Z1000SX
Ninja 1000

Motorcycle
Service Manual



Kawasaki

Quick Reference Guide

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

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

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

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

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LIST OF ABBREVIATIONS

A	ampere(s)	in.	inch(es)
ABDC	after bottom dead center	KIBS	Kawasaki intelligent anti-lock brake system
ABS	anti-lock brake system	km/h	kilometers per hour
AC	alternating current	KTRC	Kawasaki traction control
Ah	ampere hour	L	liter(s)
ATDC	after top dead center	LCD	liquid crystal display
BBDC	before bottom dead center	LED	light emitting diode
BDC	bottom dead center	lb	pound(s)
BTDC	before top dead center	m	meter(s)
°C	degree(s) Celsius	min	minute(s)
CAN	controller area network	mmHg	millimeters of mercury
cmHg	centimeters of mercury	mph	miles per hour
CPU	central processing unit	N	newton(s)
cu in.	cubic inch(es)	oz	ounce(s)
DC	direct current	Pa	pascal(s)
DFI	digital fuel injection	PS	horsepower(s)
DOHC	double overhead camshaft	psi	pound(s) per square inch
DOT	department of transportation	qt	quart(s)
ECU	electronic control unit	r	revolution
F	farad(s)	rpm	revolution(s) per minute
°F	degree(s) Fahrenheit	s	second(s)
ft	foot, feet	TDC	top dead center
g	gram(s)	TIR	total indicator reading
gal	gallon(s)	V	volt(s)
h	hour(s)	W	watt(s)
HP	horsepower(s)	Ω	ohm(s)
IC	integrated circuit		

COUNTRY AND AREA CODES

AT	Austria
AU	Australia
BR	Brazil
CA	Canada
CAL	California
CH	Switzerland
DE	Germany
EUR	Europe
GB	United Kingdom
IN	India
MY	Malaysia
PH	Philippines
SEA-B1	Southeast Asia B1
SEA-B3	Southeast Asia B3
TH	Thailand
US	United States
WVTA (FULL)	WVTA Model (Full Power)
GB WVTA (FULL)	GB WVTA Model (Full Power)

EMISSION CONTROL INFORMATION

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

1. Crankcase Emission Control System

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

2. Exhaust Emission Control System

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

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

3. Evaporative Emission Control System

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

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

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

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

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

NOTE

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

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

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

TAMPERING WITH NOISE CONTROL SYSTEM PROHIBITED

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

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

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

Foreword

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

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

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

To get the longest life out of your vehicle.

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

How to Use This Manual

In this manual, the product is divided into its major systems and these systems make up the manual's chapters. The Quick Reference Guide shows you all of the product's system and assists in locating their chapters. Each chapter in turn has its own comprehensive Table of Contents.

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

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

⚠ DANGER

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

⚠ WARNING

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

NOTICE

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

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

NOTE

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

- Indicates a procedural step or work to be done.

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

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

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

General Information

Table of Contents

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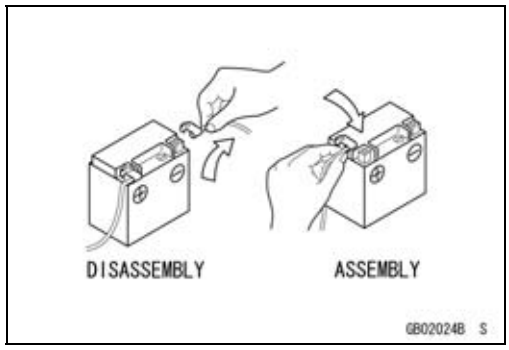
Before Servicing

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

Especially note the following.

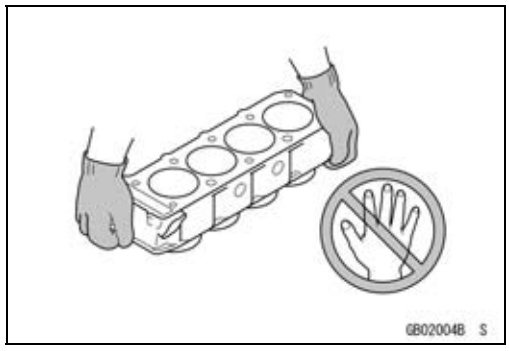
Battery Ground

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



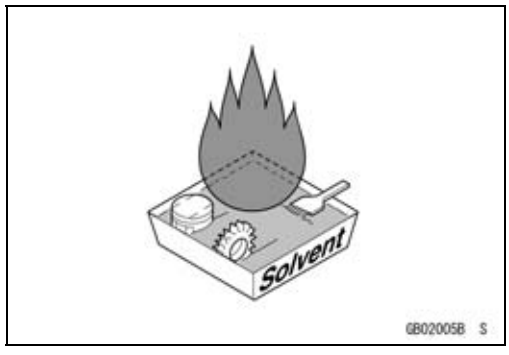
Edges of Parts

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



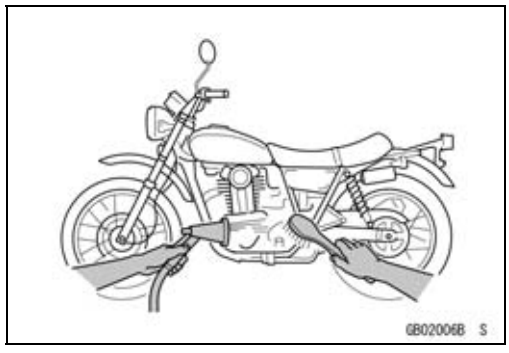
Solvent

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



Cleaning Vehicle before Disassembly

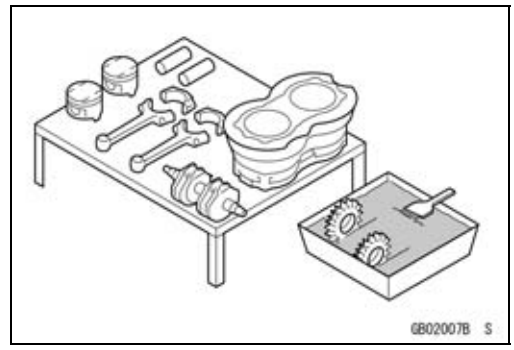
Clean the vehicle thoroughly before disassembly. Dirt or other foreign materials entering into sealed areas during vehicle disassembly can cause excessive wear and decrease performance of the vehicle.



Before Servicing

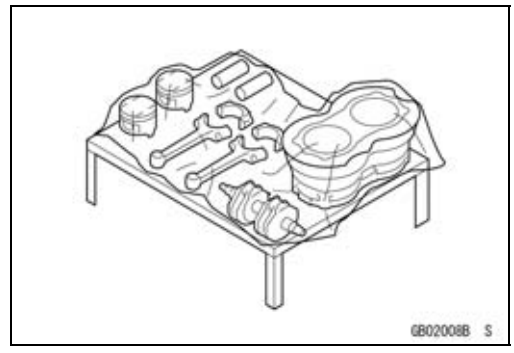
Arrangement and Cleaning of Removed Parts

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



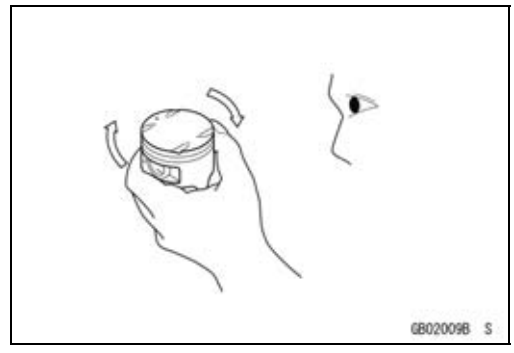
Storage of Removed Parts

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



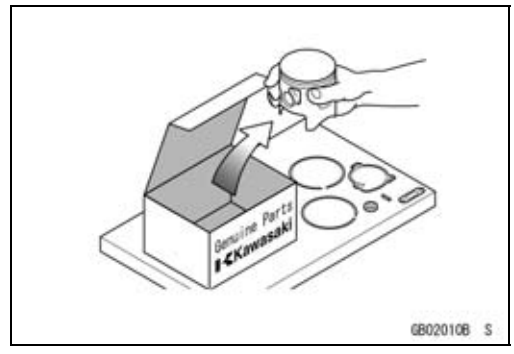
Inspection

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



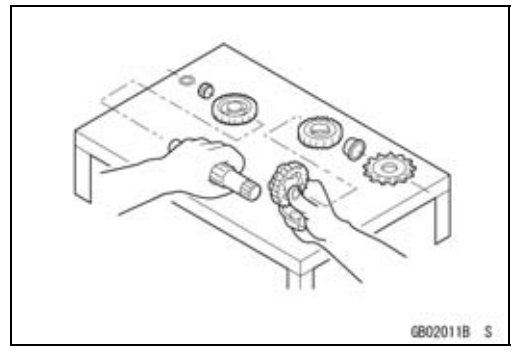
Replacement Parts

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



Assembly Order

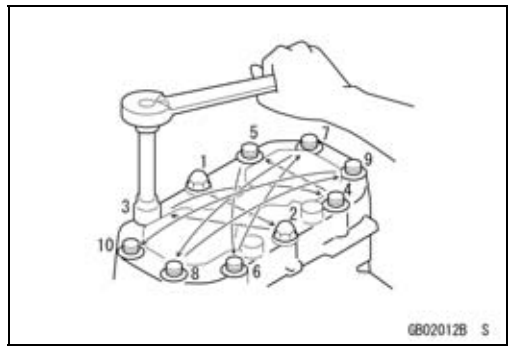
In most cases assembly order is the reverse of disassembly, however, if assembly order is provided in this Service Manual, follow the procedures given.



Before Servicing

Tightening Sequence

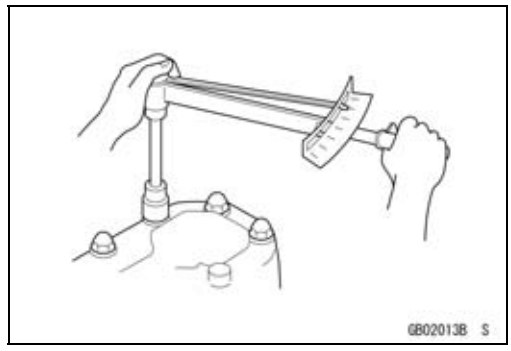
Generally, when installing a part with several bolts, nuts, or screws, start them all in their holes and tighten them to a snug fit. Then tighten them according to the specified sequence to prevent case warpage or deformation which can lead to malfunction. Conversely when loosening the bolts, nuts, or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



Tightening Torque

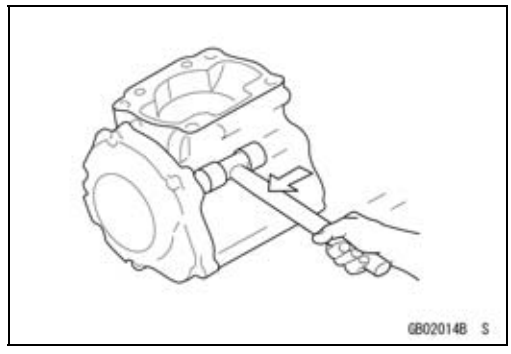
Incorrect torque applied to a bolt, nut, or screw may lead to serious damage. Tighten fasteners to the specified torque using a good quality torque wrench.

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



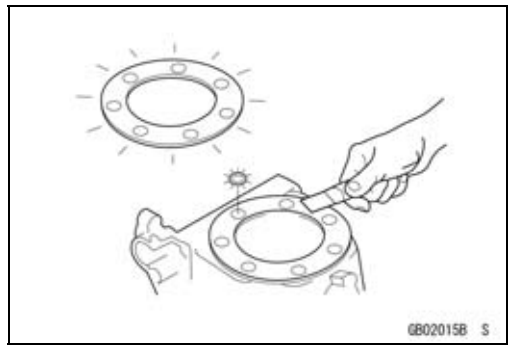
Force

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



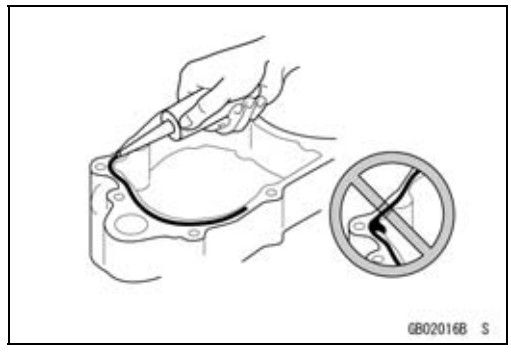
Gasket, O-ring

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



Liquid Gasket, Non-permanent Locking Agent

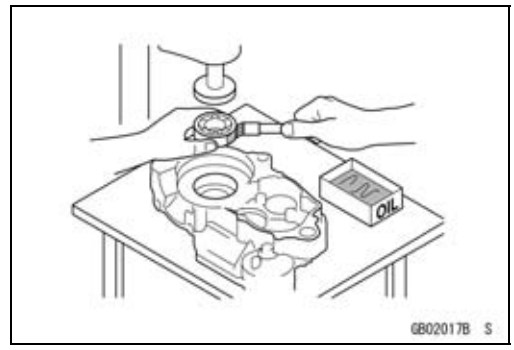
For applications that require Liquid Gasket or a Non-permanent Locking Agent, clean the surfaces so that no oil residue remains before applying liquid gasket or non-permanent locking agent. Do not apply them excessively. Excessive application can clog oil passages and cause serious damage.



Before Servicing

Press

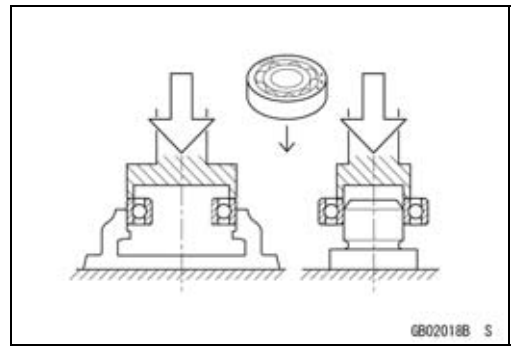
For items such as bearings or oil seals that must be pressed into place, apply small amount of oil to the contact area. Be sure to maintain proper alignment and use smooth movements when installing.



Ball Bearing and Needle Bearing

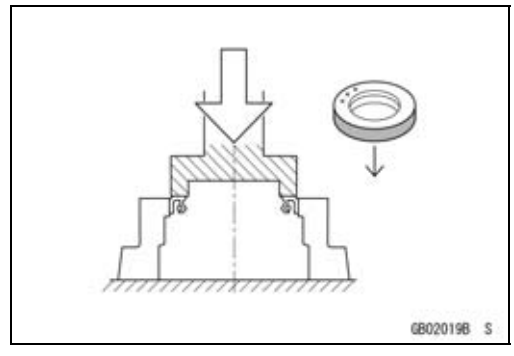
Do not remove pressed ball or needle unless removal is absolutely necessary. Replace with new ones whenever removed. Press bearings with the manufacturer and size marks facing out. Press the bearing into place by putting pressure on the correct bearing race as shown.

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

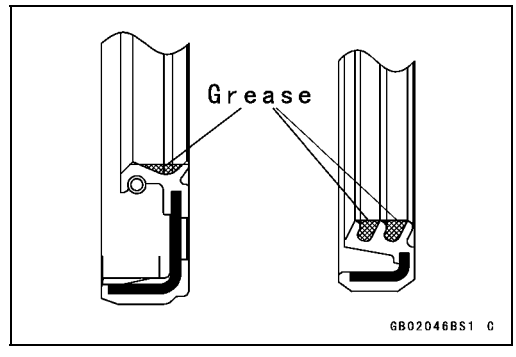


Oil Seal, Grease Seal

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

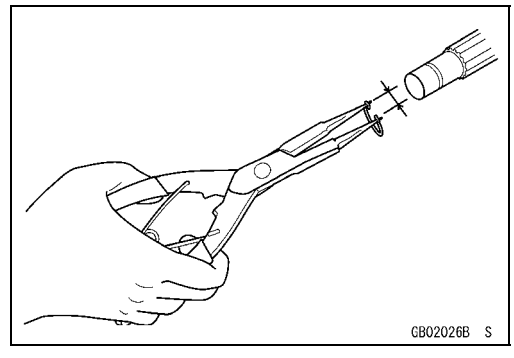


Apply specified grease to the lip of seal before installing the seal.



Circlips, Cotter Pins

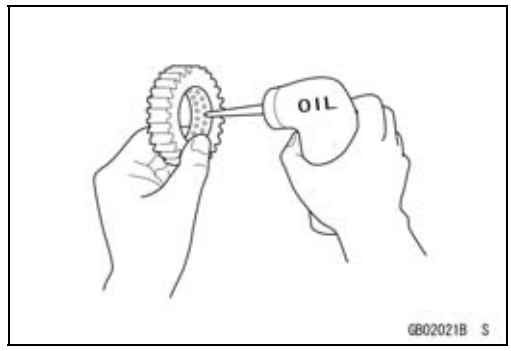
Replace the circlips or cotter pins that were removed with new ones. Take care not to open the clip excessively when installing to prevent deformation.



Before Servicing

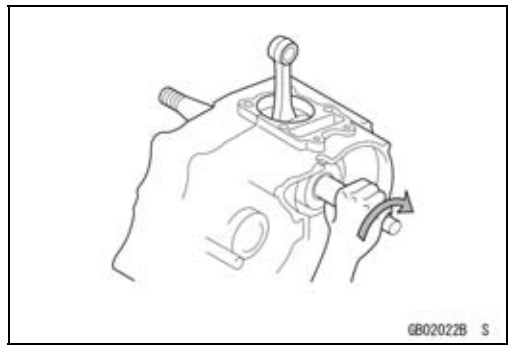
Lubrication

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



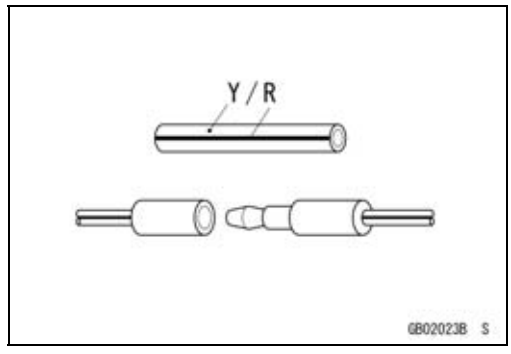
Direction of Engine Rotation

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



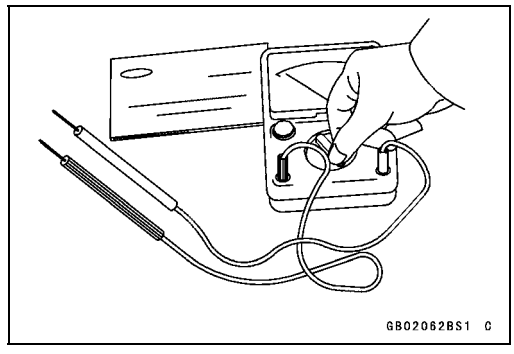
Electrical Wires

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



Instrument

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



Handling Electronic Parts

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

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

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

Model Identification

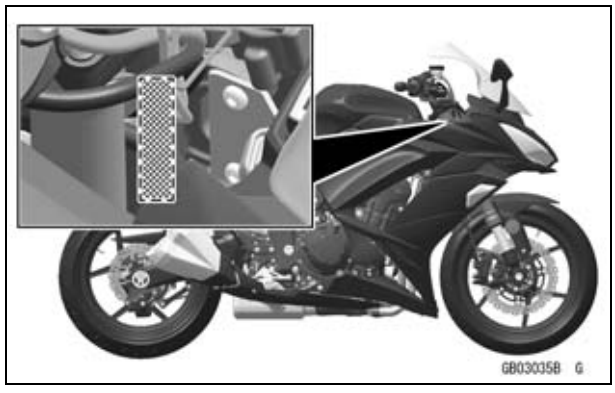
ZX1000WH Left Side View



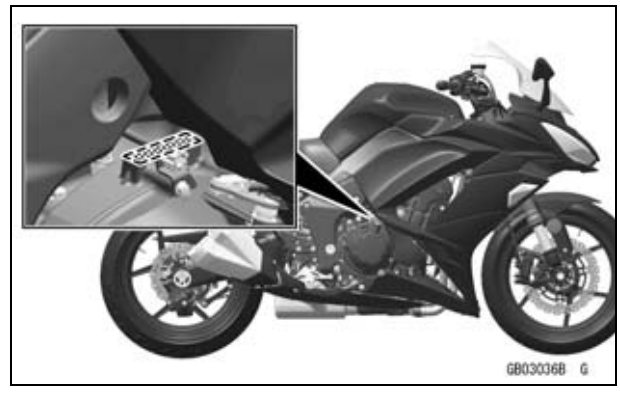
ZX1000WH Right Side View



Frame Number



Engine Number



General Specifications

Items	ZX1000WH ~ WJ
Dimensions	
Overall Length	2 100 mm (82.68 in.)
Overall Width	790 mm (31.10 in.)
Overall Height/High Position	1 185 mm (46.65 in.)/1235 mm (48.62 in.)
Wheelbase	1 440 mm (56.69 in.)
Road Clearance	130 mm (5.12 in.)
Seat Height	815 mm (32.1 in.)
Curb Mass:	235 kg (518 lb) (US, CA) 234 kg (516 lb) (IN: with Saree Guard equipped model) 239 kg (527 lb)
Front	121 kg (267 lb) (US, CA) 120 kg (265 lb)
Rear	114 kg (251 lb) (IN: with Saree Guard equipped model) 118 kg (260 lb)
Fuel Tank Capacity	19 L (5.0 US gal)
Performance	
Minimum Turning Radius	3.1 m (10.2 ft)
Engine	
Type	4-stroke, DOHC, 4-cylinder
Cooling System	Liquid-cooled
Bore and Stroke	77.0 × 56.0 mm (3.03 × 2.20 in.)
Displacement	1 043 cm^3 (63.6 cu in.)
Compression Ratio	11.8:1
Maximum Horsepower	104.5 kW (142 PS) @10 000 r/min (rpm) (SEA-B1,TH) 100.9 kW (137 PS) @9 800 r/min (rpm) (AU) 105 kW (143 PS) @10 000 r/min (rpm) (US, CA, CAL) ---
Maximum Torque	111.0 N·m (11.3 kgf·m, 82 ft·lb) @7 300 r/min (rpm) (SEA-B1,TH) 109.0 N·m (11.1 kgf·m, 80 ft·lb) @7 300 r/min (rpm) (AU) 111 N·m (11.3 kgf·m, 82 ft·lb) @7 300 r/min (rpm) (US, CA, CAL) ---
Fuel System	FI (Fuel injection), KEIHIN TTK 38 × 4
Fuel Type:	
Minimum Octane Rating:	
Research Octane number (RON)	95
Antiknock Index (RON + MON)/2	90
Starting System	Electric Starter
Ignition System	Battery and coil (transistorized)
Timing Advance	Electronically advanced (IC igniter in ECU)
Ignition Timing	10° BTDC @1 100 r/min (rpm) ~ 40.2° BTDC @5 200 r/min (rpm)
Spark Plug	NGK CR9EIA-9
Cylinder Numbering Method	Left to right, 1-2-3-4
Firing Order	1-2-4-3

General Specifications

Items	ZX1000WH ~ WJ
Valve Timing:	
Intake:	
Open	25° (BTDC)
Close	65° (ABDC)
Duration	270°
Exhaust:	
Open	58° (BBDC)
Close	18° (ATDC)
Duration	256°
Lubrication System	Forced lubrication (wet sump)
Engine Oil:	
Type	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2
Viscosity	SAE 10W-40
Capacity	4.0 L (4.2 US qt)
Drive Train	
Primary Reduction System:	
Type	Gear
Reduction Ratio	1.627 (83/51)
Clutch Type	Wet multi disc
Transmission:	
Type	6-speed, constant mesh, return shift
Gear Ratios:	
1st	2.600 (39/15)
2nd	1.950 (39/20)
3rd	1.600 (24/15)
4th	1.389 (25/18)
5th	1.238 (26/21)
6th	1.107 (31/28)
Final Drive System:	
Type	Chain drive
Reduction Ratio	2.733 (41/15)
Overall Drive Ratio	4.925 at Top gear
Frame	
Type	Tubular, diamond
Caster (Rake Angle)	24.5°
Trail	102 mm (4.02 in.)
Front Tire:	
Type	Tubeless
Size	120/70 ZR17 M/C (58W)
Rim Size	17M/C × MT3.50
Rear Tire:	
Type	Tubeless
Size	190/50 ZR17M/C (73W)
Rim Size	17M/C × MT6.00

General Specifications

Items	ZX1000WH ~ WJ
Front Suspension:	
Type	Telescopic fork (upside-down)
Wheel Travel	120 mm (4.72 in.)
Rear Suspension:	
Type	Swingarm
Wheel Travel	144 mm (5.67 in.)
Brake Type:	
Front	Dual discs
Rear	Single disc
Electrical Equipment	
Battery	12 V 8 Ah (10 HR)
Headlight:	
Type	Semi-sealed beam
High Beam	LED
Low Beam	LED
Brake/Tail Light	LED
Alternator:	
Type	Three-phase AC
Maximum Output	14 V - 24.3 A @5 000 r/min (rpm)

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

Unit Conversion Table

Prefixes for Units:

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

Units of Mass:

kg	×	2.205	=	lb
g	×	0.03527	=	oz

Units of Volume:

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

Units of Force:

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

Units of Length:

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

Units of Torque:

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

Units of Pressure:

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

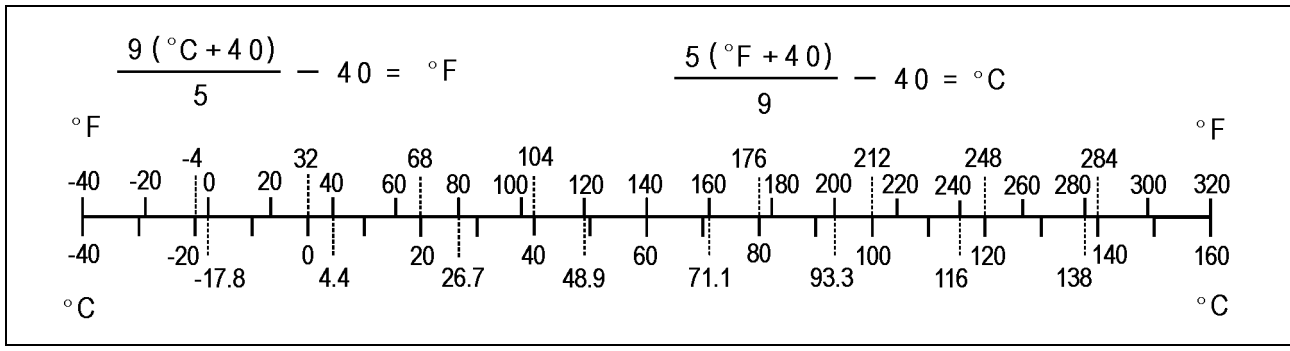
Units of Speed:

km/h	×	0.6214	=	mph

Units of Power:

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

Units of Temperature:



Periodic Maintenance

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Periodic Maintenance Chart

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

Periodic Inspection

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

Q: Inspection
: Change or Replace
: Lubrication

	Items	year (*A)	Odometer Reading (*B) × 1 000 km (× 1 000 mile) 1 (0.6)	6 (3.8)	12 (7.6)	18 (11.4)	24 (15.2)	See Page
Fuel System								
○	Air cleaner element (*C)							2-15
○	Idle speed		Q		Q		Q	2-16
○	Throttle control system (play, smooth return, no drag)	Q:1	Q		Q		Q	2-16
○	Engine vacuum synchronization				Q		Q	2-17
	Fuel system	Q:1	Q		Q		Q	2-20
	Fuel filter							2-21
	Fuel hose	:5						2-23
○	Evaporative emission control system (*D)		Q	Q	Q	Q	Q	2-24
Cooling System								
	Coolant level		Q		Q		Q	2-25
	Cooling system	Q:1	Q		Q		Q	2-26
	Coolant, water hose and O-ring	:3	: every 36 000 km (22 500 mile)					2-26, 2-29
Engine Top End								
○	Valve clearance (US and CA Models)						Q	2-30
	Valve clearance (Other than US and CA Models)		Q: every 42 000 km (26 250 mile)					2-30
○	Air suction system				Q		Q	2-35
Clutch								
	Clutch operation (play, engagement, disengagement)		Q		Q		Q	2-36
Engine Lubrication System								
	Engine oil (*C) and oil filter	:1						2-37, 2-38
Wheels and Tires								
	Tire air pressure	Q:1			Q		Q	2-38

2-4 PERIODIC MAINTENANCE

Periodic Maintenance Chart

	Items	year (*A)	Odometer Reading (*B) × 1 000 km (× 1 000 mile) 1 (0.6)	6 (3.8)	12 (7.6)	18 (11.4)	24 (15.2)	See Page
	Wheel and tire	Q:1			Q		Q	2-38
	Wheel bearing damage	Q:1			Q		Q	2-39
Final Drive								
	Drive chain lubrication condition (*C)		Q: every 600 km (400 mile)					2-40
	Drive chain slack (*C)		Q: every 1 000 km (600 mile)					2-41
	Drive chain wear (*C)				Q		Q	2-42
	Drive chain guide wear				Q		Q	2-42
Brakes								
	Brake system	Q:1	Q		Q		Q	2-43
	Brake operation (effectiveness, play, no drag)	Q:1	Q		Q		Q	2-44
	Brake fluid level	Q:1	Q		Q		Q	2-44
	Brake fluid (front and rear)	:2						2-45
	Brake hose	:4						2-46
	Rubber parts of brake master cylinder and caliper	:4	: every 48 000 km (30 000 mile)					2-50, 2-51
	Brake pad wear (*C)			Q	Q	Q	Q	2-54
	Brake light switch operation		Q	Q	Q	Q	Q	2-55
Suspension								
	Suspension system	Q:1			Q		Q	2-56
Steering								
	Steering play	Q:1	Q		Q		Q	2-57
	Steering stem bearing	:2						2-59
Electrical System								
	Electrical system	Q:1			Q		Q	2-60
○	Spark plug							2-65
Others								
	Chassis parts	:1						2-65
	Condition of bolts, nuts and fasteners		Q		Q		Q	2-66

Torque and Locking Agent

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

Letters used in the “Remarks” column mean:
AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque.
G: Apply grease.
L: Apply a non-permanent locking agent.
LG: Apply liquid gasket.
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.
2T: Apply 2-stroke oil.

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Fuel System (DFI)				
Air Cleaner Housing Assembly Screws	1.1	0.11	10 in·lb	
Throttle Body Assy Holder Clamp Bolts	3.0	0.31	27 in·lb	
Delivery Pipe Assy Mounting Screws	3.43	0.350	30 in·lb	
Air Cleaner Housing Plate Screws	1.1	0.11	10 in·lb	
Throttle Case Bolts	3.5	0.36	31 in·lb	
Air Cleaner Housing Clamp Bolts	2.0	0.20	18 in·lb	S
Oxygen Sensor	45	4.6	33	
Water Temperature Sensor	12	1.2	106 in·lb	
Vehicle-down Sensor Mounting Bolts	6.0	0.61	53 in·lb	
Intake Air Temperature Sensor Screw	1.2	0.12	11 in·lb	
Crankshaft Sensor Bolts	6.0	0.61	53 in·lb	
Fuel Pump Assembly Screws	0.98	0.10	8.7 in·lb	R
Fuel Pump Bolts	10	1.0	89 in·lb	L, S
IMU Mounting Bolts	6.5	0.66	58 in·lb	L
Cooling System				
Water Hose Clamp Screws	3.0	0.31	27 in·lb	
Fitting Bolt	9.0	0.92	80 in·lb	L
Thermostat Housing Bolts	6.0	0.61	53 in·lb	L
Heat Insulation Plate Bolts	7.0	0.71	62 in·lb	
Oil Cooler Bolts	12	1.2	106 in·lb	L
Water Pipe Bolts	12	1.2	106 in·lb	L
Water Pump Impeller Bolt	10	1.0	89 in·lb	
Water Pump Cover Bolts	11	1.1	97 in·lb	
Coolant Drain Bolt	11	1.1	97 in·lb	
Engine Top End				
Air Suction Valve Cover Bolts	10	1.0	89 in·lb	L
Spark Plugs	13	1.3	115 in·lb	
Cylinder Head Cover Bolts	10	1.0	89 in·lb	S
Camshaft Cap Bolts	12	1.2	106 in·lb	S

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Upper Camshaft Chain Guide Bolts	12	1.2	106 in·lb	S
Cylinder Head Bolts (M10) (First)	30	3.1	22	MO, S
Cylinder Head Bolts (M10) (Final)	54	5.5	40	MO, S
Cylinder Head Jacket Plugs	19.6	2.00	14.5	L
Cylinder Head Bolts (M6)	12	1.2	106 in·lb	S
Throttle Body Assy Holder Bolts	12	1.2	106 in·lb	L
Throttle Body Assy Holder Clamp Bolts	3.0	0.31	27 in·lb	
Camshaft Chain Tensioner Cap Bolt	20	2.0	15	
Camshaft Chain Tensioner Mounting Bolts	11	1.1	97 in·lb	
Camshaft Sprocket Bolts	15	1.5	11	L
Front Camshaft Chain Guide Bolt (Upper)	25	2.5	18	
Rear Camshaft Chain Guide Bolt	25	2.5	18	
Front Camshaft Chain Guide Bolt (Lower)	12	1.2	106 in·lb	
Muffler Body Mounting Bolts	35	3.6	26	
Exhaust Pipe Holder Nuts	20	2.0	15	
Oxygen Sensor	45	4.6	33	
Premuffler Chamber Mounting Bolt	35	3.6	26	
Muffler Body Clamp Bolts	21	2.1	15	
Premuffler Chamber Cover Bolts	10	1.0	89 in·lb	
Clutch				
Clutch Lever Clamp Bolts	7.8	0.80	69 in·lb	S
Clutch Spring Bolts	10	1.0	89 in·lb	
Clutch Hub Nut	135	13.8	100	R
Clutch Cover Bolts	12	1.2	106 in·lb	S
Oil Filler Plug	Hand-tighten	–	–	
Engine Lubrication System				
Oil Cooler Bolts	12	1.2	106 in·lb	L
Oil Filler Plug	Hand-tighten	-	-	
Oil Passage Plugs	20	2.0	15	L
Oil Passage Plug	10	1.0	89 in·lb	
Oil Pressure Switch	15	1.5	11	L
Oil Pressure Switch Terminal Bolt	2.0	0.20	18 in·lb	G
Oil Pressure Relief Valve	15	1.5	11	L
Oil Filter	17	1.7	13	G, R
Oil Filter Pipe	25	2.5	18	L
Engine Oil Drain Bolt	29	3.0	21	
Oil Pan Bolts	12	1.2	106 in·lb	S
Engine Removal/Installation				
Upper Engine Bracket Bolts	45	4.6	33	S
Lower Engine Bracket Bolts	60	6.1	44	S
Upper Adjusting Collar	5.0	0.51	44 in·lb	2T, S
Upper Adjusting Collar Locknut	50	5.1	37	S
Upper Engine Mounting Bolt (L = 65 mm)	45	4.6	33	S

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Lower Engine Mounting Nut	45	4.6	33	S
Lower Adjusting Collar Locknut	50	5.1	37	S
Middle Engine Mounting Nut	45	4.6	33	S
Middle Engine Bracket Bolts	25	2.5	18	L, S
Lower Adjusting Collar	10	1.0	89 in·lb	S
Upper Engine Mounting Bolt (L = 40 mm)	45	4.6	33	S
Crankshaft/Transmission				
Balancer Shaft Clamp Bolt	10	1.0	89 in·lb	
Balancer Shaft Clamp Lever Bolt	25	2.5	18	L
Connecting Rod Big End Nuts	see the text	←	←	MO
Breather Side Plate Bolt	6.0	0.61	53 in·lb	L
Breather Plate Bolts	10	1.0	89 in·lb	L
Starter Motor Clutch Bolts	12	1.2	106 in·lb	L
Oil Passage Plugs	20	2.0	15	L
Oil Passage Plug	10	1.0	89 in·lb	
Crankcase Bolts (M6)	12	1.2	106 in·lb	S
Crankcase Bolts (M7)	20	2.0	15	S
Crankcase Bolts (M8)	27	2.8	20	S
Crankcase Bolts (M9)	44	4.5	32	MO, S
Gear Positioning Lever Bolt	12	1.2	106 in·lb	
Shift Drum Bearing Holder Bolts	12	1.2	106 in·lb	L
Shift Drum Cam Holder Bolt	12	1.2	106 in·lb	L
Shift Shaft Return Spring Pin	39	4.0	29	L
Shift Pedal Mounting Bolt	25	2.5	18	G
Shift Lever Clamp Bolt	10	1.0	89 in·lb	L
Gear Position Sensor Bolt	10	1.0	89 in·lb	L
Wheels/Tires				
Front Axle Clamp Bolts	20	2.0	15	AL
Front Axle	110	11.2	81.1	G
Rear Axle Nut	100	10.2	73.8	
Final Drive				
Chain Guide Bolts	10	1.0	89 in·lb	L
Engine Sprocket Outer Cover Screws	0.70	0.07	6.2 in·lb	
Engine Sprocket Nut	147	15.0	108	MO
Rear Sprocket Nuts	60	6.1	44	R, S
Mud Guard Bolts	4.0	0.41	35 in·lb	L
Chain Cover Bolts	4.0	0.41	35 in·lb	L
Chain Adjuster Clamp Bolts	65	6.6	48	
Chain Guide Mounting Bolt	4.0	0.41	35 in·lb	
Brakes				
Front Brake Reservoir Bracket Bolt	8.8	0.90	78 in·lb	
Front Brake Reservoir Cap Stopper Screw	1.5	0.15	13 in·lb	
Brake Lever Pivot Bolt	1.0	0.10	8.9 in·lb	Si

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
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 Lever Pivot Bolt Locknut	5.9	0.60	52 in·lb	
Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
Front Wheel Rotation Sensor Bolt	25	2.5	18	
Brake Hose Banjo Bolts	25	2.5	18	
Brake Pipe Joint Nuts	18	1.8	13	
Bleed Valves	8.0	0.82	71 in·lb	
Front Brake Pad Pins	15	1.5	11	
Front Caliper Mounting Bolts	35	3.6	26	
Front Brake Disc Mounting Bolts	28	2.9	21	L, S
Mud Guard Bolt	4.0	0.41	35 in·lb	L
Rear Master Cylinder Mounting Bolts	25	2.5	18	
Rear Brake Reservoir Cap Stopper Screw	1.5	0.15	13 in·lb	
Brake Pedal Bolt	9.0	0.92	80 in·lb	L
Rear Master Cylinder Push Rod Locknut	17	1.7	13	
Rear Brake Disc Mounting Bolts	28	2.9	21	L, S
Rear Wheel Rotation Sensor Bolt	25	2.5	18	
Rear Caliper Mounting Bolts	25	2.5	18	
Suspension				
Upper Front Fork Clamp Bolts	20	2.0	15	
Lower Front Fork Clamp Bolts	25	2.5	18	AL
Front Fork Top Plugs	34	3.5	25	
Piston Rod Nuts	20	2.0	15	
Front Axle Clamp Bolts	20	2.0	15	AL
Right Front Fork Bottom Allen Bolt	35	3.6	26	
Left Front Fork Bottom Allen Bolt	20	2.0	15	
Upper Rear Shock Absorber Bolt	35	3.6	26	
Swingarm Pivot Shaft Nut	110	11.2	81.1	
Swingarm Pivot Shaft	20	2.0	15	
Swingarm Pivot Adjusting Collar Locknut	100	10.2	73.8	
Tie-rod Nuts	35	3.6	26	R
Lower Rear Shock Absorber Nut	35	3.6	26	R
Rocker Arm Nut	35	3.6	26	R
Torque Link Nuts	35	3.6	26	
Steering				
Right Switch Housing Screws	3.5	0.36	31 in·lb	
Throttle Case Bolts	3.5	0.36	31 in·lb	
Handlebar Holder Positioning Bolts	10	1.0	89 in·lb	L
Handlebar Holder Clamp Bolts	25	2.5	18	
Handlebar Bolts	35	3.6	26	L
Upper Front Fork Clamp Bolts	20	2.0	15	
Steering Stem Head Bolt	110	11.2	81.1	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Left Switch Housing Screws	3.5	0.36	31 in·lb	
Steering Stem Nut	30	3.1	22	
Lower Front Fork Clamp Bolts	25	2.5	18	AL
Frame				
Windshield Bracket Cover Bolts	0.50	0.05	4.4 in·lb	
Lower Fairing Bolts (Front)	0.50	0.05	4.4 in·lb	
Meter Cover Bolt (L = 16 mm)	3.0	0.31	27 in·lb	
Meter Cover Bolts (L = 20 mm)	0.50	0.05	4.4 in·lb	
Socket Cover Screw	1.2	0.12	11 in·lb	
Windshield Bolts	0.40	0.04	3.5 in·lb	
Stay Assembly Mounting Bolts	6.9	0.70	61 in·lb	
Stopper Mounting Bolts	4.2	0.43	37 in·lb	
Upper Fairing Bolts	0.50	0.05	4.4 in·lb	
Windshield Bracket Assembly Mounting Bolts	25	2.5	18	
Front Fender Mounting Bolts	4.0	0.41	35 in·lb	
Left Lower Side Fairing Mounting Bolts	3.0	0.31	27 in·lb	
Middle Fairing Bolt	0.50	0.05	4.4 in·lb	
Lower Fairing Bolts (Rear)	3.0	0.31	27 in·lb	
Lower Fairing Assembly Screws	1.2	0.12	11 in·lb	
Side Cover Bolts (Front)	0.50	0.05	4.4 in·lb	
Side Cover Bolts (Rear)	3.0	0.31	27 in·lb	
Rear Frame Bracket Bolts	45	4.6	33	
Front Footpeg Bracket Bolts	25	2.5	18	
Front Footpeg Sub Bracket Bolts	25	2.5	18	
Step Mounting Screws	3.0	0.31	27 in·lb	L
Side Stand Switch Bolt	9.0	0.92	80 in·lb	L
Side Stand Bracket Bolts	50	5.1	37	L
Side Stand Bolt	30	3.1	22	S
Side Stand Nut	45	4.6	33	R, S
Rear Footpeg Bracket Bolts	25	2.5	18	
Rear Frame Bolts	25	2.5	18	L
Seat Cover Bolts	0.50	0.05	4.4 in·lb	
Battery Case Bolts (Front)	4.0	0.41	35 in·lb	
Battery Case Bolts (Rear)	1.0	0.10	8.9 in·lb	
Connector Bracket Screw	1.2	0.12	11 in·lb	
Grab Rail Mounting Bolts (L = 20 mm)	25	2.5	18	
Flap Mounting Screws	1.2	0.12	11 in·lb	
Grab Rail Mounting Bolts (L = 60 mm)	25	2.5	18	
Mud Guard Bolts	4.0	0.41	35 in·lb	L
Chain Cover Bolts	4.0	0.41	35 in·lb	L
Flap Screws	1.2	0.12	11 in·lb	
License Plate Bracket Mounting Bolts	4.0	0.41	35 in·lb	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Reflector Nut	3.0	0.31	27 in·lb	
Grab Rail Mounting Bolt (L = 100) (IN (with Saree Guard equipped model))	25	2.5	18	L, S
Electrical System				
Headlight Screws	1.2	0.12	11 in·lb	
Meter Unit Mounting Screws	1.2	0.12	11 in·lb	
Tail/Brake Light Mounting Bolts	0.50	0.05	4.4 in·lb	
Front Turn Signal Light Screws	1.2	0.12	11 in·lb	
License Plate Light Mounting Screws	1.2	0.12	11 in·lb	
Turn Signal Light Lens Screw	1.0	0.10	8.9 in·lb	
Rear Turn Signal Light Mounting Screws	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	
Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
Oil Pressure Switch	15	1.5	11	LG
Oil Pressure Switch Terminal Bolt	2.0	0.20	18 in·lb	G
Gear Position Sensor Bolt	10	1.0	89 in·lb	L
Regulator/Rectifier Bolts	9.8	1.0	87 in·lb	
Timing Rotor Bolt	39	4.0	29	
Alternator Cover Bolts	12	1.2	106 in·lb	
Alternator Lead Holding Plate Bolt	12	1.2	106 in·lb	L
Stator Coil Bolts	12	1.2	106 in·lb	L
Alternator Rotor Bolt	155	15.8	114	
Starter Motor Clutch Bolts	12	1.2	106 in·lb	L
Starter Motor Mounting Bolts	10	1.0	89 in·lb	
Starter Motor Cable Terminal Nut	6.0	0.61	53 in·lb	
Starter Motor Terminal Locknut	11	1.1	97 in·lb	
Brush Holder Screw	3.8	0.39	34 in·lb	
Starter Motor Through Bolts	5.0	0.51	44 in·lb	
Starter Relay Terminal Bolts	5.1	0.52	45 in·lb	
Crankshaft Sensor Bolts	6.0	0.61	53 in·lb	
Crankshaft Sensor Cover Bolts	12	1.2	106 in·lb	L (1)
Water Temperature Sensor	12	1.2	106 in·lb	
Oxygen Sensor	45	4.6	33	
Engine Ground Cable Terminal Bolt	10	1.0	89 in·lb	
ECU Guard Bolts (EUR Model)	4.0	0.41	35 in·lb	L, R
ECU Guard Bracket Screw (EUR Model)	1.2	0.12	11 in·lb	

Torque and Locking Agent

The tables below, relating tightening torque to thread diameter, lists the basic torque for the bolts, nuts and screws. Use these tables for the bolts, nuts and screws which are not specified the tightening torque particularly on the previous pages. All of the values are for use with dry solvent-cleaned threads.

Basic Torque for General Fasteners

For Bolts and Nuts

Threads Diameter (mm)	Torque		
	N·m	kgf·m	ft·lb
5	4.5	0.46	40 in·lb
6	8.0	0.82	71 in·lb
8	20	2.0	15
10	35	3.6	26
12	60	6.1	44

For Screws, Plastic Part Tightening Portions and Plastic Washer Tightening Portions

Threads Diameter (mm)	Torque		
	N·m	kgf·m	ft·lb
4	1.2	0.12	11 in·lb
5	3.0	0.31	27 in·lb
6	4.0	0.41	35 in·lb

For Self-Tapping Screws

Threads Diameter (mm)	Torque		
	N·m	kgf·m	ft·lb
All	1.2	0.12	11 in·lb

For Wellnuts

Threads Diameter (mm)	Torque		
	N·m	kgf·m	ft·lb
4	0.2	0.02	1.8 in·lb
5	0.5	0.05	4.4 in·lb
6	1.0	0.10	8.9 in·lb

Specifications

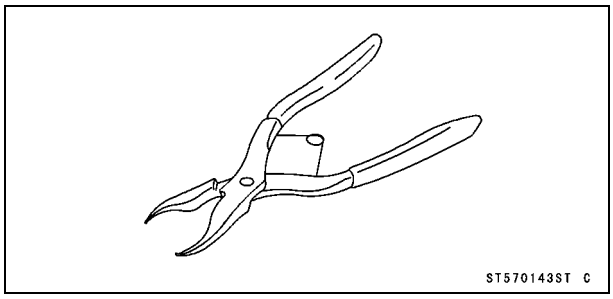
Item	Standard	Service Limit
Fuel System (DFI)		
Throttle Grip Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	– – –
Idle Speed	1 100 ±50 r/min (rpm)	– – –
Throttle Body Vacuum	40.7 ±1.3 kPa (305 ±10 mmHg) at idle speed	– – –
Bypass Screws (Turn Out)	0 ~ 2 1/2 (for reference)	– – –
Air Cleaner Element	Viscous paper element	– – –
Cooling System		
Coolant:		
Type (Recommended)	Permanent type of antifreeze	– – –
Color	Green	– – –
Mixed Ratio	Soft water 50%, coolant 50%	– – –
Freezing Point	–35°C (–31°F)	– – –
Total Amount	2.9 L (3.1 US qt)	– – –
Engine Top End		
Valve Clearance:		
Exhaust	0.22 ~ 0.31 mm (0.0087 ~ 0.0122 in.)	– – –
Intake	0.13 ~ 0.22 mm (0.0051 ~ 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	3.2 L (3.4 US qt) (when filter is not removed)	– – –
	3.8 L (4.0 US qt) (when filter is removed)	– – –
	4.0 L (4.2 US qt) (when engine is completely dry)	– – –
Level	Between upper and lower level lines (Wait several 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	5.8 mm (0.23 in.)	Up to 130 km/h (80 mph): 2 mm (0.08 in.), Over 130 km/h (80 mph): 3 mm (0.12 in.)
Air Pressure (when Cold):		
Front	Up to 195 kg (430 lb) load: 250 kPa (2.50 kgf/cm², 36 psi)	– – –
Rear	Up to 195 kg (430 lb) load: 290 kPa (2.90 kgf/cm², 42 psi)	– – –

Specifications

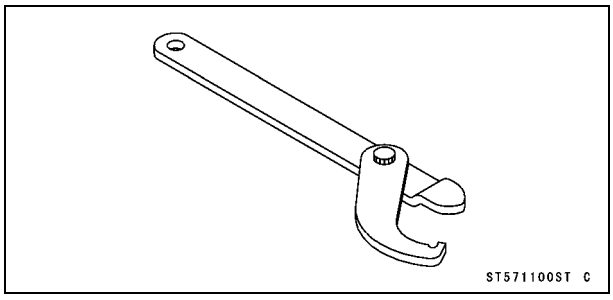
Item	Standard	Service Limit
Final Drive		
Drive Chain Slack	20 ~ 30 mm (0.8 ~ 1.2 in.)	– – –
Drive Chain Wear (20-link Length)	317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)	319 mm (12.6 in.)
Standard Chain:		
Make	ENUMA	– – –
Type	EK525ZX	– – –
Link	112 links	– – –
Brakes		
Brake Fluid:		
Grade	DOT4	– – –
Brake Pad Lining Thickness:		
Front	4.0 mm (0.16 in.)	1 mm (0.04 in.)
Rear	5.0 mm (0.20 in.)	1 mm (0.04 in.)
Brake Light Timing:		
Front	Pulled ON	– – –
Rear	ON after about 10 mm (0.39 in.) of pedal travel	– – –
Electrical System		
Spark Plug:		
Type	NGK CR9EIA-9	– – –
Gap	0.8 ~ 0.9 mm (0.031 ~ 0.035 in.)	– – –

Special Tools

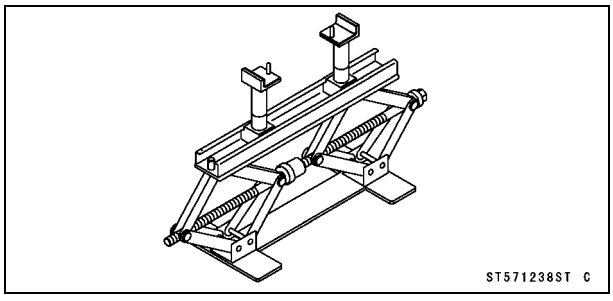
Inside Circlip Pliers:
57001-143



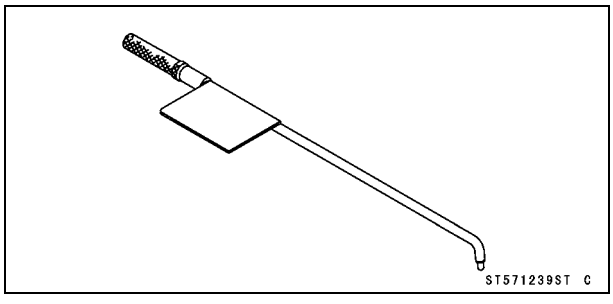
Steering Stem Nut Wrench:
57001-1100



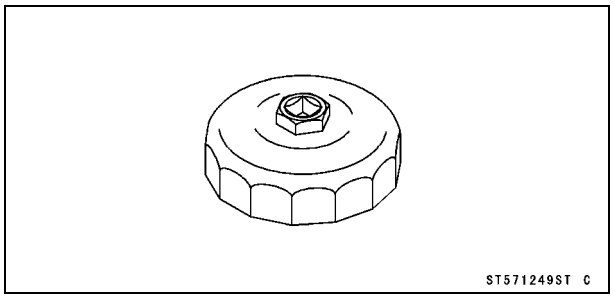
Jack:
57001-1238



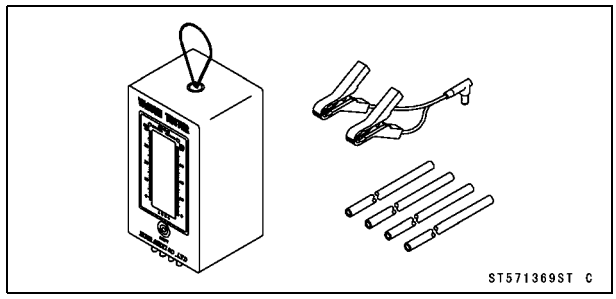
Pilot Screw Adjuster, A:
57001-1239



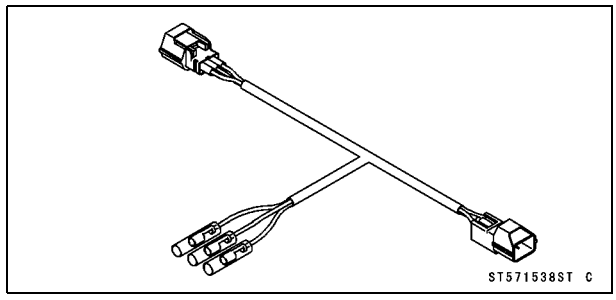
Oil Filter Wrench:
57001-1249



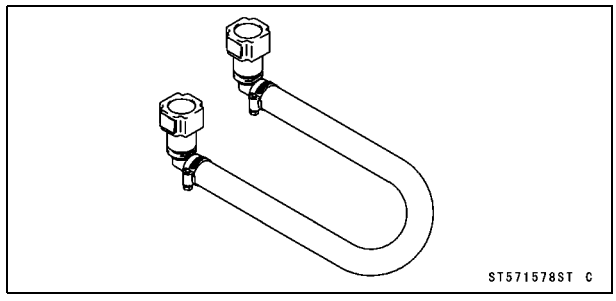
Vacuum Gauge:
57001-1369



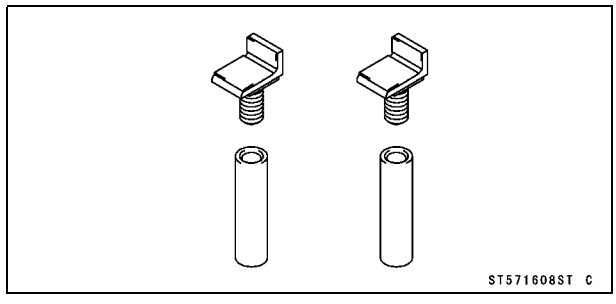
Throttle Sensor Setting Adapter:
57001-1538



Extension Tube:
57001-1578



Jack Attachment:
57001-1608



Periodic Maintenance Procedures

Fuel System (DFI)

Air Cleaner Element Replacement

NOTE

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

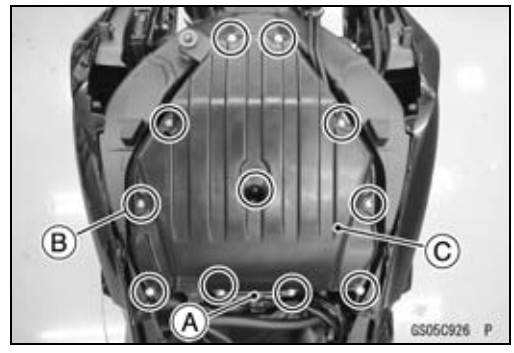
⚠ WARNING

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

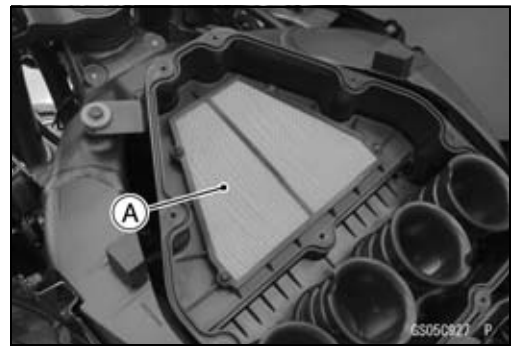
NOTICE

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

● Remove:
Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
Connector Bracket [A]
Air Cleaner Housing Assembly Screws [B]
Upper Air Cleaner Housing [C]



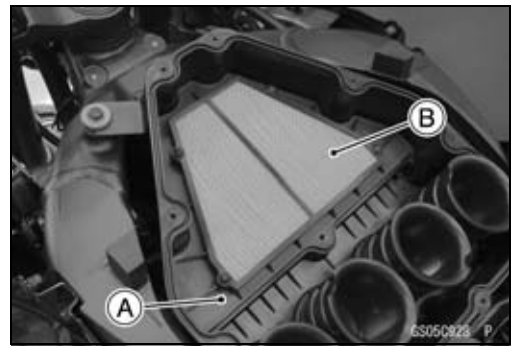
● Discard the air cleaner element [A].



● Install a new element [A] so that the screen side [B] faces upward.
● Install:
Upper Air Cleaner Housing
● Tighten:

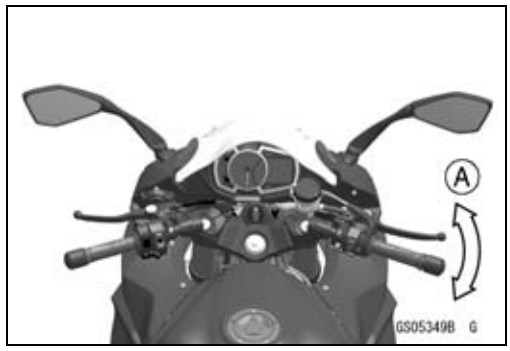
Torque - Air Cleaner Housing Assembly Screws: 1.1 N·m (0.11 kgf·m, 10 in·lb)

● Install:
Fuel Tank (see Fuel Tank Installation in the Fuel System (DFI) chapter)



Periodic Maintenance Procedures

Idle Speed Inspection



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

★If handlebars 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

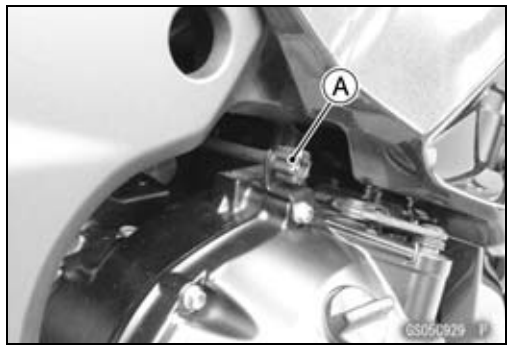
Operation with improperly adjusted, incorrectly routed or damaged cables could result in an unsafe riding condition. Follow the service manual to be make sure to correct any of these conditions.

- Check the idle speed.

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

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

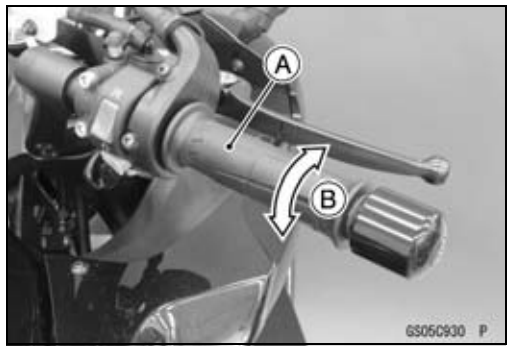
Idle Speed Adjustment



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

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

Throttle Control System Inspection

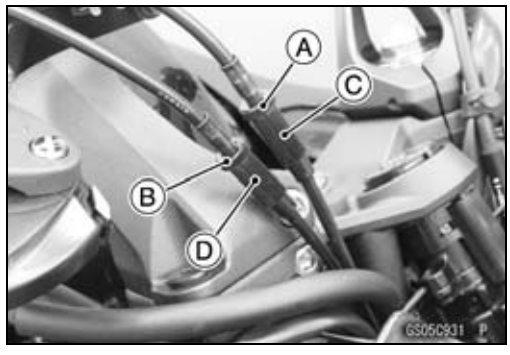


- Check that the throttle grip [A] moves smoothly from full open to close, and the throttle closes quickly and completely by the return spring in all steering positions.

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

- Check the throttle grip free play [B].

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



★If the free play is incorrect, 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 there is no play when the throttle grip play 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.

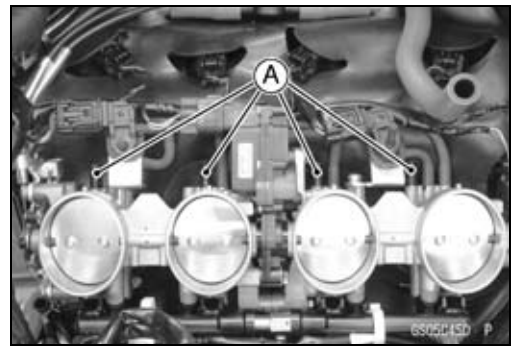
Periodic Maintenance Procedures

Engine Vacuum Synchronization Inspection

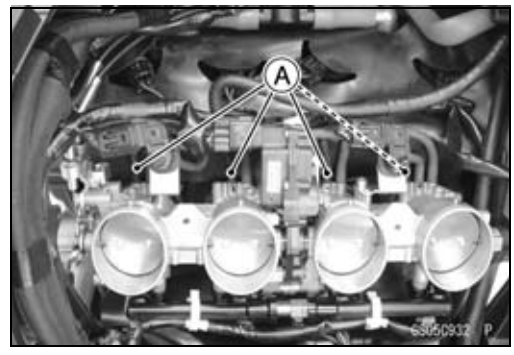
NOTE

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

- Situate the motorcycle so that it is vertical.
- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter)
  Fuel Hose (see Fuel Hose Replacement)
- For the US and CA models, pull off the rubber caps [A] from the fittings of each throttle body.



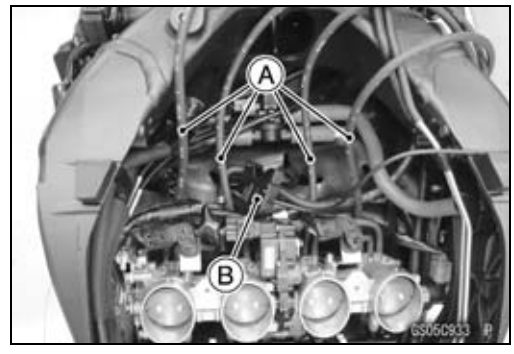
- For other than the US and CA models, disconnect the vacuum hoses [A].



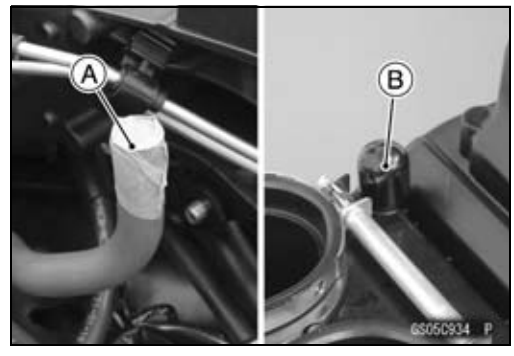
- Connect a vacuum gauge and hoses [A] (Special Tool: 57001-1369) to the fittings on the throttle body.

  Special Tool - Vacuum Gauge: 57001-1369

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



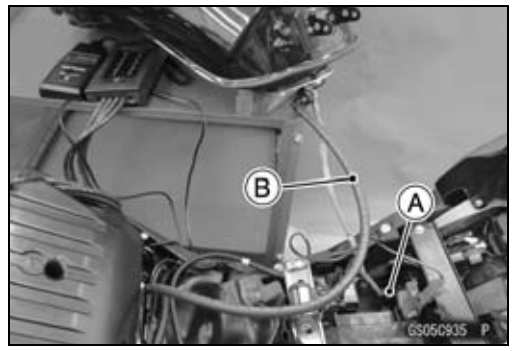
- Plug the air switching valve hose end [A] and air cleaner housing fitting [B].



Periodic Maintenance Procedures

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

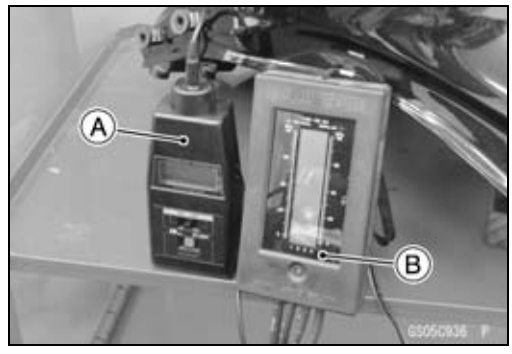
Special Tool - Extension Tube: 57001-1578



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

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

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



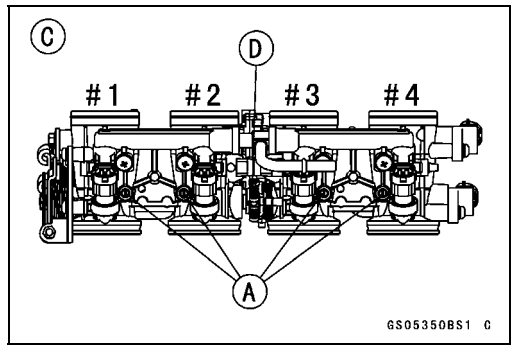
NOTICE
Do not measure the idle speed by the tachometer of the meter unit.

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

Throttle Body Vacuum
Standard: 40.7 ±1.3 kPa (305 ±10 mmHg) at idle speed

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

Special Tool - Pilot Screw Adjuster, A [B]: 57001-1239



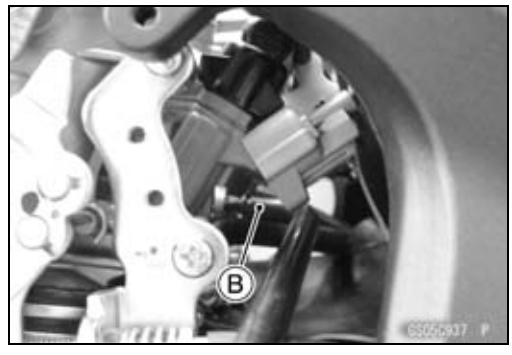
NOTE

○*In this drawing [C], the throttle body assy has been removed for clarity.*

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

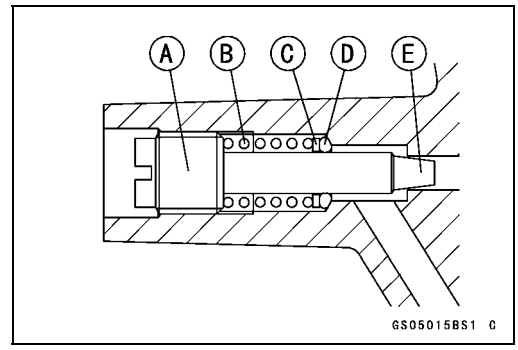
NOTE

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



● Check the vacuums as before.
★If all vacuums are within the specification range, finish the engine vacuum synchronization.
★If any vacuum can not be adjusted within the specification, replace the bypass screws #1 ~ #4 with new ones, refer to the following procedure.

Periodic Maintenance Procedures



- Remove the throttle body assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter).
- Turn in the bypass screw [A] with counting the number of turns until it 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.

- 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 assy 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 Fuel System (DFI) chapter).

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538

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

Standard: DC 1.02 ~ 1.06 V at idle throttle opening

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

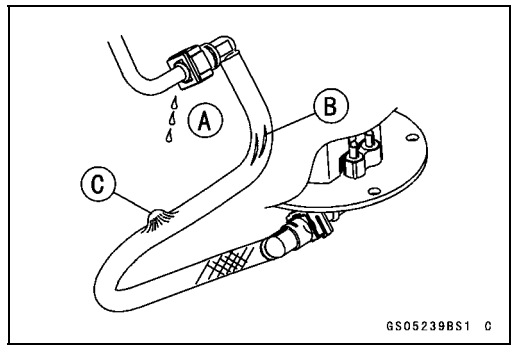
Periodic Maintenance Procedures

● Disconnect the vacuum gauge hoses.
● For the US and CA models, install the rubber caps to each throttle body.
● For other than the US and CA models, connect the vacuum hoses.
○Run the vacuum hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.
● Install the removed parts (see appropriate chapters).

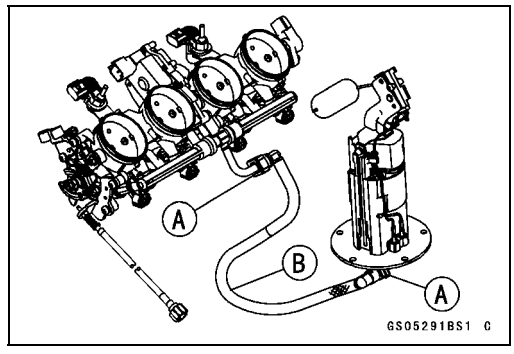
Fuel System Inspection

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



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

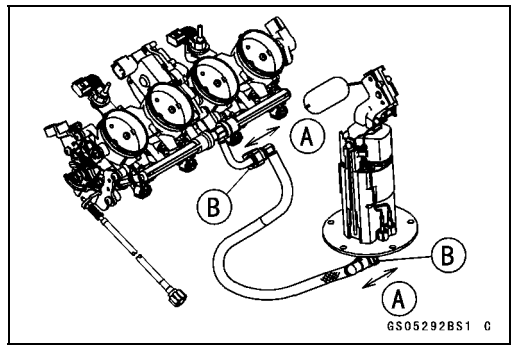


● Check that the fuel hose joints are securely connected.
○Push and pull [A] the fuel hose joint [B] back and forth more than two times, and make sure it is locked.

⚠ WARNING

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

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



Periodic Maintenance Procedures

Fuel Filter Replacement

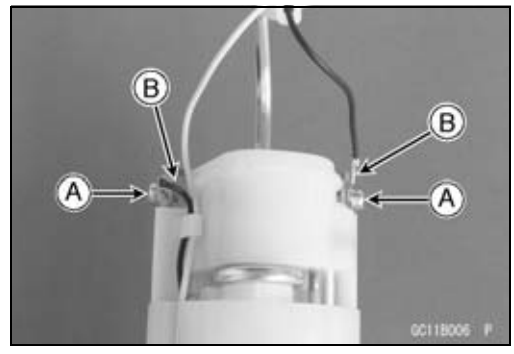
⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Disconnect the battery (–) terminal. To avoid fuel spills, draw it from the tank when the engine is cold. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

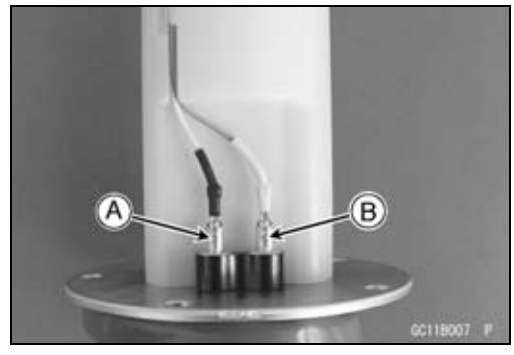
NOTICE

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

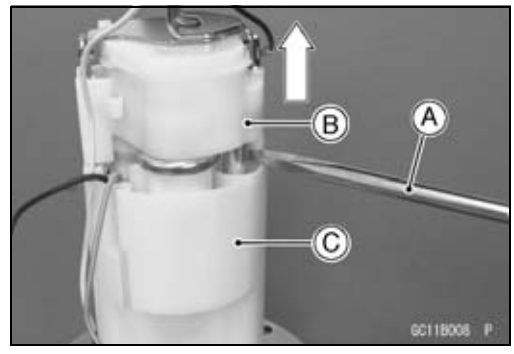
- Remove:
  Fuel Pump (see Fuel Pump Removal in the Fuel System (DFI) chapter)
  Fuel Pump Assembly Screws [A]
  Lead Terminals [B]



- Disconnect:
  Lead Connector (Yellow) [A]
  Lead Connector (Light Blue) [B]

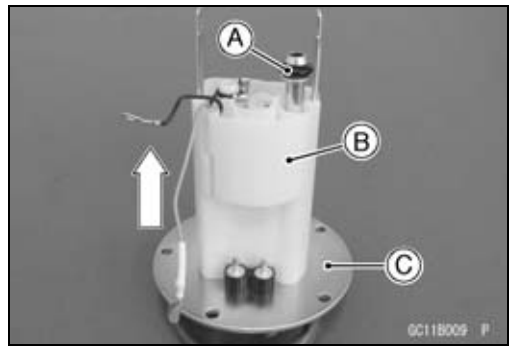


- Using the flat tip screwdriver [A], remove the fuel pump case [B] from the fuel pump body [C].

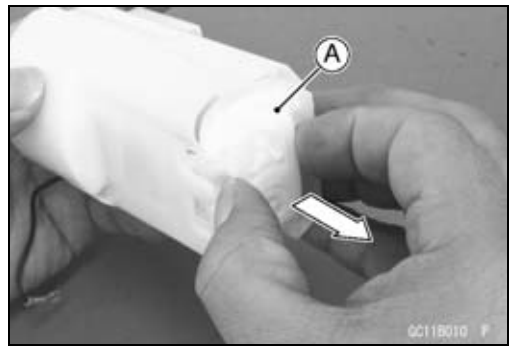


Periodic Maintenance Procedures

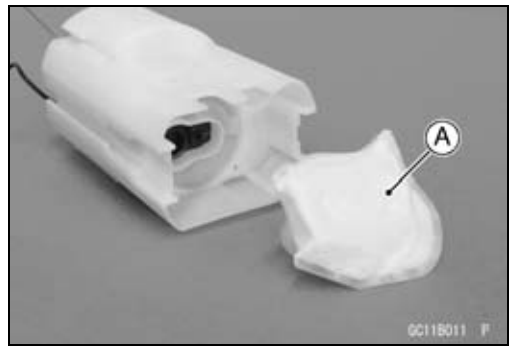
- Remove the O-ring [A].
- Remove the fuel pump body [B] from the installation plate [C].



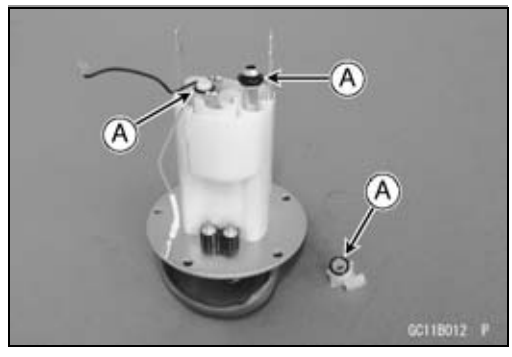
- Remove the fuel filter [A].

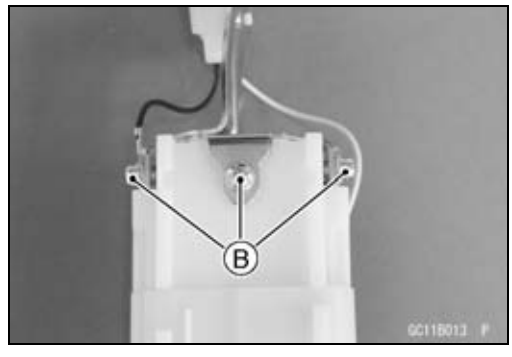


- Replace the fuel filter [A] with a new one, and install it.



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

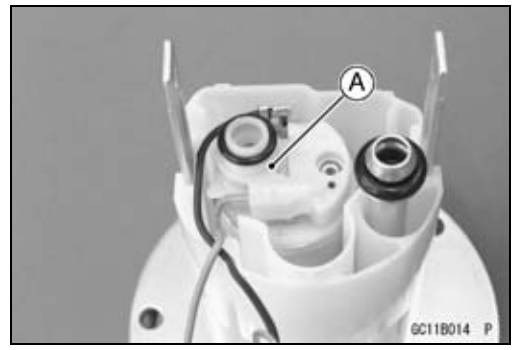




Periodic Maintenance Procedures

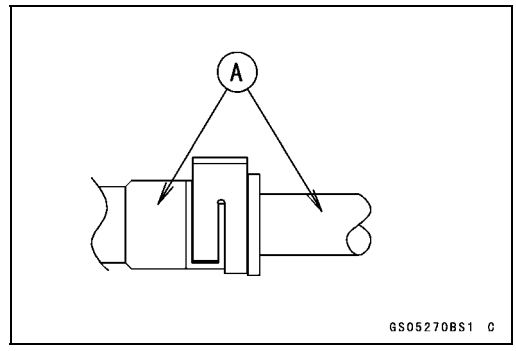
- Install the removed parts in the reverse procedure.
- Install the cap [A] so that the light blue lead terminal is covered as shown.
- Tighten:

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



Fuel Hose Replacement

- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Remove the connector bracket from the air cleaner housing.
- Disconnect the intake air temperature sensor lead connector.
- Be sure to place a piece of cloth around the fuel hose joint.
- Wipe off the dirt of the surface [A] around the connection using a cloth or a soft brush.

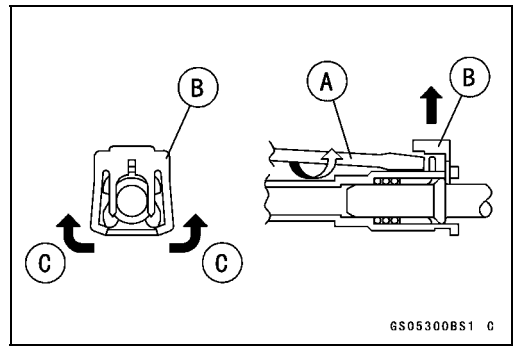


When removing with flat tip screwdriver

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

When removing with fingers

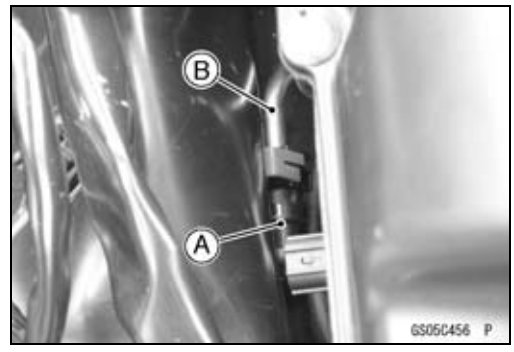
- Open and push up [C] the joint lock with your fingers.



NOTICE

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

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



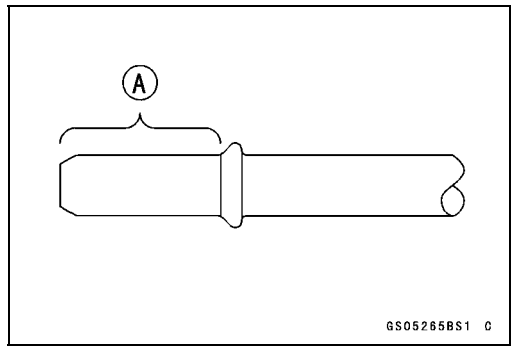
⚠ WARNING

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

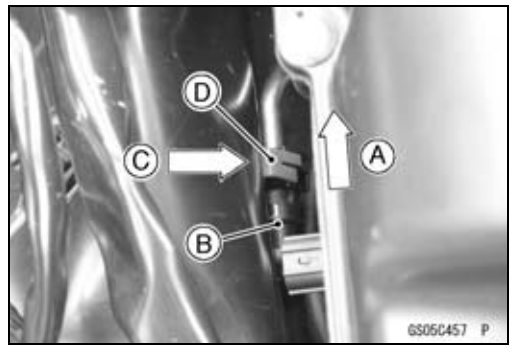
- Clean the delivery pipe.
- Cover the delivery pipe with the vinyl bag to keep it clean.

Periodic Maintenance Procedures

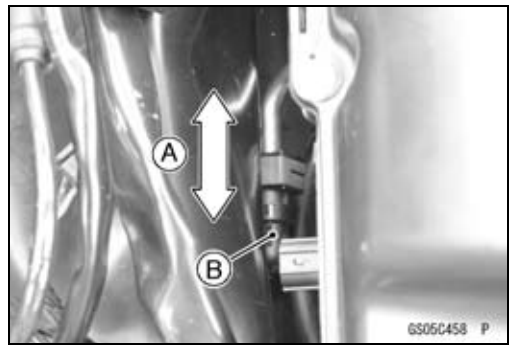
- Remove the vinyl bag on the pipe.
- Check that there are no flaws, burrs, and adhesion of foreign materials on the delivery pipe [A].



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



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



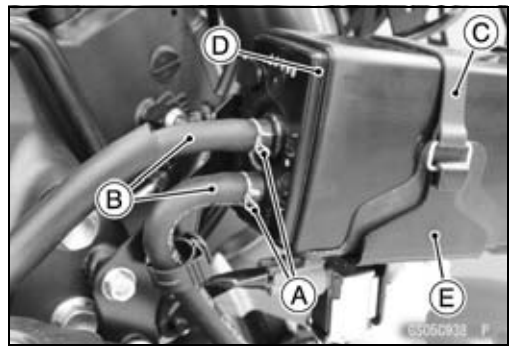
⚠ WARNING

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

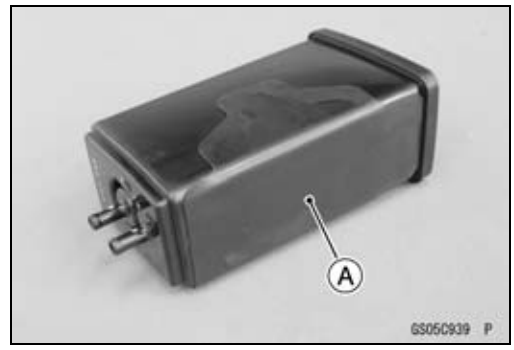
★If it comes off, reinstall the hose joint.
- Install the removed parts (see appropriate chapters).
- Start the engine and check the fuel hose for leaks.

Evaporative Emission Control System Inspection (Other than US and CA Models)

- Inspect the canister as follows.
- Remove the right lower fairing (see Lower Fairing Removal in the Frame chapter).
- Slide the clamps [A] and disconnect the hoses [B].
- Remove the band [C].
- Remove the canister [D] from the bracket [E].



Periodic Maintenance Procedures



● Visually inspect the canister [A] for cracks or other damage.
★If the canister has any cracks or bad damage, replace it with a new one.

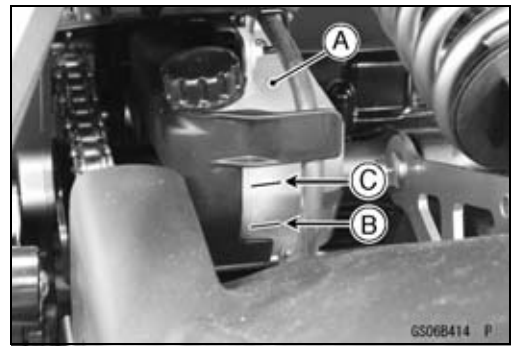
NOTE

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

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

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 side stand).
★If the coolant level is lower than the "L" level line [B], unscrew the reserve tank cap and add coolant to the "F" level line [C].
"L": Low
"F": Full

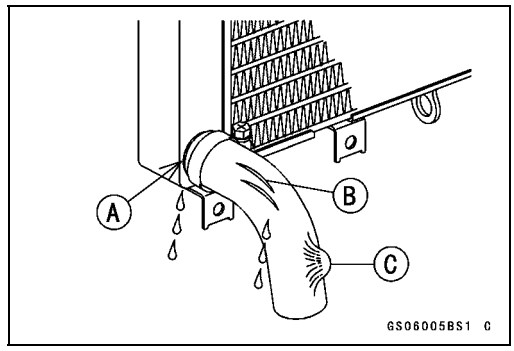
NOTICE

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.

Periodic Maintenance Procedures

Cooling System Inspection

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



○The high pressure inside the water hose can cause coolant to leak [A] or the hose to burst if the line is not properly maintained.

● Visually inspect the hoses for signs of deterioration. Squeeze the hoses. A hose should not be hard and brittle, nor should it be soft or swollen.

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

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

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

Coolant Change

⚠ WARNING

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

● Remove:
Lower Fairings (see Lower Fairing 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.

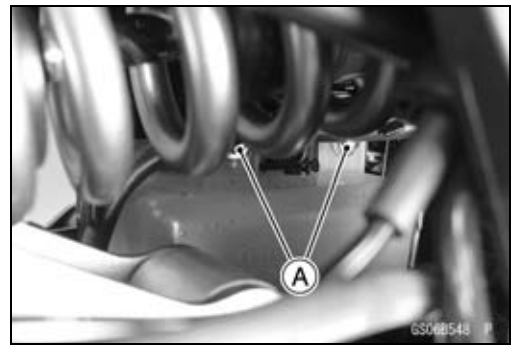
● Place a container under the drain bolt [A] of the water pump cover.

● Drain the coolant from the radiator by removing the drain bolt.



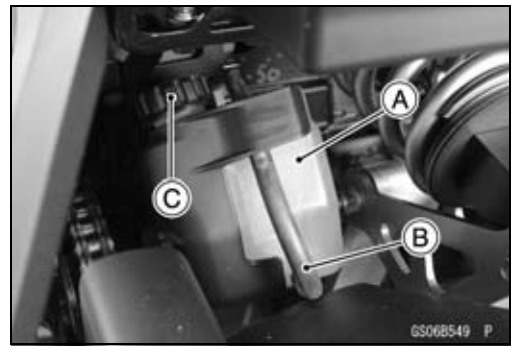
Periodic Maintenance Procedures

● Remove:
Coolant Reserve Tank Cover Bolts [A]
Collars



● Pull up the coolant reserve tank [A].
● Disconnect the radiator overflow hose [B].
● Remove the cap [C].
● Pour the coolant into a container.
● Install:
Radiator Overflow Hose
Coolant Reserve Tank
Collars
● Apply a non-permanent locking agent to the threads of the coolant reserve tank cover bolts and tighten them.
● Tighten the drain bolt with new gasket.

Torque - Coolant Drain Bolt: 11 N·m (1.1 kgf·m, 97 in·lb)



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

NOTICE

Soft or distilled water must be used with the 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:	**2.9 L (3.1 US qt)**

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

NOTE

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

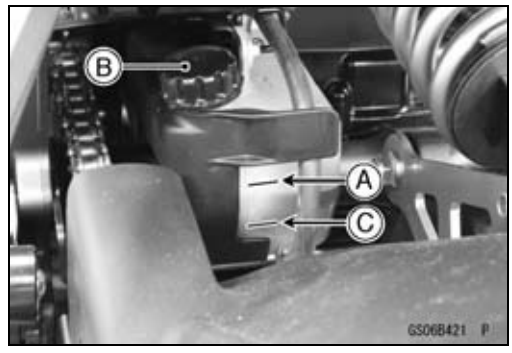
● Check the cooling system for leaks.
● Tap the water hoses to force any air bubbles caught inside.



Periodic Maintenance Procedures

- Fill the reserve tank up to the “F” (full) level line [A] with coolant and install the cap [B].
- 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” (low) level line [C], add coolant to the “F” level line.



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

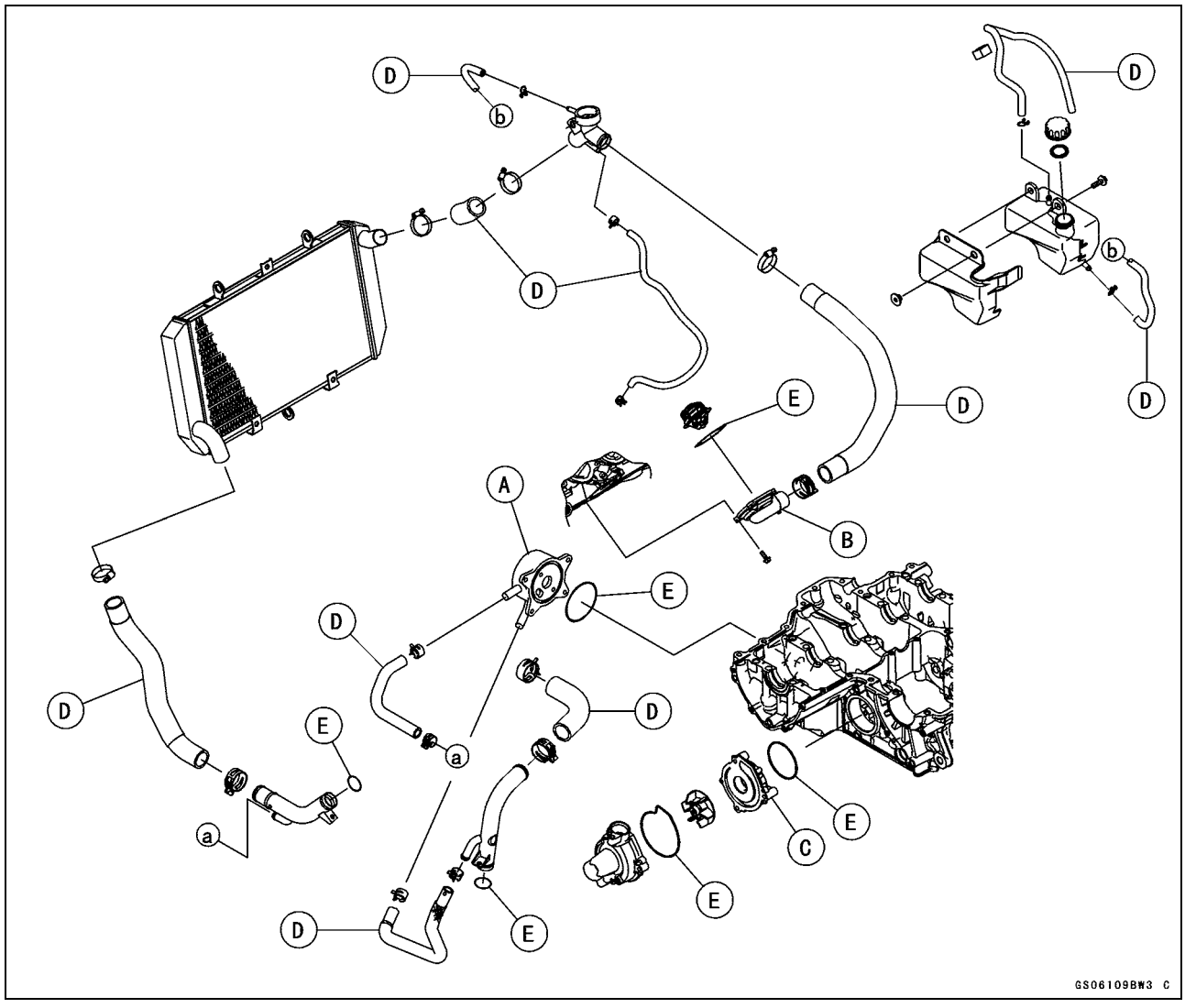
Periodic Maintenance Procedures

Water Hose and O-ring Replacement

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

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

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



Periodic Maintenance Procedures

Engine Top End

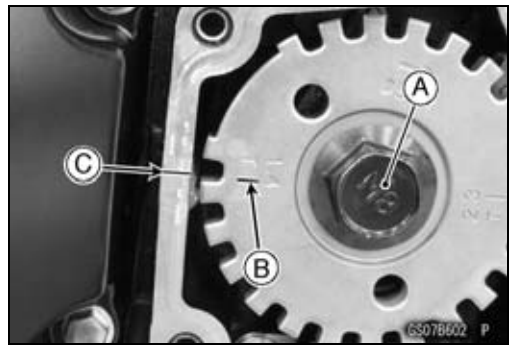
Valve Clearance Inspection

NOTE

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

● Remove:
Cylinder Head Cover (see Cylinder Head Cover Removal in the Engine Top End chapter)
Crankshaft Sensor Cover (see Crankshaft Sensor Removal in the Electrical System chapter)

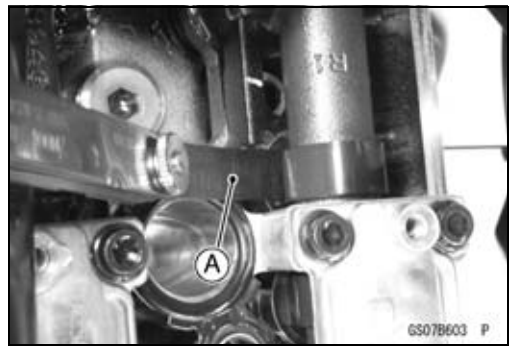
● Using a wrench on the timing rotor bolt [A], turn the crankshaft clockwise until the line [B] (TDC mark for #1,4 pistons) on the timing rotor is aligned with the mating surface [C] of the crankcase.



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

Valve Clearance
Standard:

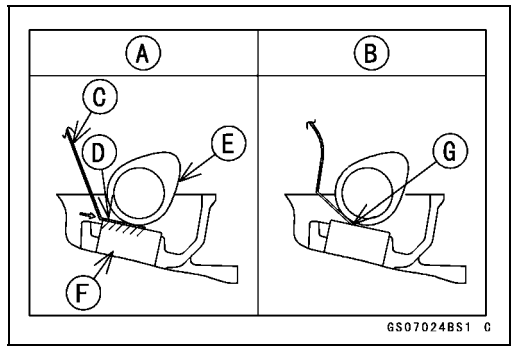
Exhaust	**0.22 ~ 0.31 mm (0.0087 ~ 0.0122 in.)**
Intake	**0.13 ~ 0.22 mm (0.0051 ~ 0.0087 in.)**



NOTE

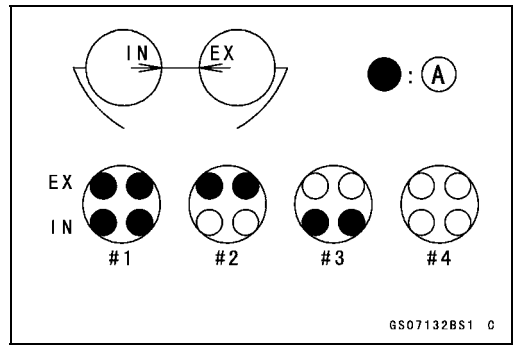
○*Thickness gauge is horizontally inserted on the valve lifter.*

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

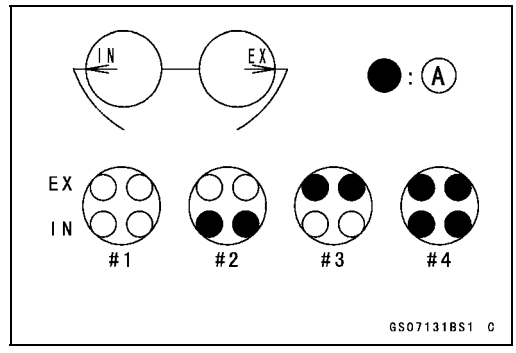


Periodic Maintenance Procedures

○**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]



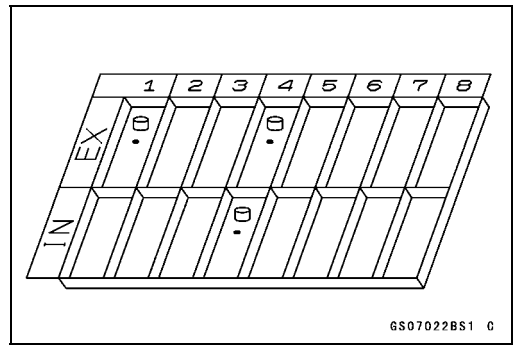
★If the valve clearance is not within the specified range, first record the clearance, and then adjust it.

Valve Clearance Adjustment

● To change the valve clearance, remove the camshaft chain tensioner, camshafts 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.*



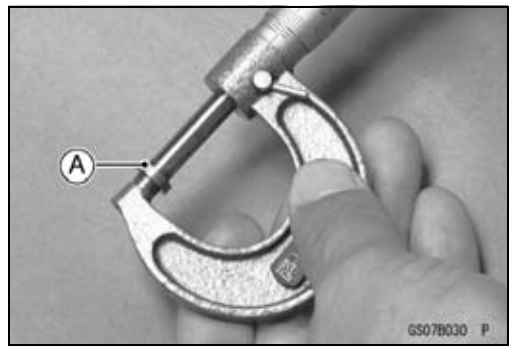
Periodic Maintenance Procedures

○Besides the standard shims in the valve clearance adjustment charts, the following shims may be installed at the factory. Although they are not available as spare parts, they can be used to adjust valve clearance.

Adjustment Shims

Thickness
2.675 mm
2.725 mm
2.775 mm
2.825 mm
2.875 mm
2.925 mm
2.975 mm
3.025 mm
3.075 mm
3.125 mm
3.175 mm
3.225 mm
3.275 mm
3.325 mm

- Clean the shim to remove any dust or oil.
- Measure the thickness of the removed shim [A].



Periodic Maintenance Procedures

VALVE CLEARANCE ADJUSTMENT CHART INTAKE VALVE

	PRESENT SHIM (Example ↓)																					
PART No. (92180-)	1014	1016	1018	1020	1022	1024	1026	1028	1030	1032	1034	1036	1038	1040	1042	1044	1046	1048	1050	1052	1054
MARK	50	55	60	65	70	75	80	85	90	95	00	05	10	15	20	25	30	35	40	45	50
THICKNESS (mm)	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50
VALVE CLEARANCE MEASUREMENT (Example →)																					
0.00～0.02	–	–	–	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35
0.03～0.07	–	–	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40
0.08～0.12	–	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45
0.13～0.22	SPECIFIED CLEARANCE/NO CHANGE REQUIRED																				
0.23～0.24	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	
0.25～0.29	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50		
0.30～0.34	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50			
0.35～0.39	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50				
0.40～0.44	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50					
0.45～0.49	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50						
0.50～0.54	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50							
0.55～0.59	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50								
0.60～0.64	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50									
0.65～0.69	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50										
0.70～0.74	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50											
0.75～0.79	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50												
0.80～0.84	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50													
0.85～0.89	3.20	3.25	3.30	3.35	3.40	3.45	3.50														
0.90～0.94	3.25	3.30	3.35	3.40	3.45	3.50															
0.95～0.99	3.30	3.35	3.40	3.45	3.50																
1.00～1.04	3.35	3.40	3.45	3.50																	
1.05～1.09	3.40	3.45	3.50																		
1.10～1.14	3.45	3.50																			
1.15～1.19	3.50																				

INSTALL THE SHIM OF THIS THICKNESS (mm)

GS07257B S

1. Measure the clearance (when engine is cold).
2. Check present shim size.
3. Match clearance in vertical column with present shim size in horizontal column.
4. Install the shim specified where the lines intersect. This shim will give the proper clearance.

Example: Present shim is **2.95 mm**
Measured clearance is **0.45 mm**
Replace **2.95 mm** shim with **3.25 mm** shim.

5. Remeasure the valve clearance and readjust if necessary.

Periodic Maintenance Procedures

VALVE CLEARANCE ADJUSTMENT CHART EXHAUST VALVE

	PRESENT SHIM									↓Example											
PART No. (92180-)	1014	1016	1018	1020	1022	1024	1026	1028	1030	1032	1034	1036	1038	1040	1042	1044	1046	1048	1050	1052	1054
MARK	50	55	60	65	70	75	80	85	90	95	00	05	10	15	20	25	30	35	40	45	50
THICKNESS (mm)	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50
0.00~0.04	-	-	-	-	-	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25
0.05~0.09	-	-	-	-	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30
0.10~0.14	-	-	-	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35
0.15~0.19	-	-	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40
0.20~0.21	-	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45
0.22~0.31	SPECIFIED CLEARANCE/NO CHANGE REQUIRED																				
0.32~0.34	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	
0.35~0.39	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50		
0.40~0.44	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50			
←Example 0.45~0.49	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50				
0.50~0.54	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50					
0.55~0.59	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50						
0.60~0.64	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50							
0.65~0.69	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50								
0.70~0.74	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50									
0.75~0.79	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50										
0.80~0.84	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50											
0.85~0.89	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50												
0.90~0.94	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50													
0.95~0.99	3.20	3.25	3.30	3.35	3.40	3.45	3.50														
1.00~1.04	3.25	3.30	3.35	3.40	3.45	3.50															
1.05~1.09	3.30	3.35	3.40	3.45	3.50																
1.10~1.14	3.35	3.40	3.45	3.50																	
1.15~1.19	3.40	3.45	3.50																		
1.20~1.24	3.45	3.50																			
1.25~1.29	3.50																				

VALVE CLEARANCE MEASUREMENT

INSTALL THE SHIM OF THIS THICKNESS (mm)

GS07120BW3 C

1. Measure the clearance (when engine is cold).
2. Check present shim size.
3. Match clearance in vertical column with present shim size in horizontal column.
4. Install the shim specified where the lines intersect. This shim will give the proper clearance.

Example: Present shim is **2.95 mm.**
Measured clearance is **0.47 mm.**
Replace **2.95 mm** shim with **3.15 mm** shim.

5. Remeasure the valve clearance and readjust if necessary.

Periodic Maintenance Procedures

NOTICE

Be sure to remeasure the clearance after selecting a shim according to the table. If the clearance is out of the specified range, use the additional shim.

○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.

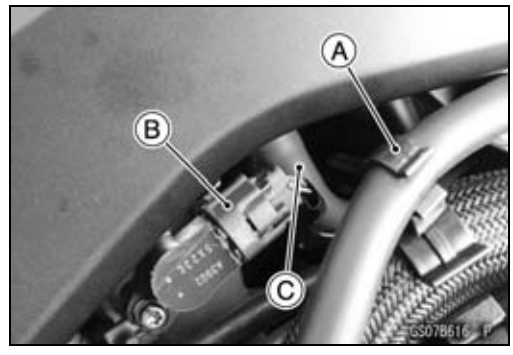
NOTICE

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 engine oil 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

● Remove:
Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
Clamp [A] (Other than US and CA Models)
● Disconnect:
Subthrottle Sensor Connector [B]
Air Switching Valve Hose [C]



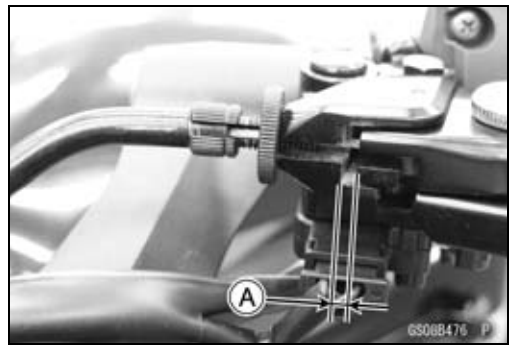
● Connect the subthrottle sensor connector.
● Start the engine and run it at idle speed.
● Plug the air switching valve hose end [A] with your finger and feel vacuum pulsing in the hose.
★If there is no vacuum pulsation, check the hose line for leak. If there is no leak, check the air switching valve (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).



Periodic Maintenance Procedures

Clutch

Clutch Operation Inspection



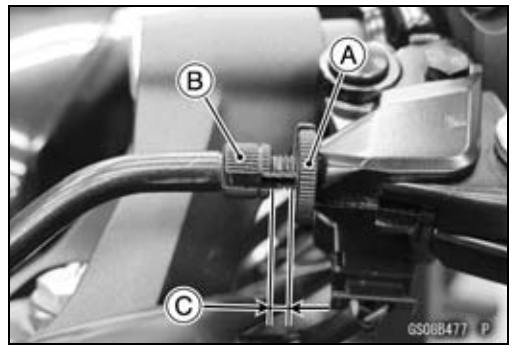
- Pull the clutch lever just enough to take up the free play [A].
- Measure the gap between the lever and the lever holder.

★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.

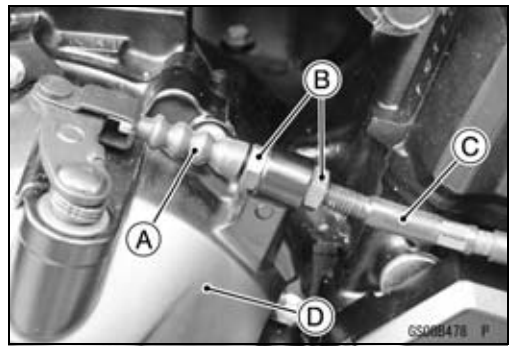
Clutch Lever Free Play
Standard: 2 ~ 3 mm (0.08 ~ 0.12 in.)

⚠ WARNING

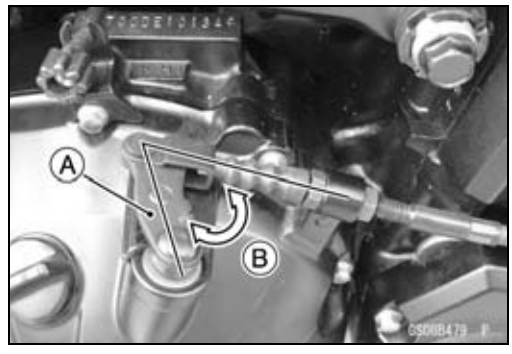
The engine and exhaust system get extremely hot during normal operation and can cause serious burns. Never touch the engine or exhaust pipe during clutch adjustment.



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



- Remove the right lower fairing (see Lower Fairing Removal in the Frame chapter).
- Slide the dust cover [A] at the clutch cable lower end out of place.
- Loosen both adjusting nuts [B] at the clutch cover as far as they will go.
- Pull the clutch outer cable [C] tight and tighten the adjusting nuts against the clutch cover [D].
- Slip the dust cover back onto place.
- Turn the adjuster at the clutch lever until the free play is correct.



