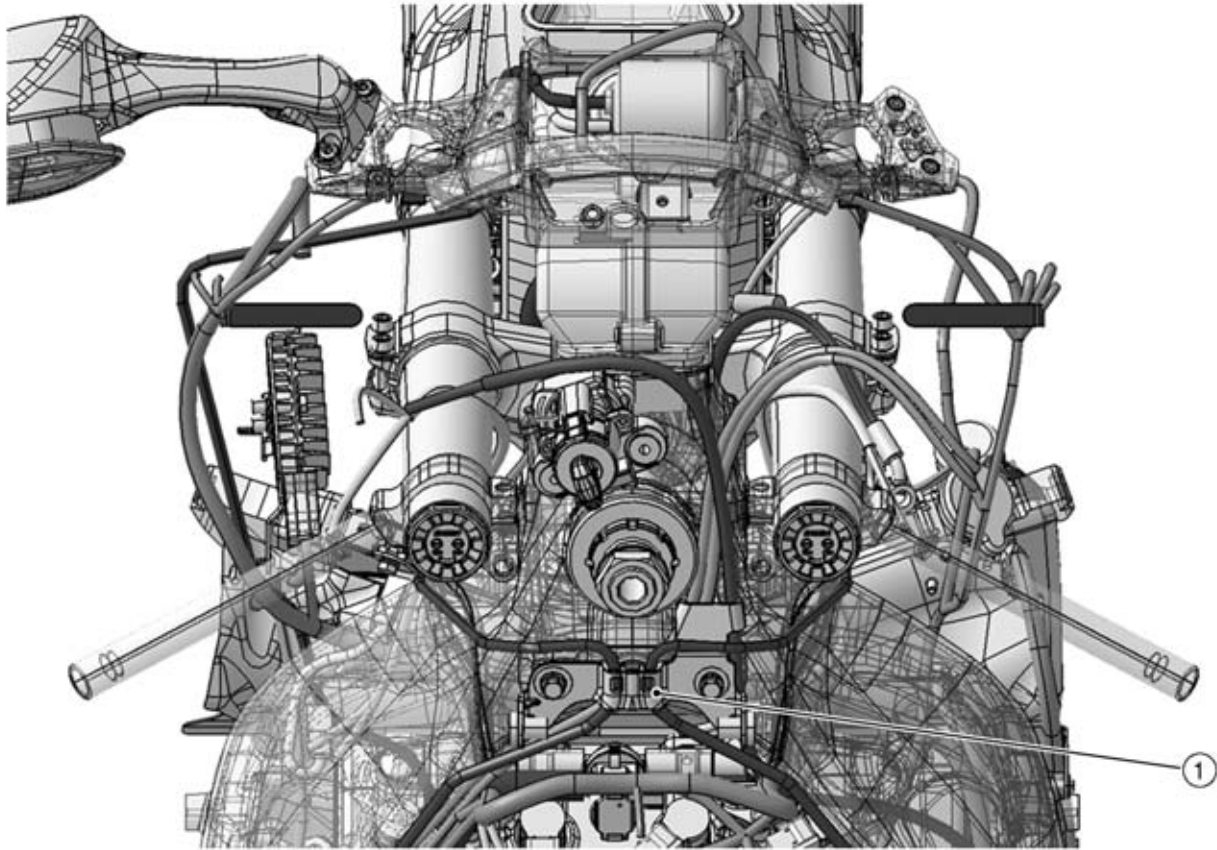
Cable, Wire, and Hose Routing

1. Run the main harness in back of the rib for the fuse box 2.
2. Run the main harness between the rib and projection of the tool kit case.
3. Place all connectors into the dust cover.
4. Hook the licence plate light lead and the left turn signal light lead on the projection of the tool kit case.
5. US and CA Models
6. Hook the licence plate light lead, the left turn signal lead and the right turn signal lead on the projection of the tool kit case.

18-18 APPENDIX

Cable, Wire, and Hose Routing

KIBS Equipped Models



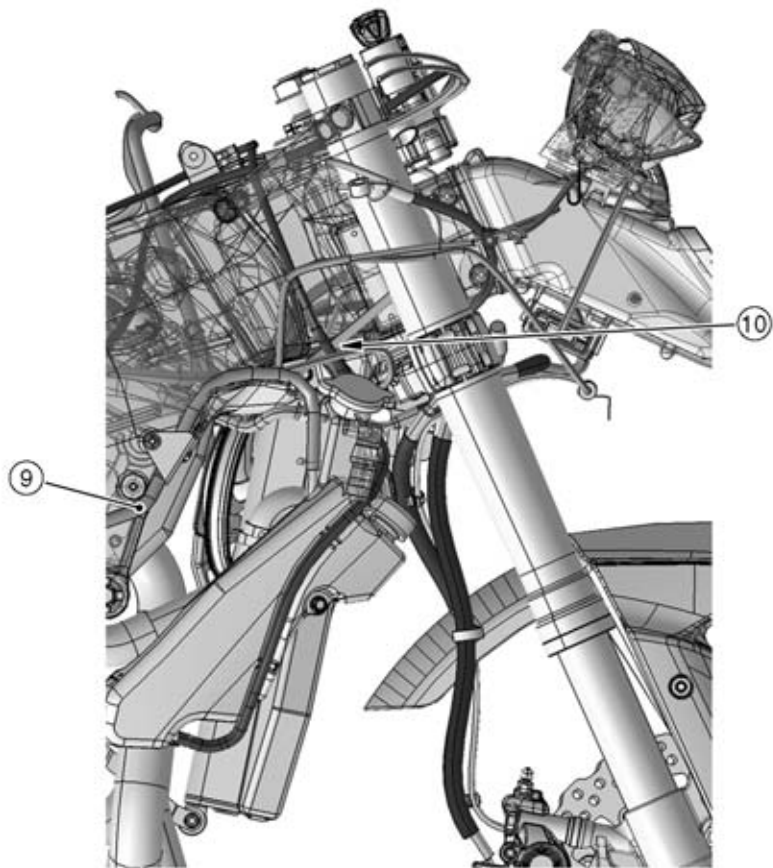
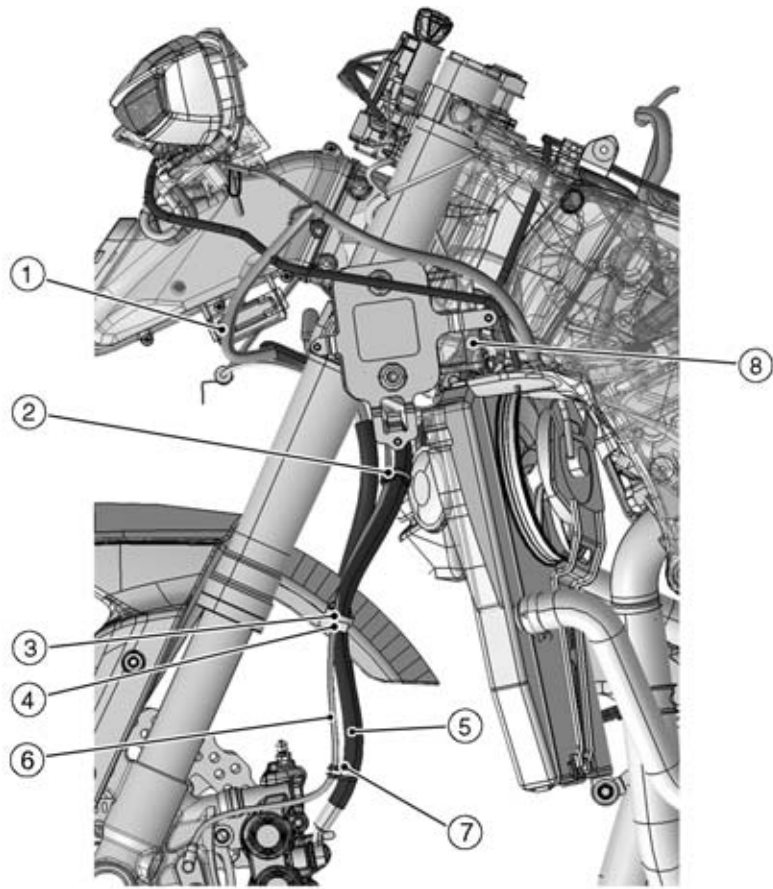
Cable, Wire, and Hose Routing

1. Bracket (Hold the brake pipes.)
2. Clamp (Hold the damper of the front wheel rotation sensor lead.)
3. Run the meter lead to outside of the meter bracket.
4. Run the vacuum hoses to inside of the meter bracket (equipped models).