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

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

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

⚠ WARNING

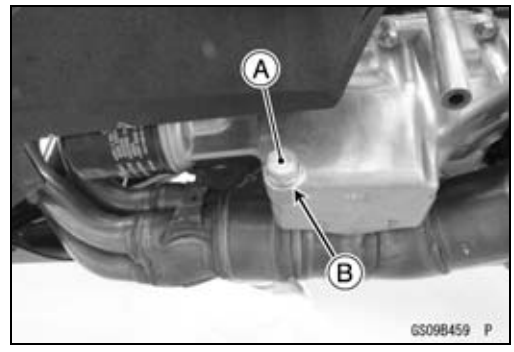
Too much cable play can prevent clutch disengagement and cause an accident resulting in serious injury or death. When adjusting the clutch or replacing the cable, be sure the upper end of the clutch outer cable is fully seated in its fitting, or it could slip into place later, creating enough cable play to prevent clutch disengagement.

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

Periodic Maintenance Procedures

Engine Lubrication System

Engine Oil Change

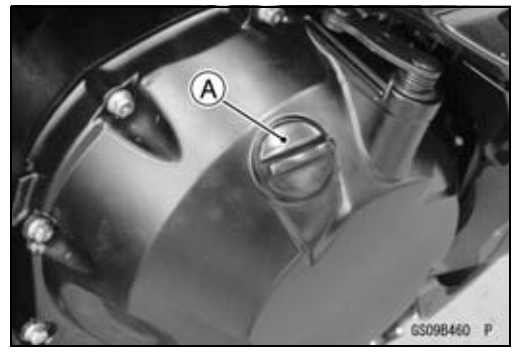


- Situate the motorcycle so that it is vertical after warming up the engine.
- Remove the engine oil drain bolt [A] to drain the oil.

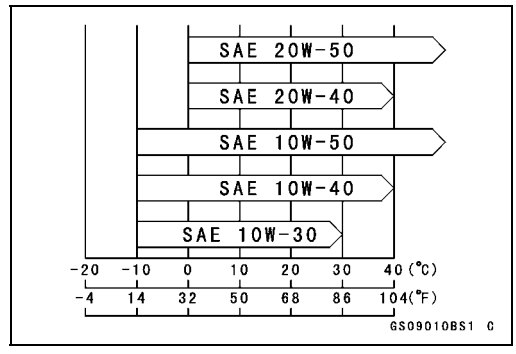
○The oil in the oil filter can be drained by removing the filter (see Oil Filter Replacement).

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

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



- Remove the oil filler plug [A].



- 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:	**3.2 L (3.4 US qt) (when filter is not removed)**
	3.8 L (4.0 US qt) (when filter is removed)
	4.0 L (4.2 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.*

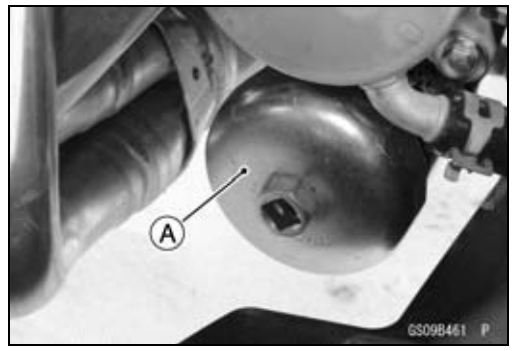
- Replace the O-ring of the oil filler plug with a new one.
- Apply grease to the new O-ring.
- Install the oil filler plug.

Torque - Oil Filler Plug: Hand-tighten

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

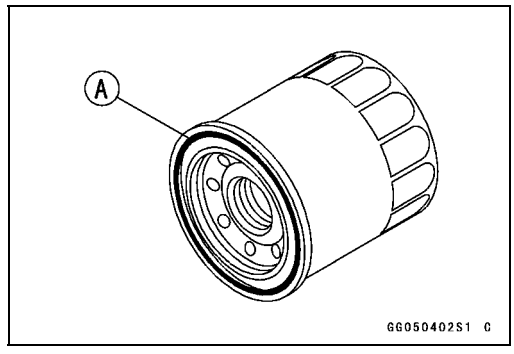
Periodic Maintenance Procedures

Oil Filter Replacement



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

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)

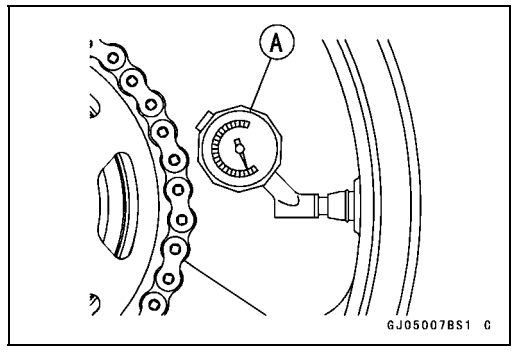
NOTE

○*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 capacity of oil (see Engine Oil Change).

Wheels/Tires

Air Pressure Inspection



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

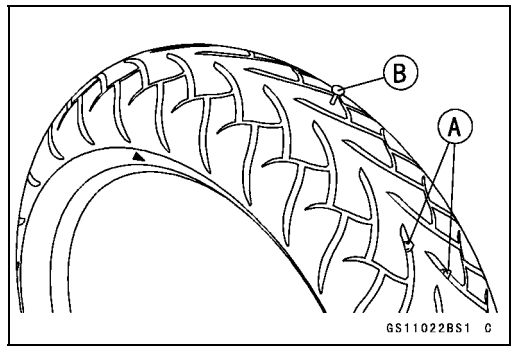
Air Pressure (when Cold)

Front: Up to 195 kg (430 lb) load:
250 kPa (2.50 kgf/cm², 36 psi)

Rear: Up to 195 kg (430 lb) load:
290 kPa (2.90 kgf/cm², 42 psi)

Wheels and Tires Inspection

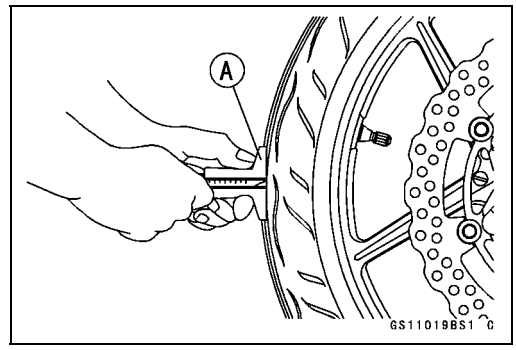
Wheel/Tire Damage Inspection



- 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	**5.8 mm (0.23 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

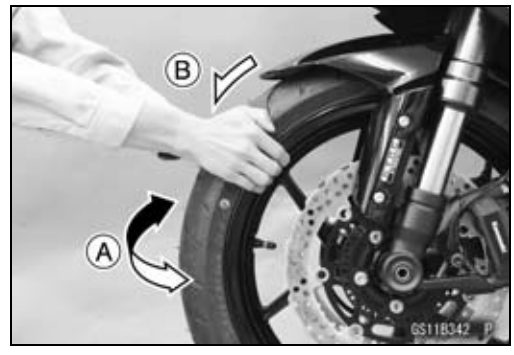
Some replacement tires may adversely affect handling and cause an accident resulting in serious injury or death. To ensure proper handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.

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



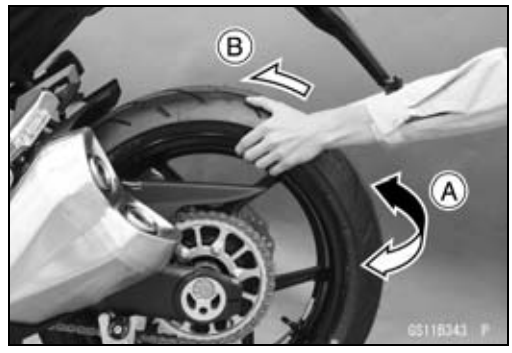
- Raise the front wheel off the ground with the jack (see Front Wheel Removal in the Wheels/Tires chapter).

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

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

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

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 pushing and pulling [A] the wheel.
- Spin [B] the rear wheel lightly, and check for smoothly turn, roughness, binding or noise.

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

Final Drive

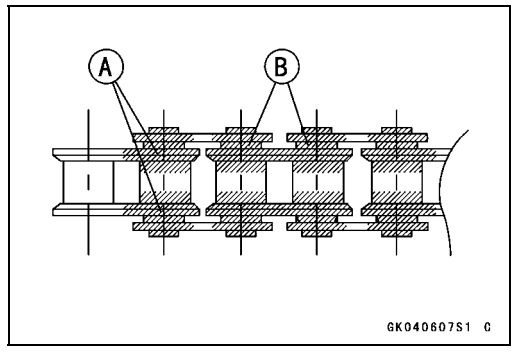
Drive Chain Lubrication Condition Inspection

Lubrication is necessary after riding through rain or on wet roads, or any time that the chain appears dry.

Use a lubricant for sealed chains to prevent deterioration of chain seals. If the chain is especially dirty, clean it using a cleaner for sealed chains following the instructions supplied by the chain cleaner manufacturer.

NOTICE

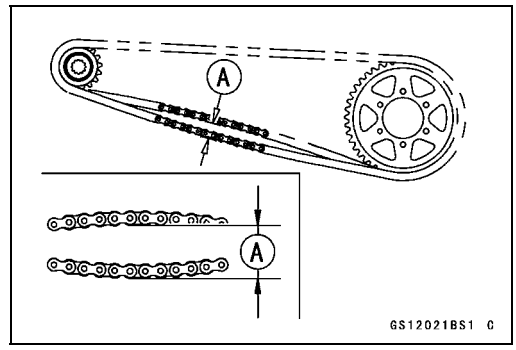
The O-rings between the side plates seal in the lubricant between the pin and the bushing. To avoid damaging the O-rings and resultant loss of lubricant, observe the following rules.
Use only chain cleaner for cleaning of the O-ring of the drive chain. Any other cleaning solution such as gasoline will 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 chain 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]
- Wipe off lubricant that gets on the tire surface.

Periodic Maintenance Procedures

Drive Chain Slack Inspection



NOTE

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

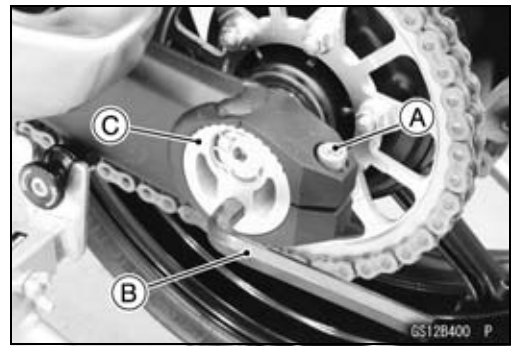
○*Clean the chain if it is dirty, and lubricate it if it appears dry.*

- 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: 20 ~ 30 mm (0.8 ~ 1.2 in.)

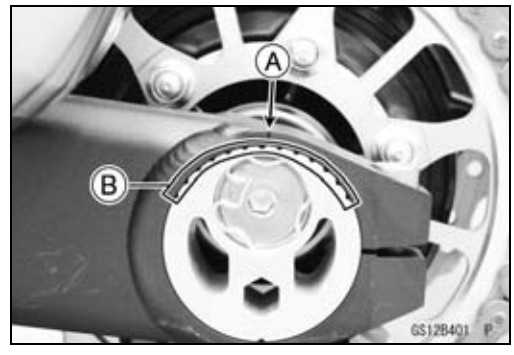
Drive Chain Slack Adjustment



- Loosen the chain adjuster clamp bolt [A] (Both Sides).
- Using an Allen wrench [B], turn the adjusters [C] forward or rearward until the drive chain has the correct amount of chain slack.
- Tighten:

Torque - Chain Adjuster Clamp Bolts: 65 N·m (6.6 kgf·m, 48 ft·lb)

Wheel Alignment Inspection



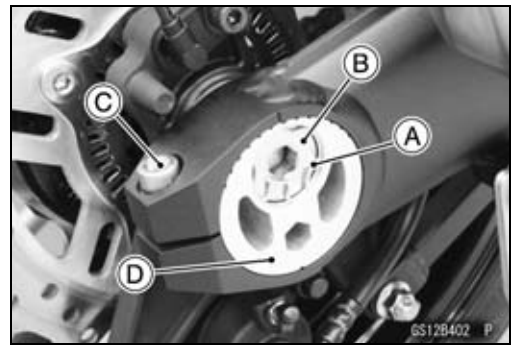
- Check that the notch [A] on the swingarm should point to the same marks or positions [B] on the adjuster (Both Sides).

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

⚠ 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.

Wheel Alignment Adjustment



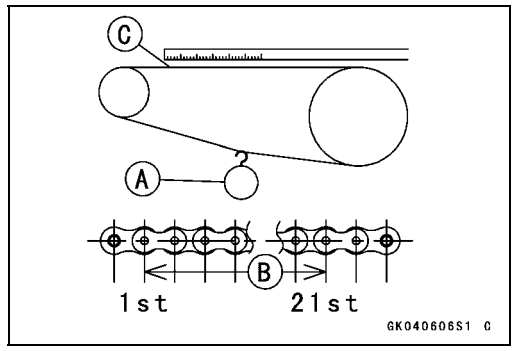
- Remove the right retaining ring [A].
- Loosen the axle nut [B].
- Loosen the right chain adjuster clamp bolt [C], and turn the right chain adjuster [D] so that the left and right notches on the swingarm may point to the same marks or positions on the left and right adjusters.
- Tighten:

Torque - Chain Adjuster Clamp Bolt: 65 N·m (6.6 kgf·m, 48 ft·lb)
Rear Axle Nut: 100 N·m (10.2 kgf·m, 73.8 ft·lb)

- Replace the right retaining ring with a new one and install it.

Periodic Maintenance Procedures

Drive Chain Wear Inspection



- Remove the chain cover (see Drive Chain Removal in the Final Drive chapter).
- Rotate the rear wheel to inspect the drive chain for damaged rollers, and loose pins and links.

★If there is any irregularity, replace the drive chain.

★Lubricate the drive chain if it appears dry.

- Stretch the chain taut by hanging a 10 kg (22 lb) weight [A] on the chain.
- Measure the length of 20 links [B] on the straight part [C] of the chain from the pin center of the 1st pin to the pin center of the 21st pin. Since the chain may wear unevenly, take measurements at several places.

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

Drive Chain 20-link Length

Standard: 317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)

Service Limit: 319 mm (12.6 in.)

⚠ WARNING

A chain that breaks or jumps off the sprockets could snag on the engine sprocket or lock the rear wheel, severely damaging the motorcycle and causing it to go out of control. Inspect the chain for damage and proper adjustment before each ride. If chain wear exceeds the service limit, replace it with the standard chain.

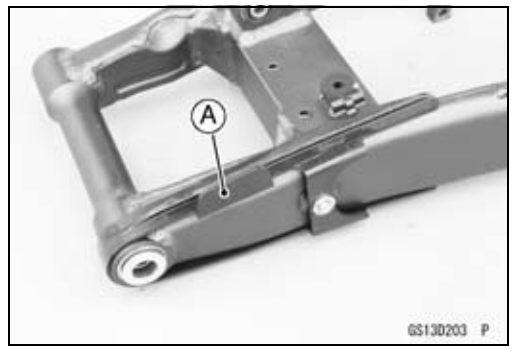
Standard Chain

Make: ENUMA

Type: EK525ZX

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.

Periodic Maintenance Procedures

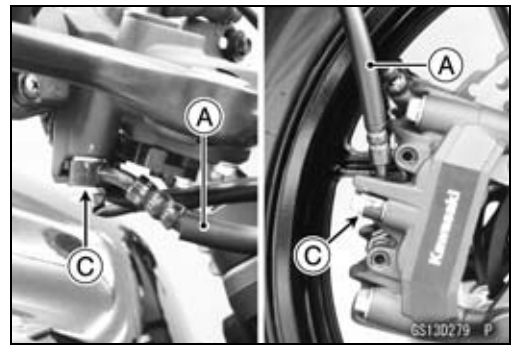
Brakes

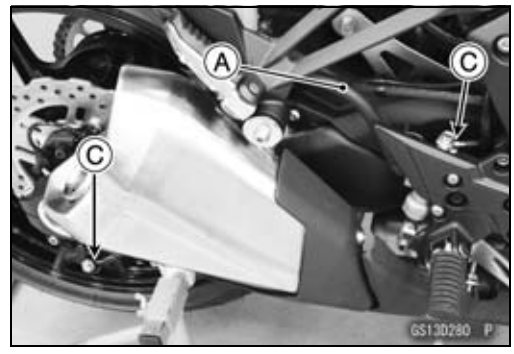
Brake System Inspection

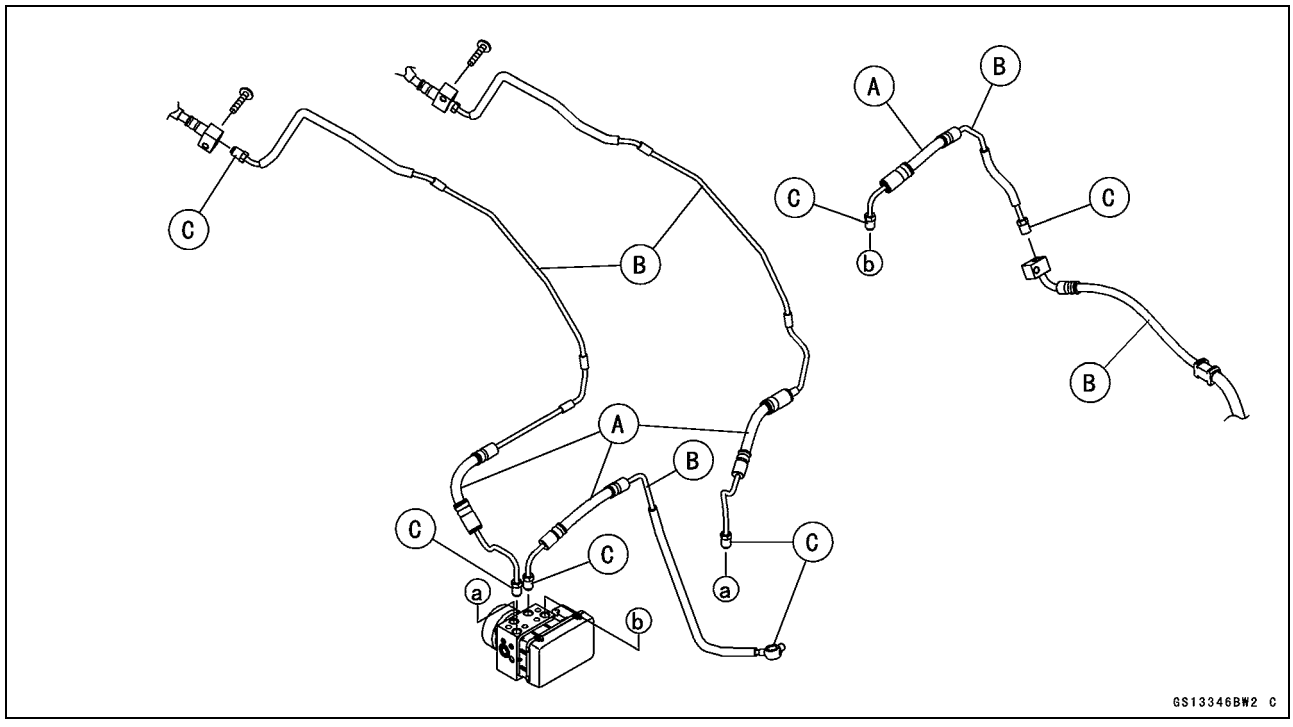
Brake Fluid Leak (Brake Hose and Pipe) Inspection

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

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

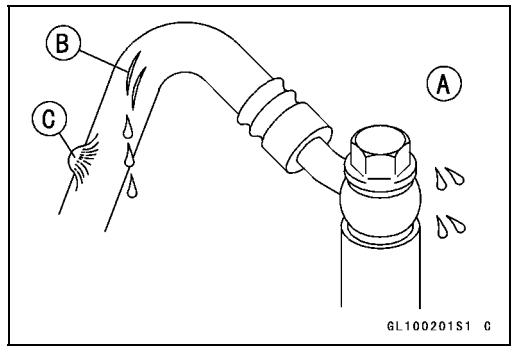






Periodic Maintenance Procedures

Brake Hose and Pipe Damage and Installation Condition Inspection



- Remove the air cleaner housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter).
- Inspect the brake hoses, pipe and fittings for deterioration, cracks and signs of leakage.

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

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

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

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)

- Inspect the brake hose and pipe routing.

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

Brake Operation Inspection

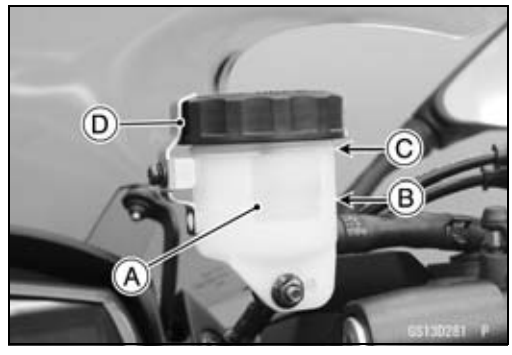
- Inspect the operation of the front and rear brake by running the vehicle on the dry road.

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

⚠ WARNING

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

Brake Fluid Level Inspection



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

NOTE

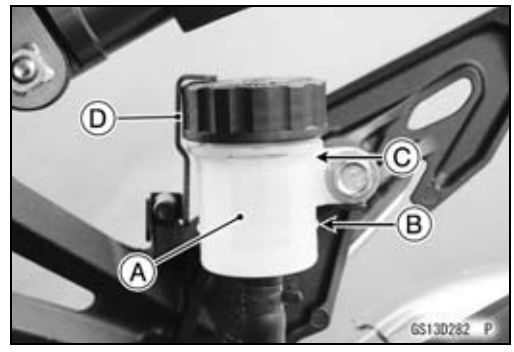
○*Hold the reservoir horizontal by turning the handlebars when checking brake fluid level.*

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

○Remove the stopper [D].

Periodic Maintenance Procedures

● 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].

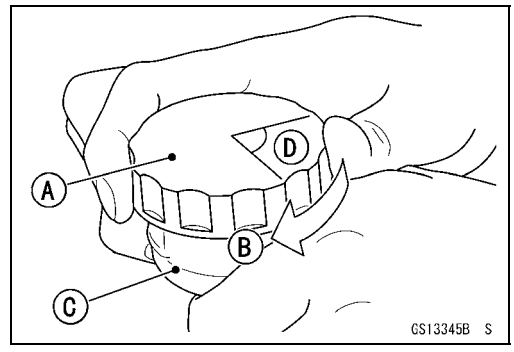


⚠ WARNING

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

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

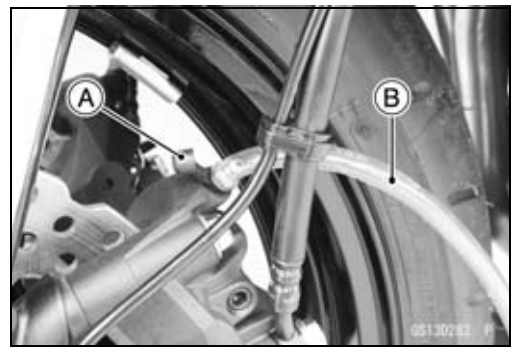


Brake Fluid Change

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 the reservoir cap, diaphragm plate and 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.

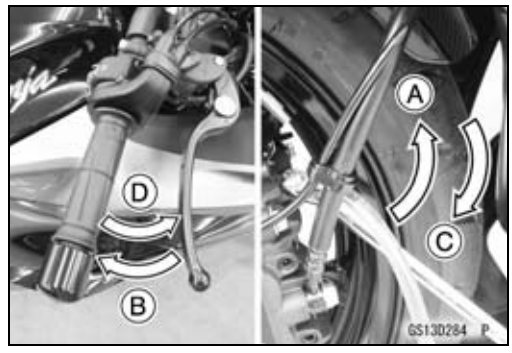


Periodic Maintenance Procedures

● 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.

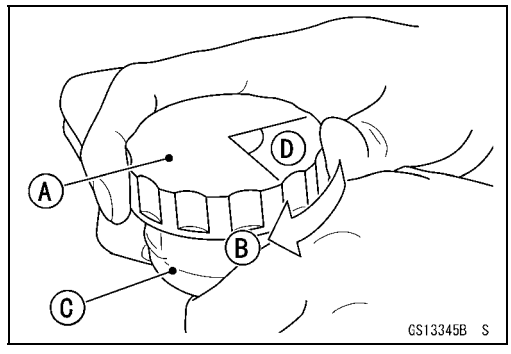
● Install the diaphragm, diaphragm plate and reservoir cap.

● Tighten:

Torque - Front Brake Reservoir Cap Stopper Screw: 1.5 N·m (0.15 kgf·m, 13 in·lb)

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

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



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

Torque - Bleed Valves: 8.0 N·m (0.82 kgf·m, 71 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.

Brake Hose and Pipe Replacement

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

Periodic Maintenance Procedures

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Periodic Maintenance Procedures

NOTE

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

● Remove:
Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter)
Battery Case (see Battery Case Removal in the Frame chapter)
Brake Pipe Joint Nuts [A]
Brake Hose Banjo Bolts [B]
Bolts [C]
Clamps
● There are washers on each side of the brake hose and pipe fitting. Replace them with new ones when installing.
● Before installing the brake pipe, check to see that there is no damage on the threads of the brake pipe joint nut.
★If there is any damage, replace the damaged parts with new ones.

NOTE

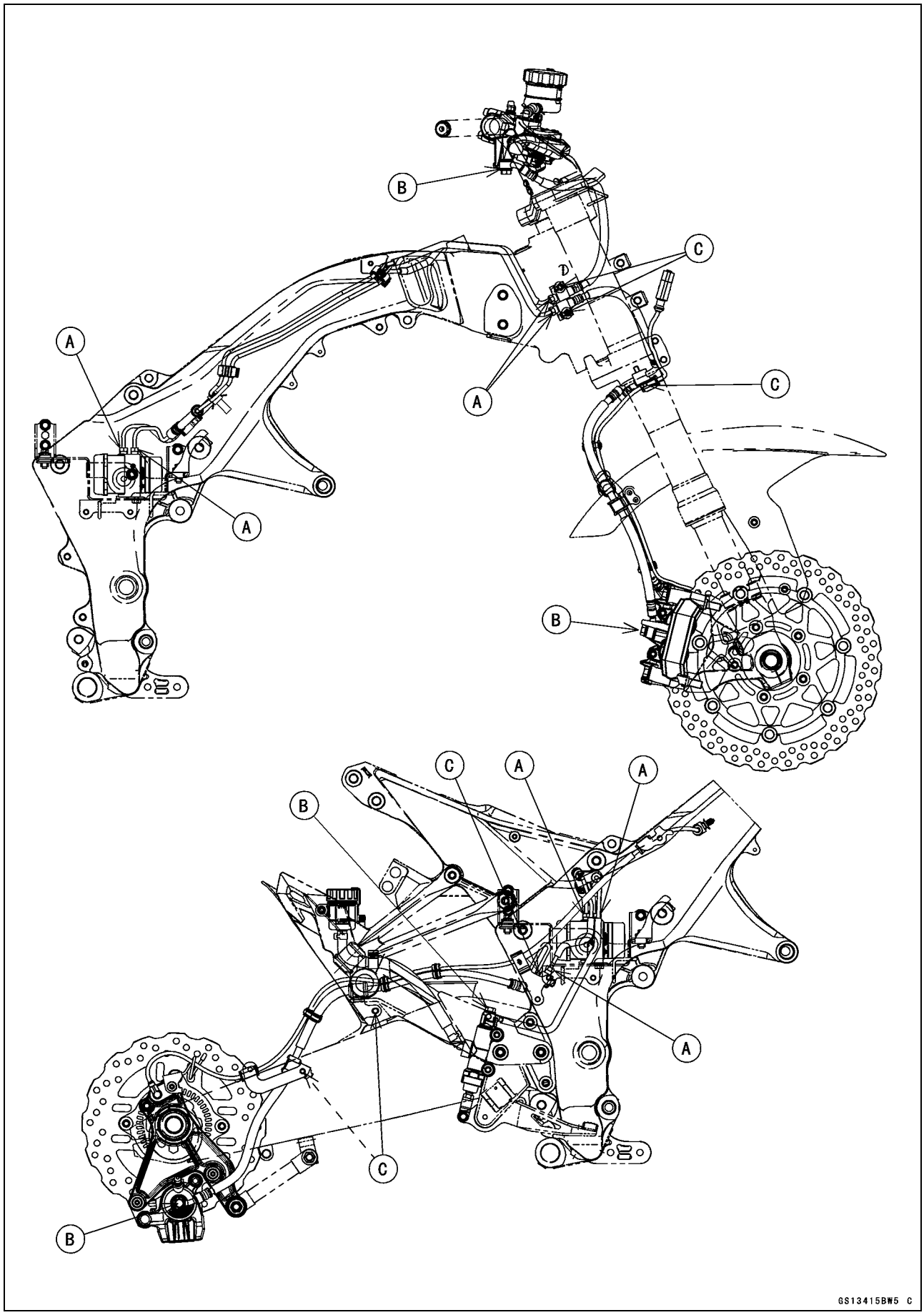
○*Tighten the brake pipe joint nut at both ends of the brake pipe temporarily and then tighten them to the specified torque.*

● Install the brake pipes and brake hoses to the specified angle (see Cable, Wire, and Hose Routing section in the Appendix chapter).
● Tighten the brake pipe joint nuts with the flare nut wrench.
● Tighten:

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

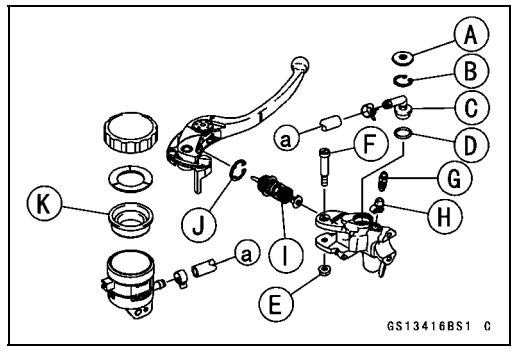
● Fill the brake line after installing the brake hose and pipe (see Brake Fluid Change).

Periodic Maintenance Procedures



Periodic Maintenance Procedures

Master Cylinder Rubber Parts Replacement



Front Master Cylinder Disassembly

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

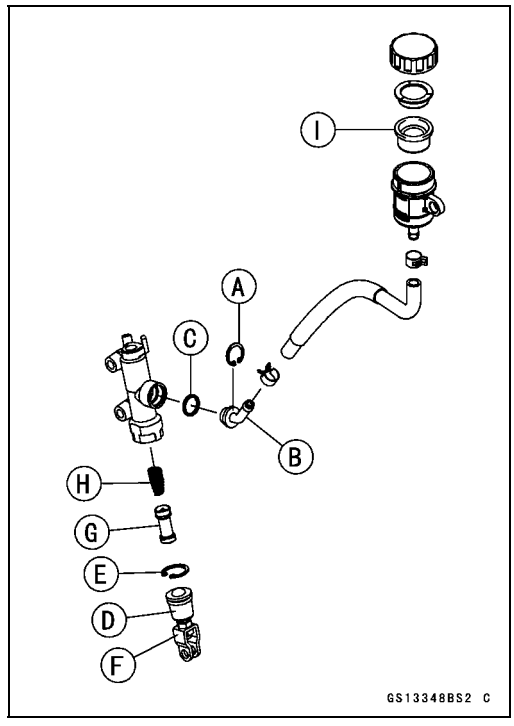
Special Tool - Inside Circlip Pliers: 57001-143

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

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

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

Rear Master Cylinder Disassembly



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

Special Tool - Inside Circlip Pliers: 57001-143

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

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 [I]

Periodic Maintenance Procedures

Master Cylinder Assembly

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

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

- Apply brake fluid to the new parts and to the inner wall of the cylinder.
- Take care not to scratch the piston or the inner wall of the cylinder.
- Apply silicone grease to the followings.

  Front: Brake Lever Pivot Bolt

  Rear: Dust Cover of Push Rod Assembly

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

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

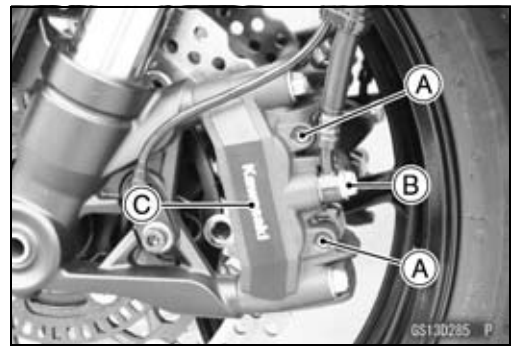
- For the front master cylinder, install the bleed valve and rubber cap.

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

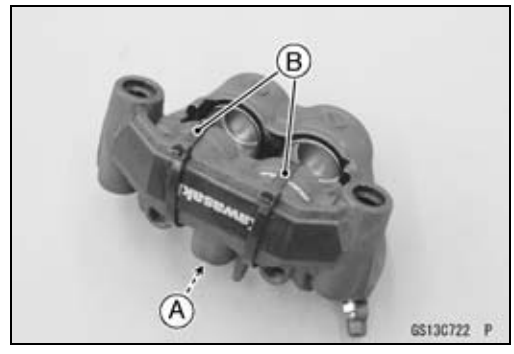
Caliper Rubber Parts Replacement

Front Caliper Disassembly

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

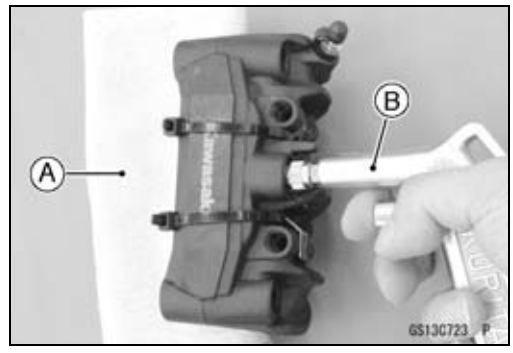


- Hold the pistons nearest the oil passage [A] with the bands [B].



Periodic Maintenance Procedures

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

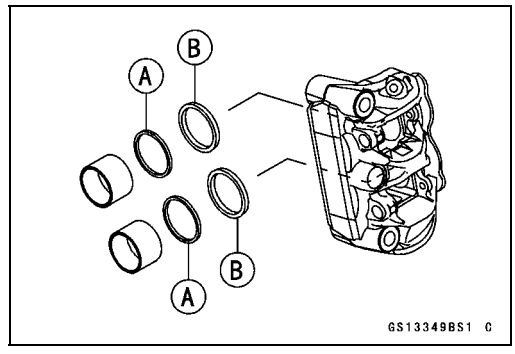


⚠ WARNING

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

○Pull out the pistons by hand.

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



Front Caliper Assembly

● Clean the caliper parts except for the pads.

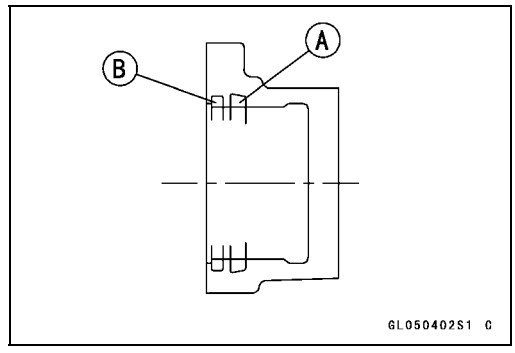
NOTICE

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

● Install the bleed valve and rubber cap.
● Tighten:

Torque - Bleed Valves: 8.0 N·m (0.82 kgf·m, 71 in·lb)

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

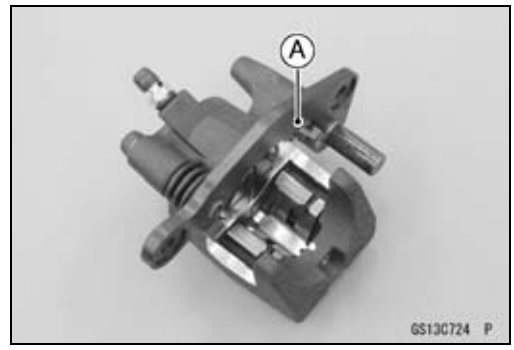


● Apply brake fluid to the outside of the pistons, and push them into each cylinder by hand.
● Install the removed parts (see appropriate chapters).
● Wipe up any spilled brake fluid on the caliper with wet cloth.

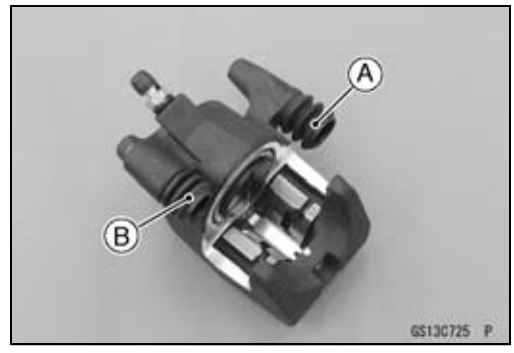
Periodic Maintenance Procedures

Rear Caliper Disassembly

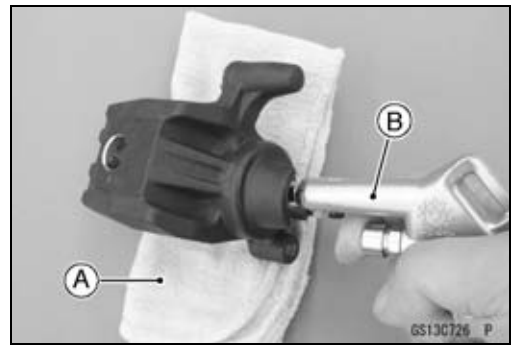
● Remove:
Rear Caliper (see Rear Caliper Removal in the Brakes chapter)
Brake Pads (see Rear Brake Pad Removal in the Brakes chapter)
Caliper Holder [A]



● Remove:
Dust Boot [A]
Friction 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 pad spring.
● Remove the dust seal and fluid seal.
● Remove the bleed valve and rubber cap.

Rear Caliper Assembly

● Clean the caliper parts except for the pads.

NOTICE

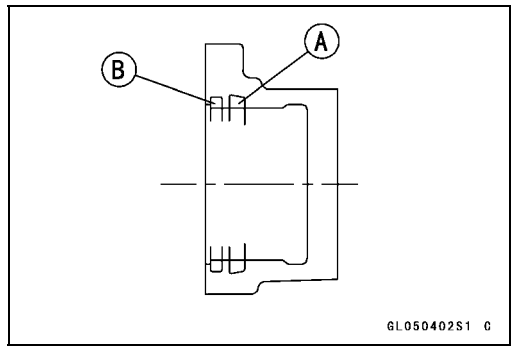
For cleaning the parts, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol.

● Install the bleed valve and rubber cap.
● Tighten:

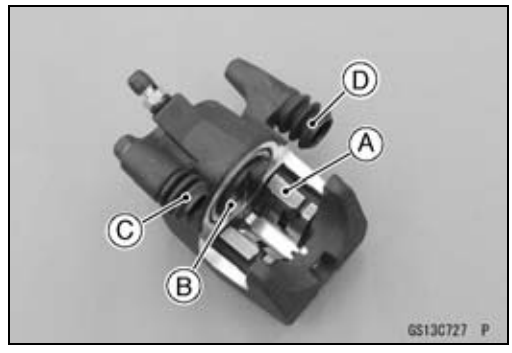
Torque - Bleed Valve: 8.0 N·m (0.82 kgf·m, 71 in·lb)

Periodic Maintenance Procedures

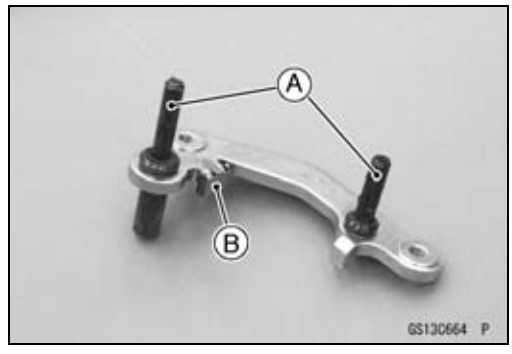
● Replace the fluid seal [A] with a new one.
○Apply silicone grease to the fluid seal, and install it into the cylinder by hand.
● Replace the dust seal [B] with a new one.
○Apply silicone grease to the dust seal, and install it into the cylinder by hand.



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

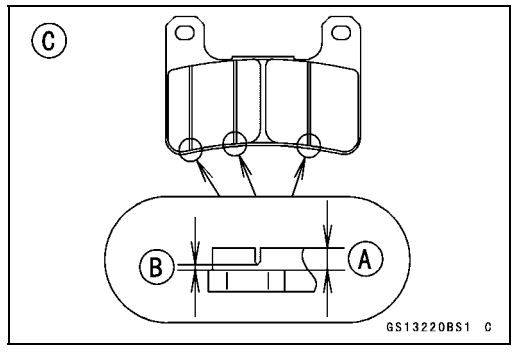


● Apply a silicone grease to the caliper holder shafts [A].
● Check that the guide [B] is in place on the caliper holder.
● Assemble the caliper and the caliper holder.
● Install the pads (see Rear Brake Pad Installation in the Brakes chapter).
● Wipe up any spilled brake fluid on the caliper with wet cloth.



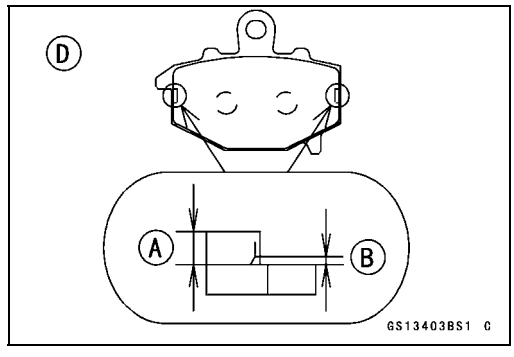
Brake Pad Wear Inspection

● Remove the brake pads (see Front/Rear Brake Pad Removal in the Brakes chapter).
● Check the lining thickness [A] of the pads in each caliper.
★If the lining thickness of either pad is less than the service limit [B], replace both pads in the caliper as a set.
Front Brake Pad [C]
Rear Brake Pad [D]



Pad Lining Thickness
Standard:

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



Periodic Maintenance Procedures

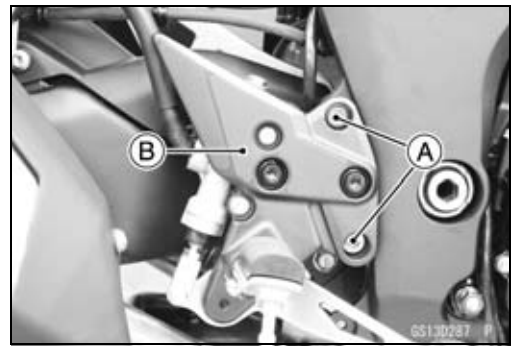
Brake Light Switch Operation Inspection

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

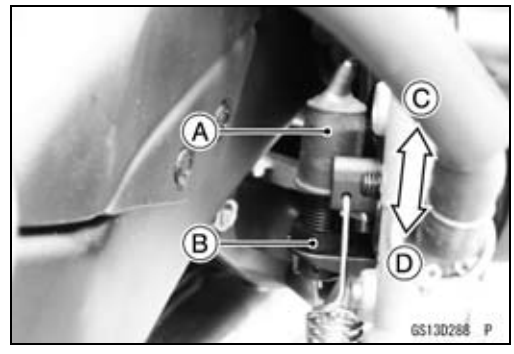


★If it does not, adjust the brake light switch.

- Remove:
  Rear Lower Fairing (see Rear Lower Fairing Removal in the Frame chapter)
  Front Footpeg Bracket Bolts [A]
- Pull the right footpeg bracket [B] outward.



- 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]



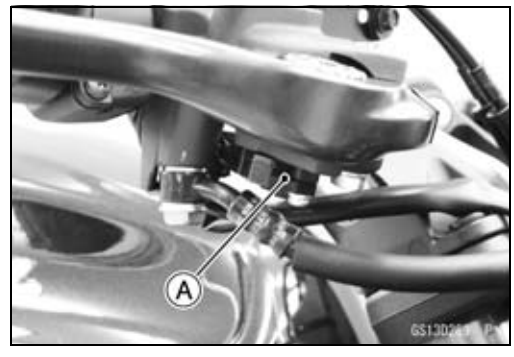
NOTICE
To avoid damaging the electrical connections inside the switch, be sure that the switch body does not turn during adjustment.

- Tighten:

Torque - Front Footpeg Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Install:
  Rear Lower Fairing (see Rear Lower Fairing Installation in the Frame chapter)

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



Periodic Maintenance Procedures

Suspension

Suspension System Inspection

Front Forks/Rear Shock Absorber Operation Inspection

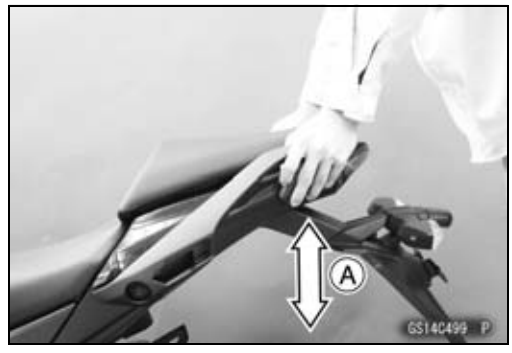
- Pump the forks down and up [A] 4 or 5 times, and inspect the smooth stroke.

★If the forks do not smoothly or noise is found, inspect the fork oil level or fork clamps (see Front Fork Oil Change in the Suspension chapter).



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

★If the shock absorber does not smoothly stroke or noise is found, inspect the oil leak (see Rear Shock Absorber Oil Leak Inspection).



Front Fork Oil Leak Inspection

- Visually inspect the front forks [A] for oil leakage.

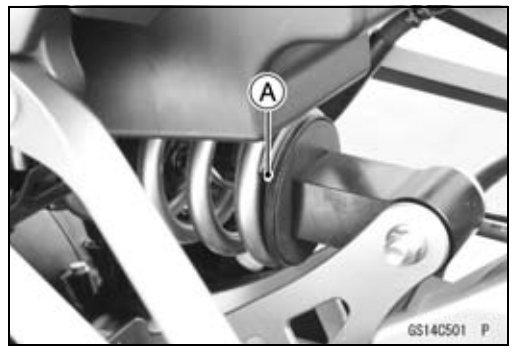
★Replace any defective parts, if necessary.



Rear Shock Absorber Oil Leak Inspection

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

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



Rocker Arm Operation Inspection

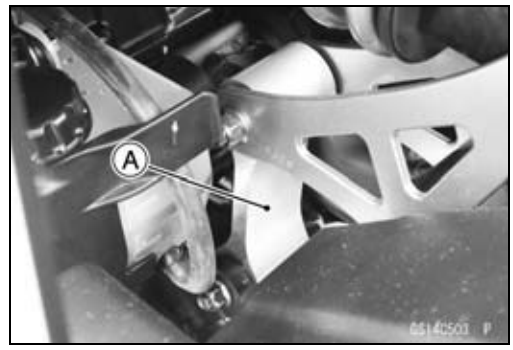
- Pump the seat down and up 4 or 5 times, and inspect the smooth stroke.

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



Periodic Maintenance Procedures

Tie-Rod Operation Inspection



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

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

Steering

Steering Play Inspection



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

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

- With the front wheel pointing straight ahead, alternately tap each end of the handlebars. 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.

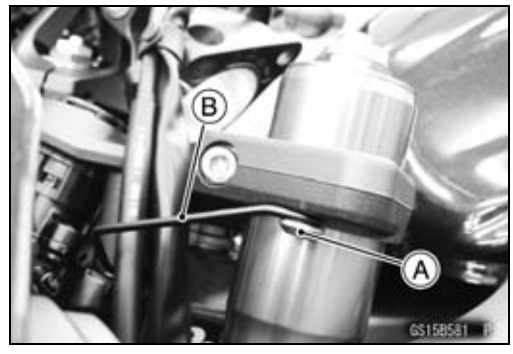
- Feel for steering looseness by pushing and pulling [A] the forks.

★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.*

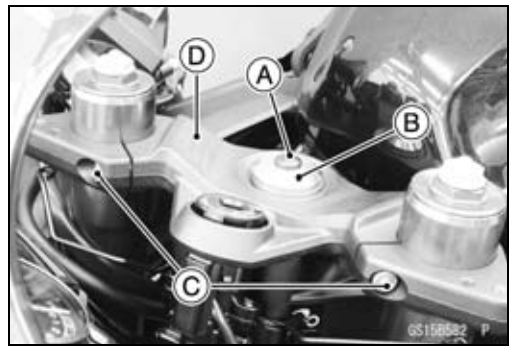
Steering Play Adjustment



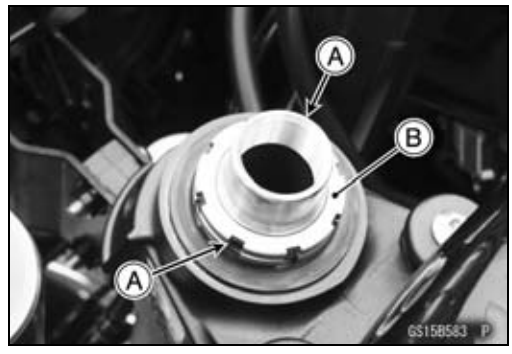
- Remove:
  Middle Fairing (see Middle Fairing Removal in the Frame chapter)
  Handlebar Holders (see Handlebar Removal in the Steering chapter)
- Remove the bolt [A], and free the leads from the guide [B] on both side.

Periodic Maintenance Procedures

● Remove:
Steering Stem Head Bolt Plug [A]
Steering Stem Head Bolt [B] and Washer
● Loosen the upper front fork clamp bolts [C].
● Remove the stem head [D].



● Bend the claws [A] of the claw washer straighten.
● Remove:
Steering Stem Locknut [B]
Claw Washer



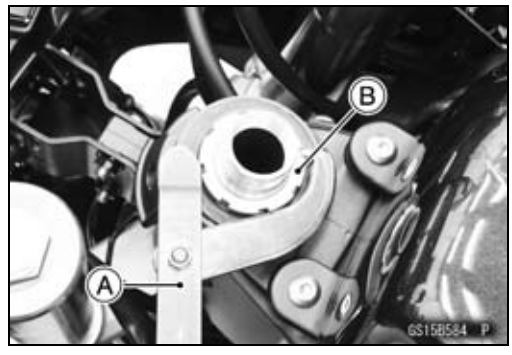
● Adjust the steering using the steering stem nut wrench [A].

Special Tool - Steering Stem Nut Wrench: 57001-1100

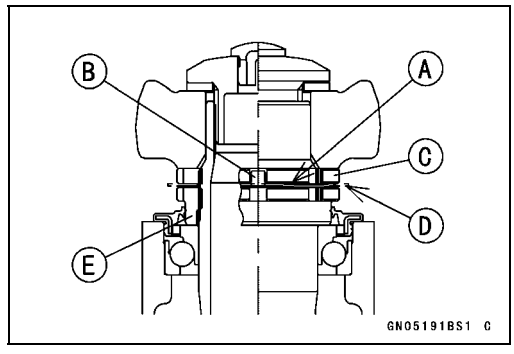
★If the steering is too tight, loosen the stem nut [B] a fraction of a turn.
★If the steering is too loose, tighten the stem nut a fraction of a turn.

NOTE

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

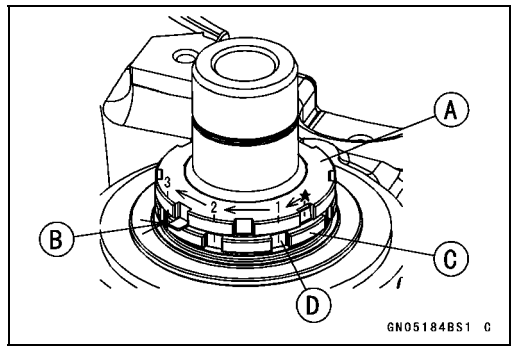


● Install the claw washer [A] so that its bent claws [B] faces upward, and engage the bent claws with the grooves of steering stem locknut [C].
● Hand tighten the steering stem locknut until it contacts against the claw washer.
● Check if the straight claws [D] of the claw washer aligned with the grooves of the steering stem nut [E].



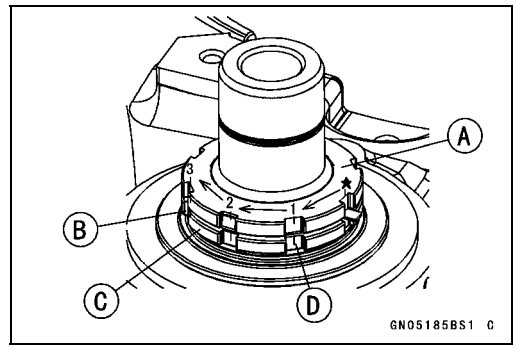
In case of the claws positioned between the grooves:

● Tighten the steering stem locknut [A] until the straight claws aligned with 3rd grooves [B] of the steering stem nut [C].
○Count the number of groove from the **first** aligned groove [D] as shown.
● Bend the two straight claws downward into the groove of the steering stem nut.



Periodic Maintenance Procedures

In case of the claws aligned with the grooves:



- Tighten the steering stem locknut [A] until the straight claws aligned with 3rd grooves [B] of the steering stem nut [C].

○Count the number of groove from the **next** aligned groove [D] as shown.

- Bend the two straight claws downward into the groove of the steering stem nut.
- Install the stem head.
- Install the washer, and temporary tighten the stem head bolt.

NOTE

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

Torque - Upper Front Fork Clamp Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)
Steering Stem Head Bolt: 110 N·m (11.2 kgf·m, 81.1 ft·lb)

⚠ WARNING

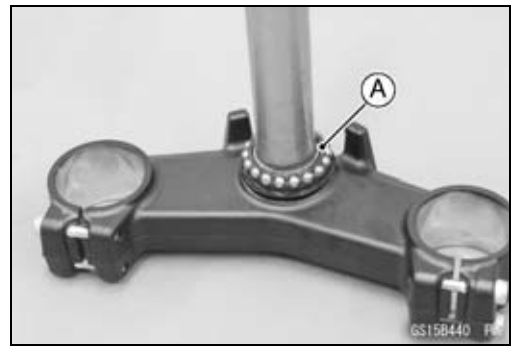
If the handlebars do not turn to the steering stop, they may cause an accident resulting in injury or death. Be sure the cables, harnesses and hoses are routed properly and do not interfere with handlebar movement (see Cable, Wire, and Hose Routing section in the Appendix chapter).

- Check the steering again.

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

- Install the removed parts (see appropriate chapters).

Steering Stem Bearing Lubrication



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

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

- Pack the upper and lower ball bearings in the cages with grease, and apply a light coat of grease to the upper and lower outer races.
- Install the steering stem (see Stem, Stem Bearing Installation in the Steering chapter).
- Adjust the steering (see Steering Play Adjustment).

Periodic Maintenance Procedures

Electrical System

Lights and Switches Operation Inspection

First Step

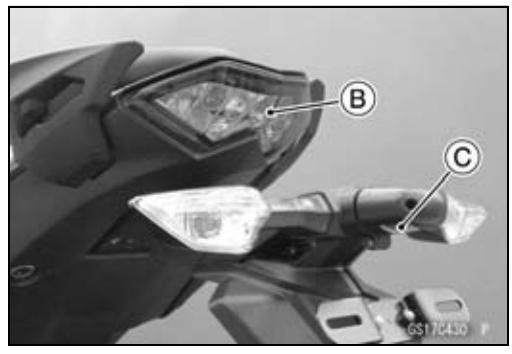
- Set the gear position in the neutral position.
- Turn the ignition switch on.
- The following lights should go on according to below table.

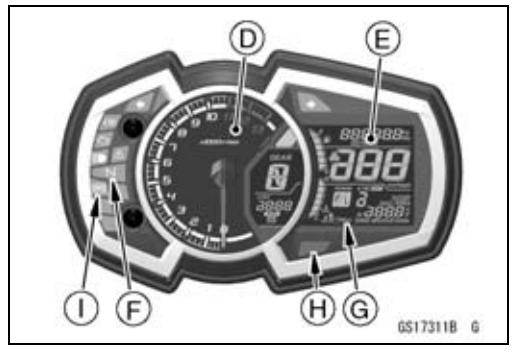
City Light (LED) [A]	Goes on
Taillight (LED) [B]	Goes on
License Plate Light [C]	Goes on
Meter Panel Illumination (LED) [D]	Goes on
Meter Panel LCD [E]	Goes on
Green Neutral Indicator (LED) [F]	Goes on
Oil Pressure Warning Indicator [G] and Red Warning Indicator (LED) [H]	Goes on
Yellow ABS Indicator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

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

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







Periodic Maintenance Procedures

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

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

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

Second Step

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

★If the light goes on, inspect or replace the following item.
Ignition Switch (see Switch Inspection in the Electrical System chapter)

Third Step

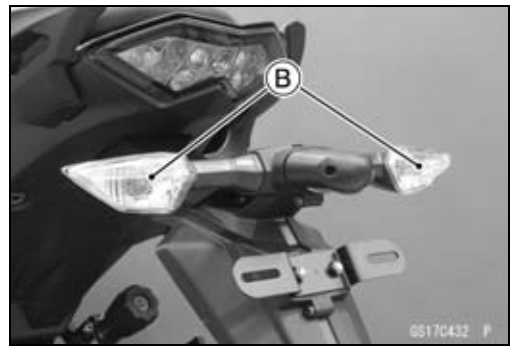
- Turn the ignition switch on.
- Turn on the turn signal switch [A] (left or right position).
- The left or right turn signal lights [B] (front and rear) according to the switch position should blink.
- The green turn signal indicators (LED) [C] in the meter unit should blink.

★If the each light does not blink, inspect or replace the following parts.
Turn Signal Light Bulb (see Turn Signal Light Bulb Replacement in the Electrical System chapter)
Green Turn Signal Indicator (LED) (see Meter Unit Inspection in the Electrical System chapter)
Turn Signal Relay Fuse 7.5 A (see Fuse Inspection in the Electrical System chapter)
Turn Signal Switch (see Switch Inspection in the Electrical System chapter)
Turn Signal Relay (see Turn Signal Relay Inspection in the Electrical System chapter)
Harness (see Wiring Inspection in the Electrical System chapter)

- Push the turn signal switch.
- The turn signal lights and green turn signal indicator (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)

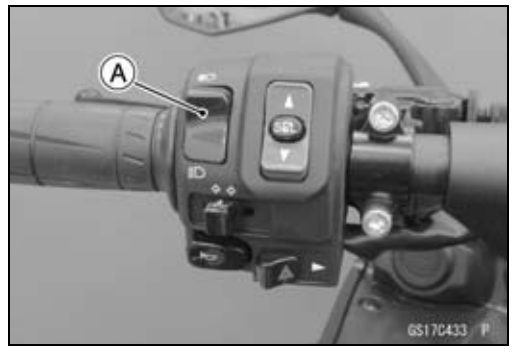






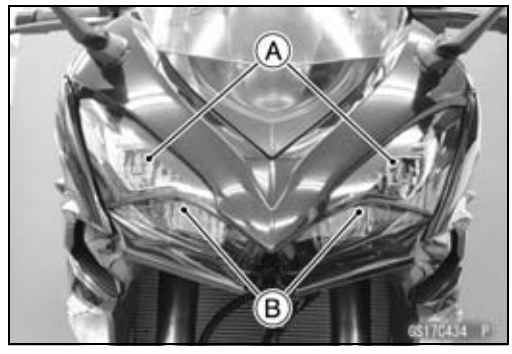
Periodic Maintenance Procedures

Fourth Step



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

★If the low beam headlights do not go on, inspect or replace the following parts.
Headlight (LED) Assembly (see Headlight (LED) Assembly Removal/Installation in the Electrical System chapter)
Headlight Fuse 25 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 blue high beam indicator (LED) [C] should goes on.

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



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

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

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

Headlight Aiming Inspection

- Inspect the headlight beam for aiming.

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

Periodic Maintenance Procedures

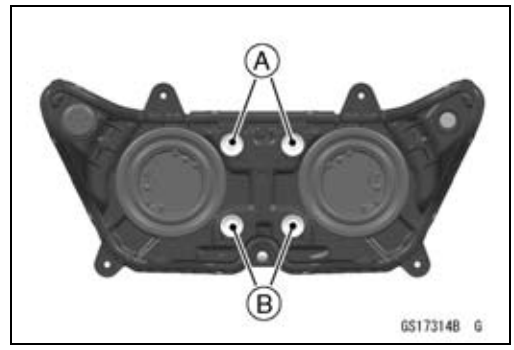
Headlight Beam Horizontal Adjustment

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

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

Headlight Beam Vertical Adjustment

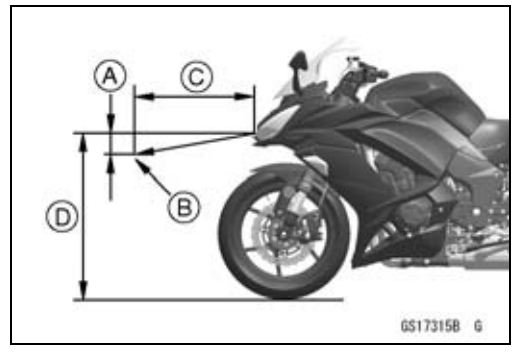
- Turn the vertical adjuster [B] in both headlights in or out to adjust the headlight vertically.



NOTE

○*On high beam, the brightest points should be slightly below horizontal with the motorcycle on its wheels and the rider seated. Adjust the headlight to the proper angle according to local regulations.*

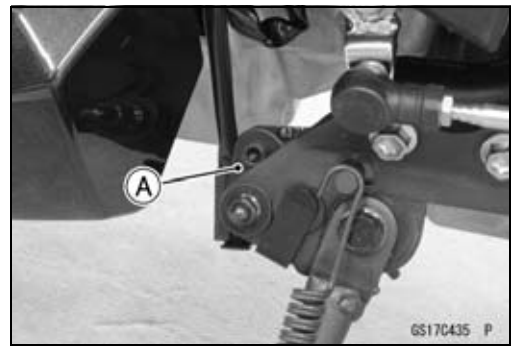
○*For the US model, the proper angle is 0.4 degrees below horizontal. This is 50 mm (2.0 in.) drop at 7.6 m (25 ft) measured from the center of the headlight with the motorcycle on its wheels and the rider seated.*



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

Side Stand Switch Operation Inspection

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



Side Stand Switch Operation

Side Stand	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 side stand 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)
Side Stand 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 Sensor (see Gear Position Sensor Input Voltage Inspection in the Fuel System (DFI) chapter)
Starter Lockout Switch (see Switch Inspection in the Electrical System chapter)
Starter Relay (see Starter Relay Inspection in the Electrical System chapter)
Relay Box (see Relay Circuit Inspection in the Electrical System chapter)
Starter Circuit Relay (see Relay Circuit Inspection in the Electrical System chapter)
Harness (see Wiring Inspection in the Electrical System chapter)

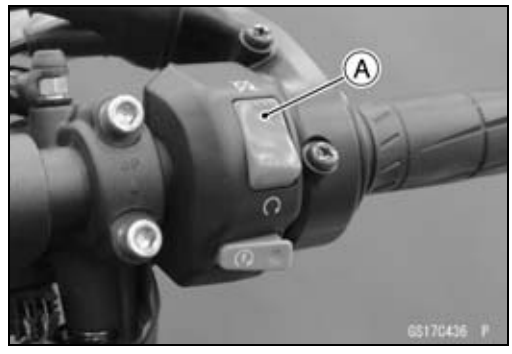
★If the all parts are good condition, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Engine Stop Switch Operation Inspection

First Step

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

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

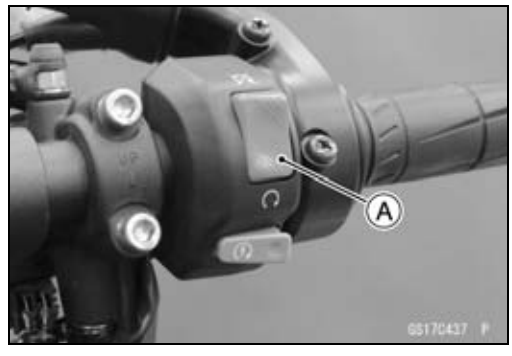


Second Step

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

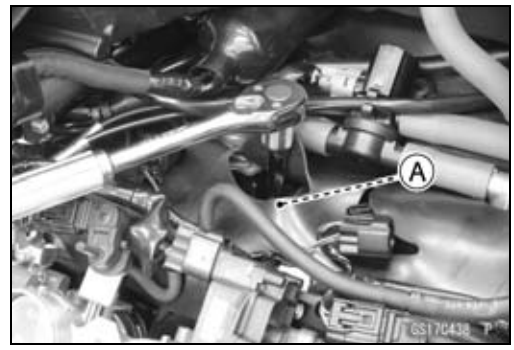
★If the engine does not stop, inspect or replace the engine stop switch (see Switch Inspection in the Electrical System chapter).

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



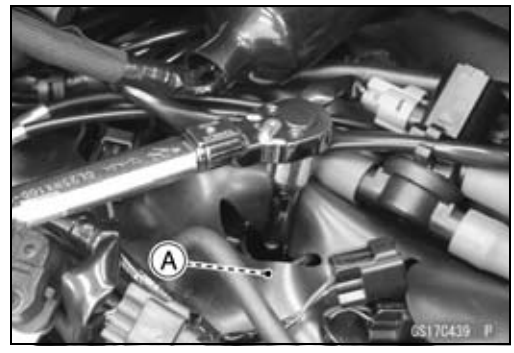
Periodic Maintenance Procedures

Spark Plug Replacement



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

Standard Spark Plug
Type: NGK 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.

Others

Chassis Parts Lubrication

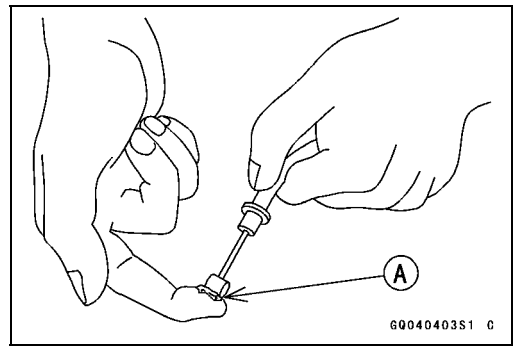
- Before lubricating each part, clean off any rusty spots with rust remover and wipe off any grease, oil, dirt, or grime.
- Lubricate the points listed below with indicated lubricant.

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
Side Stand

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

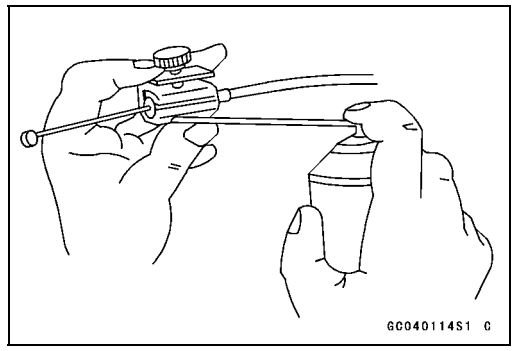


Periodic Maintenance Procedures

Cables: Lubricate with Rust Inhibitor.
Clutch Cable
Throttle Cables

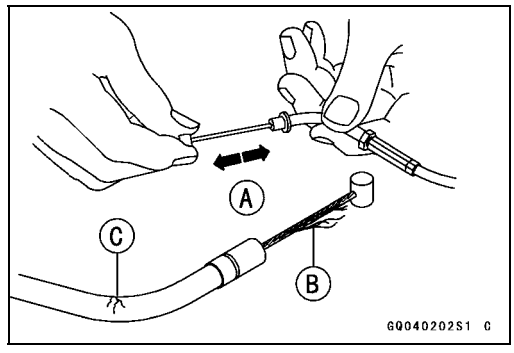
● Lubricate the cables by seeping the oil between the cable and housing.

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



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

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



Condition of Bolts, Nuts and Fasteners Tightness Inspection

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

NOTE

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

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

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

Periodic Maintenance Procedures

Bolt, Nut and Fastener to be checked

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

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

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

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

Steering:
- Handlebar Holder Bolts
- Steering Stem Head Bolt

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

Fuel System (DFI)

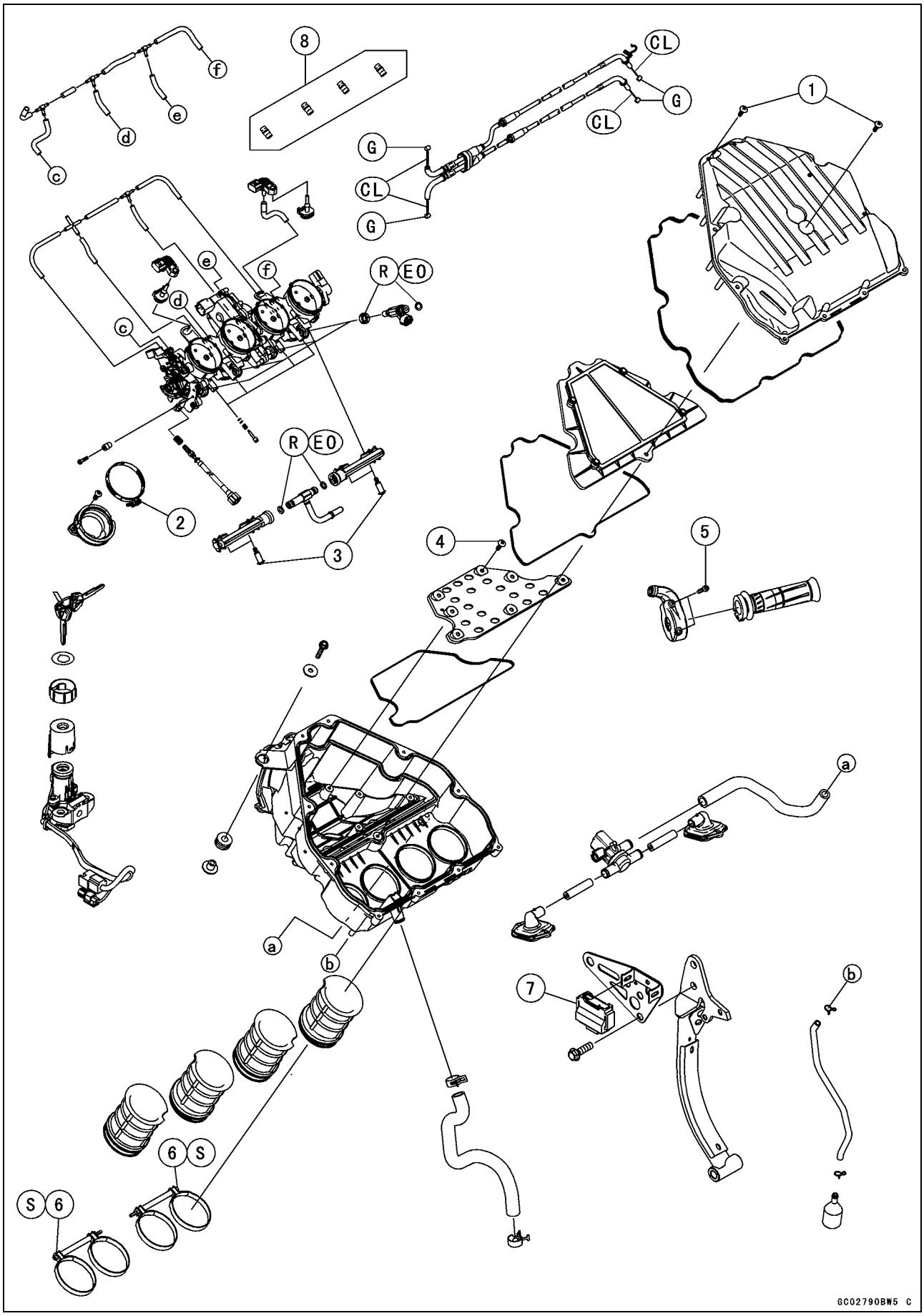
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Exploded View



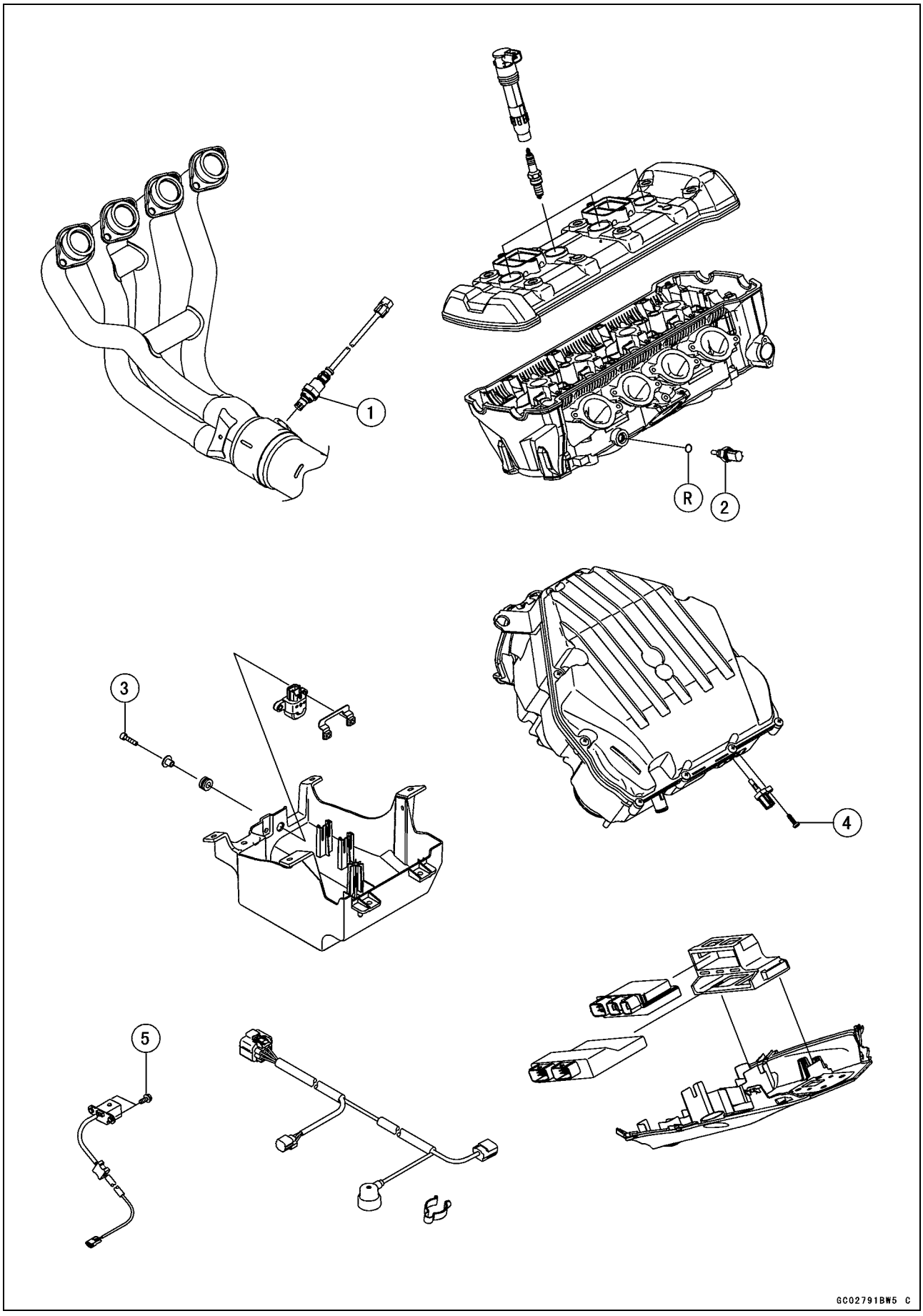
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Air Cleaner Housing Assembly Screws	1.1	0.11	10 in·lb	
2	Throttle Body Assy Holder Clamp Bolts	3.0	0.31	27 in·lb	
3	Delivery Pipe Assy Mounting Screws	3.43	0.350	30 in·lb	
4	Air Cleaner Housing Plate Screws	1.1	0.11	10 in·lb	
5	Throttle Case Bolts	3.5	0.36	31 in·lb	
6	Air Cleaner Housing Clamp Bolts	2.0	0.20	18 in·lb	S

7. Immobilizer System Equipped Models.
8. US and CA Models.

CL: Apply cable lubricant.
EO: Apply engine oil.
G: Apply grease.
R: Replacement Parts
S: Follow the specified tightening sequence.

Exploded View

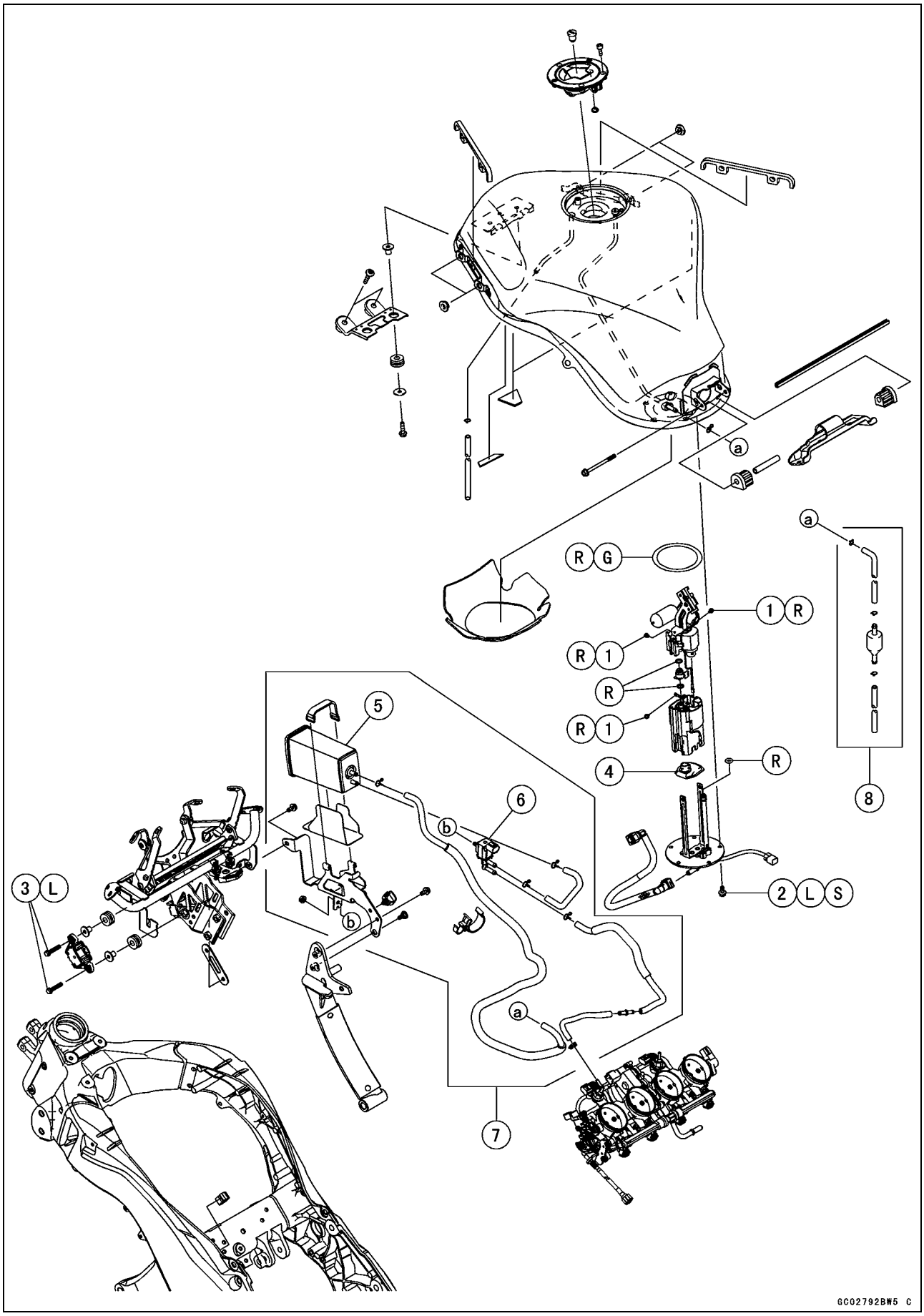


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Oxygen Sensor	45	4.6	33	
2	Water Temperature Sensor	12	1.2	106 in·lb	
3	Vehicle-down Sensor Mounting Bolts	6.0	0.61	53 in·lb	
4	Intake Air Temperature Sensor Screw	1.2	0.12	11 in·lb	
5	Crankshaft Sensor Bolts	6.0	0.61	53 in·lb	

R: Replacement Parts

Exploded View



Exploded View

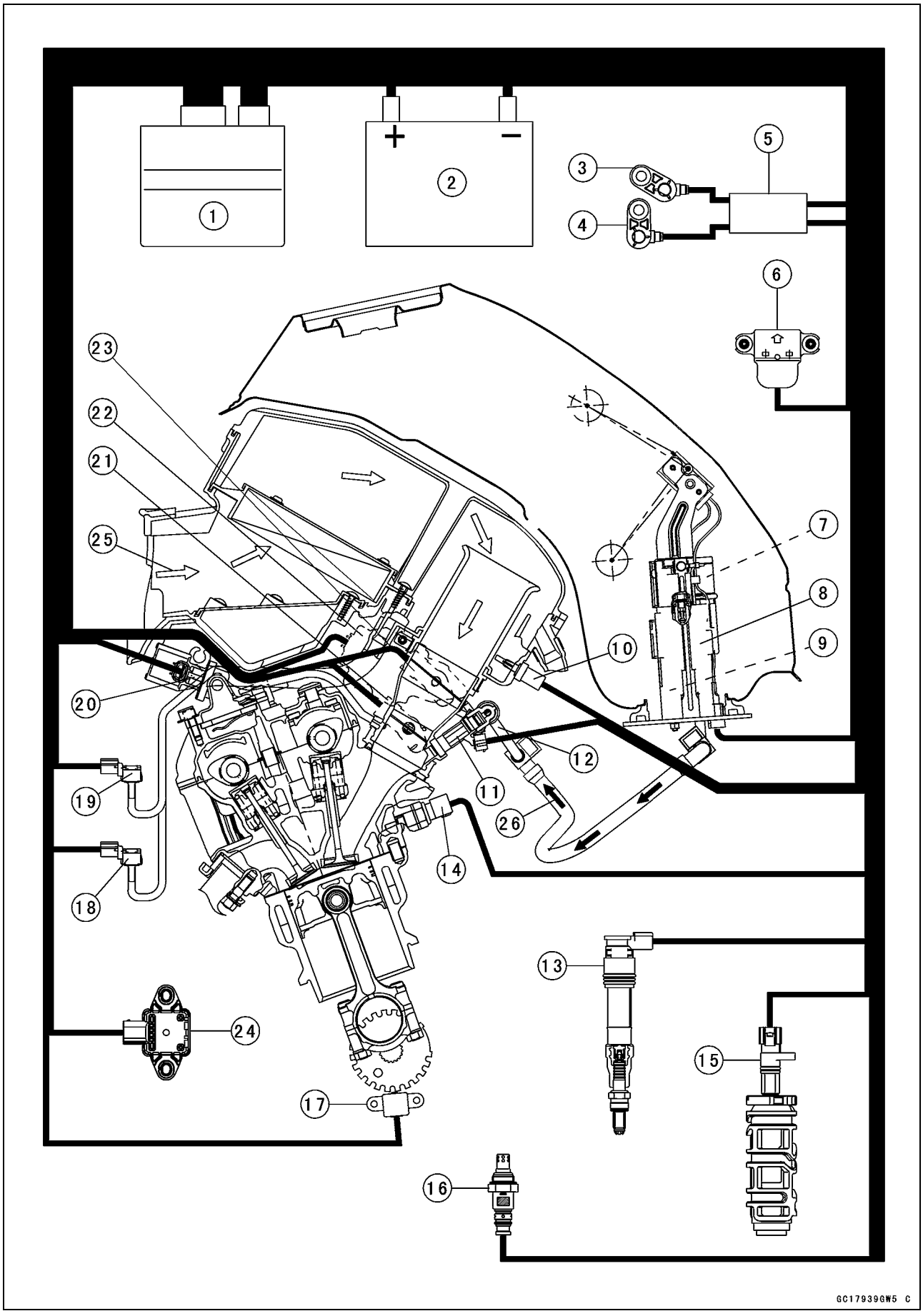
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Fuel Pump Assembly Screws	0.98	0.10	8.7 in·lb	R
2	Fuel Pump Bolts	10	1.0	89 in·lb	L, S
3	IMU Mounting Bolts	6.5	0.66	58 in·lb	L

4. Fuel Filter
5. Canister
6. Purge Valve
7. Other than US and CA Models.
8. US and CA Models.

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

DFI System

DFI System



DFI System

1. ECU
2. Battery 12 V 8 Ah
3. Front Wheel Rotation Sensor
4. Rear Wheel Rotation Sensor
5. ABS Hydraulic Unit
6. Vehicle-down Sensor
7. Pressure Regulator
8. Fuel Pump
9. Fuel Filter
10. Intake Air Temperature Sensor
11. Fuel Injectors
12. Delivery Pipe
13. Stick Coils
14. Water Temperature Sensor
15. Gear Position Sensor
16. Oxygen Sensor
17. Crankshaft Sensor
18. Intake Air Pressure Sensor #1
19. Intake Air Pressure Sensor #2
20. Air Switching Valve
21. Main Throttle Sensor
22. Subthrottle Valve Actuator
23. Subthrottle Sensor
24. IMU
25. Air Flow
26. Fuel Flow

DFI System

DFI Components Naming

The terms used in the European regulation for DFI components are sometimes different from those used by Kawasaki. Use this table to cross reference terms which may appear in a generic scan tool when diagnosing the DFI system.

Sensors described in R44/2014 (Description per ISO 15031-6 in the parentheses)	Kawasaki Name
Barometric pressure sensor (Barometric pressure circuit)	Intake air pressure sensor #2
Crankshaft position sensor (Crankshaft position sensor “A”)	Crankshaft sensor
Engine coolant temperature sensor (Engine coolant temperature sensor 1)	Water temperature sensor
Exhaust control valve angle sensor (Exhaust pressure control valve position sensor)	Exhaust butterfly valve actuator sensor
Gear shift position sensor (Gear Shift Position Circuit)	Gear position sensor
Intake air temperature sensor (Intake air temperature sensor 1)	Intake air temperature sensor
Manifold absolute pressure sensor (Manifold absolute pressure/barometric pressure circuit)	Intake air pressure sensor #1
O_2 sensor (binary/linear) signals (O_2 sensor)	Oxygen sensor
Throttle position sensor (Throttle/Pedal position sensor/switch “A”)	Main throttle sensor
Throttle position sensor (Throttle/Pedal position sensor/switch “B”)	Subthrottle sensor
Wheel speed sensor (Vehicle speed sensor “A”)	Front wheel rotation sensor
Vehicle speed sensor (Vehicle speed sensor “B”)	Rear wheel rotation sensor

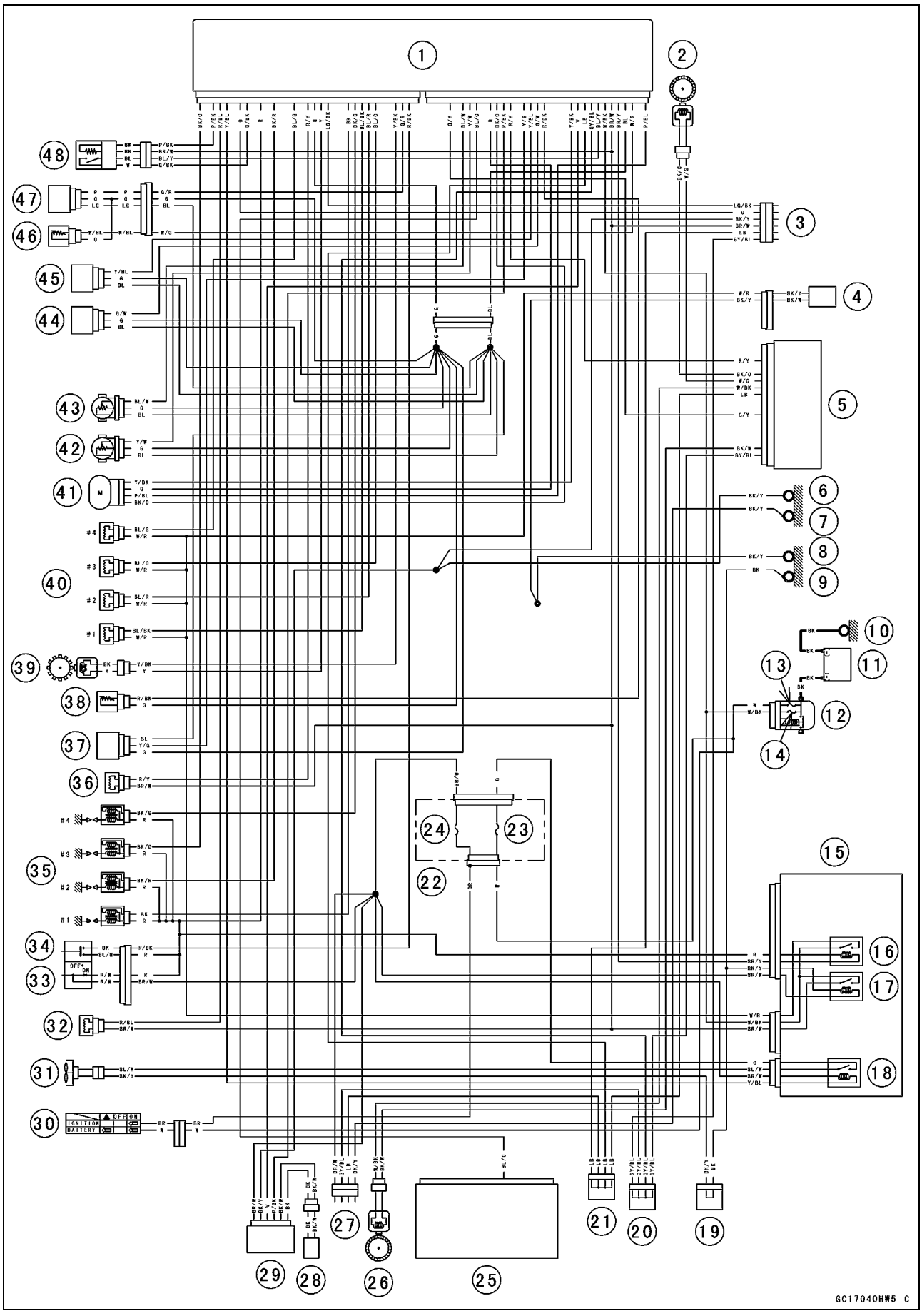
Actuators described in R44/2014 (Description per ISO 15031-6 in the parentheses)	Kawasaki Name
Evaporative emission system purge control valve (Evaporative emission system purge control valve)	Purge valve
Exhaust control valve actuator (motor driven) (Exhaust pressure control valve)	Exhaust butterfly valve actuator
Fuel injector (Injector - cylinder 1 ~ 4)	Fuel injector
Ignition coil primary control circuits (Ignition coil “A ~ D” primary/secondary circuit)	Stick coil
O_2 sensor heater (HO_2S heater control circuit)	Oxygen sensor heater
Secondary air injection system (Secondary air injection system)	Air switching valve
Throttle by wire actuator (Throttle actuator control motor circuit)	Subthrottle valve actuator

DFI System

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DFI System

DFI System Wiring Diagram



DFI System

Part Names

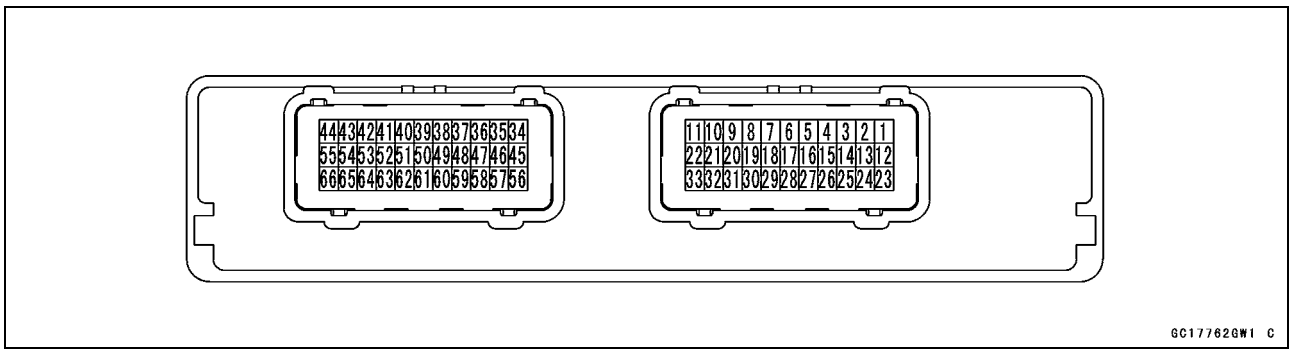
1. ECU
2. Rear Wheel Rotation Sensor
3. Immobilizer (Equipped Models)/Kawasaki Diagnostic System Connector
4. Fuel Pump
5. ABS Hydraulic Unit
6. Frame Ground (5)
7. Frame Ground (4)
8. Frame Ground (2)
9. Frame Ground (1)
10. Engine Ground
11. Battery 12 V 8 Ah
12. Starter Relay
13. Main Fuse 30 A
14. ECU Fuse 15 A
15. Relay Box
16. Fuel Pump Relay
17. ECU Main Relay
18. Radiator Fan Relay
19. Joint Connector B
20. Joint Connector (1)
21. Joint Connector (2)
22. Fuse Box (1)
23. Fan Fuse 15 A
24. Ignition Fuse 15 A
25. Meter Unit
26. Front Wheel Rotation Sensor
27. IMU
28. Immobilizer Antenna (Equipped Models)
29. Immobilizer Amplifier (Equipped Models)
30. Ignition Switch
31. Fan Motor
32. Air Switching Valve
33. Engine Stop Switch
34. Starter Button
35. Spark Plugs and Stick Coils
36. Purge Valve (Other than US and CA Models)
37. Vehicle-down Sensor
38. Intake Air Temperature Sensor
39. Crankshaft Sensor
40. Fuel Injectors
41. Subthrottle Valve Actuator
42. Main Throttle Sensor
43. Subthrottle Sensor
44. Intake Air Pressure Sensor #2
45. Intake Air Pressure Sensor #1
46. Water Temperature Sensor
47. Gear Position Sensor
48. Oxygen Sensor

○Color Codes:

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

DFI System

Terminal Numbers of ECU Connectors



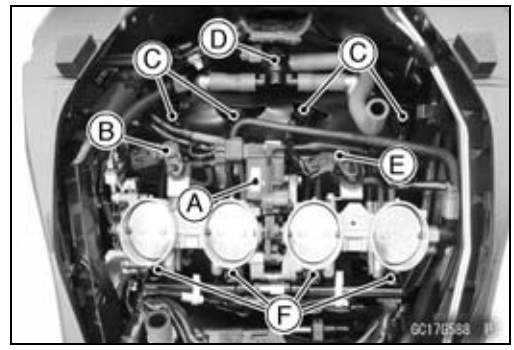
Terminal Names

1. Subthrottle Valve Actuator: P/BL
2. Unused
3. Water Temperature Sensor: W/G
4. Power Supply to Sensors: BL
5. Fuel Pump Relay: BR/Y
6. Power Supply to ECU (from Battery): BR/W
7. Power Supply to ECU (from Battery): W/BK
8. Oxygen Sensor: BL/Y
9. CAN Communication Line (High): GY/BL
10. CAN Communication Line (Low): LB
11. Immobilizer Amplifier (Equipped Models): V
12. Subthrottle Valve Actuator: Y/BK
13. Unused
14. Unused
15. Unused
16. Intake Air Temperature Sensor: R/BK
17. Intake Air Pressure Sensor #2: G/W
18. Intake Air Pressure Sensor #1: Y/BL
19. Vehicle-down Sensor: Y/G
20. Rear Wheel Rotation Sensor Output: P
21. Rear Wheel Rotation Sensor Signal: R/Y
22. Immobilizer Amplifier (Equipped Models): P/BK
23. Subthrottle Valve Actuator: BK/O
24. Subthrottle Valve Actuator: G
25. Unused
26. Meter Communication Line: BL/O
27. Main Throttle Sensor: Y/W
28. Subthrottle Sensor: BL/W
29. Unused
30. Front Wheel Rotation Sensor Signal: G/Y
31. Outside Temperature Sensor: BL/R
32. Unused
33. Side Stand Switch: G/BK
34. Upper Button: P/BL
35. Starter Button: R/BK
36. Gear Position Sensor: G/R
37. Crankshaft Sensor (–): Y/BK
38. Ground for Control System: BK/BL
39. Ground for Fuel System: BK/Y
40. Fuel Injector #3: BL/O
41. Fuel Injector #2: BL/R
42. Fuel Injector #1: BL/BK
43. Stick Coil #4: BK/G
44. Stick Coil #1: BK
45. Lower Button: Y/R
46. Starter Lockout Switch: R/G
47. External Communication Line (Immobilizer System (Equipped Models)/*KDS): LG/BK
48. Crankshaft Sensor (+): Y
49. Ground for Sensors: G
50. Purge Valve (Other than US and CA Models): R/Y
51. Green Neutral Indicator Light: LG
52. Fuel Injector #4: BL/G
53. Yellow KTRC Indicator Light (LED): G/R
54. Unused
55. Stick Coil #2: BK/R
56. SEL Button: G/W
57. Engine Stop Switch: R
58. Ground: BK/BL
59. Oxygen Sensor Ground: G/BK
60. External Communication Line (Immobilizer System (Equipped Models)/*KDS): O
61. Meter Unit (Tachometer): LB
62. Radiator Fan Relay: Y/BL
63. Air Switching Valve: R/BL
64. Oxygen Sensor Heater: P/BK
65. Ground for Ignition System: BK/Y
66. Stick Coil #3: BK/O

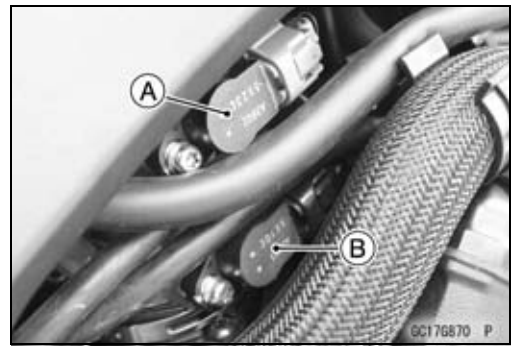
*: KDS (Kawasaki Diagnostic System)

DFI Parts Location

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



Subthrottle Sensor [A]
Main Throttle Sensor [B]



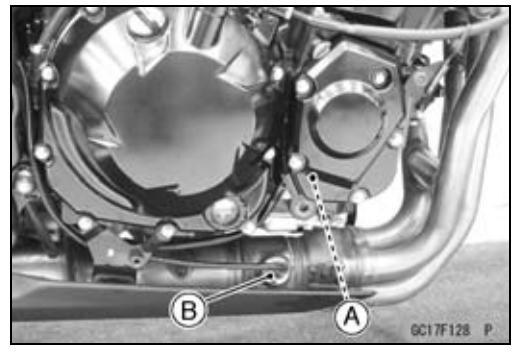
Water Temperature Sensor [A]



Intake Air Temperature Sensor [A]

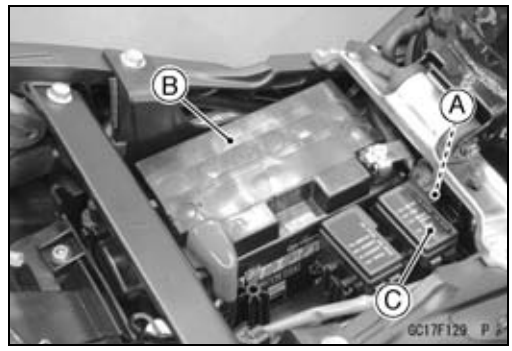


Crankshaft Sensor [A]
Oxygen Sensor [B]

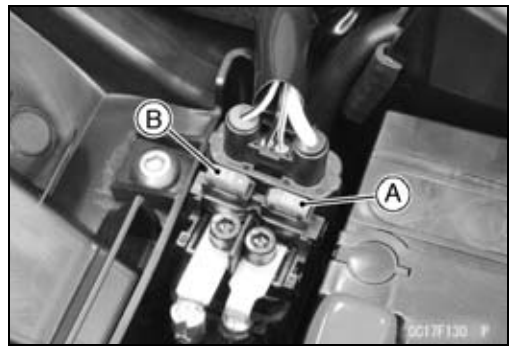


DFI Parts Location

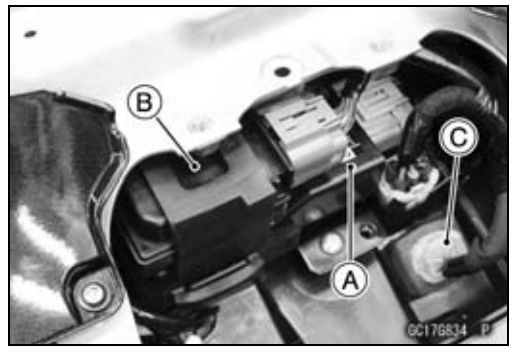
Vehicle-down Sensor [A]
Battery 12 V 8 Ah [B]
Fuse Box (1) [C]



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



ECU [A]
Relay Box [B]
Immobilizer (Equipped Models)/Kawasaki Diagnostic System Connector [C]



Fuel Pump [A]

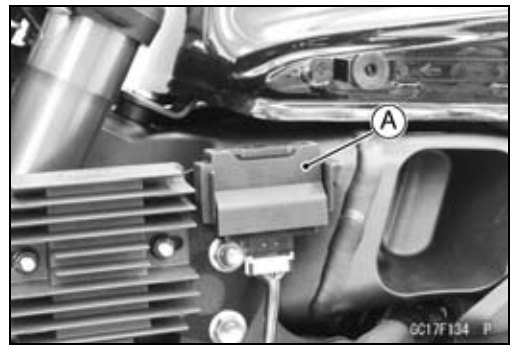


Ignition Key [A] (Transponder, Immobilizer System Equipped Models)
Immobilizer Antenna [B] (Equipped Models)
Ignition Switch [C]
Yellow Engine Warning Indicator Light (LED) [D]

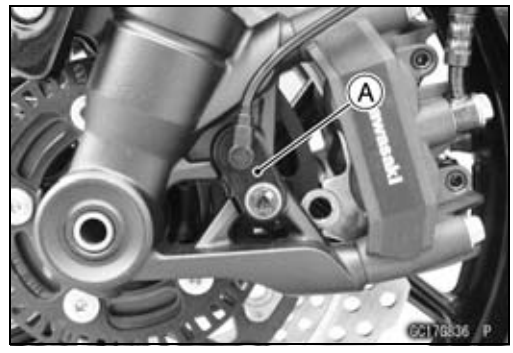


DFI Parts Location

Immobilizer Amplifier [A] (Equipped Models)



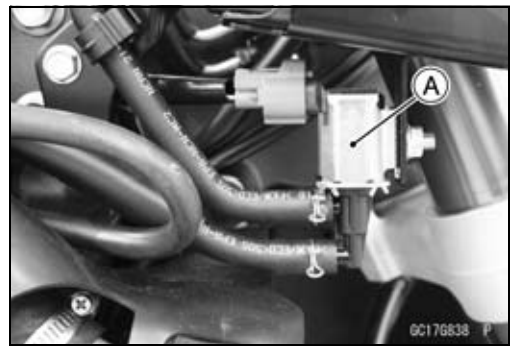
Front Wheel Rotation Sensor [A]



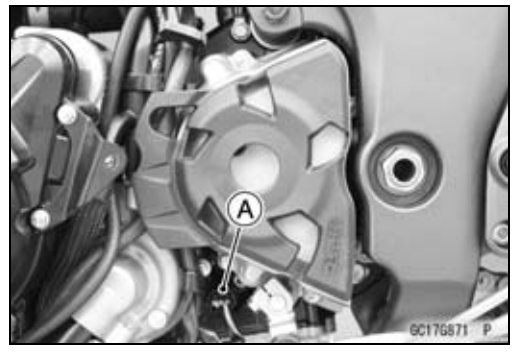
Rear Wheel Rotation Sensor [A]



Purge Valve [A] (Other than US and CA Models)

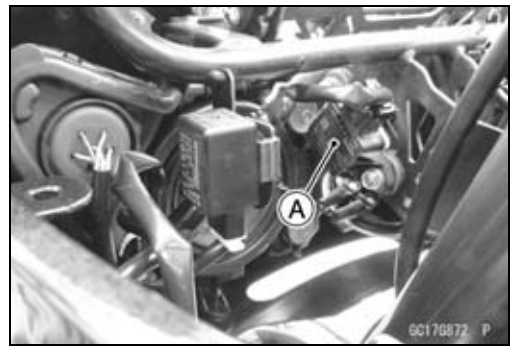


Gear Position Sensor [A]



DFI Parts Location

IMU [A]



Specifications

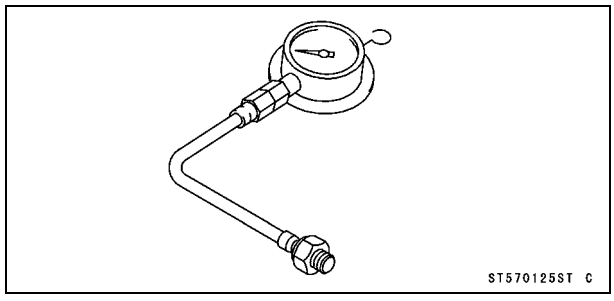
Item	Standard
Digital Fuel Injection System	
Idle Speed	1 100 ±50 r/min (rpm)
Throttle Body Assy:	
Throttle Valve	Dual throttle valve
Bore	ϕ38 mm (1.5 in.)
Throttle Body Vacuum	40.7 ±1.3 kPa (305 ±10 mmHg) at idle speed
Bypass Screws (Turn Out)	0 ~ 2 1/2 (for reference)
ECU:	
Make	DENSO
Type	Digital memory type, with built in IC igniter, sealed with resin
Fuel Pressure (High Pressure Line)	294 kPa (3.0 kgf/cm², 43 psi) with engine idling
Fuel Pump:	
Type	In-tank pump (in fuel pump)
Discharge	50 mL (1.7 US oz.) or more for 3 seconds
Fuel Injectors:	
Type	EAT289
Nozzle Type	Fine atomizing type with 8 holes
Resistance	About 11.7 ~ 12.3 Ω @20°C (68°F)
CAN Communication Line:	
Resistance	About 120 Ω at ECU Terminals
Main Throttle Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	DC 1.02 ~ 1.06 V at idle throttle opening
	DC 4.22 ~ 4.42 V at full throttle opening (for reference)
Resistance	4 ~ 6 kΩ
Intake Air Pressure Sensor #1/#2:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	DC 3.80 ~ 4.20 V at standard atmospheric pressure (see this text for details)
Intake Air Temperature Sensor:	
Output Voltage	About DC 2.25 ~ 2.50 V @20°C (68°F)
Resistance	5.4 ~ 6.6 kΩ @0°C (32°F)
	0.29 ~ 0.39 kΩ @80°C (176°F)
Water Temperature Sensor:	
Output Voltage	About DC 2.80 ~ 2.97 V @20°C (68°F)
Gear Position Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	in the text
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

Specifications

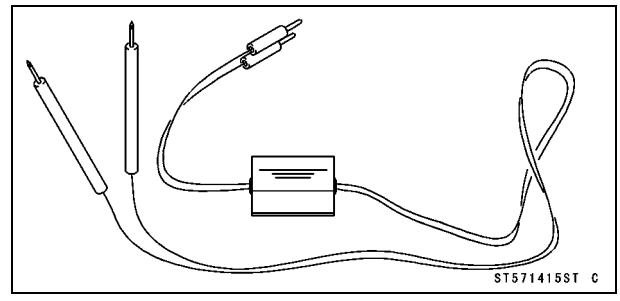
Item	Standard
Subthrottle Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	DC 1.08 ~ 1.12 V at subthrottle valve full close position
	DC 4.2 ~ 4.4 V at subthrottle valve full open position (for reference)
Resistance	4 ~ 6 kΩ
Immobilizer Antenna (Equipped Models):	
Resistance	About 3.0 ~ 4.6 Ω
Subthrottle Valve Actuator:	
Resistance	About 5.2 ~ 7.8 Ω
Input Voltage	About DC 8.5 ~ 10.5 V and then 0 V or About DC 8.5 ~ 10.5 V
Oxygen Sensor:	
Output Voltage (Rich)	DC 0.7 V or more
Output Voltage (Lean)	DC 0.2 V or less
Heater Resistance	11.7 ~ 14.5 Ω @20°C (68°F)
Purge Valve (Other than US and CA Models):	
Resistance	30 ~ 34 Ω @20°C (68°F)
IMU:	
Input Voltage	Battery voltage
Throttle Grip and Cables	
Throttle Grip Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)
Air Cleaner	
Air Cleaner Element	Viscous paper element

Special Tools and Sealant

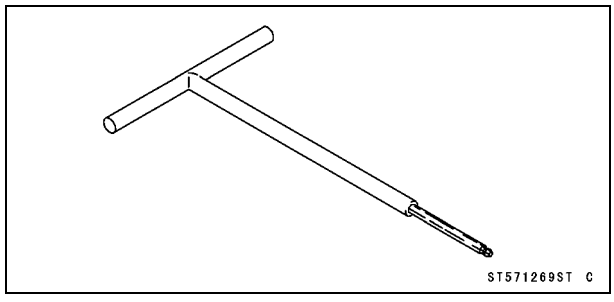
Oil Pressure Gauge, 5 kgf/cm²:
57001-125



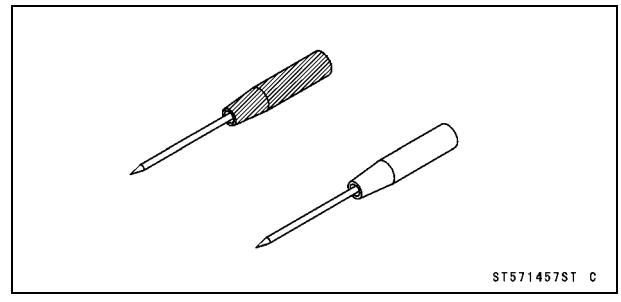
Peak Voltage Adapter:
57001-1415



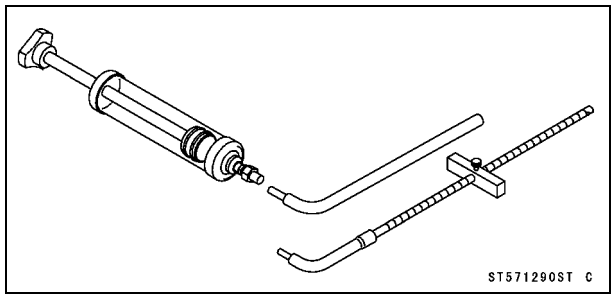
Carburetor Drain Plug Wrench, Hex 3:
57001-1269



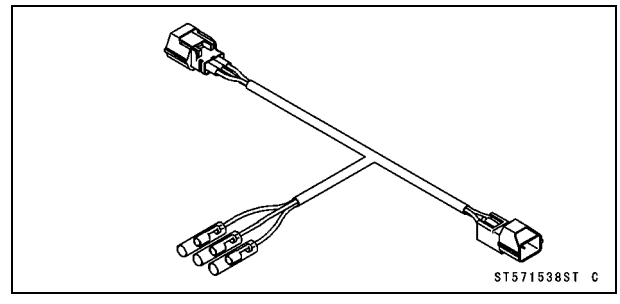
Needle Adapter Set:
57001-1457



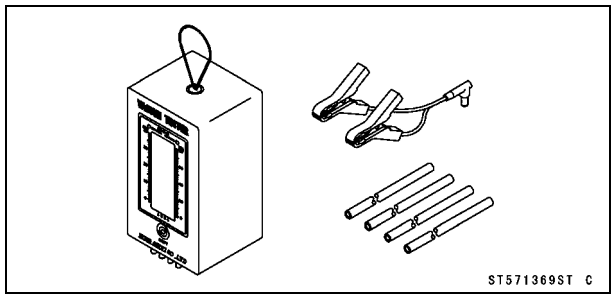
Fork Oil Level Gauge:
57001-1290



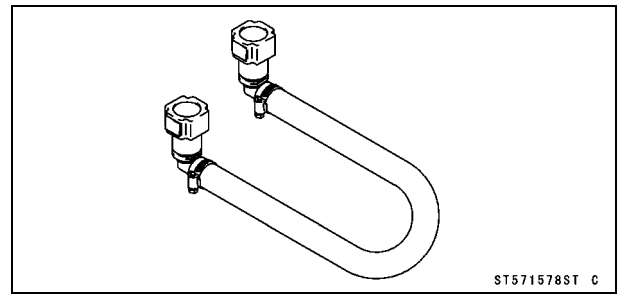
Throttle Sensor Setting Adapter:
57001-1538



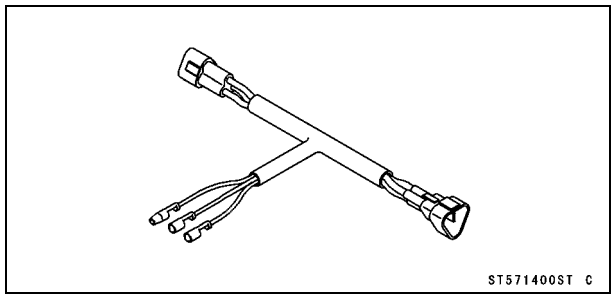
Vacuum Gauge:
57001-1369



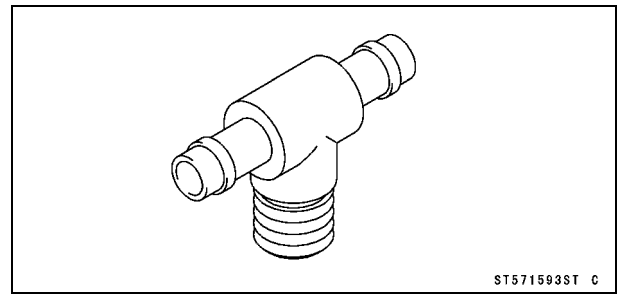
Extension Tube:
57001-1578



Throttle Sensor Setting Adapter #1:
57001-1400

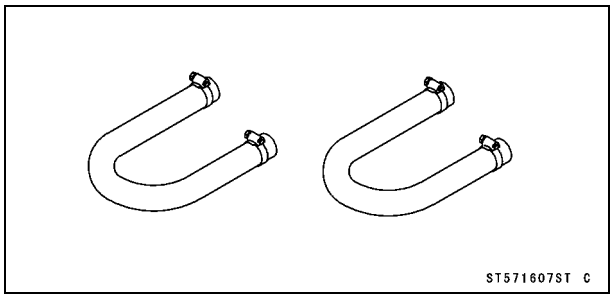


Fuel Pressure Gauge Adapter:
57001-1593

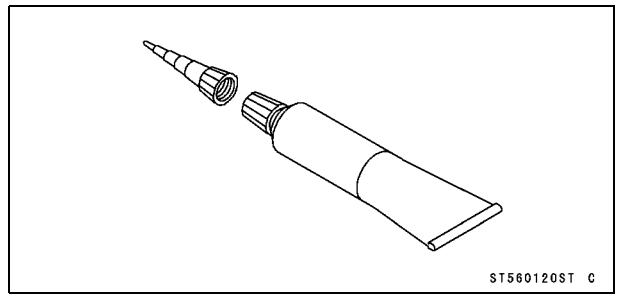


Special Tools and Sealant

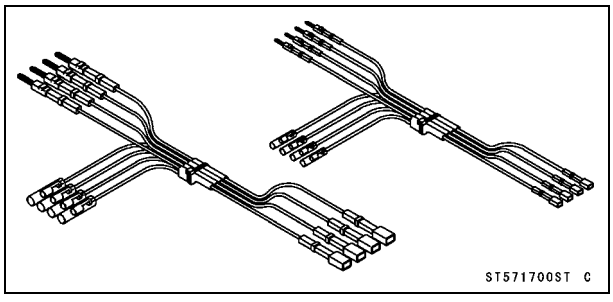
Fuel Hose:
57001-1607



Liquid Gasket, TB1211:
56019-120



Measuring Adapter:
57001-1700

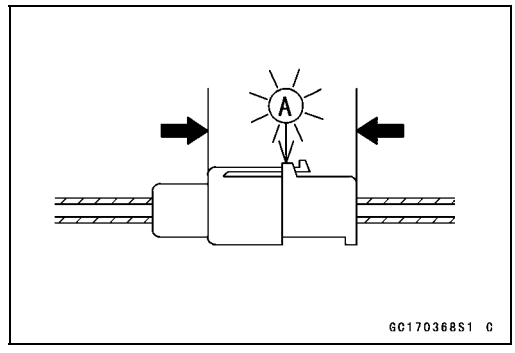


DFI Servicing Precautions

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

- This DFI system is designed to be used with a 12 V sealed battery as its power source. Do not use any other battery except for a 12 V sealed battery as a power source.
- Do not reverse the battery cable connections. This will damage the ECU.
- To prevent damage to the DFI parts, do not disconnect the battery cables or any other electrical connections when the ignition switch is on, or while the engine is running.
- Take care not to short the leads that are directly connected to the battery positive (+) terminal to the chassis ground.
- When charging, remove the battery from the motorcycle. This is to prevent ECU damage by excessive voltage.