18-20 APPENDIX

Cable, Wire, and Hose Routing

KIBS Equipped Models



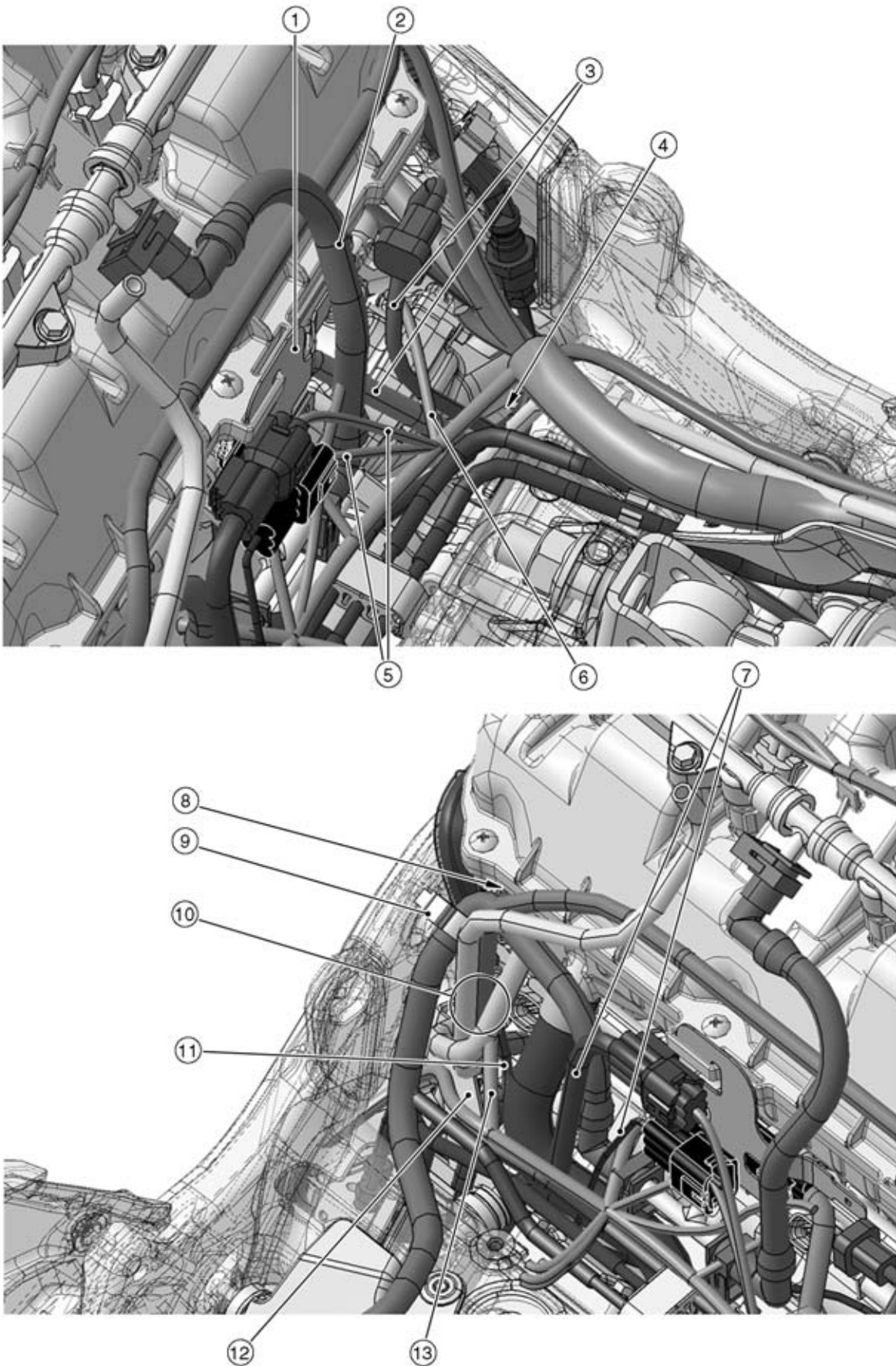
Cable, Wire, and Hose Routing

1. Run the fuse box 1 lead in front of the fuse box 1.
2. Clamp (Hold the front brake hose and the front wheel rotation sensor lead at the white painted position of the lead. Run the lead in front of the hose.)
3. Clamp (Hold the front wheel rotation sensor lead and the front brake hose. Run the lead in front of the hose.)
4. Clamp (Run the front brake hose only.)
5. Front Brake Hose
6. Front Wheel Rotation Sensor Lead
7. Clamp (Hold the front brake hose and the front wheel rotation sensor lead at the white painted position of the lead. Run the lead in front of the hose.)
8. Run the left switch housing lead and ignition switch lead inside the brake pipe.
9. Run the radiator hose between the heat insulation plate and frame, and under the projection of the frame.
10. Run the right switch housing lead inside the brake pipe.

18-22 APPENDIX

Cable, Wire, and Hose Routing

KIBS Equipped Models



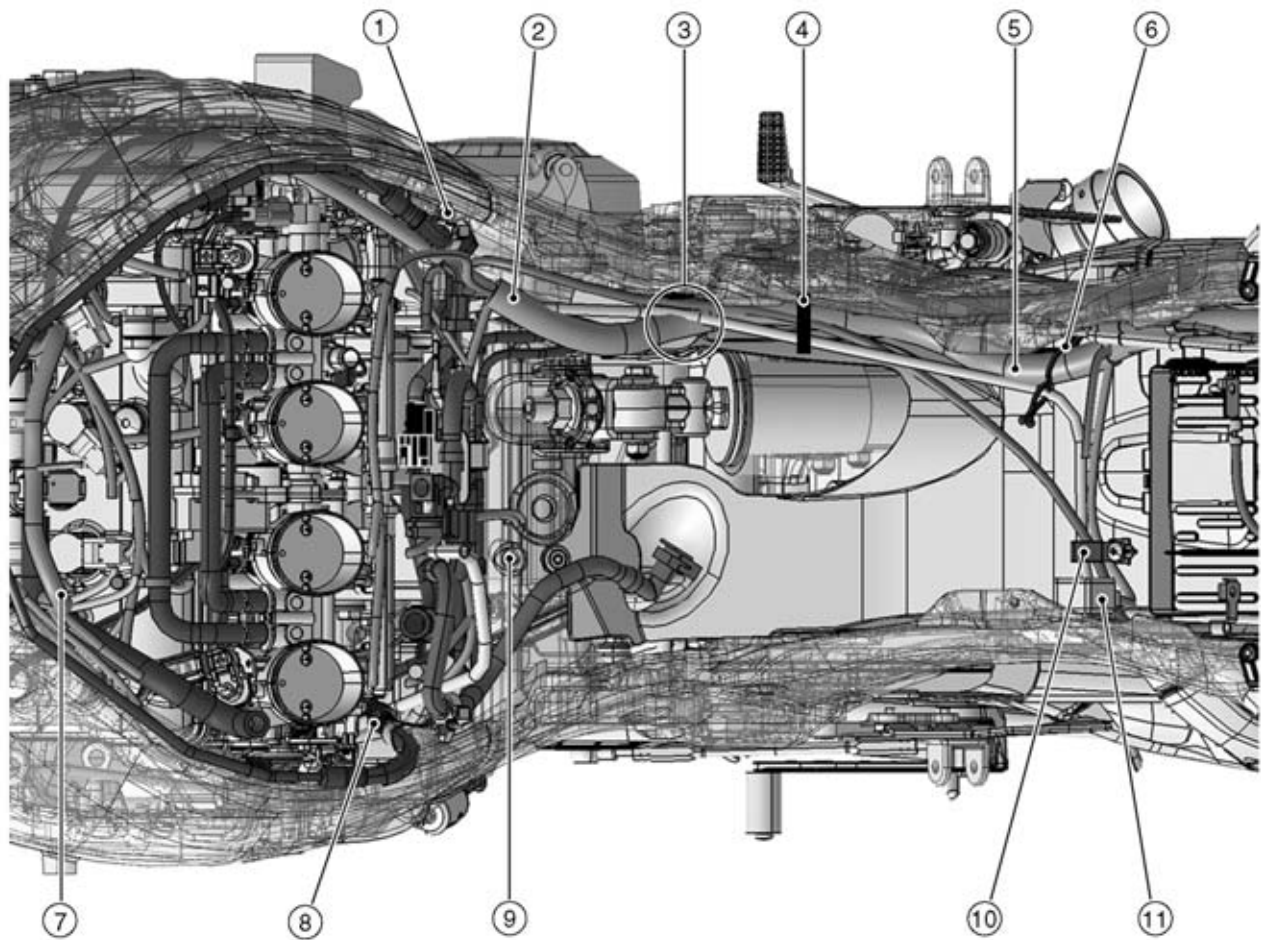
Cable, Wire, and Hose Routing

1. Connectors Bracket
2. Secondary Fuel Hose
3. Run the crankshaft sensor lead and the oxygen sensor lead (equipped models) between the fuel injector lead #3 and the secondary fuel hose.
4. Run the crankshaft sensor lead, the oxygen sensor lead (equipped models), the battery negative cable and the starter cable in front of the brake pipe (to front master cylinder).
5. Run the gear position switch lead and the engine sub harness in back of the secondary fuel hose.
6. Fuel Injector Lead #4
7. Run the gear position switch lead and the engine sub harness between the fuel hose and the main harness, and run them under the crankcase breather hose.
8. Run the primary fuel hose in front of the fuel tank breather hose and the fuel drain hose.
9. Clamp (Hold the primary fuel hose.)
10. Run the fuel tank breather hose, the fuel tank drain hose and the air cleaner drain hose to left side of the fuel injector lead #1, and run them between the brake pipe (to front caliper) and the KIBS hydraulic unit bracket.
11. Brake Pipe (to Front Caliper)
12. KIBS Hydraulic Unit Bracket
13. Fuel Injector Lead #1

18-24 APPENDIX

Cable, Wire, and Hose Routing

KIBS Equipped Models



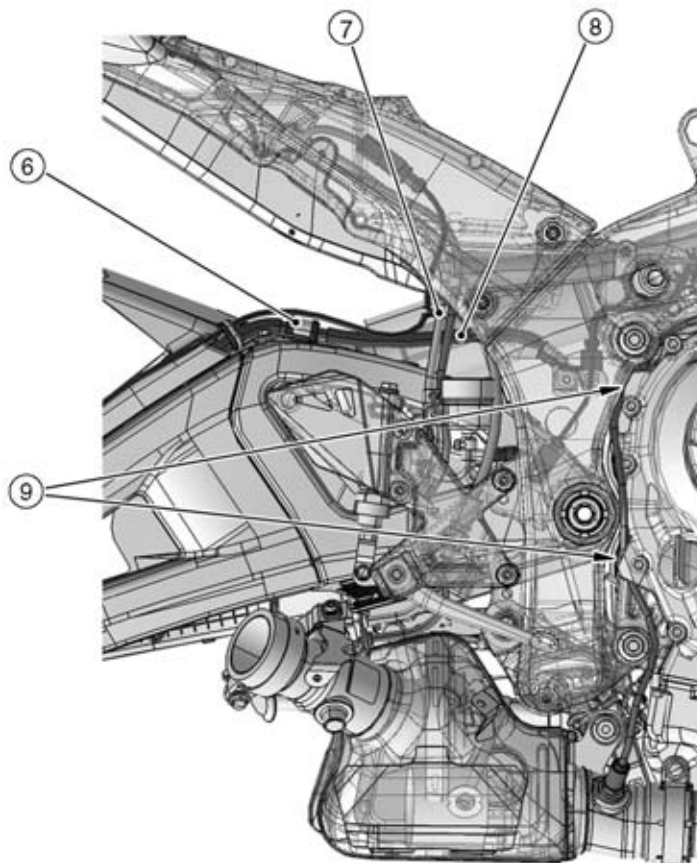
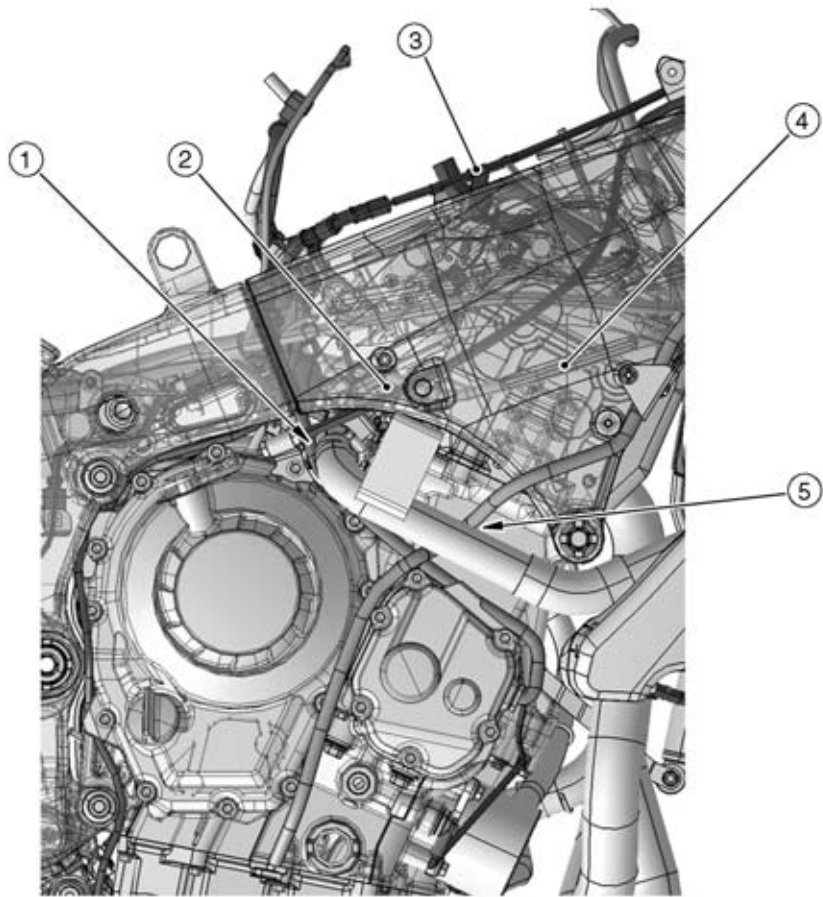
Cable, Wire, and Hose Routing