- Whenever the DFI electrical connections are to be disconnected, first turn off the ignition switch, and disconnect the battery (–) terminal. Do not pull the lead, only the connector. Conversely, make sure that all the DFI electrical connections are firmly reconnected before starting the engine.
- Connect these connectors until they click [A].



- Do not turn the ignition switch on while any of the DFI electrical connectors are disconnected. The ECU memorizes service codes.
- Do not spray water on the electrical parts, DFI parts, connectors, leads and wiring.
- If a transceiver is installed on the motorcycle, make sure that the operation of the DFI system is not influenced by electric wave radiated from the antenna. Check operation of the system with the engine at idle. Locate the antenna as far as possible away from the ECU.
- When any fuel hose is disconnected, do not turn on the ignition switch. Otherwise, the fuel pump will operate and fuel will spout from the fuel hose.
- Do not operate the fuel pump if the pump is completely dry. This is to prevent pump seizure.
- Before removing the fuel system parts, blow the outer surfaces of these parts clean with compressed air.
- When any fuel hose is disconnected, fuel may spout out by residual pressure in the fuel line. Cover the hose joint with a piece of clean cloth to prevent fuel spillage.
- When installing the fuel hoses, avoid sharp bending, kinking, flattening or twisting, and run the fuel hoses with a minimum of bending so that the fuel flow will not be obstructed.
- Run the hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.
- To prevent corrosion and deposits in the fuel system, do not add to fuel any fuel antifreeze chemicals.

DFI Servicing Precautions

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

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



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

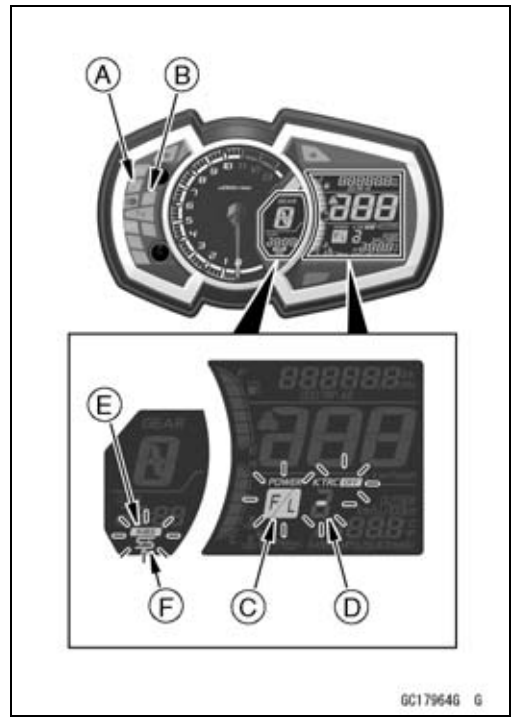
Torque - Oil Filler Plug: Hand-tighten



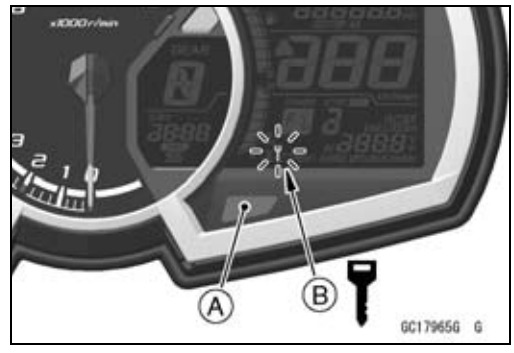
Troubleshooting the DFI System

Outline

- When a problem occurs with DFI system, the yellow engine warning indicator light (LED) [A] goes on to alert the rider.
- When a problem occurs with a electrical control system, the yellow warning indicator light (LED) [B] goes on and following indicator blinking on the LCD to indicate kind of malfunctioning system.
  Power Mode Indicators [C]
  KTRC Mode Indicators [D] with "–"
  KIBS Indicator [E]
  IMU Indicator [F]



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



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

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

Fuel Pump
Fuel Pump Relay
ECU Main Relay



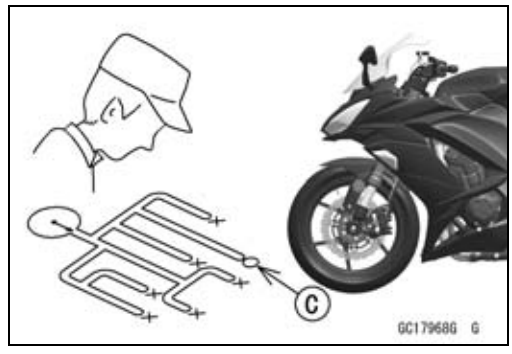
Troubleshooting the DFI System

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

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

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





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

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

When the repair has been done, the yellow engine warning indicator light (LED) goes off after the service code erasing procedure (see Service Code Erasing) is done.

When the motorcycle is down, the vehicle-down sensor operates and the ECU shuts off the fuel pump relay, fuel injectors and ignition system. The ignition switch is left on. If the starter button is pushed, the electric starter turns but the engine does not start. To start the engine again, raise the motorcycle, turn the ignition switch off, and then on.

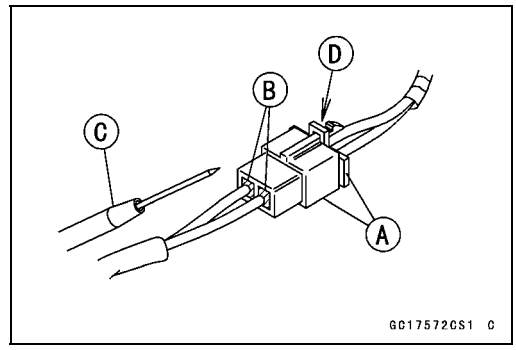
Much of the DFI system troubleshooting work consists of confirming continuity of the wiring. The DFI parts are assembled and adjusted with precision, and it is impossible to disassemble or repair them.

Troubleshooting the DFI System

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

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

Special Tool - Needle Adapter Set: 57001-1457



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

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

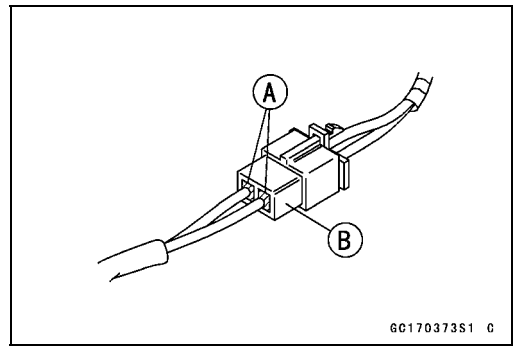
● Be careful not to short-circuit the leads of the DFI or electrical system parts by contact between adapters.

● Turn the ignition switch on and measure the voltage with the connector joined.

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

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

Sealant - Liquid Gasket, TB1211: 56019-120



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

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

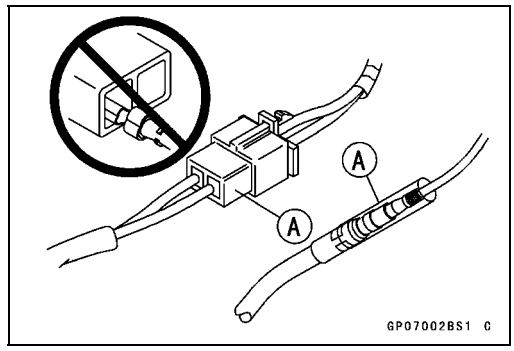
● Measure the coil winding resistance when the DFI part is cold (at room temperature).

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

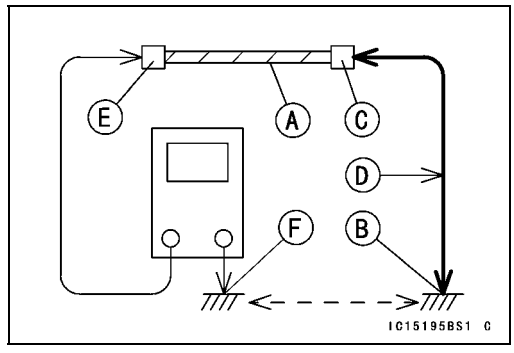
★If any wiring is deteriorated, replace the wiring.

Troubleshooting the DFI System

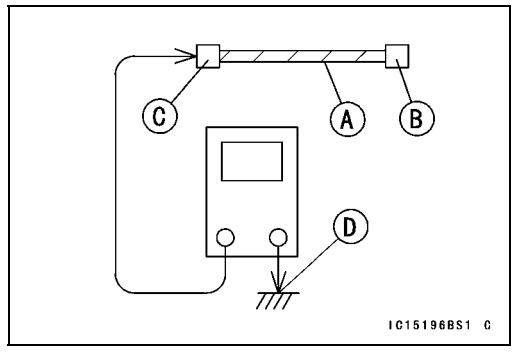
● Pull each connector [A] apart and inspect it for corrosion, dirt, and damage.
★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it. Connect the connectors securely.
● Check the wiring for continuity.
○Use the wiring diagram to find the ends of the lead which is suspected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



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



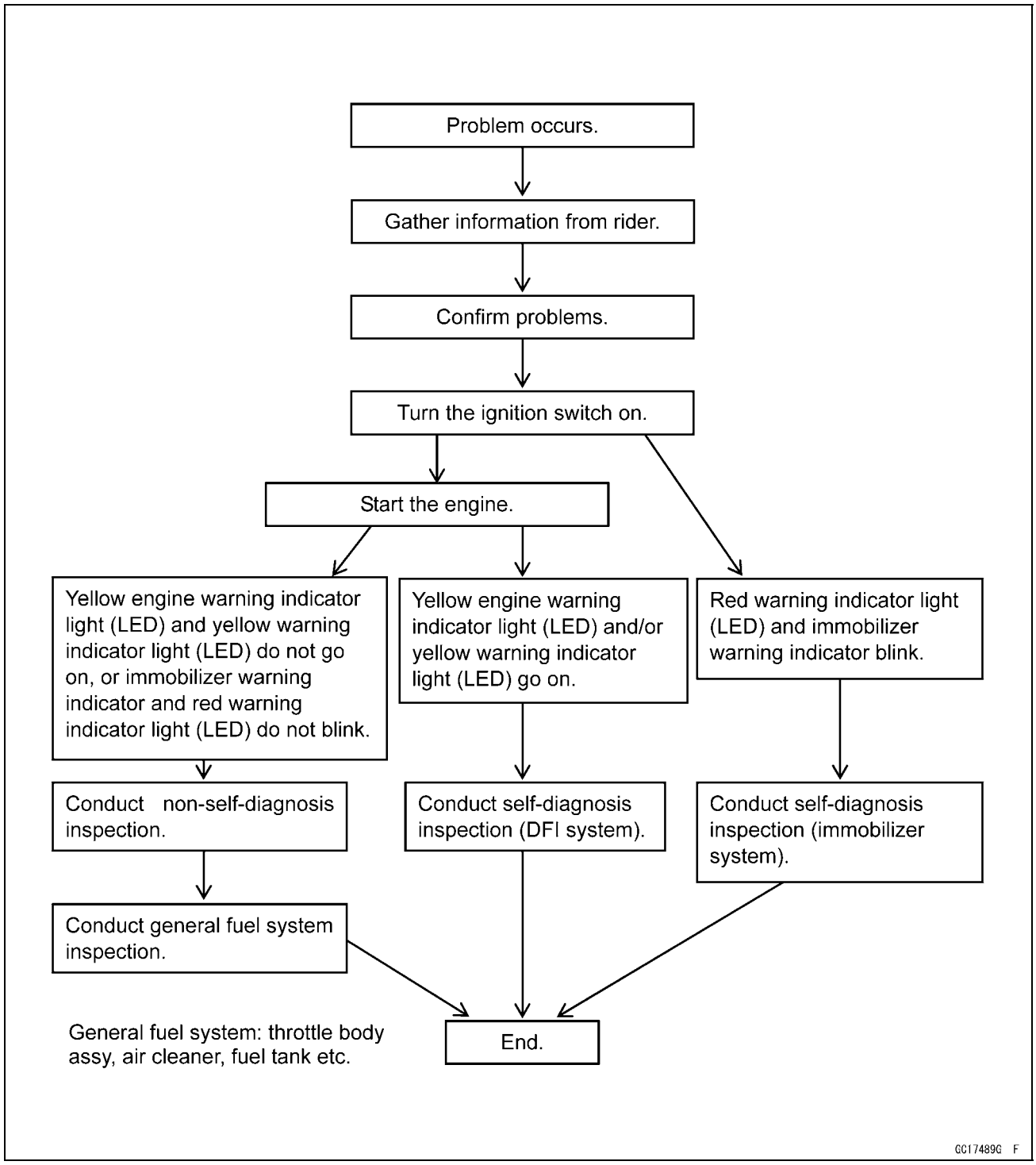
○When checking a harness [A] for short circuit, open one end [B] and check the continuity between the other end [C] and ground [D]. If there is continuity, the harness has a short circuit to ground, and it must be repaired or replaced.



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

Troubleshooting the DFI System

DFI Diagnosis Flow Chart



Inquiries to Rider

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

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

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

Troubleshooting the DFI System

Sample Diagnosis Sheet

Rider name:	**Registration No. (license plate No.):**	**Year of initial registration:**
Model:	**Engine No.:**	**Frame No.:**
Date problem occurred:		**Mileage:**
Environment when problem occurred.		
Weather	☐ fine, ☐ cloudy, ☐ rain, ☐ snow, ☐ always, ☐ other:	
Temperature	☐ hot, ☐ warm, ☐ cold, ☐ very cold, ☐ always, ☐ other:	
Problem frequency	☐ chronic, ☐ often, ☐once	
Road	☐ street, ☐ highway, ☐ mountain road (☐ uphill, ☐ downhill), ☐ bumpy, ☐ pebble	
Altitude	☐ normal, ☐ high (about 1 000 m or more)	
Motorcycle conditions when problem occurred.		
Yellow engine warning indicator light (LED) or yellow warning indicator light (LED)	☐ goes on immediately after turning the ignition switch on, and goes off after about 1 second, and goes off after starting the engine (normal)	
	☐ goes on immediately after turning the ignition switch on, goes off after about 1 second, and goes on again after about 10 seconds (ECU communication error)	
	☐ goes on immediately after turning the ignition switch on, goes off after about 1 second, and stays on after starting the engine [DFI system or other electrical system problem]	
	☐ does not go on after turning the ignition switch on [indicator light (LED), meter unit fault]	
Red warning indicator light (LED)	☐ Starts blinking about 1 seconds after ignition switch on, and the immobilizer warning indicator on the LCD starts blinking (immobilizer system problem).	
	☐ Does not go on about 1 seconds after ignition switch on (ECU or meter unit fault).	
	☐ light up (battery, oil pressure, water temperature, immobilizer or meter unit problem)	
Starting difficulty	☐ starter motor not rotating.	
	☐ starter motor rotating but engine do not turn over.	
	☐ starter motor and engine do not turn over.	
	☐ no fuel flow (☐ no fuel in tank, ☐ no fuel pump sound).	
	☐ no spark.	
	☐ other:	
Engine stalls	☐ right after starting.	
	☐ when opening throttle grip.	
	☐ when closing throttle grip.	
	☐ when moving off.	
	☐ when stopping the motorcycle.	
	☐ when cruising.	
	☐ other:	

Troubleshooting the DFI System

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

DFI System Troubleshooting Guide

NOTE

○*This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties in DFI system.*

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

Engine Won't Turn Over

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

Poor Running at Low Speed

Symptoms or Possible Causes	Actions (chapter)
Spark weak:	
Stick coil shorted or not in good contact	Inspect or reinstall (see chapter 16).
Stick coil trouble	Inspect (see chapter 16).
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 16).
Spark plug incorrect	Replace it with the correct plug (see chapter 2).
ECU trouble	Inspect (see chapter 3).
Fuel/air mixture incorrect:	
Little fuel in tank	Supply fuel (see Owner's Manual).
Air cleaner clogged, poorly sealed, or missing	Clean element or inspect sealing (see chapter 2).
Air duct loose	Reinstall (see chapter 3).
Throttle body assy holder loose	Reinstall (see chapter 3).
Throttle body assy dust seal damage	Replace (see chapter 3).
Fuel injector O-ring damage	Replace (see chapter 3).
Fuel filter clogged	Replace fuel filter (see chapter 2).

DFI System Troubleshooting Guide

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

DFI System Troubleshooting Guide

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

DFI System Troubleshooting Guide

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

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions (chapter)
Intake air temperature sensor trouble	Inspect (see chapter 3).
Miscellaneous:	
Subthrottle sensor trouble	Inspect (see chapter 3).
Subthrottle valve actuator trouble	Inspect (see chapter 3).
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 17)
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 3).
Intake air temperature sensor trouble	Inspect (see chapter 3).
(Brown smoke)	
Air duct loose	Reinstall (see chapter 3).
Fuel pressure too low	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Intake air temperature sensor trouble	Inspect (see chapter 3).

Self-Diagnosis

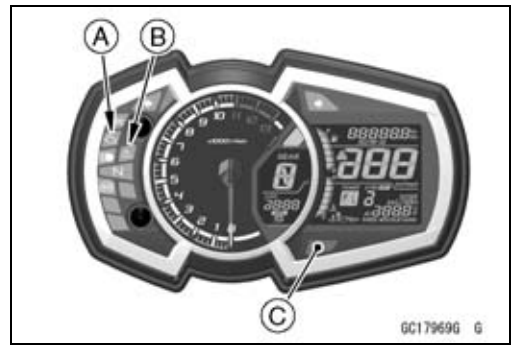
Self-Diagnosis Outline

The self-diagnosis system is monitoring the following mechanism.

DFI System and Ignition System
Power Mode System
KTRC System
IMU
KIBS System
Immobilizer System (Equipped Models)

The following indicator lights (LED) are used for symbols of below table.

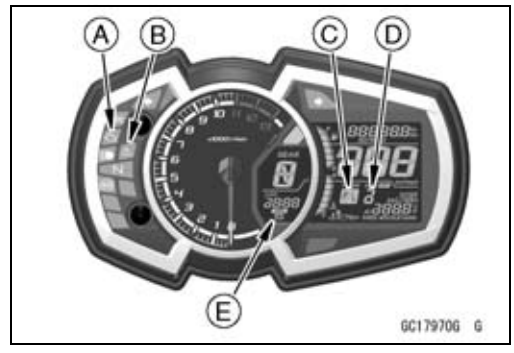
LED Color	Warning Indicators
Yellow [A]	FI (DFI System and Ignition System)
Yellow [B]	Power Mode, KTRC, IMU, KIBS
Red [C]	Oil Pressure, Battery Voltage, Water temperature, Immobilizer (Equipped Models)



The self-diagnosis system has two modes and can be switched to another mode by operating the meter unit.

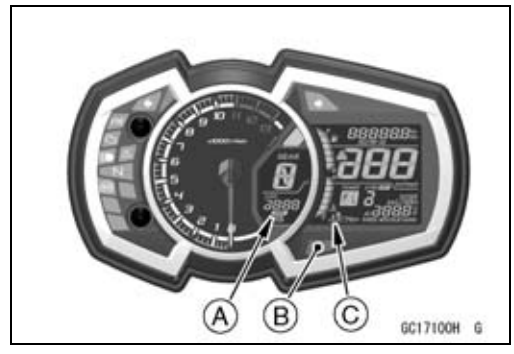
User Mode

The ECU notifies the rider of troubles in DFI system and ignition system by lighting or blinking the yellow engine warning indicator light (LED) [A], or yellow warning indicator light (LED) [B], power mode indicator [C], KTRC mode indicator [D], and IMU indicator [E] when DFI, ignition, power mode, KTRC or IMU are faulty, and initiates fail-safe function. In case of serious troubles, ECU stops the injection and ignition operation.



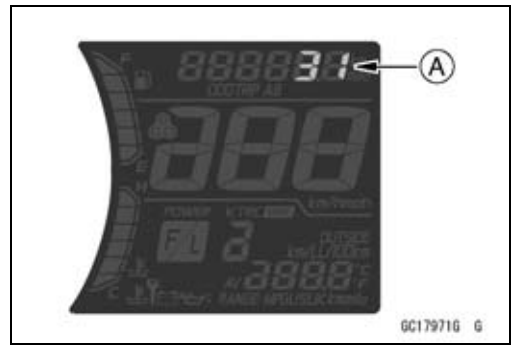
The ABS hydraulic unit notifies the rider of troubles in this system by lighting or blinking the yellow ABS indicator light (LED) or KIBS indicator [A] when ABS parts are faulty, and initiates fail-safe function.

For models equipped with immobilizer system, the ECU notifies the rider of troubles in this system by lighting or blinking the red warning indicator light (LED) [B] and immobilizer indicator [C] when immobilizer system parts are faulty, and initiates fail-safe function.



Dealer Mode

The LCD displays the service code(s) [A] to show the problem(s) which the above system has at the moment of diagnosis.



Self-Diagnosis

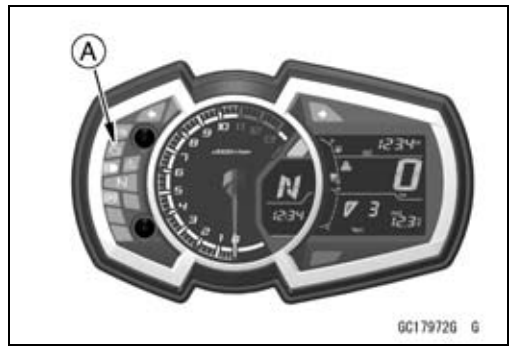
Self-Diagnosis Procedures

NOTE

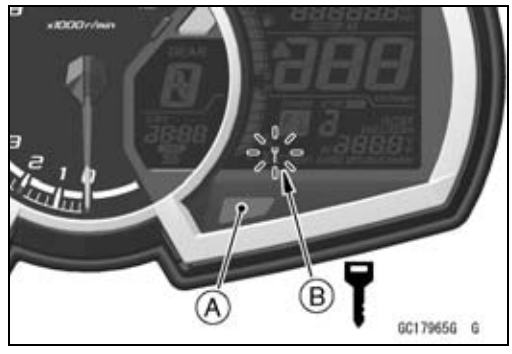
○*Use a fully charged battery when conducting self-diagnosis. Otherwise, the warning indicator light (LED) and indicator do not light or blink.*

● Turn the ignition switch on and start the engine.

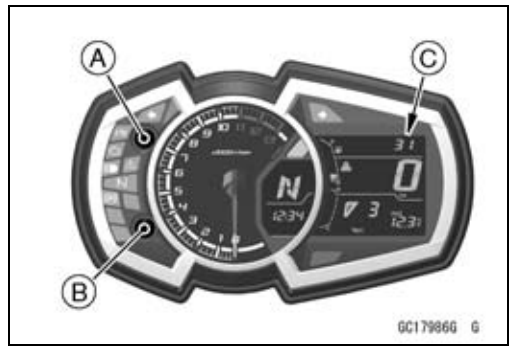
○When a problem occurs with DFI system and ignition system, the yellow engine warning indicator light (LED) [A] stays on after starting the engine to alert the rider.



○When a problem occurs with immobilizer system (equipped models), the red warning indicator light (LED) [A] and immobilizer warning indicator [B] blink.



● Push the upper meter button [A] to select the odometer mode.
● Push the upper meter button and lower meter button [B] the for more than two seconds.
● The service code [C] is displayed on the LCD by the number or letters of two or three digits.



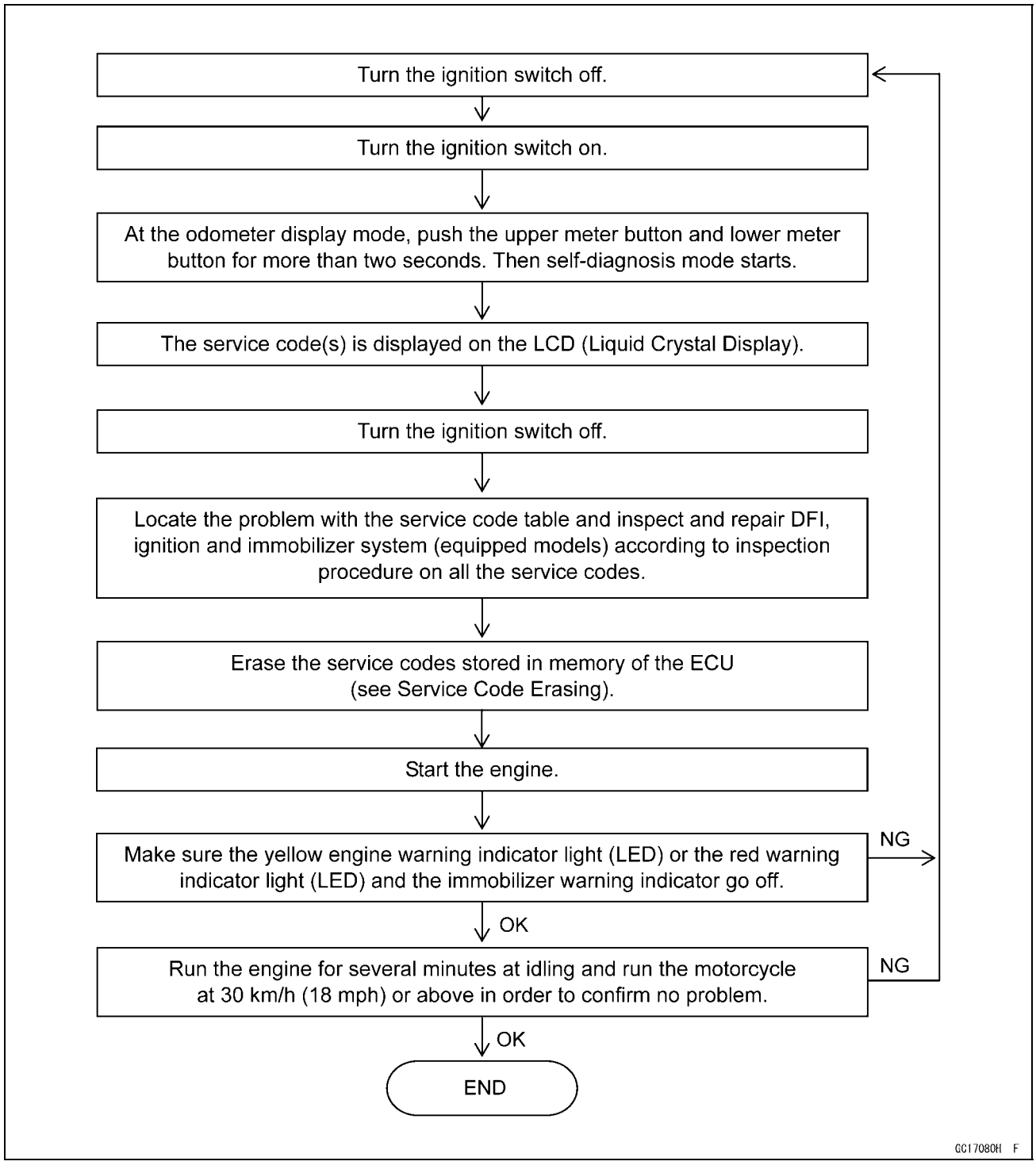
● Any of the following procedures ends self-diagnosis.

○When the service code is displayed on the LCD, push the upper and lower meter buttons for more than two seconds. The display will return to the previous display.

○When the ignition switch is turned off.

Self-Diagnosis

Self-Diagnosis Flow Chart



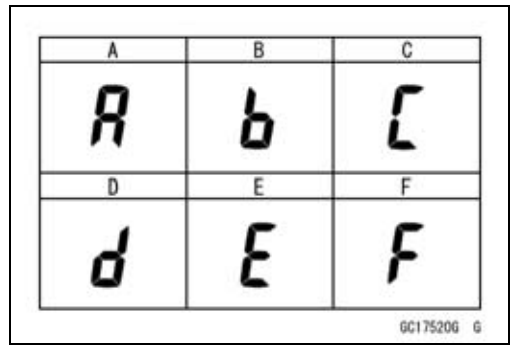
Service Code Reading

○The service code(s) is displayed on the LCD by the numbers or letters of two or three digits.

NOTE

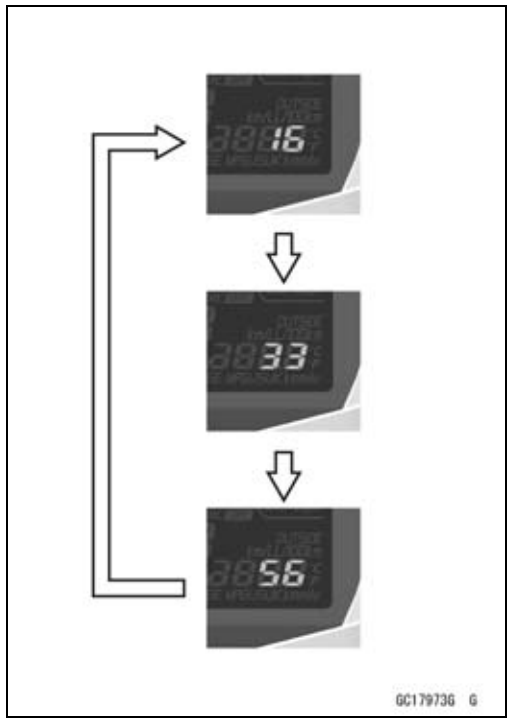
○*The LCD displays the alphabet of the service code as shown.*

○*The service code of the IMU adds "E" at the left side of the code.*



Self-Diagnosis

○When there are a number of problems, all the service codes can be stored and the display will begin starting from the lowest number service code in the numerical order.
○Then after completing all codes, the display is repeated until the ignition switch is turned off or upper and lower meter buttons are pushed for more than two seconds.
○For example, if three problems occurred in the order of 56, 16, 33, the service codes are displayed (each two seconds) from the lowest number in the order listed as shown below.
(16 → 33 → 56) → (16 → 33 → 56) → · · · (repeated)



Service Code Erasing

● The service codes stored in memory of the ECU can be erased using Kawasaki Diagnostic System (KDS Ver.3).
★If the Kawasaki Diagnostic System (KDS Ver.3) is not available, do the following procedures.
1. Turn on the ignition switch and start the engine.
2. Keep the idling speed more than 30 seconds.
3. Run the vehicle more than 5 minutes at a speed of 40 km/h (25 mph) or more.
Be sure to keep the engine running during procedures 2 and 3 for more than 10 minutes in total.
4. Turn the ignition switch off.
5. Repeat the above procedures 3 times.
6. Start the engine and check that the yellow engine warning indicator light (LED) goes off.

Service Code Table

○The service codes of the immobilizer system appear to system equipped models.

Service Codes	DTC (Diagnostic Trouble Code)	System	Problems
11	P0120	FI	Main throttle sensor malfunction, wiring open or short
	P0123		
12	P0105	FI	Intake air pressure sensor #1 malfunction, wiring open or short
	P0107		
13	P0110	FI	Intake air temperature sensor malfunction, wiring open or short
	P0112		
14	P0115	FI	Water temperature sensor malfunction, wiring open or short
	P0117		
16	P2226	FI	Intake air pressure sensor #2 malfunction, wiring open or short
	P2227		
	P2228		
21	P0335	FI	Crankshaft sensor malfunction, wiring open or short
24	P2158	FI	Rear wheel rotation sensor malfunction, wiring open or short

Self-Diagnosis

Service Codes	DTC (Diagnostic Trouble Code)	System	Problems
25	P0914	FI	Gear position sensor malfunction, wiring open or short
	P0915		
	P0916		
27	P0500	FI	Front wheel rotation sensor malfunction, wiring open or short
31	C0064	FI	Vehicle-down sensor malfunction, wiring open or short
32	P0220	FI	Subthrottle sensor malfunction, wiring open or short
	P0223		
33	P0130	FI	Oxygen sensor malfunction or inactivate, wiring open or short
	P0132		
35	–	Immobilizer	Immobilizer amplifier malfunction (Equipped Models)
36	–	Immobilizer	Blank key detection (Equipped Models)
39	–	FI	ECU communication error
41	P0201	FI	Fuel injector #1 malfunction, wiring open or short
42	P0202	FI	Fuel injector #2 malfunction, wiring open or short
43	P0203	FI	Fuel injector #3 malfunction, wiring open or short
44	P0204	FI	Fuel injector #4 malfunction, wiring open or short
51	P0351	FI	Stick coil #1 malfunction, wiring open or short
52	P0352	FI	Stick coil #2 malfunction, wiring open or short
53	P0353	FI	Stick coil #3 malfunction, wiring open or short
54	P0354	FI	Stick coil #4 malfunction, wiring open or short
56	P0480	FI	Radiator fan relay malfunction, wiring open or short
62	P2100	FI	Subthrottle valve actuator malfunction, wiring open or short
64	P0410	FI	Air switching valve malfunction, wiring open or short
67	P0030	FI	Oxygen sensor heater malfunction, wiring open or short
94	P0170	FI	Fuel supply system malfunction
3A	P0443	FI	Purge valve malfunction, wiring open or short (Other than US and CA Models)
E8E	–	FI	IMU malfunction
E8F	–	FI	IMU communication error or wiring open

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.

○DTC (Diagnostic Trouble Code) is displayed on the Kawasaki Diagnostic System (KDS Ver.3) and the Generic Scan Tool (GST).

Self-Diagnosis

Backups

○The ECU takes the following measures to prevent engine damage when the DFI, ignition or immobilizer system parts have troubles.

Service Codes	Parts or Function	Output Signal Usable Range or Criteria	Backups by ECU
11	Main Throttle Sensor	Output Voltage 0.2 ~ 4.8 V	If the main throttle sensor system fails (the output voltage is out of the usable range, wiring short or open), the ECU locks ignition timing into the ignition timing at closed throttle position and sets the DFI in the D-J method (1).
12	Intake Air Pressure Sensor #1	Intake Air Pressure (Absolute) Pv = 60 ~ 900 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). The ECU stops the feedback mode of the oxygen sensor.
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 40°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	Intake Air Pressure (Absolute) Pv = 60 ~ 900 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). The ECU stops the feedback mode of the oxygen sensor.
21	Crankshaft Sensor	Crankshaft sensor must send 22 signals to the ECU at the one cranking.	If the crankshaft sensor fails, the engine stops by itself.
24	Rear Wheel Rotation Sensor	Rear wheel rotation sensor must send 45 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 set the internal gear position value for the top (6th) and stops the KTRC.
25	Gear Position Sensor	Output Voltage 0.2 ~ 4.8 V	If the gear position sensor system fails (no signal, wiring short or open), the ECU set the top (6th) gear position.
27	Front Wheel Rotation Sensor	Front wheel rotation sensor must send 48 signals to the ECU at the 1 rotation of the wheel.	If the front wheel rotation sensor system fails (the signal is missing, wiring open), the ECU stops the KTRC.
31	Vehicle -down Sensor	Output Voltage Vd = 0.10 ~ 4.84 V	If the vehicle-down sensor system has failures (the output voltage is out of the usable range, wiring short or open), the ECU shuts off the fuel pump relay, the fuel injectors and the ignition system.
32	Subthrottle Sensor	Output Voltage 0.15 ~ 4.85 V	If the subthrottle sensor system fails (the output voltage is out of the usable range, wiring short or open), the ECU drive the subthrottle valve to the full closed position, and it stops the current to the subthrottle valve actuator.

Self-Diagnosis

Service Codes	Parts or Function	Output Signal Usable Range or Criteria	Backups by ECU
33	Oxygen Sensor	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.
35	Immobilizer Amplifier (Equipped Models)	–	If the immobilizer system fails (no signal, wiring short or open), the vehicle does not start, and does not run.
36	Ignition Key	The ignition key must use register key.	If the blank key or broken key is used, the vehicle does not start the engine.
39	ECU	The communication error between the ECU and meter unit	–
41	Fuel Injector #1*	The injector must send signals continuously to the ECU.	If the injector #1 fails (no signal, wiring short or open), the ECU shuts off the signal to the injector. Fuel is not supplied to the cylinder #1, though the engine keeps running. The ECU stops the feedback mode of the oxygen sensor.
42	Fuel Injector #2*	The injector must send signals continuously to the ECU.	If the injector #2 fails (no signal, wiring short or open), the ECU shuts off the signal to the injector. Fuel is not supplied to the cylinder #2, though the engine keeps running. The ECU stops the feedback mode of the oxygen sensor.
43	Fuel Injector #3*	The injector must send signals continuously to the ECU.	If the injector #3 fails (no signal, wiring short or open), the ECU shuts off the signal to the injector. Fuel is not supplied to the cylinder #3, though the engine keeps running. The ECU stops the feedback mode of the oxygen sensor.
44	Fuel Injector #4*	The injector must send signals continuously to the ECU.	If the injector #4 fails (no signal, wiring short or open), the ECU shuts off the signal to the injector. Fuel is not supplied to the cylinder #4, though the engine keeps running. The ECU stops the feedback mode of the oxygen sensor.
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. The ECU stops the feedback mode of the oxygen sensor.
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. The ECU stops the feedback mode of the oxygen sensor.

Self-Diagnosis

Service Codes	Parts or Function	Output Signal Usable Range or Criteria	Backups by ECU
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. The ECU stops the feedback mode of the oxygen sensor.
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. The ECU stops the feedback mode of the oxygen sensor.
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.
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	The oxygen sensor heater raise 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.
94	Fuel Supply System	Fuel correction value exceeds a threshold.	–
3A	Purge Valve (Other than US and CA Models)	The purge valve controls the flow of the purge air for the canister and shutting the solenoid valve.	If the purge valve fails (wiring short or open), the ECU stops operating purge valve.
E8E	IMU	The IMU sends the data to the ECU and ABS hydraulic unit through the CAN communication line.	–
E8F	IMU Communication Line	The IMU sends the data to the ECU and ABS hydraulic unit through the CAN communication line.	–

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 (intake air pressure sensor output voltage) and engine speed (crankshaft sensor output voltage). This method is called D-J method.

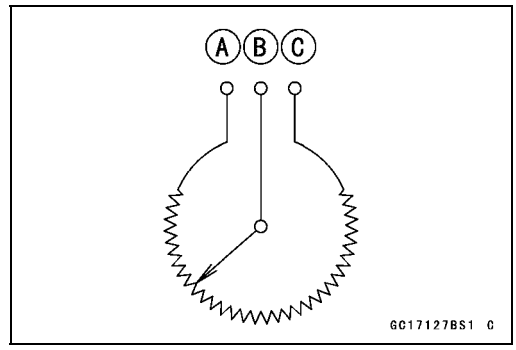
(2): α-N Method: As the engine speed increases, and the engine load turns middle to heavy, the ECU determines the injection quantity by calculating from the throttle opening (throttle sensor output voltage) and the engine speed. This method is called α-N method.

*: This depends on the number of stopped cylinders.

Main Throttle Sensor (Service Code 11) (DTC P0120, P0123)

The main throttle sensor is a rotating variable resistor that change output voltage according to throttle operating. The ECU senses this voltage change and determines fuel injection quantity, and ignition timing according to engine rpm, and throttle opening.

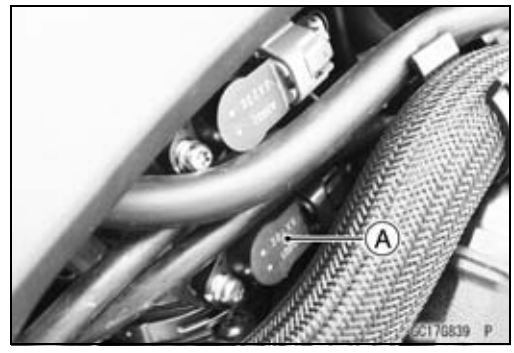
Input Terminal [A]: BL
Output Terminal [B]: Y/W
Ground Terminal [C]: G



Main Throttle Sensor Removal/Adjustment

NOTICE

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



Main Throttle Sensor Input Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the right lower fairing (see Lower Fairing Removal in the Frame chapter).
- Disconnect the main throttle sensor connector and connect the setting adapter [A] between these connectors.

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538



- Connect a digital meter to the setting adapter leads.

Main Throttle Sensor Input Voltage
Connections to Adapter:
Digital Meter (+) → W (sensor BL) lead
Digital Meter (–) → BK (sensor G) lead

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

Input Voltage
Standard: DC 4.75 ~ 5.25 V

- Turn the ignition switch off.

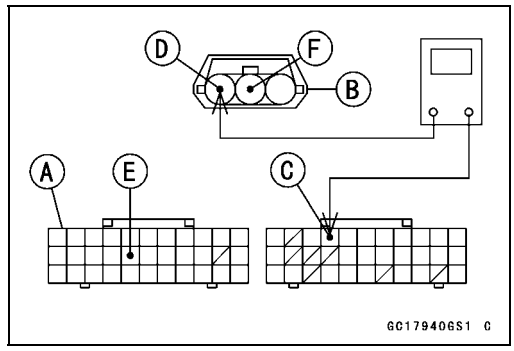
★If the reading is within the standard, check the main throttle sensor resistance (see Main Throttle Sensor Resistance Inspection).

Main Throttle Sensor (Service Code 11) (DTC P0120, P0123)

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

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Main Throttle Sensor Connector [B]
ECU Terminal 4 [C] ←→ Sensor Terminal [D]
ECU Terminal 49 [E] ←→ Sensor Terminal [F]



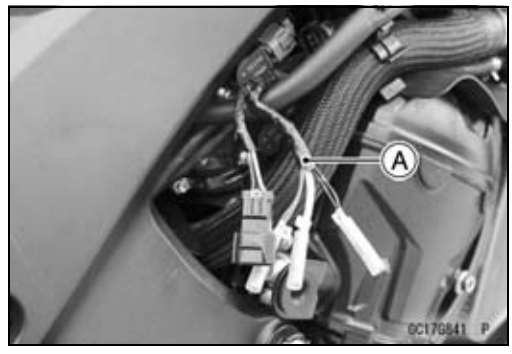
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

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

Main Throttle Sensor Resistance Inspection

- Turn the ignition switch off.
- Disconnect the main throttle sensor connector.
- Connect the setting adapter [A] to the sensor connector only.

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538



- Measure the main throttle sensor resistance.

Main Throttle Sensor Resistance
Connections to Adapter:
W (sensor BL) lead ←→ BK (sensor G) lead

Standard: 4 ~ 6 kΩ

★If the reading is out of the standard, replace the throttle body assy (see Throttle Body Assy Removal/Installation).

★If the reading is within the standard, check the output voltage (see Main Throttle Sensor Output Voltage Inspection).

Main Throttle Sensor Output Voltage Inspection

- Measure the output voltage at the main throttle sensor in the same way as input voltage inspection, note the following.

○Disconnect the main throttle sensor connector and connect the setting adapter [A] between these connectors.

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538



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

- Start the engine and warm it up thoroughly.
- Check idle speed to ensure the throttle opening is correct (see Idle Speed Inspection in the Periodic Maintenance chapter).

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

Main Throttle Sensor (Service Code 11) (DTC P0120, P0123)

- Turn the ignition switch off.
- Measure the output voltage with the engine stopped and with the connector joined.
- Turn the ignition switch on.

Output Voltage

Standard: DC 1.02 ~ 1.06 V at idle throttle opening

DC 4.22 ~ 4.42 V at full throttle opening (for reference)

NOTE

○*Open the throttle, confirm the output voltage will be raise.*

○*The standard voltage refers to the value when the voltage reading at the Input Voltage Inspection shows 5 V exactly.*

○*When the input voltage reading shows other than 5 V, derive a voltage range as follows.*
Example:
In the case of a input voltage of 4.75 V.
1.02 × 4.75 ÷ 5.00 = 0.969 V
1.06 × 4.75 ÷ 5.00 = 1.007 V
Thus, the valid range is 0.969 ~ 1.007 V

- Turn the ignition switch off.

★If the reading is out of the standard, replace the throttle body assy (see Throttle Body Assy Removal/Installation).

★If the reading is within the standard, replace the ECU and check the wiring for continuity between main harness connectors.

○Disconnect the ECU and sensor connectors.

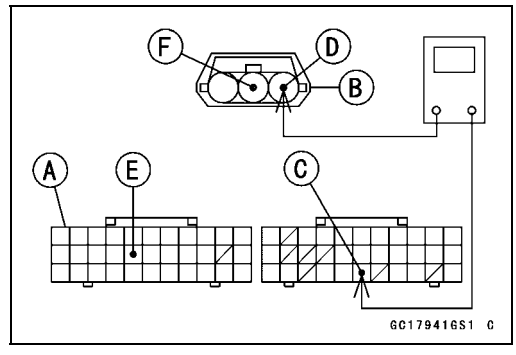
Wiring Continuity Inspection

ECU Connector [A] ←→

Main Throttle Sensor Connector [B]

ECU Terminal 27 [C] ←→ Sensor Terminal [D]

ECU Terminal 49 [E] ←→ Sensor Terminal [F]

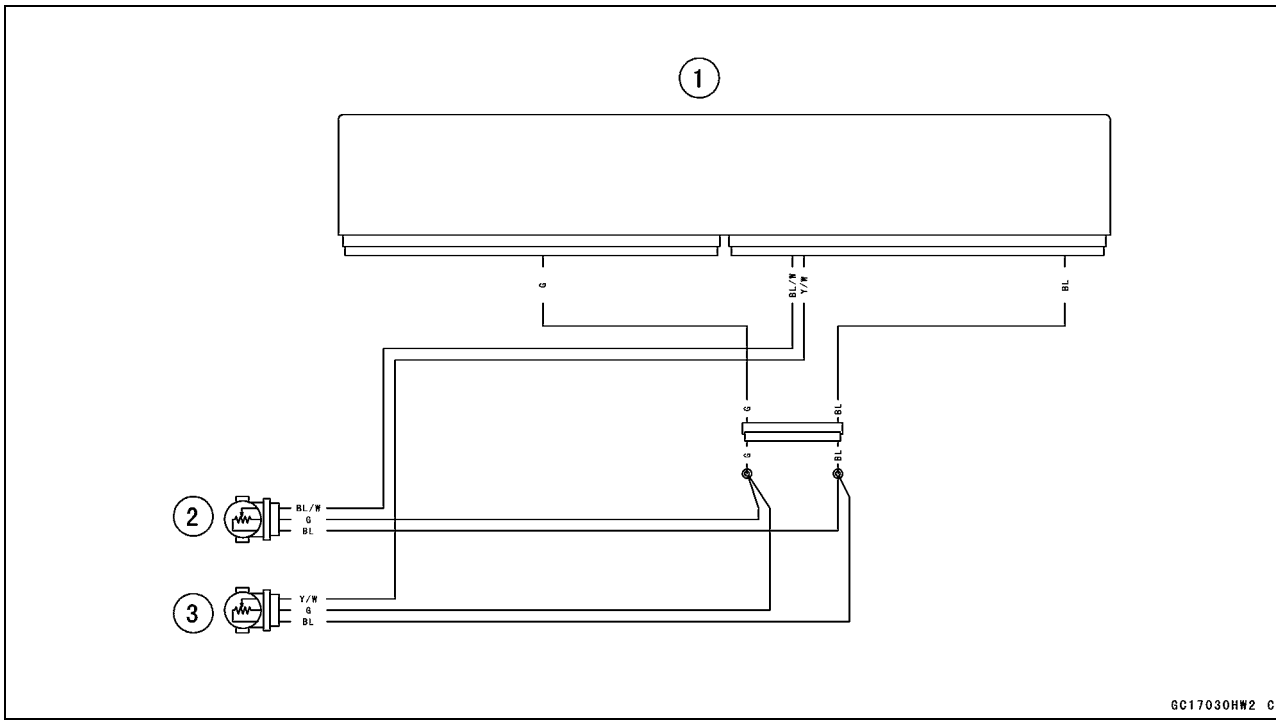


★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

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

Main Throttle Sensor (Service Code 11) (DTC P0120, P0123)

Main Throttle Sensor Circuit

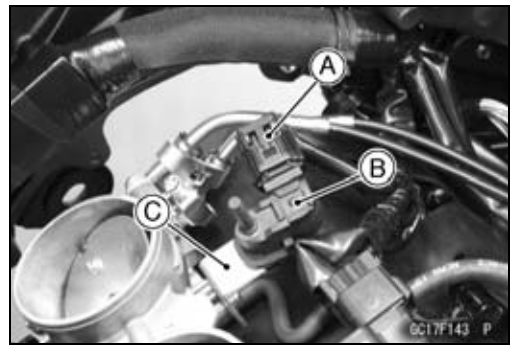


1. ECU
2. Subthrottle Sensor
3. Main Throttle Sensor

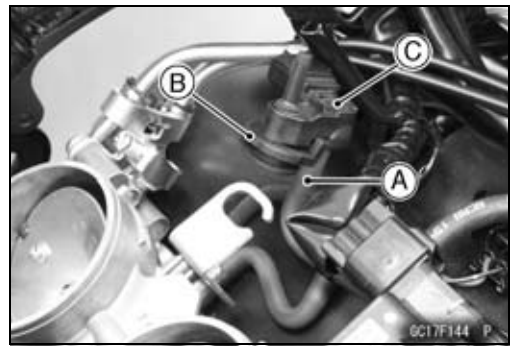
Intake Air Pressure Sensor #1 (Service Code 12) (DTC P0105, P0107)

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)
- Disconnect:
  Intake Air Pressure Sensor #1 Connector [A]
- Remove the intake air pressure sensor #1 [B] from the bracket [C].

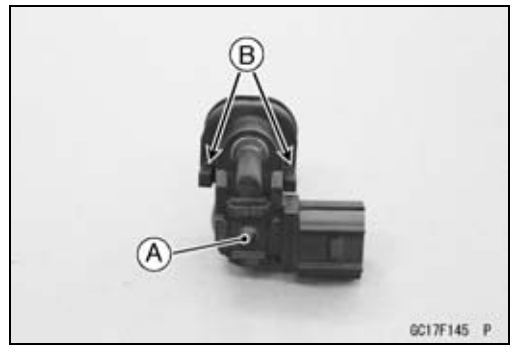


- Disconnect the vacuum hose [A].
- Remove the rubber damper [B] from the intake air pressure sensor #1 [C].

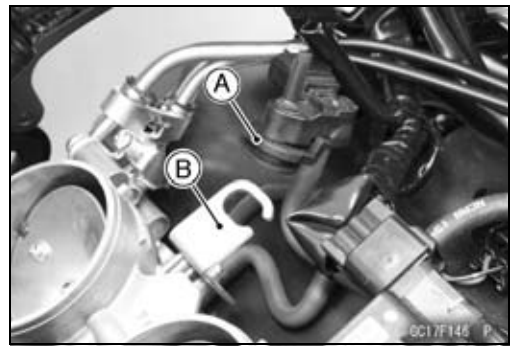
Intake Air Pressure Sensor #1 Installation

NOTE

○*The intake air pressure sensor #1 is the same part as the intake air pressure sensor #2.*



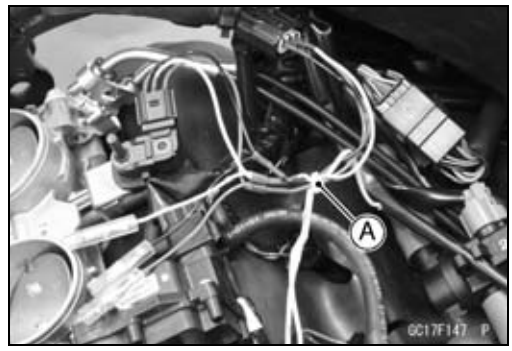
- Installation is the reverse of removal.
- Position the intake air pressure sensor #1 [A] between the projections [B] on the rubber damper.



- Install the rubber damper [A] on the bracket [B].

Intake Air Pressure Sensor #1 (Service Code 12) (DTC P0105, P0107)

Intake Air Pressure Sensor #1 Input Voltage Inspection

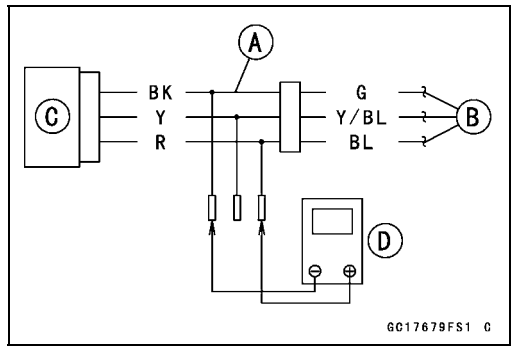


NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the air cleaner housing (see Air Cleaner Housing Removal).
- Disconnect the intake air pressure sensor #1 connector and connect the measuring adapter [A] between these connectors.
  Main Harness [B]
  Intake Air Pressure Sensor #1 [C]

Special Tool - Measuring Adapter: 57001-1700



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

Intake Air Pressure Sensor #1 Input Voltage
Connections to Adapter:
Digital Meter (+) → R (sensor BL) lead
Digital Meter (–) → BK (sensor G) lead

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

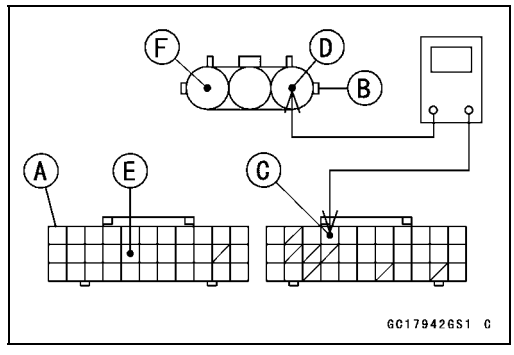
Input Voltage
Standard: DC 4.75 ~ 5.25 V

- Turn the ignition switch off.

★If the reading is within the standard, check the output voltage (see Intake Air Pressure Sensor #1 Output Voltage Inspection).

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

○Disconnect the ECU and sensor connectors.



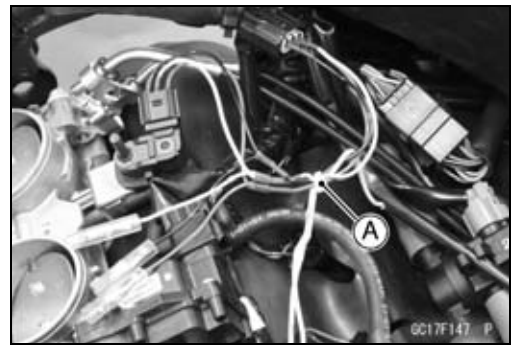
Wiring Continuity Inspection
ECU Connector [A] ←→
Intake Air Pressure Sensor #1 Connector [B]
ECU Terminal 4 [C] ←→ Sensor Terminal [D]
ECU Terminal 49 [E] ←→ Sensor Terminal [F]

★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).

Intake Air Pressure Sensor #1 (Service Code 12) (DTC P0105, P0107)

Intake Air Pressure Sensor #1 Output Voltage Inspection

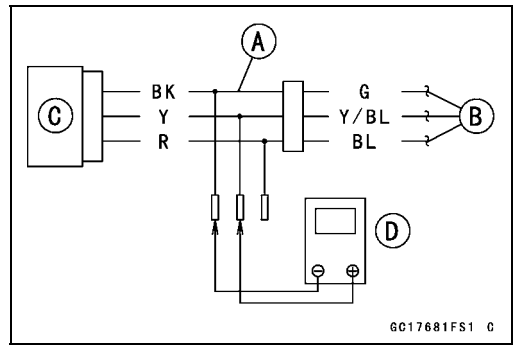


● Measure the output voltage at the intake air pressure sensor #1 in the same way as input voltage inspection, note the following.

○Disconnect the intake air pressure sensor #1 connector and connect the measuring adapter [A] between these connectors.

Main Harness [B]
Intake Air Pressure Sensor #1 [C]
Digital Meter [D]

Special Tool - Measuring Adapter: 57001-1700



Intake Air Pressure Sensor #1 Output Voltage
Connections to Adapter:
Digital Meter (+) → Y (sensor Y/BL) lead
Digital Meter (–) → BK (sensor G) lead

● Measure the output voltage with the engine stopped and with the connector joined.

● Turn the ignition switch on.

Output Voltage
Usable Range: **DC 3.80 ~ 4.20 V at standard atmospheric pressure (101.32 kPa, 76 cmHg)**

NOTE

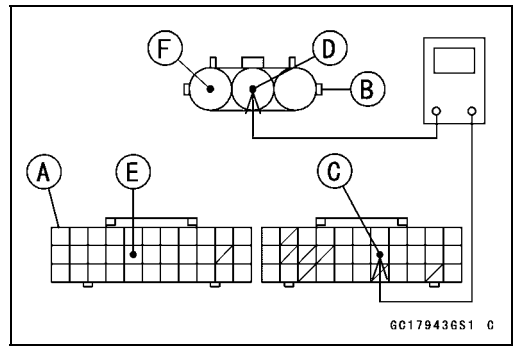
○*The output voltage changes according to local atmospheric pressure.*

● Turn the ignition switch off.

★If the reading is out of the usable range, replace the sensor.

★If the reading is within the usable range, remove the ECU and check the wiring for continuity between main harness connectors.

○Disconnect the ECU and sensor connectors.



Wiring Continuity Inspection
ECU Connector [A] ←→
Intake Air Pressure Sensor #1 Connector [B]
ECU Terminal 18 [C] ←→ Sensor Terminal [D]
ECU Terminal 49 [E] ←→ Sensor Terminal [F]

Intake Air Pressure Sensor #1 (Service Code 12) (DTC P0105, P0107)

★If the wiring is good, check the sensor for various vacuum.
● Remove the intake air pressure sensor #1 [A] and disconnect the vacuum hose from the sensor.
● Connect an auxiliary hose [B] to the intake air pressure sensor #1.
● Temporarily install the intake air pressure sensor #1.
○Connect a digital meter [C], vacuum gauge [D], the fork oil level gauge [E] and the measuring adapter to the intake air pressure sensor #1.

Special Tools - Fork Oil Level Gauge: 57001-1290
Vacuum Gauge: 57001-1369
Measuring Adapter: 57001-1700

Intake Air Pressure Sensor #1 Output Voltage Connections to Adapter:
Digital Meter (+) → Y (sensor Y/BL) lead
Digital Meter (–) → BK (sensor G) lead

○Turn the ignition switch on.
○Measure the intake air pressure sensor #1 output voltage from various vacuum readings, while pulling the handle of the fork oil level gauge.
○Check the intake air pressure sensor #1 output voltage, using the following formula and chart.

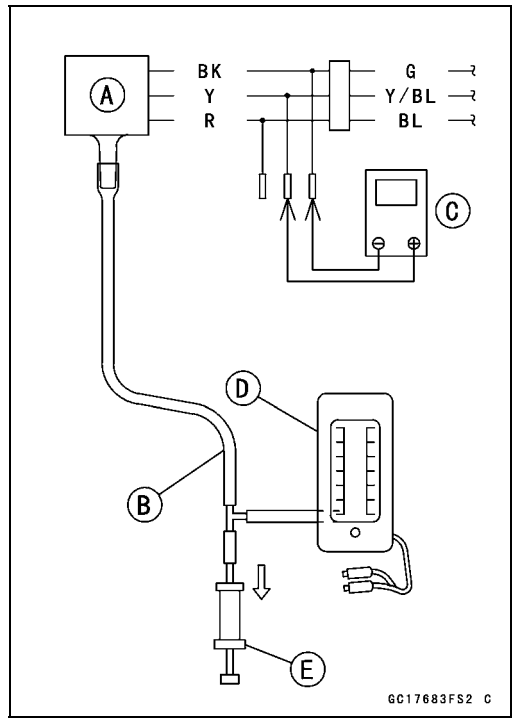
Suppose:
Pg: Vacuum Pressure (Gauge) of Throttle Body
Pl: Local Atmospheric Pressure (Absolute) measured by a barometer
Pv: Vacuum Pressure (Absolute) of Throttle Body
Vv: Sensor Output Voltage (V)

then
Pv = Pl + Pg

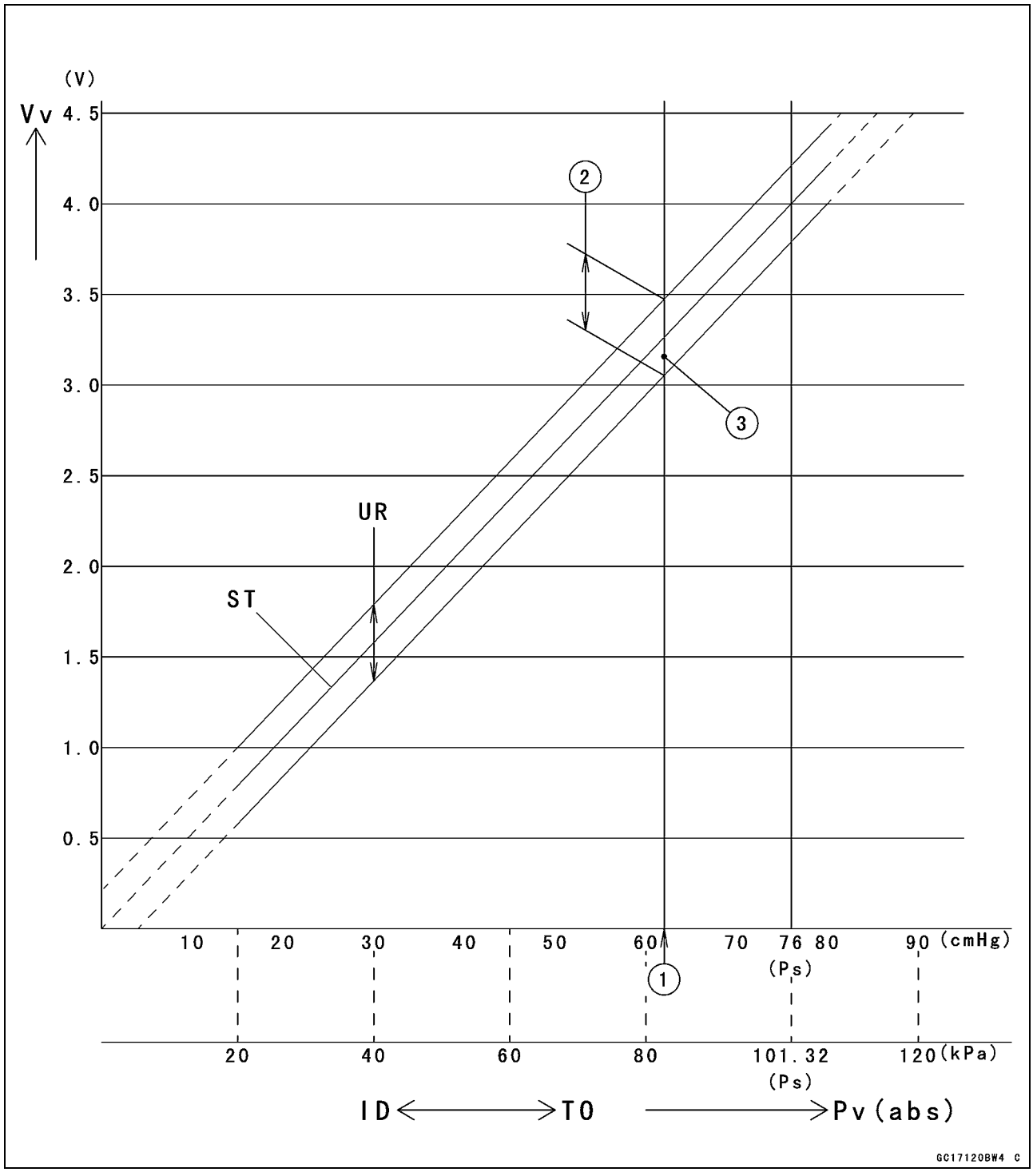
For example, suppose the following data is obtained:
Pg = −8 cmHg (Vacuum Gauge Reading)
Pl = 70 cmHg (Barometer Reading)
Vv = 3.2 V (Digital Meter Reading)

then
Pv = 70 + (−8) = 62 cmHg (Absolute)

Plot this Pv (62 cmHg) at a point [1] on the chart and draw a vertical line through the point. Then, you can get the usable range [2] of the sensor output voltage.
Usable range = 3.08 ~ 3.48 V
Plot Vv (3.2 V) on the vertical line. → Point [3].
Results: In the chart, Vv is within the usable range and the sensor is normal.
★If the reading is out of the usable range, replace the sensor.
★If the reading is within the usable range, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).



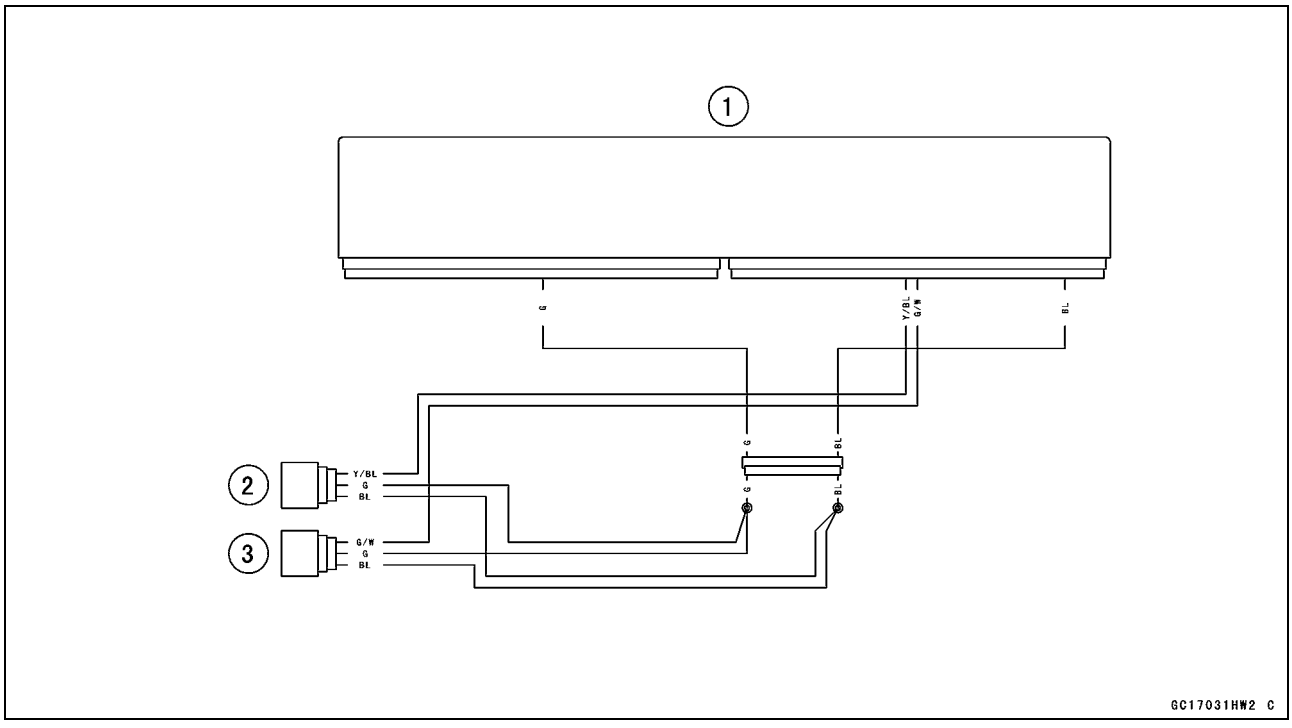
Intake Air Pressure Sensor #1 (Service Code 12) (DTC P0105, P0107)



ID: Idling
Ps: Standard Atmospheric Pressure (Absolute)
Pv: Throttle Vacuum Pressure (Absolute)
ST: Standard of Sensor Output Voltage (V)
TO: Throttle Full Open
UR: Usable Range of Sensor Output Voltage (V)
Vv: Intake Air Pressure Sensor #1 Output Voltage (V) (Digital Meter Reading)

Intake Air Pressure Sensor #1 (Service Code 12) (DTC P0105, P0107)

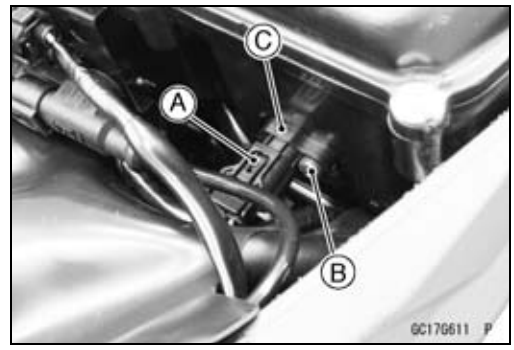
Intake Air Pressure Sensor #1 Circuit



1. ECU
2. Intake Air Pressure Sensor #1
3. Intake Air Pressure Sensor #2

Intake Air Temperature Sensor (Service Code 13) (DTC P0110, P0112)

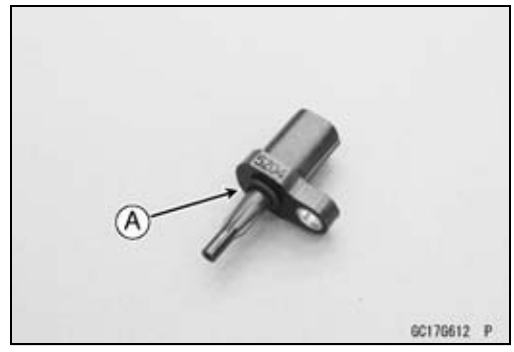
Intake Air Temperature Sensor Removal/Installation



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).
- Disconnect the intake air temperature sensor connector [A].
- Remove:
  Intake Air Temperature Sensor Screw [B]
  Intake Air Temperature Sensor [C]

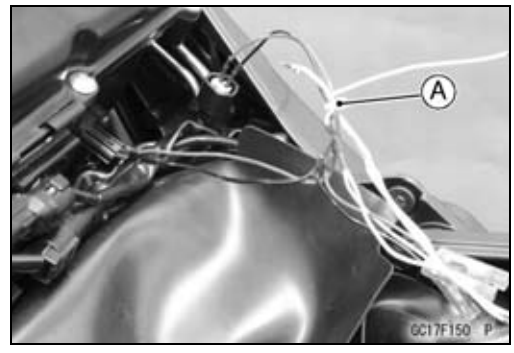


- Be sure to install the O-ring [A].
- Install the intake air temperature sensor.
- Tighten:

Torque - Intake Air Temperature Sensor Screw: 1.2 N·m (0.12 kgf·m, 11 in·lb)

- Connect the intake air temperature sensor connector.
- Install the fuel tank (see Fuel Tank Installation).

Intake Air Temperature Sensor Output Voltage Inspection



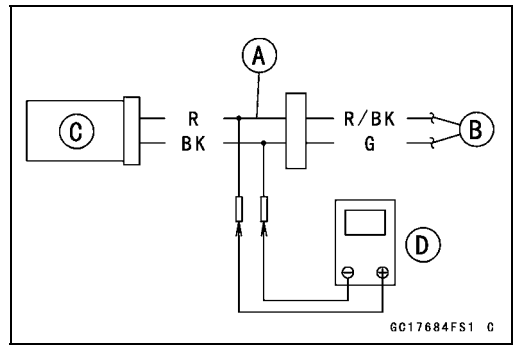
NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the intake air temperature sensor connector and connect the measuring adapter [A] between these connectors as shown.
  Main Harness [B]
  Intake Air Temperature Sensor [C]

Special Tool - Measuring Adapter: 57001-1700

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



Intake Air Temperature Sensor (Service Code 13) (DTC P0110, P0112)

Intake Air Temperature Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → R (sensor R/BK) lead
Digital Meter (–) → BK (sensor G) lead

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

Output Voltage
Standard: About DC 2.25 ~ 2.50 V @20°C (68°F)

NOTE

○*The output voltage changes according to the intake air temperature.*

- Turn the ignition switch off.

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

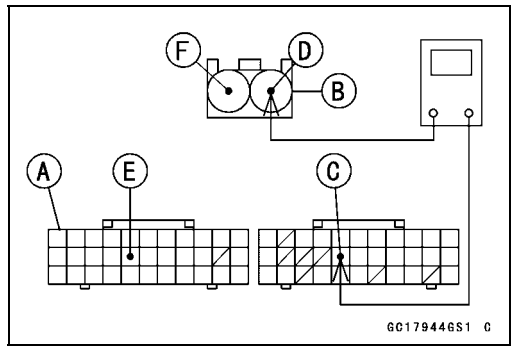
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

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

○Disconnect the ECU and sensor connectors.

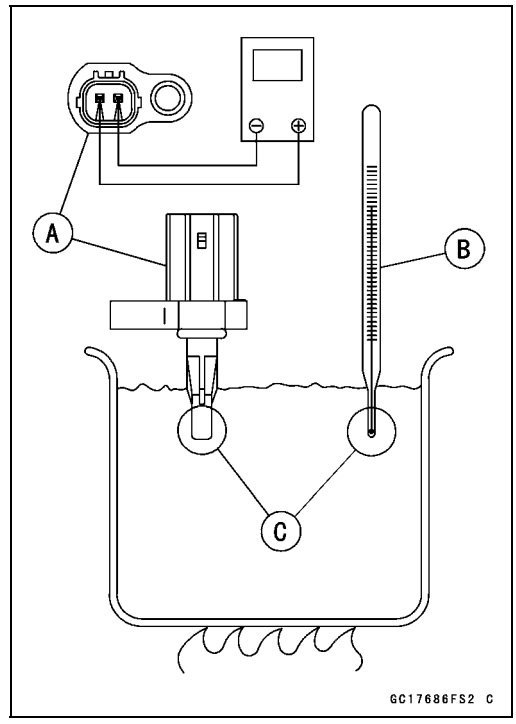
Wiring Continuity Inspection
ECU Connector [A] ←→
Intake Air Temperature Sensor Connector [B]
ECU Terminal 16 [C] ←→ Sensor Terminal [D]
ECU Terminal 49 [E] ←→ Sensor Terminal [F]

★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) (DTC P0110, P0112)

Intake Air Temperature Sensor Resistance Inspection



- Remove the intake air temperature sensor (see Intake Air Temperature Sensor Removal/Installation).
- Suspend the sensor [A] in a container of water 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

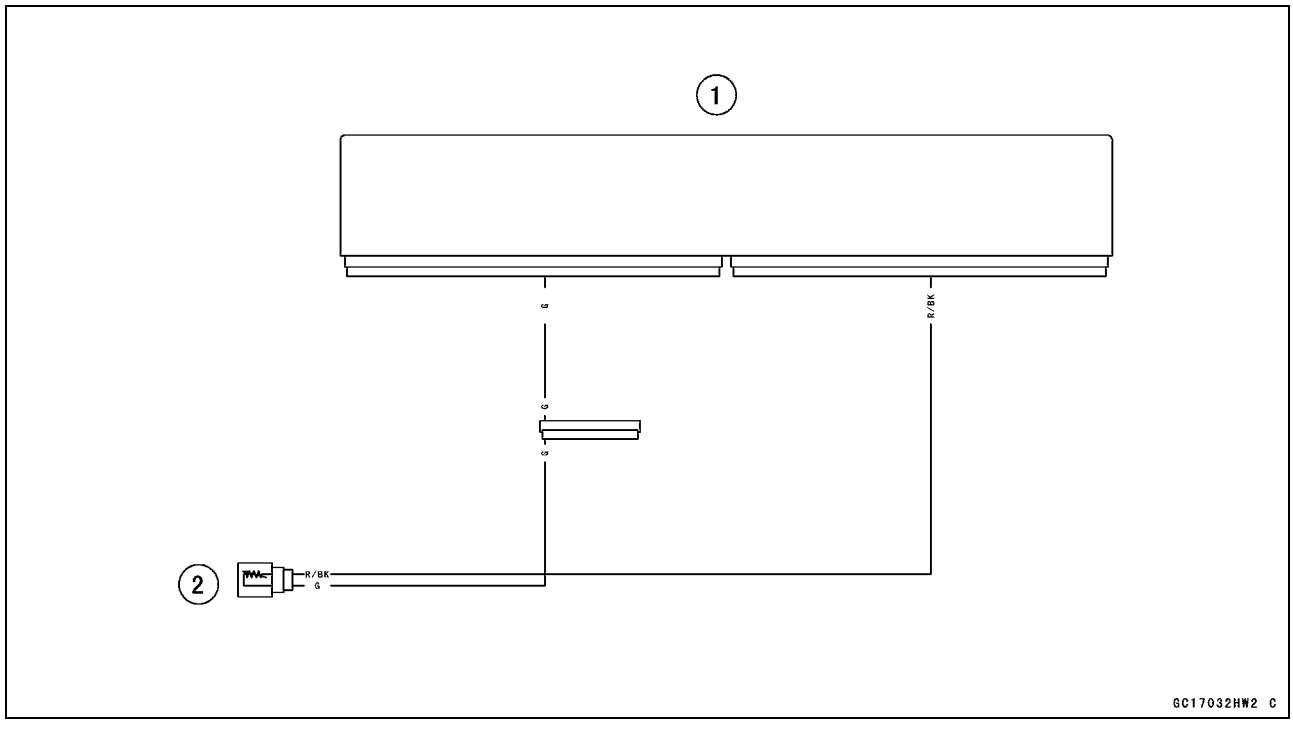
○*The sensor and thermometer must not touch the container side or bottom.*

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

Intake Air Temperature Sensor Resistance
Standard: 5.4 ~ 6.6 kΩ @0°C (32°F)
0.29 ~ 0.39 kΩ @80°C (176°F)

★If the reading is out of the standard, replace the sensor.
★If the reading is within the standard, but the problem still exists, replace the ECU (see ECU Removal/Installation).

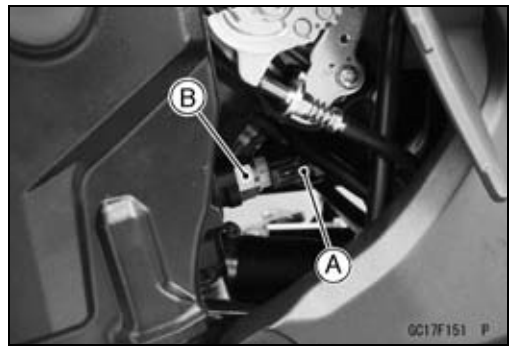
Intake Air Temperature Sensor Circuit



1. ECU
2. Intake Air Temperature Sensor

Water Temperature Sensor (Service Code 14) (DTC P0115, P0117)

Water Temperature Sensor Removal/Installation



NOTICE

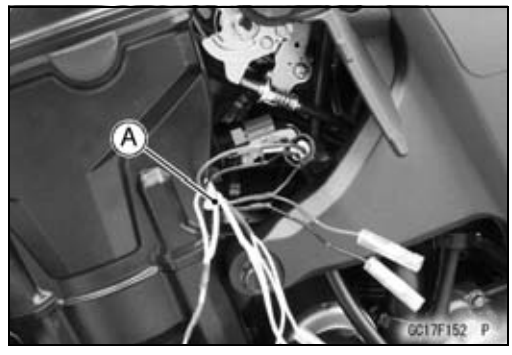
Never drop the water temperature sensor especially on a hard surface. Such a shock to the sensor can damage it.

- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Disconnect:
  Water Temperature Sensor Connector [A]
- Remove:
  Water Temperature Sensor [B] with O-ring
- Replace the O-ring with a new one.
- Tighten:

Torque - Water Temperature Sensor: 12 N·m (1.2 kgf·m, 106 in·lb)

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

Water Temperature Sensor Output Voltage Inspection

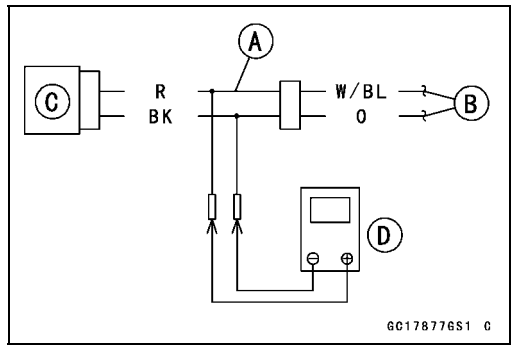


NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the left lower fairing (see Lower Fairing Removal in the Frame chapter).
- Disconnect the water temperature sensor connector and connect the measuring adapter [A] between these connectors as shown.
  Subharness [B]
  Water Temperature Sensor [C]

Special Tool - Measuring Adapter: 57001-1700



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

Water Temperature Sensor Output Voltage
Connections to Adapter:

Digital Meter (+) → R (sensor W/BL) lead

Digital Meter (–) → BK (sensor O) lead

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

Water Temperature Sensor (Service Code 14) (DTC P0115, P0117)

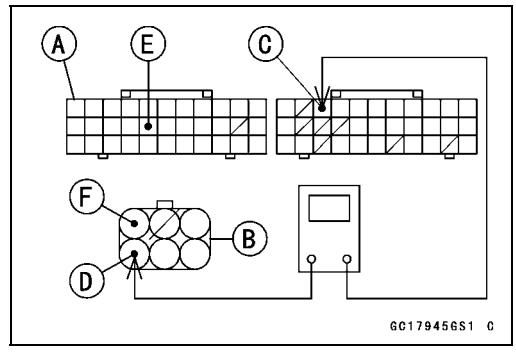
Output Voltage
Standard: About DC 2.80 ~ 2.97 V @20°C (68°F)

NOTE

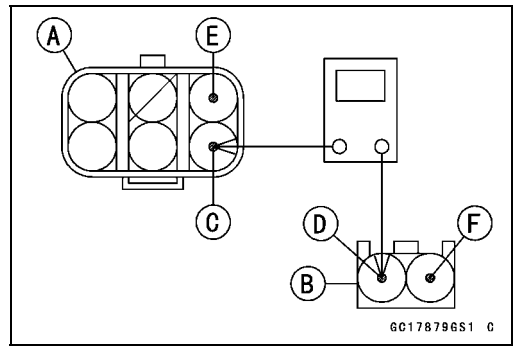
○*The output voltage changes according to the coolant temperature in the engine.*

● Turn the ignition switch off.
★If the reading is within the standard, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

★If the reading is out of the standard, remove the ECU and check the wiring for continuity between main and subharness connectors.
○Disconnect the ECU and sensor connectors.



Wiring Continuity Inspection
ECU Connector [A] ←→
Subharness Connector [B]
ECU Terminal 3 [C] ←→ Connector Terminal [D]
ECU Terminal 49 [E] ←→ Connector Terminal [F]



Subharness Connector [A] ←→
Water Temperature Sensor Connector [B]
Connector Terminal [C] ←→ Sensor Terminal [D]
Connector Terminal [E] ←→ Sensor Terminal [F]

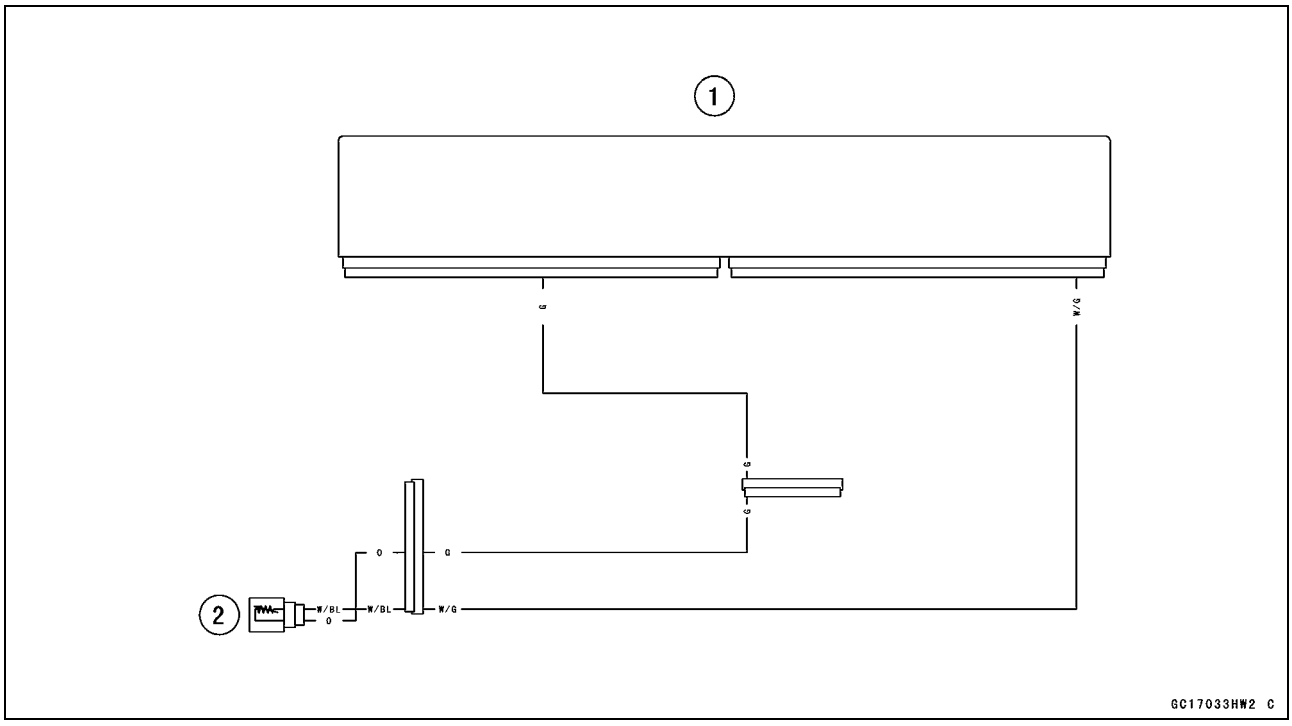
★If the wiring is good, check the water temperature sensor resistance (see Water Temperature Sensor Resistance Inspection).

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).

Water Temperature Sensor (Service Code 14) (DTC P0115, P0117)

Water Temperature Sensor Circuit

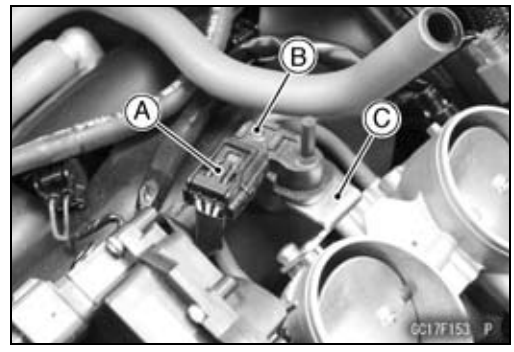


1. ECU
2. Water Temperature Sensor

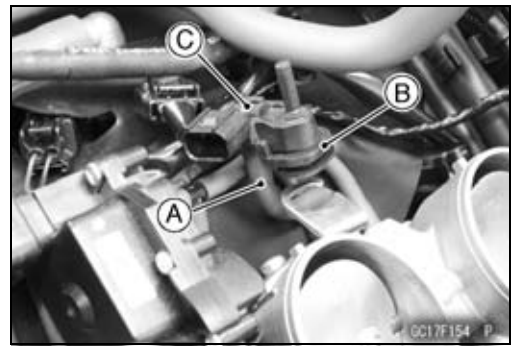
Intake Air Pressure Sensor #2 (Service Code 16) (DTC P2226, P2227, P2228)

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)
- Disconnect:
  Intake Air Pressure Sensor #2 Connector [A]
- Remove the intake air pressure sensor #2 [B] from the bracket [C].

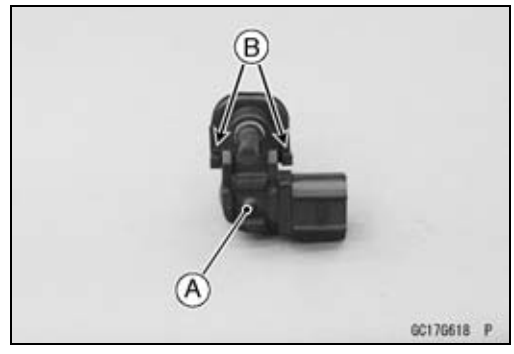


- Disconnect the vacuum hose [A].
- Remove the rubber damper [B] from the intake air pressure sensor #2 [C].

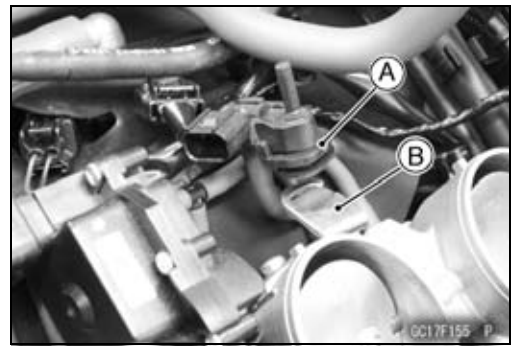
Intake Air Pressure Sensor #2 Installation

NOTE

○*The intake air pressure sensor #2 is the same part as the intake air pressure sensor #1.*



- Installation is the reverse of removal.
- Position the intake air pressure sensor #2 [A] between the projections [B] on the rubber damper.



- Install the rubber damper [A] on the bracket [B].

Intake Air Pressure Sensor #2 (Service Code 16) (DTC P2226, P2227, P2228)

Intake Air Pressure Sensor #2 Input Voltage Inspection



NOTE

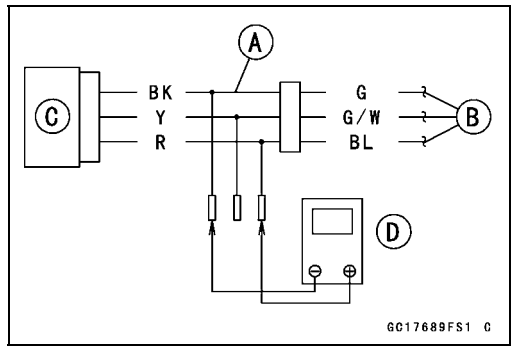
○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the air cleaner housing (see Air Cleaner Housing Removal).
- Disconnect the intake air pressure sensor #2 connector and connect the measuring adapter [A] between these connectors.
  Main Harness [B]
  Intake Air Pressure Sensor #2 [C]

Special Tool - Measuring Adapter: 57001-1700

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

Intake Air Pressure Sensor #2 Input Voltage
Connections to Adapter:
Digital Meter (+) → R (sensor BL) lead
Digital Meter (–) → BK (sensor G) lead



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

Input Voltage
Standard: DC 4.75 ~ 5.25 V

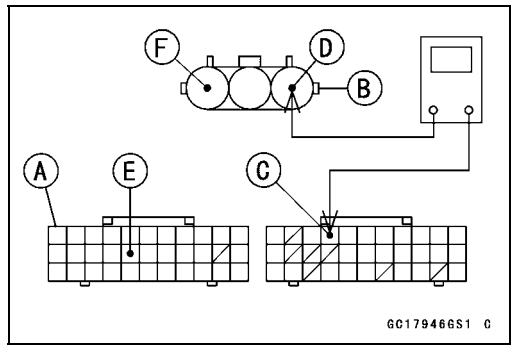
- Turn the ignition switch off.

★If the reading is within the standard, check the output voltage (see Intake Air Pressure Sensor #2 Output Voltage Inspection).

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

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Intake Air Pressure Sensor #2 Connector [B]
ECU Terminal 4 [C] ←→ Sensor Terminal [D]
ECU Terminal 49 [E] ←→ Sensor Terminal [F]



★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).

Intake Air Pressure Sensor #2 (Service Code 16) (DTC P2226, P2227, P2228)

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.

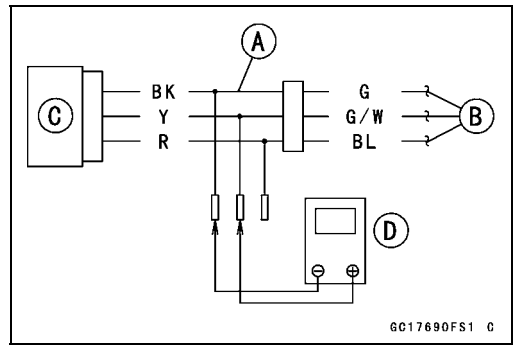
Main Harness [B]
Intake Air Pressure Sensor #2 [C]
Digital Meter [D]

Special Tool - Measuring Adapter: 57001-1700

Intake Air Pressure Sensor #2 Output Voltage
Connections to Adapter:

Digital Meter (+) → Y (sensor G/W) lead

Digital Meter (–) → BK (sensor G) lead



● Measure the output voltage with the engine stopped and with the connector joined.

● Turn the ignition switch on.

Output Voltage
Usable Range: DC 3.80 ~ 4.20 V at standard atmospheric pressure (101.32 kPa, 76 cmHg absolute)

NOTE

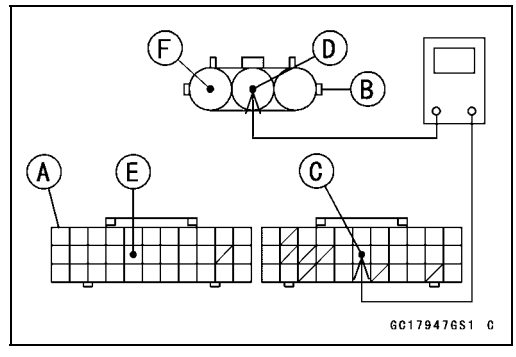
○*The output voltage changes according to the local atmospheric pressure.*

● Turn the ignition switch off.

★If the reading is out of the usable range, replace the sensor.

★If the reading is within the usable range, remove the ECU and check the wiring for continuity between main harness connectors.

○Disconnect the ECU and sensor connectors.