1. Clamp (Hold the brake hose. Turn the opening portion upward.)
2. Run the main harness above the battery negative cable and the starter cable.
3. Run the battery negative cable and the starter cable above the main harness.
4. Clamp (Hold the main harness, the battery negative cable and the starter cable tightly. Run the main harness to right side of the leads. Cut below the tip of the band 10 mm or less.)
5. Run the main harness in left side of the rib of the rear fender.
6. Clamp (Hold the main harness and the starter cable.)
7. Clamp (Hold the white tape position of the main harness.)
8. Hold the brake hose with the bracket.
9. Engine Ground Terminal Bolt (Turn the ground lead to the right side.)
10. Clamp (Hold the battery negative cable, the starter cable and the turn signal relay lead.)
11. Turn Signal Relay

18-26 APPENDIX

Cable, Wire, and Hose Routing

KIBS Equipped Models



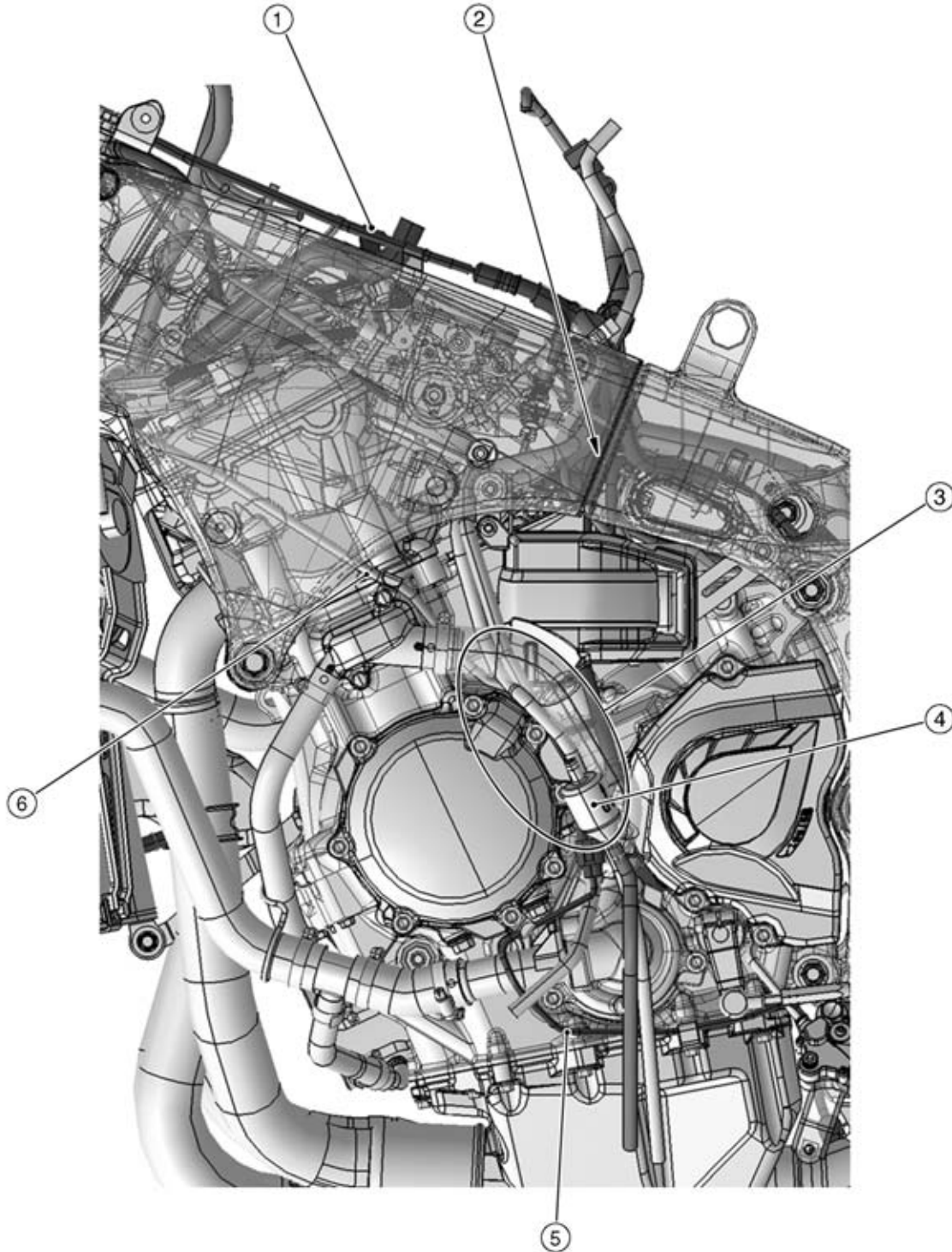
Cable, Wire, and Hose Routing

1. Hook the heat insulation rubber plate on the water hose (US, CA and CAL Models).
2. Run the clutch cable along the frame.
3. Clamp (Hold the brake pipe.)
4. Run the water hose above the sponge of the heat insulation rubber plate. Take care not to pinch the air bleeding hose to the sponge and the engine (US, CA and CAL Models).
5. Run the reserve tank over flow hose into the hole of the heat insulation rubber plate (US, CA and CAL Models).
6. Clamp (Hold the damper of the rear brake hose.)
7. Clamp (Hold the exhaust butterfly valve cable and the rear wheel rotation sensor lead at the white painted position of the lead.)
8. Run the rear brake hose to inside of the exhaust butterfly valve cables.
9. Hook the oxygen sensor lead (equipped models) to the projections of the clutch cover.