Wiring Continuity Inspection
ECU Connector [A] ←→
Intake Air Pressure Sensor #2 Connector [B]

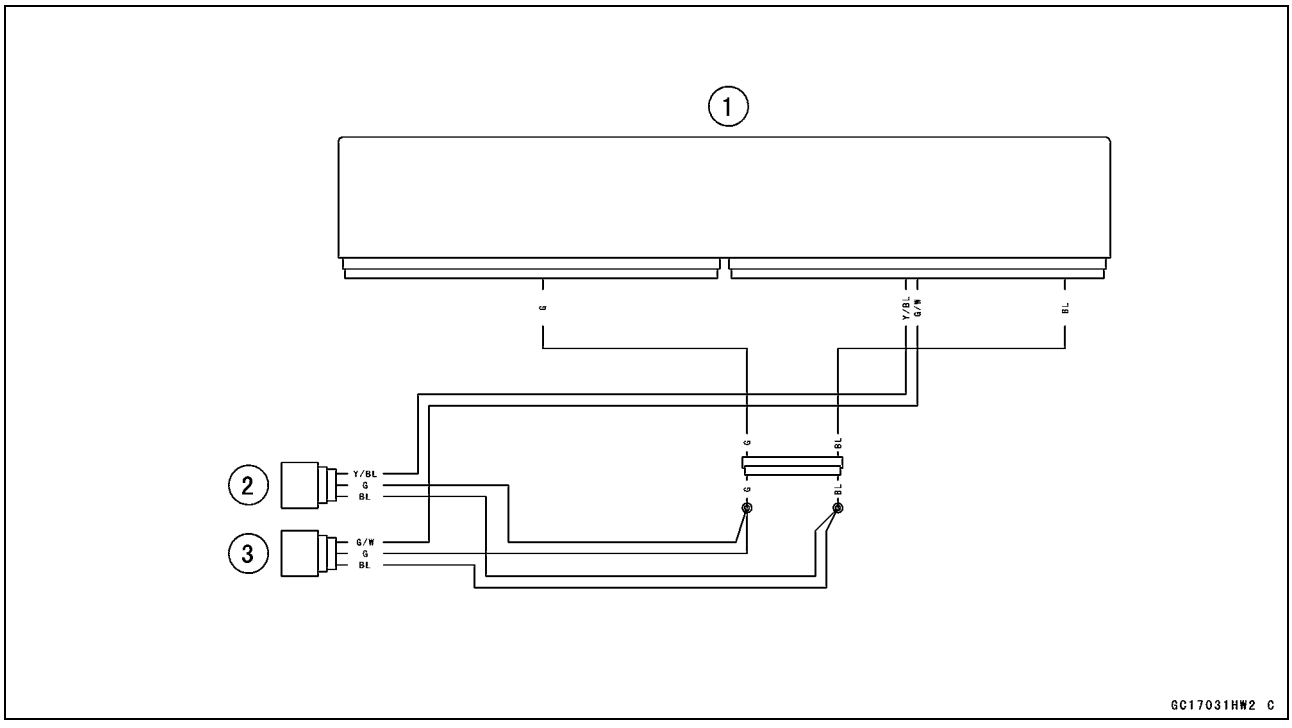
ECU Terminal 17 [C] ←→ Sensor Terminal [D]

ECU Terminal 49 [E] ←→ Sensor Terminal [F]

★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) (DTC P2226, P2227, P2228)

Intake Air Pressure Sensor #2 Circuit



1. ECU
2. Intake Air Pressure Sensor #1
3. Intake Air Pressure Sensor #2

Crankshaft Sensor (Service Code 21) (DTC P0335)

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.

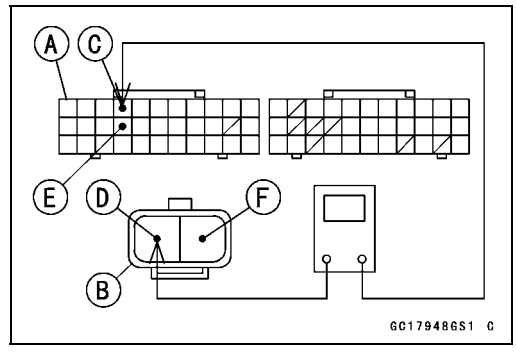
★If the reading is within the standard, remove the ECU and check the wiring for continuity between main harness connectors.

○Disconnect the ECU and sensor connectors.

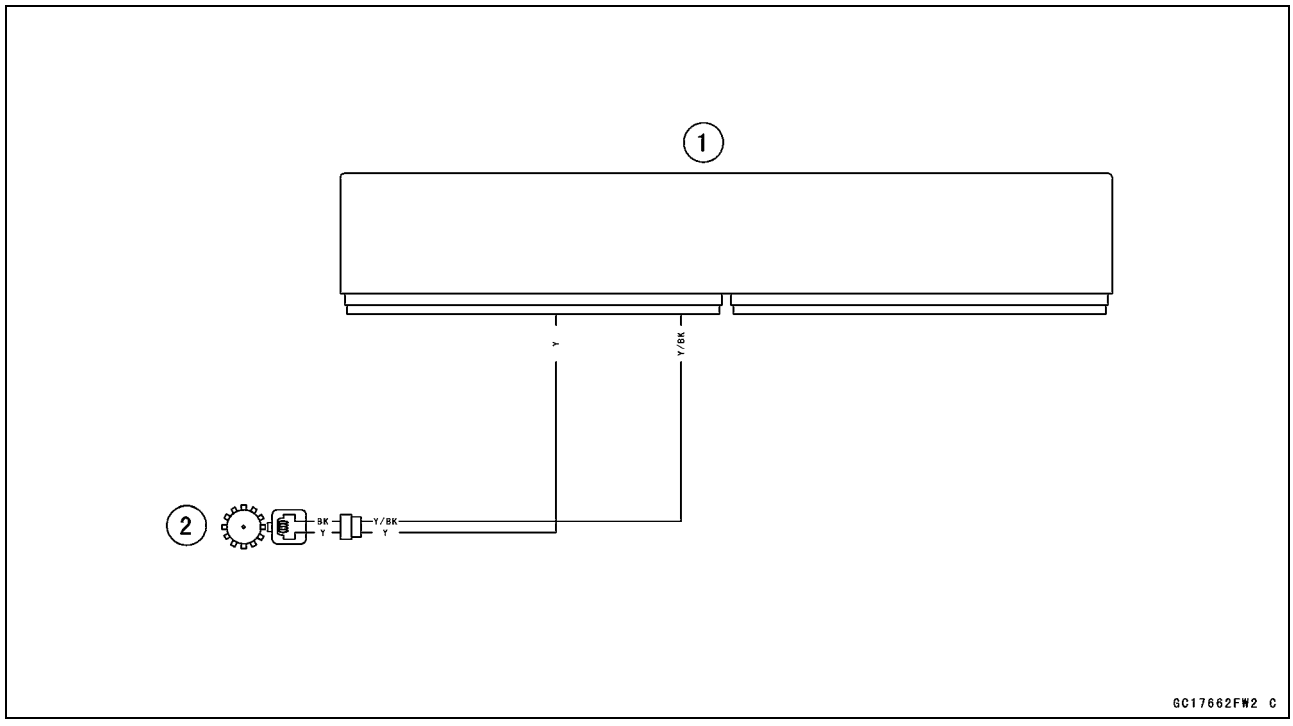
Wiring Continuity Inspection
ECU Connector [A] ←→
Crankshaft Sensor Connector [B]
ECU Terminal 37 [C] ←→ Sensor Terminal [D]
ECU Terminal 48 [E] ←→ Sensor Terminal [F]

★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).



Crankshaft Sensor Circuit



1. ECU
2. Crankshaft Sensor

Rear Wheel Rotation Sensor (Service Code 24) (DTC P2158)

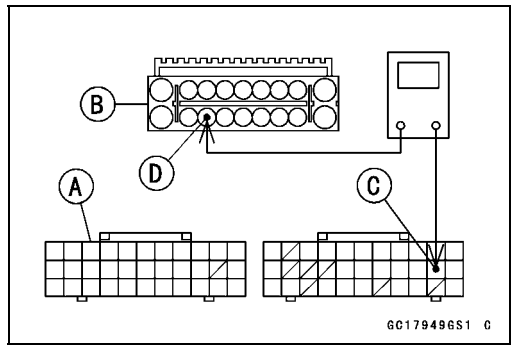
Rear Wheel Rotation Sensor Signal Inspection

○The rear wheel rotation sensor sends the signal to the ECU through the ABS hydraulic unit.
○The ECU uses the rear wheel rotation sensor signal for motorcycle speed.
○The service code 24/DTC P2158 is detected with the ECU.
● Inspect the wheel rotation sensor air gap (see Wheel Rotation Sensor Air Gap Inspection in the Brakes chapter).
● Inspect the wheel rotation sensor rotor (see Wheel Rotation Sensor Rotor Inspection in the Brakes chapter).

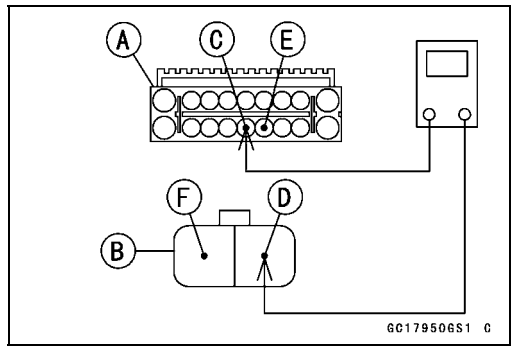
● When service code 24/DTC P2158 is displayed, do the following inspection procedures.
● Disconnect:
ECU Connectors (see ECU Removal)
Rear Wheel Rotation Sensor Lead Connector (see Rear Wheel Rotation Sensor Removal in the Brakes chapter)
ABS Hydraulic Unit Connector (see ABS Hydraulic Unit Removal in the Brakes chapter)

● Check the wiring for continuity between main harness connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
ABS Hydraulic Unit Connector [B]
ECU Terminal 21 [C] ←→ ABS Hydraulic Unit Terminal 16 [D]



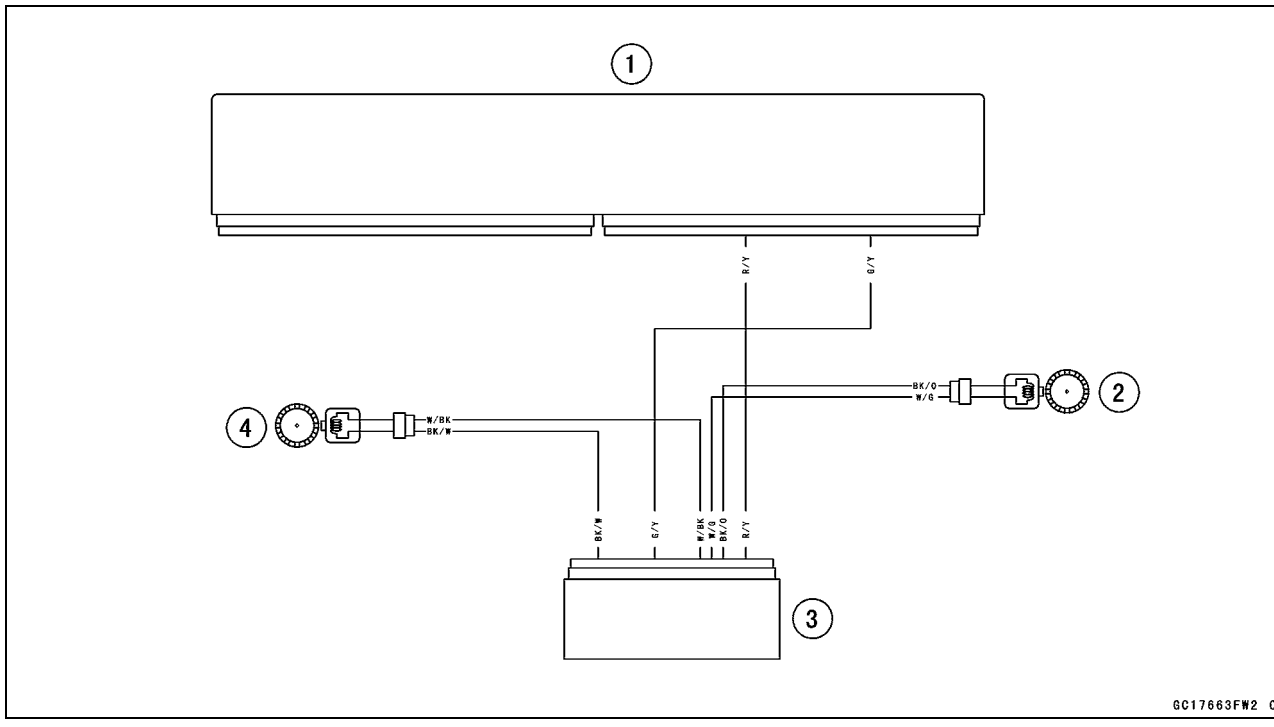
Wiring Continuity Inspection
ABS Hydraulic Unit Connector [A] ←→
Rear Wheel Rotation Sensor Connector [B]
ABS Hydraulic Unit Connector Terminal 14 [C] ←→ Sensor Terminal [D]
ABS Hydraulic Unit Connector Terminal 13 [E] ←→ Sensor Terminal [F]



★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).

Rear Wheel Rotation Sensor (Service Code 24) (DTC P2158)

Wheel Rotation Sensor Circuit



1. ECU
2. Rear Wheel Rotation Sensor
3. ABS Hydraulic Unit
4. Front Wheel Rotation Sensor

Gear Position Sensor (Service Code 25) (DTC P0914, P0915, P0916)

Gear Position Sensor Removal/Installation

● Refer to the Gear Position Sensor Removal/Installation in the Electrical System chapter.

Gear Position Sensor Input Voltage Inspection

NOTE

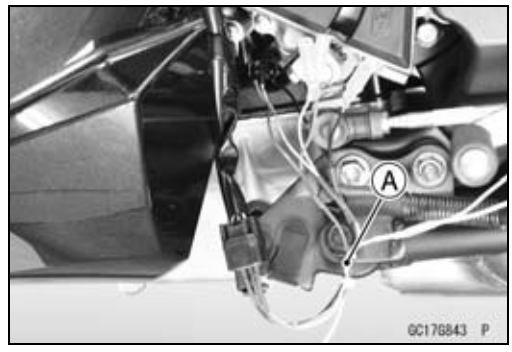
○*Be sure the battery is fully charged.*

● Turn the ignition switch off.
● Disconnect:
Gear Position Sensor Connector [A]



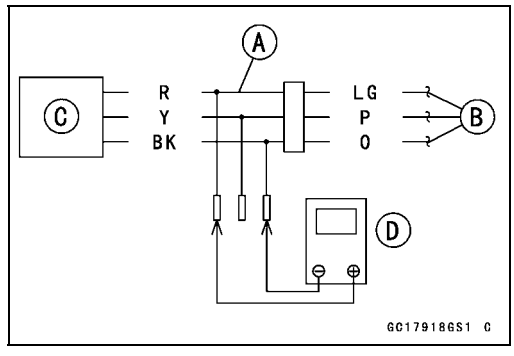
● Connect the measuring adapter [A] between the harness connector and gear position sensor connector.
Subharness [B]
Gear Position Sensor [C]

Special Tool - Measuring Adapter: 57001-1700



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

Gear Position Sensor Input Voltage
Connections to Adapters:
Digital Meter (+) → R (sensor LG) lead
Digital Meter (–) → BK (sensor O) lead

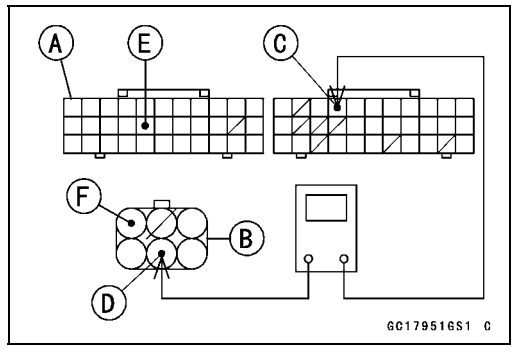


● Measure the input voltage with the engine stopped and with the connector joined.
● Turn the ignition switch on.

Input Voltage
Standard: DC 4.75 ~ 5.25 V

● Turn the ignition switch off.
★If the reading is within standard, check the output voltage (see Gear Position Sensor Output Voltage Inspection).

★If the reading is out of the standard, remove the ECU and check the wiring for continuity between main and subharness connectors.
○Disconnect the ECU and sensor connectors.

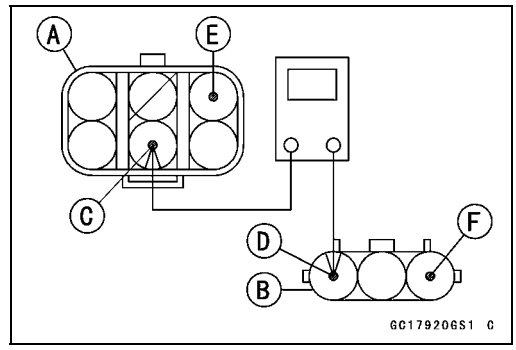


Wiring Continuity Inspection
ECU Connector [A] ←→
Subharness Connector [B]
ECU Terminal 4 [C] ←→ Connector Terminal [D]
ECU Terminal 49 [E] ←→ Connector Terminal [F]

Gear Position Sensor (Service Code 25) (DTC P0914, P0915, P0916)

Subharness Connector [A] ←→
Gear Position Sensor Connector [B]
Connector Terminal [C] ←→ Sensor Terminal [D]
Connector Terminal [E] ←→ Sensor Terminal [F]

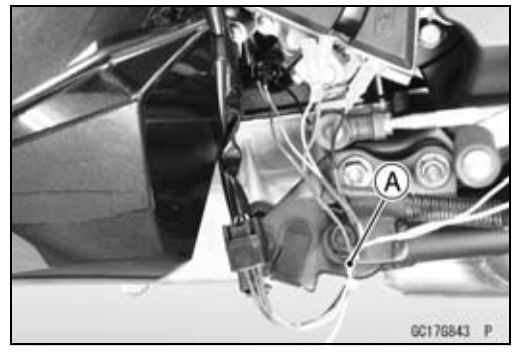
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).



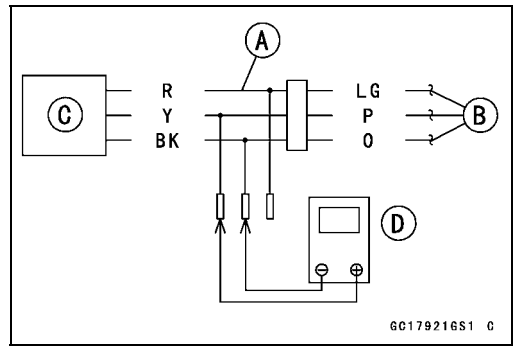
Gear Position Sensor Output Voltage Inspection

● Measure the output voltage at the gear position sensor in the same way as input voltage inspection, note the following.
○Disconnect the gear position sensor connector and connect the measuring adapter [A] between these connectors.
Subharness [B]
Gear Position Sensor [C]
Digital Meter [D]

Special Tool - Measuring Adapter: 57001-1700



Gear Position Sensor Output Voltage
Connections to Adapters:
Digital Meter (+) → Y (sensor P) lead
Digital Meter (–) → BK (sensor O) lead



● Measure the output voltage with the engine stopped and with the connector joined.
● Turn the ignition switch on.
○When changing the gear position from lower gear to higher gear, raise the rear wheel off the ground with the stand and rotate the rear wheel by hand.

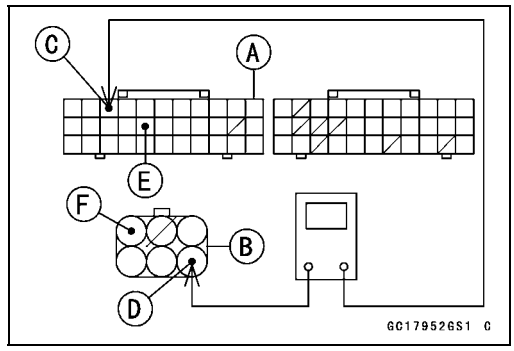
Gear Position Sensor Output Voltage

Gear Position	Output Voltage
1st	0.195 ~ 0.629 V
N	0.811 ~ 0.976 V
2nd	1.143 ~ 1.615 V
3rd	1.860 ~ 2.426 V
4th	2.612 ~ 3.100 V
5th	3.398 ~ 3.998 V
6th	4.272 ~ 4.799 V

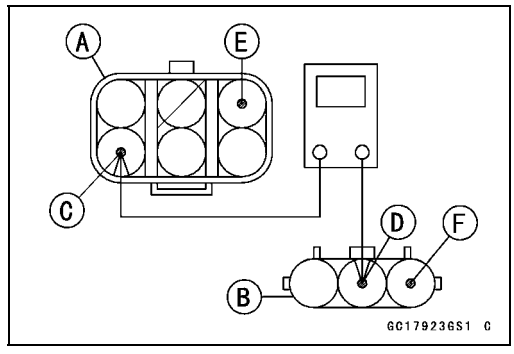
● Turn the ignition switch off.
★If the reading is out of the standard, replace the gear position sensor.

Gear Position Sensor (Service Code 25) (DTC P0914, P0915, P0916)

★If the reading is within standard, remove the ECU and check the wiring for continuity between main and subharness connectors.
○Disconnect the ECU and sensor connectors.



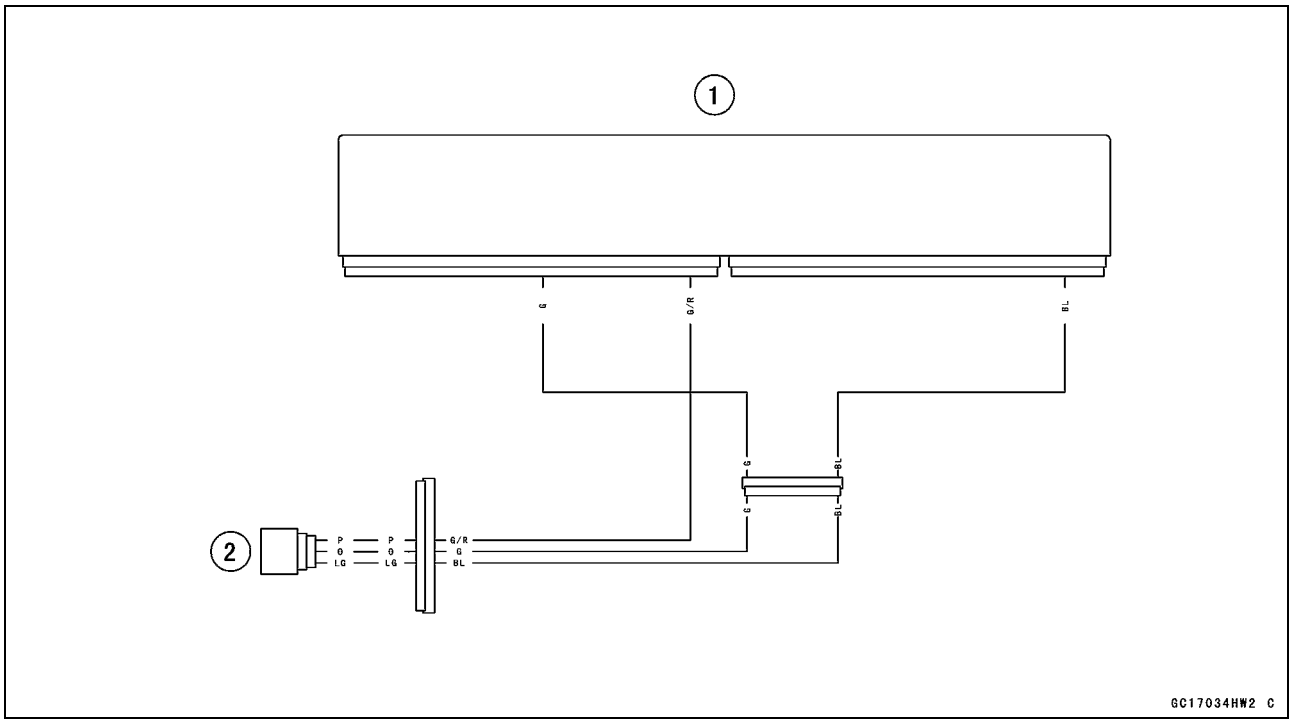
Wiring Continuity Inspection
ECU Connector [A] ←→
Subharness Connector [B]
ECU Terminal 36 [C] ←→ Connector Terminal [D]
ECU Terminal 49 [E] ←→ Connector Terminal [F]



Subharness Connector [A] ←→
Gear Position Sensor Connector [B]
Connector Terminal [C] ←→ Sensor Terminal [D]
Connector Terminal [E] ←→ Sensor Terminal [F]

★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).

Gear Position Sensor Circuit



1. ECU
2. Gear Position Sensor

Front Wheel Rotation Sensor (Service Code 27) (DTC P0500)

Front Wheel Rotation Sensor Signal Inspection

○The front wheel rotation sensor sends the signal to the ECU through the ABS hydraulic unit.

○The service code 27/DTC P0500 is detected with the ECU.

● Inspect the wheel rotation sensor air gap (see Wheel Rotation Sensor Air Gap Inspection in the Brakes chapter).

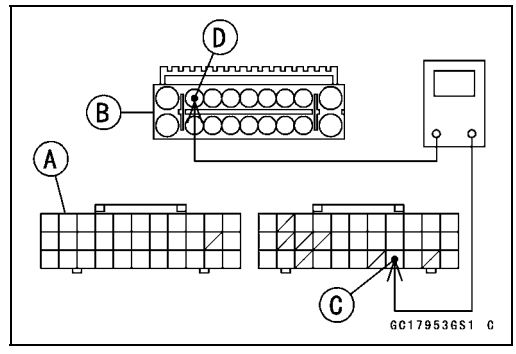
● Inspect the wheel rotation sensor rotor (see Wheel Rotation Sensor Rotor Inspection in the Brakes chapter).

● When service code 27/DTC P0500 is displayed, do the following inspection procedures.

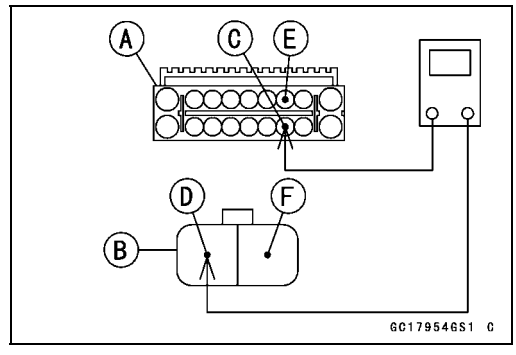
● Disconnect:
ECU Connectors (see ECU Removal)
Front Wheel Rotation Sensor Lead Connector (see Front Wheel Rotation Sensor Removal in the Brakes chapter)
ABS Hydraulic Unit Connector (see ABS Hydraulic Unit Removal in the Brakes chapter)

● Check the wiring for continuity between harness connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
ABS Hydraulic Unit Connector [B]
ECU Terminal 30 [C] ←→ ABS Hydraulic Unit Terminal 8 [D]



Wiring Continuity Inspection
ABS Hydraulic Unit Connector [A] ←→
Front Wheel Rotation Sensor Connector [B]
ABS Hydraulic Unit Connector Terminal 12 [C] ←→ Sensor Terminal [D]
ABS Hydraulic Unit Connector Terminal 3 [E] ←→ Sensor Terminal [F]

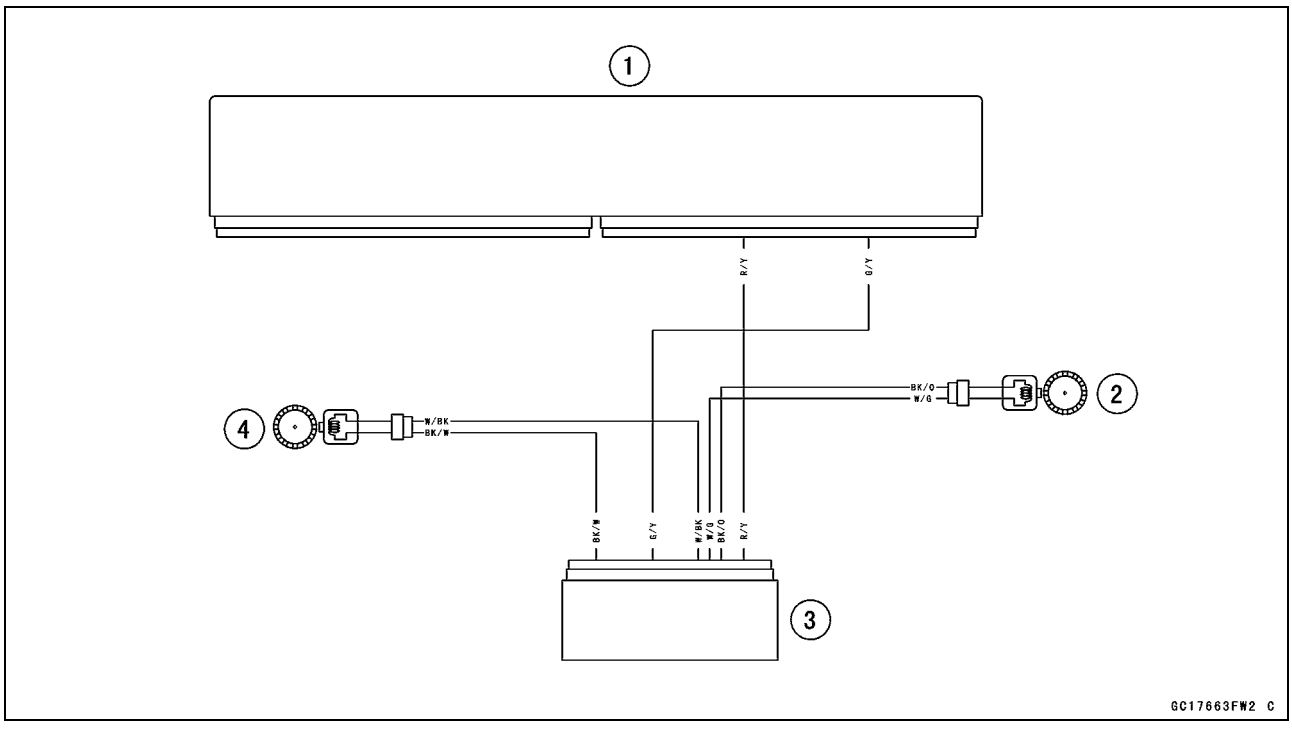


★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

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

Front Wheel Rotation Sensor (Service Code 27) (DTC P0500)

Wheel Rotation Sensor Circuit



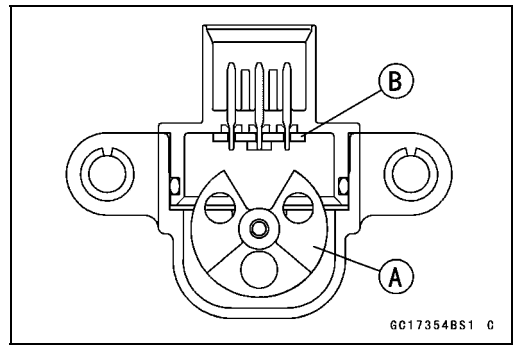
1. ECU
2. Rear Wheel Rotation Sensor
3. ABS Hydraulic Unit
4. Front Wheel Rotation Sensor

Vehicle-down Sensor (Service Code 31) (DTC C0064)

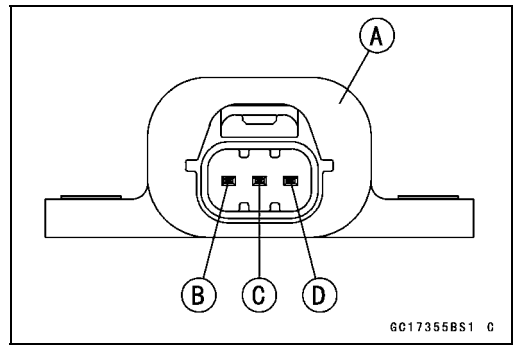
This sensor has a weight [A] with two magnets inside, and sends a signal to the ECU. But when the motorcycle banks 60 ~ 70° or more to either side (in fact falls down), the weight turns and the signal changes. The ECU senses this change, and stops the fuel pump relay, the fuel injectors and the ignition system.

Hall IC [B]

When the motorcycle is down, the ignition switch is left on. If the starter button is pushed, the electric starter turns but the engine does not start. To start the engine again, raise the motorcycle, turn the ignition switch off, and then turn it on.



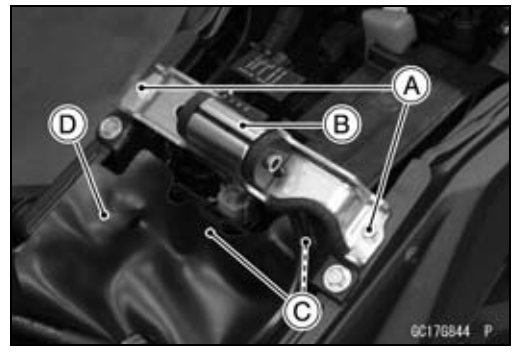
Vehicle-down Sensor [A]
Ground Terminal [B]: G
Output Terminal [C]: Y/G
Power Source Terminal [D]: BL



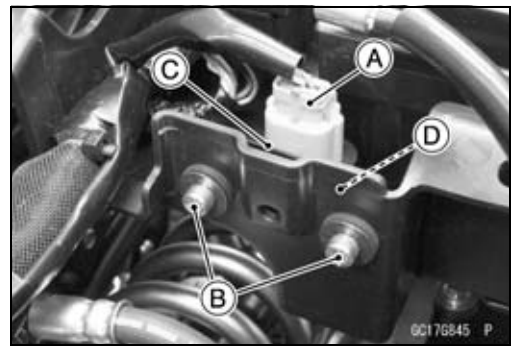
Vehicle-down Sensor Removal

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

- Remove:
  Fuel Tank (see Fuel Tank Removal)
  Fuel Tank Bracket Bolts [A]
  Fuel Tank Bracket [B]
  Rivet [C]
- Turn up the heat insulation rubber plate [D].

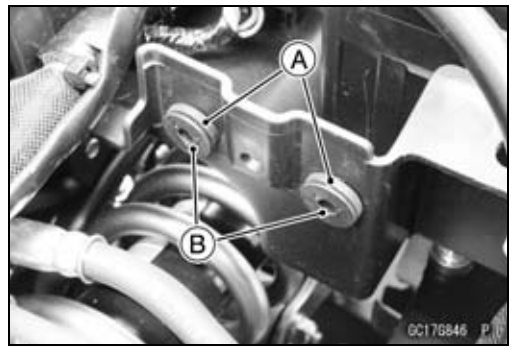


- Disconnect:
  Vehicle-down Sensor Connector [A]
- Remove:
  Vehicle-down Sensor Bolts [B] and Bracket [C]
  Vehicle-down Sensor [D]

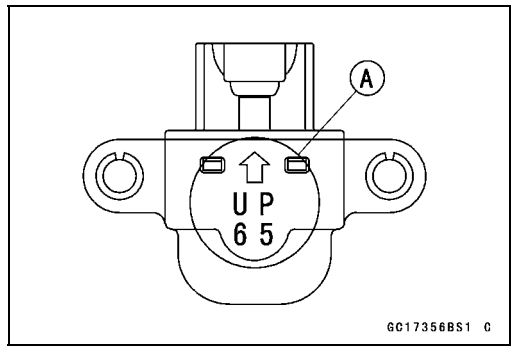


Vehicle-down Sensor (Service Code 31) (DTC C0064)

Vehicle-down Sensor Installation



- Be sure to install the rubber dampers [A] and collars [B] on the battery case.
- 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 battery case.

- Install the bracket.
- Tighten:

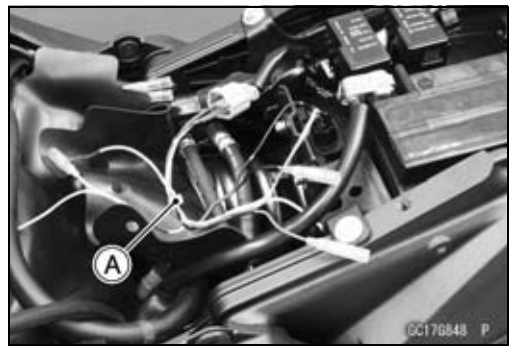
Torque - Vehicle-down Sensor Mounting Bolts: 6.0 N·m (0.61 kgf·m, 53 in·lb)

- Install the removed parts (see appropriate chapters).

Vehicle-down Sensor Input Voltage Inspection

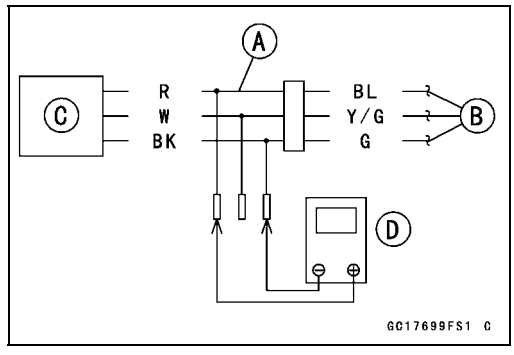
NOTE

○*Be sure the battery is fully charged.*



- Turn the ignition switch off.
- Disconnect the vehicle-down sensor connector and connect the measuring adapter [A] between these connectors as shown.
  Main Harness [B]
  Vehicle-down Sensor [C]

Special Tool - Measuring Adapter: 57001-1700



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

Vehicle-down Sensor Input Voltage
Connections to Adapter:
Digital Meter (+) → R (sensor BL) lead
Digital Meter (–) → BK (sensor G) lead

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

Input Voltage
Standard: DC 4.75 ~ 5.25 V

- Turn the ignition switch off.

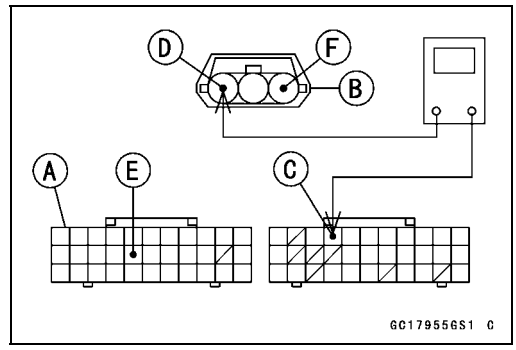
★If the reading is within the standard, check the output voltage (see Vehicle-down Sensor Output Voltage Inspection).

Vehicle-down Sensor (Service Code 31) (DTC C0064)

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

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Vehicle-down Sensor Connector [B]
ECU Terminal 4 [C] ←→ Sensor Terminal [D]
ECU Terminal 49 [E] ←→ Sensor Terminal [F]



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

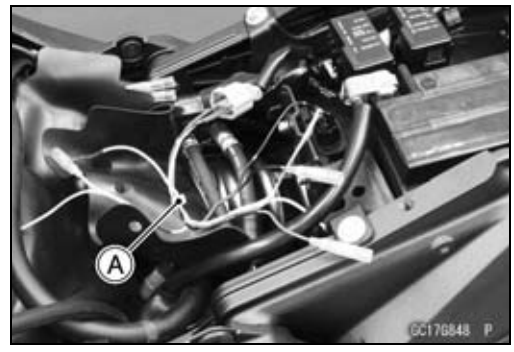
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Vehicle-down Sensor Output Voltage Inspection

● Remove the vehicle-down sensor (see Vehicle-down Sensor Removal).

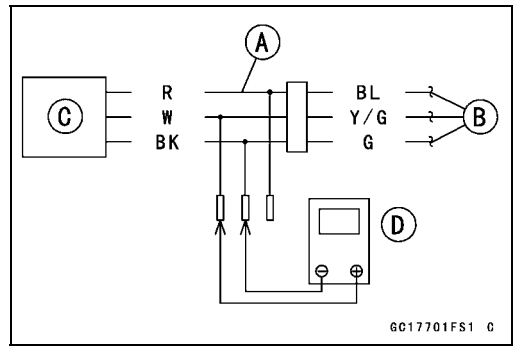
● Connect the measuring adapter [A] to the vehicle-down sensor connectors as shown.
Main Harness [B]
Vehicle-down Sensor [C]

Special Tool - Measuring Adapter: 57001-1700



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

Vehicle-down Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → W (sensor Y/G) lead
Digital Meter (–) → BK (sensor G) lead



Vehicle-down Sensor (Service Code 31) (DTC C0064)

- Hold the sensor vertically.
- Measure the output voltage with the engine stopped and with the connector joined.
- Turn the ignition switch on.
- Tilt the sensor 60 ~ 70° or more [A] right or left, then hold the sensor almost vertical with the arrow mark pointed up [B], and measure the output voltage.

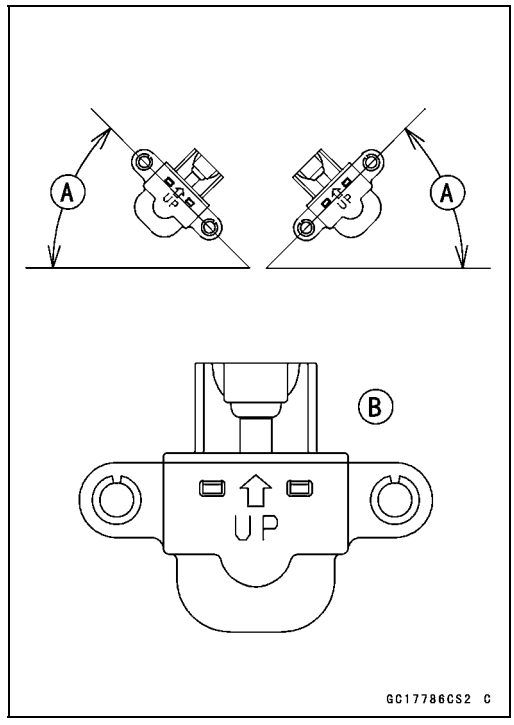
Output Voltage

Standard: With sensor tilted 60 ~ 70° or more right or left: DC 0.65 ~ 1.35 V

With sensor arrow mark pointed up: DC 3.55 ~ 4.45 V

- Turn the ignition switch off.

★If the reading is out of the standard, replace the sensor.



★If the reading is within the standard, remove the ECU and check the wiring for continuity between main harness connectors.

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection

ECU Connector [A] ←→

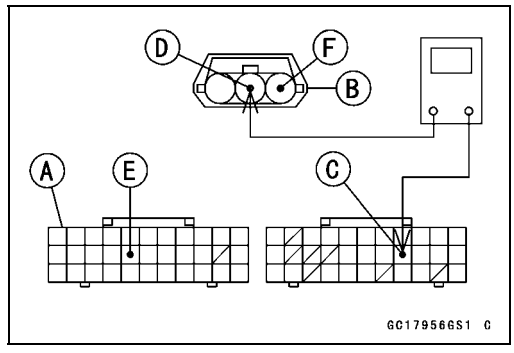
Vehicle-down Sensor Connector [B]

ECU Terminal 19 [C] ←→ Sensor Terminal [D]

ECU Terminal 49 [E] ←→ Sensor Terminal [F]

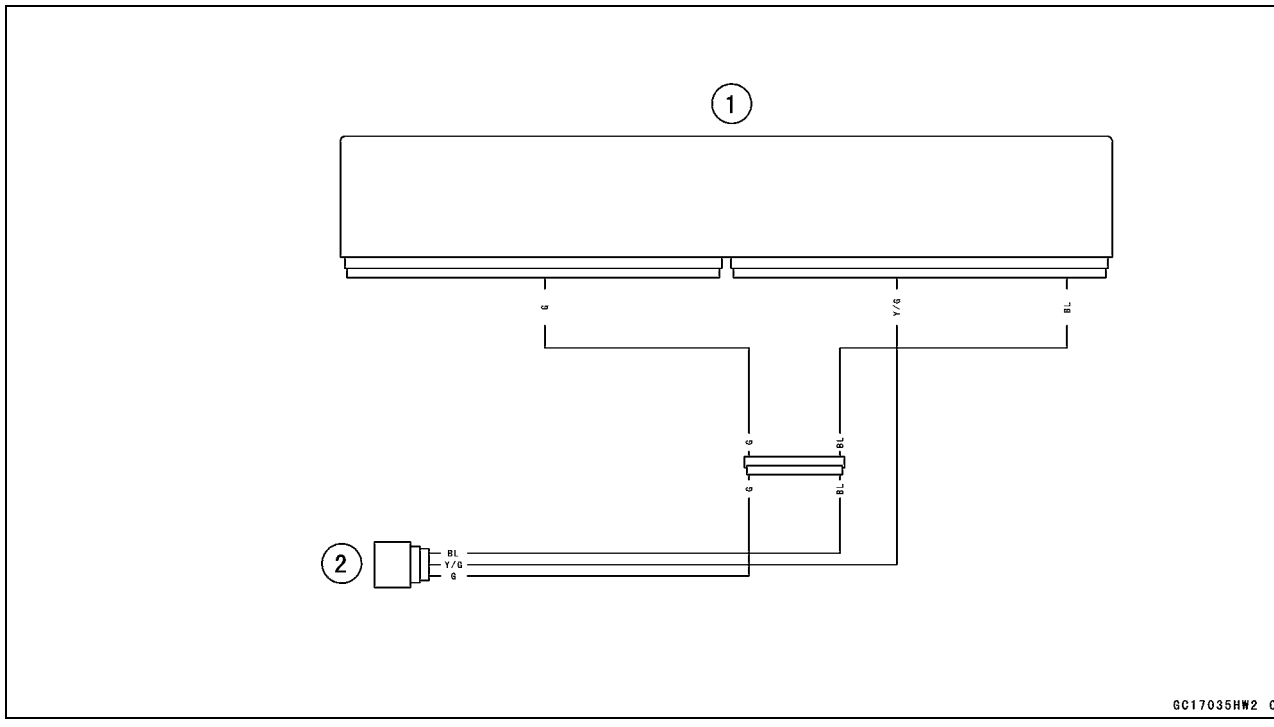
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

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



Vehicle-down Sensor (Service Code 31) (DTC C0064)

Vehicle-down Sensor Circuit

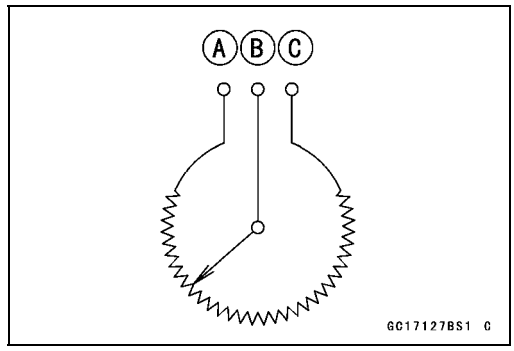


1. ECU
2. Vehicle-down Sensor

Subthrottle Sensor (Service Code 32) (DTC P0220, P0223)

The subthrottle sensor is a rotating variable resistor that change output voltage according to throttle operating. The ECU senses this voltage change and determines fuel injection quantity, and ignition timing according to engine rpm, and throttle opening.

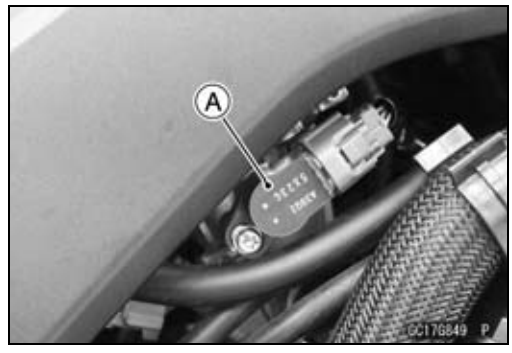
Input Terminal [A]: BL
Output Terminal [B]: BL/W
Ground Terminal [C]: G



Subthrottle Sensor Removal/Adjustment

NOTICE

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



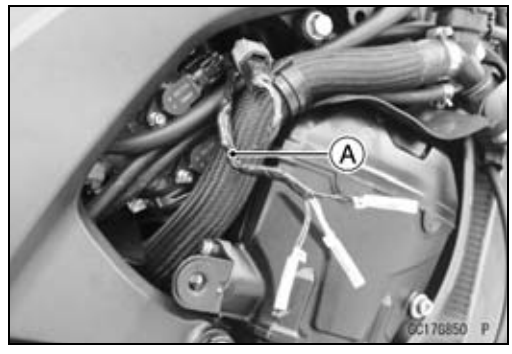
Subthrottle Sensor Input Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the right lower fairing (see Lower Fairing Removal in the Frame chapter).
- Disconnect the subthrottle sensor connector and connect the setting adapter [A] between these connectors.

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538



- Connect a digital meter to the setting adapter leads.

Subthrottle Sensor Input Voltage
Connections to Adapter:
Digital Meter (+) → W (sensor BL) lead
Digital Meter (–) → BK (sensor G) lead

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

Input Voltage
Standard: DC 4.75 ~ 5.25 V

- Turn the ignition switch off.

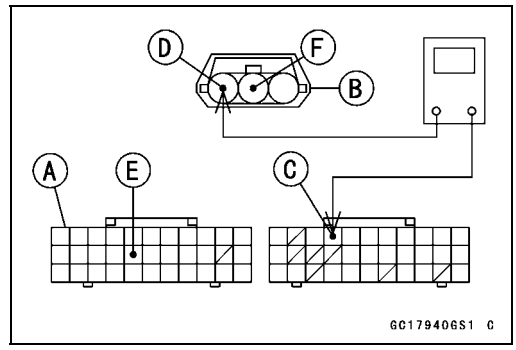
★If the reading is within the standard, check the output voltage (see Subthrottle Sensor Output Voltage Inspection).

Subthrottle Sensor (Service Code 32) (DTC P0220, P0223)

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

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Subthrottle Sensor Connector [B]
ECU Terminal 4 [C] ←→ Sensor Terminal [D]
ECU Terminal 49 [E] ←→ Sensor Terminal [F]



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

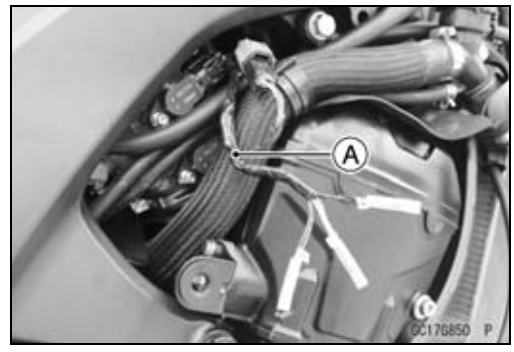
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Subthrottle Sensor Output Voltage Inspection

● Measure the output voltage at the subthrottle sensor in the same way as input voltage inspection, note the following.

○Disconnect the subthrottle sensor connector and connect the setting adapter [A] between these connectors.

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538



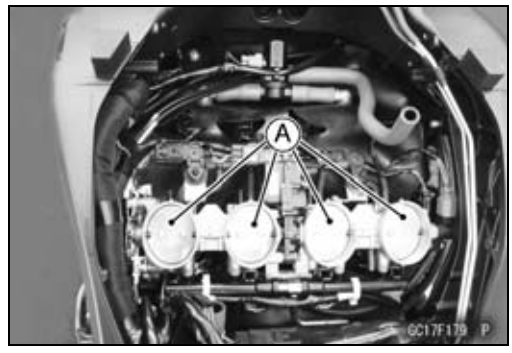
Subthrottle Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → R (sensor BL/W) lead
Digital Meter (–) → BK (sensor G) lead

● Remove the air cleaner housing (see Air Cleaner Housing Removal).

● Disconnect the subthrottle valve actuator connector [A].



Subthrottle Sensor (Service Code 32) (DTC P0220, P0223)



- Measure the output voltage with the engine stopped with the connector joined.
- Turn the ignition switch on.
- Measure the output voltage when the subthrottle valves [A] are fully opened by hand.

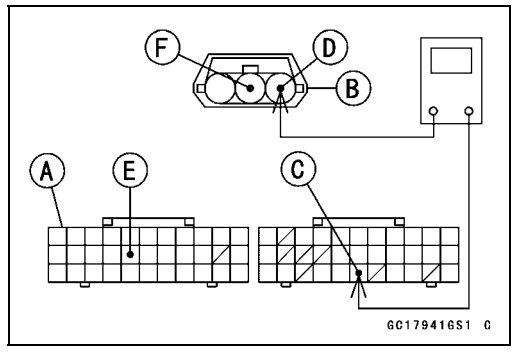
Output Voltage
Standard: DC 1.08 ~ 1.12 V at subthrottle valve full close position
DC 4.2 ~ 4.4 V at subthrottle valve full open position (for reference)

NOTE

○*Open the subthrottle valves, confirm the output voltage will be raise.*
○*The standard voltage refers to the value when the voltage reading at the Input Voltage Inspection shows 5 V exactly.*
○*When the input voltage reading shows other than 5 V, derive a voltage range as follows.*
Example:
In the case of a input voltage of 4.75 V.
1.08 × 4.75 ÷ 5.00 = 1.03 V
1.12 × 4.75 ÷ 5.00 = 1.06 V
Thus, the valid range is 1.03 ~ 1.06 V

- Turn the ignition switch off.

★If the reading is out of the standard, check the subthrottle sensor resistance (see Subthrottle Sensor Resistance Inspection).



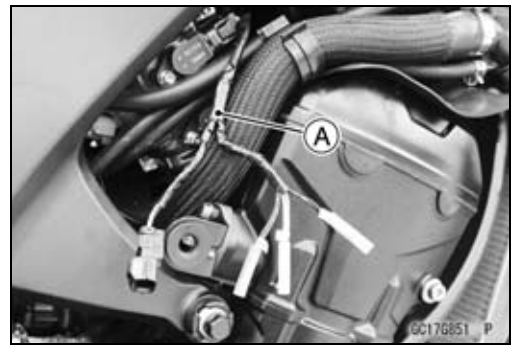
★If the reading is within the standard, remove the ECU and check the wiring for continuity between main harness connectors.
○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Subthrottle Sensor Connector [B]
ECU Terminal 28 [C] ←→ Sensor Terminal [D]
ECU Terminal 49 [E] ←→ Sensor Terminal [F]

★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).

Subthrottle Sensor (Service Code 32) (DTC P0220, P0223)

Subthrottle Sensor Resistance Inspection



- Turn the ignition switch off.
- Disconnect the subthrottle sensor connector.
- Connect the setting adapter [A] to the sensor connector only.

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538

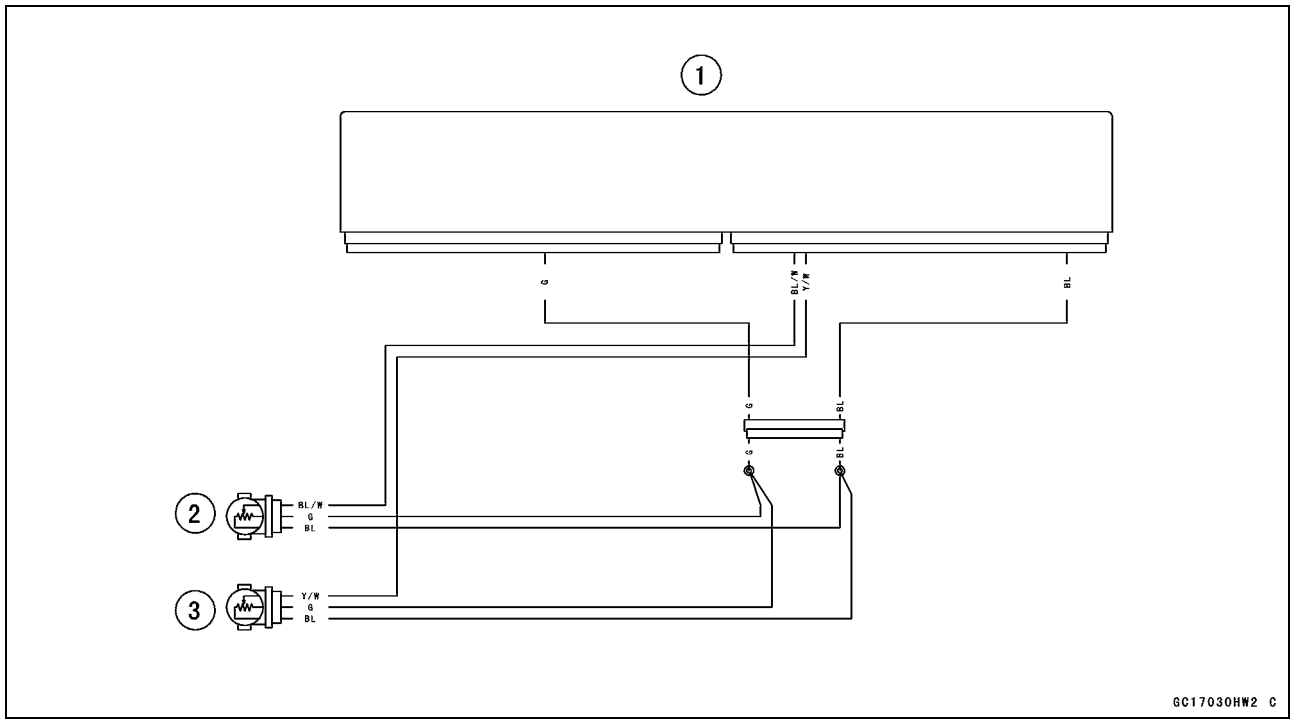
- Measure the subthrottle sensor resistance.

Subthrottle Sensor Resistance
Connections to Adapter:
W (sensor BL) lead ←→ BK (sensor G) lead

Standard: 4 ~ 6 kΩ

★If the reading is out of the standard, replace the throttle body assy (see Throttle Body Assy Removal/Installation).
★If the reading is within the standard, but the problem still exists, replace the ECU (see ECU Removal/Installation).

Subthrottle Sensor Circuit



1. ECU
2. Subthrottle Sensor
3. Main Throttle Sensor

Oxygen Sensor - not activated (Service Code 33) (DTC P0130, P0132)

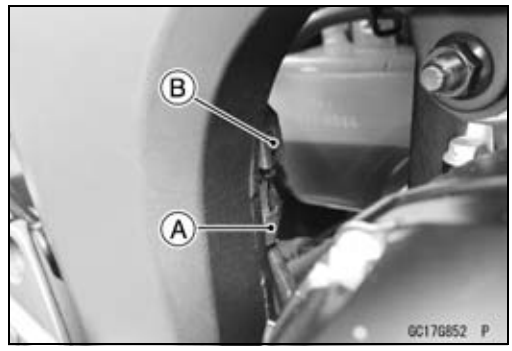
Oxygen Sensor Removal/Installation

● Refer to the Oxygen Sensor Removal/Installation in the Electrical System chapter.

Oxygen Sensor Inspection

● Turn the ignition switch off.

● Open the clamp [A], and pull out the oxygen sensor lead connector [B].

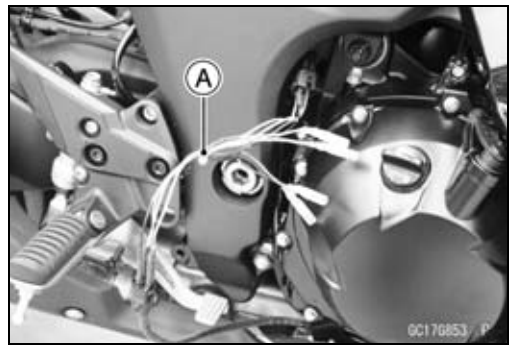


● Disconnect the oxygen sensor lead connector and connect the measuring adapter [A] between these connectors.

Main Harness [B]

Oxygen Sensor [C]

Special Tool - Measuring Adapter: 57001-1700



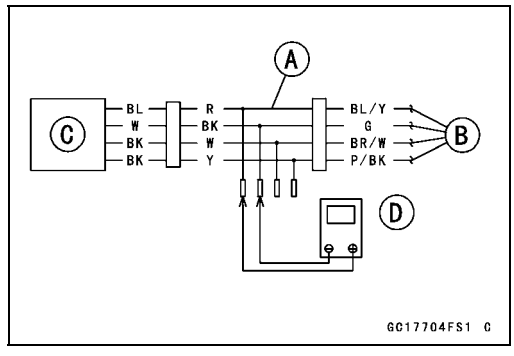
● Connect a digital meter [D] to the measuring adapter leads.

Oxygen Sensor Output Voltage

Connections to Adapter:

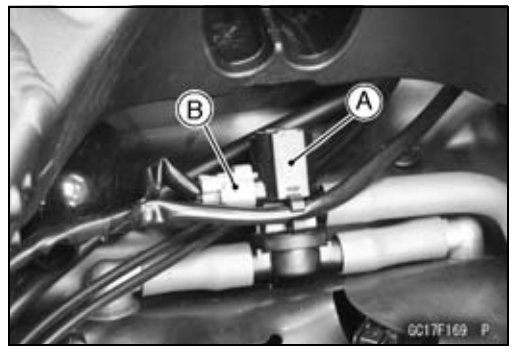
Digital Meter (+) → R (sensor BL) lead

Digital Meter (−) → BK (sensor W) lead



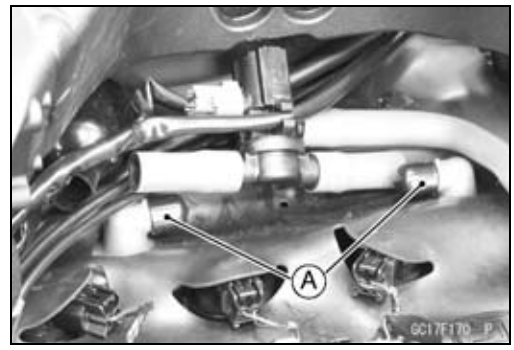
● Remove the air switching valve [A] (see Air Switching Valve Removal in the Engine Top End chapter).

○Do not disconnect the air switching valve connector [B].



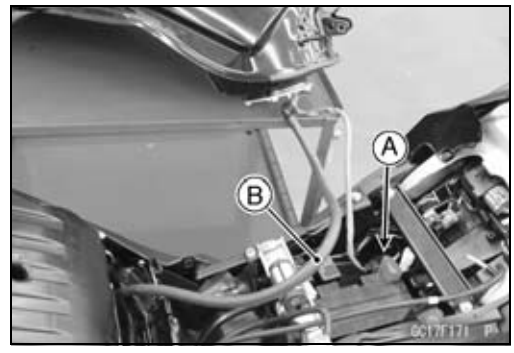
Oxygen Sensor - not activated (Service Code 33) (DTC P0130, P0132)

- Install the suitable plugs [A] on the fitting of the air suction valve covers, and shut off the secondary air.



- Remove the fuel hose (see Fuel Hose Replacement in the Periodic Maintenance chapter).
- Connect the following parts temporarily.
  Fuel Pump Lead Connector [A]
  Extension Tube [B]
  Air Cleaner Housing (see Air Cleaner Housing Installation)

Special Tool - Extension Tube: 57001-1578



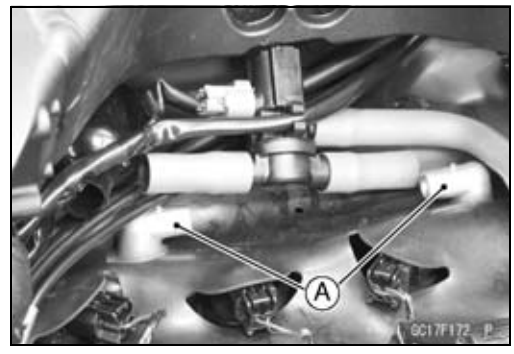
- Warm up the engine thoroughly until the radiator fan starts.
- Measure the output voltage with the connector joined.

Output Voltage (with Plugs, Rich)
Standard: DC 0.7 V or more

- Turn the ignition switch off.
- Remove the air cleaner housing (see Air Cleaner Housing Removal).
- 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 air cleaner housing temporarily (see Air Cleaner Housing Installation).
- Start the engine, and let it idle.
- Measure the output voltage with the connector joined.

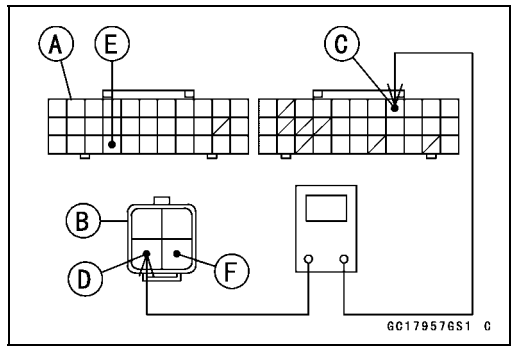
Output Voltage (without Plugs, Lean)
Standard: DC 0.2 V or less

- Turn the ignition switch off.

Oxygen Sensor - not activated (Service Code 33) (DTC P0130, P0132)

★If the reading is out of the standard (with plugs: DC 0.7 V or more, without plugs: DC 0.2 V or less), remove the ECU and check the wiring for continuity between main harness connectors.

○Disconnect the ECU and sensor connectors.



Wiring Continuity Inspection

ECU Connectors [A] ←→

Oxygen Sensor Connector [B]

ECU Terminal 8 [C] ←→ Sensor Terminal [D]

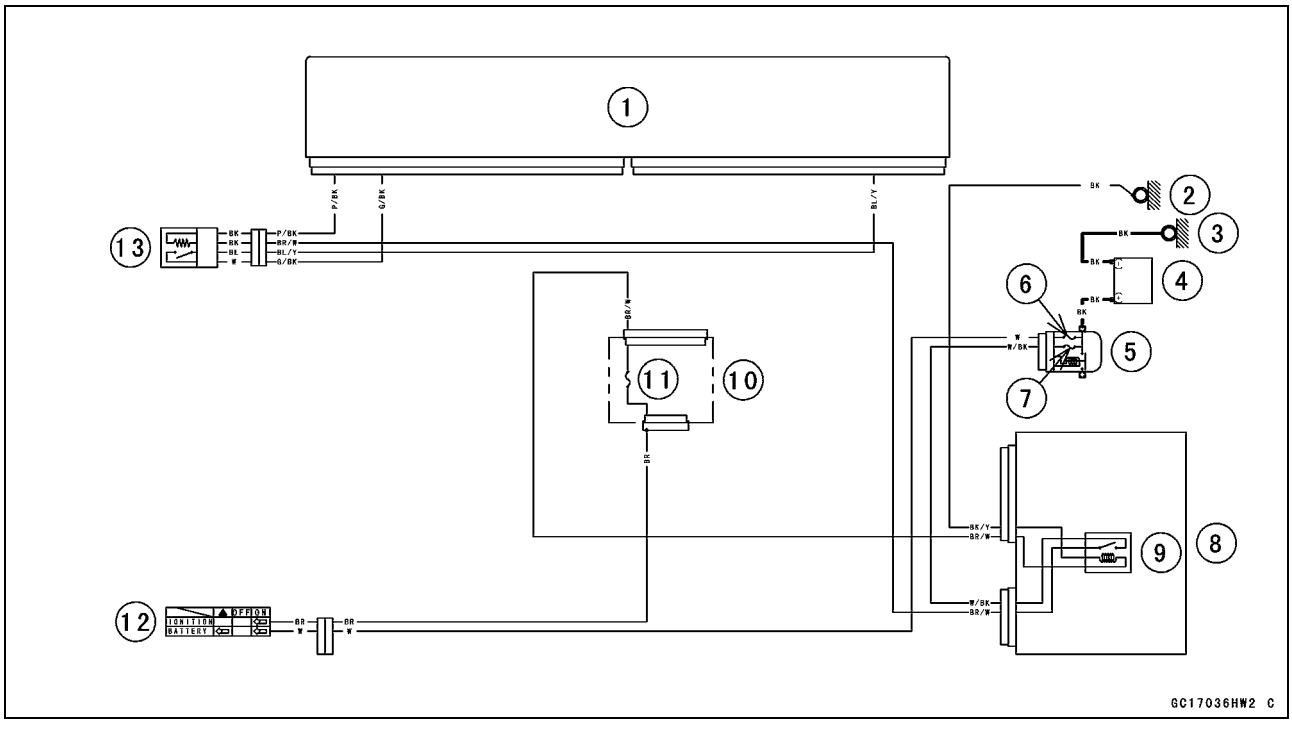
ECU Terminal 59 [E] ←→ Sensor Terminal [F]

★If the wiring is good, replace the sensor.

★If the reading is within the standard (with plugs: DC 0.7 V or more, without plugs: DC 0.2 V or less), 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).

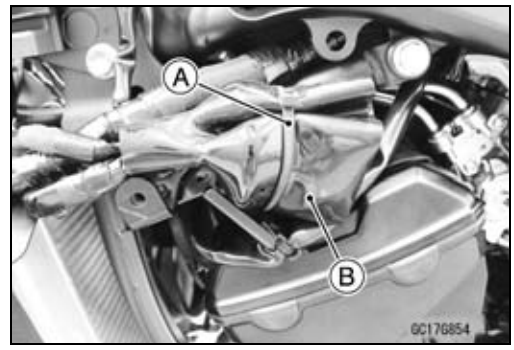
Oxygen Sensor Circuit



1. ECU
2. Frame Ground (1)
3. Engine Ground
4. Battery 12 V 8 Ah
5. Starter Relay
6. Main Fuse 30 A
7. ECU Fuse 15 A
8. Relay Box
9. ECU Main Relay
10. Fuse Box (1)
11. Ignition Fuse 15 A
12. Ignition Switch
13. Oxygen Sensor

Immobilizer Amplifier (Service Code 35, Equipped Models)

Antenna Resistance Inspection



- Turn the ignition switch off.
- Remove the left lower fairing (see Lower Fairing Removal in the Frame chapter).
- Cut the band [A].
- Slide the dust cover [B].

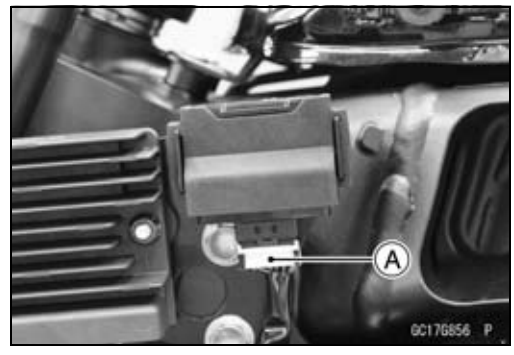


- Disconnect the antenna lead connector [A].
- Measure the antenna resistance.

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 ignition switch (see Immobilizer System Parts Replacement in the Electrical System chapter).
★If the reading is within the standard, check the wiring to the amplifier (see Immobilizer System Circuit).
★If the wiring is good, check the input voltage of the amplifier (see Amplifier Input Voltage Inspection).

Amplifier Input Voltage Inspection



NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the left lower fairing (see Lower 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 on.

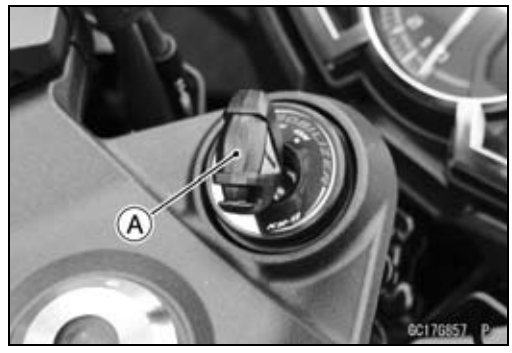
Input Voltage
Standard: Battery Voltage

- Turn the ignition switch off.

★If the reading is out of the standard, check the wiring (see Immobilizer System Circuit).
★If the reading is within the standard, check the wiring to ECU (see Immobilizer System Circuit).
★If the wiring is good, replace the amplifier (see Immobilizer System Parts Replacement in the Electrical System chapter).

Blank Key Detection (Service Code 36, Equipped Models)

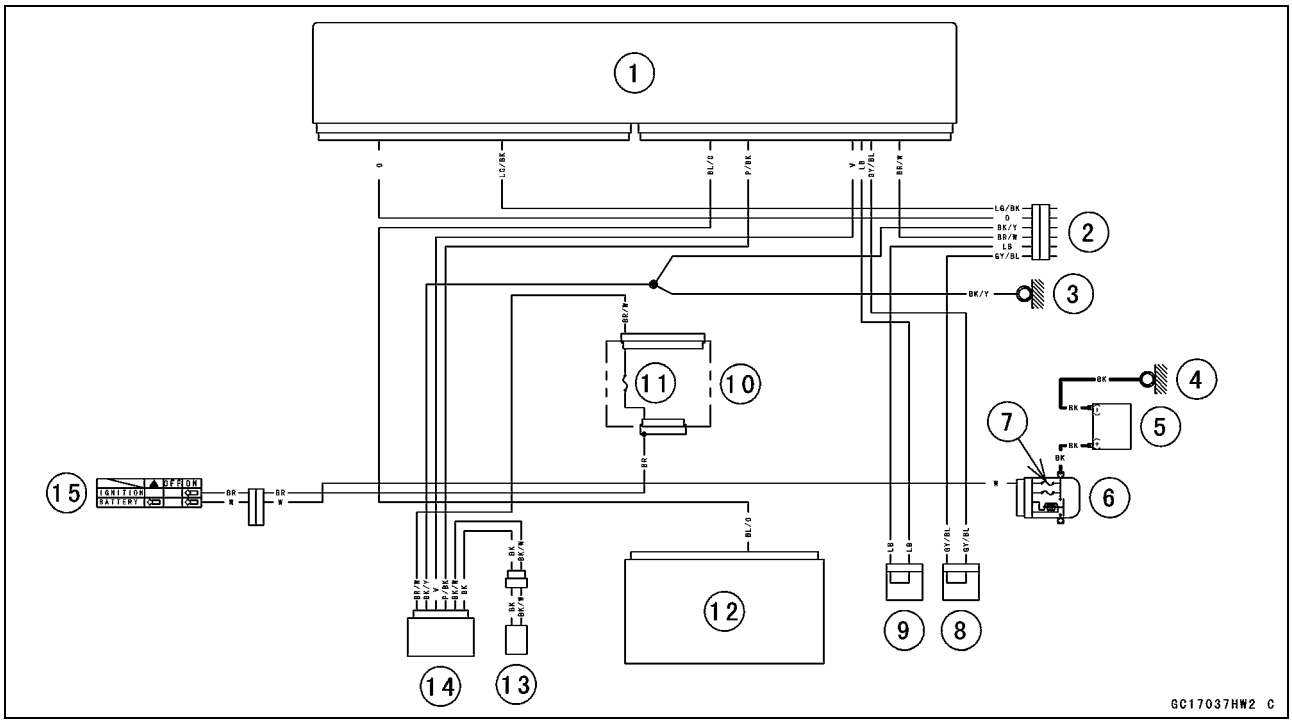
● This code appears in the following conditions.
○The transponder [A] in the ignition key is malfunction.
○When the spare key of unregistration is used.
○When the ignition key is registered in the registered ECU.
● Therefore, the service code 36 will disappear when the above issue is solved.



Ignition Key Inspection

● Register the ignition key correctly (see Key Registration in the Electrical System chapter).
★If the service code 36 appears again, the transponder in the key is malfunction, replace it.

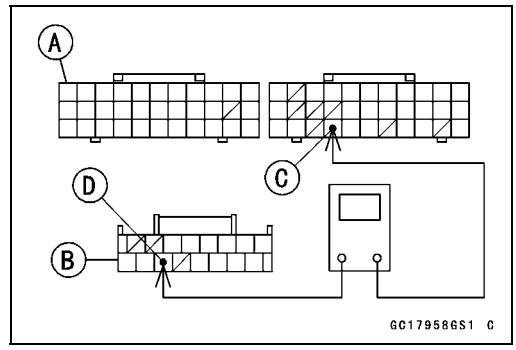
Immobilizer System Circuit



1. ECU
2. Immobilizer/Kawasaki Diagnostic System Connector
3. Frame Ground (5)
4. Engine Ground
5. Battery 12 V 8 Ah
6. Starter Relay
7. Main Fuse 30 A
8. Joint Connector (1)
9. Joint Connector (2)
10. Fuse Box (1)
11. Ignition Fuse 15 A
12. Meter Unit
13. Immobilizer Antenna
14. Immobilizer Amplifier
15. Ignition Switch

ECU Communication Error (Service Code 39) (DTC U0001)

ECU Communication Line Inspection

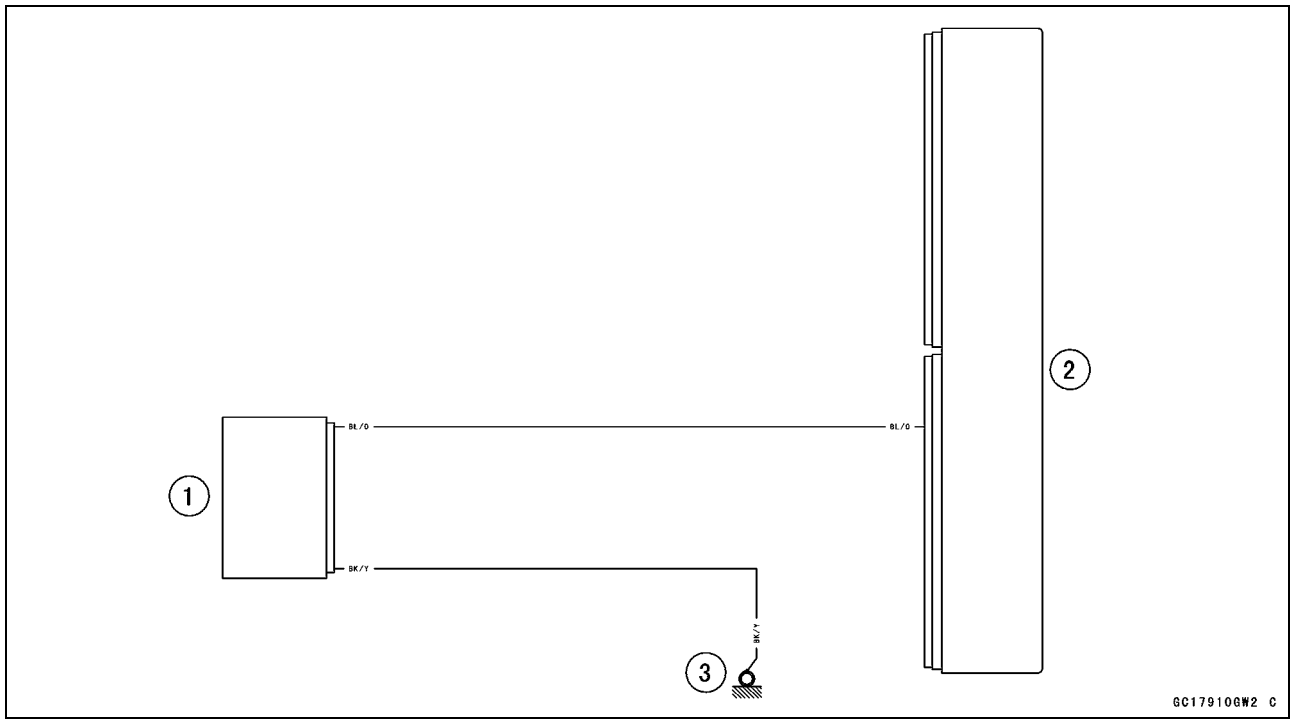


○When the data is not sent from the ECU to the meter unit for more than about 10 seconds, the service code 39 is displayed.
○The service code 39 is detected with meter unit.
● Remove the ECU and meter unit, check the wiring for continuity between main harness connectors.
○Disconnect the ECU and meter unit connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→ Meter Unit Connector [B]
ECU Terminal 26 [C] ←→ Meter Terminal [D]

★If the wiring is good, check the meter unit (see Meter Unit Inspection in the Electrical System chapter).
★If the meter unit is normal, replace the ECU (see ECU Removal/Installation).

ECU Communication Line Circuit



1. Meter Unit
2. ECU
3. Frame Ground (4)

Fuel Injectors (Service Code 41, 42, 43, 44) (DTC P0201, P0202, P0203, P0204)

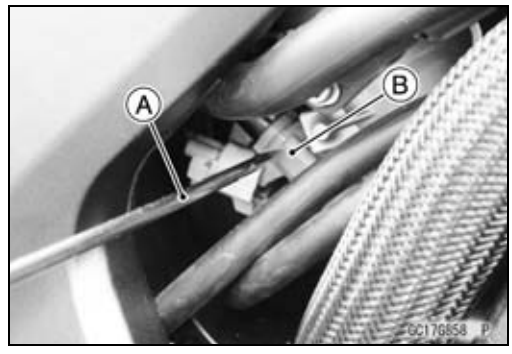
Inspect the eligible fuel injector according to the following service code or DTC.

Service Code 41/DTC P0201 → Fuel Injector #1
Service Code 42/DTC P0202 → Fuel Injector #2
Service Code 43/DTC P0203 → Fuel Injector #3
Service Code 44/DTC P0204 → Fuel Injector #4

Fuel Injector Removal/Installation

● Refer to the Throttle Body Assy Disassembly/Assembly.

Fuel Injector Audible Inspection

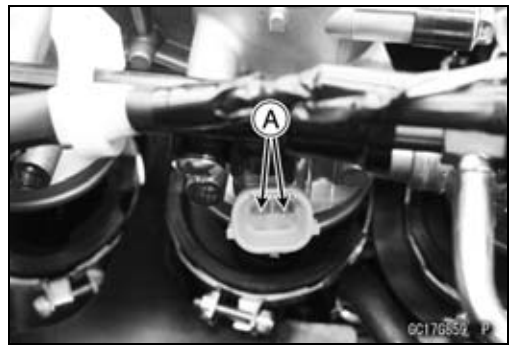


NOTE

○*Be sure the battery is fully charged.*

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

Fuel Injector Resistance Inspection



● Remove the throttle body assy with the connectors installed (see Throttle Body Assy Removal).
● Disconnect the fuel injector connector.
● Connect a digital meter to the terminals [A] in each fuel injector.
● Measure the fuel injector resistance.

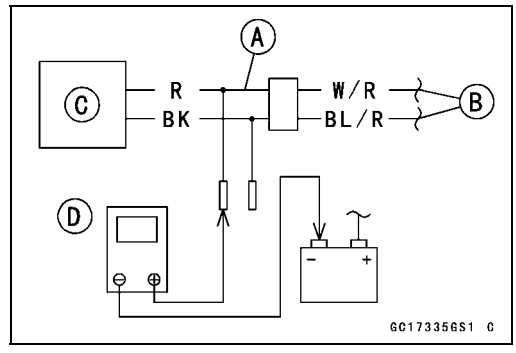
Fuel Injector Resistance
Standard: About 11.7 ~ 12.3 Ω @20°C (68°F)

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

Fuel Injectors (Service Code 41, 42, 43, 44) (DTC P0201, P0202, P0203, P0204)

Fuel Injector Power Source Voltage Inspection





NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the throttle body assy with the connectors installed (see Throttle Body Assy Removal).
- Disconnect the injector connector and connect the measuring adapter [A] between these connectors as shown.
  Main Harness [B]
  Fuel Injector #1 [C]

  Special Tool - Measuring Adapter: 57001-1700
- Connect a digital meter [D] to the measuring adapter lead.

  Fuel Injector Power Source Voltage
  Connections to Adapter:
  For Fuel Injector #1, #2, #3, #4
  Digital Meter (+) → R (injector W/R) lead
  Digital Meter (–) → Battery (–) Terminal
- Measure the power source voltage with the engine stopped.
- Turn the engine stop switch to run position.
- Turn the ignition switch on.

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

- Turn the ignition switch off.

★If the reading stays on battery voltage and never shows 0 V, check the fuel pump relay (see Relay Circuit Inspection in the Electrical System chapter).

★If the fuel pump relay is normal, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

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

★If there is still no battery voltage, check the fuel pump relay (see Relay Circuit Inspection in the Electrical System chapter).

★If the fuel pump relay is normal, check the power source wiring (see Fuel Injector Circuit).

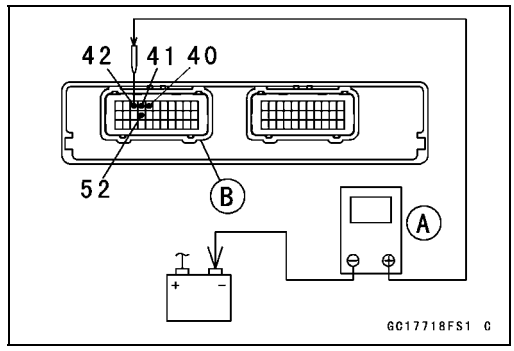
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

★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 (Service Code 41, 42, 43, 44) (DTC P0201, P0202, P0203, P0204)

Fuel Injector Output Voltage Inspection



NOTE

○*Be sure the battery is fully charged.*

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

○Do not disconnect the ECU connector.

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

Special Tool - Needle Adapter Set: 57001-1457

Fuel Injector Output Voltage
Connections to ECU Connector:
For Fuel Injector #1
Digital Meter (+) → BL/BK lead (ECU terminal 42)
Digital Meter (–) → Battery (–) Terminal
For Fuel Injector #2
Digital Meter (+) → BL/R lead (ECU terminal 41)
Digital Meter (–) → Battery (–) Terminal
For Fuel Injector #3
Digital Meter (+) → BL/O lead (ECU terminal 40)
Digital Meter (–) → Battery (–) Terminal
For Fuel Injector #4
Digital Meter (+) → BL/G lead (ECU terminal 52)
Digital Meter (–) → Battery (–) Terminal

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

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

- Turn the ignition switch off.

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

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

Fuel Injectors (Service Code 41, 42, 43, 44) (DTC P0201, P0202, P0203, P0204)

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

○Disconnect the ECU and injector connector.

Wiring Continuity Inspection

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

For Fuel Injector #1 [C]

ECU Terminal 42 [D] ⟷ Fuel Injector Terminal [E]

For Fuel Injector #2

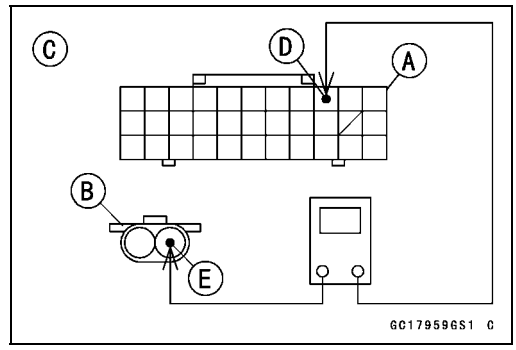
ECU Terminal 41 ⟷ Fuel Injector Terminal

For Fuel Injector #3

ECU Terminal 40 ⟷ Fuel Injector Terminal

For Fuel Injector #4

ECU Terminal 52 ⟷ Fuel Injector Terminal



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

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

Fuel Injector Fuel Line Inspection

● Remove the throttle body assy (see Throttle Body Assy Removal).

● Check the fuel 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.

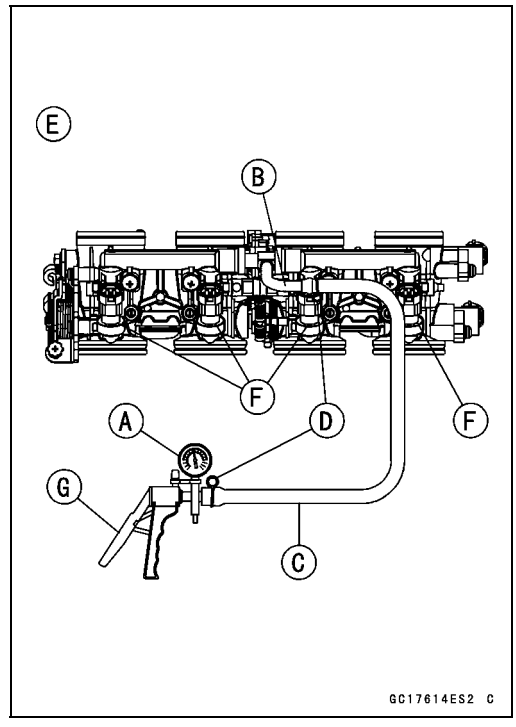
Rear Side View [E]

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

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

Fuel 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, fuel injectors and related parts.

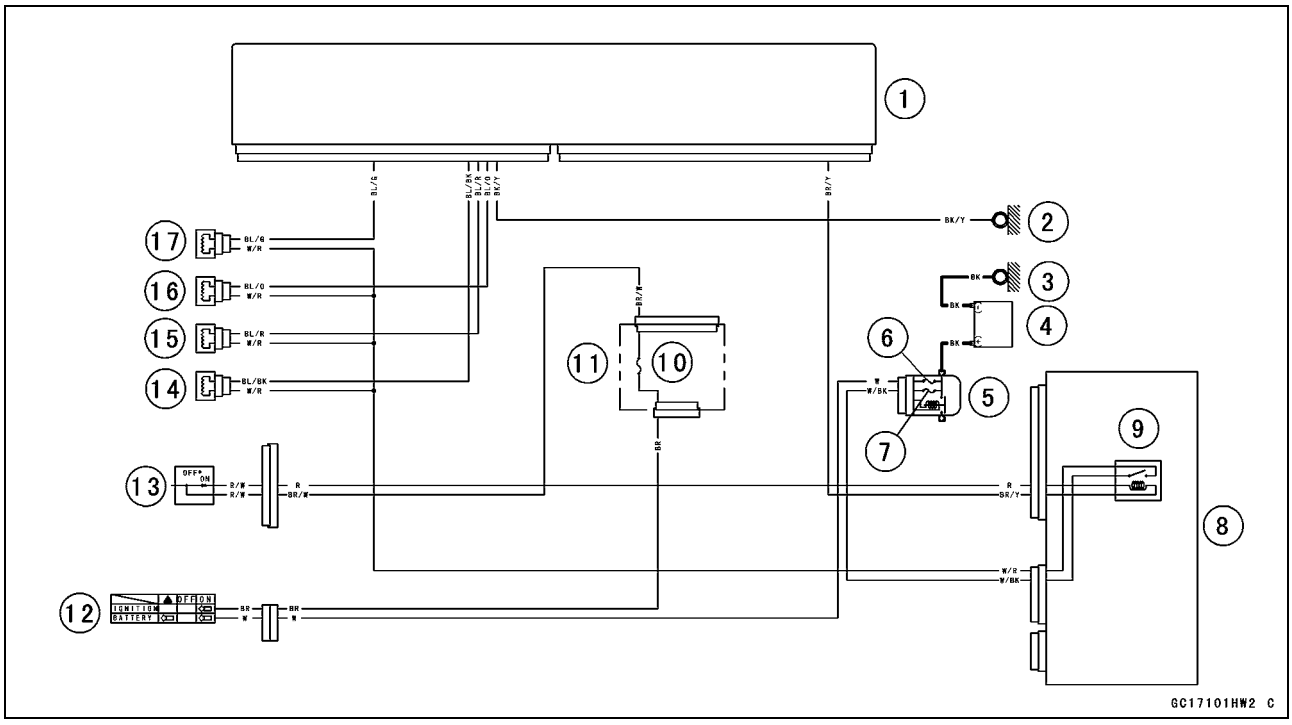
○Repeat the leak test, and check the fuel line for no leakage.

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

● Start the engine and check for fuel leakage.

Fuel Injectors (Service Code 41, 42, 43, 44) (DTC P0201, P0202, P0203, P0204)

Fuel Injector Circuit



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

Stick Coils #1, #2, #3, #4 (Service Code 51, 52, 53, 54) (DTC P0351, P0352, P0353, P0354)

Inspect the eligible stick coil according to the following service code or DTC.

Service Code 51/DTC P0351 → Stick Coil #1
Service Code 52/DTC P0352 → Stick Coil #2
Service Code 53/DTC P0353 → Stick Coil #3
Service Code 54/DTC P0354 → Stick Coil #4

Stick Coil Removal/Installation

● Refer to the Stick Coil Removal/Installation in the Electrical System chapter.

Stick Coil Primary Winding Resistance Inspection

● Refer to the Stick Coil Inspection in the Electrical System chapter.

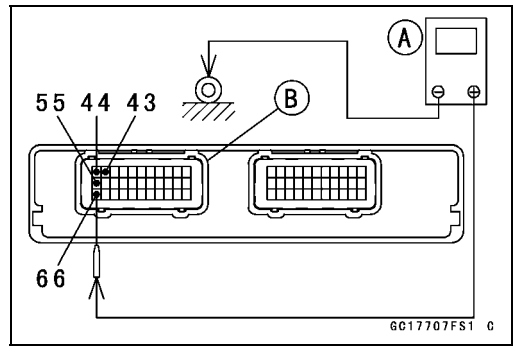
★If the reading is within the standard, check the input voltage (see Stick Coil Input Voltage Inspection).

Stick Coil Input Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

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



Special Tool - Needle Adapter Set: 57001-1457

Stick Coil Input Voltage
Connections to ECU Connector:
For Stick Coil #1
Digital Meter (+) → BK lead (terminal 44)
Digital Meter (–) → Battery (–) Terminal
For Stick Coil #2
Digital Meter (+) → BK/R lead (terminal 55)
Digital Meter (–) → Battery (–) Terminal
For Stick Coil #3
Digital Meter (+) → BK/O lead (terminal 66)
Digital Meter (–) → Battery (–) Terminal
For Stick Coil #4
Digital Meter (+) → BK/G lead (terminal 43)
Digital Meter (–) → Battery (–) Terminal

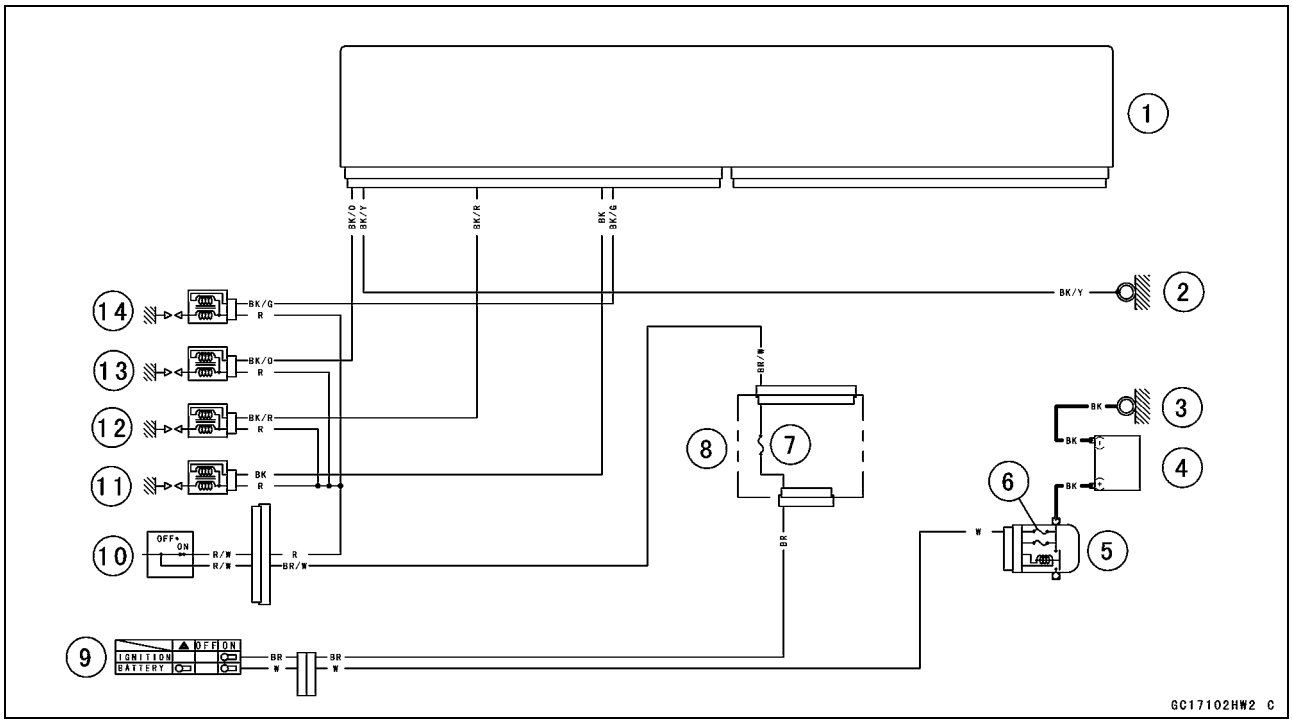
● Measure the input voltage to each primary winding of the stick coils with the engine stopped and with the connectors joined.
● Turn the engine stop switch to run position.
● Turn the ignition switch on.

Input Voltage
Standard: Battery Voltage

Stick Coils #1, #2, #3, #4 (Service Code 51, 52, 53, 54) (DTC P0351, P0352, P0353, P0354)

● Turn the ignition switch off.
★If the input voltage is out of the standard, check the wiring for continuity (see Stick Coil Circuit).
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
★If the input voltage is within the standard, 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).

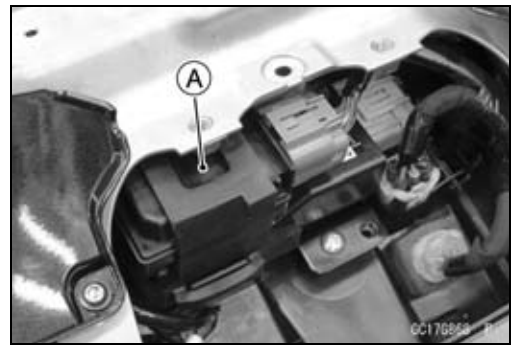
Stick Coil Circuit



1. ECU
2. Frame Ground (2)
3. Engine Ground
4. Battery 12 V 8 Ah
5. Starter Relay
6. Main Fuse 30 A
7. Ignition Fuse 15 A
8. Fuse Box (1)
9. Ignition Switch
10. Engine Stop Switch
11. Stick Coil #1
12. Stick Coil #2
13. Stick Coil #3
14. Stick Coil #4

Radiator Fan Relay (Service Code 56) (DTC P0480)

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

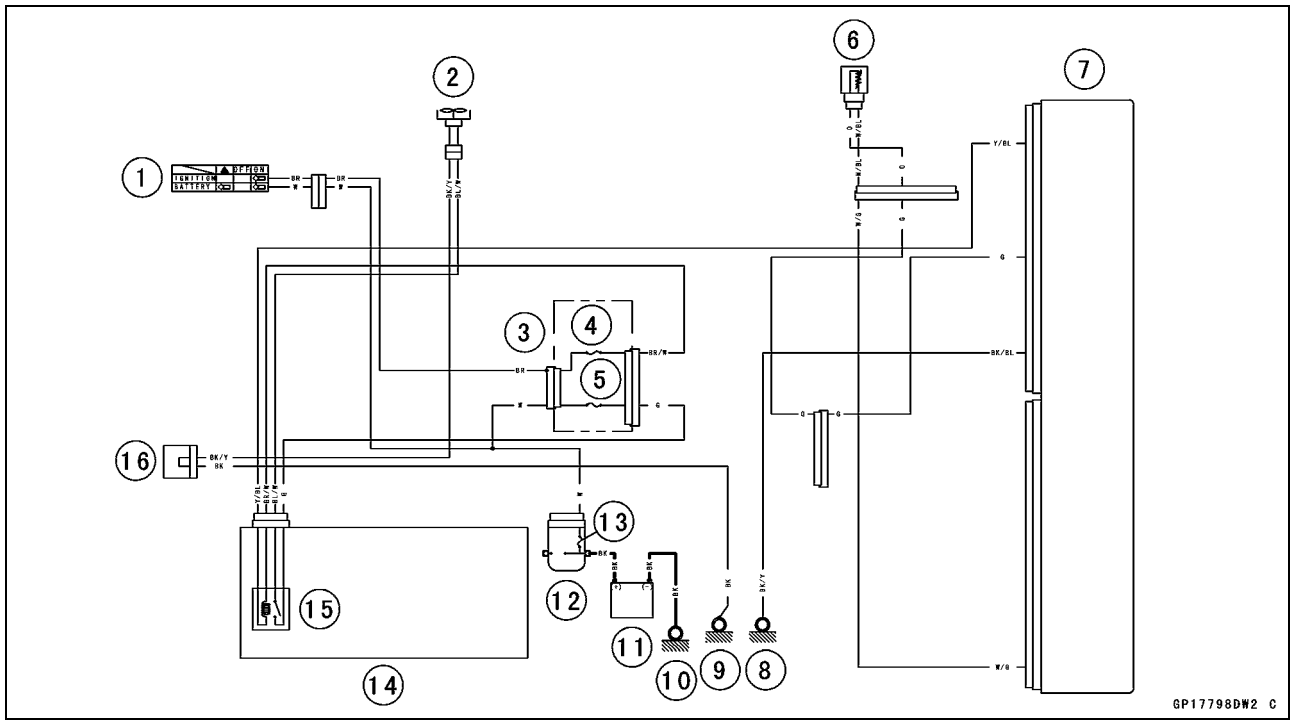
● Refer to the Relay Circuit Inspection in the Electrical System chapter.

★If the radiator fan relay is normal, check the wiring for continuity (see Radiator Fan Relay Circuit).

★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).

Radiator Fan Relay Circuit



1. Ignition Switch
2. Fan Motor
3. Fuse Box (1)
4. Ignition Fuse 15 A
5. Fan Fuse 15 A
6. Water Temperature Sensor
7. ECU
8. Frame Ground (5)
9. Frame Ground (1)
10. Engine Ground
11. Battery 12 V 8 Ah
12. Starter Relay
13. Main Fuse 30 A
14. Relay Box
15. Radiator Fan Relay
16. Joint Connector B

Subthrottle Valve Actuator (Service Code 62) (DTC P2100)

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.



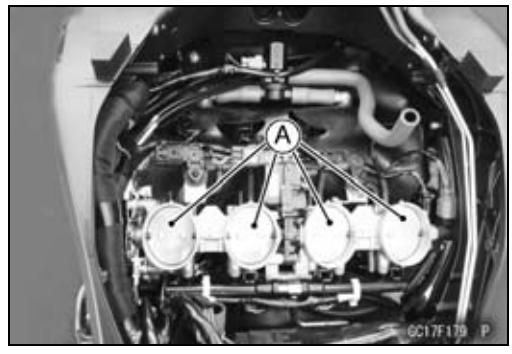
Subthrottle Valve Actuator Inspection

NOTE

○*Be sure the battery is fully charged.*

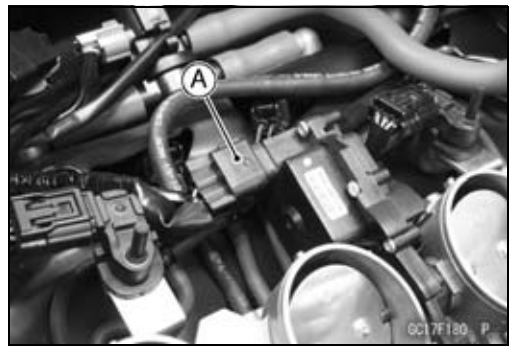
- Remove the air cleaner housing (see Air Cleaner Housing Removal).
- Turn the ignition switch on.
- Check to see that all the subthrottle valves [A] open and close smoothly.
- Turn the ignition switch off.

★If the subthrottle valves do not operate, check the subthrottle valve actuator resistance (see Subthrottle Valve Actuator Resistance Inspection).



Subthrottle Valve Actuator Resistance Inspection

- Turn the ignition switch off.
- Remove the air cleaner housing (see Air Cleaner Housing Removal).
- Disconnect the subthrottle valve actuator connector [A].

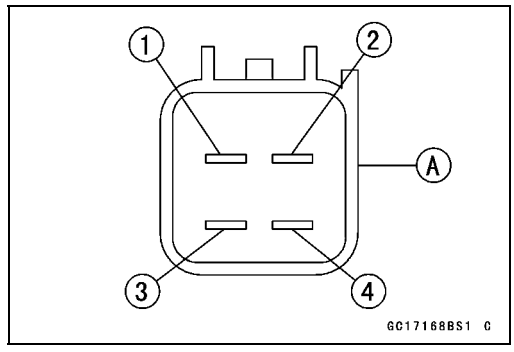


- Connect a digital meter to the subthrottle valve actuator connector [A].
- Measure the subthrottle valve actuator resistance.

Subthrottle Valve Actuator Resistance
Connections: **Y/BK lead [1] ←→ P/BL lead [2]**
G lead [3] ←→ BK/O lead [4]
Standard: **About 5.2 ~ 7.8 Ω**

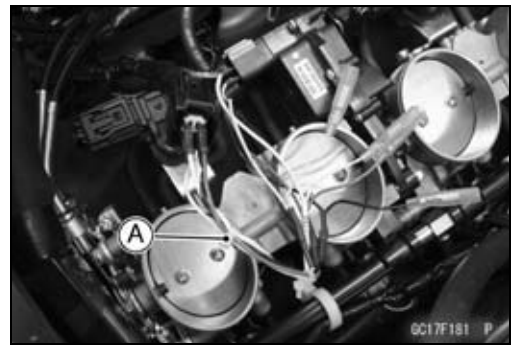
★If the reading is out of the standard, replace the throttle body assy (see Throttle Body Assy Removal/Installation).

★If the reading is within the standard, check the input voltage (see Subthrottle Valve Actuator Input Voltage Inspection).



Subthrottle Valve Actuator (Service Code 62) (DTC P2100)

Subthrottle Valve Actuator Input Voltage Inspection

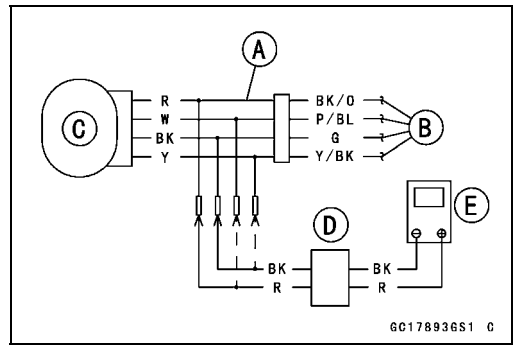


NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the air cleaner housing (see Air Cleaner Housing Removal).
- Disconnect the subthrottle valve actuator connector and connect the measuring adapter [A] between these connectors as shown.
  Main Harness [B]
  Subthrottle Valve Actuator [C]

Special Tool - Measuring Adapter: 57001-1700



- Connect the peak voltage adapter [D] and a digital meter [E] to the measuring adapter leads.