18-28 APPENDIX

Cable, Wire, and Hose Routing

KIBS Equipped Models

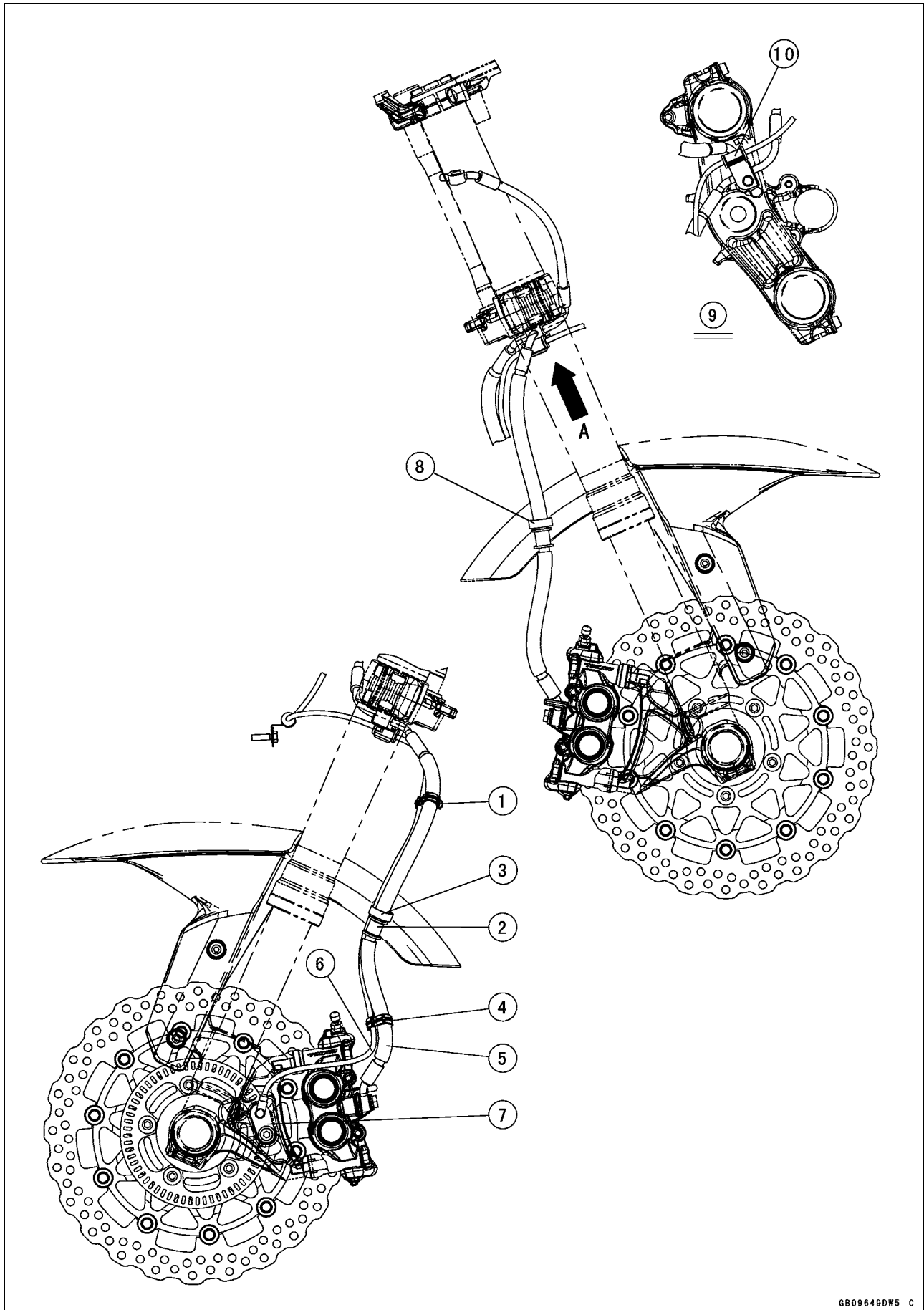


Cable, Wire, and Hose Routing

1. Clamp (Hold the brake pipe.)
2. Run the gear position switch lead to inside of the heat insulation rubber plate, and under the air cleaner hose, and through the space of the part that heat insulation rubber plate matched (US, CA and CAL Models).
3. Run the fuel tank drain hose, fuel tank breather hose, and air cleaner drain hose inside the water hose, and outside the alternator lead and sidestand switch lead.
4. Fuel Tank Breather (Other than CAL and SEA Models)
5. Sidestand Switch Lead
6. Alternator Lead

18-30 APPENDIX

Cable, Wire, and Hose Routing

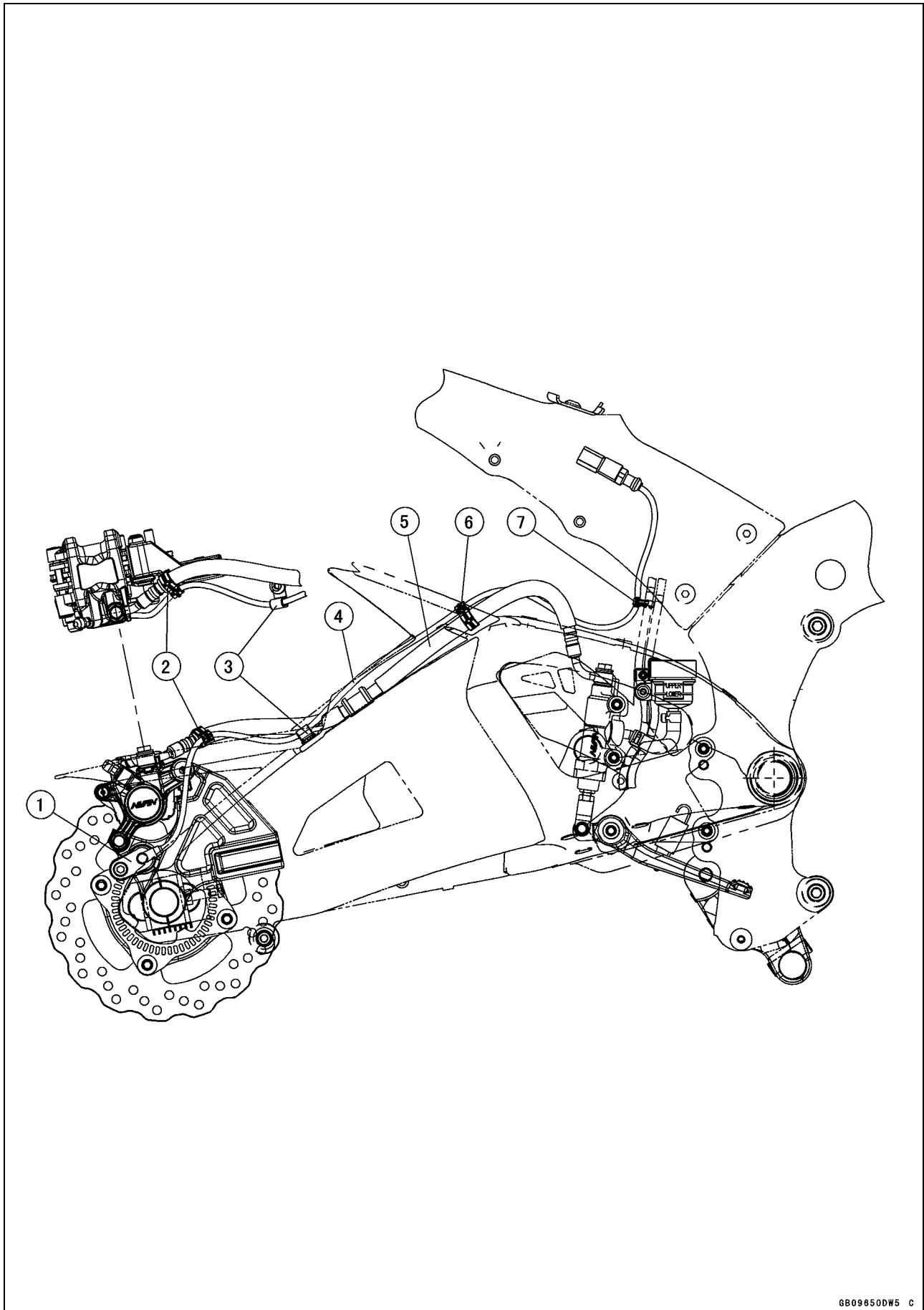


Cable, Wire, and Hose Routing

1. Clamp (Hold the front brake hose and the front wheel rotation sensor lead at the white painted position of the lead.)
2. Clamp (Run the front brake hose only.)
3. Clamp (Hold the front wheel rotation sensor lead and the front brake hose. Run the lead in front of the hose.)
4. Clamp (Hold the front brake hose and the front wheel rotation sensor lead at the white painted position of the lead.)
5. Front Brake Hose
6. Front Wheel Rotation Sensor Lead
7. Front Wheel Rotation Sensor
8. Clamp (Run the front brake hose.)
9. Viewed A
10. Clamp (Hold the damper of the front wheel rotation sensor lead.)

18-32 APPENDIX

Cable, Wire, and Hose Routing



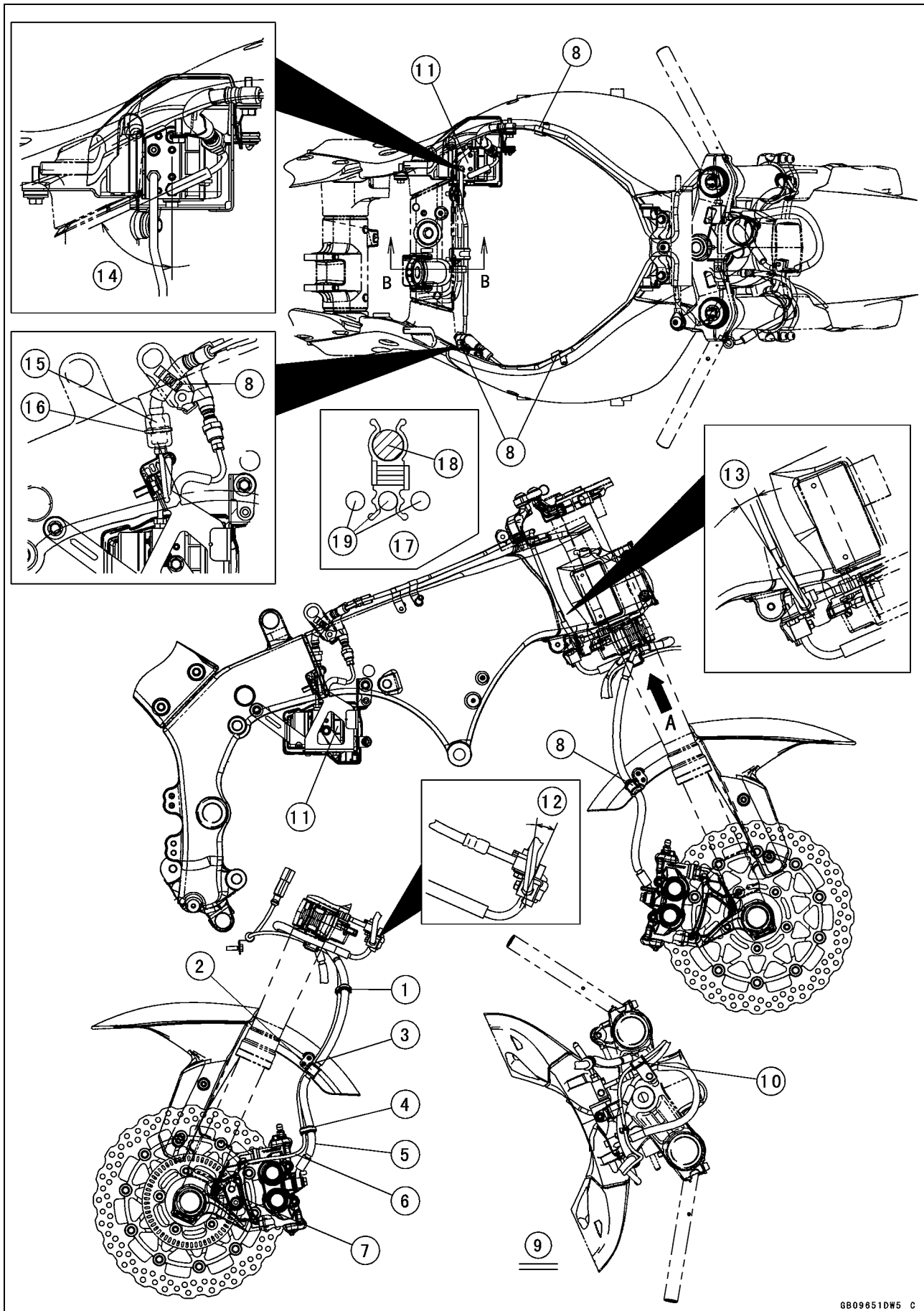
Cable, Wire, and Hose Routing

1. Rear Wheel Rotation Sensor
2. Clamp (Hold the rear brake hose and the rear wheel rotation sensor lead at the white painted position of the lead. Run the lead to outside of the hose.)
3. Clamp (Hold the rear wheel rotation sensor lead.)
4. Run the rear wheel rotation sensor to outside of the mud guard.
5. Run the rear brake hose to inside of the mud guard.
6. Clamp (Hold the rear brake hose and the rear wheel rotation sensor lead at the white painted position of the lead. Run the lead above the hose.)
7. Clamp (Hold the rear brake hose and the rear wheel rotation sensor lead at the white painted position of the lead. Run the lead in back of the hose.)

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Cable, Wire, and Hose Routing