Special Tool - Peak Voltage Adapter: 57001-1415
Type: KEK-54-9-B

Subthrottle Valve Actuator Input Voltage
Connections to Adapter:

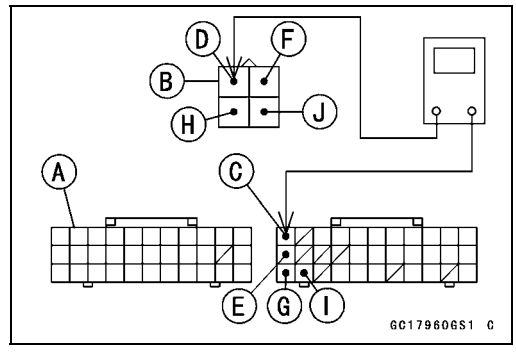
(I) Digital Meter (+) → R (actuator BK/O) lead
Digital Meter (–) → BK (actuator G) lead
(II) Digital Meter (+) → W (actuator P/BL) lead
Digital Meter (–) → Y (actuator Y/BK) lead

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

Input Voltage
Standard: About DC 8.5 ~ 10.5 V and then 0 V or
About DC 8.5 ~ 10.5 V

- Turn the ignition switch off.

★If the reading is in specification, but the actuator does not operate, replace the throttle body assy (see Throttle Body Assy Removal/Installation).



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

○Disconnect the ECU and actuator connectors.

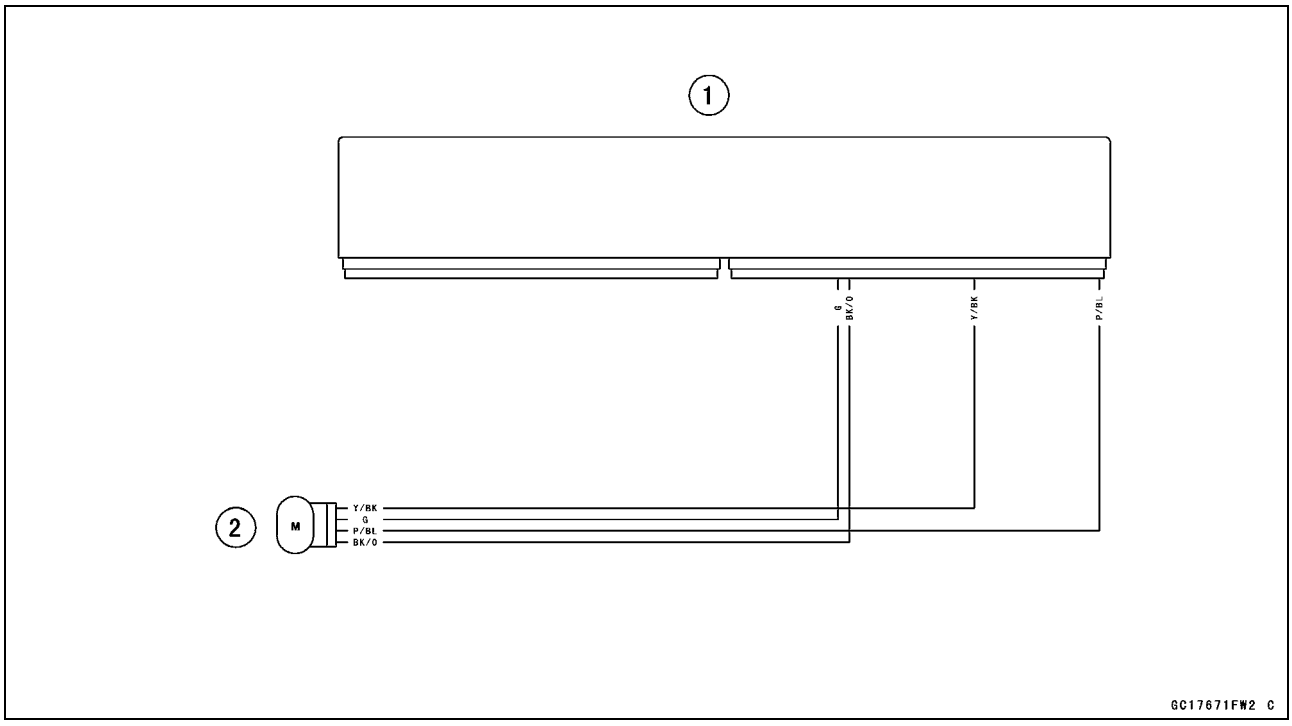
Wiring Continuity Inspection
ECU Connector [A] ←→
Subthrottle Valve Actuator Connector [B]
ECU Terminal 1 [C] ←→ Actuator Terminal [D]
ECU Terminal 12 [E] ←→ Actuator Terminal [F]
ECU Terminal 23 [G] ←→ Actuator Terminal [H]
ECU terminal 24 [I] ←→ Actuator Terminal [J]

★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).

Subthrottle Valve Actuator (Service Code 62) (DTC P2100)

Subthrottle Valve Actuator Circuit



1. ECU
2. Subthrottle Valve Actuator

Air Switching Valve (Service Code 64) (DTC P0410)

Air Switching Valve Removal/Installation

● Refer to the Air Switching Valve Removal/Installation in the Engine Top End chapter.

Air Switching Valve Inspection

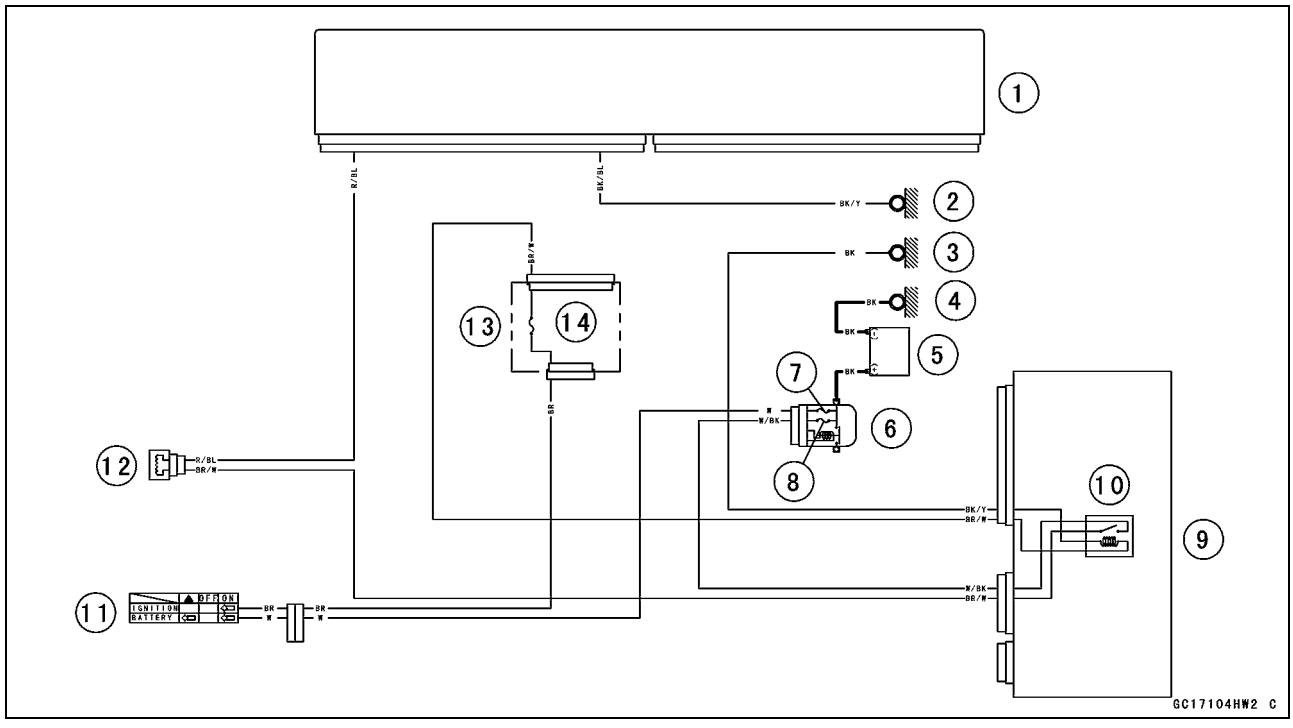
● Refer to the Air Switching Valve Unit Test in the Electrical System chapter.

★If the air switching valve is normal, check the wiring for continuity (see Air Switching Valve Circuit).

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

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

Air Switching Valve Circuit



1. ECU
2. Frame Ground (5)
3. Frame Ground (1)
4. Engine Ground
5. Battery 12 V 8 Ah
6. Starter Relay
7. Main Fuse 30 A
8. ECU Fuse 15 A
9. Relay Box
10. ECU Main Relay
11. Ignition Switch
12. Air Switching Valve
13. Fuse Box (1)
14. Ignition Fuse 15 A

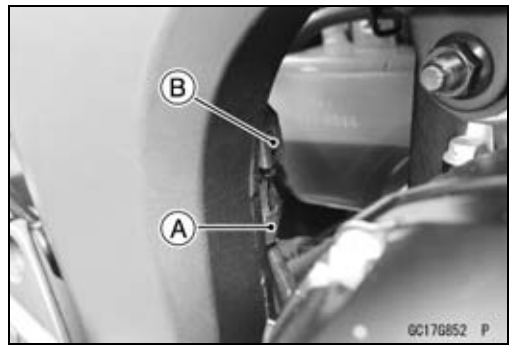
Oxygen Sensor Heater (Service Code 67) (DTC P0030)

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 in the Electrical System chapter).

Oxygen Sensor Heater Resistance Inspection

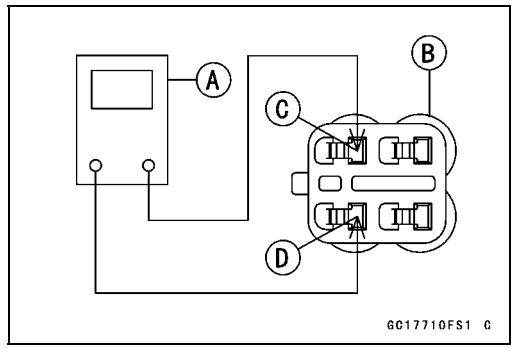
- Turn the ignition switch off.
- Open the clamp [A], and pull out the oxygen sensor lead connector [B].
- Disconnect the oxygen sensor lead connector.



- Connect a digital meter [A] to the oxygen sensor lead connector [B].
- Measure the oxygen sensor heater resistance.

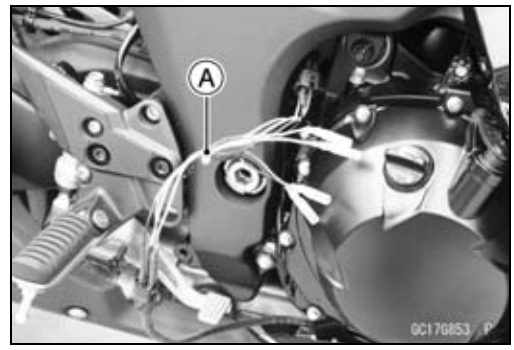
Oxygen Sensor Heater Resistance
Connections: BK lead [C] ←→ BK lead [D]
Standard: 11.7 ~ 14.5 Ω @20°C (68°F)

★If the reading is out of the standard, replace the sensor.
★If the reading is within the standard, check the power source voltage (see Oxygen Sensor Heater Power Source Voltage Inspection).



Oxygen Sensor Heater (Service Code 67) (DTC P0030)

Oxygen Sensor Heater Power Source Voltage Inspection



NOTE

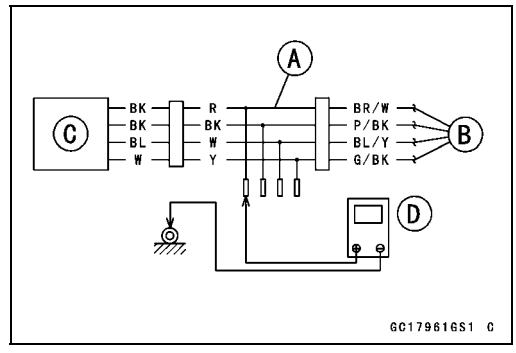
○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Disconnect the oxygen sensor lead connector and connect the measuring adapter [A] between these connectors.
  Main Harness [B]
  Oxygen Sensor [C]

Special Tool - Measuring Adapter: 57001-1700

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

Oxygen Sensor Power Source Voltage
Connections to Adapter:
Digital Meter (+) → R (main harness BR/W) lead
Digital Meter (–) → Frame Ground Terminal



- Measure the power source voltage with the engine stopped and with the connector joined.
- Turn the ignition switch on.

Power Source Voltage
Standard: Battery Voltage

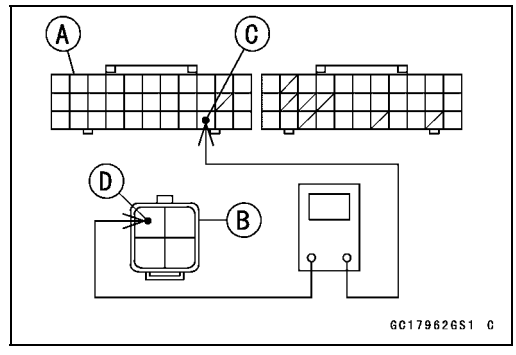
- Turn the ignition switch off.

★If the reading is in specification, but the problem still exists, replace the ECU (see ECU Removal/Installation).

★If the reading is out of the standard, check the following.
ECU Fuse 15 A (see Fuse Inspection in the Electrical System chapter)
Power Source Wiring (see Oxygen Sensor Circuit)

★If the fuse and wiring are good, remove the ECU and check the wiring for continuity between main harness connectors.

○Disconnect the ECU and sensor connectors.



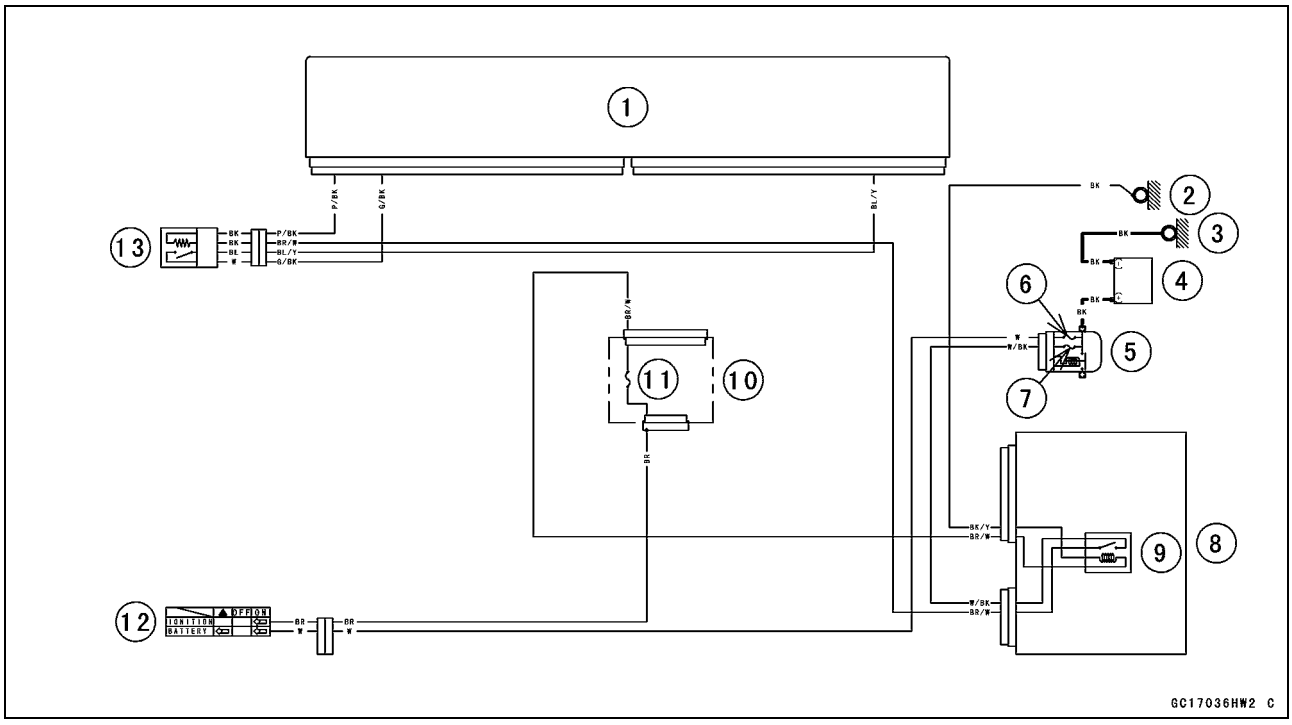
Wiring Continuity Inspection
ECU Connector [A] ←→
Oxygen Sensor Connector [B]
ECU Terminal 64 [C] ←→ Sensor Terminal [D]

★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).

Oxygen Sensor Heater (Service Code 67) (DTC P0030)

Oxygen Sensor Circuit



1. ECU
2. Frame Ground (1)
3. Engine Ground
4. Battery 12 V 8 Ah
5. Starter Relay
6. Main Fuse 30 A
7. ECU Fuse 15 A
8. Relay Box
9. ECU Main Relay
10. Fuse Box (1)
11. Ignition Fuse 15 A
12. Ignition Switch
13. Oxygen Sensor

Fuel Supply System (Service Code 94) (DTC P0170)

Fuel Supply System Inspection

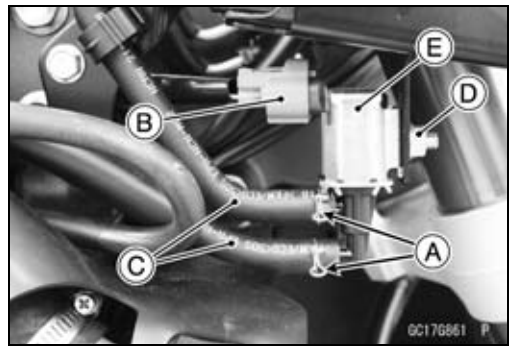
NOTE

○*If the motorcycle has any other service code, first inspect the other service code.*

● Inspect the General fuel system (throttle body assy, air cleaner, fuel tank etc.).
★If the General fuel system 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).

Purge Valve (Service Code 3A) (DTC P0443) (Other than US and CA Models)

Purge Valve Removal/Installation



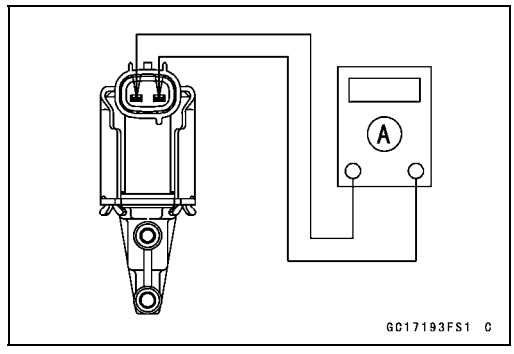
- Remove:
  Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
- Slide the clamps [A].
- Disconnect:
  Purge Valve Lead Connector [B]
  Hoses [C]
- Remove:
  Nut [D]
  Purge Valve [E]
- Installation is the reverse of removal.
- Run the hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Purge Valve Inspection

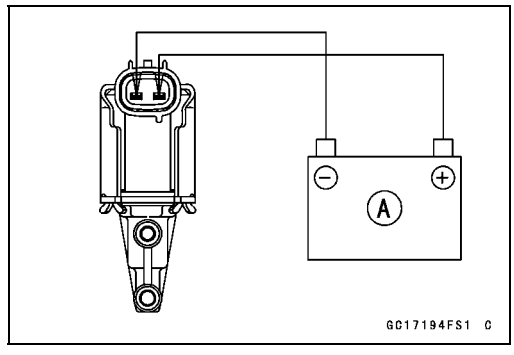
- Remove the purge valve (see Purge Valve Removal/Installation).
- Connect a digital meter [A] to the purge valve terminals as shown.

Purge Valve Resistance
Standard: 30 ~ 34 Ω @20°C (68°F)

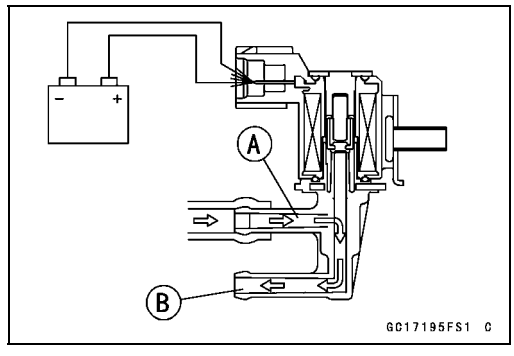
★If the resistance reading is out of the specified value, replace it with a new one.



- Connect the 12 V battery [A] to the purge valve terminals as shown.



- Blow the air to the intake air duct [A], and make sure that the air flows from the outlet air duct [B].



Purge Valve (Service Code 3A) (DTC P0443) (Other than US and CA Models)

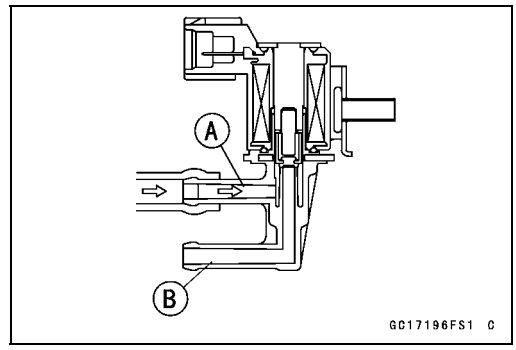
- Disconnect the 12 V battery.
- Blow the air to the intake air duct [A] again, and make sure that the air does not flow from the outlet air duct [B].

★If the purge valve dose not operate as described, replace it with a new one.

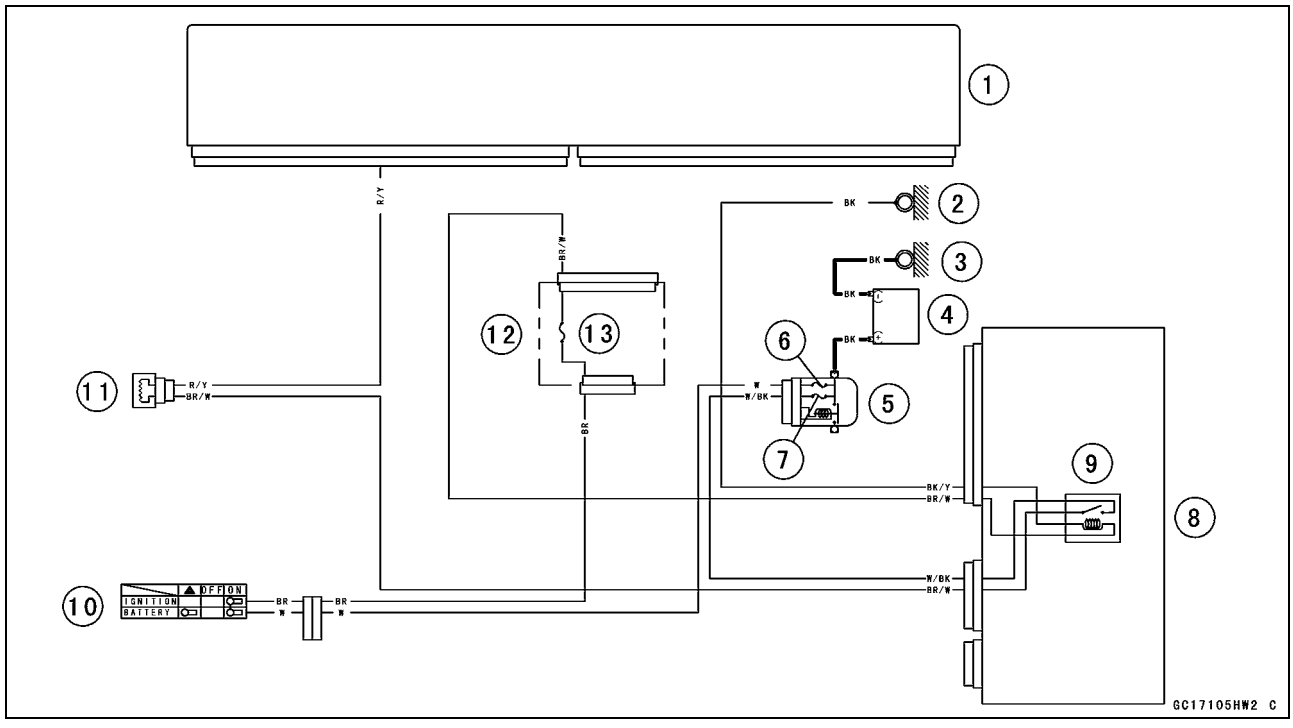
★If the purge valve is good, check the wiring for continuity (see Purge Valve Circuit).

★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).



Purge Valve Circuit

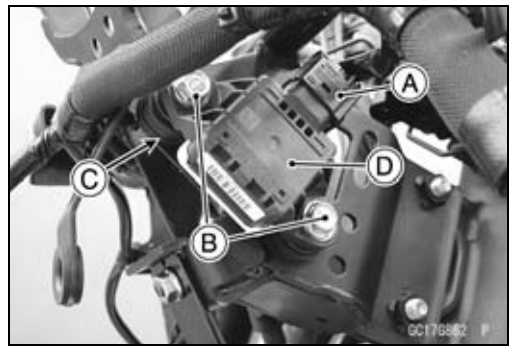


1. ECU
2. Frame Ground (1)
3. Engine Ground
4. Battery 12 V 8 Ah
5. Starter Relay
6. Main Fuse 30 A
7. ECU Fuse 15 A
8. Relay Box
9. ECU Main Relay
10. Ignition Switch
11. Purge Valve
12. Fuse Box (1)
13. Ignition Fuse 15 A

IMU (Inertial Measurement Unit) (Service Code E8E)

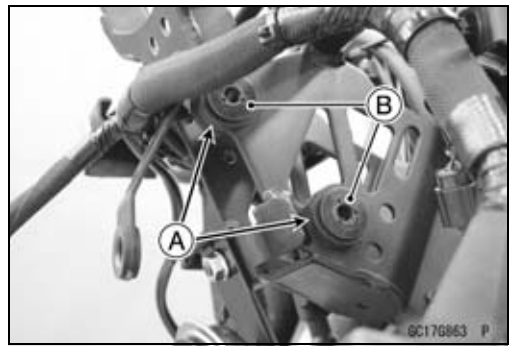
IMU Removal

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



- Remove the upper fairing (see Upper Fairing Removal in the Frame chapter).
- Disconnect the IMU connector [A].
- Remove:
  IMU Mounting Bolts [B] and Nut Plate [C]
  IMU [D]

IMU Installation



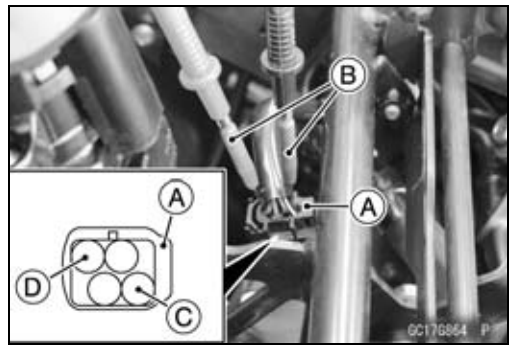
- Install the grommets [A] and collar [B] if removed.
- ○Install the collar with flange side outward.
- Install the IMU.
- Apply a non-permanent locking agent to the threads of the IMU mounting bolts, and tighten them.

  Torque - IMU Mounting Bolts: 6.5 N·m (0.66 kgf·m, 58 in·lb)
- Connect the IMU connector.
- Install the upper fairing (see Upper Fairing Installation in the Frame chapter).

IMU Power Supply Inspection

NOTE

○*Be sure the battery is fully charged.*



- Turn the ignition switch off.
- ○Do not disconnect the IMU connector [A].
- Connect a digital meter to the IMU connector with needle adapter set [B].

  Special Tool - Needle Adapter Set: 57001-1457

  IMU Power Supply Voltage
  Connections to IMU Connector:
  Digital Meter (+) → BR/W [C] lead
  Digital Meter (–) → BK/Y [D] lead

- Measure the power supply voltage with the engine stopped and with the connector joined.
- Turn the ignition switch on.

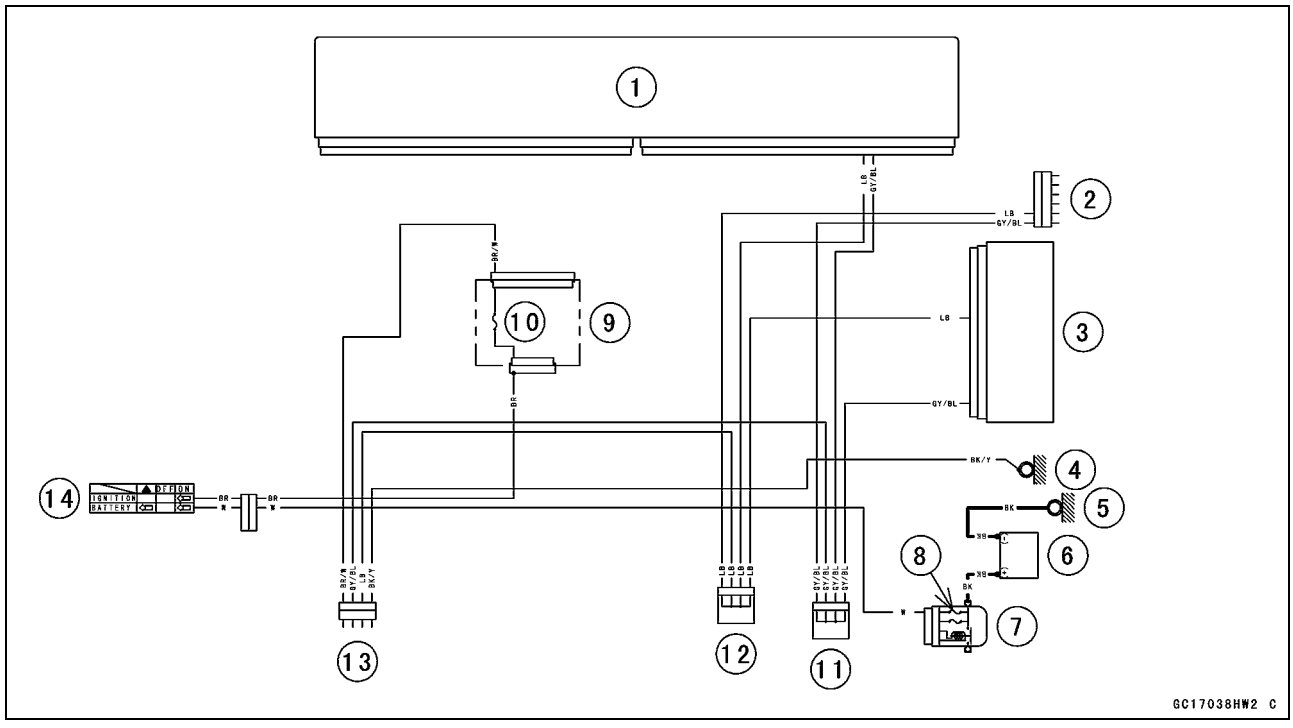
  Power Supply Voltage
  Standard: Battery Voltage

- Turn the ignition switch off.

IMU (Inertial Measurement Unit) (Service Code E8E)

★If the reading is out of the specification, check the following.
Main Fuse 30 A (see Fuse Inspection in the Electrical System chapter)
Ignition Fuse 15 A (see Fuse Inspection in the Electrical System chapter)
Power Source and Ground Wirings (see IMU Circuit)
★If the fuses and wirings are good, replace the IMU (see IMU Installation).
★If the IMU is normal, 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).

IMU Circuit



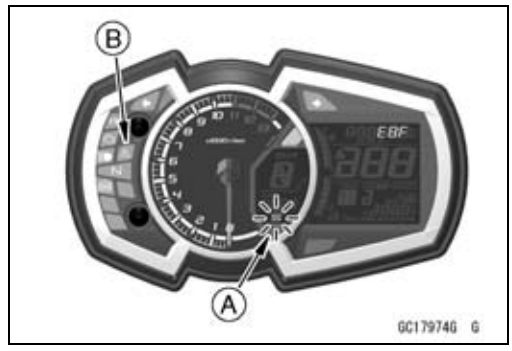
1. ECU
2. ABS Kawasaki Self-diagnosis System Connector
3. ABS Hydraulic Unit
4. Frame Ground (4)
5. Engine Ground
6. Battery 12 V 8 Ah
7. Starter Relay
8. Main Fuse 30 A
9. Fuse Box (1)
10. Ignition Fuse 15 A
11. Joint Connector (1)
12. Joint Connector (2)
13. IMU
14. Ignition Switch

IMU (Inertial Measurement Unit) Communication Error (Service Code E8F)

IMU Communication Line Inspection

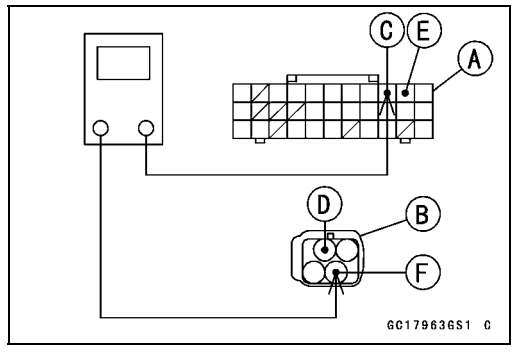
○When the data (for status of IMU) is not sent from the IMU to the ECU, the service code E8F is displayed.
○The data is sent through the CAN communication line.
○The service code E8F is detected with the ECU.

○When the service code E8F is detected, the IMU indicator [A] blinks and the yellow warning indicator light (LED) [B] goes on.



● Disconnect the ECU, ABS and IMU connectors, and check the wiring for continuity between main harness connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→ IMU Connector [B]
ECU terminal 9 [C] ←→ Sensor Terminal [D]
ECU terminal 10 [E] ←→ Sensor Terminal [F]



★If the wiring is good, check the ECU for CAN communication line resistance (see CAN Communication Line Resistance Inspection).
★If the CAN communication line resistance is good, replace the IMU (see IMU Installation).
★If the IMU is normal, 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).

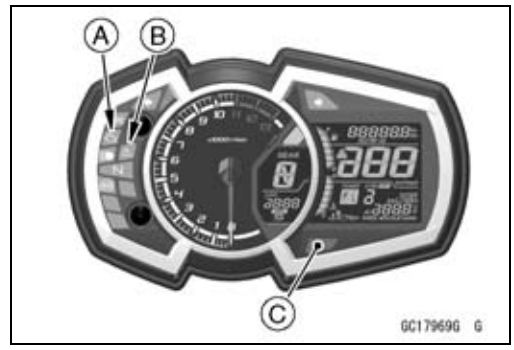
Warning Indicator Light (LED)

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

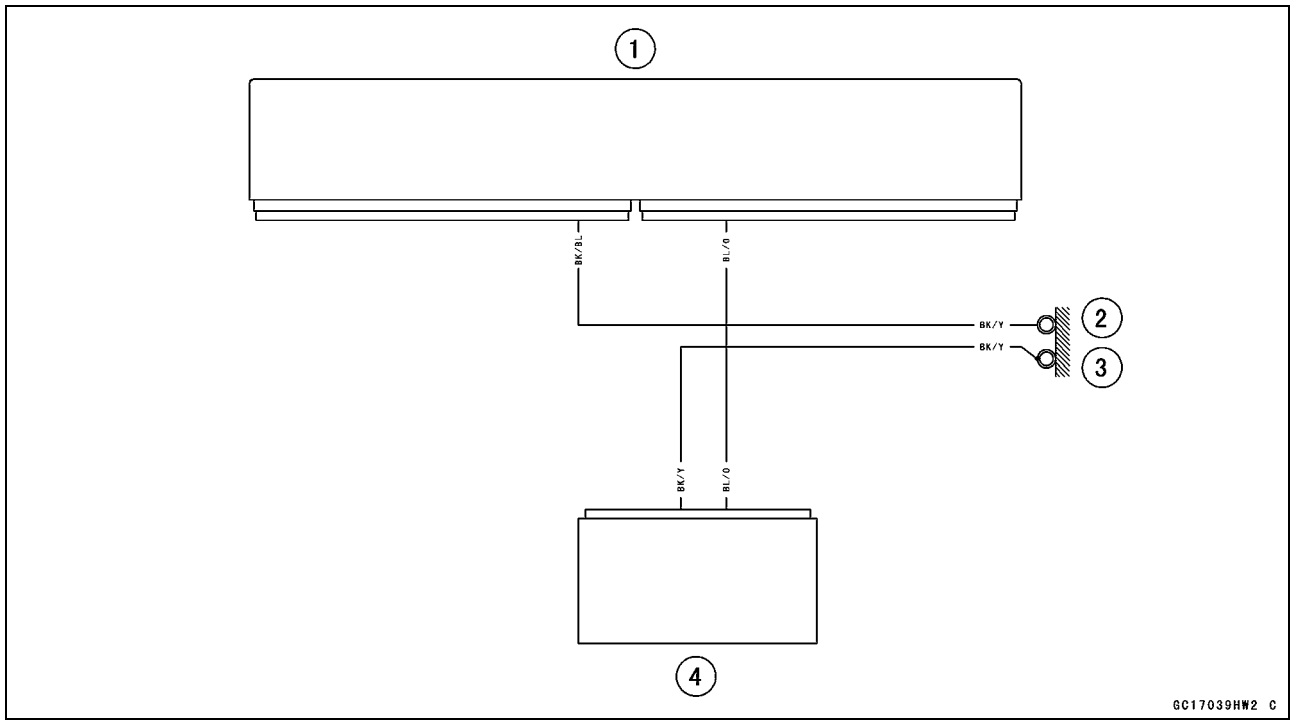
Yellow Engine Warning Indicator Light (LED) [A]
Yellow Warning Indicator Light (LED) [B]
Red Warning Indicator Light (LED) [C]

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

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



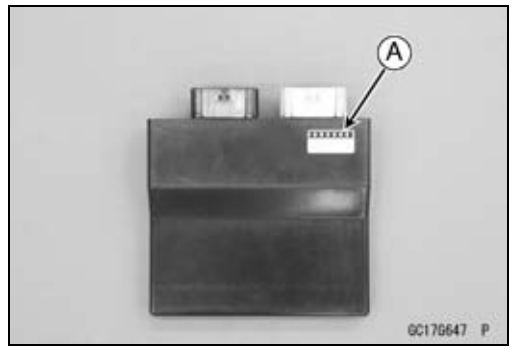
Warning Indicator Light (LED) Circuit



1. ECU
2. Frame Ground (5)
3. Frame Ground (4)
4. Meter Unit

ECU

ECU Identification



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

ECU Identification

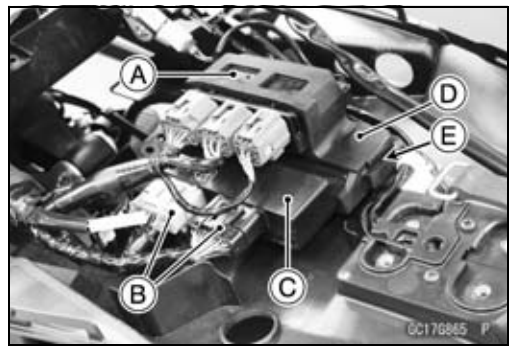
Part Number [A]	Specification
21175-1247	AU, IN, SEA-B3 and WVTA (FULL), with Immobilizer
21175-1248	US and CA without Immobilizer
21175-1249	CAL, without Immobilizer
21175-1250	ID, PH and IN (with saree guard equipped model)
21175-1251	SEA-B1 and TH with Immobilizer
21175-1254	MY with Immobilizer

ECU Removal

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

NOTE

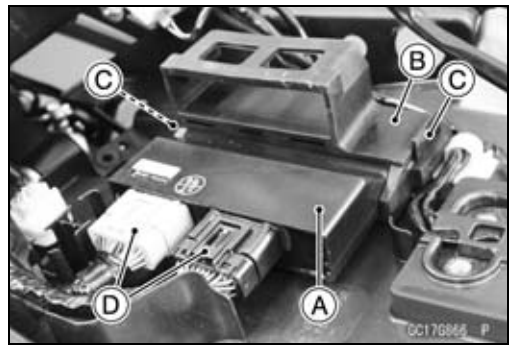
○*Refer to the Immobilizer System Parts Replacement in the Electrical System chapter for the models with the ECU guard.*



- Remove the rear fender from the battery case and rear frame (see Flap and Rear Fender Removal in the Frame chapter).
- Remove the relay box [A] from the rubber protector.
- Disconnect the ECU connectors [B].
- Remove:
  ECU [C] (with Rubber Protector [D])

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

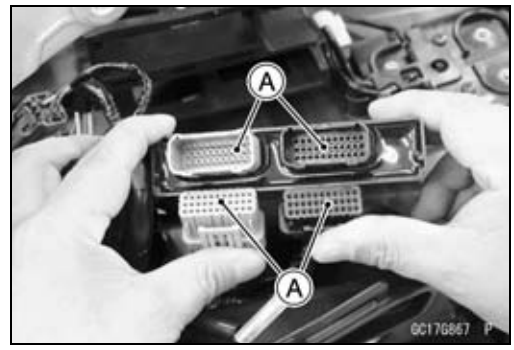
ECU Installation



- Install:
  ECU [A] (in Rubber Protector [B])
- Insert the slits of the rubber protector to the projections [C] of the rear fender.
- Connect the ECU connectors [D].
- Install the removed parts (see appropriate chapters).

ECU

ECU Power Supply Inspection



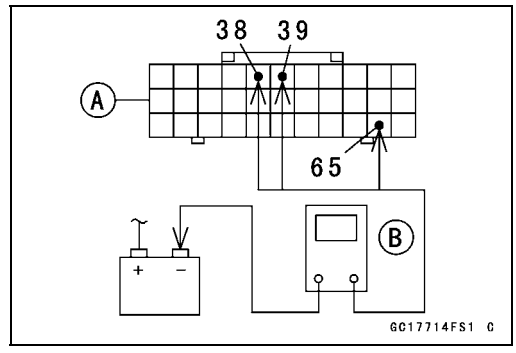
- Visually inspect the ECU connectors.

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

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

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

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



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

ECU Grounding Inspection
Connections:

(I) ECU Terminal 38, 39 or 65 ←→ **Battery (–) Terminal**

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

Criteria:

Both: 0 Ω

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

ECU

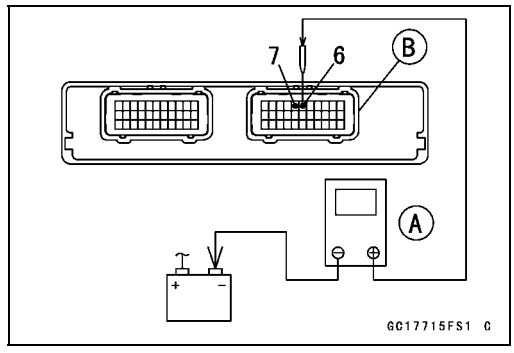
★If the wiring is good, check the power source voltage of the ECU.

NOTE

○*Be sure the battery is fully charged.*

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

Special Tool - Needle Adapter Set: 57001-1457

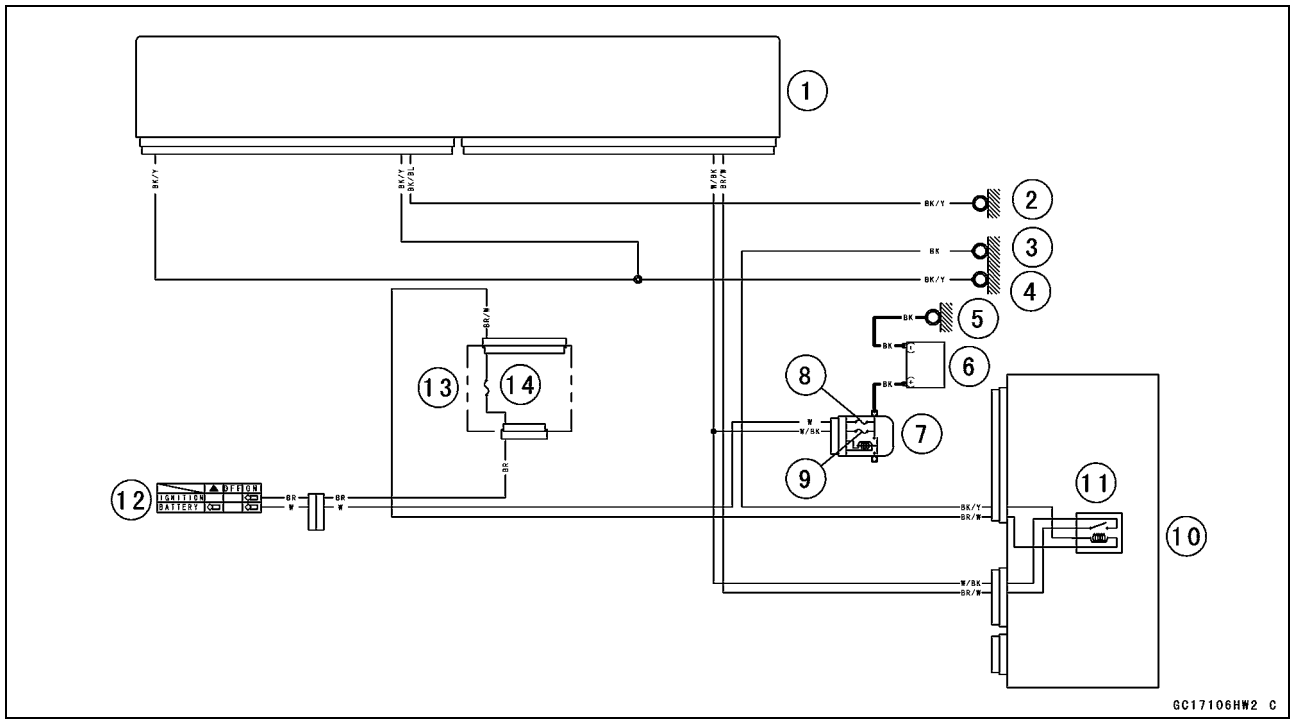


ECU Power Supply Inspection
Connections:
(I) Digital Meter (+) → BR/W lead (terminal 6)
Digital Meter (–) → Battery (–) Terminal
(II) Digital Meter (+) → W/BK lead (terminal 7)
Digital Meter (–) → Battery (–) Terminal
Ignition Switch off:
BR/W lead (terminal 6): 0 V
W/BK lead (terminal 7): Battery Voltage
Ignition Switch on:
Both: 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 ECU Power Source Circuit)
★If the fuse, wiring and relay are good, replace the ECU (see ECU Removal/Installation).

ECU

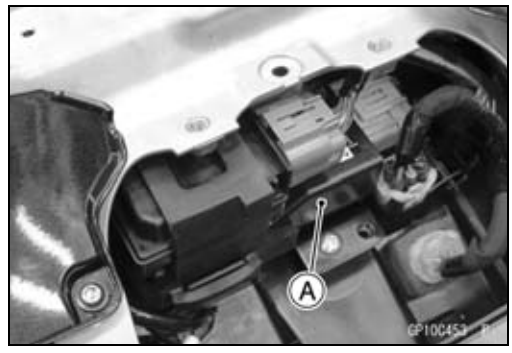
ECU Power Source Circuit



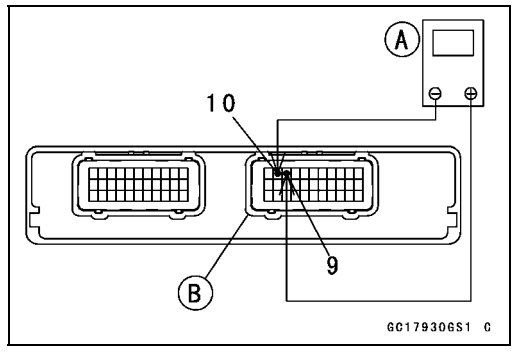
1. ECU
2. Frame Ground (5)
3. Frame Ground (1)
4. Frame Ground (2)
5. Engine Ground
6. Battery 12 V 8 Ah
7. Starter Relay
8. Main Fuse 30 A
9. ECU Fuse 15 A
10. Relay Box
11. ECU Main Relay
12. Ignition Switch
13. Fuse Box (1)
14. Ignition Fuse 15 A

CAN Communication Line

CAN Communication Line Resistance Inspection



○In this model, resistors for CAN communication line are built in the ECU [A] and ABS hydraulic unit.
- Refer to the ABS Hydraulic Unit Inspection in the Brackes chapter for the resistor in the ABS hydraulic unit.
- Turn the ignition switch off.
- Remove:
  ECU [A] (see ECU Removal)



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

CAN Communication Line Resistance (at ECU Terminals)

Connections: Terminal 9 ←→ Terminal 10

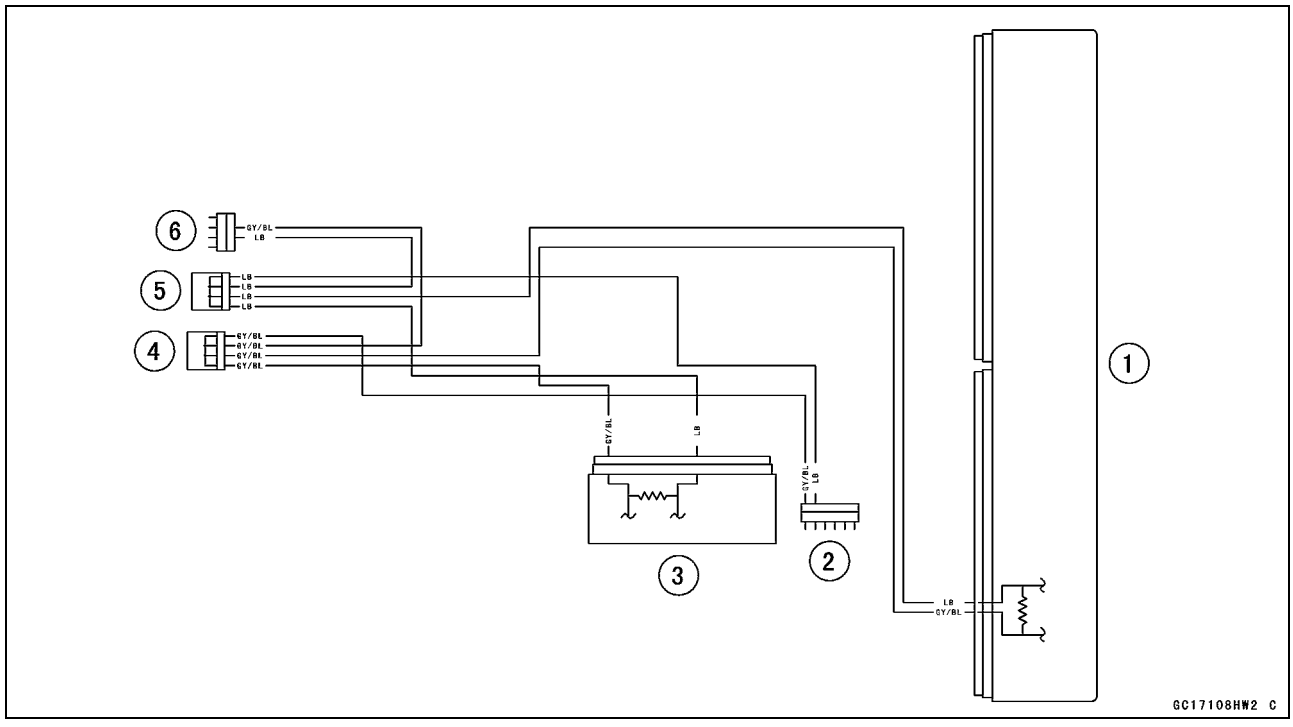
Standard: about 120 Ω

★If the reading is out of the standard, replace the ECU with new one.
★If the reading is within the standard, resistor of the ECU for CAN communication line is normal.
- Check the wiring for continuity of the CAN communication line (see wiring diagram in this section).

★If there is a open or short circuit, repair or replace the main harness.

CAN Communication Line

CAN Communication Line Circuit



1. ECU
2. Kawasaki Diagnostic System Connector
3. ABS Hydraulic Unit
4. Joint Connector (1)
5. Joint Connector (2)
6. IMU

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.

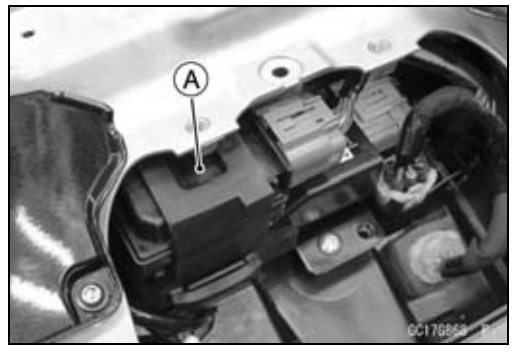
ECU Fuse Inspection

● 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.

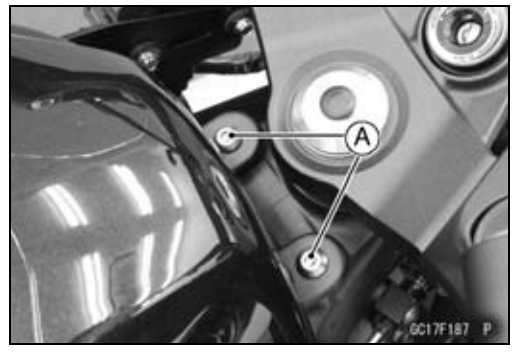


ECU Main Relay Inspection

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

Fuel Line

Fuel Pressure Inspection



NOTE

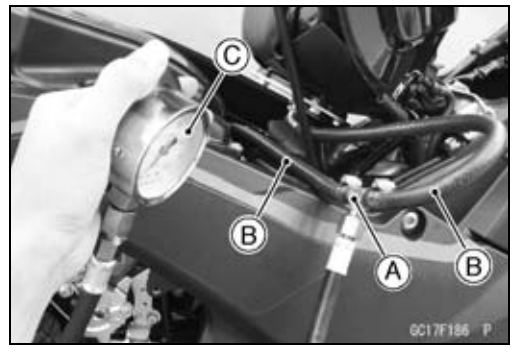
○*Be sure the battery is fully charged.*

● Remove:
Side Covers (see Side Cover Removal in the Frame chapter)
Fuel Tank Bolts [A]
Fuel Hose (see Fuel Hose Replacement in the Periodic Maintenance chapter)

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

⚠ WARNING

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



● Install the fuel pressure gauge adapter [A] and fuel hoses (Special Tool: 57001-1607) [B] between the fuel outlet pipe and delivery pipe.
● Secure the fuel hoses with the clamps.
● Connect the pressure gauge [C] to the fuel pressure gauge adapter.

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

⚠ WARNING

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

● Turn the engine stop switch to run position.
● Turn the ignition switch on.

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

NOTE

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

NOTICE

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

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 off.

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

★If the fuel pressure is much lower than specified, check the following.
Fuel Line Leakage (see Fuel Injector Fuel Line Inspection)
Amount of Fuel Flow (see Fuel Flow Rate Inspection)

- After above checks, measure the fuel pressure again.
- Remove the fuel pressure gauge, hoses and adapter.
- Install:
Fuel Hose (see Fuel Hose Replacement in the Periodic Maintenance chapter)
Fuel Tank (see Fuel Tank Installation)
- Start the engine and check for fuel leakage.

Fuel Flow Rate Inspection

⚠ WARNING

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

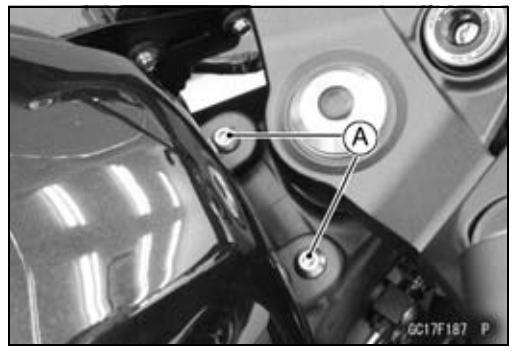
NOTE

○*Be sure the battery is fully charged.*

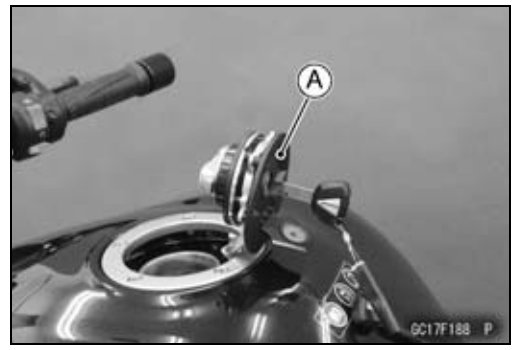
- Turn the ignition switch off.
- Wait until the engine cools down.
- Prepare a fuel hose (Special Tool: 57001-1607) and a measuring cylinder.

Special Tool - Fuel Hose: 57001-1607

- Remove:
Seat Covers (see Seat Cover Removal in the Frame chapter)
Fuel Tank Bolts [A]



Fuel Line

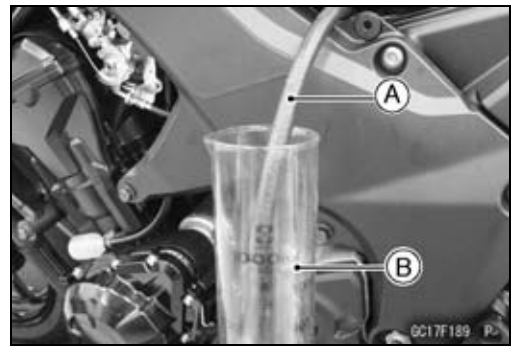


- Open the fuel tank cap [A] to lower the pressure in the tank.
- Disconnect the fuel hose from the fuel pump (see Fuel Tank Removal).

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

⚠ WARNING

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



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

⚠ WARNING

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

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

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

NOTICE

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

- Measure the discharge for 3 seconds.

○Repeat this operation several times.

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

- Turn the ignition switch off.

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

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

Fuel Pump

Fuel Pump Removal

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Disconnect the battery (–) terminal. To avoid fuel spills, draw it from the tank when the engine is cold. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

NOTICE

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

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

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

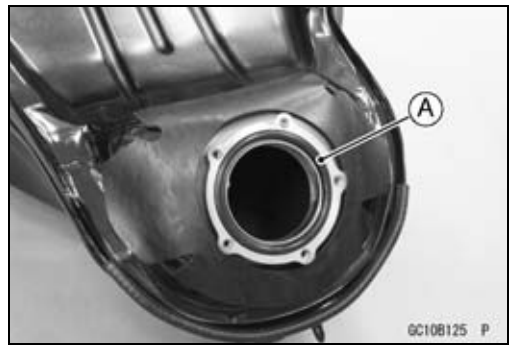
- Turn the fuel tank upside down.
- Remove the fuel pump bolts [A], and take out the fuel pump [B].



NOTICE

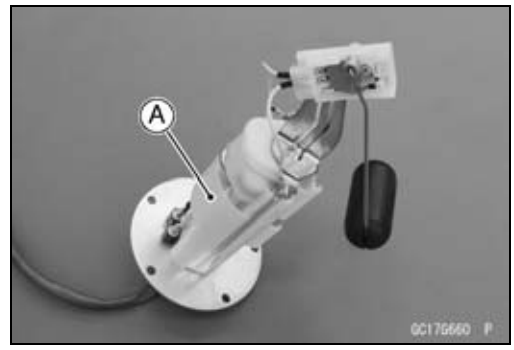
Do not pull the leads of the fuel pump. If they are pulled, the lead terminals may be damaged.

- Discard the fuel pump gasket [A].



Fuel Pump

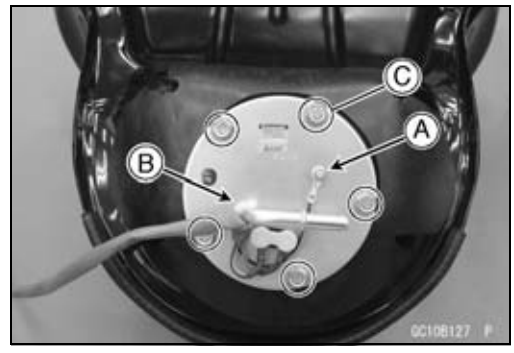
Fuel Pump Installation



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

NOTE

○*Be careful not to bend the fuel level sensor arm.*



- 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: 10 N·m (1.0 kgf·m, 89 in·lb)

- Tighten the pump bolts again to check the tightness.

Fuel Pump Operation Inspection

NOTE

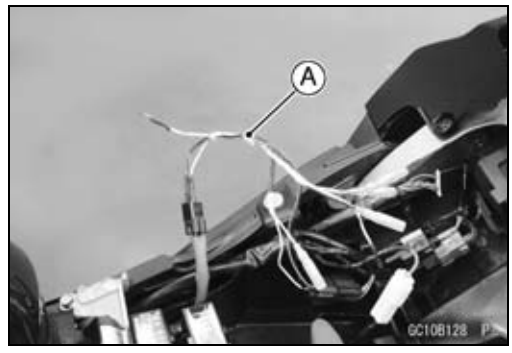
○*Be sure the battery is fully charged.*

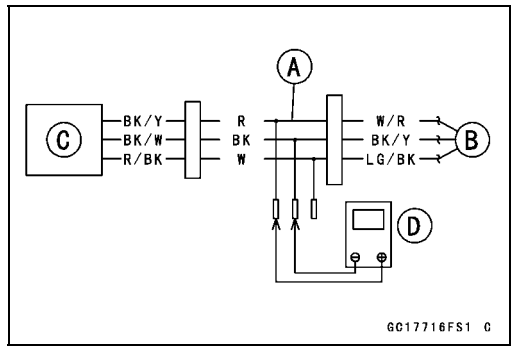
- Turn the engine stop switch to run position.
- Turn the ignition switch on and make sure that the fuel pump operates (make light sounds) for 3 seconds, and then stops.
- Turn the ignition switch off.

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

Fuel Pump

Fuel Pump Operating Voltage Inspection





NOTE

○*Be sure the battery is fully charged.*

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

Special Tool - Measuring Adapter: 57001-1700

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

Fuel Pump Operating Voltage
Connections to Adapter:

Digital Meter (+) → R (pump BK/Y) lead

Digital Meter (–) → BK (pump BK/W) lead

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

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

- Turn the ignition switch off.

★If the reading stays on battery voltage and never shows 0 V, check the fuel pump relay (see Relay Circuit Inspection in the Electrical System chapter).

★If the fuel pump relay is normal, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

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

★If there is still no battery voltage, check the fuel pump relay (see Relay Circuit Inspection in the Electrical System chapter).

★If the fuel pump relay is normal, check the wiring for continuity (see Fuel Pump Circuit).

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

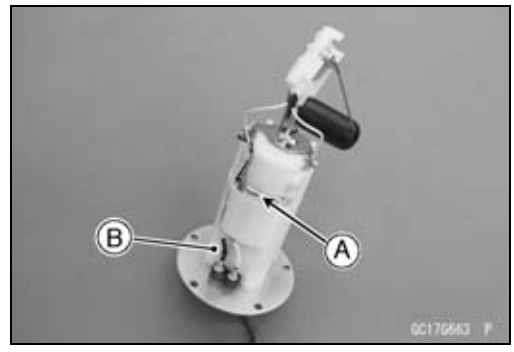
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

★If the reading is in specification, but the pump does not operate, replace the fuel pump (see Fuel Pump Removal/Installation).

Fuel Pump

Pressure Regulator Removal

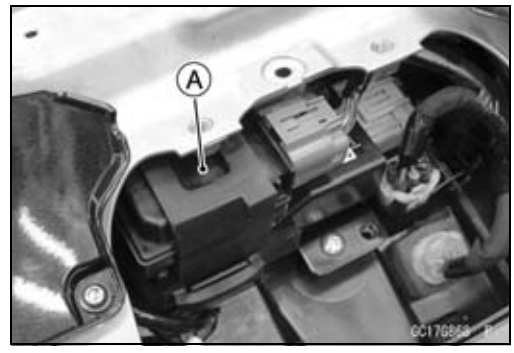
○The pressure regulator [A] is built into the fuel pump [B] and can not be removed.



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.

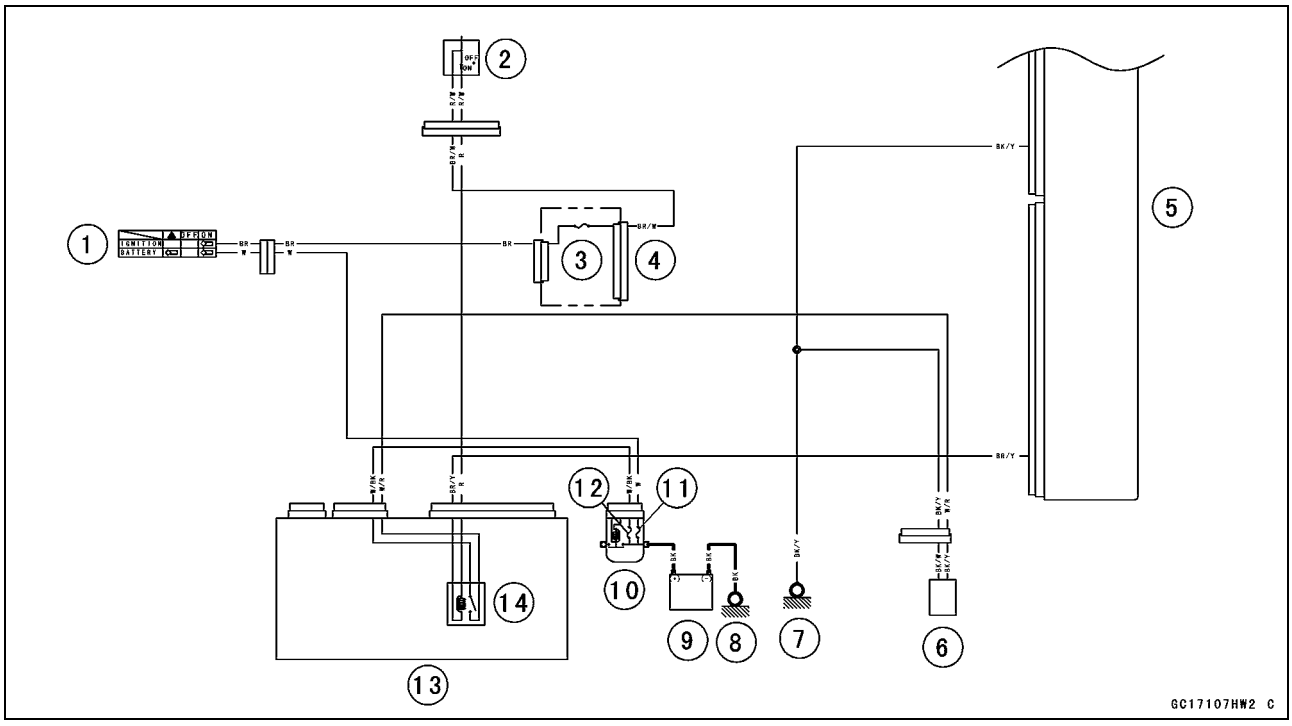


Fuel Pump Relay Inspection

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

Fuel Pump

Fuel Pump Circuit



1. Ignition Switch
2. Engine Stop Switch
3. Ignition Fuse 15 A
4. Fuse Box (1)
5. ECU
6. Fuel Pump
7. Frame Ground (2)
8. Engine Ground
9. Battery 12 V 8 Ah
10. Starter Relay
11. Main Fuse 30 A
12. ECU Fuse 15 A
13. Relay Box
14. Fuel Pump Relay

Throttle Grip and Cables

Free Play Inspection

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

Free Play Adjustment

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

Cable Installation

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

⚠ WARNING

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

Cable Lubrication

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

Throttle Body Assy

Idle Speed Inspection/Adjustment

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

Synchronization Inspection/Adjustment

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

Throttle Body Assy Removal

⚠ WARNING

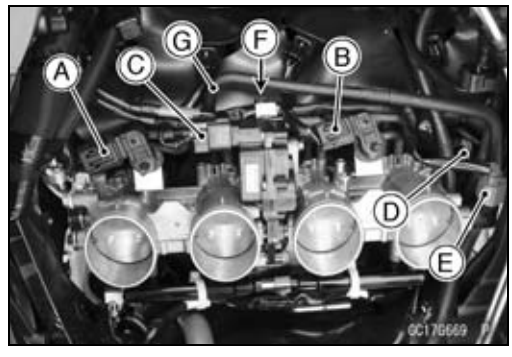
Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Be prepared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

NOTICE

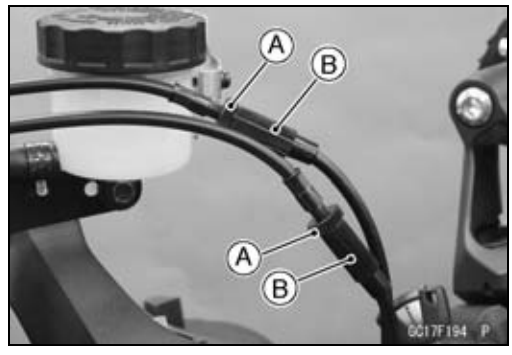
Never drop the throttle body assy especially on a hard surface. Such a shock to the body assy can damage it.

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

- Disconnect:
  Intake Air Pressure Sensor #1 Connector [A]
  Intake Air Pressure Sensor #2 Connector [B]
  Subthrottle Valve Actuator Connector [C]
  Main Throttle Sensor Connector [D]
  Subthrottle Sensor Connector [E]
- Open the clamp [F].
- Disconnect the vacuum hose [G] (Other than US and CA models).

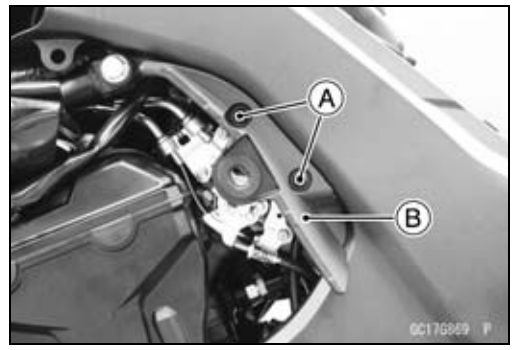


- Loosen the locknuts [A].
- Turn the adjusters [B] to give the more free play.

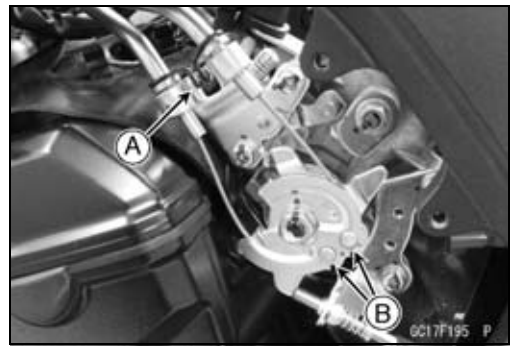


Throttle Body Assy

● Remove:
Bolts [A]
Throttle Pulley Cover [B]



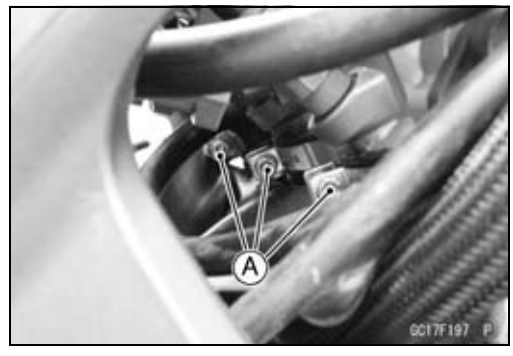
● Remove:
Throttle Cable Holder Clamp [A]
Throttle Cable Lower Ends [B]



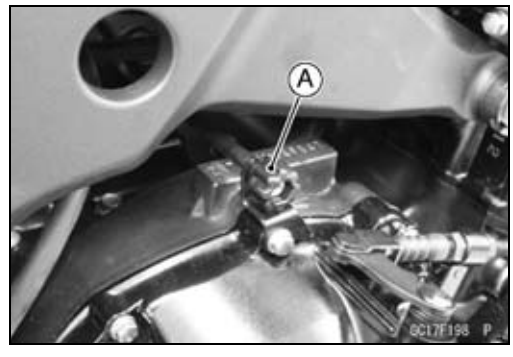
● Loosen the throttle body assy holder clamp bolts [A].

Special Tool - Carburetor Drain Plug Wrench, Hex 3: 57001-1269



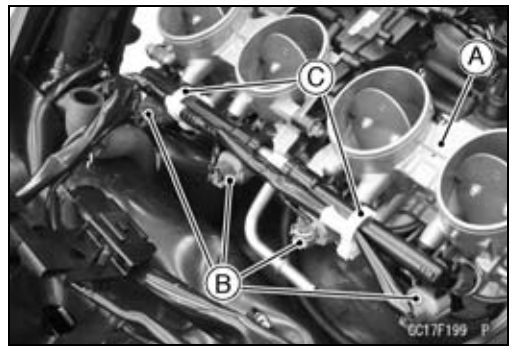


● Disconnect the adjusting screw [A] from the bracket.



Throttle Body Assy

- Remove the throttle body assy [A] from the throttle body assy holders.
- Disconnect the fuel injector connectors [B].
- Remove the clamps [C].
- After removing the throttle body assy, stuff pieces of lint -free, clean cloth into the throttle body assy holders.



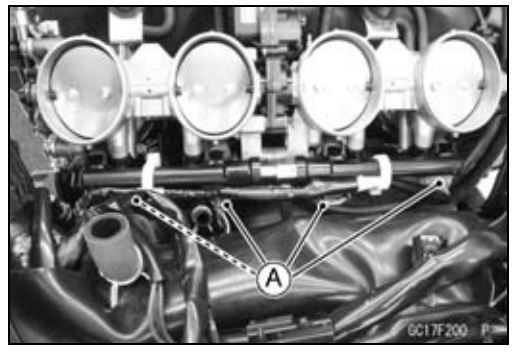
NOTICE
If dirt gets into the engine, excessive engine wear and possible engine damage will occur.

Throttle Body Assy Installation

- Be sure to position the throttle body assy holder clamp in original position (see Throttle Body Assy Holder Installation in the Engine Top End chapter).
- Connect the fuel injector connectors [A].
- Install the throttle body assy to the throttle body assy holders.
- Tighten:

Torque - Throttle Body Assy Holder Clamp Bolts: 3.0 N·m (0.31 kgf·m, 27 in·lb)

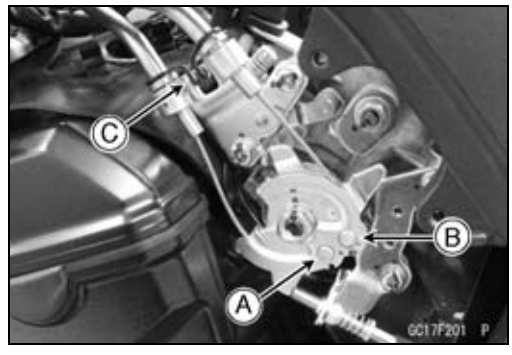
Special Tool - Carburetor Drain Plug Wrench, Hex 3: 57001-1269



- 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.

○The accelerator cable has a clamp [C].

- Install the clamp securely.



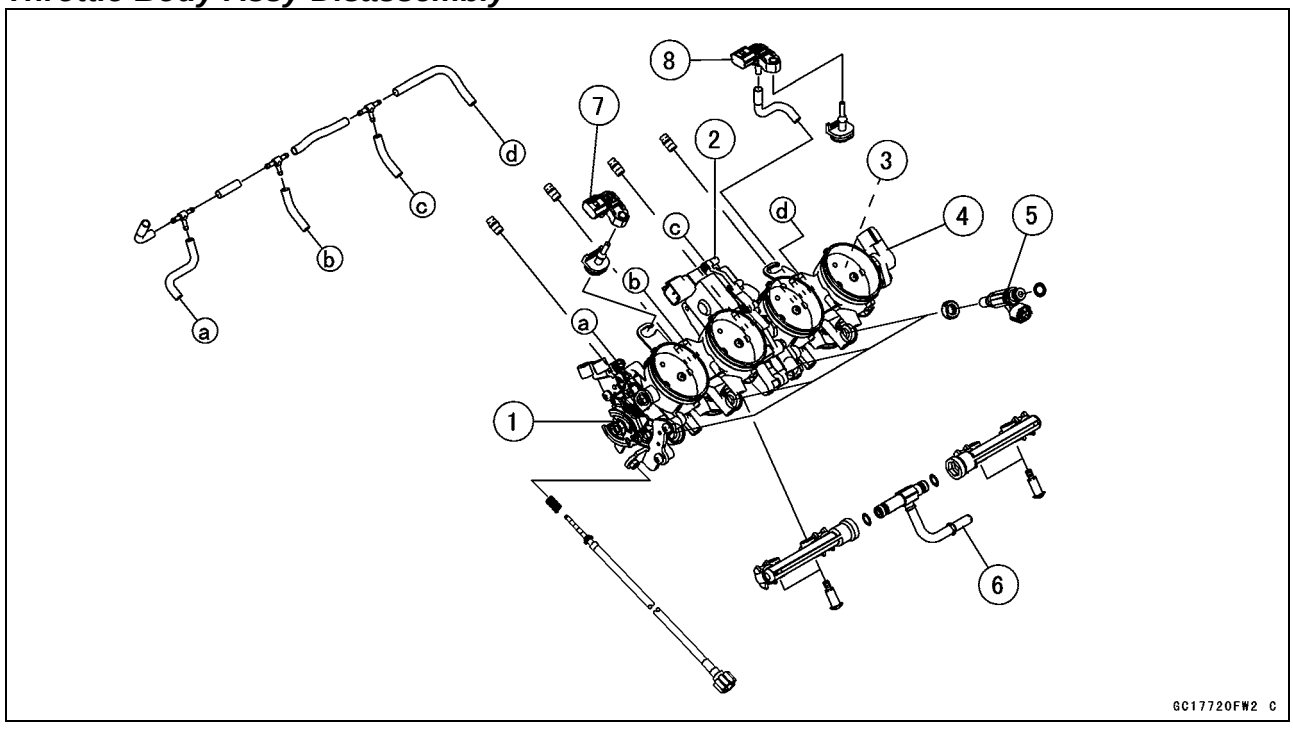
- Turn the throttle grip and make sure that the throttle pulley moves smoothly and return by spring force.
- Run the leads and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).
- Adjust:

  Throttle Grip Free Play (see Throttle Control System Inspection in the Periodic Maintenance chapter)

  Idle Speed (see Idle Speed Adjustment in the Periodic Maintenance chapter)

Throttle Body Assy

Throttle Body Assy Disassembly



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

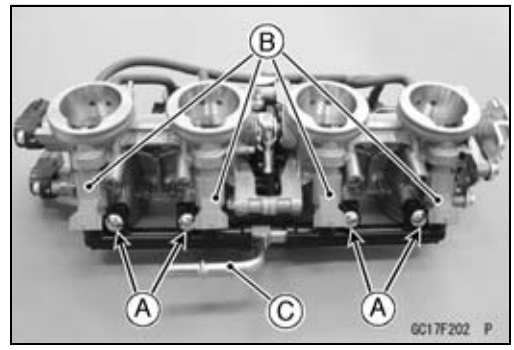
NOTICE

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

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

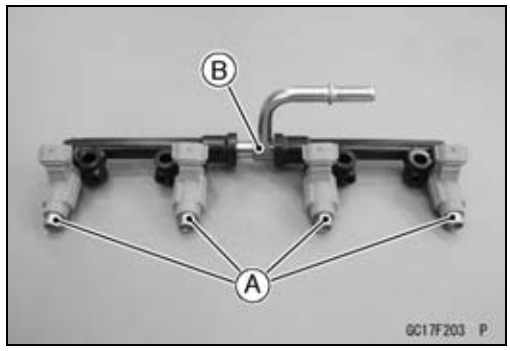
NOTE

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



Throttle Body Assy

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



NOTE

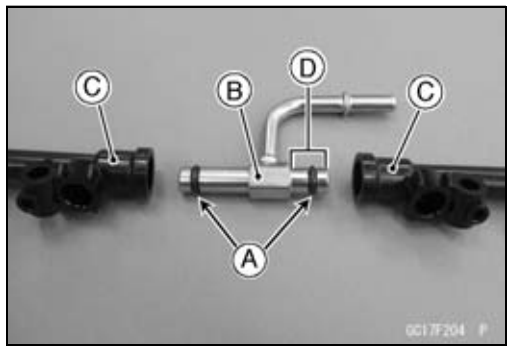
○*Do not damage the insertion portions of the injectors when they are pulled out from the delivery pipe assy.*

NOTICE

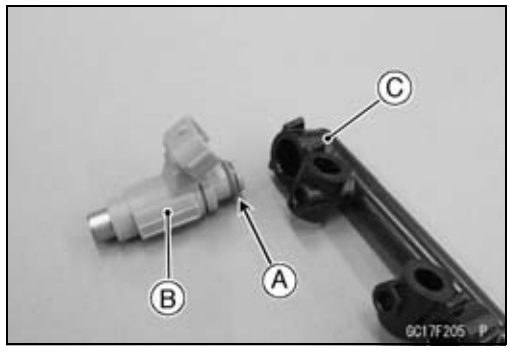
Never drop the fuel injector especially on a hard surface. Such a shock to the injector can damage it.

Throttle Body Assy Assembly

● Before assembling, blow away dirt or dust from the throttle body and delivery pipe assy by applying compressed air.
● Replace the O-rings [A] of the joint pipe [B] with new ones.
● Apply engine oil to the new O-rings, and insert it to the delivery pipes [C].
○Insert the joint pipe so that the short side [D] faces right side.
○Left and right delivery pipes are identical.



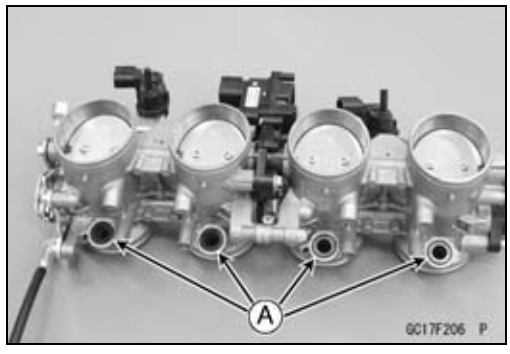
● Replace the O-rings [A] of each fuel injector [B] with new ones.
● Apply engine oil to the new O-rings, insert them to the delivery pipe assy [C] and confirm whether the injectors turn smoothly or not.



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

Torque - Delivery Pipe Assy Mounting Screws: 3.43 N·m (0.350 kgf·m, 30 in·lb)

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



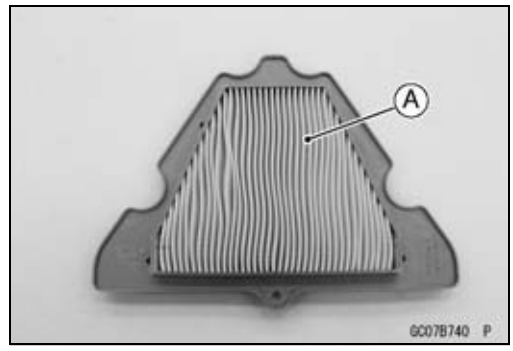
Air Cleaner

Air Cleaner Element Removal/Installation

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

Air Cleaner Element Inspection

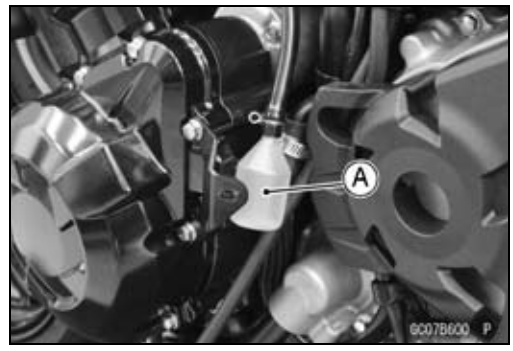
● Remove the air cleaner element (see Air Cleaner Element Replacement in the Periodic Maintenance chapter).
● Visually check the element [A] for tears or breaks.
★If the element has any tears or breaks, replace the element.



Air Cleaner Oil Draining

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

● Visually check the catch tank [A] of the drain hose, if the water or oil accumulates in the tank.
★If any water or oil accumulates in the catch tank, remove the catch tank from the drain hose and drain it.

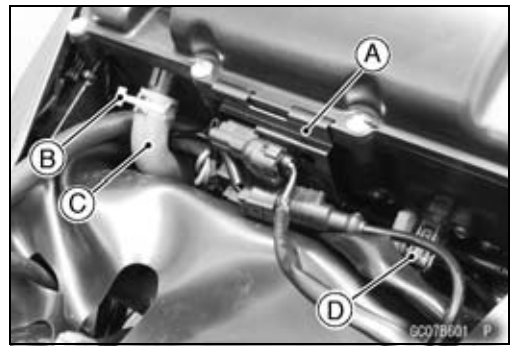


⚠ WARNING

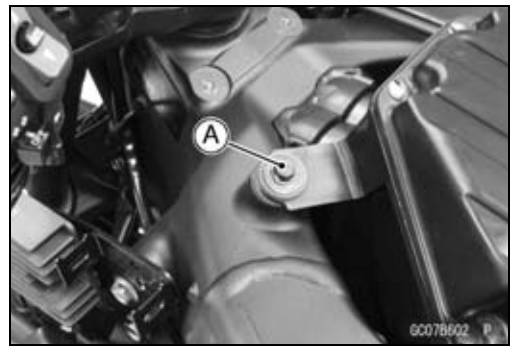
Oil on tires will make them slippery and can cause an accident and injury. Be sure to reinstall the catch tank after draining.

Air Cleaner Housing Removal

● Remove:
Fuel Tank (see Fuel Tank Removal)
Connector Bracket [A]
● Slide the clamp [B].
● Disconnect:
Breather Hose [C]
Intake Air Temperature Sensor Connector [D]



● Remove:
Bolt [A]

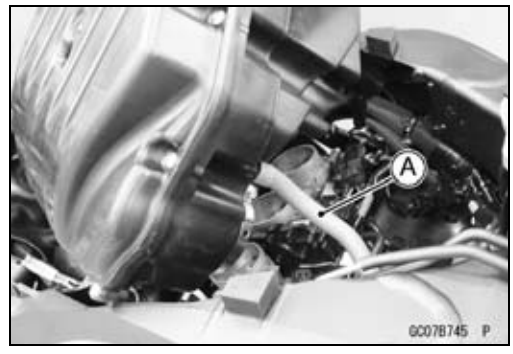


Air Cleaner

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



● Lift up the air cleaner housing, and disconnect the air switching valve hose [A].
● After removing the air cleaner housing, cover the clean cloth on the throttle body assy.

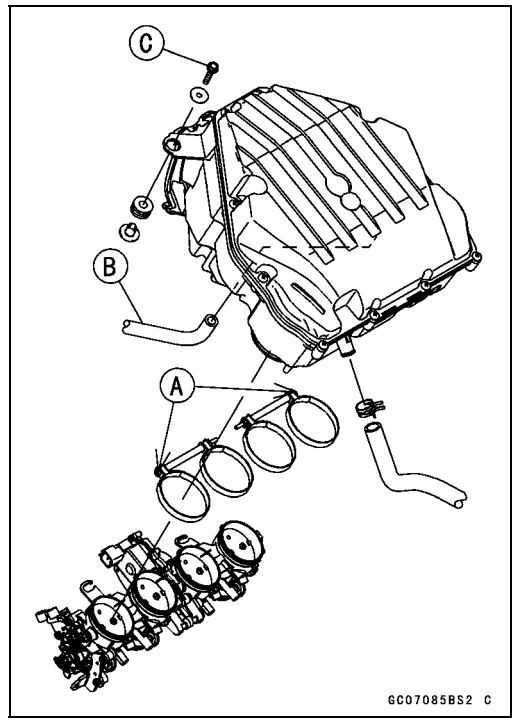


Air Cleaner Housing Installation

● Install the clamp bolt heads [A] outside as shown.
● Install the air switching valve hose [B] to the air cleaner housing.
● Install the air cleaner housing on the throttle body assy.
○Push in the ducts touch the stopper of the throttle body assy.
● Tighten the air cleaner housing clamp bolt (left) first, and then air cleaner housing bolt (right).

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

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



Fuel Tank

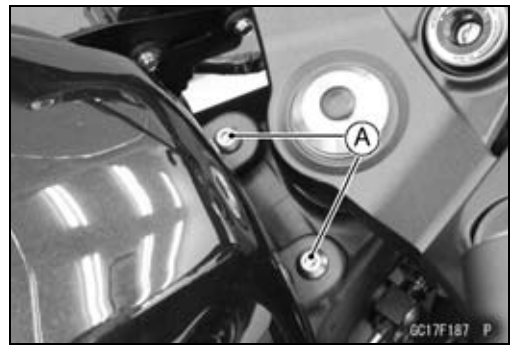
Fuel Tank Removal

⚠ WARNING

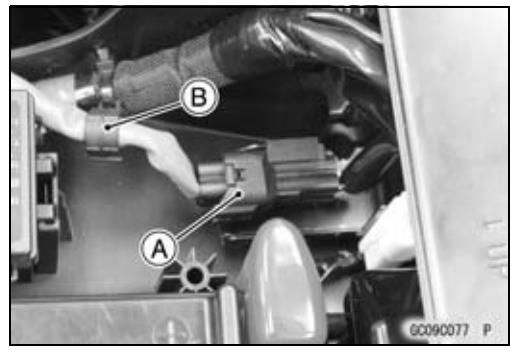
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- Turn the ignition switch off.
- Wait until the engine cools down.
- Disconnect the battery (–) terminal (see Battery Removal in the Electrical System chapter).

- Remove:
  Lower Fairings (see Lower Fairing Removal in the Frame chapter)
  Side Covers (see Side Cover Removal in the Frame chapter)
  Fuel Tank Bolts [A]

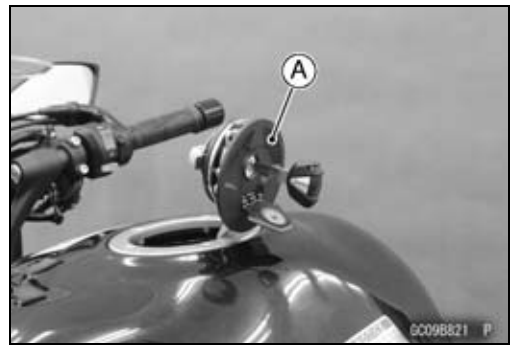


- Disconnect the fuel pump lead connector [A].
- Clear the fuel pump lead from the clamp [B].



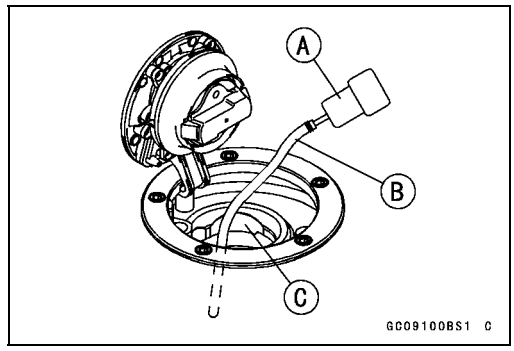
- Open the fuel tank cap [A] to lower the pressure in the tank.

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



Fuel Tank

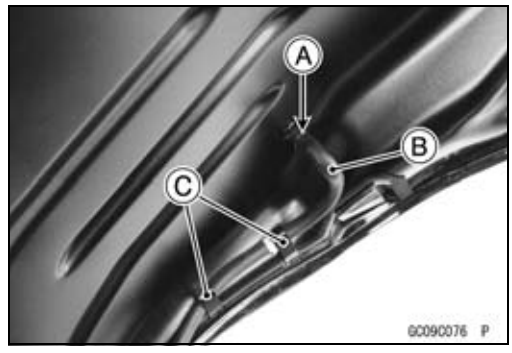
- Draw the fuel out from the fuel tank with a commercially available pump [A].
  - ○Use a soft plastic hose [B] as a pump intake hose in order to insert the hose smoothly.
  - ○Put the hose through the fill opening [C] into the tank and draw the fuel out.



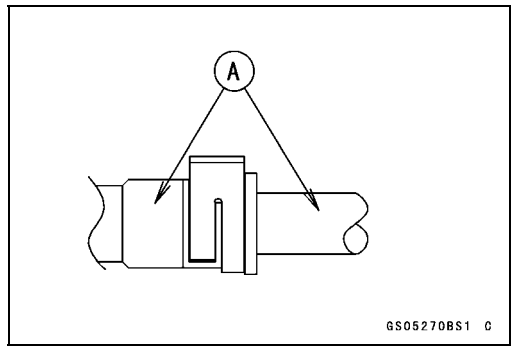
⚠ WARNING

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.

- Slide the clamp [A].
- Disconnect the drain hose [B], and free the drain hose from the clamps [C].



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

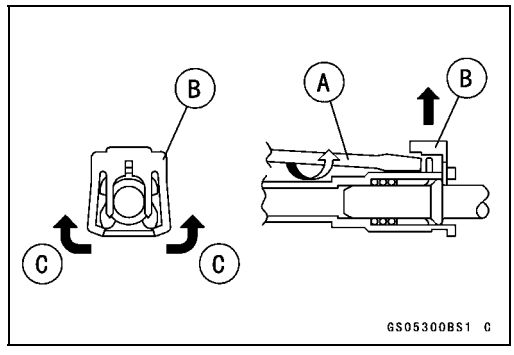


When removing with flat tip screwdriver

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

When removing with fingers

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

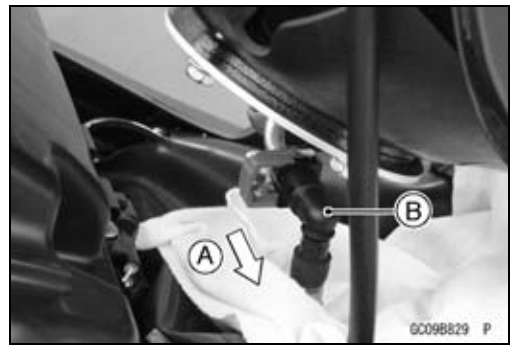


NOTICE

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

Fuel Tank

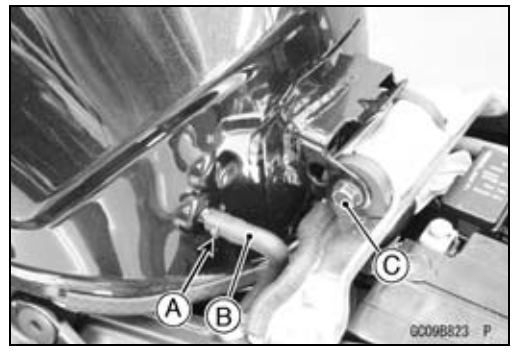
● Pull [A] the fuel hose joint [B] out of the outlet pipe.



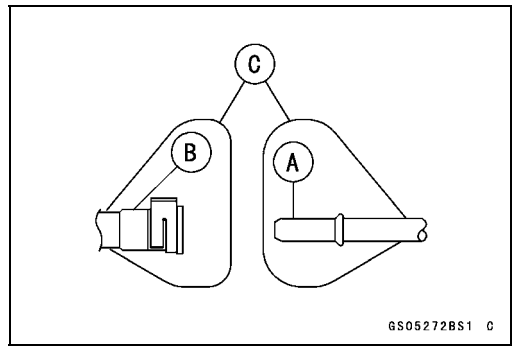
⚠ WARNING

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 because of residual pressure. Cover the hose connection with a piece of clean cloth to prevent fuel spillage.

● Slide the clamp [A].
● Disconnect:
  Fuel Tank Breather Hose [B]
● Remove:
  Fuel Tank Bolt [C]

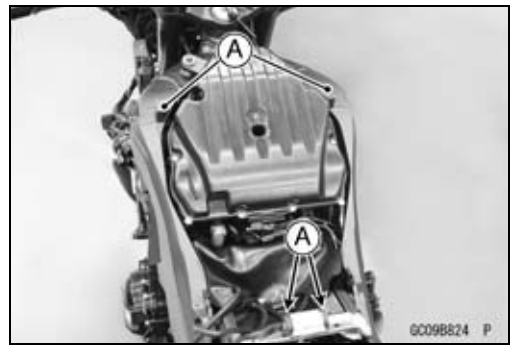


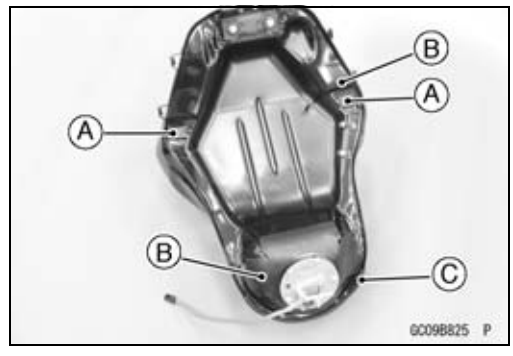
● Close the fuel tank cap.
● Remove the fuel tank, and place it on a flat surface.
○Do not apply the load to the fuel pipe of the fuel pump.
● Clean the pipe [A].
● Cover the pipe and the hose joint [B] with the vinyl bags [C] to keep it clean.



Fuel Tank Installation

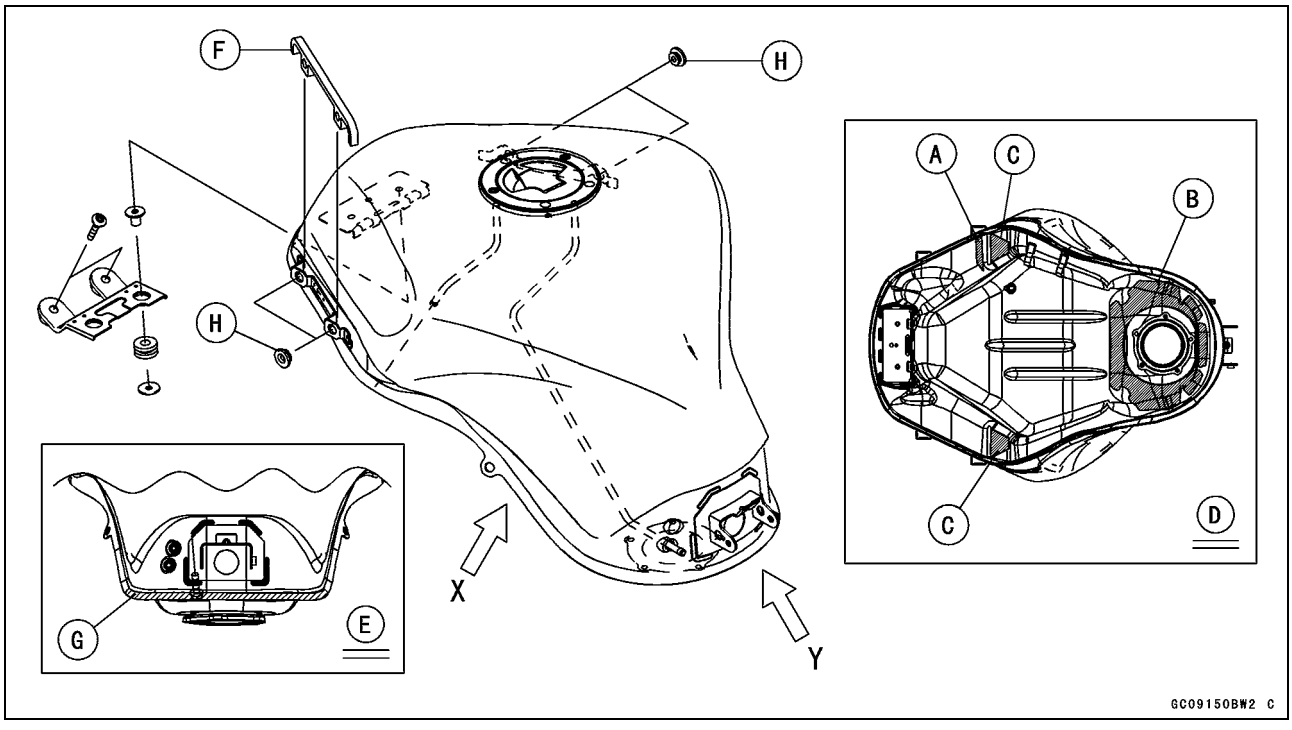
● Note the above WARNING (see Fuel Tank Removal).
● Check that the dampers [A], pads [B] and trim [C] are in place on the frame and the fuel tank.
★If the dampers, pads and trim are damaged or deteriorated, replace them.
● Run the hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix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



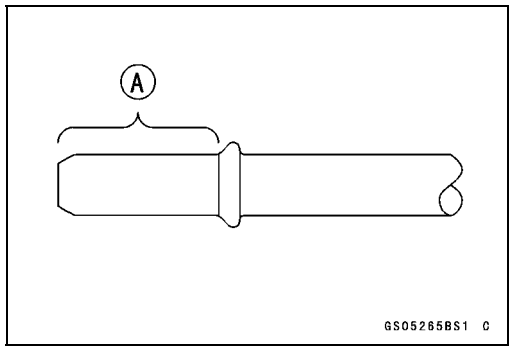


Fuel Tank

● When assembling the fuel tank, note the followings.
○When attaching the pads [A], align its corner with the rounded edge of the tank.
○When attaching the pads [B] align its center with the fuel pump cover on the fuel tank.
Dampers [C]
View X [D]
View Y [E]
Dampers [F] (Both Side)
○When installing the dampers [G], position it at center of left and right.
○When installing the grommets [H], position the large diameter side toward the outside.

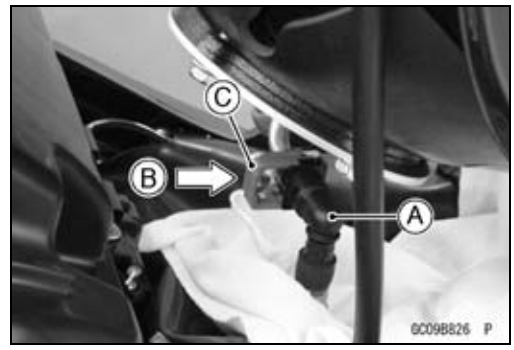


● Remove the vinyl bags on the pipe and fuel hose joint.
● Check the joint lock for deformation and wear.
★If the joint lock is deformed, replace the fuel hose with a new one.
● Check that there are no flaws, burrs, and adhesion of foreign materials on the pipe [A].
● Apply engine oil to the pipe.

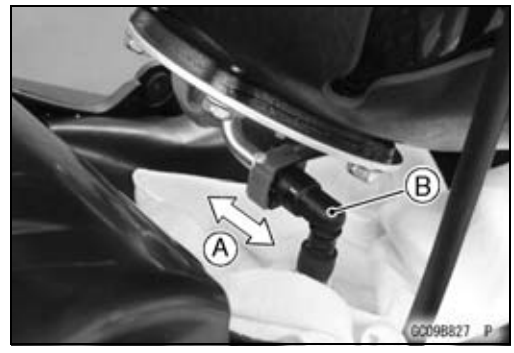


Fuel Tank

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



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

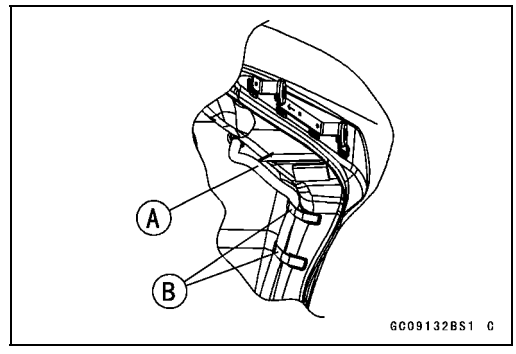


⚠ WARNING

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

★If it comes off, reinstall the hose joint.

- Connect the drain hose [A].
- Bend the clamps [B] to hold the drain hose.
- Connect the fuel pump lead connector and the battery (–) terminal (see Battery Installation in the Electrical System chapter).
- Install the removed parts (see appropriate chapters).



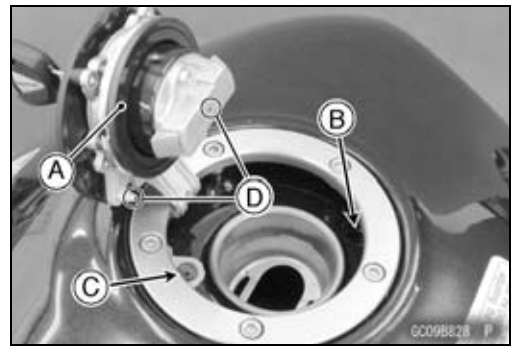
Fuel Tank and Cap Inspection

- Open the tank cap.
- Visually inspect the gasket [A] on the tank cap for any damage.

★Replace the tank cap if gasket is damaged.

- Check to see if the water drain pipe hole [B] and fuel breather pipe hole [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

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 (other than US and CA 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.

- 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 (Other than US and CA Models) in the Periodic Maintenance chapter.

Purge Valve Inspection

- Refer to the Purge Valve Inspection.

Canister Inspection

- Refer to the Evaporative Emission Control System Inspection (Other than US and CA Models) in the Periodic Maintenance chapter.