KIBS Equipped Models



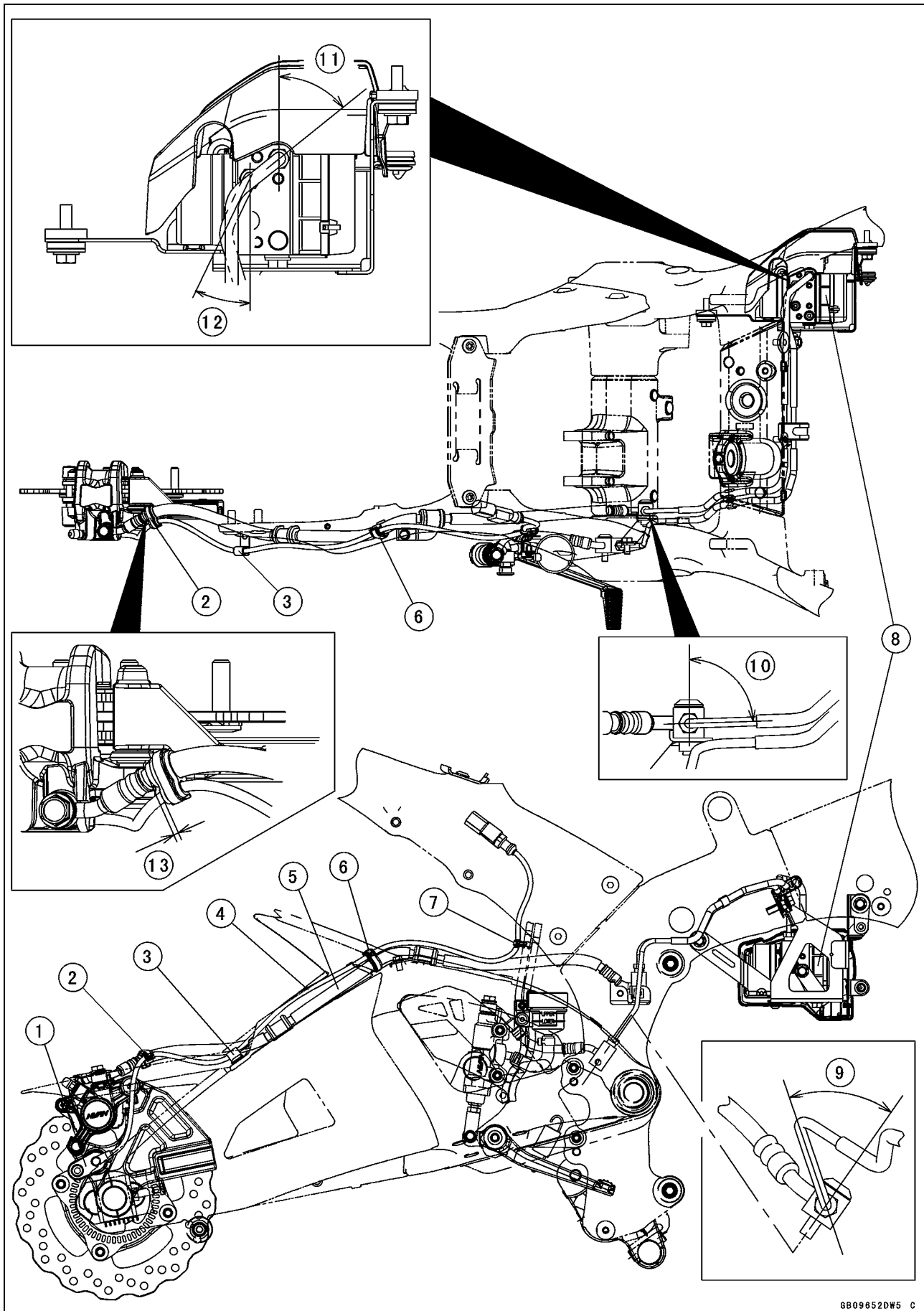
Cable, Wire, and Hose Routing

1. Clamp (Hold the front brake hose and the front wheel rotation sensor lead at the white painted position of the lead.)
2. Clamp (Hold only the front brake hose.)
3. Clamp (Hold the front wheel rotation sensor lead and the front brake hose. Run the lead in front of the hose.)
4. Clamp (Hold the front brake hose and the front wheel rotation sensor lead at the white painted position of the lead.)
5. Front Brake Hose
6. Front Wheel Rotation Sensor Lead
7. Front Wheel Rotation Sensor
8. Clamps (Hold the brake pipe and hose.)
9. Viewed A
10. Clamp (Hold the damper of the front wheel rotation sensor lead.)
11. KIBS Hydraulic Unit
12. About 16.3°
13. About 9.7°
14. About 64.9°
15. Grommet
16. Band
17. Viewed B-B
18. Main Harness
19. Brake Pipes

18-36 APPENDIX

Cable, Wire, and Hose Routing

KIBS Equipped Models



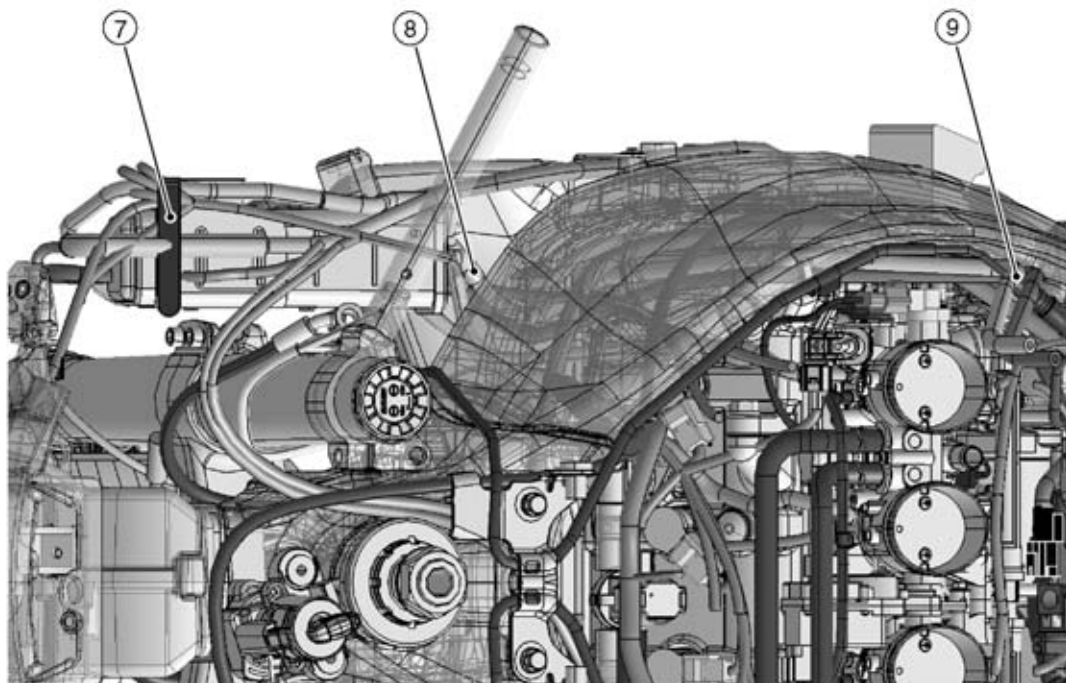
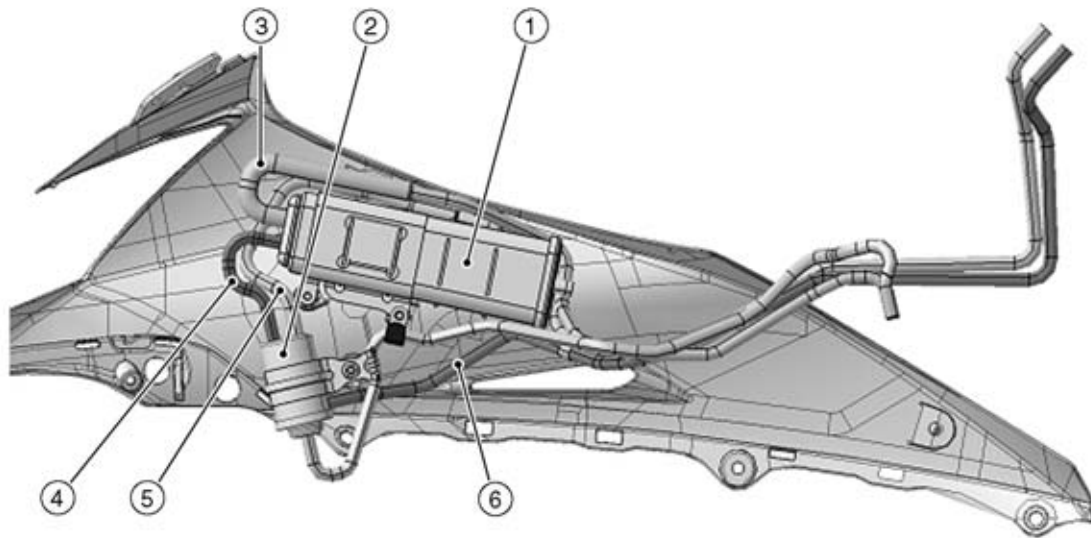
Cable, Wire, and Hose Routing

1. Rear Wheel Rotation Sensor
2. Clamp (Hold the rear brake hose and the rear wheel rotation sensor lead at the white painted position of the lead. Run the lead to outside of the hose.)
3. Clamp (Hold the rear wheel rotation sensor lead.)
4. Run the rear wheel rotation sensor to outside of the mud guard.
5. Run the rear brake hose to inside of the mud guard.
6. Clamp (Hold the rear brake hose and the rear wheel rotation sensor lead at the white painted position of the lead. Run the lead above the hose.)
7. Clamp (Hold the rear brake hose and the rear wheel rotation sensor lead at the white painted position of the lead. Run the lead in back of the hose.)
8. KIBS Hydraulic Unit
9. About 53.8°
10. About 88.2°
11. About 51.3°
12. About 25.7°
13. About 0 ~ 5 mm (0 ~ 0.2 in.)

18-38 APPENDIX

Cable, Wire, and Hose Routing

CAL and SEA Models



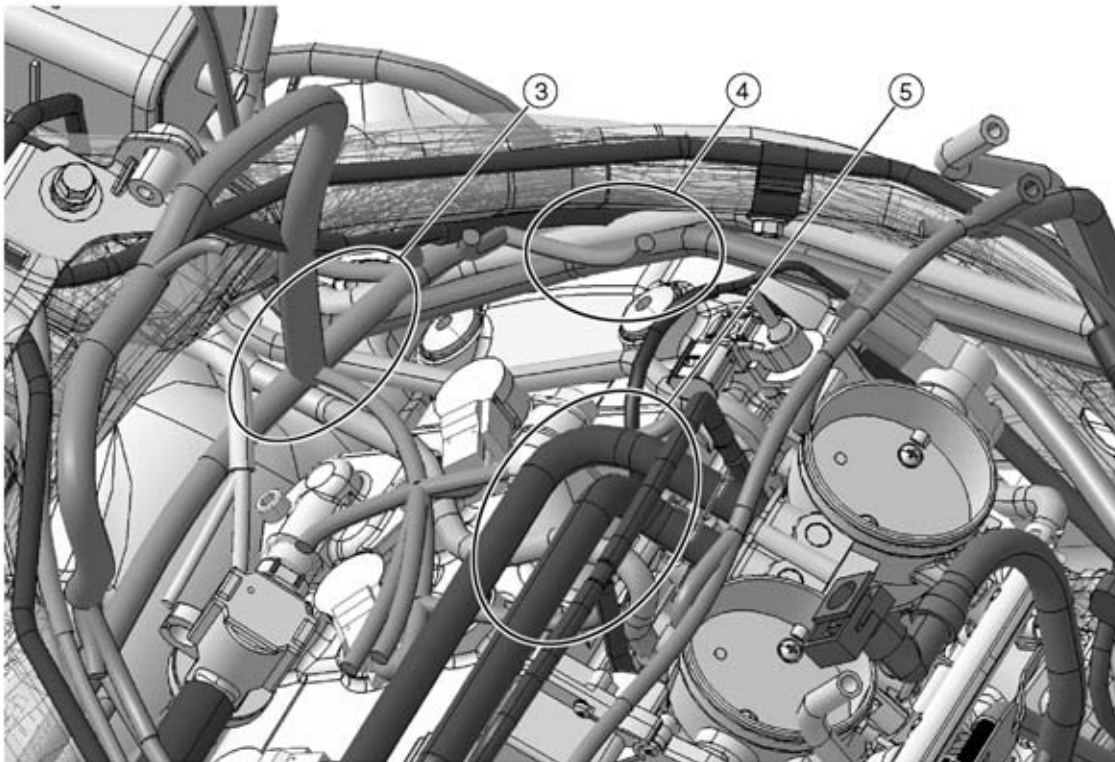
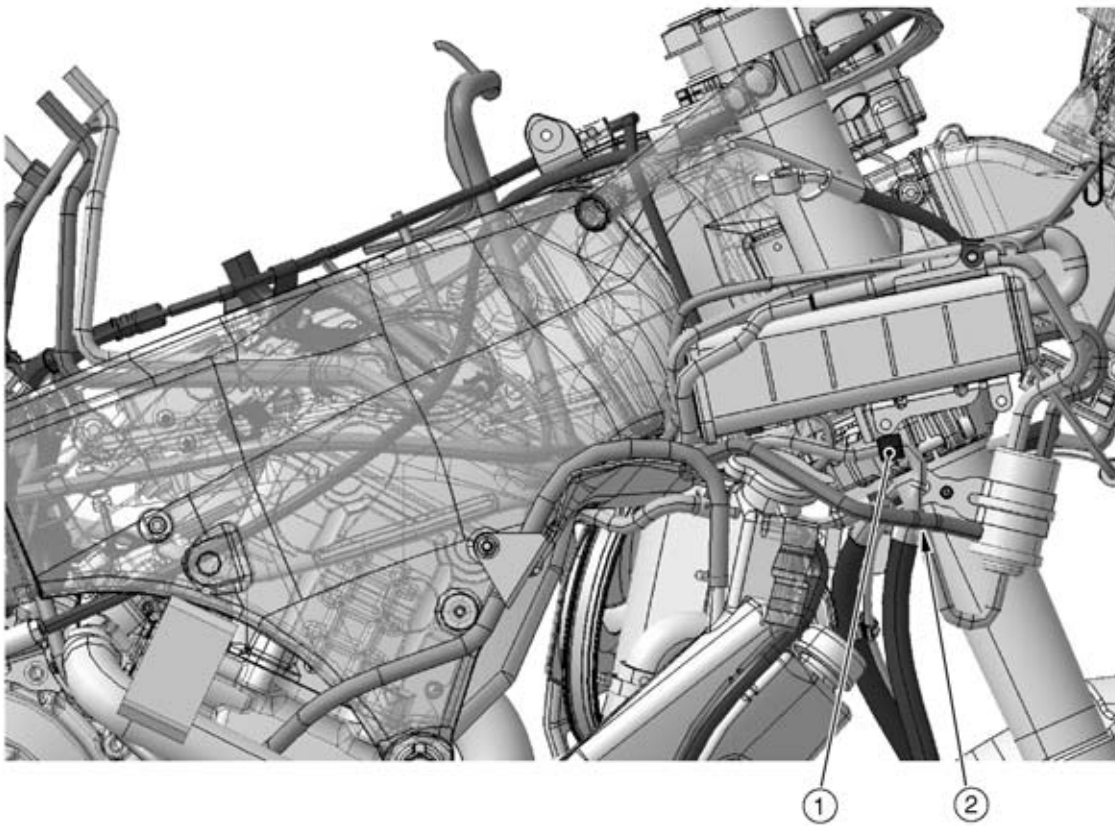
Cable, Wire, and Hose Routing

1. Canister
2. Separator
3. Hose (Green)
4. Hose (Blue; to the Canister)
5. Hose (Blue; to the Fuel Tank)
6. Hose (Red)
7. Clamp (Bend down the clamp, and hold the hose (blue), the hose (green), the main harness and the front wheel rotation sensor lead in turn from right side.)
8. Run the horn lead under the hose.
9. Run the hose (red) and the hose (blue) between the brake pipe and the frame (KIBS equipped model).

18-40 APPENDIX

Cable, Wire, and Hose Routing

CAL and SEA Models



Cable, Wire, and Hose Routing

1. Clamp (Hold the hose (white) only.)
2. Run the hose (red) to outside of the hose (white).
3. Run the all hoses under the main harness, and run the main harness, the hose (blue), the hose (red), the hose (green) and the hose (white) in turn from outside between the frame and the heat insulation plate.
4. Run the hose (blue) and the hose (red) to inside of the clutch cable and the main harness.
5. Run the hose (white) and the hose (green) under the main harness.

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
- Balancer bearing 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 OFF
- 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

Troubleshooting Guide

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

18-44 APPENDIX

Troubleshooting Guide

- Air cleaner housing holder loose
- Air cleaner poorly sealed, or missing
- 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

Troubleshooting Guide

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
 Balancer gear worn or chipped
 Balancer shaft position maladjusted
 Balancer bearing worn
 Balancer rubber damper damaged

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

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Troubleshooting Guide

Shock absorption unsatisfactory:

(Too hard)

Front fork oil excessive

Front fork oil viscosity too high

Rear shock absorber adjustment too hard

Tire air pressure too high

Front fork bent

(Too soft)

Tire air pressure too low

Front fork oil insufficient and/or leaking

Front fork oil viscosity too low

Rear shock adjustment too soft

Front fork, rear shock absorber spring weak

Rear shock absorber oil leaking

Brake Doesn't Hold:

Air in the brake line

Pad or disc worn

Brake fluid leakage

Disc warped

Contaminated pad

Brake fluid deteriorated

Primary or secondary cup damaged in master cylinder

Master cylinder scratched inside

Battery Trouble:

Battery discharged:

Charge insufficient

Battery faulty (too low terminal voltage)

Battery 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

MODEL APPLICATION

Year	Model	Beginning Frame No.
2011	ZX1000JBF	JKAZXCJ1□BA000001 or JKAZXT00JJA000001 or ZXT00J-000001 or 96PZXDJ1□BFS000001
2011	ZX1000KBF	JKAZXCK1□BA000001 or JKAZXT00JKA000001 or 96PZXDK1□BFS000001

□:This digit in the frame number changes from one machine to another.



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