Cooling System

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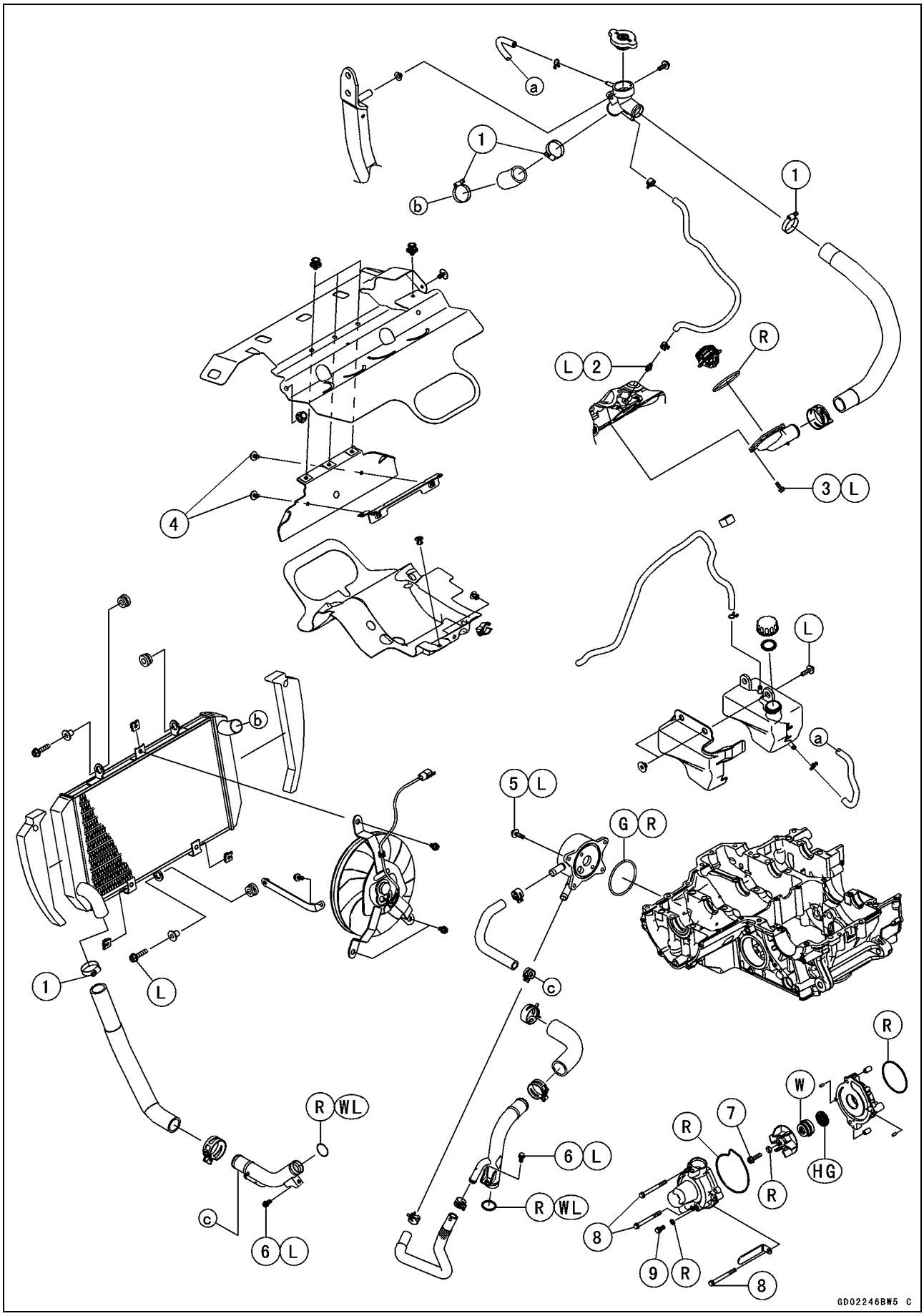
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Exploded View

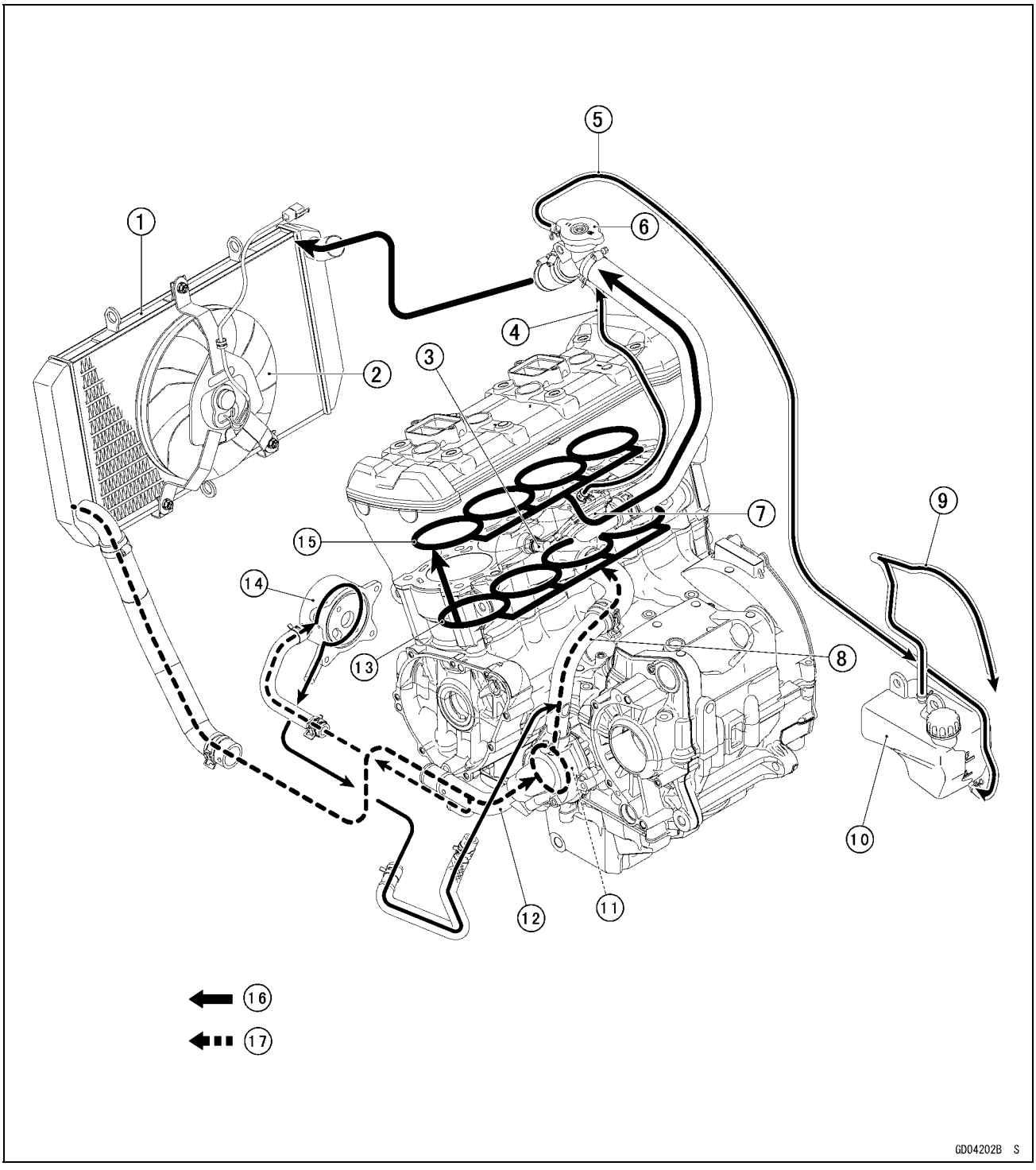


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Water Hose Clamp Screws	3.0	0.31	27 in·lb	
2	Fitting Bolt	9.0	0.92	80 in·lb	L
3	Thermostat Housing Bolts	6.0	0.61	53 in·lb	L
4	Heat Insulation Plate Bolts	7.0	0.71	62 in·lb	
5	Oil Cooler Bolts	12	1.2	106 in·lb	L
6	Water Pipe Bolts	12	1.2	106 in·lb	L
7	Water Pump Impeller Bolt	10	1.0	89 in·lb	
8	Water Pump Cover Bolts	11	1.1	97 in·lb	
9	Coolant Drain Bolt	11	1.1	97 in·lb	

G: Apply grease.
HG: Apply high-temperature grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts
W: Apply water.
WL: Apply soap and water solution or rubber lubricant.

Coolant Flow Chart



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

Coolant Flow Chart

Permanent type antifreeze is used as a coolant to protect the cooling system from rust and corrosion. When the engine starts, the water pump turns and the coolant circulates.

The thermostat is a wax pellet type which opens or closes with coolant temperature changes. The thermostat continuously changes its valve opening to keep the coolant temperature at the proper level. When coolant temperature is less than 55°C (131°F), the thermostat closes so that the coolant flow is restricted through the air bleeder hole, causing the engine to warm up more quickly. When coolant temperature is more than 58 ~ 62°C (136 ~ 144°F), the thermostat opens and the coolant flows.

When the coolant temperature goes up beyond 100°C (212°F), the radiator fan relay conducts to operate the radiator fan. The radiator fan draws air through the radiator core when there is not sufficient air flow such as at low speeds. This increases up the cooling action of the radiator. When the coolant temperature is below 97.5°C (208°F), the fan relay opens and the radiator fan stops.

In this way, this system controls the engine temperature within narrow limits where the engine operates most efficiently even if the engine load varies.

The system is pressurized by the radiator cap to suppress boiling and the resultant air bubbles which can cause engine overheating. As the engine warms up, the coolant in the radiator and the water jacket expands. The excess coolant flows through the radiator cap and hose to the reserve tank to be stored there temporarily. Conversely, as the engine cools down, the coolant in the radiator and the water jacket contracts, and the stored coolant flows back to the radiator from the reserve tank.

The radiator cap has two valves. One is a pressure valve which holds the pressure in the system when the engine is running. When the pressure exceeds 93.3 ~ 122.7 kPa (0.95 ~ 1.25 kgf/cm², 13.5 ~ 17.8 psi), the pressure valve opens and releases the pressure to the reserve tank. As soon as pressure escapes, the valve closes, and keeps the pressure at 93.3 ~ 122.7 kPa (0.95 ~ 1.25 kgf/cm², 13.5 ~ 17.8 psi). When the engine cools down, another small valve (vacuum valve) in the cap opens. As the coolant cools, the coolant contracts to form a vacuum in the system. The vacuum valve opens and allows the coolant from the reserve tank to enter the radiator.

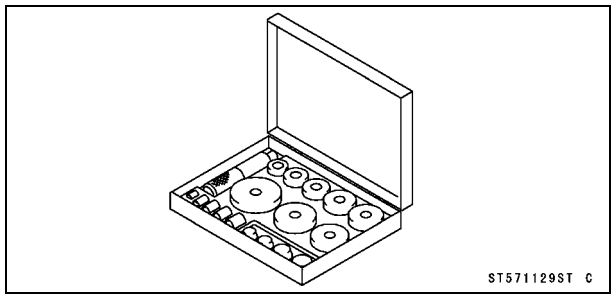
4-6 COOLING SYSTEM

Specifications

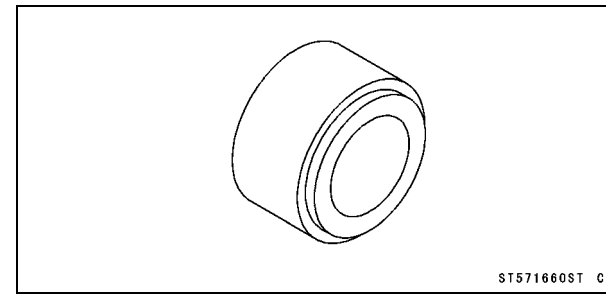
Item	Standard
Coolant Provided when Shipping	
Type (Recommended)	Permanent type of antifreeze (soft water and ethylene glycol plus corrosion and rust inhibitor chemicals for aluminum engines and radiators)
Color	Green
Mixed Ratio	Soft water 50%, coolant 50%
Freezing Point	−35°C (−31°F)
Total Amount	2.9 L (3.1 US qt) (reserve tank full level, including radiator and engine)
Radiator Cap	
Relief Pressure	93.3 ~ 122.7 kPa (0.95 ~ 1.25 kgf/cm², 13.5 ~ 17.8 psi)
Thermostat	
Valve Opening Temperature	58 ~ 62°C (136 ~ 144°F)
Valve Full Opening Lift	8 mm (0.31 in.) or more at 75°C (167°F)

Special Tools

Bearing Driver Set:
57001-1129

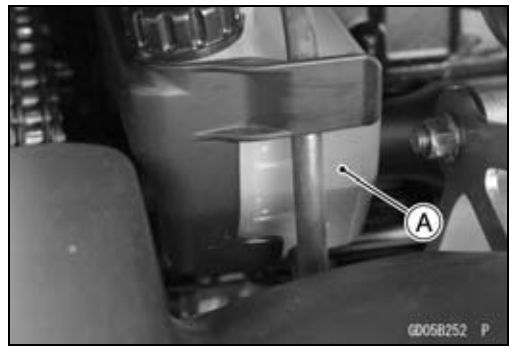


Oil Seal Driver ϕ37.5:
57001-1660



Coolant

Coolant Deterioration Inspection



- 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.

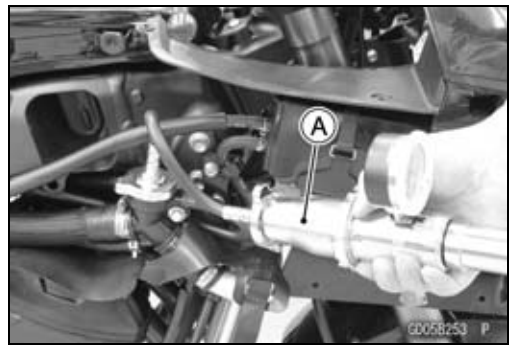
Coolant Draining

- 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 the right lower fairing (see Lower Fairing Removal in the Frame chapter).
- Remove the radiator cap, and install a 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 122.7 kPa (1.25 kgf/cm², 17.8 psi).

NOTICE

During pressure testing, do not exceed the pressure for which the system is designed. The maximum pressure is 122.7 kPa (1.25 kgf/cm², 17.8 psi).

- Watch the gauge for at least 6 seconds.

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

★If the pressure drops and no external source is found, check for internal leaks. Droplets in the engine oil indicate internal leakage. Check the cylinder head gasket and the water pump.

- Remove the pressure tester, replenish the coolant, and install the radiator cap.
- Install the right lower fairing (see Lower Fairing Installation in the Frame chapter).

Coolant

Cooling System Flushing

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

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

NOTICE

Do not use a flushing compound which is harmful to the aluminum engine and radiator. Carefully follow the instructions supplied by the manufacturer of the cleaning product.

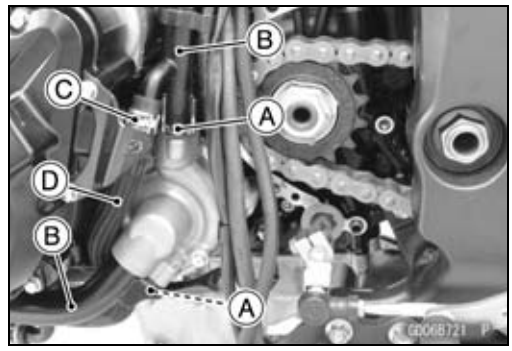
- Warm up the engine, and run it at normal operating temperature for about ten minutes.
- Stop the engine, and drain the cooling system.
- Fill the system with fresh water.
- Warm up the engine and drain the system.
- Repeat the previous two steps once more.
- Fill the system with a permanent type coolant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

Coolant Reserve Tank Removal/Installation

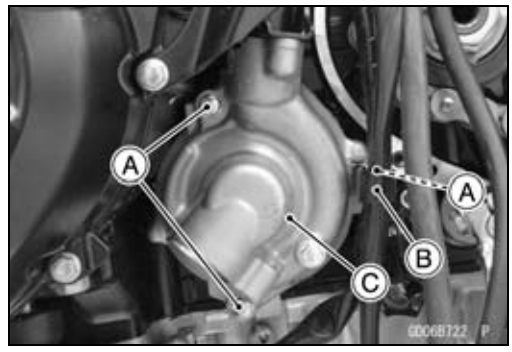
- The coolant reserve tank is removed and installed during coolant change (see Coolant Change in the Periodic Maintenance chapter).

Water Pump

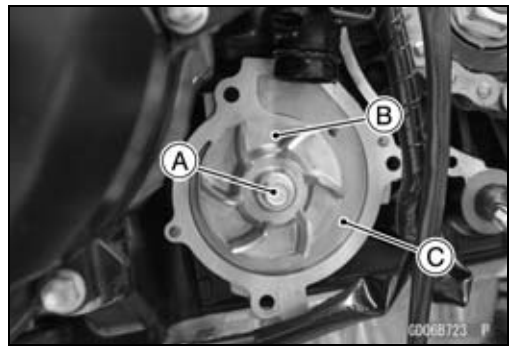
Water Pump Removal



- Drain:
  Coolant (see Coolant Change in the Periodic Maintenance chapter)
  Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
- Remove the engine sprocket cover (see Engine Sprocket Removal in the Final Drive chapter).
- Remove the water pipe bolts [A], and disconnect the water pipes [B].
- Slide the water hose clamp [C].
- Disconnect the water hose [D].

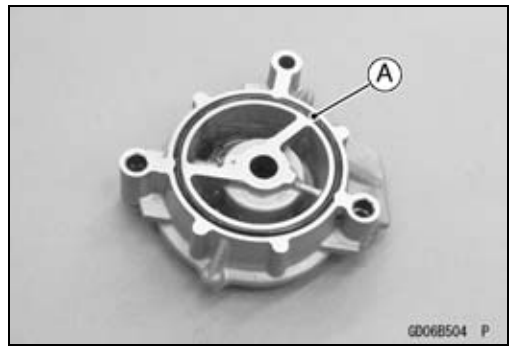


- Remove:
  Water Pump Cover Bolts [A]
  Clamp [B]
  Water Pump Cover [C]



- Remove:
  Water Pump Impeller Bolt [A] and Washer
  Water Pump Impeller [B]
  Water Pump Housing [C]

Water Pump Installation



- Replace the O-ring [A] with a new one, and install it.

Water Pump

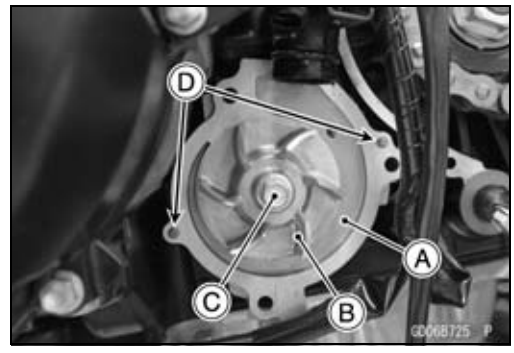
● Be sure to install the dowel pins [A].



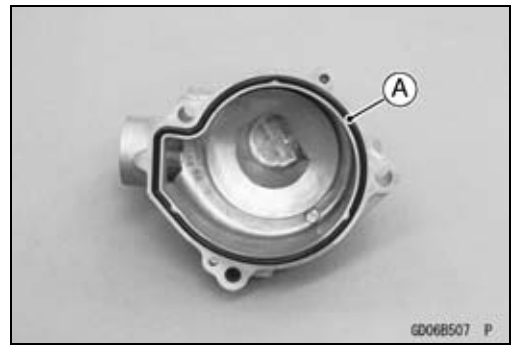
● Install:
  Water Pump Housing [A]
  Water Pump Impeller [B]
● Replace the washer with a new one, and install it.
● Tighten:

Torque - Water Pump Impeller Bolt [C]: 10 N·m (1.0 kgf·m, 89 in·lb)

● Be sure to install the dowel pins [D].



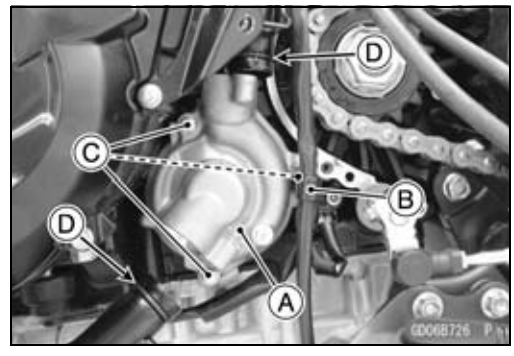
● Replace the O-ring [A] with a new one, and install it.



● Install:
  Water Pump Cover [A]
  Clamp [B]
● Tighten:

Torque - Water Pump Cover Bolts [C]: 11 N·m (1.1 kgf·m, 97 in·lb)

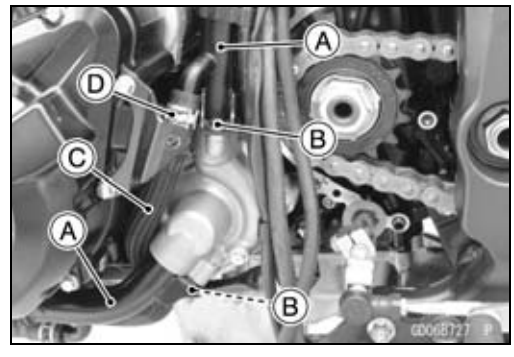
● Replace the O-rings [D] with new ones.
● Apply soap and water solution to the O-rings.



● Install the water pipes [A] to the water pump cover.
● Apply a non-permanent locking agent to the threads of the water pipe bolts [B], and tighten them.

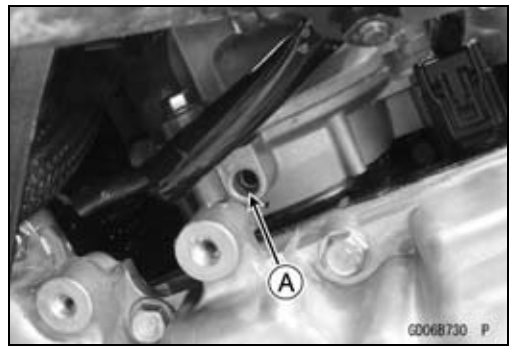
Torque - Water Pipe Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)

● Install the water hose [C] and clamp [D] (see Cable, Wire, and Hose Routing section in the Appendix chapter).
● Install the removed parts (see appropriate chapters).



Water Pump

Water Pump Inspection



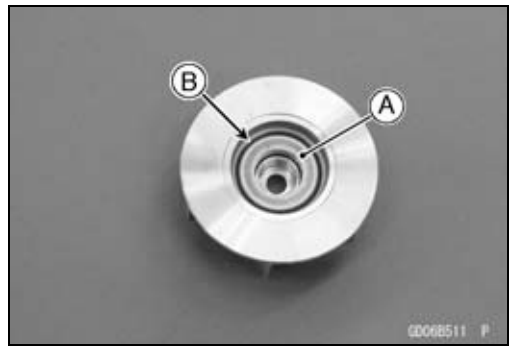
- Check the drainage outlet passage [A] at the bottom of the water pump housing for coolant leaks.
- If a coolant leak or ooze is found, start the engine and check if the coolant leaks continuously.

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

★If the mechanical seal is damaged, the coolant continuously leaks through the drainage outlet passage. Replace the mechanical seal unit (see Water Pump Housing Disassembly/Assembly).

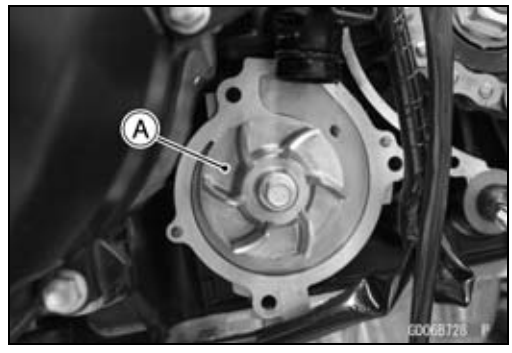
★If the oil seal is damaged, engine oil leaks through the drainage outlet passage. Replace the oil seal.

Water Pump Impeller Disassembly/Assembly



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

Water Pump Impeller Inspection

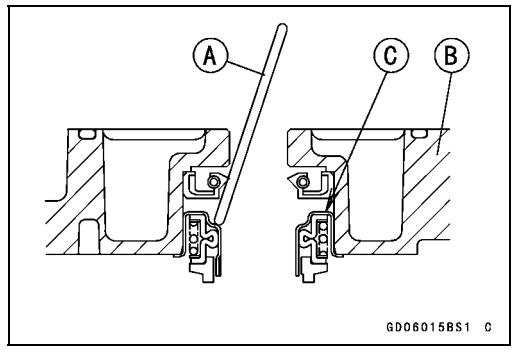


- Remove the water pump cover (see Water Pump Removal).
- Visually inspect the water pump impeller [A].

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

Water Pump Housing Disassembly

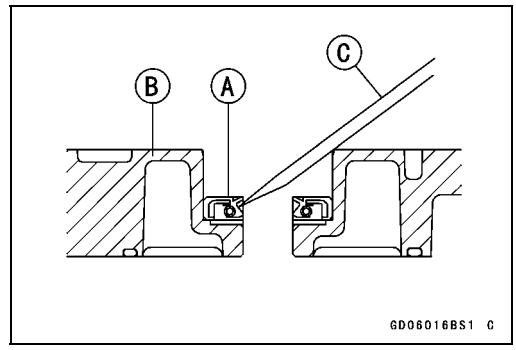
NOTICE
Do not damage the hole wall of the water pump housing.



- 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].

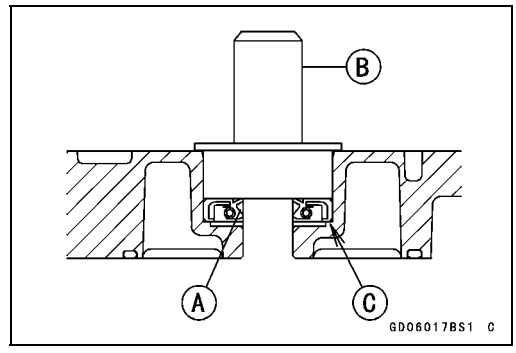


Water Pump Housing Assembly

NOTICE
Do not reuse the mechanical seal and oil seal.

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

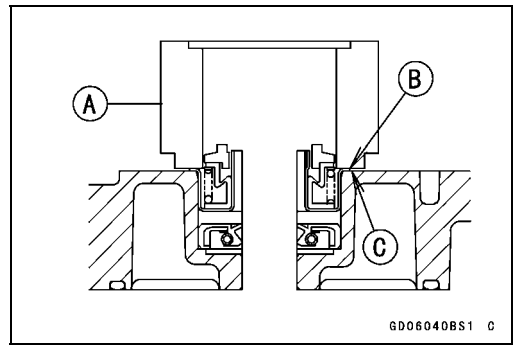
Special Tool - Bearing Driver Set: 57001-1129



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

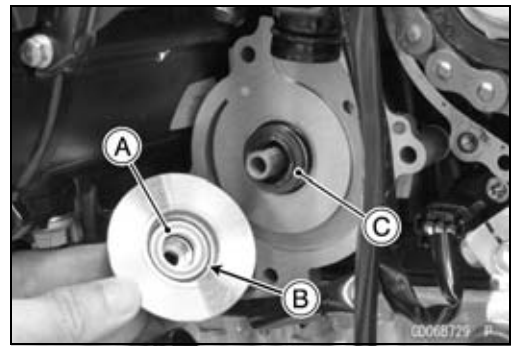
● Press the new mechanical seal into the housing with the oil seal driver [A] until its flange [B] touches the surface [C] of the housing.

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



Mechanical Seal Inspection

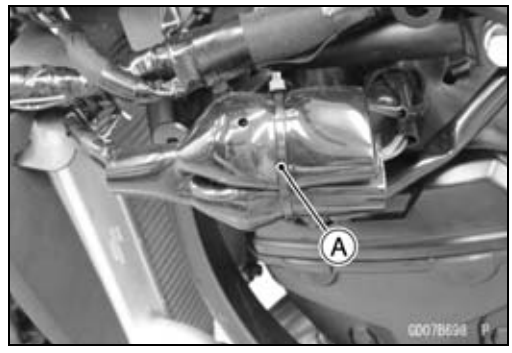
● Remove the water pump impeller (see Water Pump Removal).
● Visually inspect the mechanical seal.
★ If any one of the parts is damaged, replace the mechanical seal as a unit.
Impeller Sealing Seat Surface [A]
Rubber Seal [B]
Mechanical Seal [C]



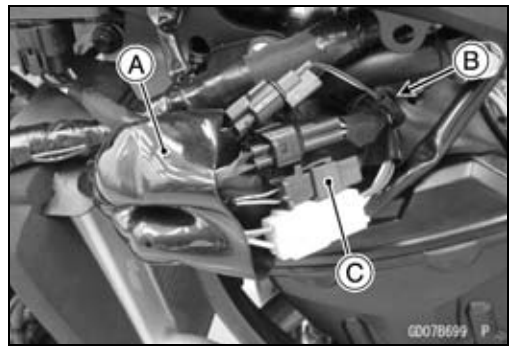
Radiator

Radiator and Radiator Fan Removal

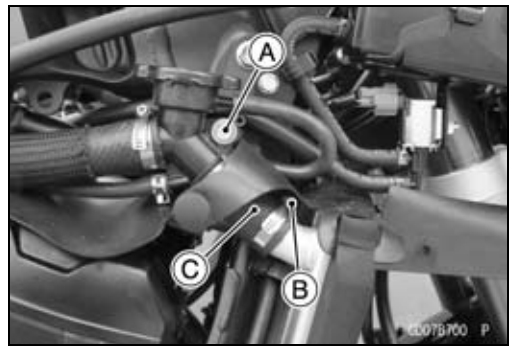
- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove the air cleaner housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter).
- Cut the band [A].



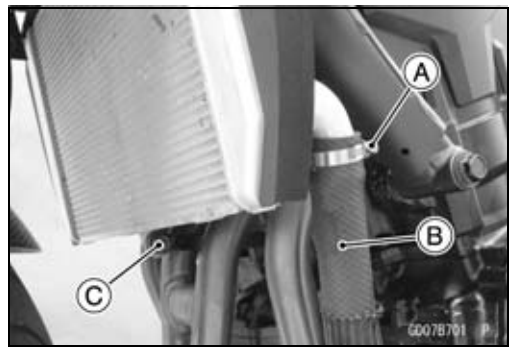
- Slide the dust cover [A].
- Open the clamp [B].
- Disconnect the radiator fan motor lead connector [C].



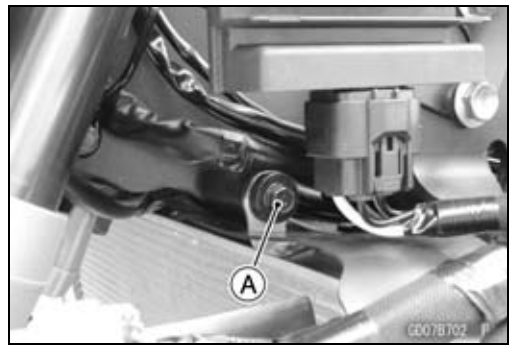
- Remove the bolt [A] and collar.
- Loosen the water hose clamp screw [B].
- Disconnect the water hose [C].



- Loosen the water hose clamp screw [A].
- Disconnect the water hose [B].
- Remove the radiator lower bolt [C].

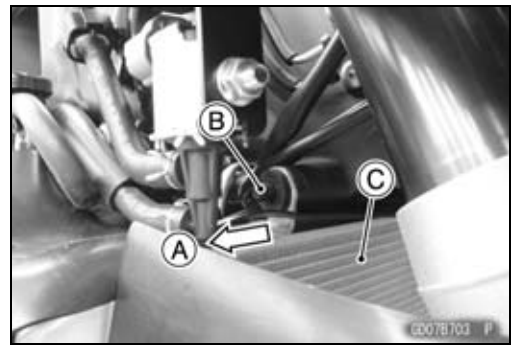


- Remove the radiator upper bolt [A].



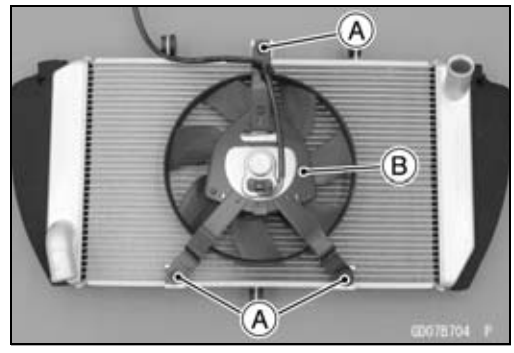
Radiator

- Move the radiator leftward [A] to clear the frame projection [B].
- Remove the radiator [C].



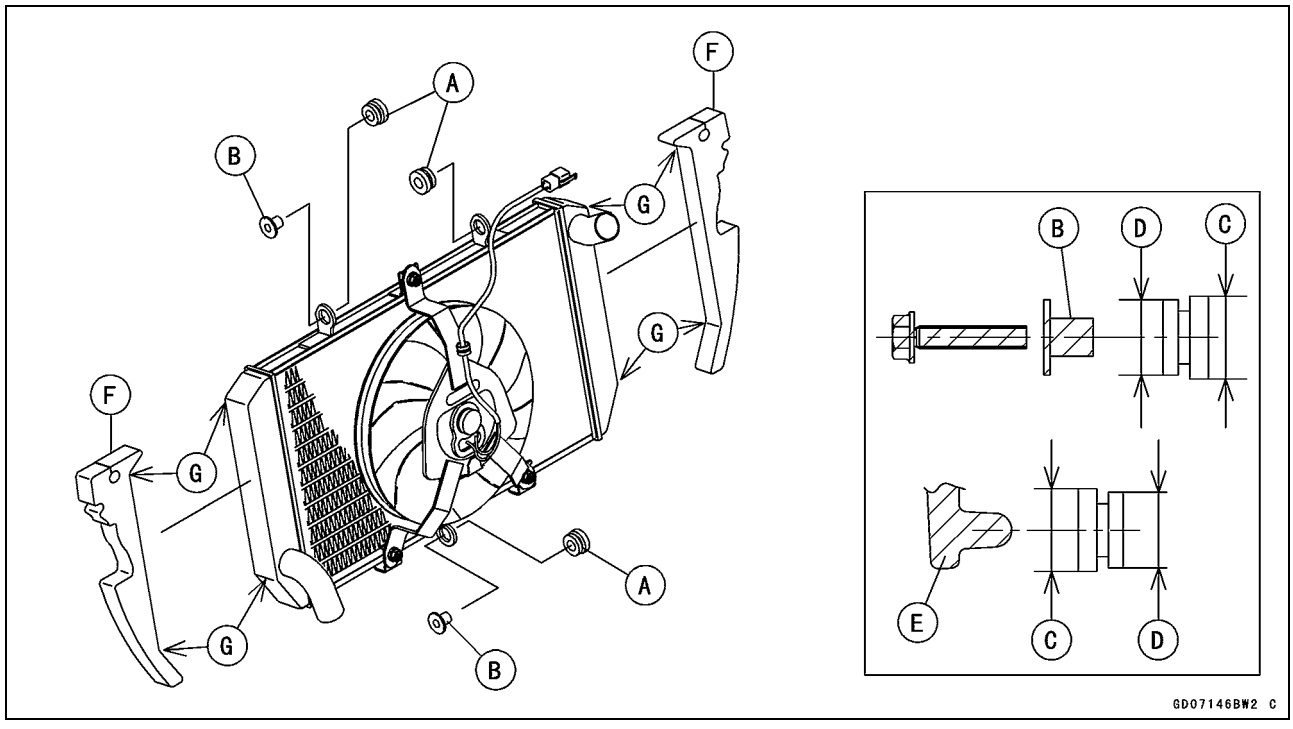
NOTICE
Do not touch the radiator core. This could damage the radiator fins, resulting in loss of cooling efficiency.

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



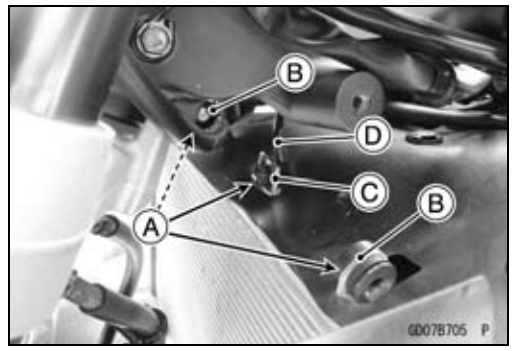
Radiator and Radiator Fan Installation

- Installation is the reverse of removal.
- Install the rubber dampers [A] and radiator bracket collars [B] as shown.
  Larger [C]
  Smaller [D]
  Frame Projection [E]
- When installing the pads [F], install it so that the corners [G] align.



Radiator

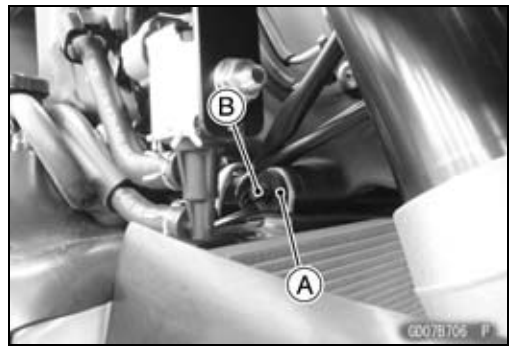
● Fit the slits [A] of the heat insulation rubber plate to the upper mounting brackets [B] and fan bracket [C] as shown.
● Run the radiator fan motor lead [D] into the slit.



● Insert the upper right mounting bracket [A] to the frame projection [B].
● Run the radiator fan motor lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
● Install the water hoses and clamps (see Cable, Wire, and Hose Routing section in the Appendix chapter).
● Tighten:

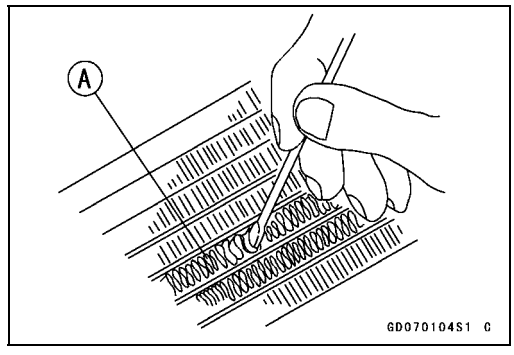
Torque - Water Hose Clamp Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)

● Install the removed parts (see appropriate chapters).



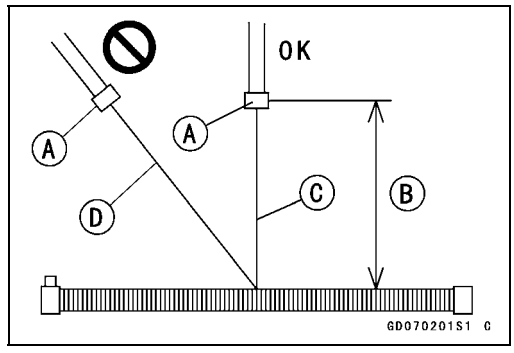
Radiator Inspection

● 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.



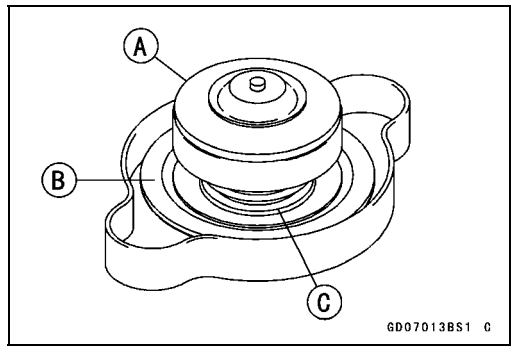
NOTICE

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:
Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
Radiator Cap
● Check the condition of the bottom [A] and top [B] valve seals and valve spring [C].
★If any one of them shows visible damage, replace the cap with a new one.

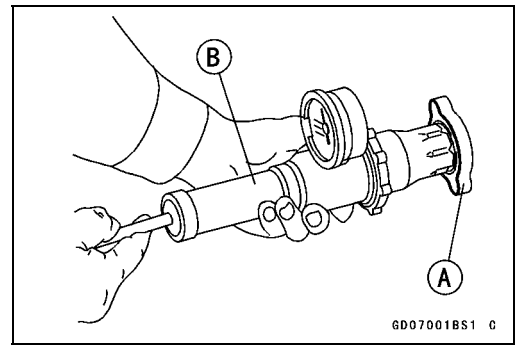


Radiator

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

NOTE

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



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

Radiator Cap Relief Pressure

Standard: 93.3 ~ 122.7 kPa (0.95 ~ 1.25 kgf/cm², 13.5 ~ 17.8 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:
Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
Radiator Cap

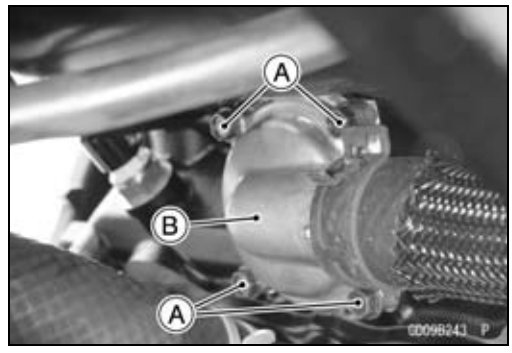
● Check the radiator filler neck for signs of damage.

● Check the condition of the top and bottom sealing seats [A] in the filler neck. They must be smooth and clean for the radiator cap to function properly.



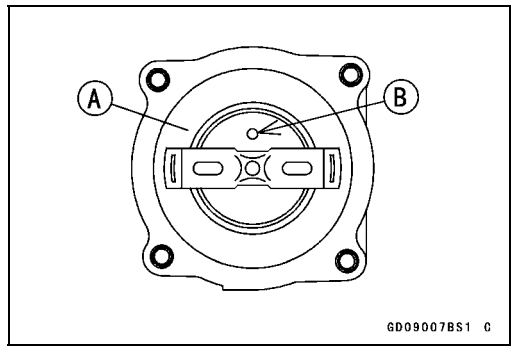
Thermostat

Thermostat Removal

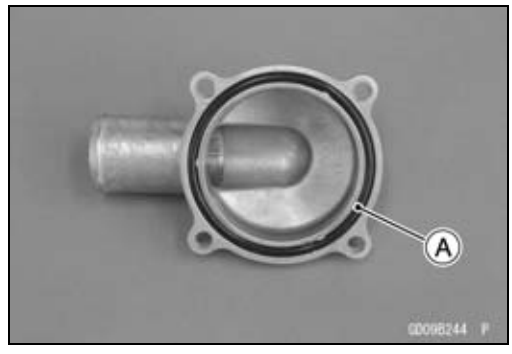


- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove:
  Thermostat Housing Bolts [A]
  Thermostat Housing Cover [B]
  Thermostat

Thermostat Installation



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



- Replace the O-ring [A] with a new one, and install it.

○Do not apply grease to the O-ring.

- Install the thermostat housing cover.

NOTE

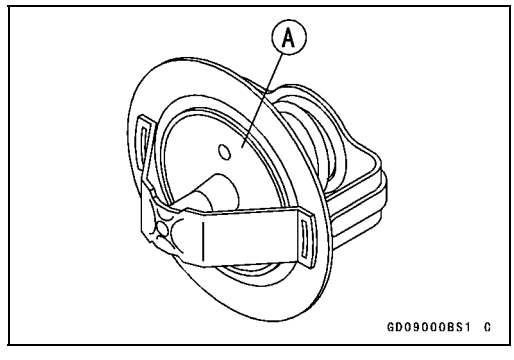
○*Note that the thermostat does not move at the place when installing the thermostat housing cover.*

- Apply a non-permanent locking agent to the threads of the thermostat housing bolts.
- Tighten:

Torque - Thermostat Housing Bolts: 6.0 N·m (0.61 kgf·m, 53 in·lb)

- Run the hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Fill the radiator with coolant (see Coolant Change in the Periodic Maintenance chapter).
- Install the removed parts (see appropriate chapters).

Thermostat Inspection



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

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

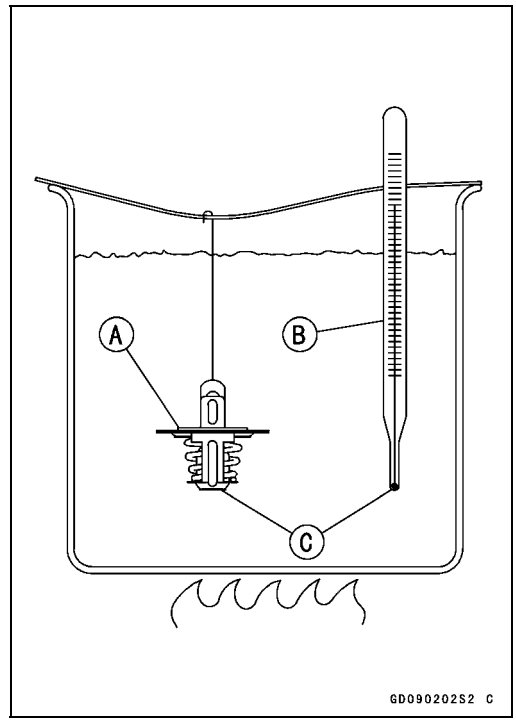
Thermostat

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

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

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

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



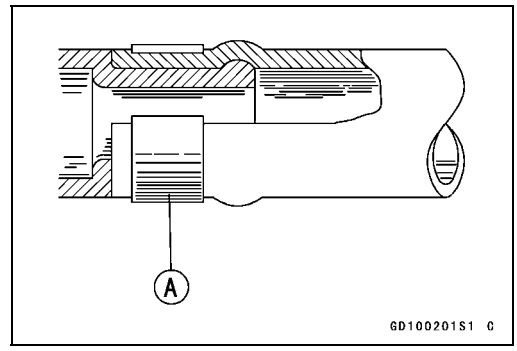
Hose and Pipes

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.

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



Hose Inspection

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

Water Temperature Sensor

NOTICE
The water temperature sensor should never be allowed to fall on a hard surface. Such a shock to the water temperature sensor can damage it.

Water Temperature Sensor Removal/Installation

- Refer to the Water Temperature Sensor Removal/Installation in the Fuel System (DFI) chapter.

Water Temperature Sensor Inspection

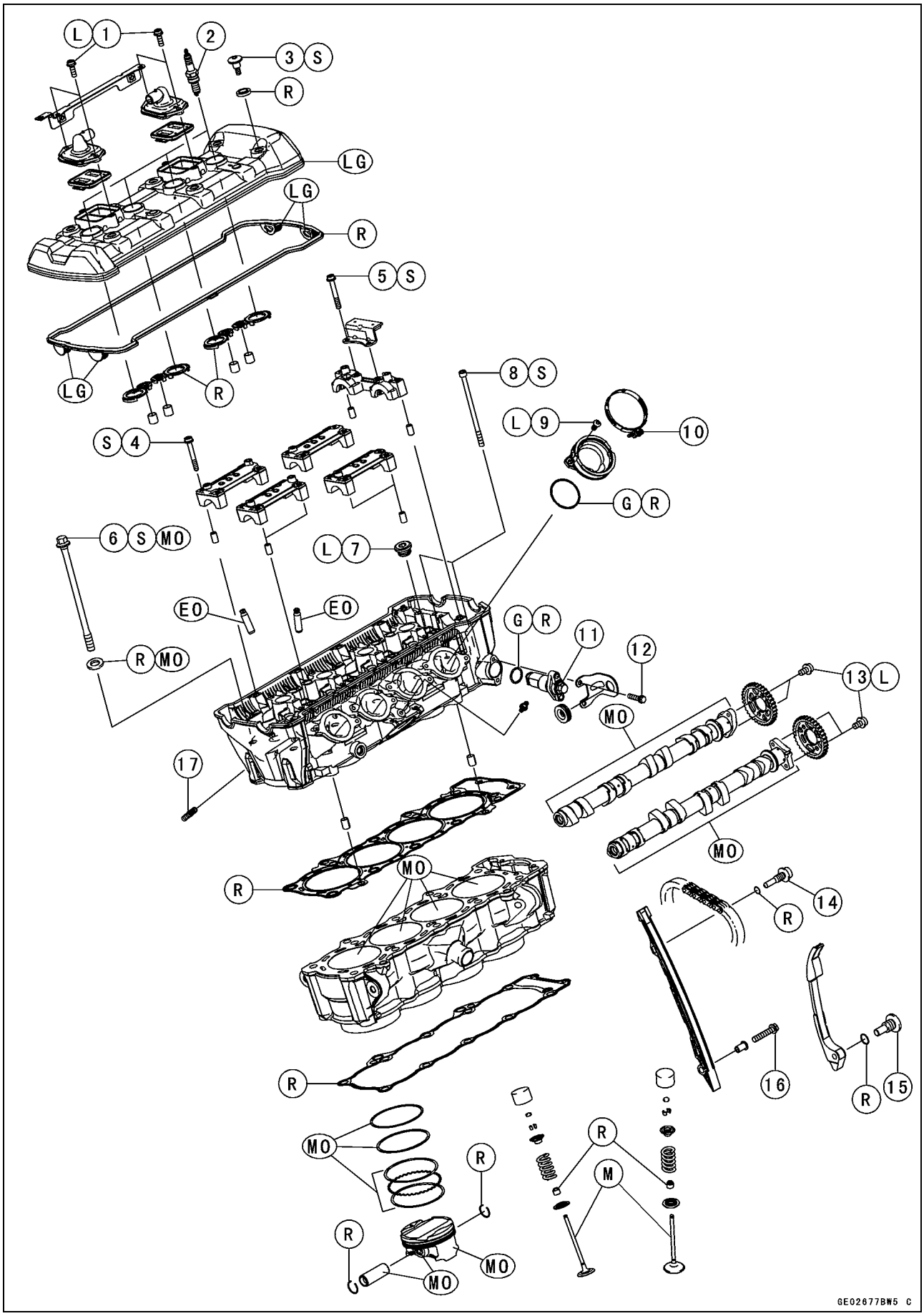
- Refer to the Water Temperature Sensor Inspection in the Electrical System chapter.

Engine Top End

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  Exhaust Pipe Removal 5-48
  Exhaust Pipe Installation 5-49

Exploded View

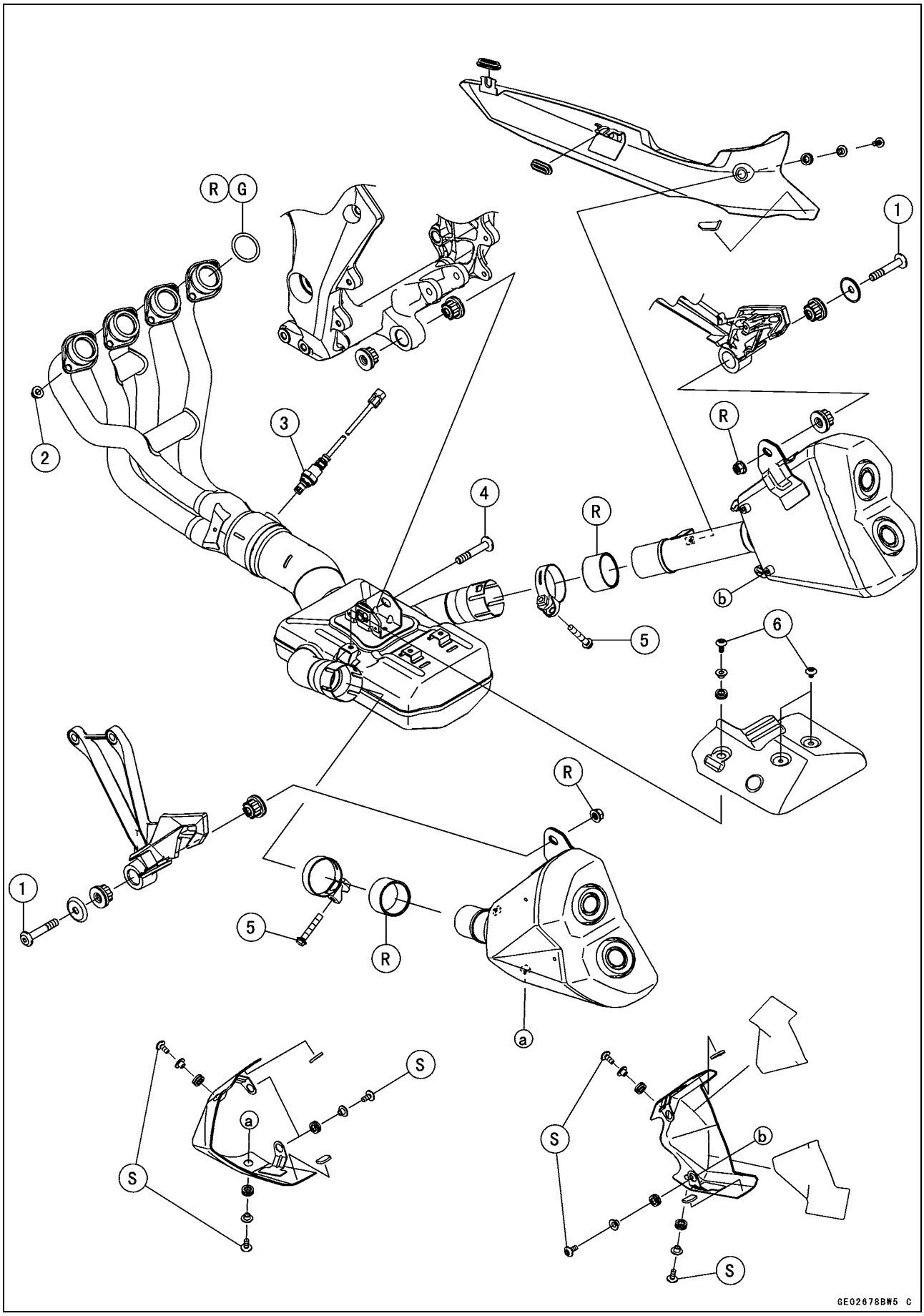


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Air Suction Valve Cover Bolts	10	1.0	89 in·lb	L
2	Spark Plugs	13	1.3	115 in·lb	
3	Cylinder Head Cover Bolts	10	1.0	89 in·lb	S
4	Camshaft Cap Bolts	12	1.2	106 in·lb	S
5	Upper Camshaft Chain Guide Bolts	12	1.2	106 in·lb	S
6	Cylinder Head Bolts (M10) (First)	30	3.1	22	MO, S
	Cylinder Head Bolts (M10) (Final)	54	5.5	40	MO, S
7	Cylinder Head Jacket Plugs	19.6	2.00	14.5	L
8	Cylinder Head Bolts (M6)	12	1.2	106 in·lb	S
9	Throttle Body Assy Holder Bolts	12	1.2	106 in·lb	L
10	Throttle Body Assy Holder Clamp Bolts	3.0	0.31	27 in·lb	
11	Camshaft Chain Tensioner Cap Bolt	20	2.0	15	
12	Camshaft Chain Tensioner Mounting Bolts	11	1.1	97 in·lb	
13	Camshaft Sprocket Bolts	15	1.5	11	L
14	Front Camshaft Chain Guide Bolt (Upper)	25	2.5	18	
15	Rear Camshaft Chain Guide Bolt	25	2.5	18	
16	Front Camshaft Chain Guide Bolt (Lower)	12	1.2	106 in·lb	

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

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Muffler Body Mounting Bolts	35	3.6	26	
2	Exhaust Pipe Holder Nuts	20	2.0	15	
3	Oxygen Sensor	45	4.6	33	
4	Premuffler Chamber Mounting Bolt	35	3.6	26	
5	Muffler Body Clamp Bolts	21	2.1	15	
6	Premuffler Chamber Cover Bolts	10	1.0	89 in·lb	

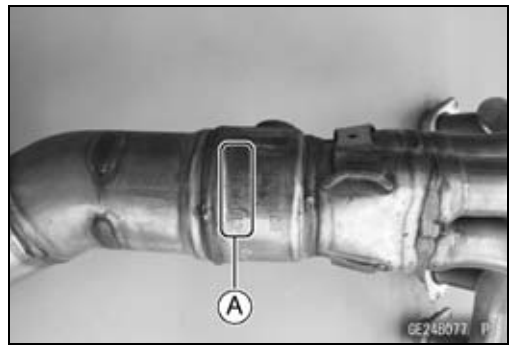
G: Apply grease.
R: Replacement Parts
S: Follow the specified tightening sequence.

Exhaust System Identification

MANIFOLD	MUFFLER BODY	SPECIFICATION	MODEL
Honeycomb Type Catalyst with Oxygen Sensor P/No. 39178-0273 Mark: KHI M 182	Non-Catalyst P/No. 18091-1108 18091-1124 Mark: KHI K 628 EPA Noise Emission Control Information	WVTA (FULL) AU MY PH IN SEA-B3 BR	ZX1000WH ~ ZX1000WH ~ ZX1000WH ~ ZX1000WH ~ ZX1000WH ZX1000WH ~ ZX1000WJ
	Non-Catalyst P/No. 18091-1109 18091-1125 Mark: KHI K 631	SEA-B1 TH	ZX1000WH ~ ZX1000WH ~
Honeycomb Type Catalyst with Oxygen Sensor P/No. 39178-0282 Mark: KHI M 182	Non-Catalyst P/No. 18091-1108 18091-1124 Mark: KHI K 628 EPA Noise Emission Control Information	IN (with Saree Guard equipped model)	ZX1000WH ~
Honeycomb Type Catalyst with Oxygen Sensor P/No. 39178-0204 Mark: KHI M 151	Non-Catalyst P/No. 18091-1108 18091-1124 Mark: KHI K 628 EPA Noise Emission Control Information	US CAL CA	ZX1000WH ~ ZX1000WH ~ ZX1000WH ~

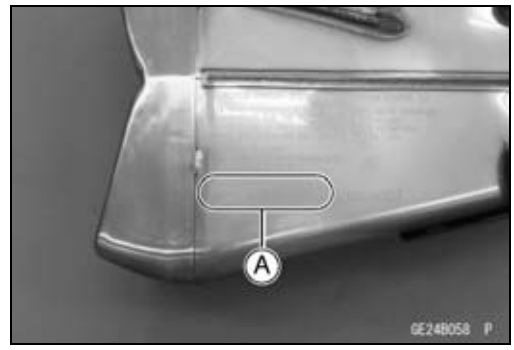
GE24778C F

Exhaust Pipe Mark Position [A]

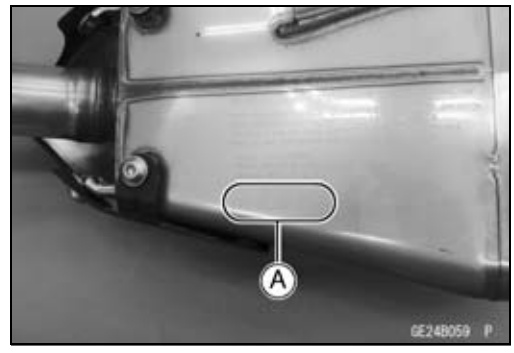


Exhaust System Identification

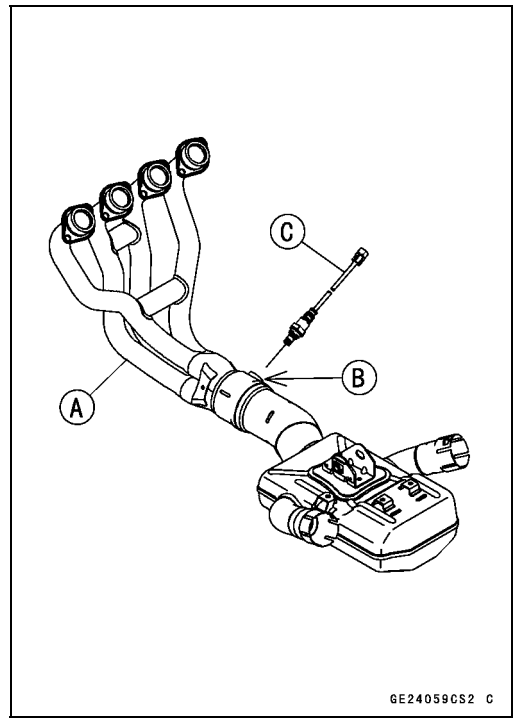
Left Muffler Body Mark Position [A]



Right Muffler Body Mark Position [A]

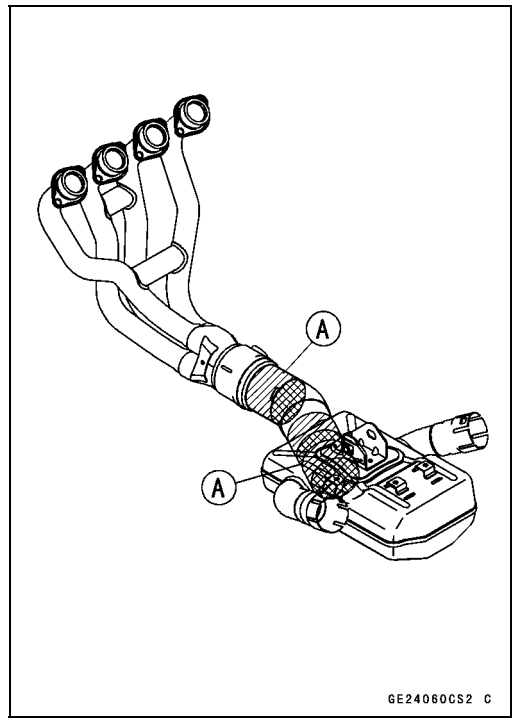


Exhaust Pipe [A] with Hole [B] for Oxygen Sensor [C]



Exhaust System Identification

Honeycomb Type Catalyst Positions [A]



Specifications

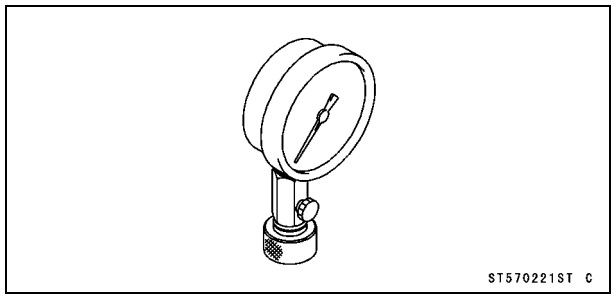
Item	Standard	Service Limit
Camshafts		
Cam Height:		
Exhaust	33.743 ~ 33.857 mm (1.3285 ~ 1.3330 in.)	33.64 mm (1.324 in.)
Intake	34.443 ~ 34.557 mm (1.3560 ~ 1.3605 in.)	34.34 mm (1.352 in.)
Camshaft Journal, Camshaft Cap Clearance	0.038 ~ 0.081 mm (0.0015 ~ 0.0032 in.)	0.17 mm (0.0067 in.)
Camshaft Journal Diameter	23.940 ~ 23.962 mm (0.94252 ~ 0.94338 in.)	23.91 mm (0.9413 in.)
Camshaft Bearing Inside Diameter	24.000 ~ 24.021 mm (0.94488 ~ 0.94571 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) 966 ~ 1 478 kPa (9.85 ~ 15.1 kgf/cm², 140 ~ 214 psi) @280 r/min (rpm)	– – –
Cylinder Head Warp	– – –	0.05 mm (0.002 in.)
Valves		
Valve Clearance:		
Exhaust	0.22 ~ 0.31 mm (0.0087 ~ 0.0122 in.)	– – –
Intake	0.13 ~ 0.22 mm (0.0051 ~ 0.0087 in.)	– – –
Valve Head Thickness:		
Exhaust	0.8 mm (0.031 in.)	0.6 mm (0.024 in.)
Intake	0.5 mm (0.020 in.)	0.3 mm (0.012 in.)
Valve Stem Bend	TIR 0.01 mm (0.0004 in.) or less	TIR 0.05 mm (0.002 in.)
Valve Stem Diameter:		
Exhaust	4.455 ~ 4.470 mm (0.1754 ~ 0.1760 in.)	4.44 mm (0.175 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	0.08 ~ 0.16 mm (0.0031 ~ 0.0063 in.)	0.35 mm (0.014 in.)
Intake	0.03 ~ 0.10 mm (0.0012 ~ 0.0039 in.)	0.30 mm (0.012 in.)
Valve Seat Cutting Angle	32°, 45°, 60°	– – –
Valve Seating Surface:		
Outside Diameter:		
Exhaust	24.7 ~ 24.9 mm (0.972 ~ 0.980 in.)	– – –
Intake	28.9 ~ 29.1 mm (1.138 ~ 1.146 in.)	– – –
Width:		
Exhaust	0.8 ~ 1.2 mm (0.031 ~ 0.047 in.)	– – –
Intake	0.5 ~ 1.0 mm (0.020 ~ 0.039 in.)	– – –
Valve Spring Free Length:		
Exhaust	36.62 mm (1.442 in.)	35.2 mm (1.39 in.)
Intake	36.62 mm (1.442 in.)	35.2 mm (1.39 in.)

Specifications

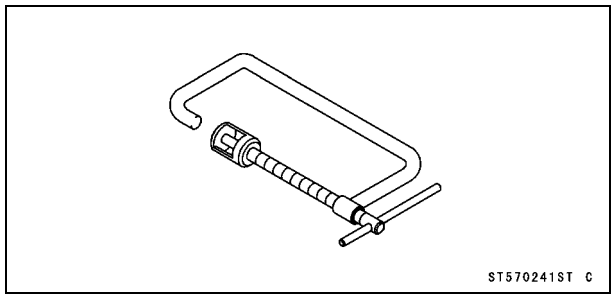
Item	Standard	Service Limit
Cylinder, Pistons		
Cylinder Inside Diameter	76.994 ~ 77.006 mm (3.0313 ~ 3.0317 in.)	77.09 mm (3.035 in.)
Piston Diameter	76.974 ~ 76.984 mm (3.0305 ~ 3.0309 in.)	76.82 mm (3.024 in.)
Piston/Cylinder Clearance	0.010 ~ 0.032 mm (0.0004 ~ 0.0013 in.)	– – –
Piston Ring/Groove Clearance:		
Top	0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in.)	0.17 mm (0.0067 in.)
Second	0.02 ~ 0.06 mm (0.0008 ~ 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 (0.0362 in.)
Second	0.81 ~ 0.83 mm (0.0319 ~ 0.0327 in.)	0.91 mm (0.0358 in.)
Piston Ring Thickness:		
Top	0.77 ~ 0.79 mm (0.0303 ~ 0.0311 in.)	0.70 mm (0.028 in.)
Second	0.77 ~ 0.79 mm (0.0303 ~ 0.0311 in.)	0.70 mm (0.028 in.)
Piston Ring End Gap:		
Top	0.20 ~ 0.30 mm (0.0079 ~ 0.0118 in.)	0.6 mm (0.024 in.)
Second	0.38 ~ 0.48 mm (0.0150 ~ 0.0189 in.)	0.8 mm (0.031 in.)

Special Tools and Sealants

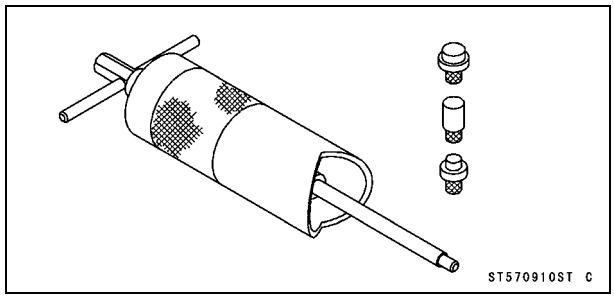
Compression Gauge, 20 kgf/cm²:
57001-221



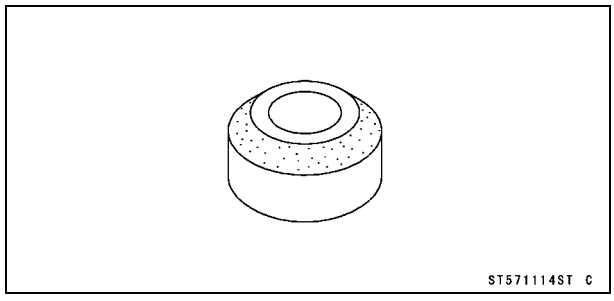
Valve Spring Compressor Assembly:
57001-241



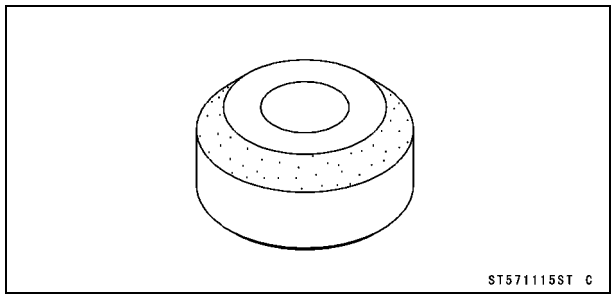
Piston Pin Puller Assembly:
57001-910



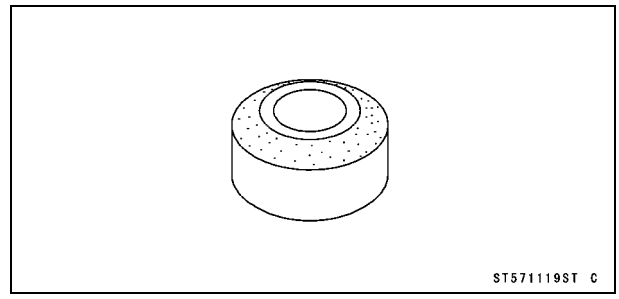
Valve Seat Cutter, 45° - ϕ27.5:
57001-1114



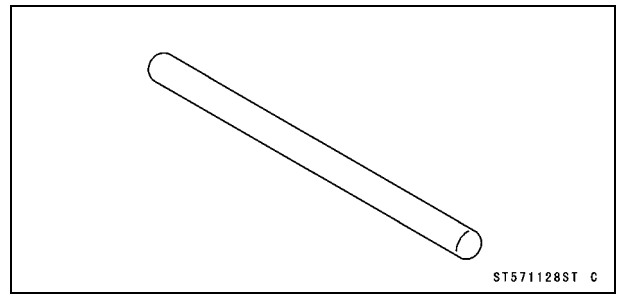
Valve Seat Cutter, 45° - ϕ32:
57001-1115



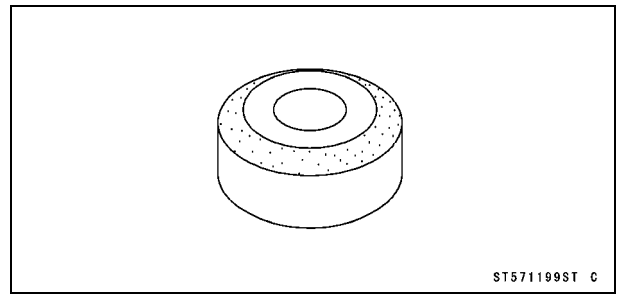
Valve Seat Cutter, 32° - ϕ28:
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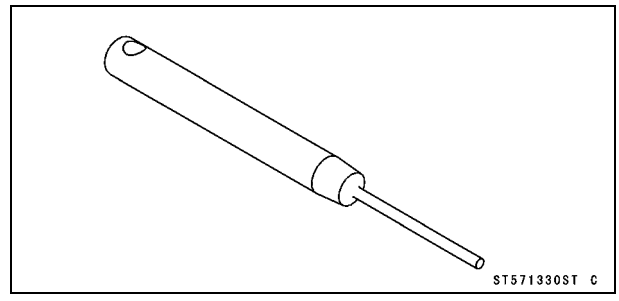
Valve Seat Cutter Holder Bar:
57001-1128



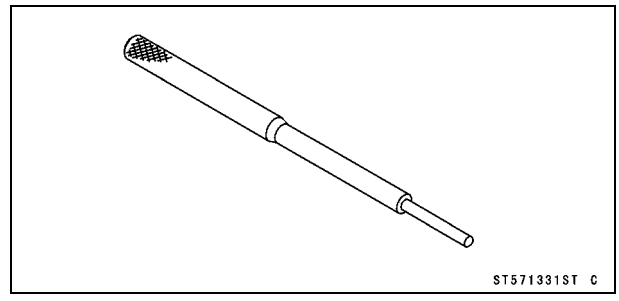
Valve Seat Cutter, 32° - ϕ33:
57001-1199



Valve Seat Cutter Holder, ϕ4.5:
57001-1330

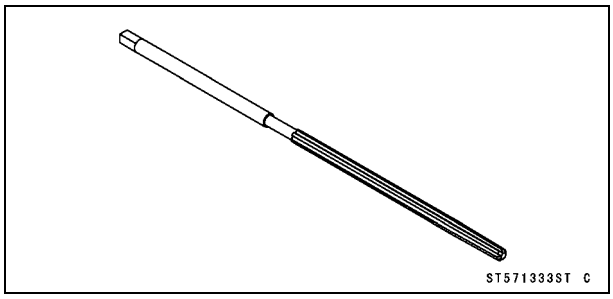


Valve Guide Arbor, ϕ4.5:
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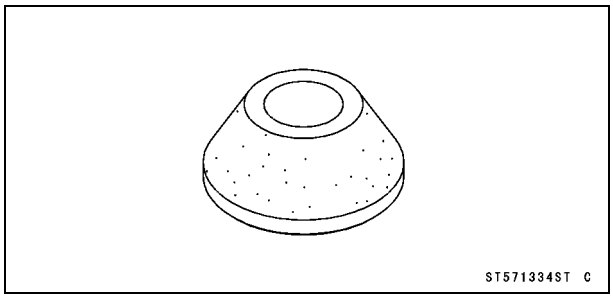


Special Tools and Sealants

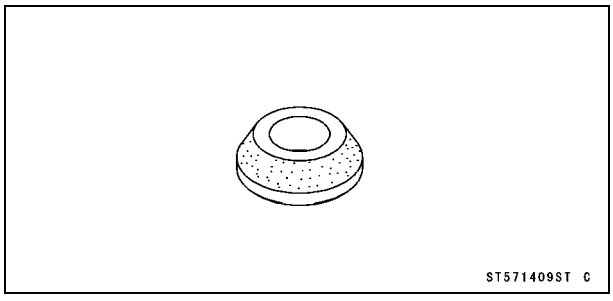
Valve Guide Reamer, ϕ4.5:
57001-1333



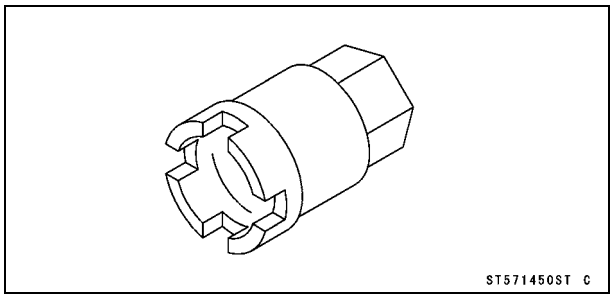
Valve Seat Cutter, 60° - ϕ33:
57001-1334



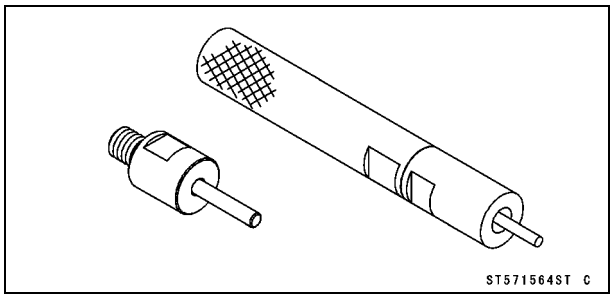
Valve Seat Cutter, 60° - ϕ27:
57001-1409



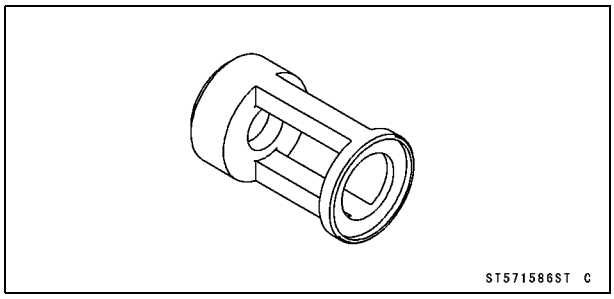
Engine Mount Nut Wrench:
57001-1450



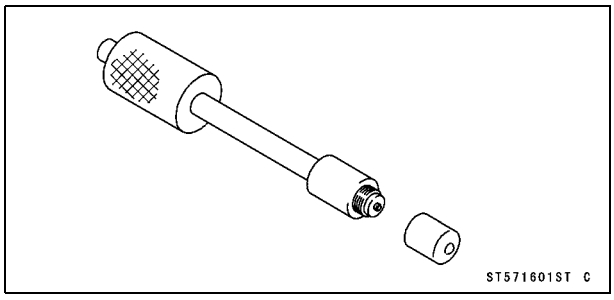
Valve Guide Driver:
57001-1564



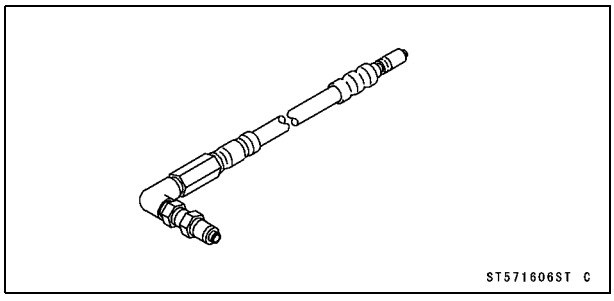
Valve Spring Compressor Adapter, ϕ24:
57001-1586



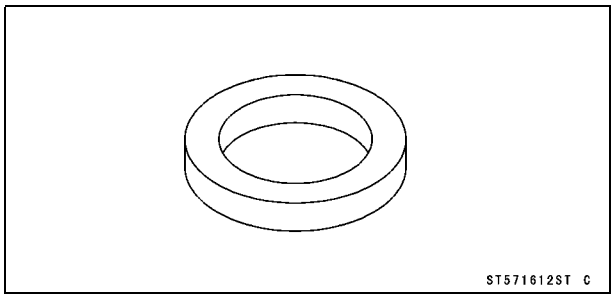
Compression Gauge Adapter, M10 × 1.0:
57001-1601



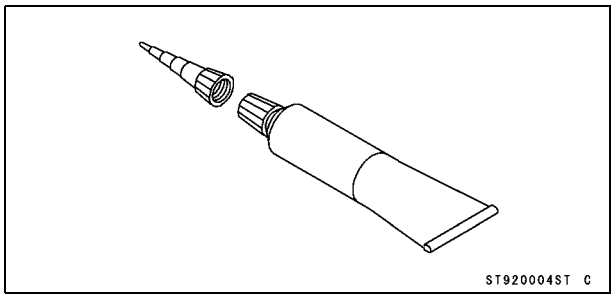
L-Shape Hose:
57001-1606



Washer:
57001-1612

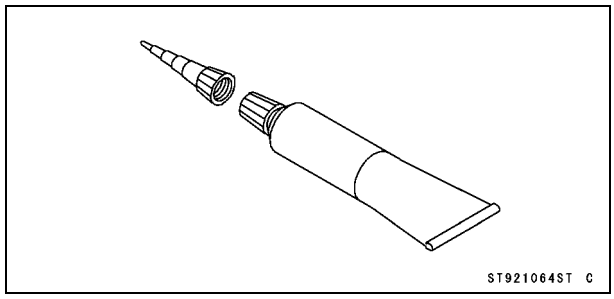


Liquid Gasket, TB1211F:
92104-0004



Special Tools and Sealants

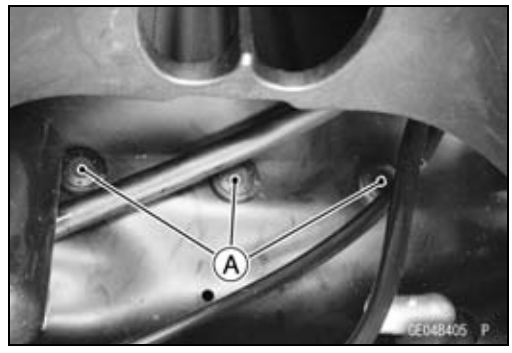
Liquid Gasket, TB1216B:
92104-1064



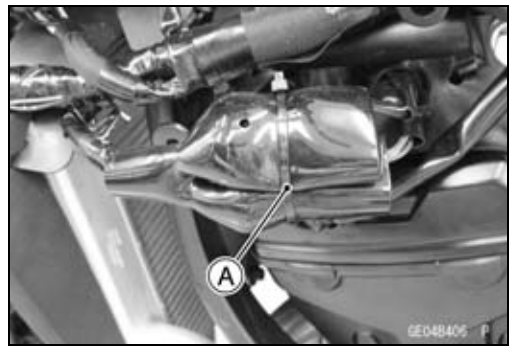
Clean Air System

Air Suction Valve Removal

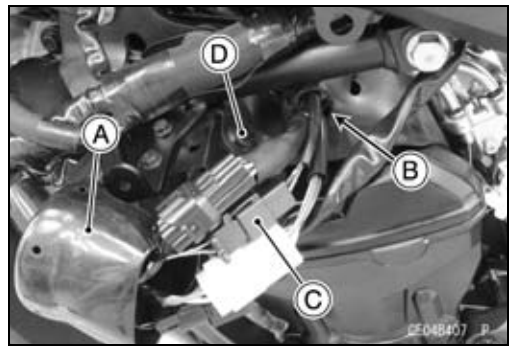
- Remove:
  Air Switching Valve (see Air Switching Valve Removal)
  Quick Rivets [A]



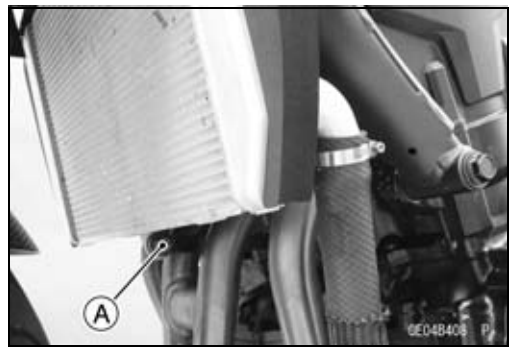
- Cut the band [A].



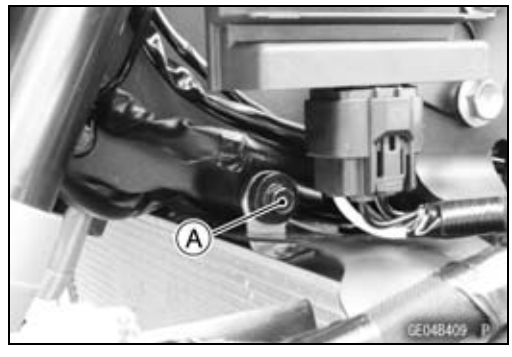
- Slide the dust cover [A].
- Open the clamp [B].
- Disconnect the radiator fan motor lead connector [C].
- Remove the quick rivet [D].



- Remove the radiator lower bolt [A].

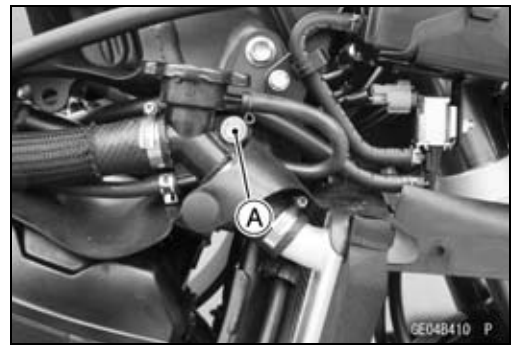


- Remove the radiator upper bolt [A].

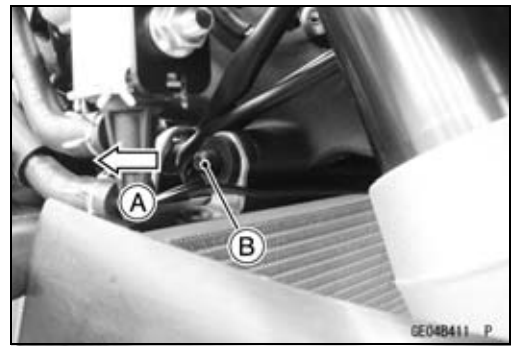


Clean Air System

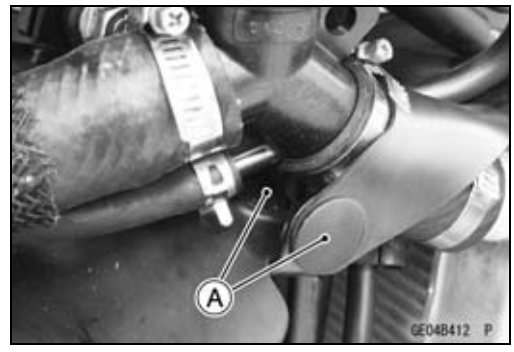
- Remove the radiator cap mounting bolt [A] and collar.



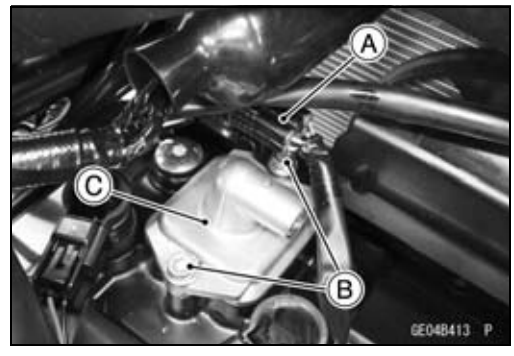
- Move the radiator leftward [A] to clear the frame projection [B].



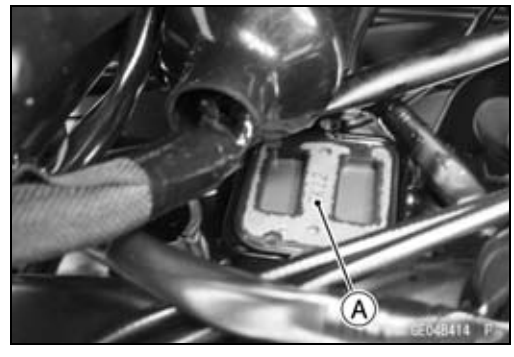
- Remove the quick rivets [A].
- Turn up the heat insulation rubber plate.
- Install the radiator temporarily to prevent damage the radiator core.



- Remove the connector [A] from the bracket.
- Remove:
  Air Suction Valve Cover Bolts [B] (Both Sides)
  Bracket with Heat Insulation Plate
  Air Suction Valve Cover [C] (Both Sides)



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

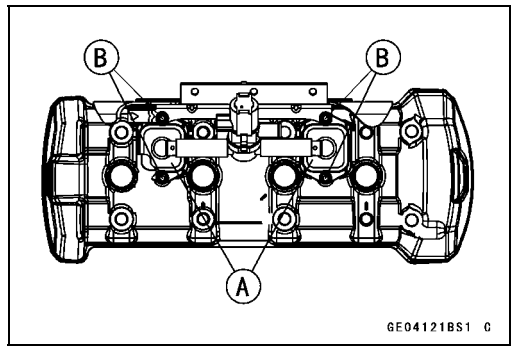


Clean Air System

Air Suction Valve Installation



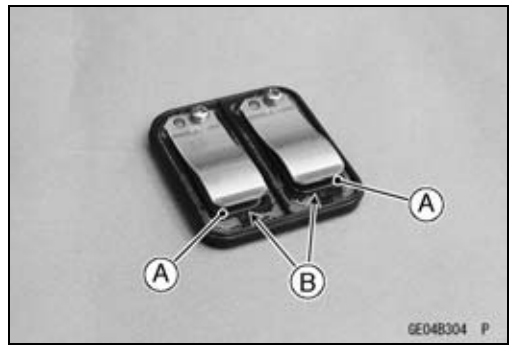
- Install the air suction valve so that opening [A] of the reed faces the front and downward.



- Install:
  Air Suction Valve Covers [A]
  Bracket with Heat Insulation Plate
- Apply a non-permanent locking agent to the threads of the air suction valve cover bolts [B], and tighten them.

  Torque - Air Suction Valve Cover Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)
- Install the removed parts (see appropriate chapters).

Air Suction Valve Inspection

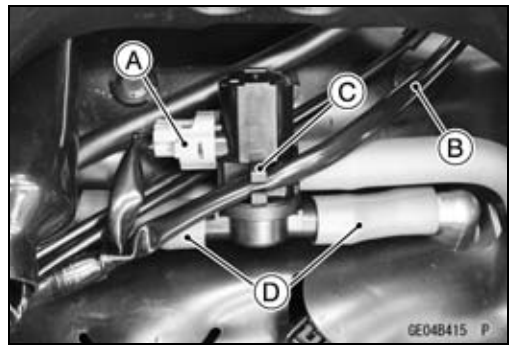


- Remove the air suction valve (see Air Suction Valve Removal).
- Visually inspect the reeds [A] for cracks, folds, warps, heat damage or other damage.
- ★If there is any doubt as to the condition of the reeds, replace the air suction valve as an assembly.
- Check the reed contact areas [B] of the valve 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

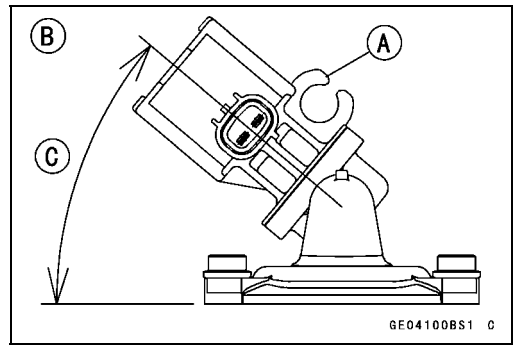
NOTICE
Never drop the air switching valve especially on a hard surface. Such a shock to the air switching valve can damaged it.



- Remove the air cleaner housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter).
- Disconnect the connector [A].
- Clear the right turn signal light lead [B] from the clamp [C] on the air switching valve.
- Disconnect the hoses [D] from the air suction valve covers, and remove the air switching valve.

Clean Air System

Air Switching Valve Installation



- Install the air switching valve [A] with hoses as shown.
  Left Side View [B]
  About 40° [C]
- Install the removed parts (see appropriate chapters).

Air Switching Valve Operation Test

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

Air Switching Valve Unit Test

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

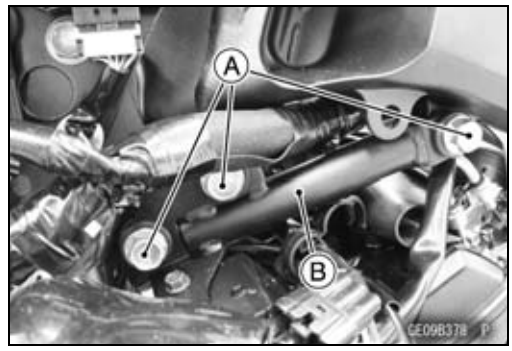
Clean Air System Hose Inspection

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

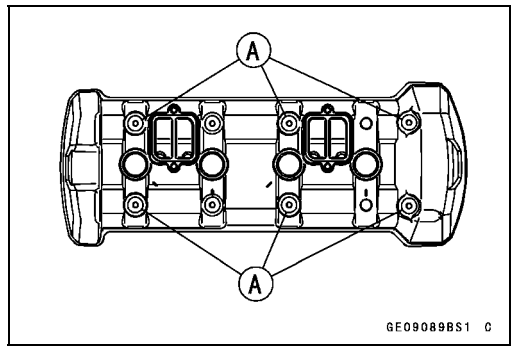
★If they are not, correct them. Replace them if they are damaged.

Cylinder Head Cover

Cylinder Head Cover Removal

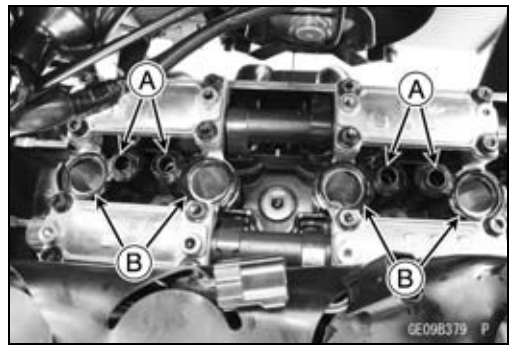


- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter)
  Stick Coils (see Stick Coil Removal in the Electrical System chapter)
  Air Suction Valves (see Air Suction Valve Removal)
  Bracket Bolts [A] (Both Sides)
  Bracket [B] (Both Sides)

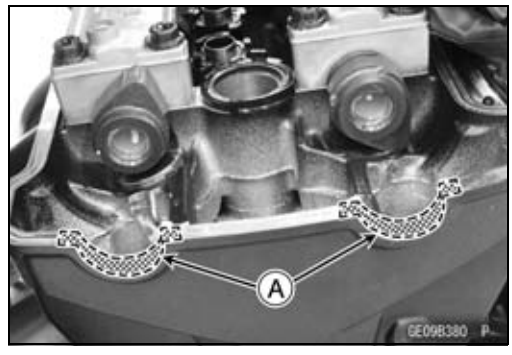


- Remove:
  Cylinder Head Cover Bolts [A] with Washers
  Cylinder Head Cover
  Gasket

Cylinder Head Cover Installation



- Replace the plug hole gaskets with new ones.
- Install:
  Dowel Pins [A]
  Plug Hole Gaskets [B]

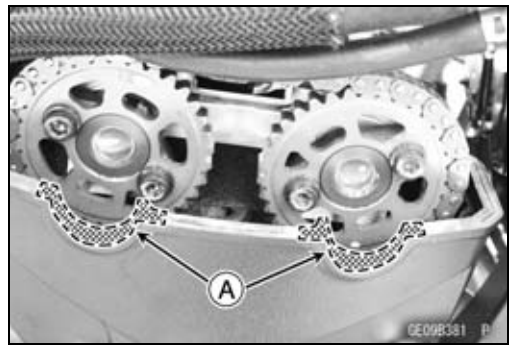


- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket [A] to the cylinder head as shown.

  Sealant - Liquid Gasket, TB1216B: 92104-1064

NOTE

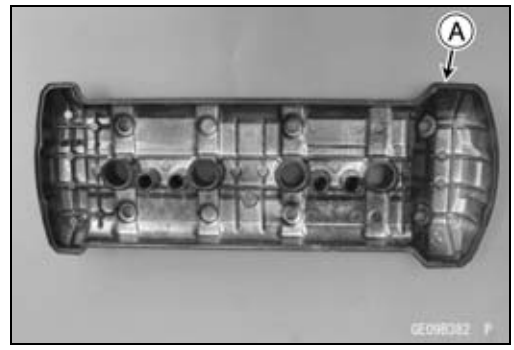
○*Make the application finish within 20 minutes with the liquid gasket (TB1216B) to the mating surface of the cylinder head cover is applied.*



Cylinder Head Cover

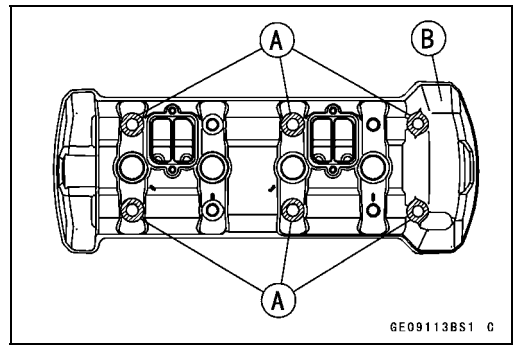
- Replace the head cover gasket with a new one.
- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket around the groove [A] on the sealing surface to retain the gasket in the cylinder head cover.

  Sealant - Liquid Gasket, TB1211F: 92104-0004
- Install the gasket to the cylinder head cover.

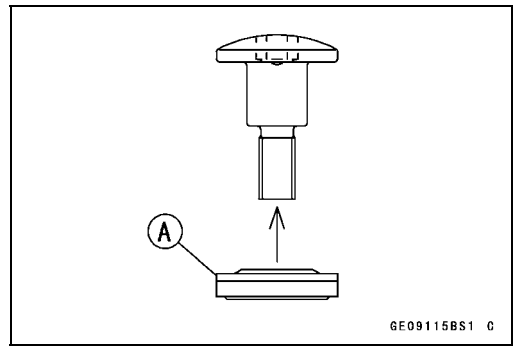


- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket [A] to the cylinder head cover [B] as shown.

  Sealant - Liquid Gasket, TB1211F: 92104-0004

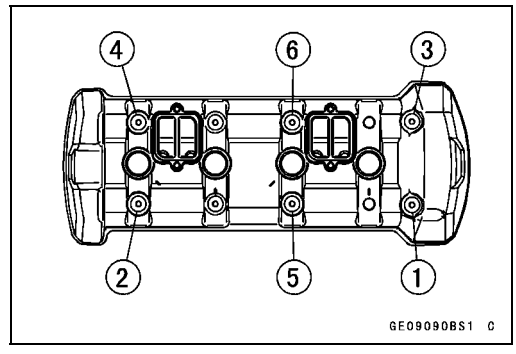


- Replace the washers with new ones.
- Install the washers with the metal side [A] faces upward.



- Tighten the cylinder head cover bolts following the specified tightening sequence [1 ~ 6].

  Torque - Cylinder Head Cover Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)



- Install:
  Bracket
- Tighten the bracket bolts.
- Install the removed parts (see appropriate chapters).

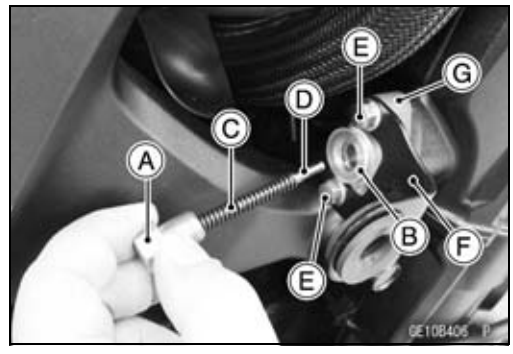
Camshaft Chain Tensioner

Camshaft Chain Tensioner Removal

NOTICE

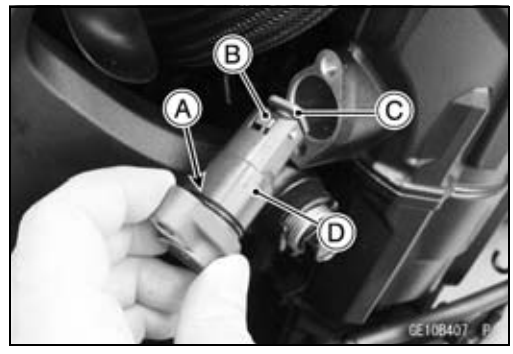
This is a non-return type camshaft chain tensioner. The push rod does not return to its original position once it moves out to take up camshaft chain slack. Observe all the rules listed below.
When removing the tensioner, do not take out the mounting bolts only halfway. Retightening the mounting bolts from this position could damage the tensioner and the camshaft chain. Once the bolts are loosened, the tensioner must be removed and reset as described in "Camshaft Chain Tensioner Installation."
Do not turn over the crankshaft while the tensioner is removed. This could upset the camshaft chain timing, and damage the valves.

- Remove:
  Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Cap Bolt [A]
  Washer [B]
  Spring [C]
  Rod [D]
  Camshaft Chain Tensioner Mounting Bolts [E]
  Bracket [F]
  Camshaft Chain Tensioner Body [G]



Camshaft Chain Tensioner Installation

- Replace the O-ring [A] with a new one.
- Apply grease to the new O-ring.
- Release the stopper [B] and push the push rod [C] into the interior of the tensioner body [D].
- Install the tensioner body so that the stopper faces upward.



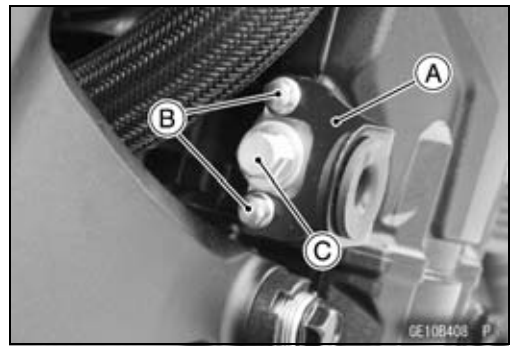
- Install the bracket [A].
- Tighten:

Torque - Camshaft Chain Tensioner Mounting Bolts [B]: 11 N·m (1.1 kgf·m, 97 in·lb)

- Install the rod, spring and washer.
- Tighten:

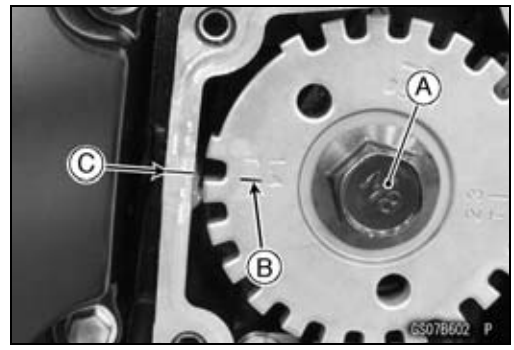
Torque - Camshaft Chain Tensioner Cap Bolt [C]: 20 N·m (2.0 kgf·m, 15 ft·lb)

- Turn the crankshaft 2 turns clockwise to allow the tensioner to expand and recheck the camshaft chain timing.
- Install:
  Right Lower Fairing (see Lower Fairing Installation in the Frame chapter)

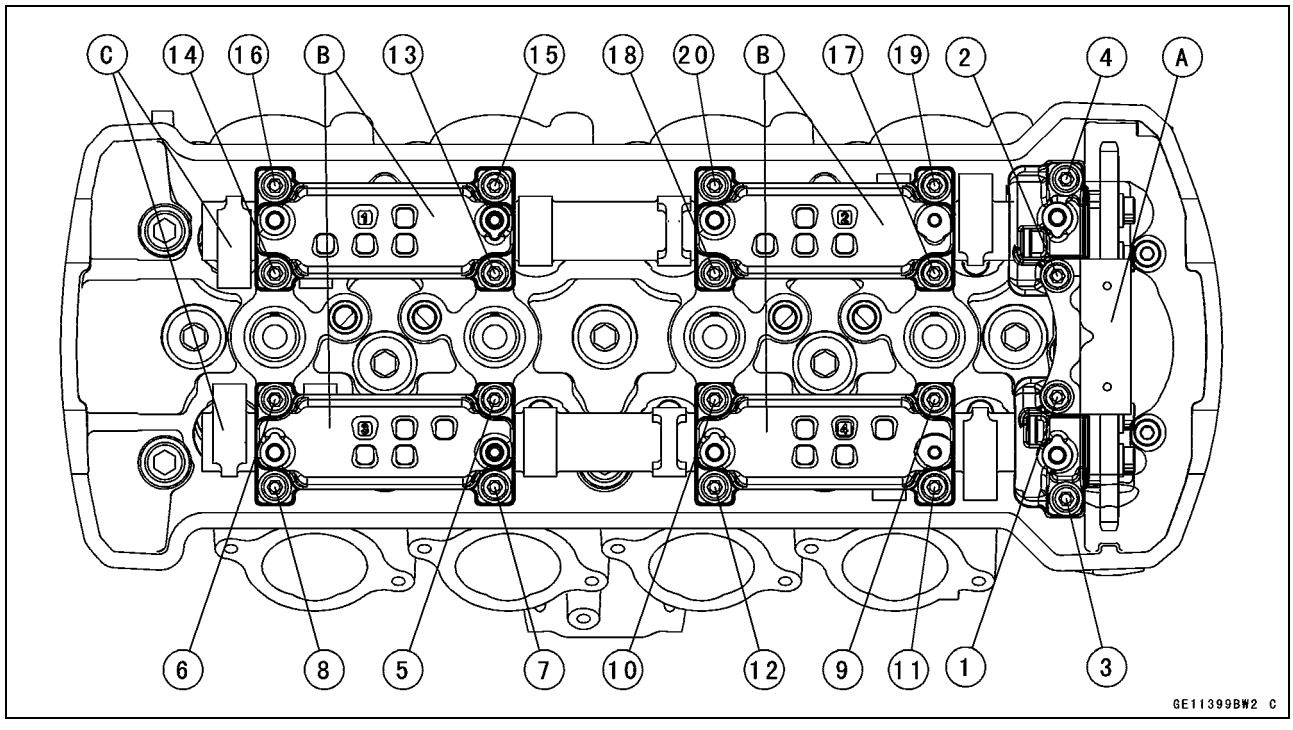


Camshaft, Camshaft Chain

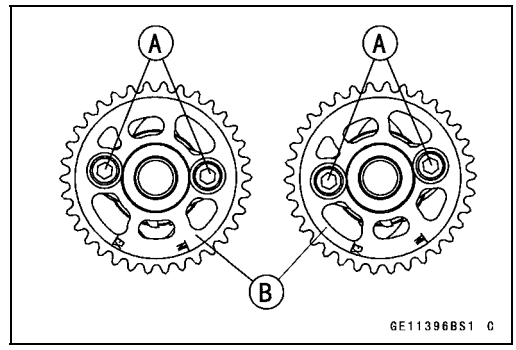
Camshaft Removal



- 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 is aligned with the mating surface [C] of the crankcase.
- Remove the camshaft chain tensioner (see Camshaft Chain Tensioner Removal).
- Loosen the upper camshaft chain guide bolts and camshaft cap bolts gradually and evenly as shown sequence [1 ~ 20], and remove them.
- Remove:
  Upper Camshaft Chain Guide [A]
  Camshaft Caps [B]
  Camshafts [C]
- Stuff a clean cloth into the chain tunnel to keep any parts from dropping into the crankcase.



- Remove:
  Camshaft Sprocket Mounting Bolts [A]
  Camshaft Sprockets [B]

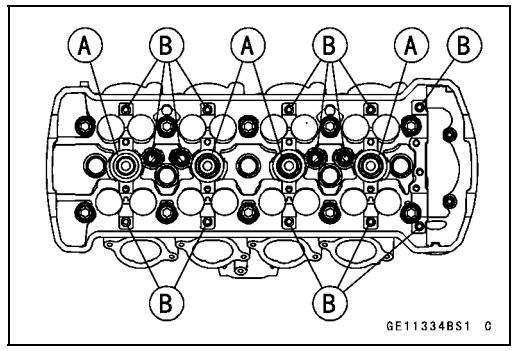


NOTICE
The crankshaft may be turned while the camshafts are removed. Always pull the chain taut while turning the crankshaft. This avoids kinking the chain on the lower (crankshaft) sprocket. A kinked chain could damage both the chain and the sprocket.

Camshaft, Camshaft Chain

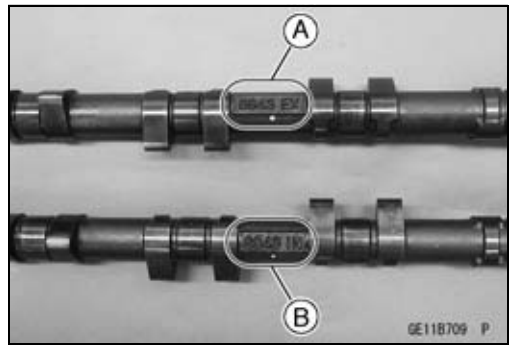
Camshaft Installation

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



NOTE

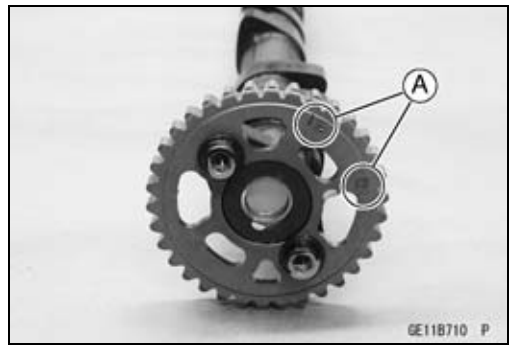
○*The exhaust camshaft has a 8943 EX mark [A] and the intake camshaft has a 8943 IN mark [B]. Be careful not to mix up these shafts.*



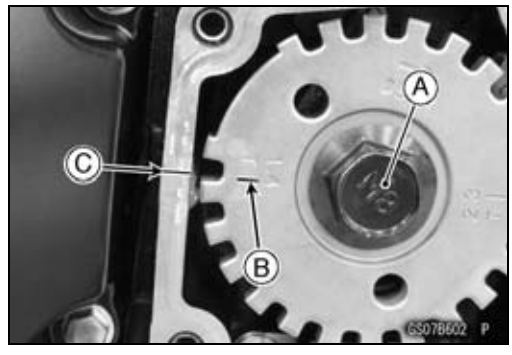
● Install the camshaft sprockets so that position the timing marks [A] outside.
○The intake camshaft sprocket and exhaust camshaft sprocket are identical.
● Apply a non-permanent locking agent to the threads of the camshaft sprocket bolts and tighten them.

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

● Apply molybdenum disulfide oil solution to all cam parts and journals.



● 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 is aligned with the mating surface [C] of the crankcase.



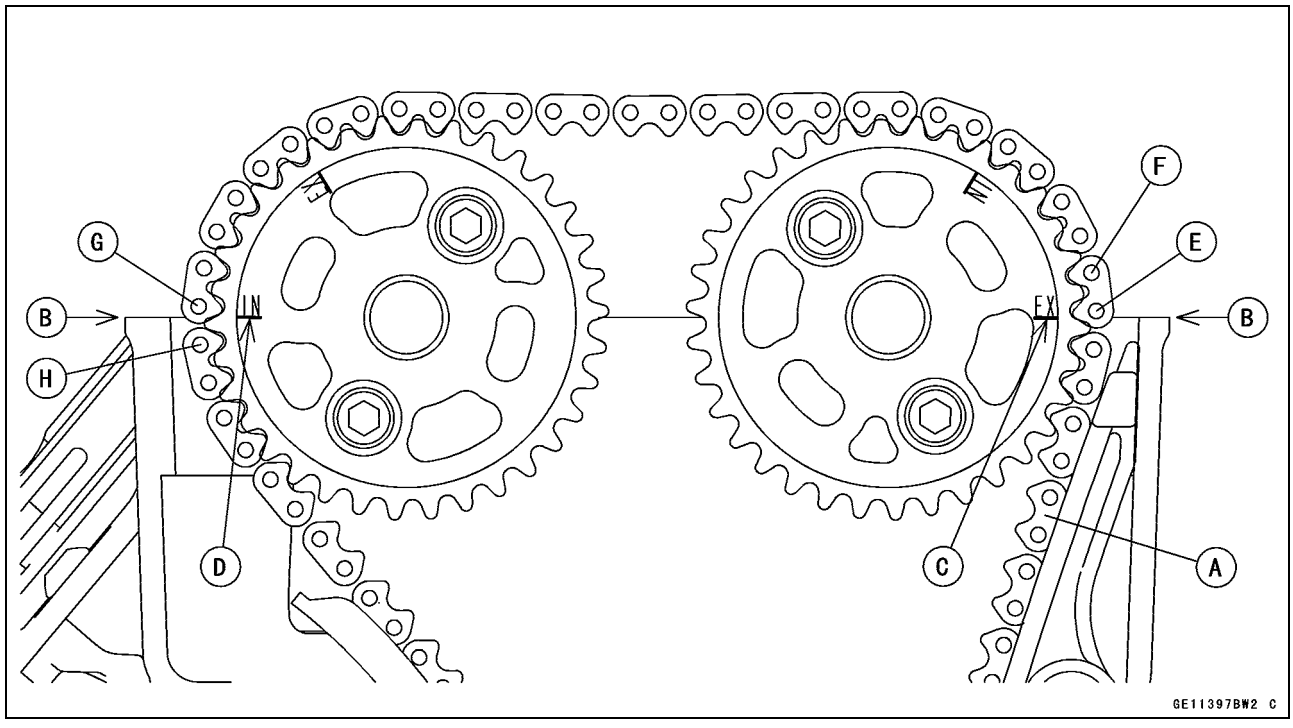
NOTICE

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.

Camshaft, Camshaft Chain

- Pull the tension side (exhaust side) [A] of the chain taut to install the chain.
- Engage the camshaft chain with the sprockets so that timing marks on the sprockets are positioned as shown.

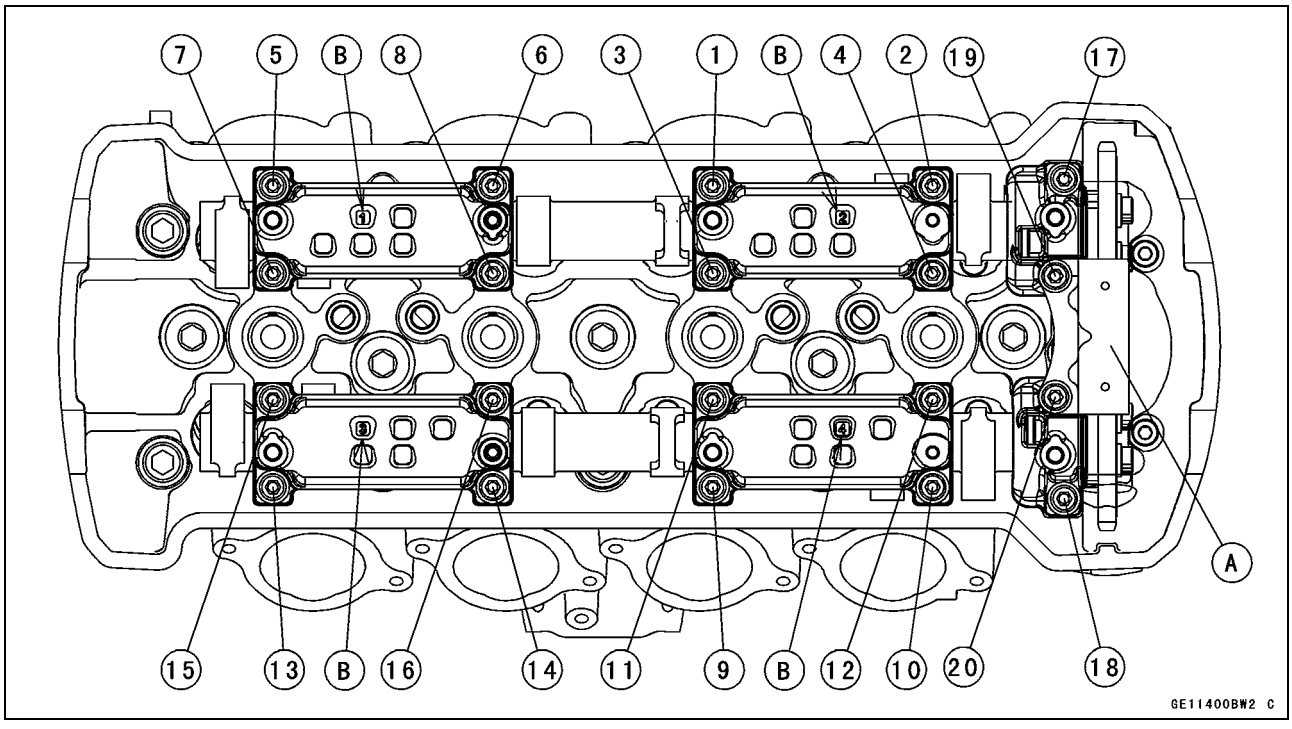
○The timing marks must be aligned with the cylinder head upper surface [B].
EX mark [C]
IN mark [D]
#1 pin [E]
#2 pin [F]
#30 pin [G]
#31 pin [H]



Camshaft, Camshaft Chain

- Before installing the camshaft caps and upper chain guide, install the camshaft chain tensioner body temporarily (see Camshaft Chain Tensioner Installation).
- Install the camshaft caps and upper camshaft chain guide [A] as shown.
  Identification No. 1 ~ 4 (Camshaft Cap) [B]
- First tighten the all camshaft cap bolts and upper camshaft chain guide 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 Chain

Camshaft, Camshaft Cap Wear Inspection



- Remove:
  Camshaft Caps (see Camshaft Removal)
- Cut the strips of plastigage (press gauge) to journal width. Place a strip on each journal parallel to the camshaft installed in the correct position.
- Tighten the camshaft cap bolts and upper camshaft chain guide bolts to the specified torque (see Camshaft Installation).

NOTE

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

- Remove the camshaft cap again, measure each clearance between the camshaft journal and the camshaft cap using plastigage [A].

Camshaft Journal, Camshaft Cap Clearance

Standard:	**0.038 ~ 0.081 mm (0.0015 ~ 0.0032 in.)**
Service Limit:	**0.17 mm (0.0067 in.)**

★If any clearance exceeds the service limit, measure the diameter of each camshaft journal with a micrometer.

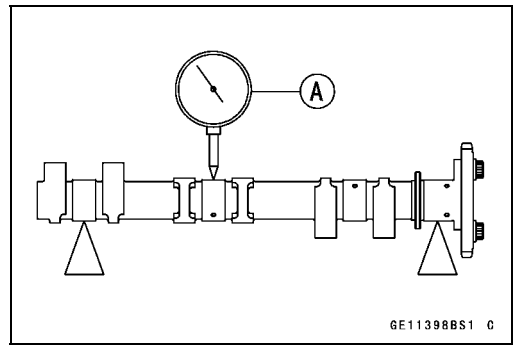
Camshaft Journal Diameter

Standard:	**23.940 ~ 23.962 mm (0.94252 ~ 0.94338 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 [A] at the specified place as shown.

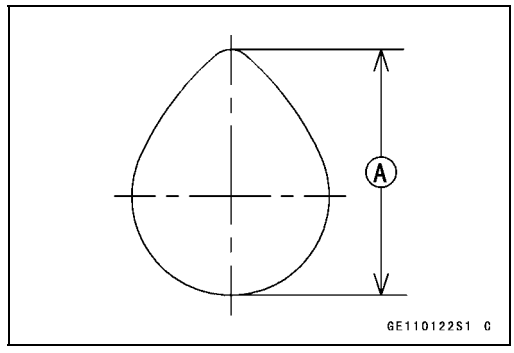
★If the runout exceeds the service limit, replace the camshaft.

Camshaft Runout

Standard:	**TIR 0.02 mm (0.0008 in.) or less**
Service Limit:	**TIR 0.1 mm (0.004 in.)**

Camshaft, Camshaft Chain

Cam Wear Inspection



- Remove the camshafts (see Camshaft Removal).
- Measure the height [A] of each cam with a micrometer.

★If the cams are worn down past the service limit, replace the camshaft.

Cam Height

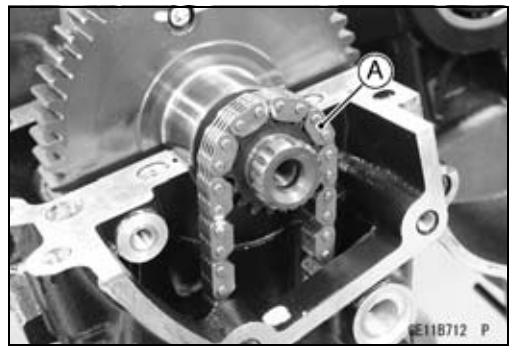
Standard:

Exhaust	**33.743 ~ 33.857 mm (1.3285 ~ 1.3330 in.)**
Intake	**34.443 ~ 34.557 mm (1.3560 ~ 1.3605 in.)**

Service Limit:

Exhaust	**33.64 mm (1.324 in.)**
Intake	**34.34 mm (1.352 in.)**

Camshaft Chain Removal



- Split the crankcase (see Crankcase Splitting in the Crankshaft/Transmission chapter).
- Remove the camshaft chain [A] from the crankshaft sprocket.

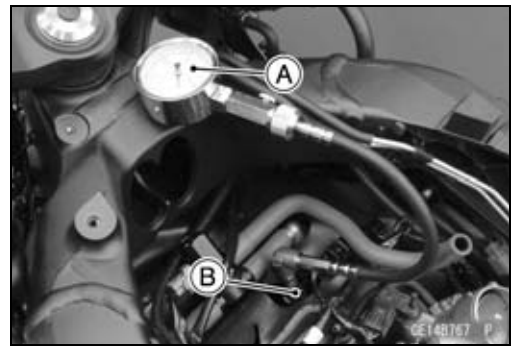
Cylinder Head

Cylinder Compression Measurement

NOTE

○*Use the battery which is fully charged.*

- Warm up the engine thoroughly.
- Stop the engine.
- Remove:
  Spark Plugs (see Spark Plug Replacement in the Periodic Maintenance chapter)



- Attach the compression gauge [A] and adapter [B] firmly into the spark plug hole.
- Using the starter motor, turn the engine over with the throttle fully open until the compression gauge stops rising; the compression is the highest reading obtainable.

Special Tools - Compression Gauge, 20 kgf/cm²: 57001-221
Compression Gauge Adapter, M10 × 1.0: 57001-1601
L-Shape Hose: 57001-1606

Cylinder Compression
Usable Range: 966 ~ 1 478 kPa (9.85 ~ 15.1 kgf/cm², 140 ~ 214 psi) @280 r/min (rpm)

- Repeat the measurement for the other cylinders.
- Install the spark plugs (see Spark Plug Replacement in the Periodic Maintenance chapter).

○The following table should be consulted if the obtainable compression reading is not within the usable range.

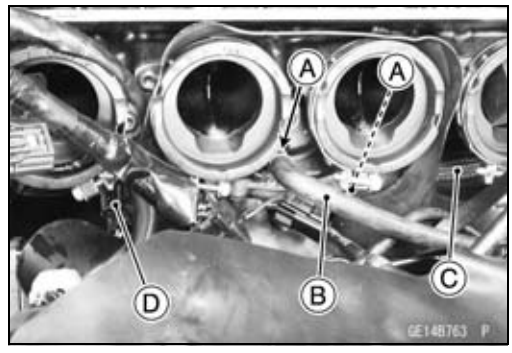
Problem	Diagnosis	Remedy (Action)
Cylinder compression is higher than usable range.	Carbon accumulation on piston and in combustion chamber possibly due to damaged valve stem oil seal and/or damaged piston oil rings (This may be indicated by white exhaust smoke).	Remove the carbon deposits and replace damaged parts if necessary.
	Incorrect cylinder head gasket thickness	Replace the gasket with a standard part.
Cylinder compression is lower than usable range.	Gas leakage around cylinder head	Replace damaged gasket and check cylinder head warp.
	Bad condition of valve seating	Repair if necessary.
	Incorrect valve clearance	Adjust the valve clearance.
	Incorrect piston/cylinder clearance	Replace the piston and/or cylinder.
	Piston seizure	Inspect the cylinder and replace/repair the cylinder and/or piston as necessary.
	Bad condition of piston ring and/or piston ring grooves	Replace the piston and/or the piston rings.

Cylinder Head

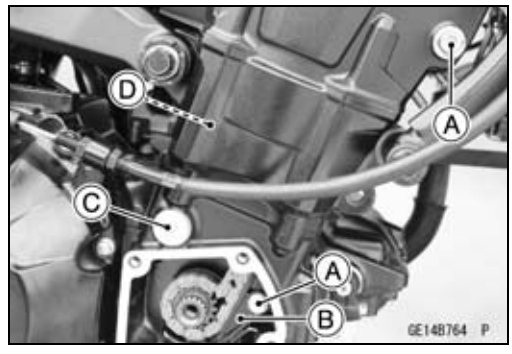
Cylinder Head Removal

- Drain:
  Coolant (see Coolant Change in the Periodic Maintenance chapter)
- Remove:
  Camshafts (see Camshaft Removal)
  Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
  Exhaust Pipe (see Exhaust Pipe Removal)

- Slide the clamps [A].
- Disconnect:
  Air Bleeder Hose [B]
  Water Hose [C]
  Water Temperature Sensor Connector [D]



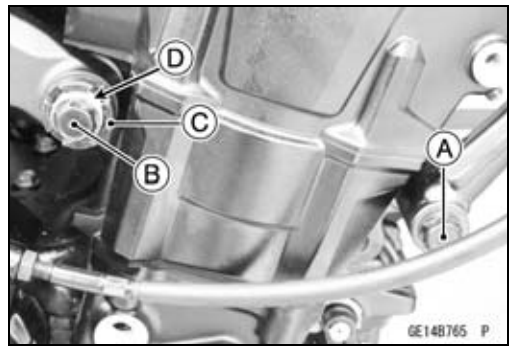
- Remove:
  Timing Rotor (see Timing Rotor Removal in the Electrical System chapter)
  Front Camshaft Chain Guide Bolts [A]
  Collar
  Front Camshaft Chain Guide [B]
  Rear Camshaft Chain Guide Bolt [C]
  Rear Camshaft Chain Guide [D]



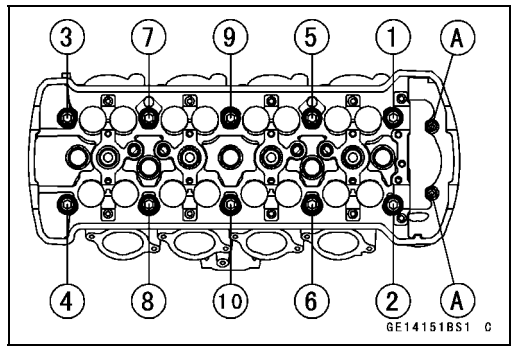
- Loosen:
  Lower Engine Bracket Bolts (Both Sides) [A]
  Upper Engine Mounting Bolts (Left)
- Remove:
  Upper Engine Mounting Bolts (Right) [B]
- Loosen:
  Upper Adjusting Collar Locknut [C]

Special Tool - Engine Mount Nut Wrench: 57001-1450

- Loosen:
  Upper Adjusting Collar [D]



- Remove the M6 cylinder head bolts [A].
- Loosen the M10 cylinder head bolts as shown sequence [1 ~ 10], and remove them with washers.
- Remove the cylinder head.



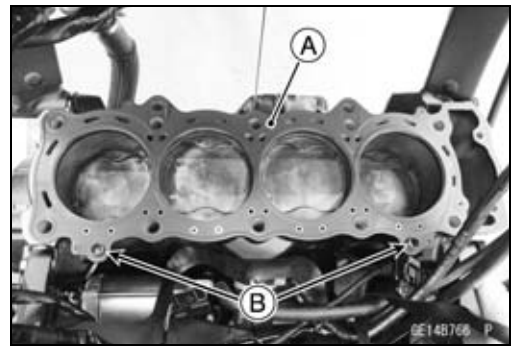
Cylinder Head

Cylinder Head Installation

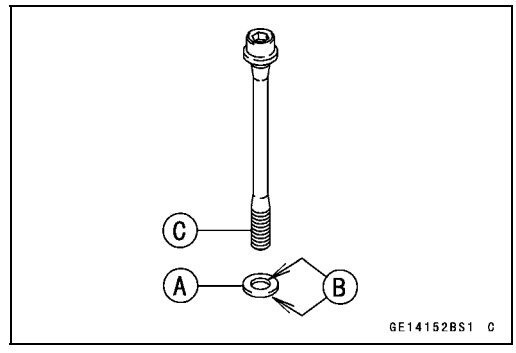
NOTE

○*The camshaft cap is machined with the cylinder head, so if a new cylinder head is installed, use the cap that is supplied with the new head.*

● Replace the cylinder head gasket [A] with a new one.
● Install the dowel pins [B] and cylinder head gasket.



● Replace the cylinder head bolt washers [A] with new ones.
● Apply molybdenum disulfide oil solution to the followings.
Both Side [B] of Cylinder Head Bolt Washers
Threads [C] of Cylinder Head Bolts



● Tighten the M10 cylinder head bolts following the tightening sequence [1 ~ 10].

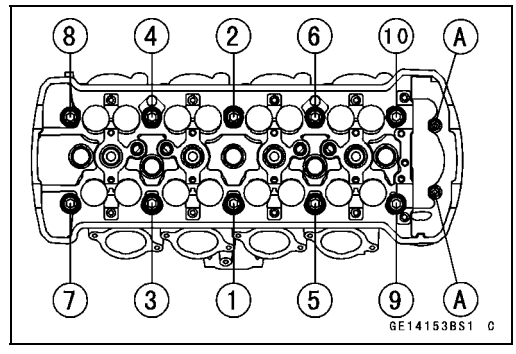
Torque - Cylinder Head Bolts (M10):

First	**30 N·m (3.1 kgf·m, 22 ft·lb)**
Final:	**54 N·m (5.5 kgf·m, 40 ft·lb)**

● Tighten the M6 cylinder head bolts [A].

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

● Tighten the following parts (see Engine Installation in the Engine Removal/Installation chapter).
Upper Adjusting Collar
Upper Adjusting Collar Locknut:
Upper Engine Mounting Bolts
Lower Engine Bracket Bolts

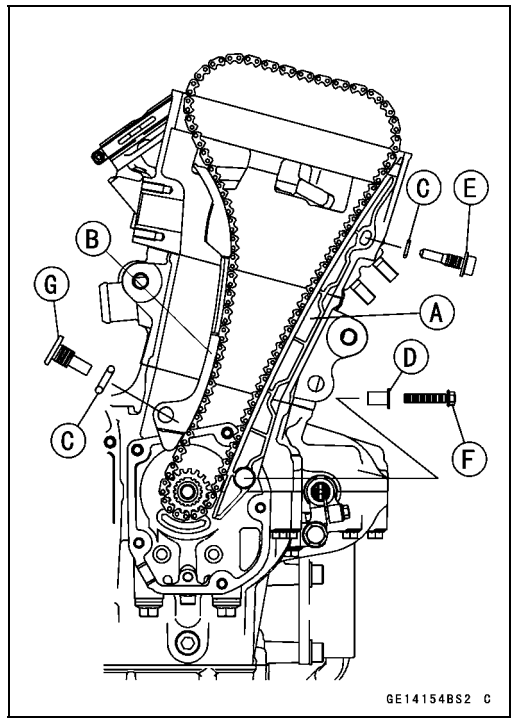


Cylinder Head

● Install:
Front Camshaft Chain Guide [A]
Rear Camshaft Chain Guide [B]
New O-rings [C]
Collar [D]
● Tighten:

Torque - Front Camshaft Chain Guide Bolt (Upper) [E]: 25 N·m (2.5 kgf·m, 18 ft·lb)
Front Camshaft Chain Guide Bolt (Lower) [F]: 12 N·m (1.2 kgf·m, 106 in·lb)
Rear Camshaft Chain Guide Bolt [G]: 25 N·m (2.5 kgf·m, 18 ft·lb)

● Install the removed parts (see appropriate chapters).

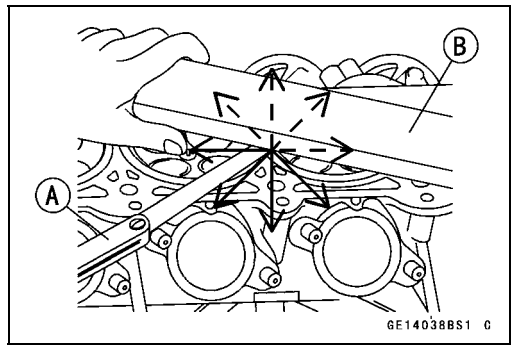


Cylinder Head Warp Inspection

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

Cylinder Head Warp
Standard: – – –
Service Limit: 0.05 mm (0.002 in.)

★If the cylinder head is warped more than the service limit, replace it.
★If the cylinder head is warped less than the service limit, repair the head by rubbing the lower surface on emery paper secured to a surface plate (first No. 200, then No. 400).



Valves

Valve Clearance Inspection

● Refer to the Valve Clearance Inspection in the Periodic Maintenance chapter.

Valve Clearance Adjustment

● Refer to the Valve Clearance Adjustment in the Periodic Maintenance chapter.

Valve Removal

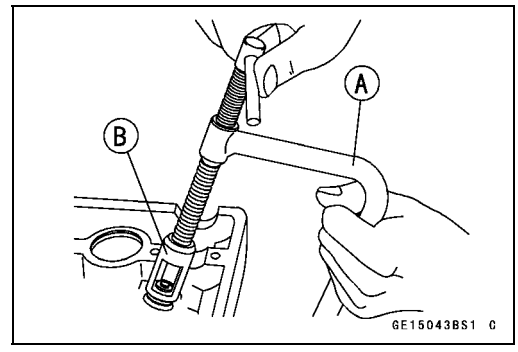
● Remove:
Cylinder Head (see Cylinder Head Removal)
Valve Lifter and Shim

NOTE

○*Mark and record the valve lifter and shim locations so they can be installed in their original positions.*

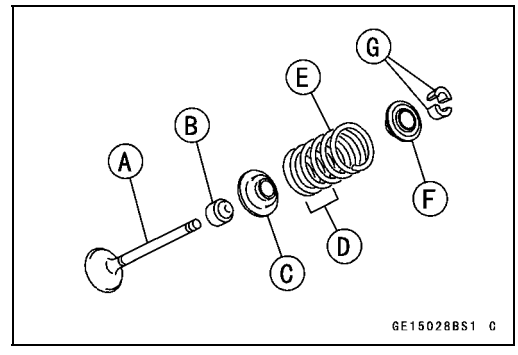
● Using the valve spring compressor assembly, remove the valve.

Special Tools - Valve Spring Compressor Assembly [A]: 57001-241
Valve Spring Compressor Adapter, ϕ24 [B]: 57001-1586



Valve Installation

● Replace the oil seal with a new one.
● Apply a thin coat of molybdenum disulfide grease to the valve stem before valve installation.
● Install the springs so that the closed coil end faces downwards.
Valve Stem [A]
Oil Seal [B]
Spring Seat [C]
Closed Coil End [D]
Valve Spring [E]
Retainer [F]
Split Keepers [G]



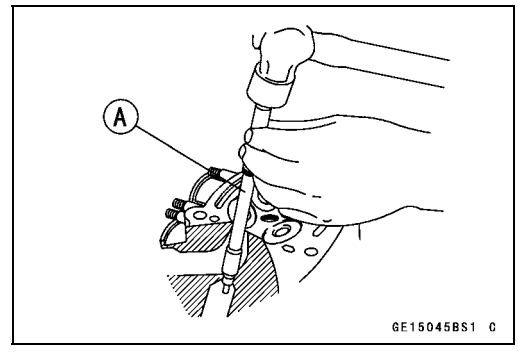
Valve Guide Removal

● Remove:
Valve (see Valve Removal)
Oil Seal
Spring Seat
● Heat the area around the valve guide to 120 ~ 150°C (248 ~ 302°F), and hammer lightly on the valve guide arbor [A] to remove the guide from the top of the head.

NOTICE

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

Special Tool - Valve Guide Arbor, ϕ4.5: 57001-1331



Valves

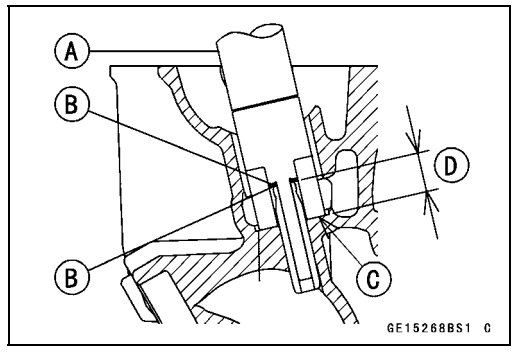
Valve Guide Installation

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

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

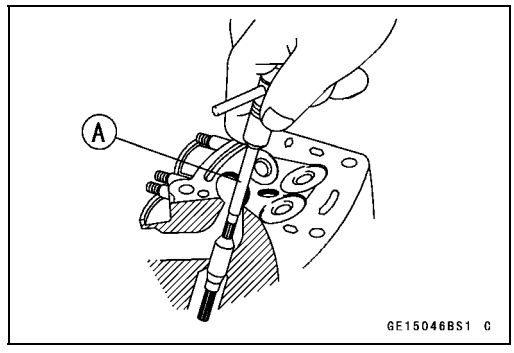
- Using the valve guide driver [A] and two washers [B], press and insert the valve guide in until the valve guide driver surface touches the head surface [C].
  12.8 ~ 13.0 mm (0.504 ~ 0.512 in.) [D]

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



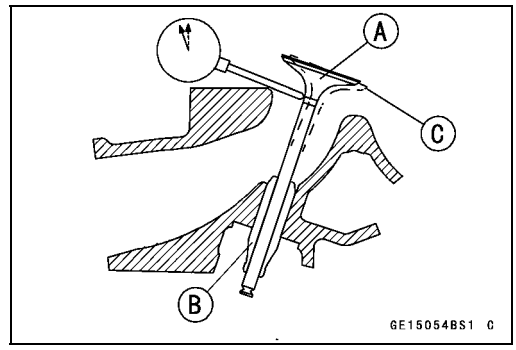
- Ream the valve guide with valve guide reamer [A], even if the old guide is reused.

  Special Tool - Valve Guide Reamer, ϕ4.5: 57001-1333



Valves

Valve-to-Guide Clearance Measurement (Wobble Method)



If a small bore gauge is not available, inspect the valve guide wear by measuring the valve to valve guide clearance with the wobble method as indicated below.

- Insert a new valve [A] into the guide [B] and set a dial gauge against the stem perpendicular to it as close as possible to the cylinder head mating surface.
- Move the stem back and forth [C] to measure valve/valve guide clearance.
- Repeat the measurement in a direction at a right angle to the first.

★If the reading exceeds the service limit, replace the guide.

NOTE

○*The reading is not actual valve/valve guide clearance because the measuring point is above the guide.*

Valve/Valve Guide Clearance (Wobble Method)

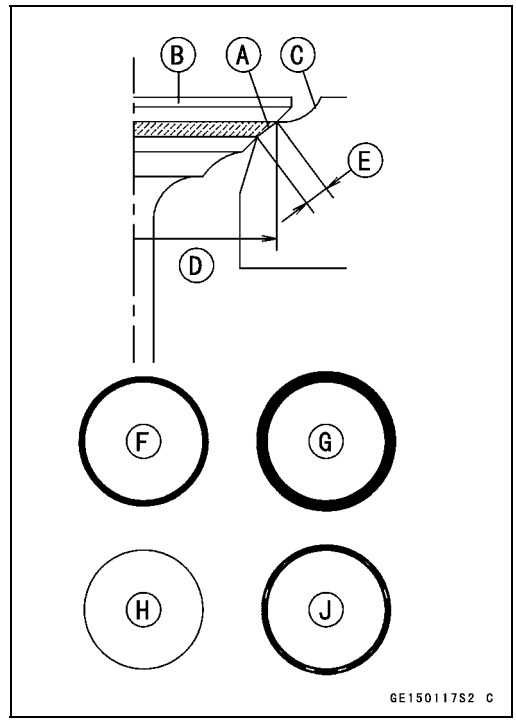
Standard:

Exhaust	**0.08 ~ 0.16 mm (0.0031 ~ 0.0063 in.)**
Intake	**0.03 ~ 0.10 mm (0.0012 ~ 0.0039 in.)**

Service Limit:

Exhaust	**0.35 mm (0.014 in.)**
Intake	**0.30 mm (0.012 in.)**

Valve Seat Inspection



- Remove the valve (see Valve Removal).
- Check the valve seating surface [A] between the valve [B] and valve seat [C].

○Measure the outside diameter [D] of the seating pattern on the valve seat.

★If the outside diameter is too large or too small, repair the seat (see Seat Repair).

Valve Seating Surface Outside Diameter

Standard:

Exhaust	**24.7 ~ 24.9 mm (0.972 ~ 0.980 in.)**
Intake	**28.9 ~ 29.1 mm (1.138 ~ 1.146 in.)**

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

Good [F]

★If the width is too wide [G], too narrow [H] or uneven [J], repair the seat (see Valve Seat Repair).

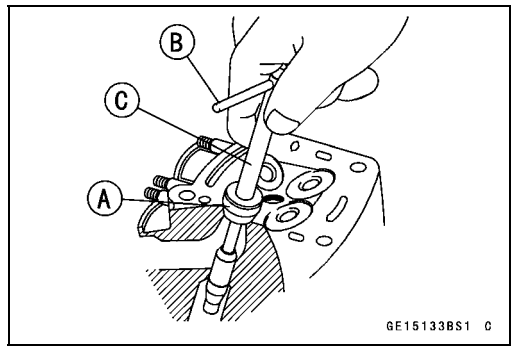
Valve Seating Surface Width

Standard:

Exhaust	**0.8 ~ 1.2 mm (0.031 ~ 0.047 in.)**
Intake	**0.5 ~ 1.0 mm (0.020 ~ 0.039 in.)**

Valves

Valve Seat Repair



● Repair the valve seat with the valve seat cutters [A].

Special Tools - Valve Seat Cutter Holder Bar [B]: 57001 -1128
Valve Seat Cutter Holder, ϕ4.5 [C]: 57001 -1330

[For Exhaust Valve Seat]
Valve Seat Cutter, 45° - ϕ27.5: 57001-1114
Valve Seat Cutter, 32° - ϕ28: 57001-1119
Valve Seat Cutter, 60° - ϕ27: 57001-1409

[For Intake Valve Seat]
Valve Seat Cutter, 45° - ϕ32: 57001-1115
Valve Seat Cutter, 32° - ϕ33: 57001-1199
Valve Seat Cutter, 60° - ϕ33: 57001-1334

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

Seat Cutter Operation Care

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

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

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

NOTE

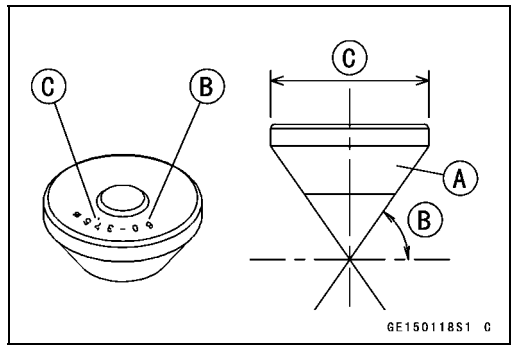
○*Prior to grinding, apply engine oil to the cutter and during the operation, wash off any ground particles sticking to the cutter with washing oil.*

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

Marks Stamped on the Cutter

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

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



Valves

Operating Procedures

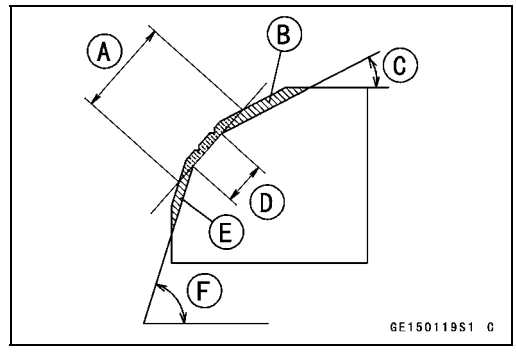
- Clean the seat area carefully.
- Coat the seat with machinist's dye.
- Fit a 45° cutter into the holder and slide it into the valve guide.
- Press down lightly on the handle and turn it right or left. Grind the seating surface only until it is smooth.

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.

- Measure the outside diameter of the seating surface with a vernier caliper.

★If the outside diameter of the seating surface is too small, repeat the 45° grind until the diameter is within the specified range.

Widened Width [A] of engagement by machining with 45° cutter
Ground Volume [B] by 32° cutter
32° [C]
Correct Width [D]
Ground Volume [E] by 60° cutter
60° [F]



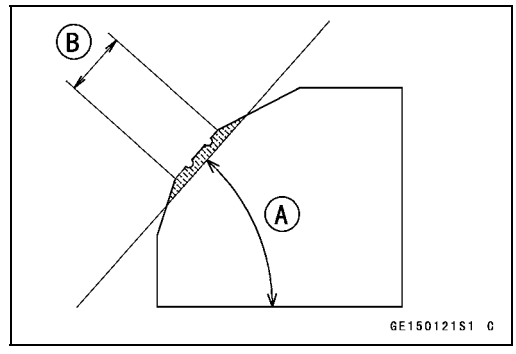
- Measure the outside diameter of the seating surface with a vernier caliper.

★If the outside diameter of the seating surface is too small, repeat the 45° [A] grind until the diameter is within the specified range.

Original Seating Surface [B]

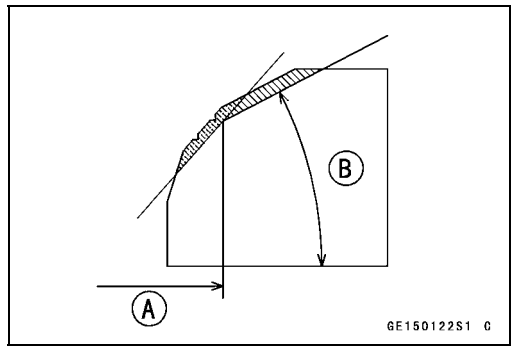
NOTE

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



Valves

★If the outside diameter [A] of the seating surface is too large, make the 32° [B] grind described below.
★If the outside diameter of the seating surface is within the specified range, measure the seat width as described below.
● Grind the seat at a 32° angle until the seat outside diameter is within the specified range.
○To make the 32° grind, fit a 32° cutter into the holder, and slide it into the valve guide.
○Turn the holder one turn at a time while pressing down very lightly. Check the seat after each turn.

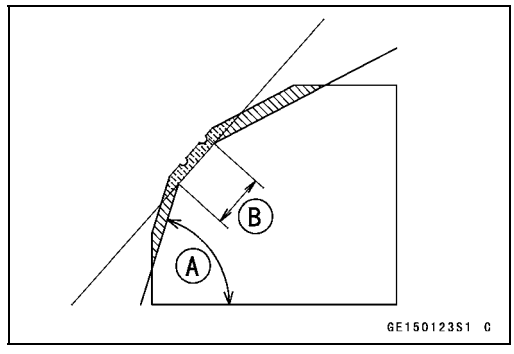


NOTICE

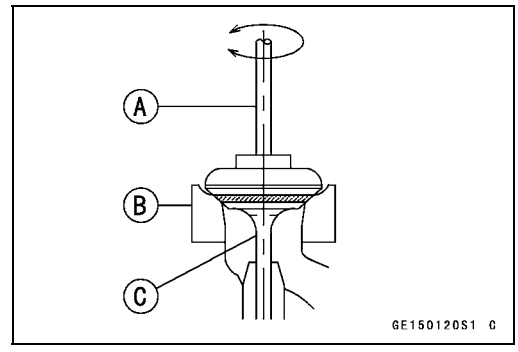
The 32° cutter removes material very quickly. Check the seat outside diameter frequently to prevent overgrinding.

○After making the 32° grind, return to the seat outside diameter measurement step above.
● To measure the seat width, use a vernier caliper to measure the width of the 45° angle portion of the seat at several places around the seat.
★If the seat width is too narrow, repeat the 45° grind until the seat is slightly too wide, and then return to the seat outside diameter measurement step above.

★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]



Valves



- Lap the valve to the valve seat, once the seat width and outside diameter are within the ranges specified above.

○Put a little coarse grinding compound on the face of the valve in a number of places around the valve head.

○Spin the valve against the seat until the grinding compound produces a smooth, matched surface on both the seat and the valve.

○Repeat the process with a fine grinding compound.

Lapper [A]
Valve Seat [B]
Valve [C]

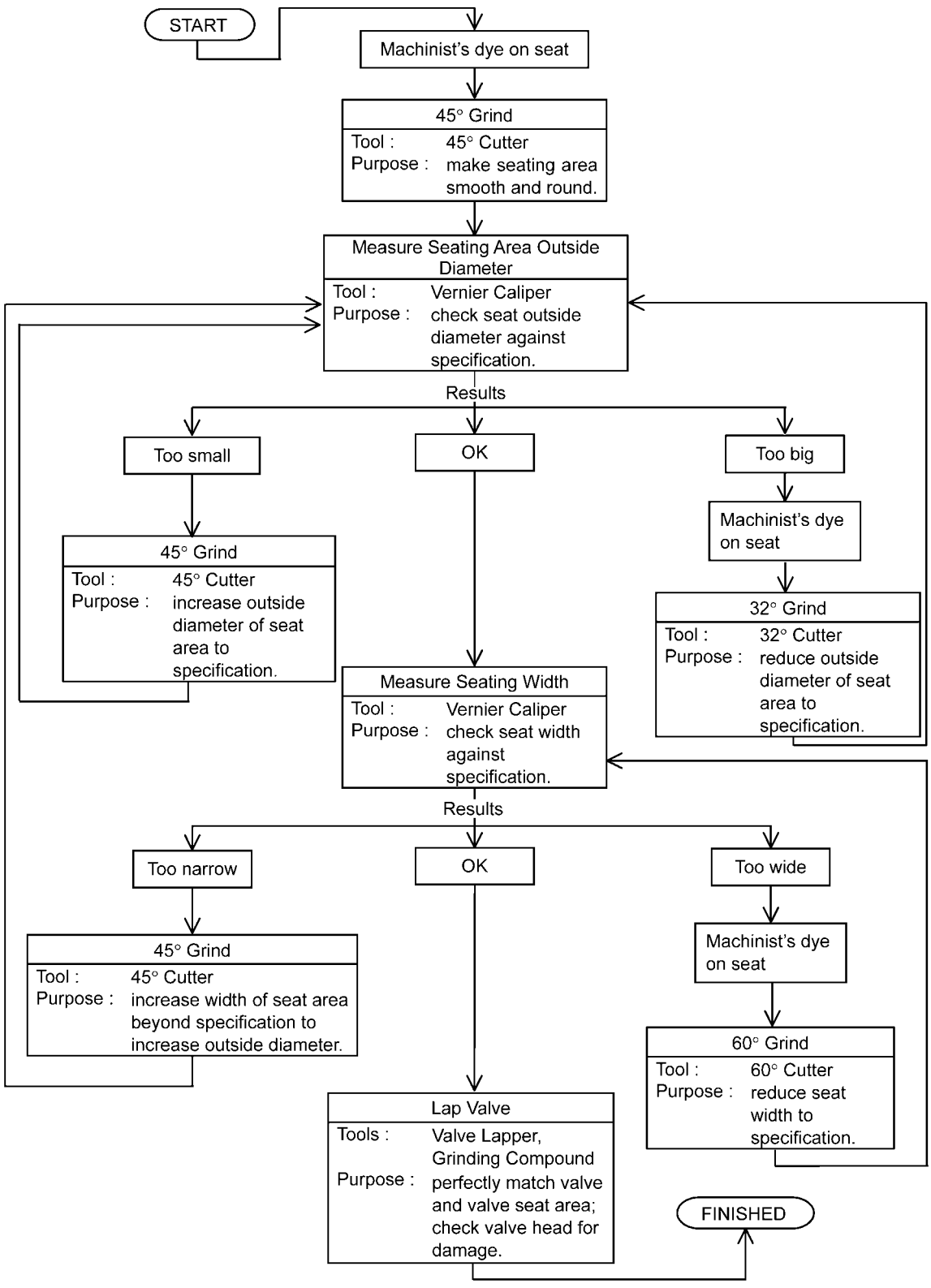
- The seating area should be marked about in the middle of the valve face.

★If the seat area is not in the right place on the valve, check to be sure the valve is the correct part. If it is, it may have been refaced too much; replace it.

- Be sure to remove all grinding compound before assembly.
- When the engine is assembled, be sure to adjust the valve clearance (see Valve Clearance Inspection in the Periodic Maintenance chapter).

Valves

Valve Seat Repair

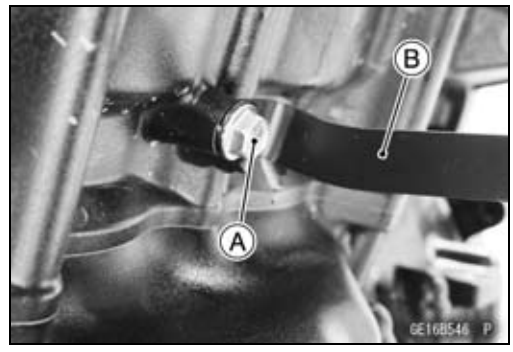


GE15143B F

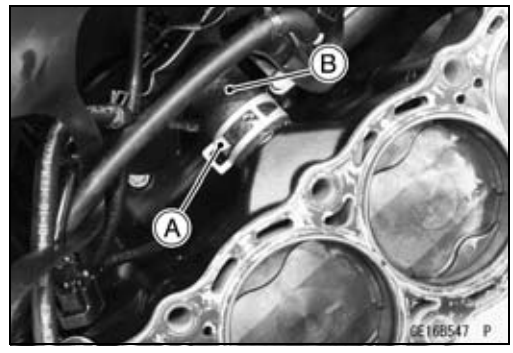
Cylinder, Pistons

Cylinder Removal

● Remove:
Cylinder Head (see Cylinder Head Removal)
Engine Brackets (see Engine Removal in the Engine Removal/Installation chapter)
Radiator Bracket Bolt [A]
Radiator Bracket [B]



● Slide the water hose clamp [A].
● Disconnect the water hose [B].



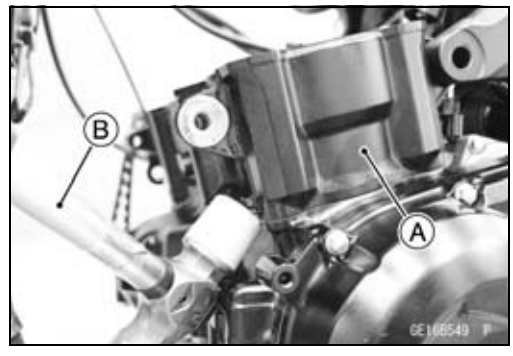
● Remove:
Upper Engine Mounting Bolts (Left) [A]



● Remove:
Cylinder [A]

NOTE

○*If it is hard to remove it, tap lightly using a plastic-faced mallet [B].*

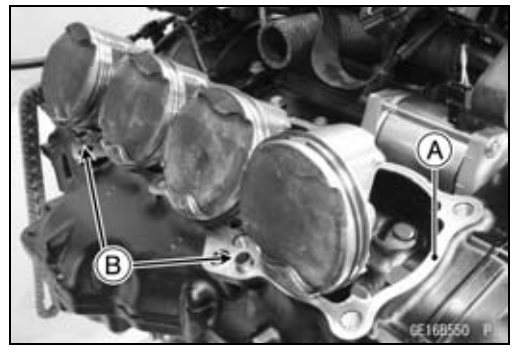


Cylinder Installation

NOTE

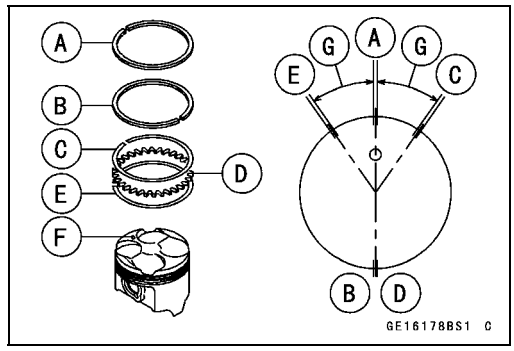
○*If a new cylinder is used, use new piston ring.*

● Replace the cylinder gasket [A] with a new one.
● Install the dowel pins [B] and new cylinder gasket.
● Apply molybdenum disulfide oil solution to the cylinder bore.

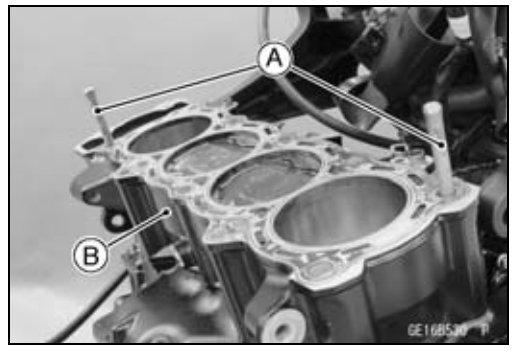


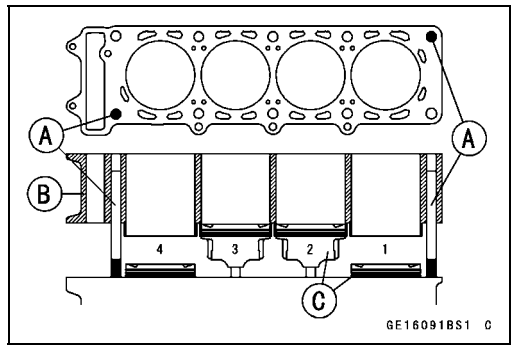
Cylinder, Pistons

● The piston ring openings must be positioned as shown. The openings of the oil ring steel rails must be about 30 ~ 40° of angle from the opening of the top ring.
Top Ring [A]
Second Ring [B]
Upper Oil Ring Steel Rail [C]
Oil Ring Expander [D]
Lower Oil Ring Steel Rail [E]
Dent [F]
30 ~ 40° [G]



● Position the crankshaft at #2, 3 piston TDC.
● Prepare two auxiliary head bolts with their head cut.
○Install the two cylinder head bolts [A] diagonally in the crankcase.
● Install the cylinder block [B].
Pistons [C]
○First insert the #2, 3 pistons, and then rotate the crankshaft at 90° angle.
○Insert the piston rings with your thumbs or the standard tip screwdriver.
● Tighten the upper engine mounting bolts and engine bracket bolts after cylinder head bolts tightend.
● Install the removed parts (see appropriate chapters).



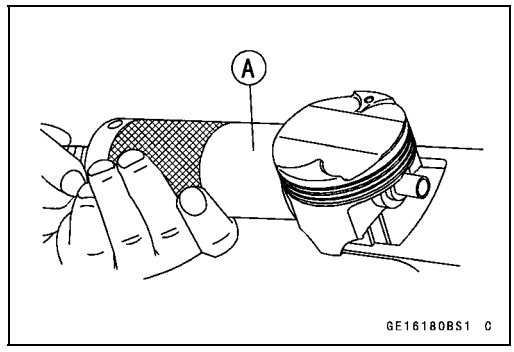


Piston Removal

● Remove the cylinder (see Cylinder Removal).
● Place a clean cloth under the pistons and remove the piston pin snap ring [A] from the outside of each piston.

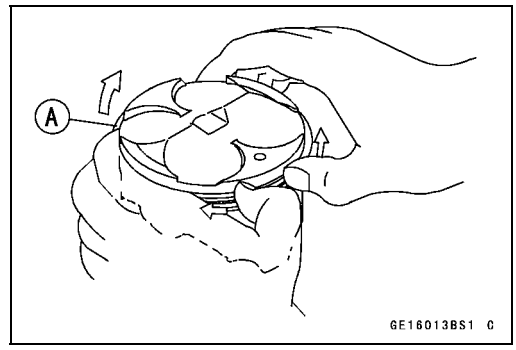


● Using the piston pin puller assembly [A], remove the piston pins.
Special Tool - Piston Pin Puller Assembly: 57001-910
● Remove the pistons.



Cylinder, Pistons

- Carefully spread the ring opening with your thumbs and then push up on the opposite side of the ring [A] to remove it.
- Remove the 3-piece oil ring with your thumbs in the same manner.



Piston Installation

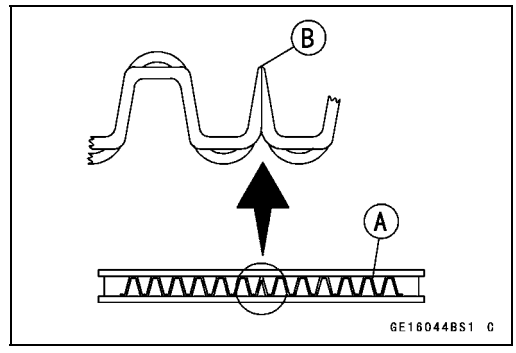
NOTE

○*If a new piston is used, use new piston ring.*

- Apply molybdenum disulfide oil solution to the oil ring expander, and install the oil ring expander [A] in the bottom piston ring groove so the ends [B] not butt together.
- Apply molybdenum disulfide oil solution to the oil ring steel rails, and install the oil ring steel rails, one above the expander and one below it.

○Spread the rail with your thumbs, but only enough to fit the rail over the piston.

○Release the rail into the bottom piston ring groove.



NOTE

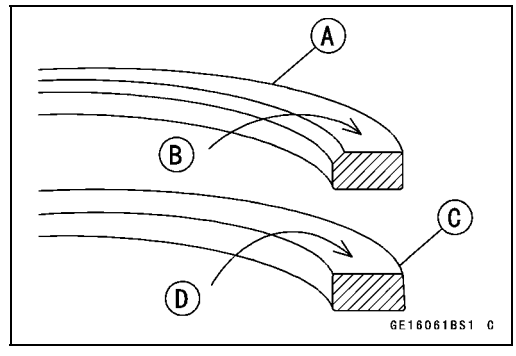
○*The oil ring rails have no "top" or "bottom."*

- Apply molybdenum disulfide oil solution to the piston rings.

NOTE

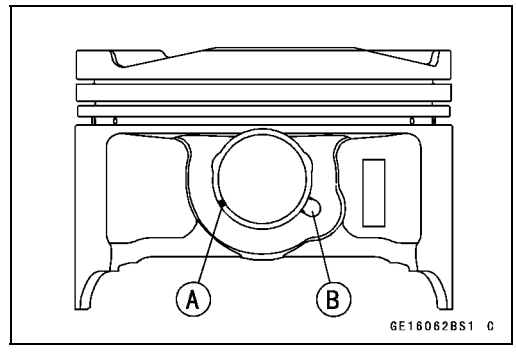
○*Do not mix up the top and second ring.*

- Install the top ring [A] so that the "1T" mark [B] faces up.
- Install the second ring [C] so that the "2T" mark [D] faces up.



- Install the piston with its dent mark facing forward.
- Apply molybdenum disulfide oil solution to the piston pins and piston journals.
- Fit a new piston pin snap ring into the side of the piston so that the ring opening [A] does not coincide with the slit [B] of the piston pin hole.

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



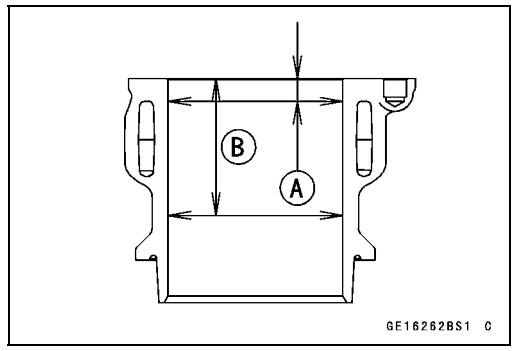
NOTICE

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

- Install the cylinder (see Cylinder Installation).

Cylinder, Pistons

Cylinder Wear Inspection

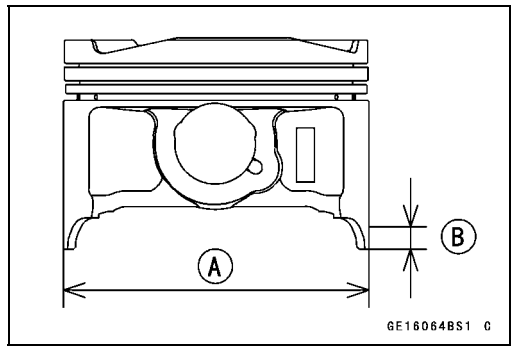


- Since there is a difference in cylinder wear in different directions, take a side-to-side and a front-to-back measurement at each of the two locations (total of four measurements) as shown.

★If any of the cylinder inside diameter measurements exceeds the service limit, replace the cylinder.
10 mm (0.39 in.) [A]
60 mm (2.36 in.) [B]

Cylinder Inside Diameter
Standard: 76.994 ~ 77.006 mm (3.0313 ~ 3.0317 in.)
Service Limit: 77.09 mm (3.035 in.)

Piston Wear Inspection

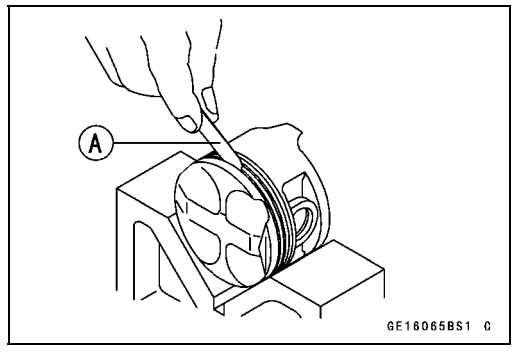


- Measure the outside diameter [A] of each piston 11 mm (0.43 in.) [B] up from the bottom of the piston at a right angle to the direction of the piston pin.

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

Piston Diameter
Standard: 76.974 ~ 76.984 mm (3.0305 ~ 3.0309 in.)
Service Limit: 76.82 mm (3.024 in.)

Piston Ring, Piston Ring Groove Wear Inspection



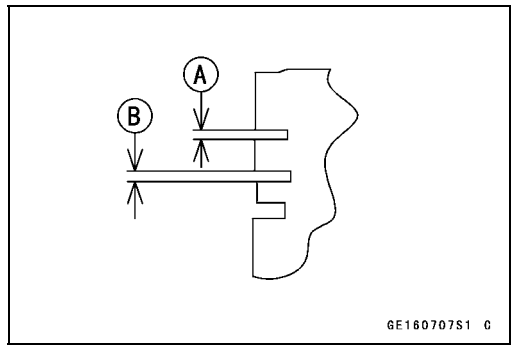
- Check for uneven groove wear by inspecting the ring seating.

★The rings should fit perfectly parallel to groove surfaces. If not, replace the piston and all the piston rings.

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

Piston Ring/Groove Clearance
Standard:
Top 0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in.)
Second 0.02 ~ 0.06 mm (0.0008 ~ 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.

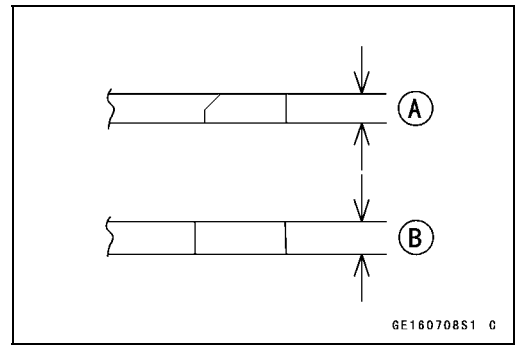
○Use a vernier caliper at several points around the piston.

Piston Ring Groove Width
Standard:
Top [A] 0.82 ~ 0.84 mm (0.0323 ~ 0.0331 in.)
Second [B] 0.81 ~ 0.83 mm (0.0319 ~ 0.0327 in.)
Service Limit:
Top [A] 0.92 mm (0.0362 in.)
Second [B] 0.91 mm (0.0358 in.)

★If the width of any of the two grooves are wider than the service limit at any point, replace the piston.

Cylinder, Pistons

Piston Ring Thickness Inspection



● Measure the piston ring thickness.

○Use the micrometer to measure at several points around the ring.

Piston Ring Thickness

Standard:

Top [A]	**0.77 ~ 0.79 mm (0.0303 ~ 0.0311 in.)**
Second [B]	**0.77 ~ 0.79 mm (0.0303 ~ 0.0311 in.)**

Service Limit:

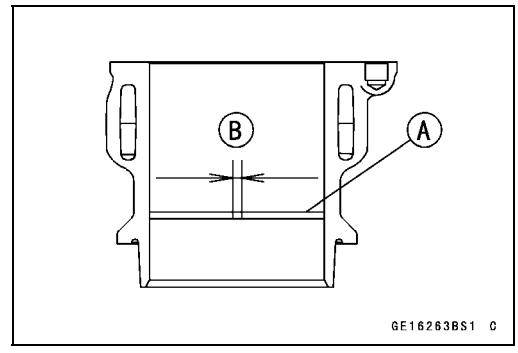
Top [A]	**0.70 mm (0.028 in.)**
Second [B]	**0.70 mm (0.028 in.)**

★If any of the measurements is less than the service limit on either of the rings, replace all the rings.

NOTE

○*When using new rings in a used piston, check for uneven groove wear. The rings should fit perfectly parallel to the groove sides. If not, replace the piston.*

Piston Ring End Gap Inspection



● Place the piston ring [A] inside the cylinder, 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	**0.38 ~ 0.48 mm (0.0150 ~ 0.0189 in.)**

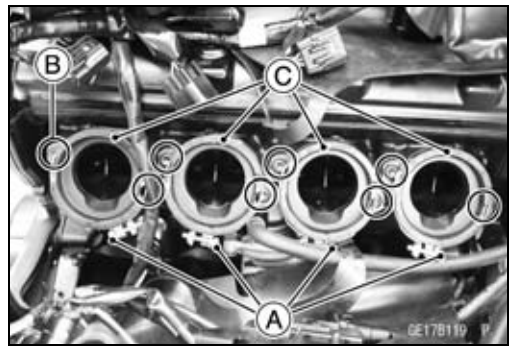
Service Limit:

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.

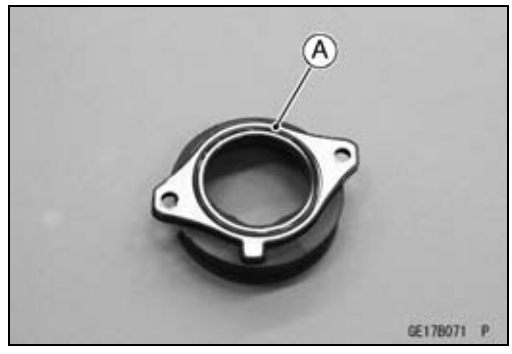
Throttle Body Assy Holder

Throttle Body Assy Holder Removal



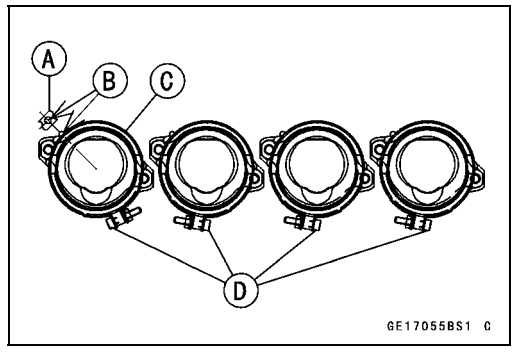
- Remove:
  Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
  Clamps [A]
  Throttle Body Assy Holder Bolts [B]
  Throttle Body Assy Holders [C]

Throttle Body Assy Holder Installation



- Replace the O-rings [A] with new ones.
- Apply grease to the O-rings, and install them.
- Apply a non-permanent locking agent to the threads of the throttle body assy holder bolts.
- Tighten:

Torque - Throttle Body Assy Holder Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)



- Fit the hole of the clamp [A] to the projection [B] of the holder [C].

○Be sure that the clamp bolt heads [D] face as shown.

- Install:
  Throttle Body Assy (see Throttle Body Assy Installation in the Fuel System (DFI) chapter)

Throttle Body Assy Holder

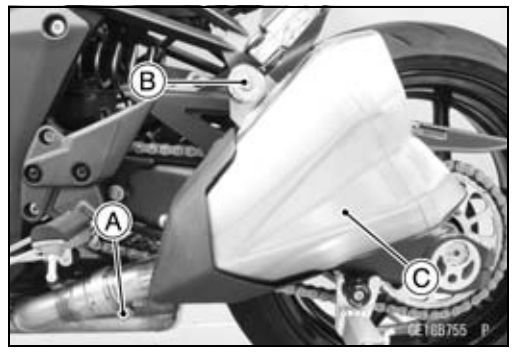
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Muffler

⚠ WARNING

The exhaust pipe or muffler body can become extremely hot during normal operation and cause severe burns. Do not remove the exhaust pipe or muffler body while it is hot.

Muffler Body Removal



- Remove the rear lower fairing (see Rear Lower Fairing Removal in the Frame chapter).
- Loosen the muffler body clamp bolt [A] on both sides.
- Remove:
  Muffler Body Mounting Bolt [B] and Nut (Both Sides)
  Muffler Body [C] (Both Sides)

Muffler Body Installation

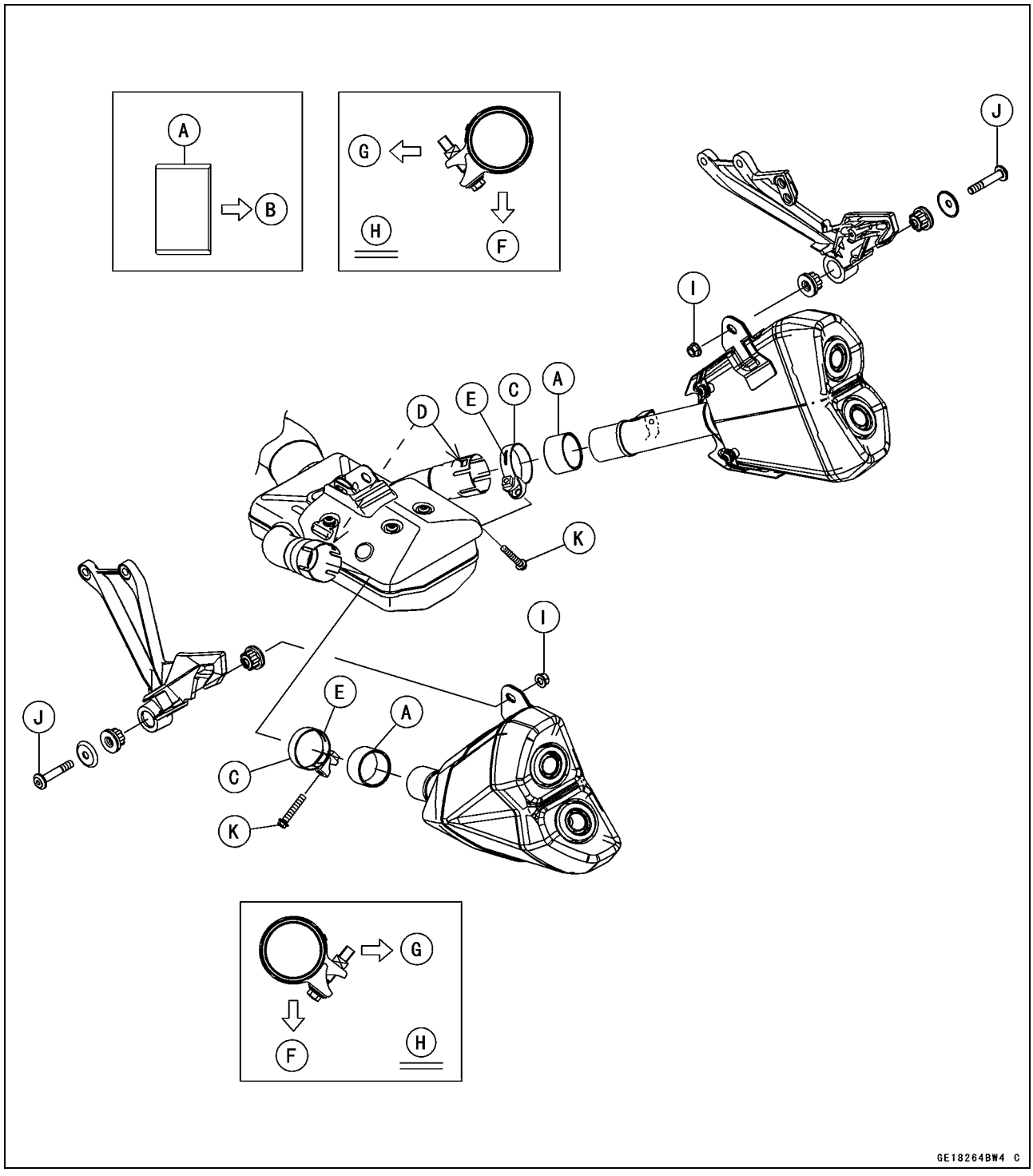
- Replace the muffler body gaskets [A] with new ones.
- Install the muffler body gaskets until it is bottomed so that the inside chamfer side faces rear [B].
- Install the muffler body clamps [C] so that the projection [D] fits into the clamp slit [E].
  Downside [F]
  Inside [G]
  Viewed from Rear [H]
- Install the muffler bodies until it stops at the bottom surface of the exhaust pipe.
- Replace the muffler body mounting nuts [I] with new ones.
- Install the muffler body mounting bolts and nuts.
- Tighten:

Torque - Muffler Body Mounting Bolts [J]: 35 N·m (3.6 kgf·m, 26 ft·lb)

- Turn the muffler body clamps outward until it stops at the slit ends.
- Tighten the muffler body clamp bolt while pulling the muffler body outward (both sides).

Torque - Muffler Body Clamp Bolts [K]: 21 N·m (2.1 kgf·m, 15 ft·lb)

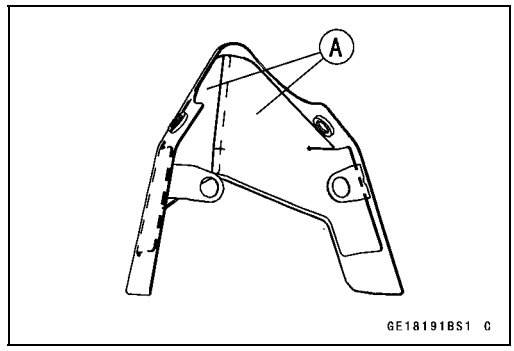
Muffler



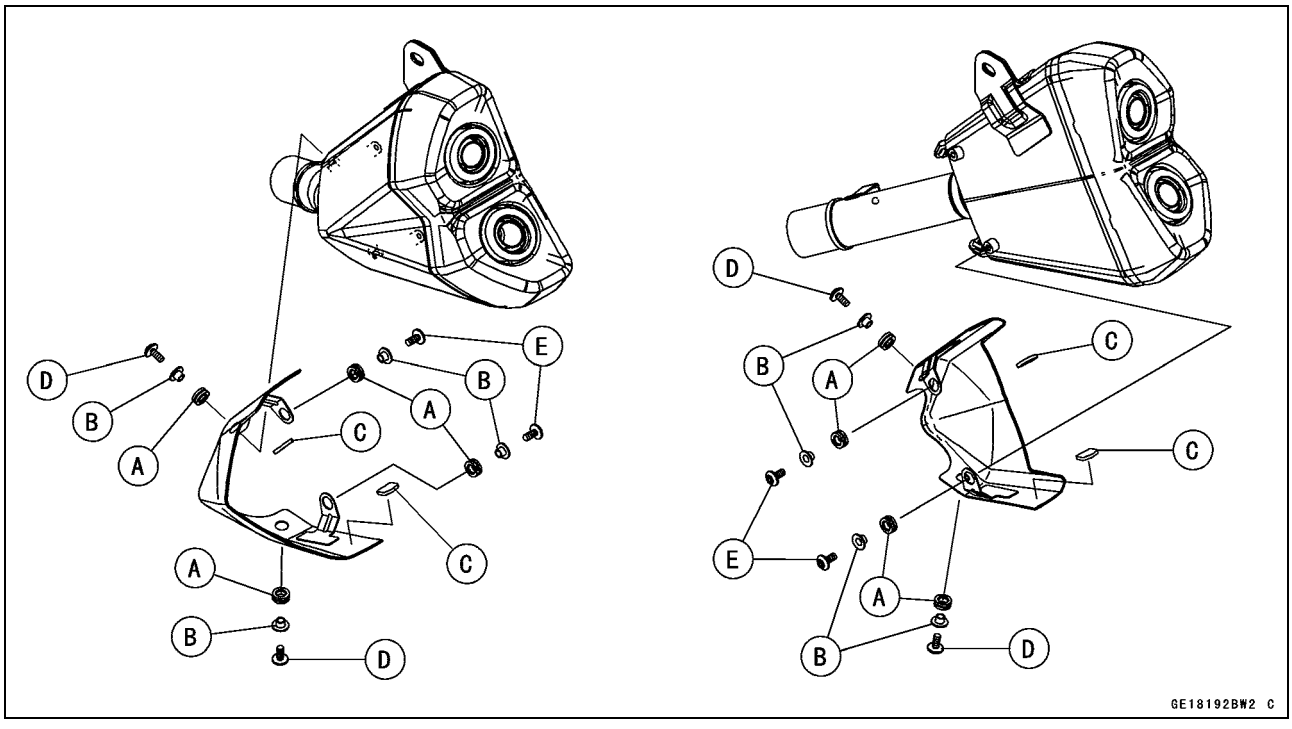
- Thoroughly warm up the engine, wait until the engine cools down, retighten all the bolts and nuts.

Muffler

● When installing the muffler covers, note the following.
● Install the pads [A] to the right muffler cover as shown.
○Fit one pad on top of the other without any gap.



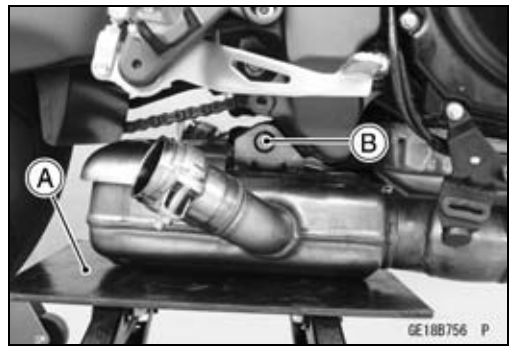
● Install the dampers [A], collars [B] and pads [C] as shown.
● Tighten the muffler cover bolts temporarily.
● Tighten the two muffler cover bolts [D].
● Push the muffler body covers outward.
● Tighten the two muffler cover bolts [E].
● Make sure the gap between the muffler body and muffler cover.



● Install the removed parts (see appropriate chapters).

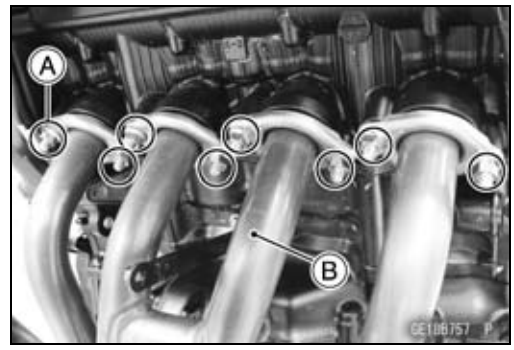
Exhaust Pipe Removal

● Remove:
Muffler Bodies (see Muffler Body Removal)
Oxygen Sensor (see Oxygen Sensor Removal in the Electrical System chapter)
● Support the premuffler chamber with the suitable stand [A].
● Remove the premuffler chamber mounting bolt [B].



Muffler

● Remove:
Exhaust Pipe Holder Nuts [A]
Exhaust Pipe (Premuffler Chamber) [B]
○In this photo, the radiator has been removed for clarity.

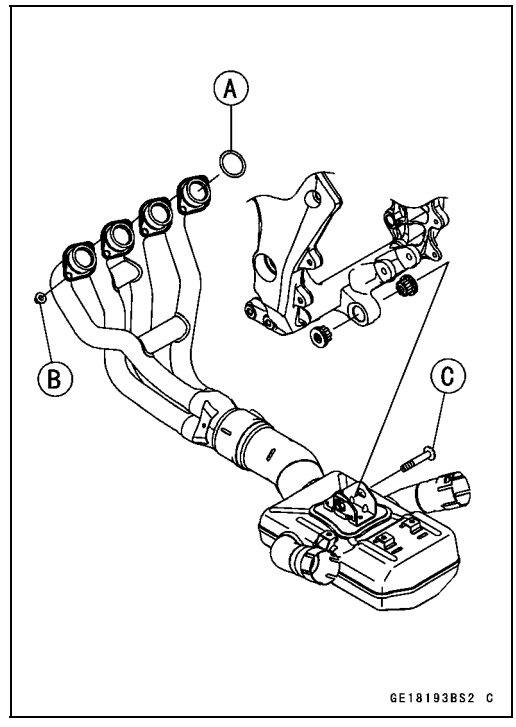


Exhaust Pipe Installation

● Replace the exhaust pipe gaskets [A] with new ones.
● Apply grease to the exhaust pipe gaskets and install them.
● Install the exhaust pipe.
● Tighten the exhaust pipe holder nuts [B] and premuffler chamber mounting bolt [C].

Torque - Exhaust Pipe Nuts: 20 N·m (2.0 kgf·m, 15 ft·lb)
Premuffler Chamber Mounting Bolt: 35 N·m (3.6 kgf·m, 26 ft·lb)

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

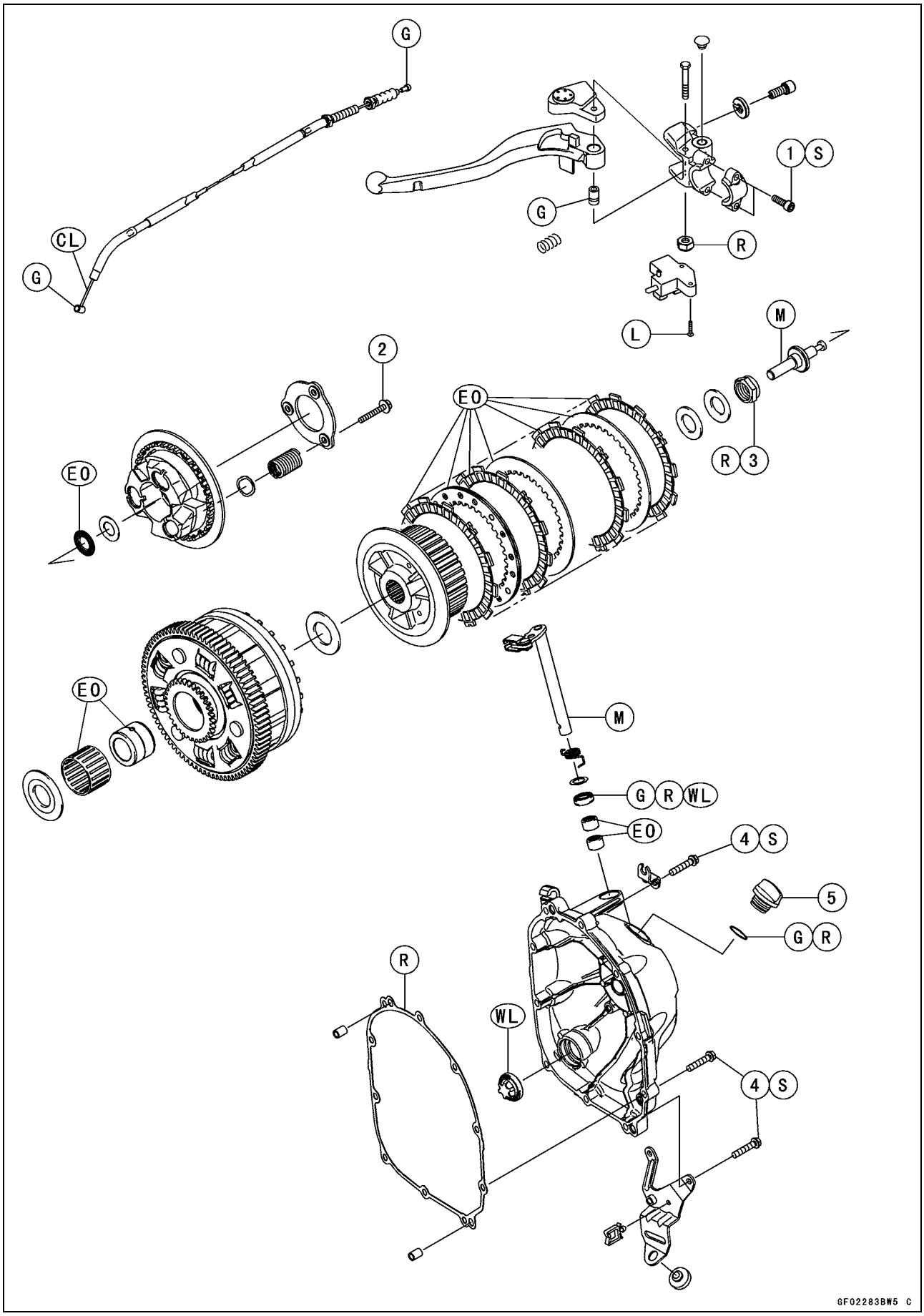


Clutch

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Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Clutch Lever Clamp Bolts	7.8	0.80	69 in·lb	S
2	Clutch Spring Bolts	10	1.0	89 in·lb	
3	Clutch Hub Nut	135	13.8	100	R
4	Clutch Cover Bolts	12	1.2	106 in·lb	S
5	Oil Filler Plug	Hand -tighten	–	–	

CL: Apply cable lubricant.
EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
M: Apply molybdenum disulfide grease.
R: Replacement Parts
S: Follow the specified tightening sequence.
WL: Apply soap and water solution or rubber lubricant.

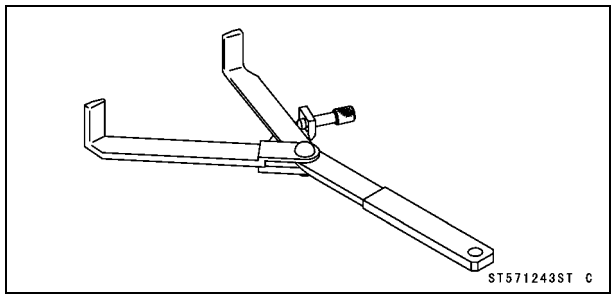
6-4 CLUTCH

Specifications

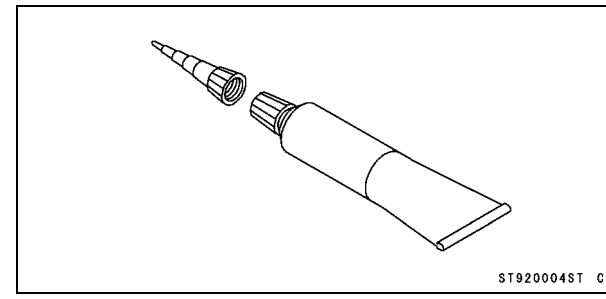
Item	Standard	Service Limit
Clutch Lever and Cable		
Clutch Lever Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	– – –
Clutch Lever		
Clutch Lever Position	5-way adjustable (to suit rider)	– – –
Clutch		
Clutch Plate Assembly Length	45.6 ~ 46.4 mm (1.80 ~ 1.83 in.)	– – –
Friction Plate Thickness	2.72 ~ 2.88 mm (0.107 ~ 0.113 in.)	2.5 mm (0.098 in.)
Friction and Steel Plate Warp	0.15 mm (0.0059 in.) or less	0.3 mm (0.01 in.)

Special Tool and Sealant

Clutch Holder:
57001-1243



Liquid Gasket, TB1211F:
92104-0004



Clutch Lever and Cable

Clutch Lever Free Play Inspection

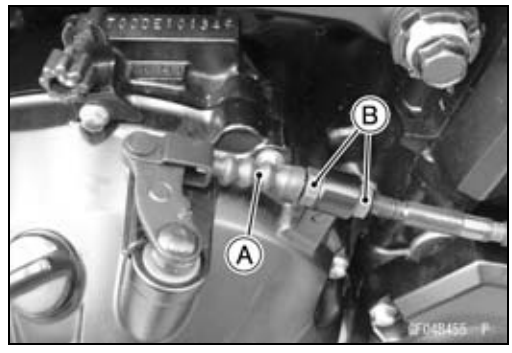
- Refer to the Clutch Operation Inspection in the Periodic Maintenance chapter.

Clutch Lever Free Play Adjustment

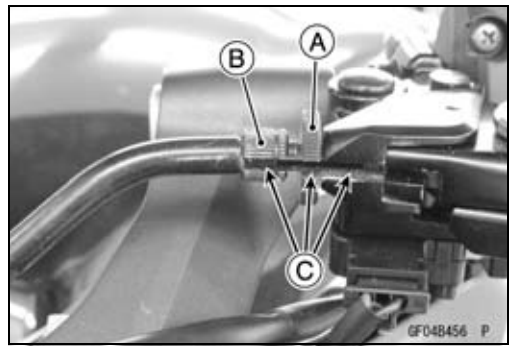
- Refer to the Clutch Operation Inspection in the Periodic Maintenance chapter.

Clutch Cable Removal

- Remove the right lower fairing (see Lower Fairing Removal in the Frame chapter).
- Slide the dust cover [A] at the clutch cable lower end out of place.
- Loosen the nuts [B], and slide the lower end of the clutch cable to give the cable plenty of play.



- Loosen the locknut [A] and screw in the adjuster [B].
- Line up the slots [C] in the clutch lever, locknut and adjuster, and then free the cable from the lever.
- Free the clutch inner cable tip from the clutch release lever.
- Remove the clutch cable out of the frame.



Clutch 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).

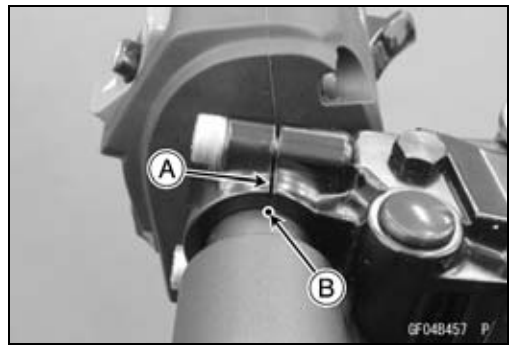
Clutch Cable Lubrication

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

Clutch Lever Assembly Installation

- Install the clutch lever so that the mating surface [A] of the clutch lever clamp is aligned with the punch mark [B].
- Tighten the upper clamp bolt first, and then the lower clamp bolt. There will be a gap at the lower part of the clamp after tightening.

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



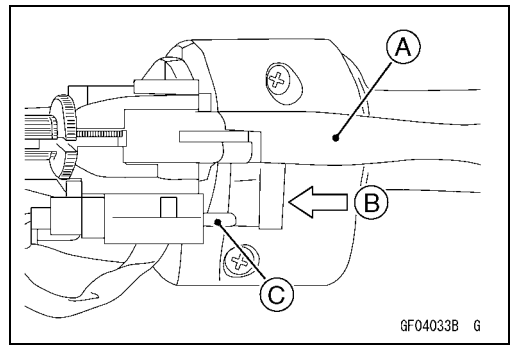
Clutch Lever and Cable

Clutch Lever Installation

⚠ WARNING

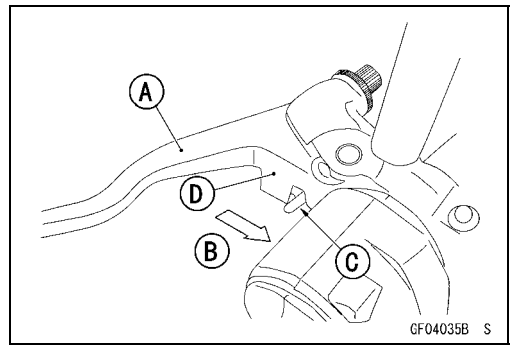
If the starter lockout switch pin has been damaged the starter lockout system will not work properly. This allows the motorcycle to be started in gear with the clutch lever released (clutch engaged), creating sudden forward movement that can result in an accident or injury. Check that the starter lockout switch operates properly when installing the clutch lever.

- Replace the locknut with a new one.
- Apply grease to the clutch lever collar.
- Install the clutch lever [A] from frame left side [B] so that it may not damage a pin [C] of the starter lockout switch.

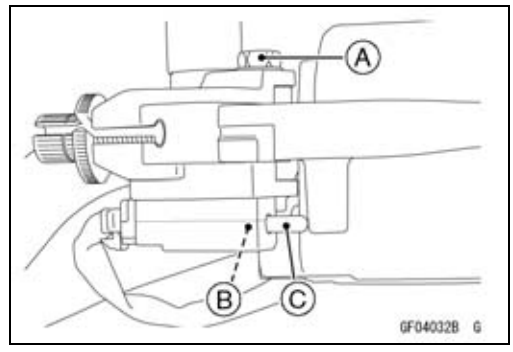


NOTICE

Do not install the clutch lever [A] from the front side [B]. The pin [C] of the starter lockout switch may be damaged in the projection [D] of a clutch lever.



- Tighten the bolt [A] and locknut [B].
- Install the upper end of the clutch cable (see Clutch Cable Installation).
- Adjust the clutch cable (see Clutch Operation Inspection in the Periodic Maintenance chapter).
- Check that the pin [C] of the starter lockout switch moves smoothly.



⚠ WARNING

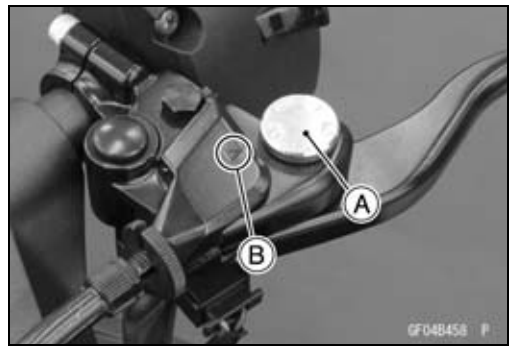
Too much cable play can prevent clutch disengagement and cause an accident resulting in serious injury or death. When adjusting the clutch or replacing the cable, be sure the upper end of the clutch outer cable is fully seated in its fitting, or it could slip into place later, creating enough cable play to prevent clutch disengagement.

Clutch Lever and Cable

Clutch Lever Position Adjustment

The adjuster has 5 positions so that the clutch lever position can be adjusted to suit the operator's hand.

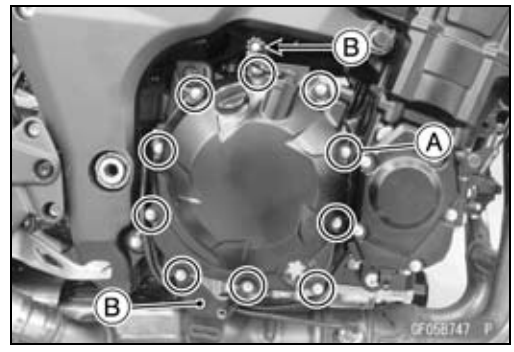
- ● Push the lever forward and turn the adjuster [A] to align the number with the mark [B] on the lever holder.
- ○ The distance from the grip to the lever is minimum at number 5 and maximum at number 1.



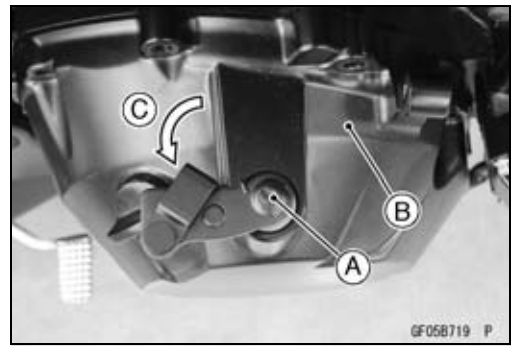
Clutch Cover

Clutch Cover Removal

- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Disconnect the clutch cable lower end (see Clutch Cable Removal).
- Remove:
  Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Rear Lower Fairing (see Rear Lower Fairing Removal in the Frame chapter)
  Clutch Cover Bolts [A]
  Brackets [B]



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

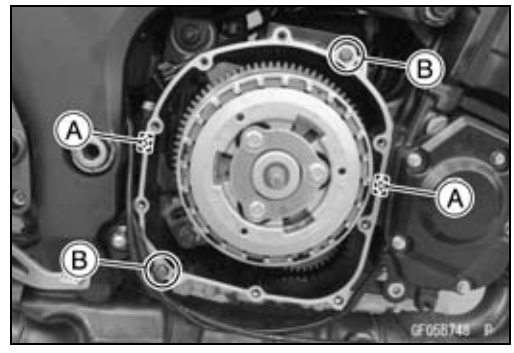


Clutch Cover Installation

- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the area [A] where the mating surface of the crankcase touches the clutch cover gasket.

  Sealant - Liquid Gasket, TB1211F: 92104-0004

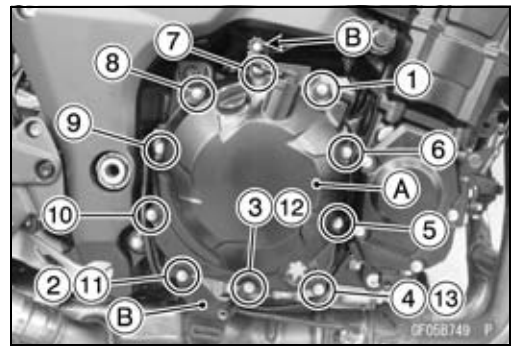
- Be sure to dowel pins [B] are in position.
- Replace the clutch cover gasket with a new one and install it.



- Install:
  Clutch Cover [A]
  Brackets [B]
- Tighten the clutch cover bolts following the specified tightening sequence [1 ~ 13].

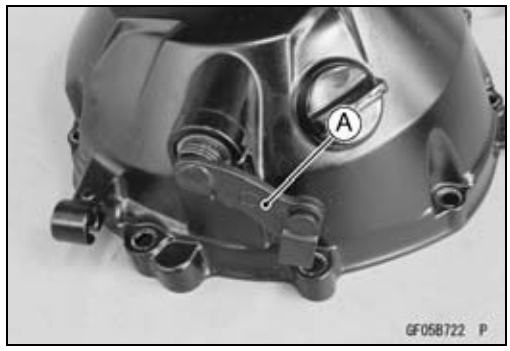
  Torque - Clutch Cover Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)

- Install the removed parts (see appropriate chapters).



Clutch Cover

Release Shaft Removal

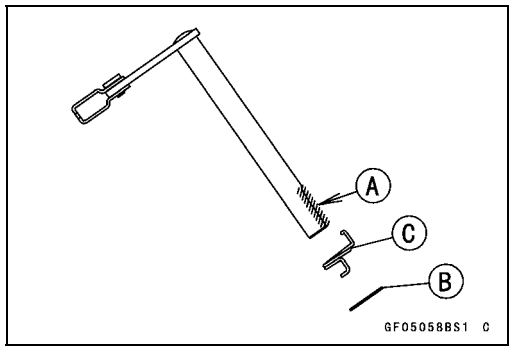


NOTICE

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

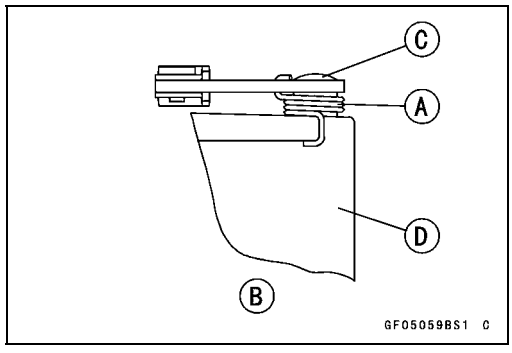


- Apply grease to the oil seal lips on the upper ridge of the clutch cover.
- Apply engine oil to the needle bearings in the hole of the clutch cover.
- Apply molybdenum disulfide grease to the pusher-holding portion [A] on the release shaft.
- Install the washer [B] and spring [C].
- Insert the release shaft straight into the upper hole of the clutch cover.

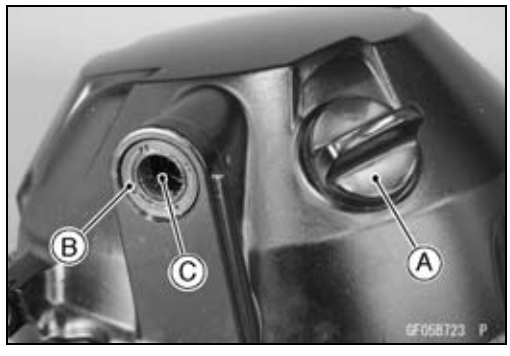
NOTICE

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

- Fit the spring [A] as shown.
  Viewed from Rear [B]
  Release Shaft [C]
  Clutch Cover [D]



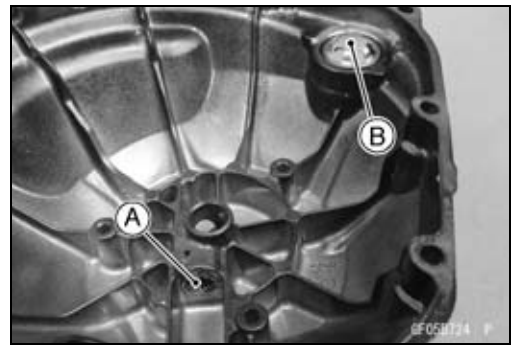
Clutch Cover Disassembly



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

Clutch Cover

● Remove:
Needle Bearing [A]
Oil Level Inspection Window [B]



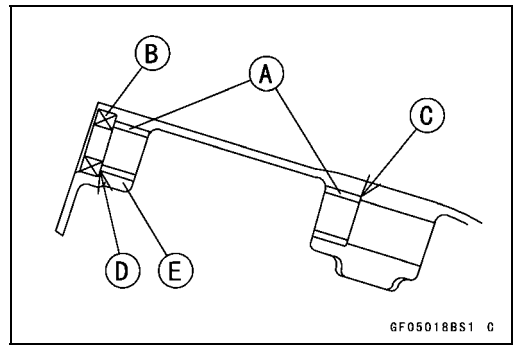
Clutch Cover Assembly

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

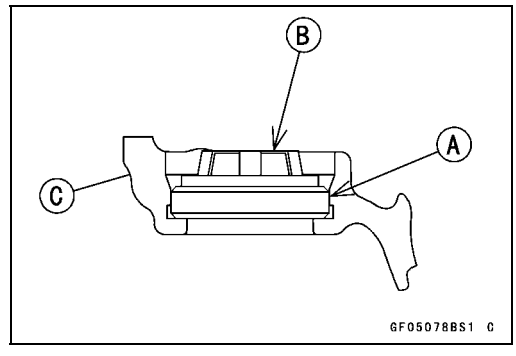
NOTE

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

● Apply soap and water solution to the oil seal.
● Install the needle bearings [A] and oil seal [B] position as shown.
○Press the needle bearing until the bottom [C].
○Press the needle bearing so that the bearing surface [D] is flush with the housing end of clutch cover [E].
○Press the oil seal until the bottom.
● Apply grease to the oil seal lips.

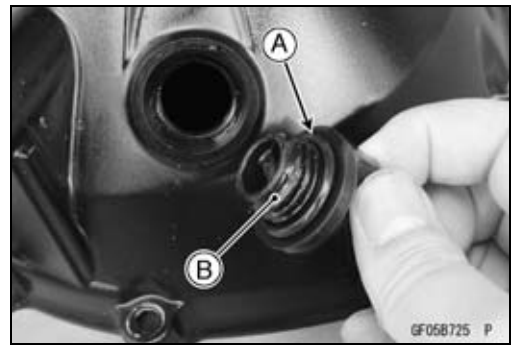


● Apply soap and water solution to the rubber portion [A] of the oil level inspection window.
● Press the oil level inspection window until the bottom so that its projection [B] faces inside of the clutch cover [C].



● Replace the O-ring [A] of the oil filler plug [B] with a new one.
● Apply grease to the new O-ring.
● Tighten:

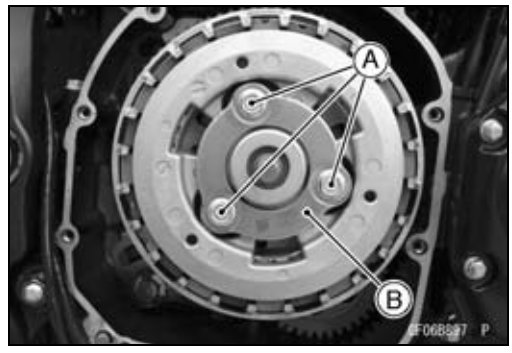
Torque - Oil Filler Plug: Hand-tighten



Clutch

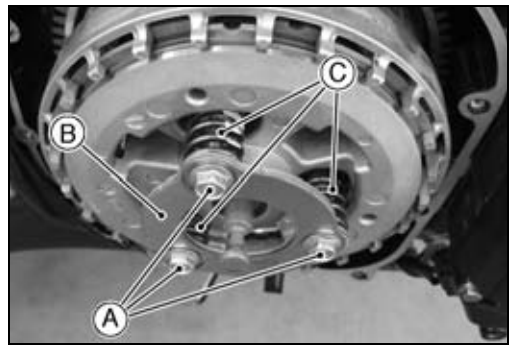
Clutch Removal

● Remove the clutch cover (see Clutch Cover Removal).
● Loosen the three clutch spring bolts [A] alternately with little by little (1/4 turn at a time) to prevent tilting the clutch stopper plate [B].

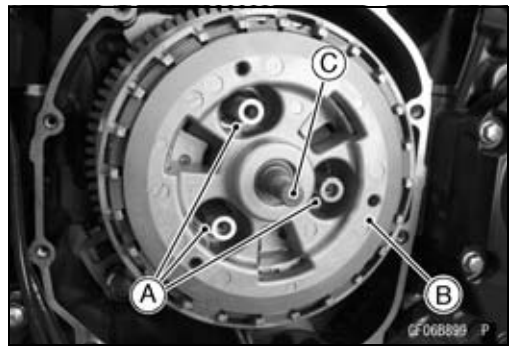


NOTICE
Do not loosen the one or two clutch stopper bolt at once to prevent clutch stopper plate from warpage by the spring force.

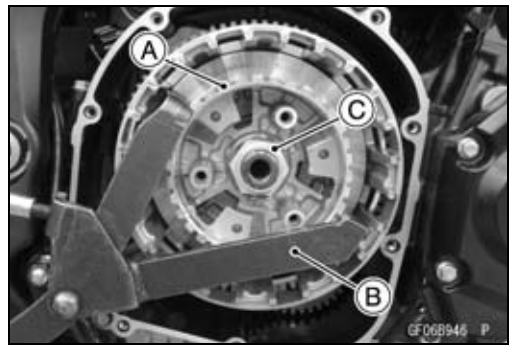
● Remove:
Clutch Spring Bolts [A]
Clutch Stopper Plate [B]
Clutch Springs [C]
● Visually inspect the clutch stopper plate.
★If the clutch stopper plate is warped, replace it with a new one.



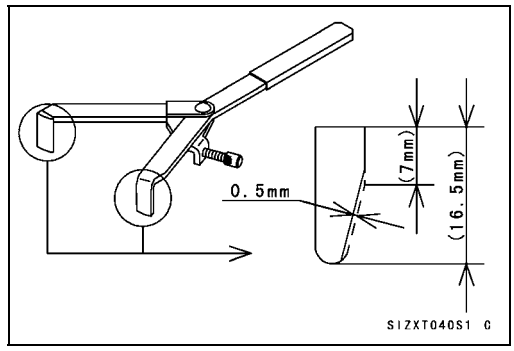
● Remove:
Spring Seats [A]
Clutch Pressure Plate [B] (with Shim, Bearing and Pusher [C])
Friction Plates and Steel Plates



● Hold the sub clutch hub [A] steady with the clutch holder [B], and remove the clutch hub nut [C] and washers.
Special Tool - Clutch Holder: 57001-1243

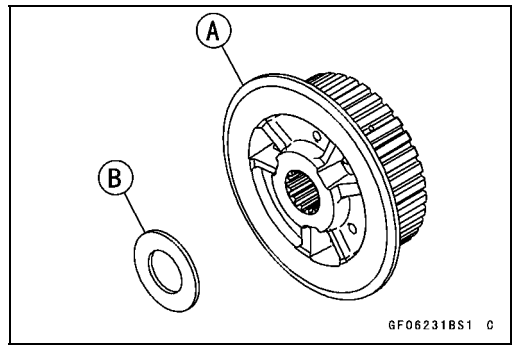


○Use the clutch holder with sharpened hook nose by grinding.
Special Tool - Clutch Holder: 57001-1243
○Grind the hook nose by 0.5 mm (0.02 in.) as shown.

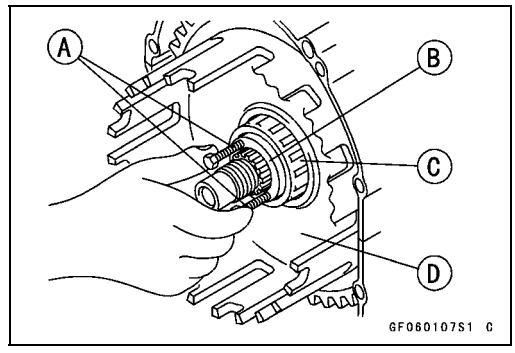


Clutch

- Remove:
  Clutch Hub [A]
  Spacer [B]

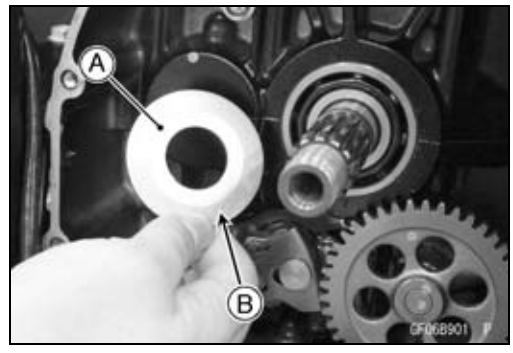


- Using the two 4 mm (0.16 in.) bolts [A], pull out the sleeve [B], needle bearing [C] and clutch housing [D].
- Remove the spacer.

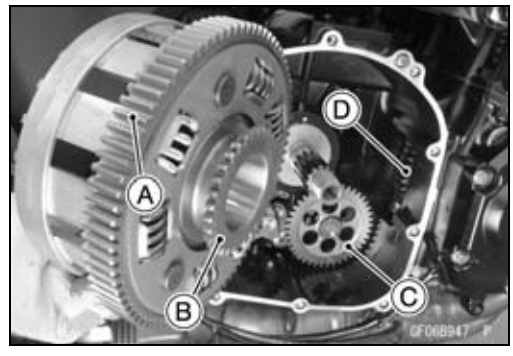


Clutch Installation

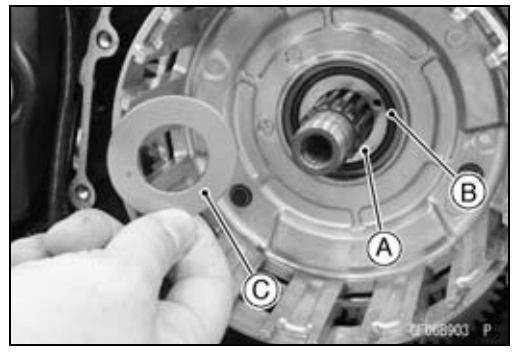
- Install the spacer [A] so that the tapered side [B] faces inward.



- Engage the clutch housing gear [A] and oil pump drive gear [B] with the crankshaft primary gear [C] and oil pump drive gear [D].

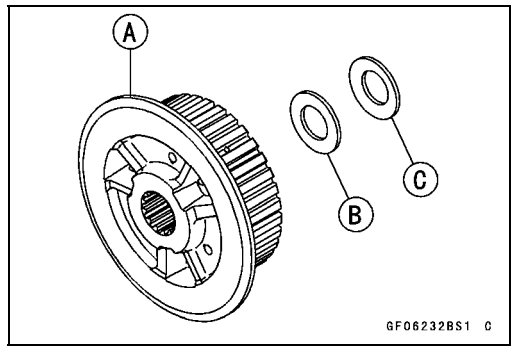


- Apply engine oil to the sleeve [A] and needle bearing [B].
- Install:
  Needle Bearing
  Sleeve
  Spacer [C]



Clutch

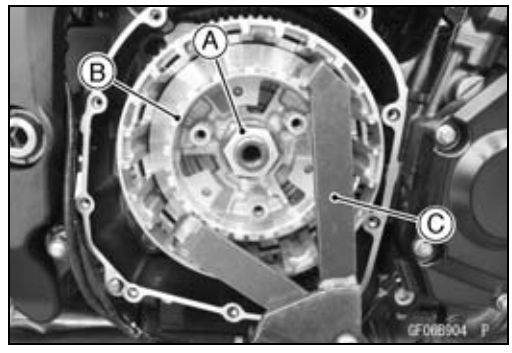
- Install:
  Clutch Hub [A]
  Washer [B]
- Install the washer [C] so that the “OUT SIDE” mark faces outward.



- Replace the clutch hub nut [A] with a new one.
- Hold the sub clutch hub [B] steady with the clutch holder [C], and tighten the clutch hub nut.

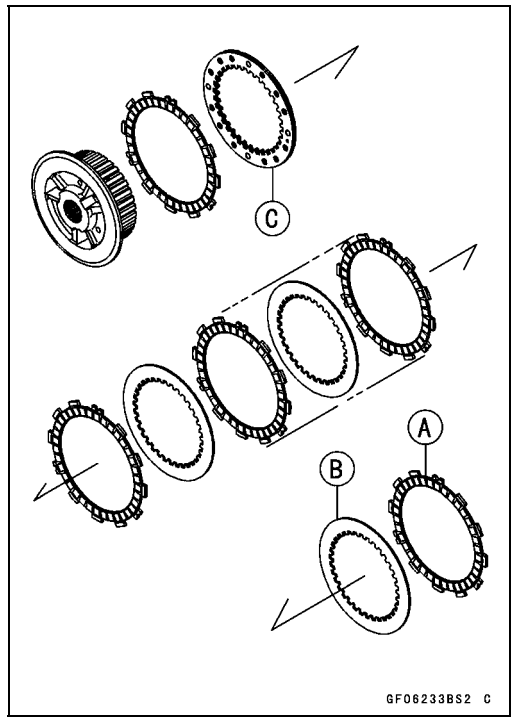
Special Tool - Clutch Holder: 57001-1243

Torque - Clutch Hub Nut: 135 N·m (13.8 kgf·m, 100 ft·lb)



- Install the friction plates [A] and steel plates [B] alternately as shown.
  Thick Steel Plate [C]

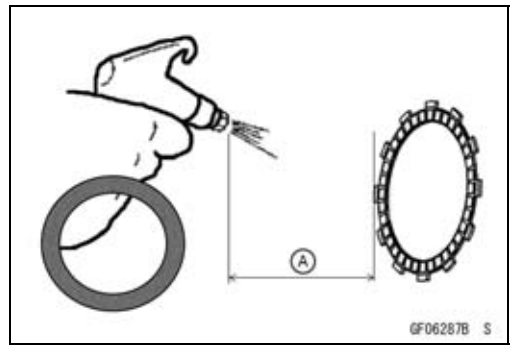
NOTICE
If new dry friction plates and steel plates are installed, apply engine oil to the surfaces of each plate to avoid clutch plate seizure.



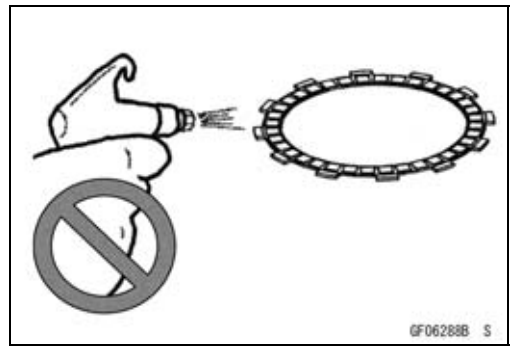
Clutch

NOTICE

High pressure air blasts may detach clutch friction material from the friction plate. To prevent material detachment, set air pressure lower than 0.5 MPa (5 kgf/cm², 73 psi), do not place air nozzle closer than 30 cm (12 in.) to friction plate and only blow air at a right angle to the plate, facing the friction material. Do not blow air from the side (horizontally) of the plate since it is more likely to detach the friction material.

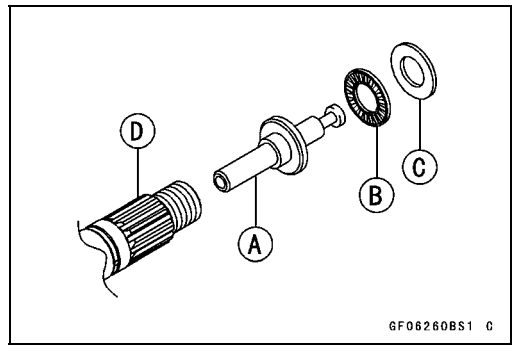


more than 30 cm (12 in.) [A]

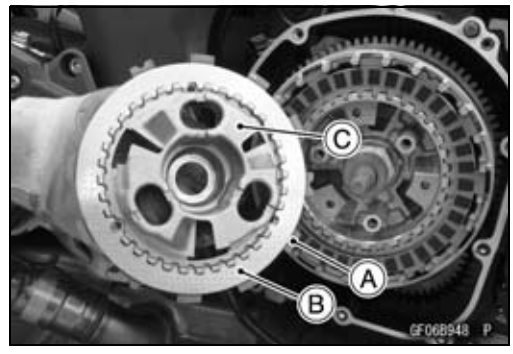


○Install the last friction plate and steel plate later with the clutch pressure plate.

- Apply molybdenum disulfide grease to the pusher end [A].
- Install the bearing [B] and shim [C] to the pusher.
- Install the pusher to the drive shaft [D] direction as shown.



- Put the last friction plate [A] and steel plate [B] on the clutch pressure plate [C] and install them.



Clutch

● Install the last friction plate so that the tangs [A] fit into the grooves in the housing as shown.



NOTE

○*Make sure that the clutch pressure plate is installed without a gap.*

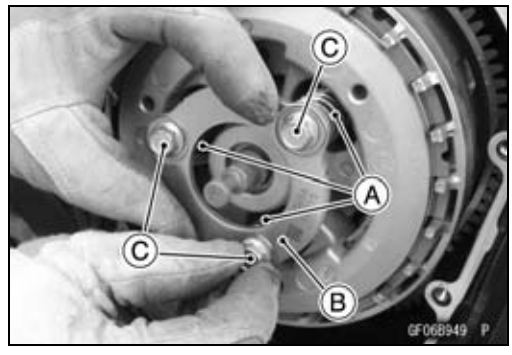
● Be sure to install the spring seats [A] on the clutch pressure plate.



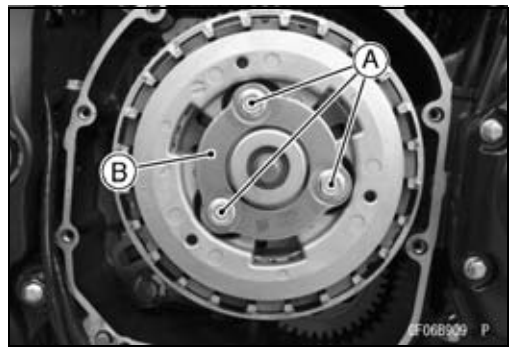
● Install:
Clutch Springs [A]
Clutch Stopper Plate [B]

● Tighten the three clutch spring bolts [C] by hand until they just begin to press each clutch spring.

○Hold the clutch pressure plate by hand while tightening the clutch stopper bolts.



● Tighten the three clutch spring bolts [A] alternately with little by little (1/4 turn at a time) to prevent tilting the clutch stopper plate [B].



NOTICE
Do not tighten the one or two clutch stopper bolt at once to prevent the clutch stopper plate from warpage by the spring force.

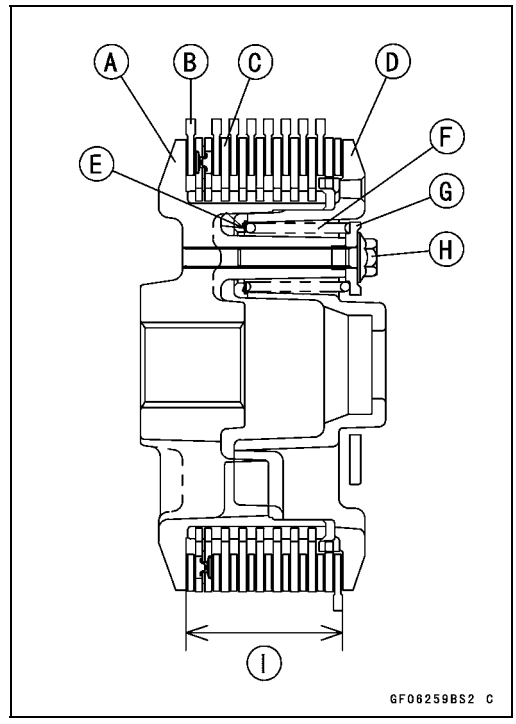
● Tighten:

Torque - Clutch Spring Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)

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

Clutch

Clutch Plate Assembly Length Inspection



- Assemble the following parts.
  Clutch Hub [A]
  Friction Plates [B]
  Steel Plates [C]
  Clutch Pressure Plate [D]
  Spring Seats [E]
  Clutch Springs [F]
  Clutch Stopper Plate [G]
  Clutch Spring Bolts [H]

Torque - Clutch Spring Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)

- Measure the clutch plate assembly length [I].

Clutch Plate Assembly Length
45.6 ~ 46.4 mm (1.80 ~ 1.83 in.)

★If the length is not within the specified range, adjust the length (see Clutch Plate Assembly Adjustment).

Clutch Plate Assembly Length Adjustment

- Inspect the clutch plate assembly length, and then replace the steel plate(s) which brings the length within the specified range.
- Remove:
  Clutch Spring Bolts
  Clutch Stopper Plates
  Clutch Springs
  Clutch Pressure Plate
  Spring Seats
- Replace the following steel plate(s).

Thickness	Part Number
2.0 mm (0.079 in.)	13089-1073
2.3 mm (0.091 in.) (STD)	13089-1084
2.6 mm (0.102 in.)	13089-1115

NOTE

○*Do not use the steel plate of 2.0 mm (0.079 in.) and 2.6 mm (0.102 in.) thickness at the same time.*

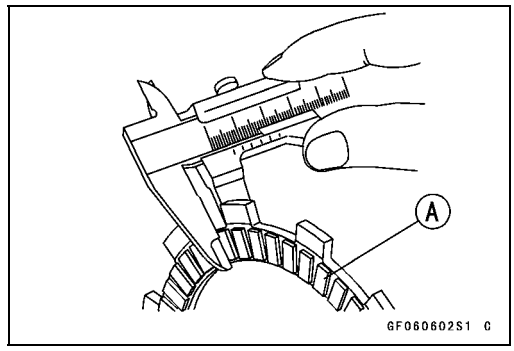
○*When adjusting the clutch plate assembly, install the steel plate of 2.0 mm (0.079 in.) or 2.6 mm (0.102 in.) thickness to the second or third from the clutch pressure plate.*

- Install the removed parts, and inspect the clutch plate assembly length.

Torque - Clutch Spring Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)

Clutch

Clutch Plate, Wear, Damage Inspection



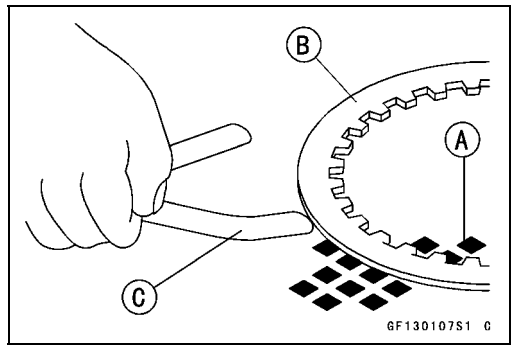
- Visually inspect the friction and steel plates for signs of seizure, overheating (discoloration), or uneven wear.
- Measure the thickness of each friction plate [A] at several points.

★If any plates show signs of damage, or if they have worn past the service limit, replace them with new ones.

Friction Plate Thickness

Standard:	**2.72 ~ 2.88 mm (0.107 ~ 0.113 in.)**
Service Limit:	**2.5 mm (0.098 in.)**

Clutch Plate Warp Inspection



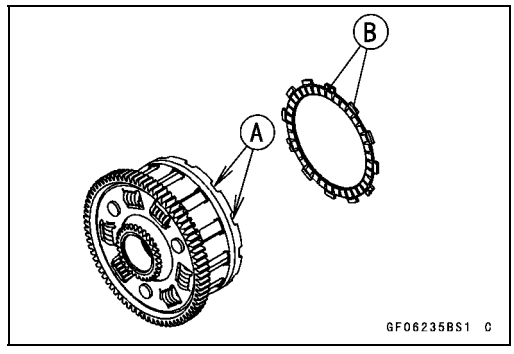
- Place each friction plate or steel plate on a surface plate and measure the gap between the surface plate [A] and each friction plate or steel plate [B] with a thickness gauge [C]. The gap is the amount of friction or steel plate warp.

★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 (0.01 in.)**

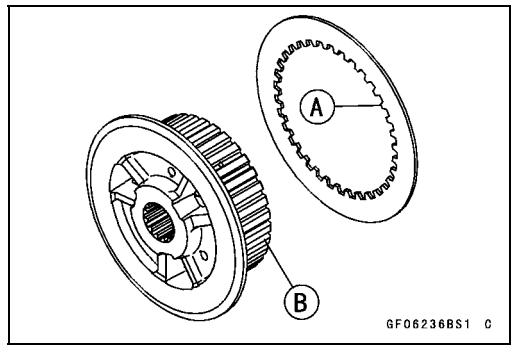
Clutch Housing Finger Inspection



- 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].

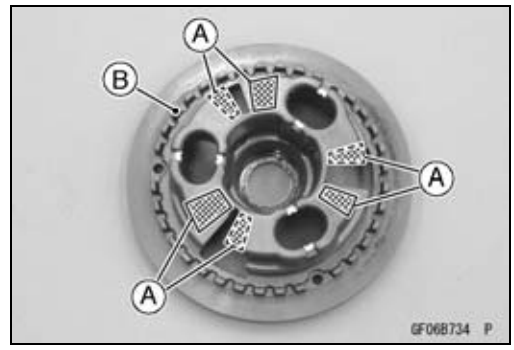
★If there are notches worn into the splines, replace the sub clutch hub. Also, replace the steel plates if their teeth are damaged.

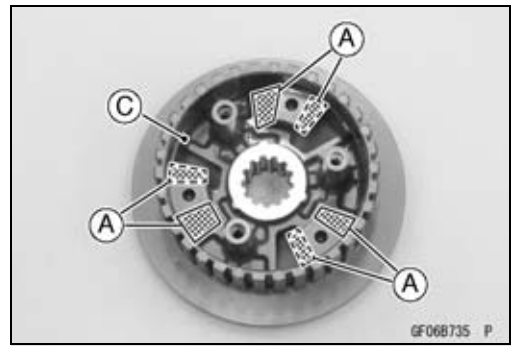
Clutch

Clutch Pressure Plate and Clutch Hub Inspection

- Visually inspect the contact areas [A] of the clutch pressure plate [B] and clutch hub [C] for damage.

★If the contact areas are damaged replace them with new ones.





Clutch Spring Inspection

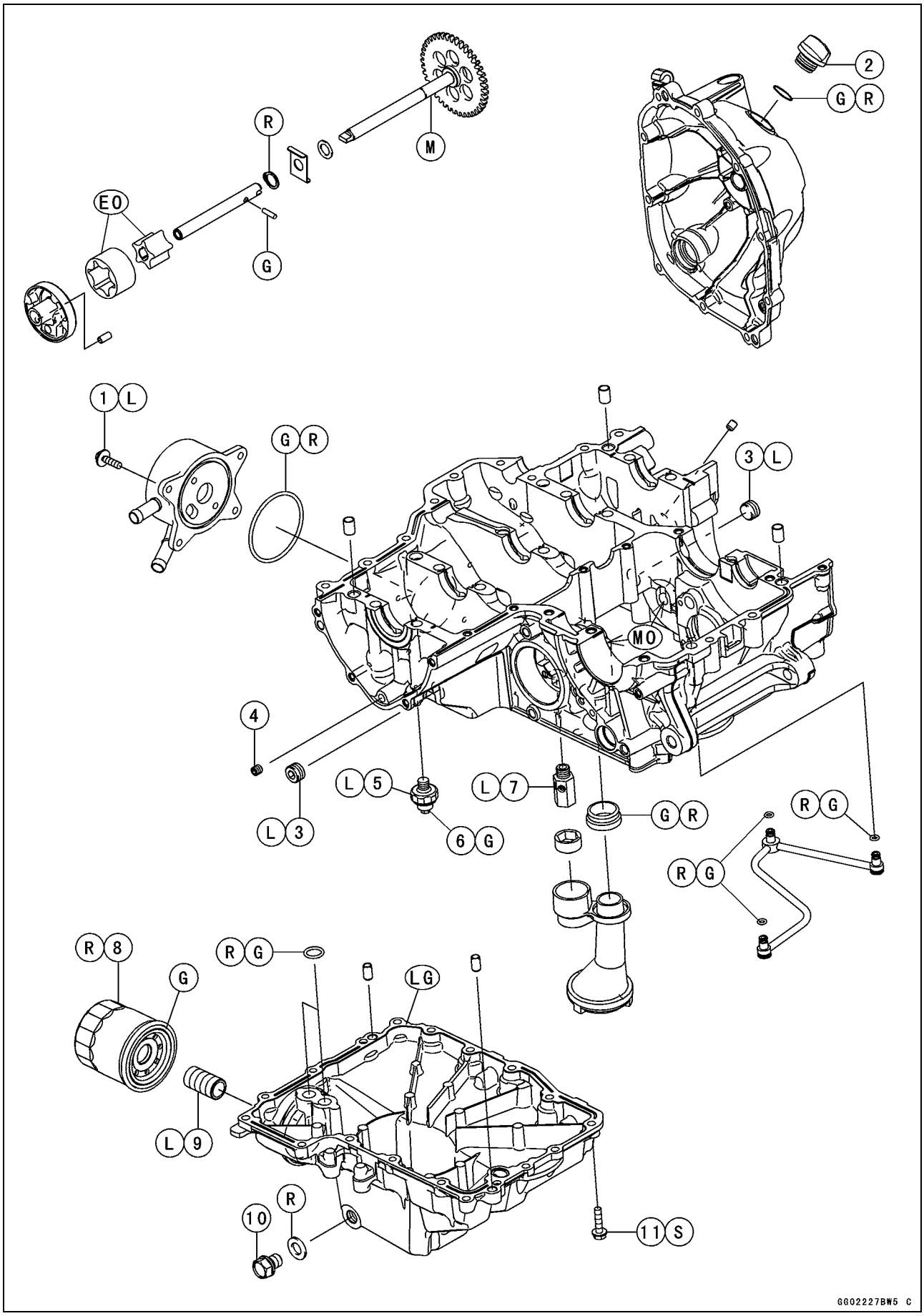
★If all the components are good, but the problem still exists, replace the clutch springs (see Clutch Removal and Clutch Installation).

Engine Lubrication System

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Exploded View

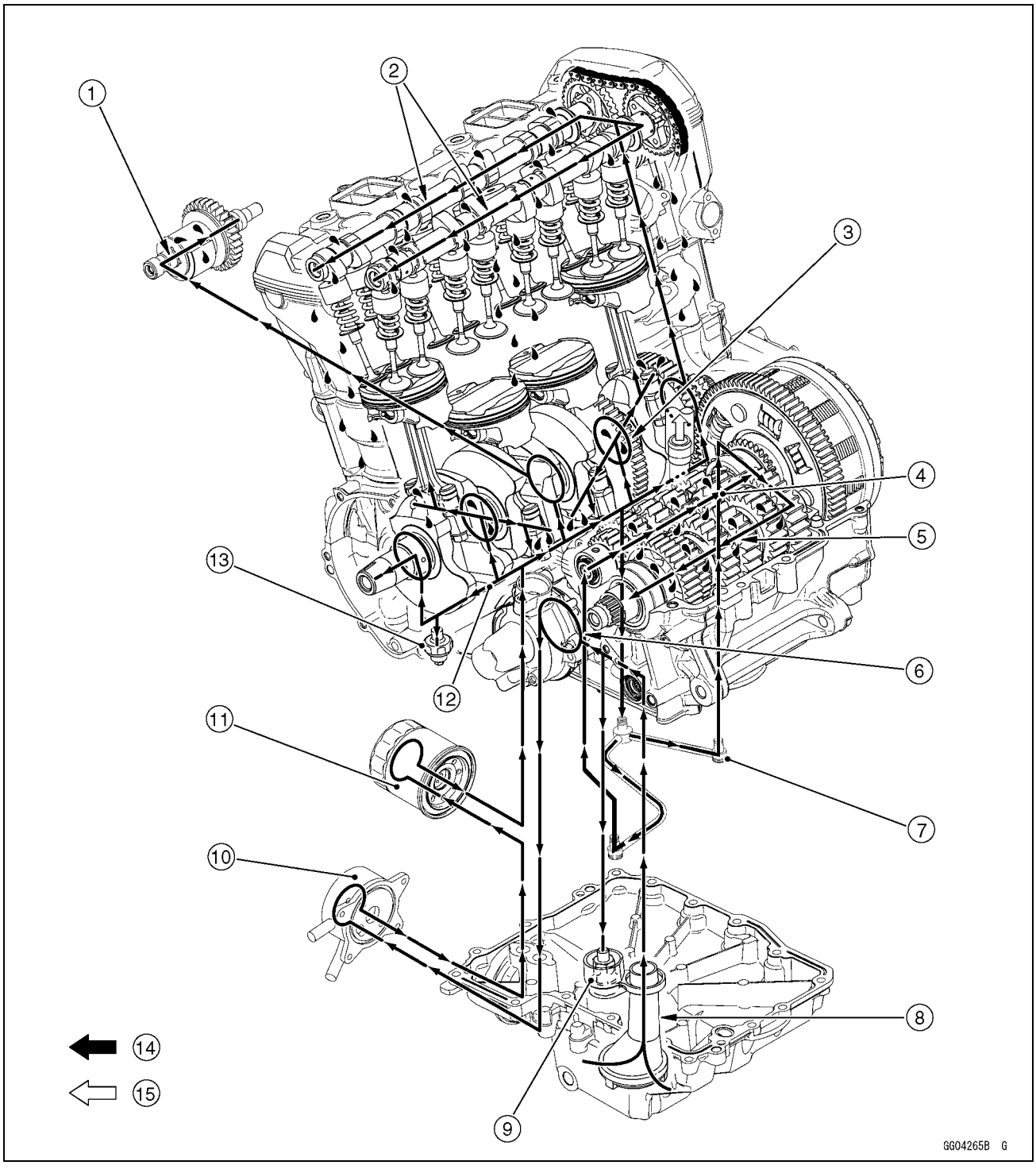


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Oil Cooler Bolts	12	1.2	106 in·lb	L
2	Oil Filler Plug	Hand -tighten	-	-	
3	Oil Passage Plugs	20	2.0	15	L
4	Oil Passage Plug	10	1.0	89 in·lb	
5	Oil Pressure Switch	15	1.5	11	L
6	Oil Pressure Switch Terminal Bolt	2.0	0.20	18 in·lb	G
7	Oil Pressure Relief Valve	15	1.5	11	L
8	Oil Filter	17	1.7	13	G, R
9	Oil Filter Pipe	25	2.5	18	L
10	Engine Oil Drain Bolt	29	3.0	21	
11	Oil Pan Bolts	12	1.2	106 in·lb	S

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

Engine Oil Flow Chart



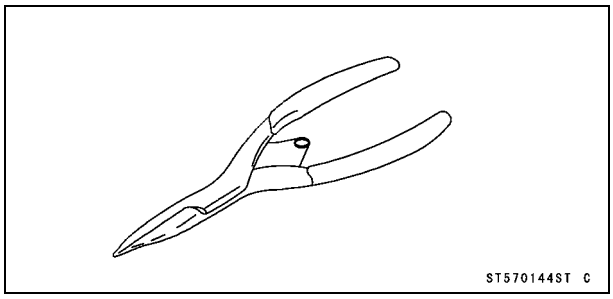
1. Balancer Oil Passage
2. Camshaft Oil Passages
3. Crankshaft Oil Passage
4. Drive Shaft Oil Passage
5. Output Shaft Oil Passage
6. Oil Pump
7. Oil Pipe
8. Oil Screen
9. Oil Pressure Relief Valve
10. Oil Cooler
11. Oil Filter
12. Main Oil Passage
13. Oil Pressure Switch
14. Engine Oil
15. Blowby Gas

Specifications

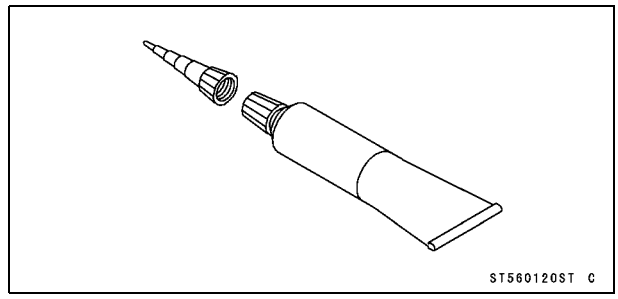
Item	Standard
Engine Oil	
Type	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2
Viscosity	SAE 10W-40
Capacity	3.2 L (3.4 US gt) (when filter is not removed)
	3.8 L (4.0 US gt) (when filter is removed)
	4.0 L (4.2 US gt) (when engine is completely dry)
Level	Between upper and lower level lines (Wait several minutes after idling or running)
Oil Pressure Measurement	
Oil Pressure	255 ~ 304 kPa (2.60 ~ 3.10 kgf/cm², 37.0 ~ 44.1 psi) @4 000 r/min (rpm), Oil Temperature 50°C (122°F)

Special Tools and Sealants

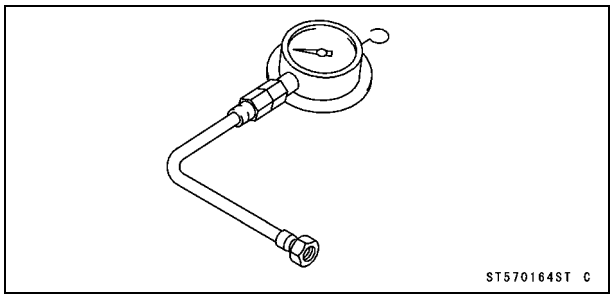
Outside Circlip Pliers:
57001-144



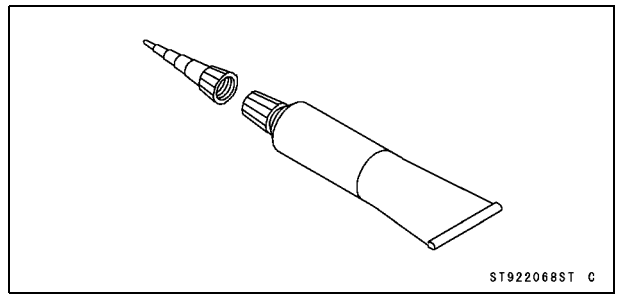
Liquid Gasket, TB1211:
56019-120



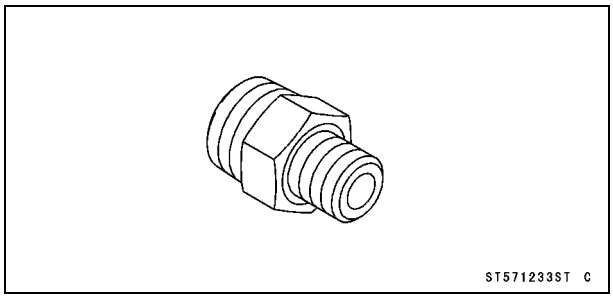
Oil Pressure Gauge, 10 kgf/cm²:
57001-164



Liquid Gasket, TB1207B:
92104-2068



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



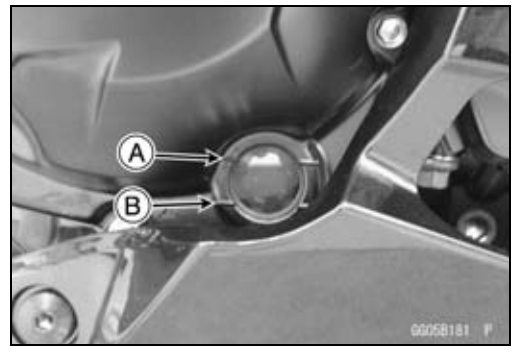
Engine Oil and Oil Filter

⚠ WARNING

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

Oil Level Inspection

● Check that the engine oil level is between the upper [A] and lower [B] levels in the oil level inspection window.



NOTE

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

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

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

NOTICE

Racing the engine before the oil reaches every part can cause engine seizure.
If the engine oil gets extremely low or if the oil pump or oil passages clog up or otherwise do not function properly, the red warning indicator (LED) and oil pressure warning indicator will light. If it stays on when the engine is running above idle speed, stop the engine immediately and find the cause.

★If the oil level is too high, remove the excess oil, using a syringe or some other suitable device.

★If the oil level is too low, add the correct amount of oil through the oil filler opening. Use the same type and make of oil that is already in the engine.

NOTE

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

Engine Oil Change

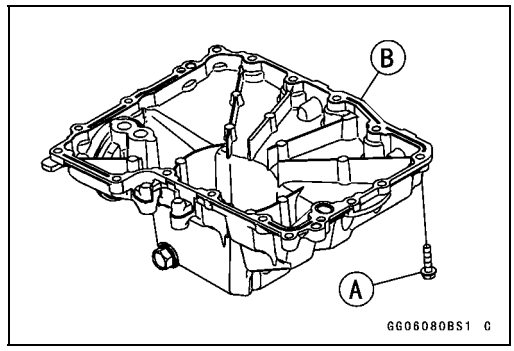
● Refer to the Engine Oil Change in the Periodic Maintenance chapter.

Oil Filter Replacement

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

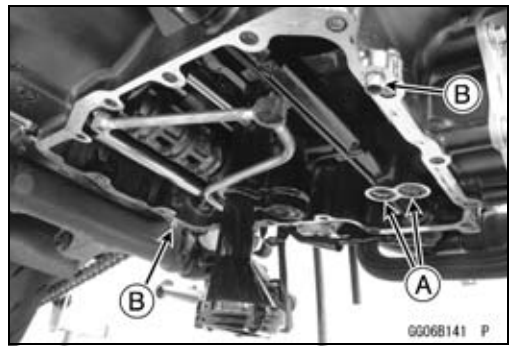
Oil Pan

Oil Pan Removal



- Remove:
  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]
  Oil Pan [B]
- Remove the following parts if necessary.
  Oil Screen (see Oil Screen Removal)
  Oil Pipe (see Oil Pipe Removal)
  Oil Pressure Relief Valve (see Oil Pressure Relief Valve Removal)

Oil Pan Installation



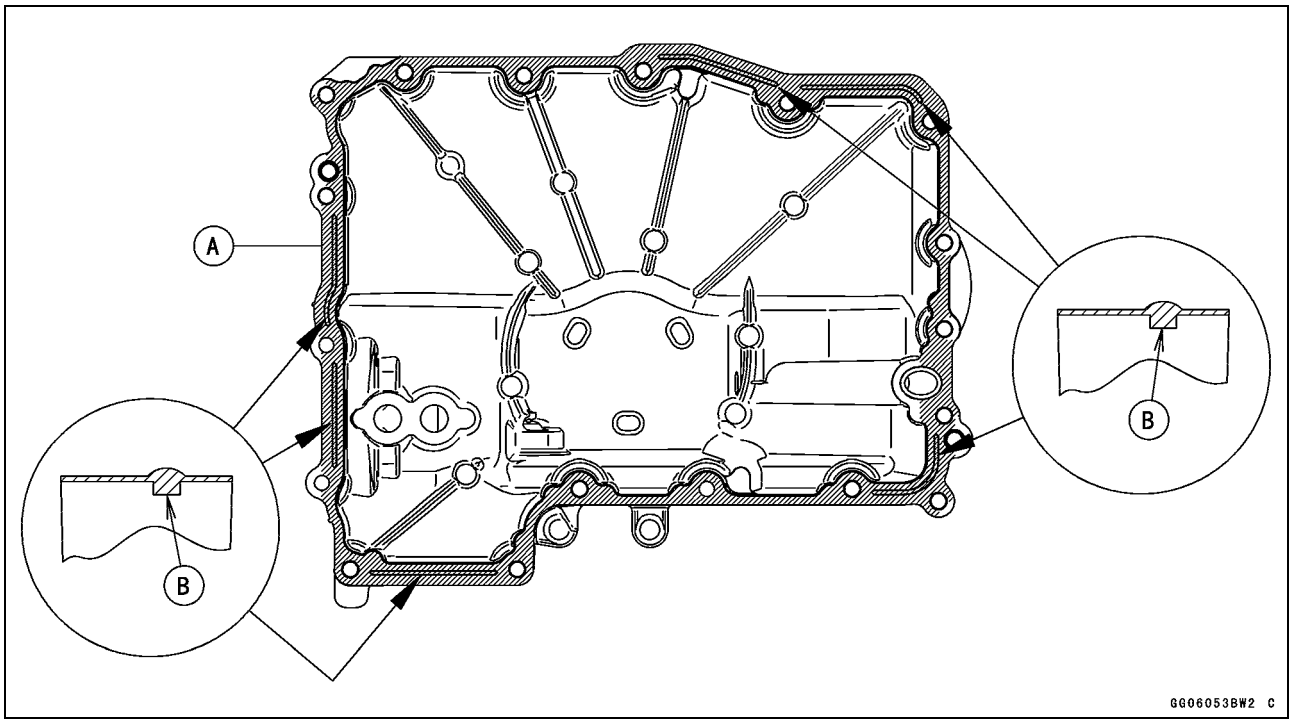
- Install the following parts if removed.
  Oil Pressure Relief Valve (see Oil Pressure Relief Valve Installation)
  Oil Pipe (see Oil Pipe Installation)
  Oil Screen (see Oil Screen Installation)
- Replace the O-rings [A] with new ones.
- Apply grease to the O-rings, and install them.
- Install the dowel pins [B].

- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket [A] to the mating surface of the oil pan.

Sealant - Liquid Gasket, TB1207B: 92104-2068

NOTE

○*Especially, apply liquid gasket so that it shall be filled up on the grooves [B].*



Oil Pan

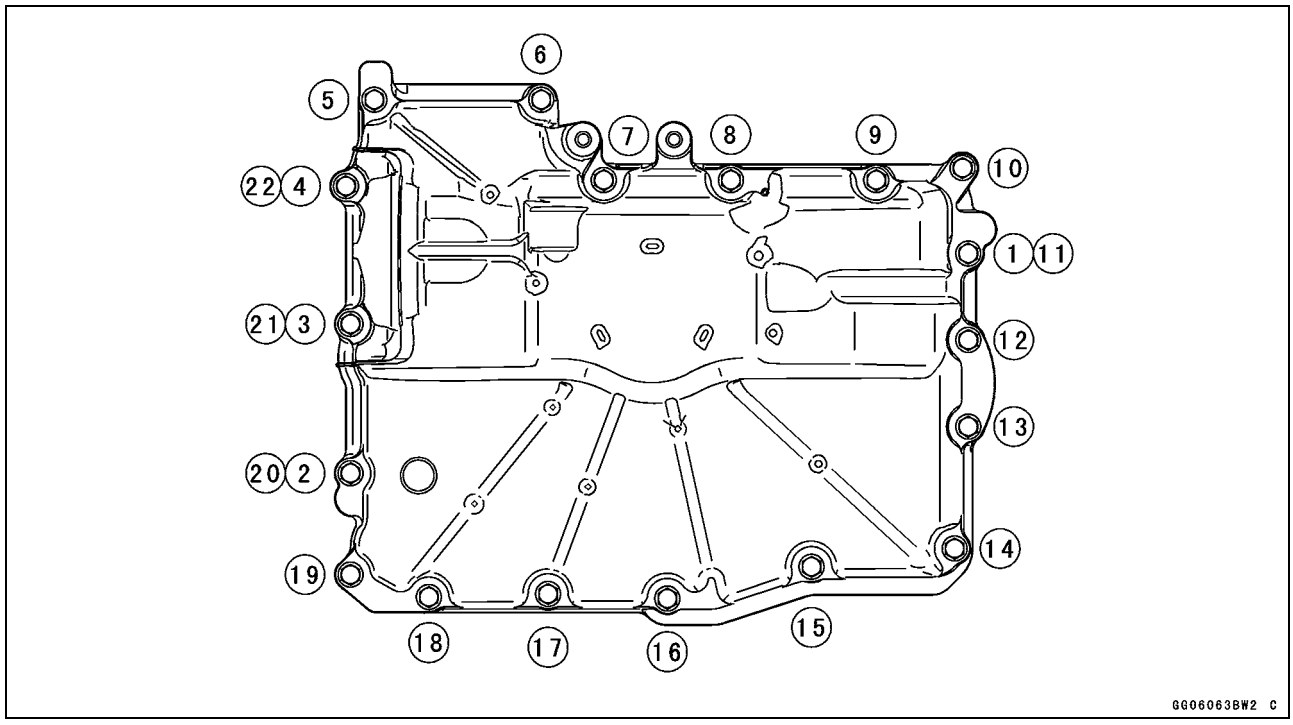
NOTE

○*Make the application finish within 7 minutes when the liquid gasket to the mating surface of the oil pan is applied.*

○*Moreover fit the oil pan and tighten the bolts just after application of the liquid gasket.*

● Tighten the oil pan bolts following sequence [1 ~ 22].

Torque - Oil Pan Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)

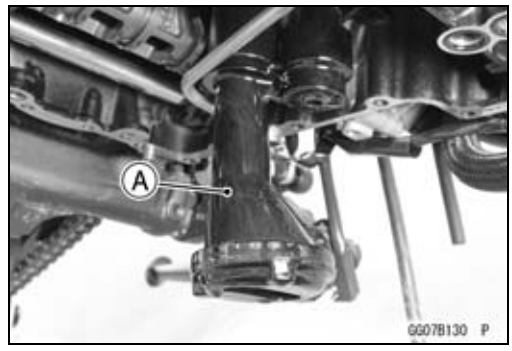


● Install the removed parts (see appropriate chapters).

Oil Screen

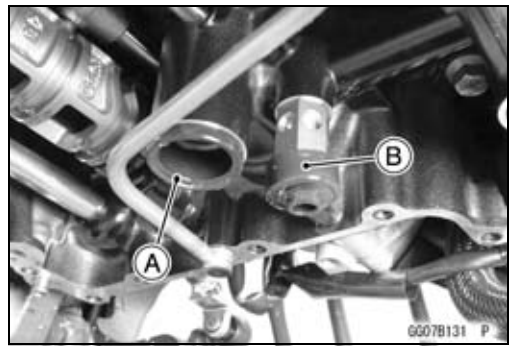
Oil Screen Removal

● Remove:
Oil Pan (see Oil Pan Removal)
Oil Screen [A]



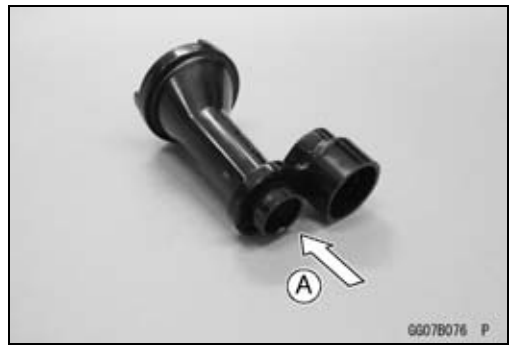
Oil Screen Installation

● Clean the oil screen (see Oil Screen Cleaning).
● Replace the O-ring [A] with a new one, and install it.
● Apply grease to the O-ring.
● Install the rubber damper [B] to the oil pressure relief valve.
● Install:
Oil Screen
Oil Pan (see Oil Pan Installation)



Oil Screen Cleaning

● Remove the oil screen (see Oil Screen Removal).
● Clean the oil screen with a high flash-point solvent and remove the particles stuck.
● Blow away the particles by applying compressed air [A] 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.

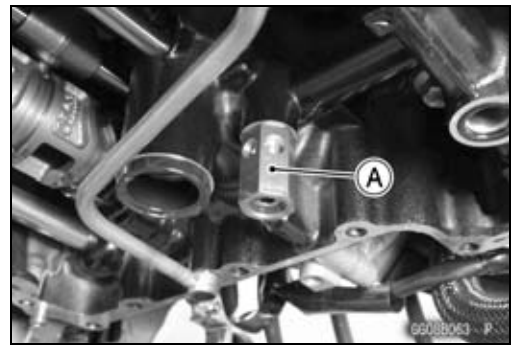
NOTE

○*While cleaning the screen, check for any metal particles that might indicate internal engine damage.*

● Check the screens carefully for any damage.
★If the screen is damaged, replace the oil screen.

Oil Pressure Relief Valve

Oil Pressure Relief Valve Removal



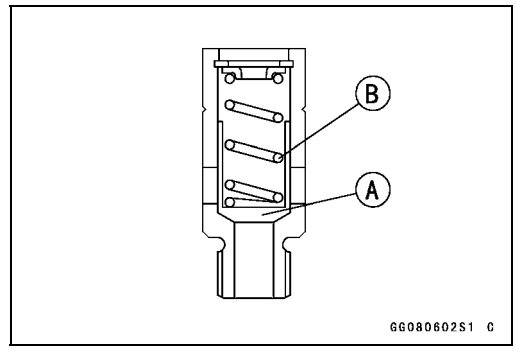
● Remove:
Oil Screen (see Oil Screen Removal)
Oil Pressure Relief Valve [A]

Oil Pressure Relief Valve Installation

● Apply a non-permanent locking agent to the threads of the oil pressure relief valve, and tighten it.

Torque - Oil Pressure Relief Valve: 15 N·m (1.5 kgf·m, 11 ft·lb)

Oil Pressure Relief Valve Inspection



● Check to see if the valve [A] slides smoothly when pushing it in with a wooden or other soft rod, and see if it comes back to its seat by spring [B] pressure.

NOTE

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

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

⚠ WARNING

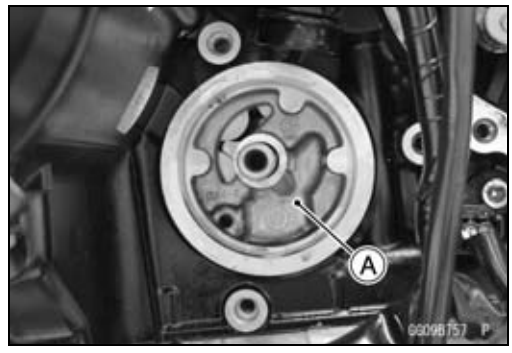
Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the oil pressure relief valve in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline 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.

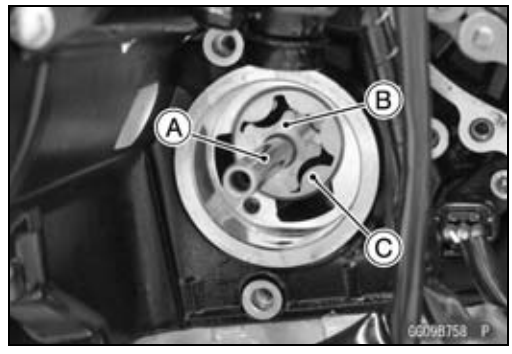
Oil Pump

Oil Pump Removal

● Remove:
Water Pump (see Water Pump Removal in the Cooling System chapter)
Oil Pump Cover [A]

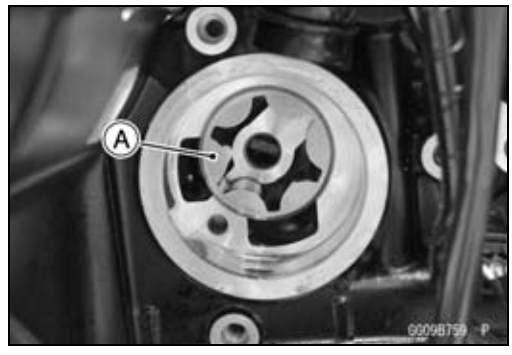


● Remove:
Oil (Water) Pump Shaft [A] with Inner Rotor [B]
Outer Rotor [C]

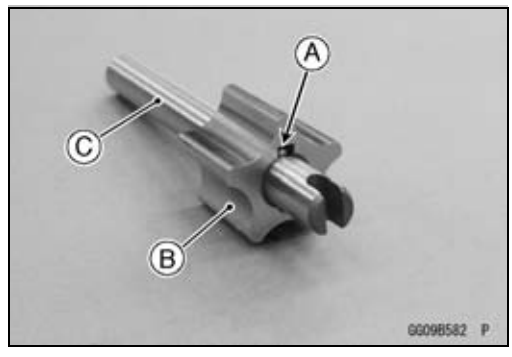


Oil Pump Installation

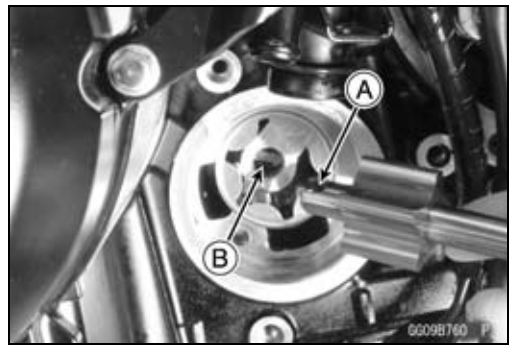
● Install the outer rotor [A] into the crankcase.



● Apply grease to the pin [A].
● Assemble the pin, inner rotor [B] and oil (water) pump shaft [C].

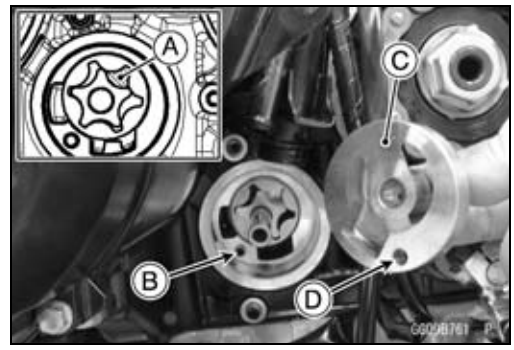


● Turn the pump shaft so that the slot [A] in its shaft fits onto the projection [B] of the pump drive gear shaft.



Oil Pump

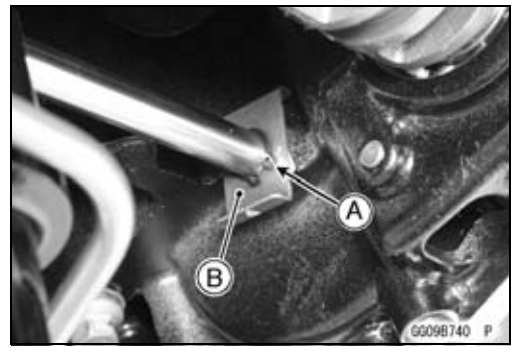
- Pack grease into the cavity [A] between the inner rotor and outer rotor for improve the oil pump initial priming.
- Install the dowel pin [B].
- Install the oil pump cover [C] so that the dowel pin fits into the hole [D] of the oil pump cover.
- Install the water pump (see Water Pump Installation in the Cooling System chapter).



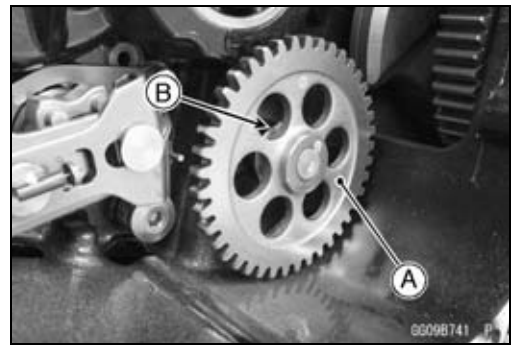
Oil Pump Drive Gear Removal

- Remove:
  Clutch (see Clutch Removal in the Clutch chapter)
  Oil Pan (see Oil Pan Removal)
  Circlip [A] and Washer [B]

  Special Tool - Outside Circlip Pliers: 57001-144

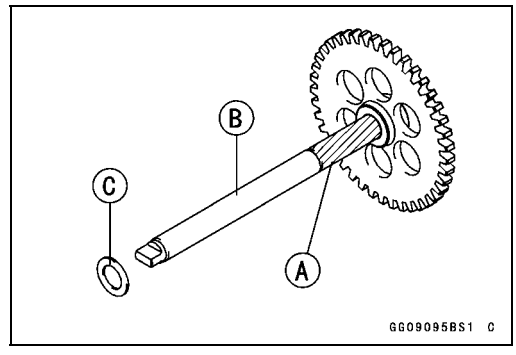


- Remove:
  Oil Pump Drive Gear [A]
  Washer [B]



Oil Pump Drive Gear Installation

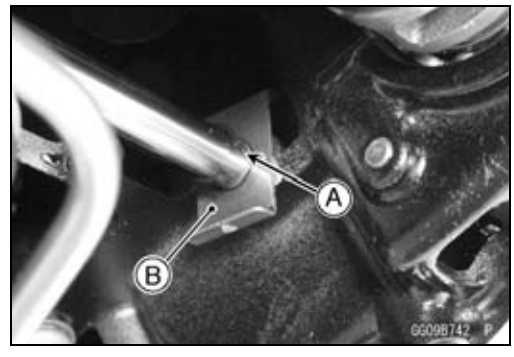
- Apply molybdenum disulfide oil solution to the hole of the oil pump drive gear shaft in the crankcase.
- Apply molybdenum grease to the journal portion [A] on the oil pump drive gear shaft [B].
- Install the washer [C] to the shaft.



- Replace the circlip [A] with a new one.
- Insert the oil pump drive gear to the lower crankcase.
- Install the washer [B] and circlip.

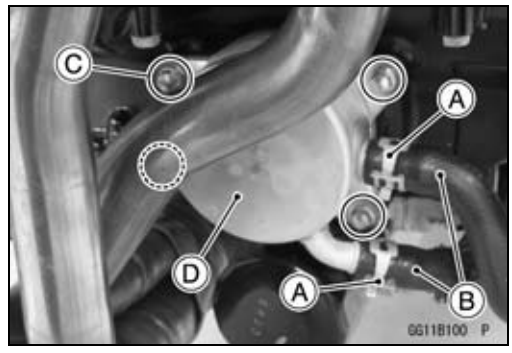
  Special Tool - Outside Circlip Pliers: 57001-144

- Fit the projection on the shaft and oil (water) pump shaft slot.
- Set the circlip to the original position.



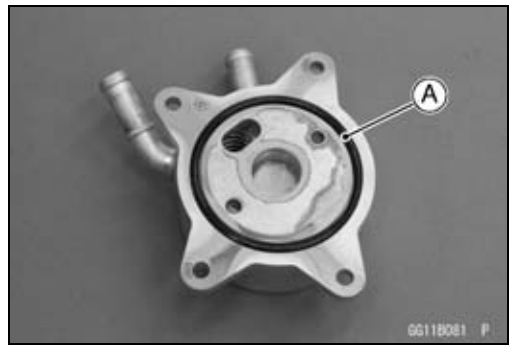
Oil Cooler

Oil Cooler Removal



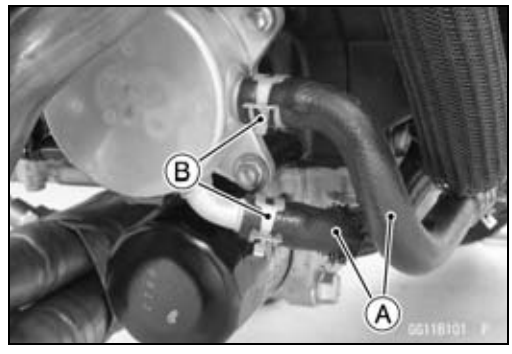
- Drain:
  Coolant (see Coolant Change in the Periodic Maintenance chapter)
  Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
- Slide the water hose clamps [A].
- Disconnect the water hoses [B].
- Remove:
  Oil Cooler Bolts [C]
  Oil Cooler [D]

Oil Cooler Installation



- Replace the O-ring [A] with a new one.
- Apply grease to the O-ring and install it.
- Install the oil cooler.
- Apply a non-permanent locking agent to the threads of the oil cooler bolts.
- Tighten:

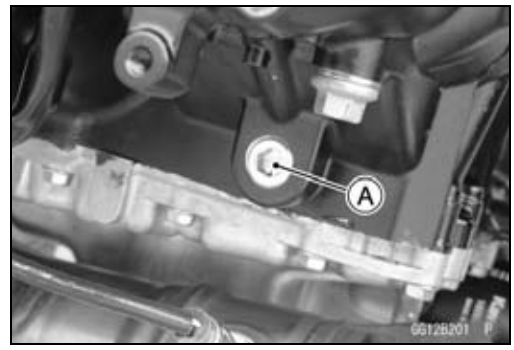
Torque - Oil Cooler Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)



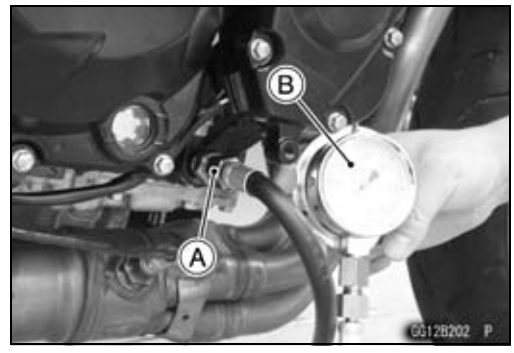
- Install the water hoses [A] and clamps [B] as shown.
- Pour:
  Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
  Coolant (see Coolant Change in the Periodic Maintenance chapter)

Oil Pressure Measurement

Oil Pressure Measurement



- Remove:
  Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Oil Passage Plug [A]



- Attach the adapter [A] and gauge [B] to the plug hole.

Special Tools - Oil Pressure Gauge, 10 kgf/cm²: 57001-164
Oil Pressure Gauge Adapter, PT3/8: 57001 -1233

- Start the engine and warm up the engine.
- Run the engine at the specified speed, and read the oil pressure gauge.

Oil Pressure
Standard: 255 ~ 304 kPa (2.60 ~ 3.10 kgf/cm², 37.0 ~ 44.1 psi) @4 000 r/min (rpm), oil temperature 50°C (122°F)

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

★If the reading is much higher than the standard, check the oil passages for clogging.

- Stop the engine.
- Remove the oil pressure gauge and adapter.

⚠ WARNING

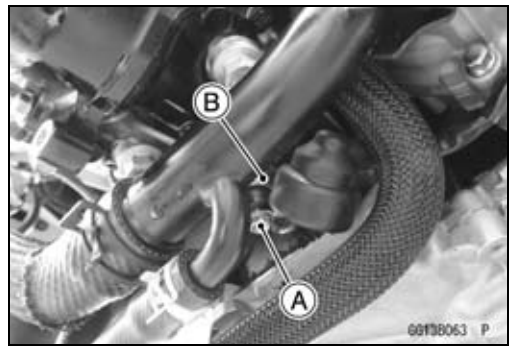
Hot oil can cause severe burns. Beware of hot engine oil that will drain through the oil passage when the gauge adapter is removed.

- Apply a non-permanent locking agent to the oil passage plug, and tighten it.

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

Oil Pressure Switch

Oil Pressure Switch Removal



- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove the left lower fairing (see Lower Fairing Removal in the Frame chapter).
- Slide the switch cover.
- Remove:
  Switch Terminal Bolt [A]
  Oil Pressure Switch [B]

Oil Pressure Switch Installation

- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the threads of the oil pressure switch and tighten it.

Sealant - Liquid Gasket, TB1211: 56019-120

Torque - Oil Pressure Switch: 15 N·m (1.5 kgf·m, 11 ft·lb)

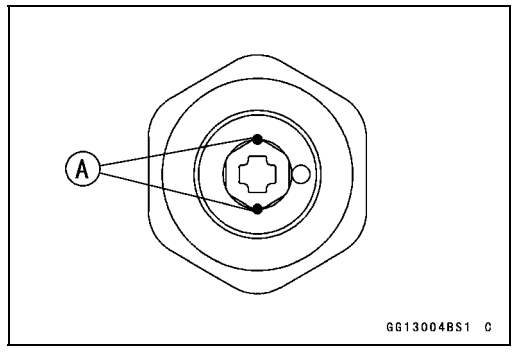
- Install the switch lead (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Tighten:

Torque - Oil Pressure Switch Terminal Bolt: 2.0 N·m (0.20 kgf·m, 18 in·lb)

- Apply grease to the terminal.

NOTE

○*Apply a small amount grease to the terminal so that grease should not close two breather holes [A] for switch diaphragm.*



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

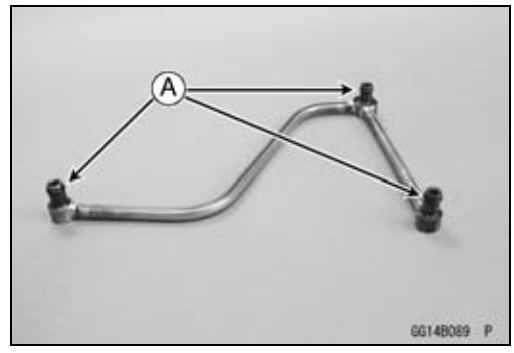
Oil Pipe

Oil Pipe Removal



- Remove:
  Oil Pan (see Oil Pan Removal)
  Oil Pipe [A]

Oil Pipe Installation



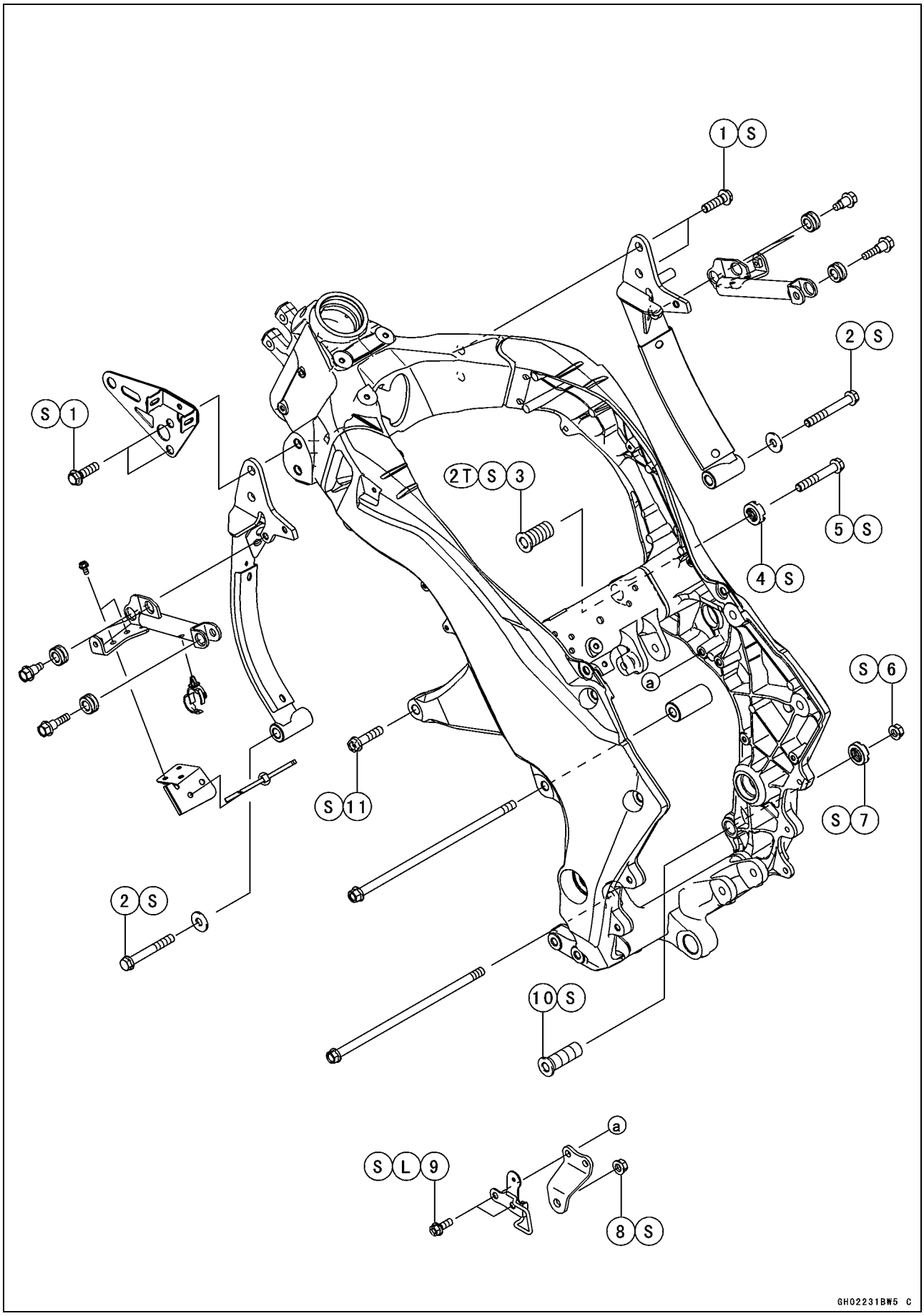
- Replace the O-rings [A] with new ones.
- Apply grease to the O-rings, and install them.
- Install:
  Oil Pipe
  Oil Pan (see Oil Pan Installation)

Engine Removal/Installation

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Exploded View



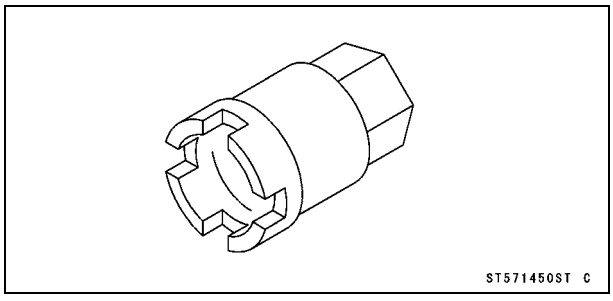
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Upper Engine Bracket Bolts	45	4.6	33	S
2	Lower Engine Bracket Bolts	60	6.1	44	S
3	Upper Adjusting Collar	5.0	0.51	44 in·lb	2T, S
4	Upper Adjusting Collar Locknut	50	5.1	37	S
5	Upper Engine Mounting Bolt (L = 65 mm)	45	4.6	33	S
6	Lower Engine Mounting Nut	45	4.6	33	S
7	Lower Adjusting Collar Locknut	50	5.1	37	S
8	Middle Engine Mounting Nut	45	4.6	33	S
9	Middle Engine Bracket Bolts	25	2.5	18	L, S
10	Lower Adjusting Collar	10	1.0	89 in·lb	S
11	Upper Engine Mounting Bolt (L = 40 mm)	45	4.6	33	S

L: Apply a non-permanent locking agent.
S: Follow the specified tightening sequence.
2T: Apply 2-stroke oil.

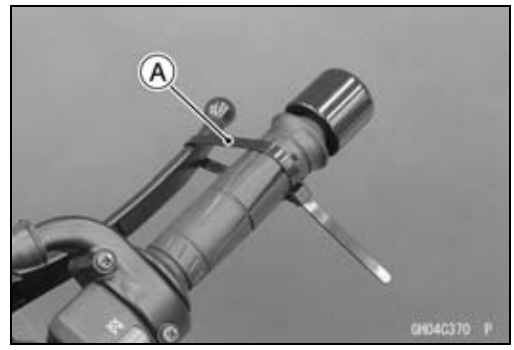
Special Tool

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

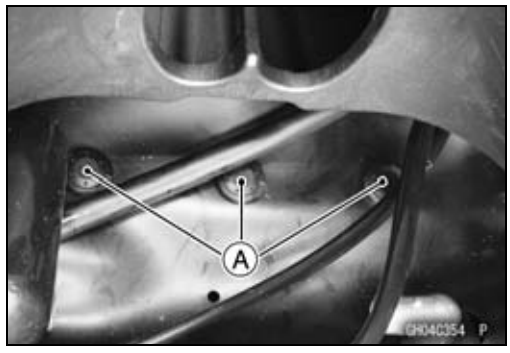
Be sure to hold the front brake when removing the engine, or the motorcycle may fall over. The engine or the motorcycle could be damaged.

- Drain:
  Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
  Coolant (see Coolant Change in the Periodic Maintenance chapter)
- Remove:
  Clutch Cable Lower End (see Clutch 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)
  Air Switching Valve (see Air Switching Valve Removal in the Engine Top End chapter)
  Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
  Shift Lever (see Shift Pedal Removal in the Crankshaft/Transmission chapter)
  Engine Sprocket (see Engine Sprocket Removal in the Final Drive chapter)

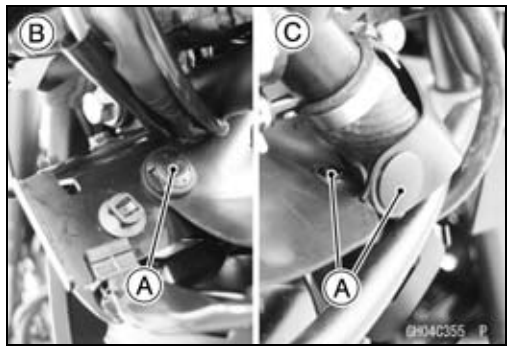
- Disconnect:
  Stick Coil Connectors (see Stick Coil Removal in the Electrical System chapter)
  Alternator Lead Connector (see Alternator Cover Removal in the Electrical System chapter)
  Crankshaft Sensor Lead Connector (see Crankshaft Senor Removal in the Electrical System chapter)
  Starter Motor Cable (see Starter Motor Removal in the Electrical System chapter)
  Water Temperature Sensor Connector (see Water Temperature Sensor Removal/Installation in the Fuel System (DFI) chapter)

Engine Removal/Installation

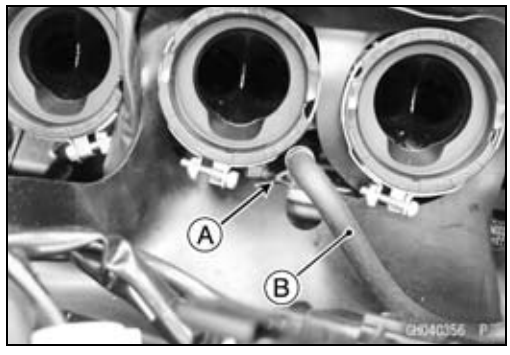
● Remove:
Quick Rivets [A]



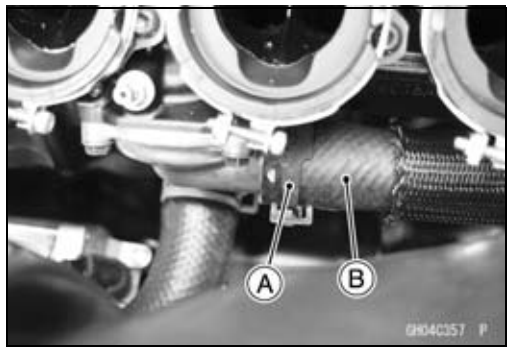
● Remove the quick rivets [A].
Left Side [B]
Right Side [C]



● Slide the clamp [A].
● Disconnect the air bleeder hose [B].
● Remove the heat insulation rubber plate.



● Slide the water hose clamp [A].
● Disconnect the water hose [B].

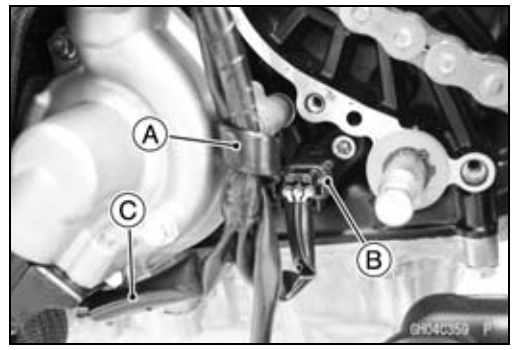


● Disconnect the connector [A] from bracket.

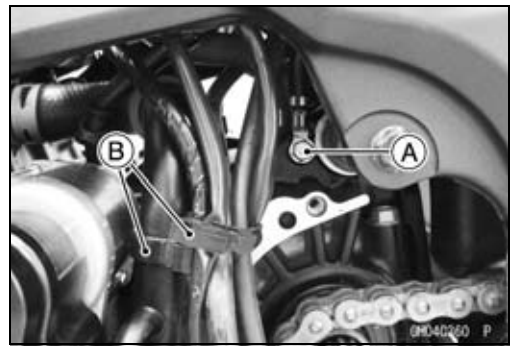


Engine Removal/Installation

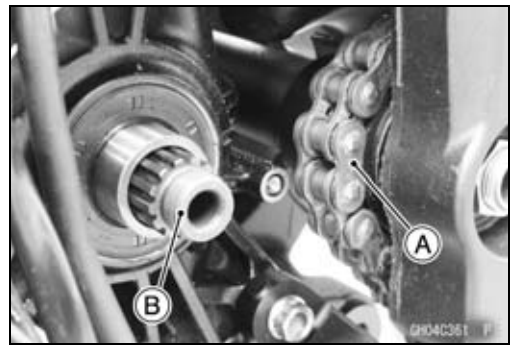
- Open the clamp [A].
- Disconnect:
  Gear Position Sensor Connector [B]
  Oil Pressure Switch Lead [C]



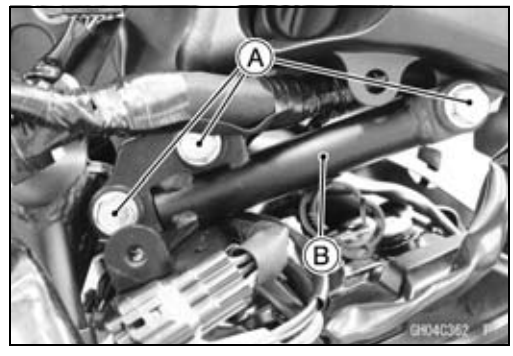
- Remove:
  Engine Ground Cable Terminal Bolt [A]
  Clamps [B]



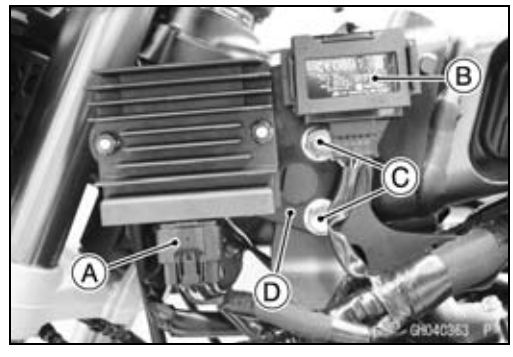
- Remove the drive chain [A] from the output shaft [B].



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

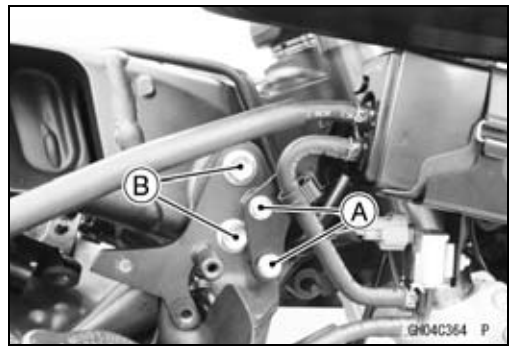


- Disconnect the regulator/rectifier connector [A].
- Remove:
  Immobilizer Amplifier [B] (Equipped Models)
  Left Upper Engine Bracket Bolts [C]
  Regulator/Rectifier with Bracket [D]

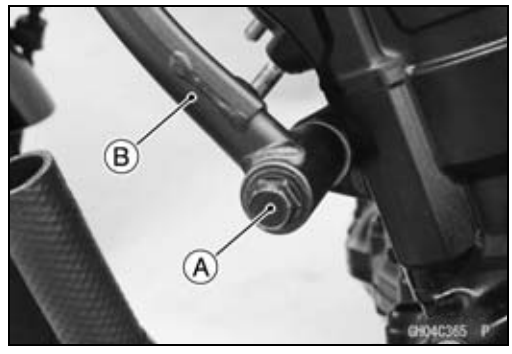


Engine Removal/Installation

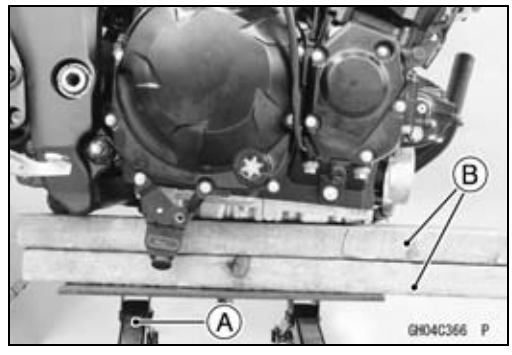
● Remove:
Canister Bracket Bolts [A] (Other than US and CA Models)
Right Upper Engine Bracket Bolts [B]



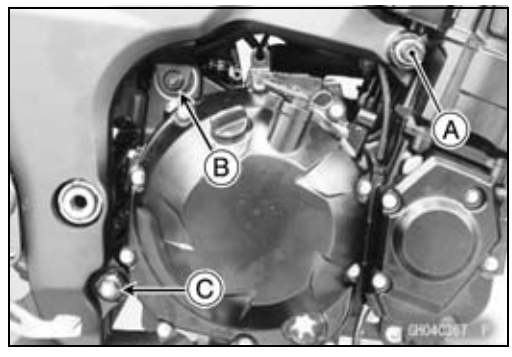
● Remove:
Lower Engine Bracket Bolt [A] and Washer (Both Sides)
Engine Bracket [B] (Both Sides)



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



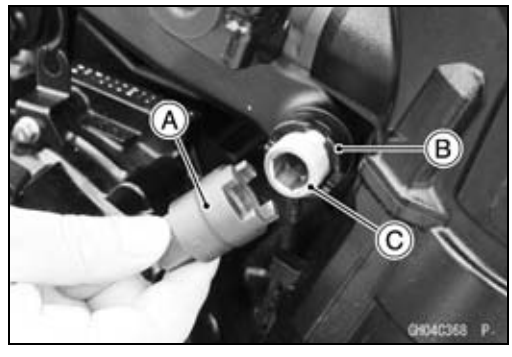
● Remove:
Upper Engine Mounting Bolt [A] (Both Sides)
Middle Engine Mounting Nut [B] and Bolt
Lower Engine Mounting Nut [C]



● Using the nut wrench [A], loosen the upper adjusting collar locknut [B].

Special Tool - Engine Mount Nut Wrench: 57001-1450

● Using the hexagon wrench, turn the adjusting collar [C] counterclockwise to make the gap between the engine and adjusting collar.

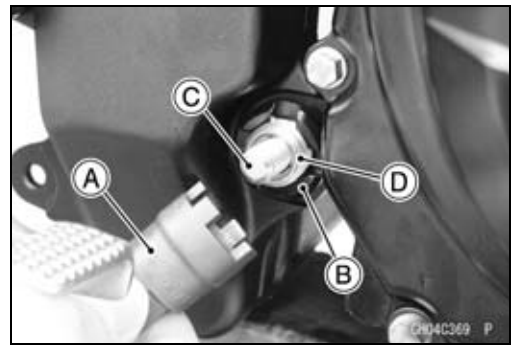


Engine Removal/Installation

● Using the nut wrench [A], loosen the lower adjusting collar locknut [B].

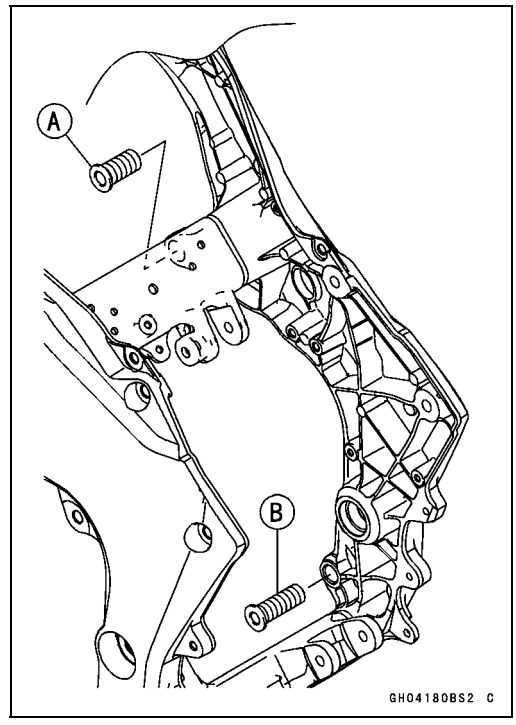
Special Tool - Engine Mount Nut Wrench: 57001-1450

● Remove the lower engine mounting bolt [C].
● Using the hexagon wrench, turn the adjusting collar [D] counterclockwise to make the gap between the engine and adjusting collar.
● Using the suitable stand, take out the engine.



Engine Installation

● Support the engine with a suitable stand.
○Put a plank onto the suitable stand for engine balance.
● Apply 2-stroke oil to the upper adjusting collar [A].
● Screw the upper adjusting collar and lower adjusting collar [B] to the frame.



Engine Removal/Installation

● Install the engine mounting bolts and nuts, following the specified installing sequence.
○First, hang the drive chain over the output shaft just before moving the engine into its final position in the frame.
○Second, apply a non-permanent locking agent to the threads of the middle engine bracket bolts [A]. Install the middle engine bracket [B] and clamp [C], tighten the middle engine bracket bolts.

Torque - Middle Engine Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

○Third, insert the lower engine mounting bolt [D].
○Forth, install the collar [E], and insert the middle engine mounting bolt [F].
○Fifth, tighten the left upper engine mounting bolt [G].

Torque - Upper Engine Mounting Bolt (L = 40 mm): 45 N·m (4.6 kgf·m, 33 ft·lb)

○Sixth, tighten the upper adjusting collar locknut [H] and right upper engine mounting bolt [I] temporarily.
○Seventh, tighten the lower adjusting collar [J].

Torque - Lower Adjusting Collar: 10 N·m (1.0 kgf·m, 89 in·lb)

○Eighth, tighten the lower adjusting collar locknut [K] and lower engine mounting nut [L].

Torque - Lower Adjusting Collar Locknut: 50 N·m (5.1 kgf·m, 37 ft·lb)
Lower Engine Mounting Nut: 45 N·m (4.6 kgf·m, 33 ft·lb)

Special Tool - Engine Mount Nut Wrench: 57001-1450

○Ninth, tighten the middle engine mounting nut [M].

Torque - Middle Engine Mounting Nut: 45 N·m (4.6 kgf·m, 33 ft·lb)

○Tenth, install the left engine bracket [N], and tighten the mounting bolts temporarily.
○Eleventh, install the bracket [O], and tighten the mounting bolts [P].
○Twelfth, tighten the engine bracket bolts and bracket mounting bolts evenly.

Torque - Upper Engine Bracket Bolts [Q]: 45 N·m (4.6 kgf·m, 33 ft·lb)
Lower Engine Bracket Bolts [R]: 60 N·m (6.1 kgf·m, 44 ft·lb)

○Thirteenth, install the right engine bracket [S] just like the left engine bracket.
○Fourteenth, remove the right upper engine mounting bolt.
○Fifteenth, tighten the upper adjusting collar [T].

Torque - Upper Adjusting Collar: 5.0 N·m (0.51 kgf·m, 44 in·lb)

○Sixteenth, tighten the upper adjusting collar locknut [H].

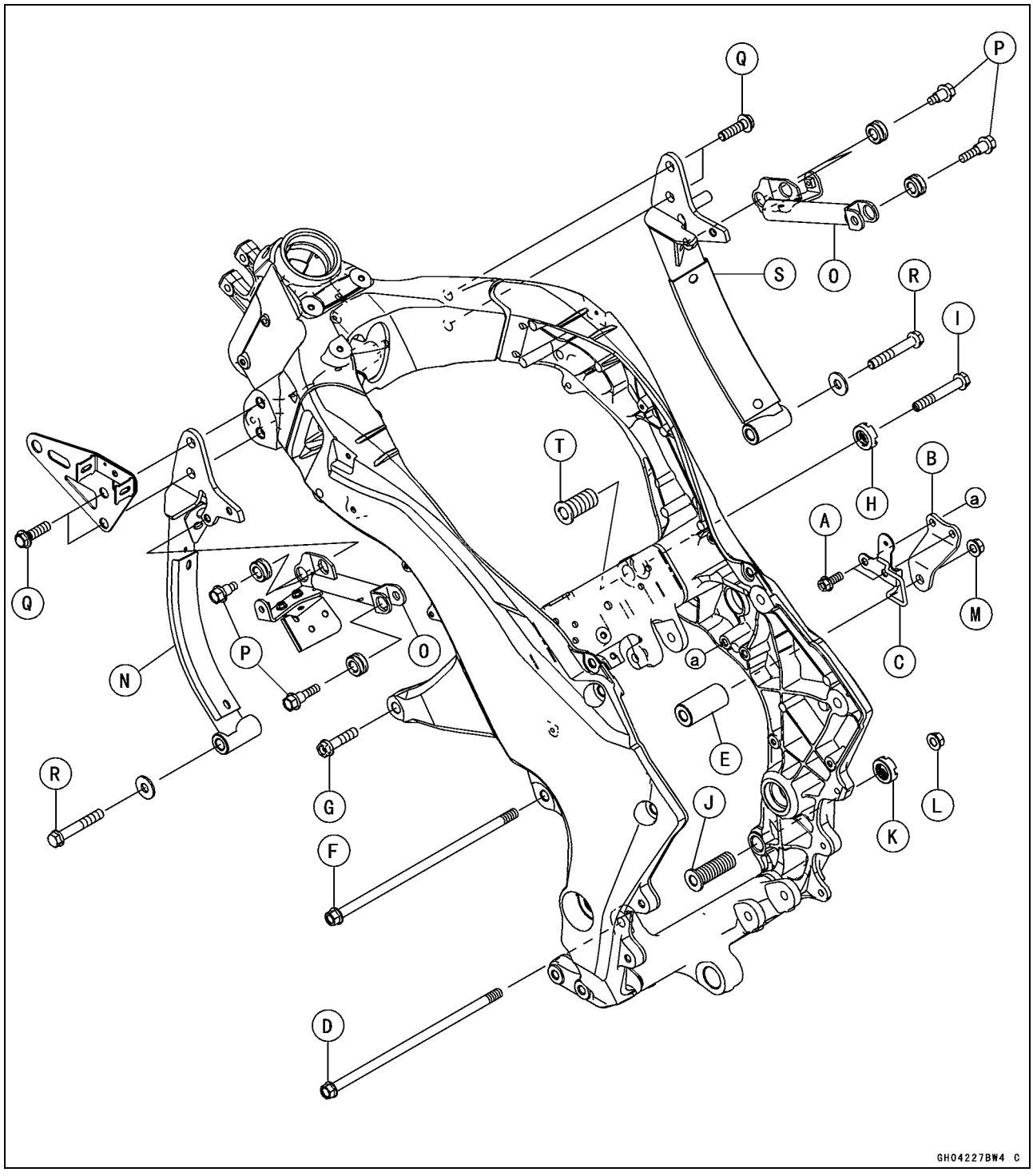
Torque - Upper Adjusting Collar Locknut: 50 N·m (5.1 kgf·m, 37 ft·lb)

Special Tool - Engine Mount Nut Wrench: 57001-1450

○Lastly, tighten the right upper engine mounting bolt [I].

Torque - Upper Engine Mounting Bolt (L = 65 mm): 45 N·m (4.6 kgf·m, 33 ft·lb)

Engine Removal/Installation



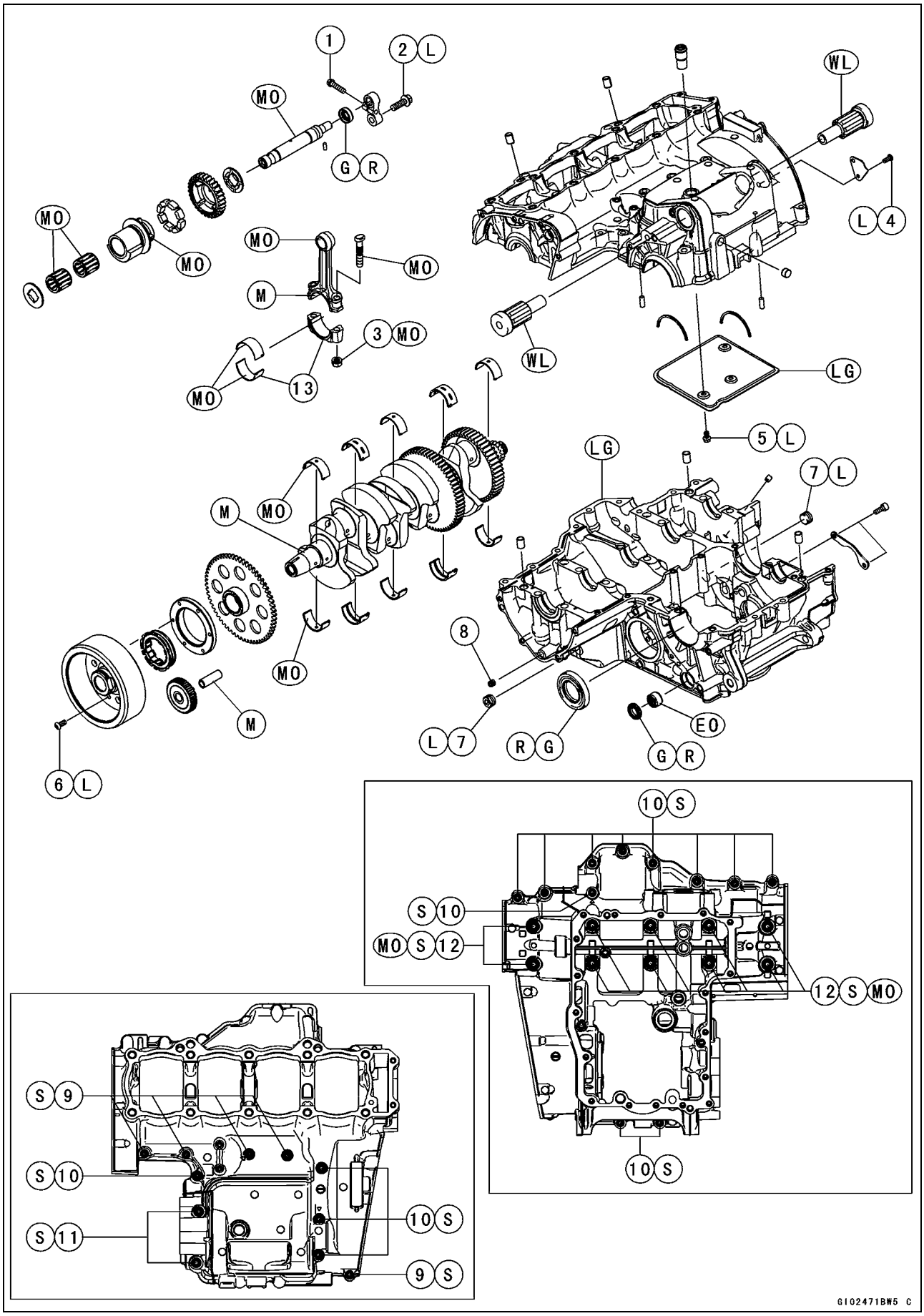
- Run the leads, cables and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).
- Adjust:
  Throttle Cables (see Throttle Control System Inspection in the Periodic Maintenance chapter)
  Clutch Cable (see Clutch Operation Inspection in the Periodic Maintenance chapter)
  Drive Chain (see Drive Chain Slack Inspection in the Periodic Maintenance chapter)
- Fill the engine with engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Fill the engine with coolant (see Coolant Change in the Periodic Maintenance chapter).

Crankshaft/Transmission

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Exploded View

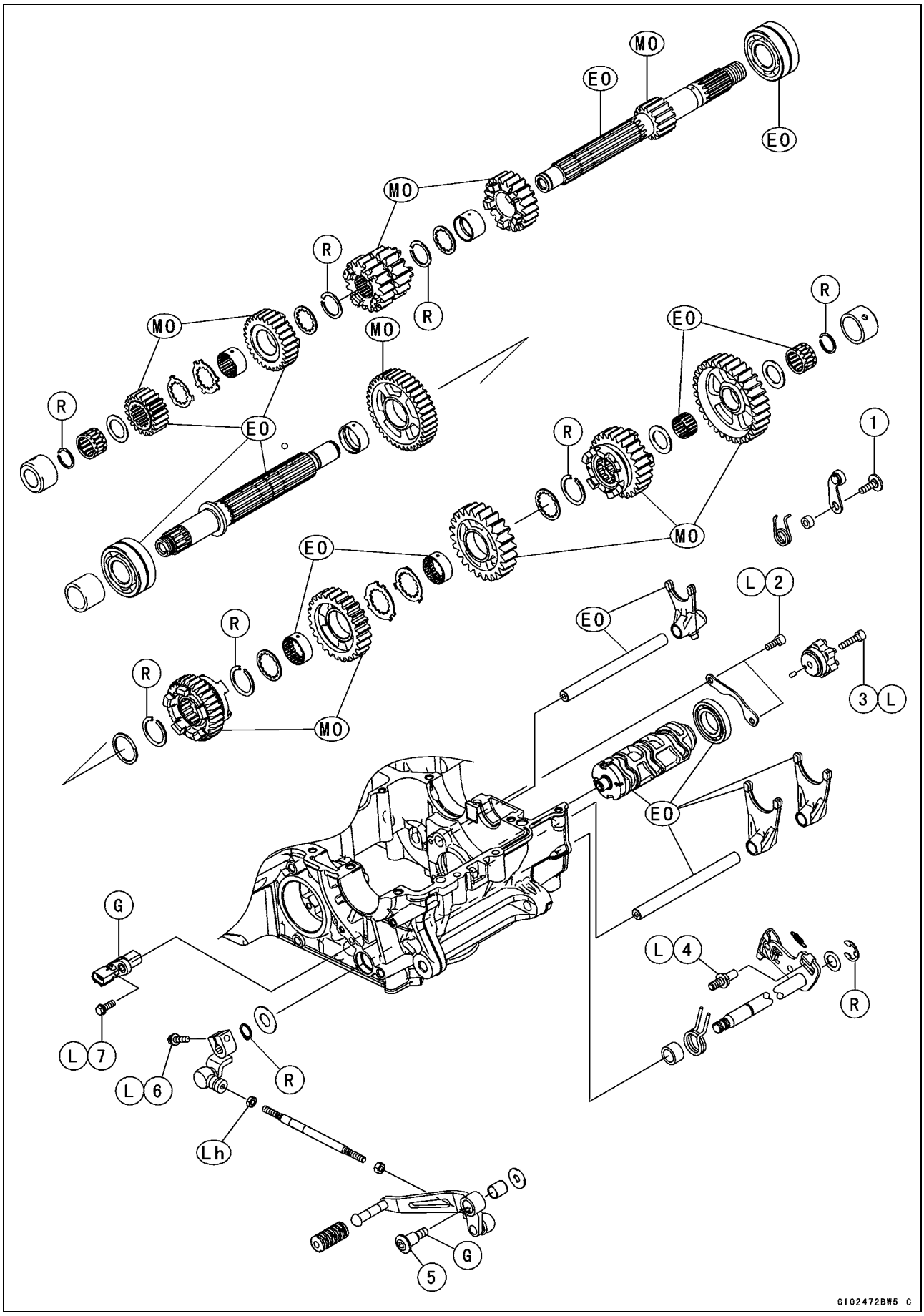


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Balancer Shaft Clamp Bolt	10	1.0	89 in·lb	
2	Balancer Shaft Clamp Lever Bolt	25	2.5	18	L
3	Connecting Rod Big End Nuts	see the text	←	←	MO
4	Breather Side Plate Bolt	6.0	0.61	53 in·lb	L
5	Breather Plate Bolts	10	1.0	89 in·lb	L
6	Starter Motor Clutch Bolts	12	1.2	106 in·lb	L
7	Oil Passage Plugs	20	2.0	15	L
8	Oil Passage Plug	10	1.0	89 in·lb	
9	Crankcase Bolts (M6)	12	1.2	106 in·lb	S
10	Crankcase Bolts (M7)	20	2.0	15	S
11	Crankcase Bolts (M8)	27	2.8	20	S
12	Crankcase Bolts (M9)	44	4.5	32	MO, S

13. Do not apply any grease or oil.
EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
LG: Apply liquid gasket.
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.
WL: Apply soap and water solution or rubber lubricant.

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Gear Positioning Lever Bolt	12	1.2	106 in·lb	
2	Shift Drum Bearing Holder Bolts	12	1.2	106 in·lb	L
3	Shift Drum Cam Holder Bolt	12	1.2	106 in·lb	L
4	Shift Shaft Return Spring Pin	39	4.0	29	L
5	Shift Pedal Mounting Bolt	25	2.5	18	G
6	Shift Lever Clamp Bolt	10	1.0	89 in·lb	L
7	Gear Position Sensor Bolt	10	1.0	89 in·lb	L

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

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.)	0.6 mm (0.024 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 (1.357 in.)
Marking:		
None	34.484 ~ 34.492 mm (1.3576 ~ 1.3579 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 ~ 1.4766 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)	
	0.20 ~ 0.32 mm (0.0079 ~ 0.0126 in.)	– – –
Crankshaft Side Clearance	0.09 ~ 0.19 mm (0.0035 ~ 0.0075 in.)	0.39 mm (0.0154 in.)
Crankshaft #3 Main Journal Width	23.49 ~ 23.54 mm (0.9248 ~ 0.9268 in.)	– – –
Crankshaft Runout	TIR 0.02 mm (0.0008 in.) or less	TIR 0.05 mm (0.0020 in.)
Crankshaft Main Bearing Insert/Journal Clearance	0.010 ~ 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 (1.376 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 ~ 1.4963 in.)	– – –
None	38.009 ~ 38.016 mm (1.4964 ~ 1.4967 in.)	– – –

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.)	– – –
Transmission		
Shift Fork Ear Thickness	5.9 ~ 6.0 mm (0.232 ~ 0.236 in.)	5.8 mm (0.23 in.)
Gear Groove Width	6.05 ~ 6.15 mm (0.238 ~ 0.242 in.)	6.3 mm (0.25 in.)
Shift Fork Guide Pin Diameter	6.9 ~ 7.0 mm (0.272 ~ 0.276 in.)	6.8 mm (0.27 in.)
Shift Drum Groove Width	7.05 ~ 7.20 mm (0.278 ~ 0.283 in.)	7.3 mm (0.29 in.)

Connecting Rod Big End Bearing Insert Selection

Con-rod Big End Inside Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Size Color	Part Number
None	○	Brown	92139-0124
None	None	Black	92139-0123
○	○		
○	None	Blue	92139-0122

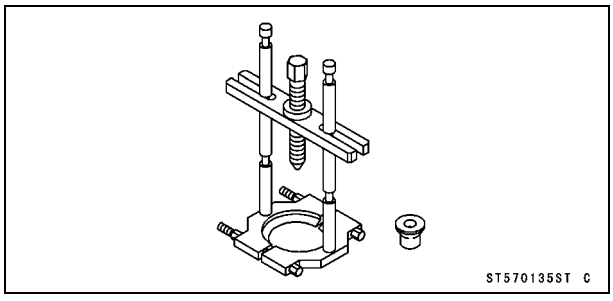
Crankshaft Main Bearing Insert Selection

Crankcase Main Bearing Inside Diameter Marking	Crankshaft Main Journal Diameter Marking	Bearing Insert*		
		Size Color	Part Number	Journal Nos.
○	1	Brown	92139-0034	2, 4
			92139-0219	1, 3, 5
None	1	Black	92139-0033	2, 4
○	None		92139-0218	1, 3, 5
None	None	Blue	92139-0032	2, 4
			92139-0217	1, 3, 5

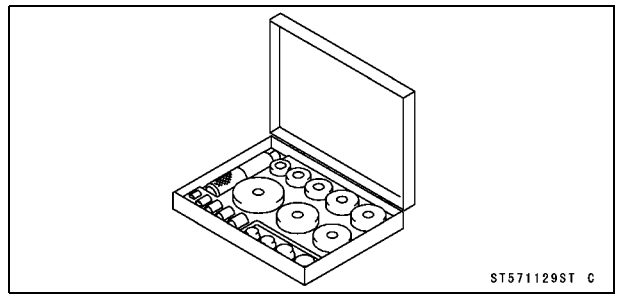
*: The bearing inserts for Nos. 2 and 4 journals have an oil groove, respectively.

Special Tools and Sealants

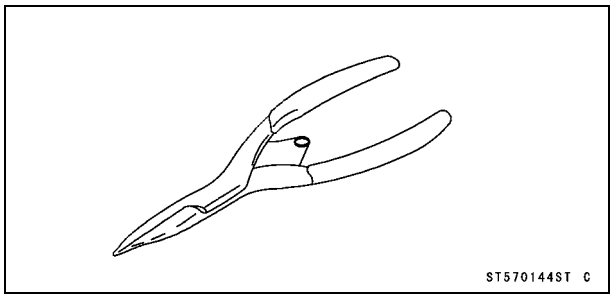
Bearing Puller:
57001-135



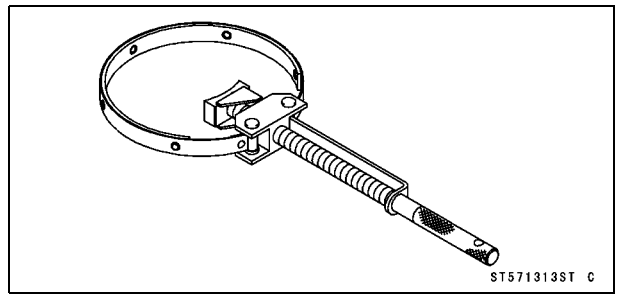
Bearing Driver Set:
57001-1129



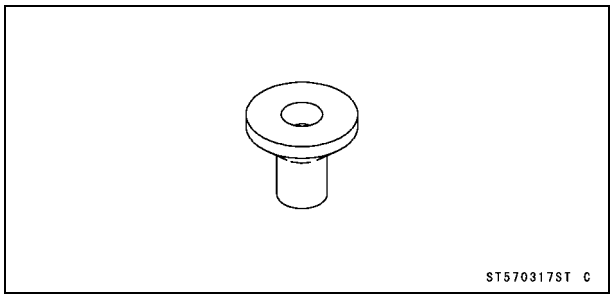
Outside Circlip Pliers:
57001-144



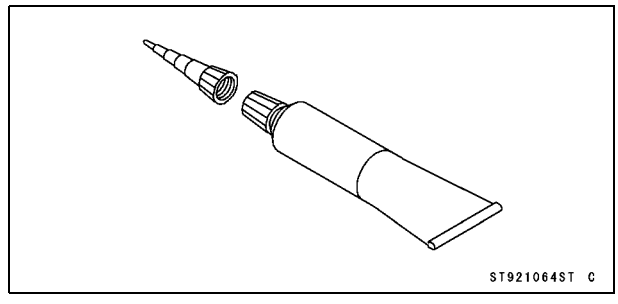
Flywheel Holder:
57001-1313



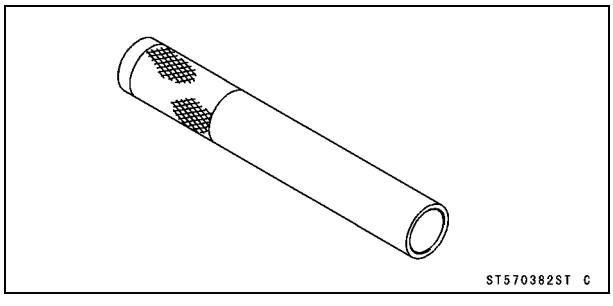
Bearing Puller Adapter:
57001-317



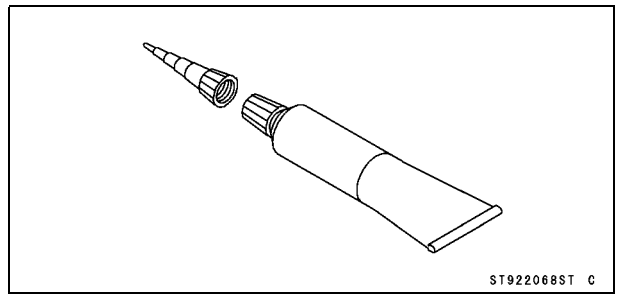
Liquid Gasket, TB1216B:
92104-1064



Bearing Driver, ϕ32:
57001-382



Liquid Gasket, TB1207B:
92104-2068



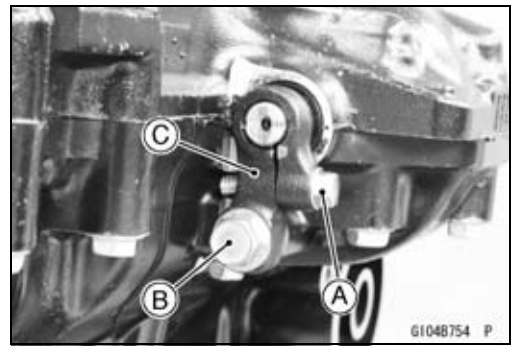
Crankcase Splitting

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 (see Cylinder Removal in the Engine Top End chapter)
  Clutch (see Clutch Removal in the Clutch chapter)
  External Shift Mechanism (see External Shift Mechanism Removal)
  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)
  Oil Filter (see Oil Filter Replacement in the Periodic Maintenance chapter)
  Oil Cooler (see Oil Cooler Removal in the Engine Lubrication System chapter)
  Oil Pipe (see Oil Pipe Removal in the Engine Lubrication System chapter)
  Oil Pressure Relief Valve (see Oil Pressure Relief Valve Removal in the Engine Lubrication System chapter)

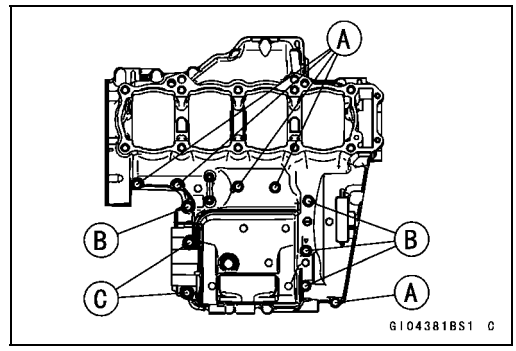
★If the crankshaft is to be removed, remove the pistons (see Piston Removal in the Engine Top End chapter).

- Loosen the balancer shaft clamp bolt [A].
- Remove:
  Balancer Shaft Clamp Lever Bolt [B]
  Balancer Shaft Clamp Lever [C]



- Remove the upper crankcase bolts, following the specified sequence.

○Firstly, loosen the M6 bolts [A].
○Secondly, loosen the M7 bolts [B].
○Lastly, loosen the M8 bolts [C].



Crankcase Splitting

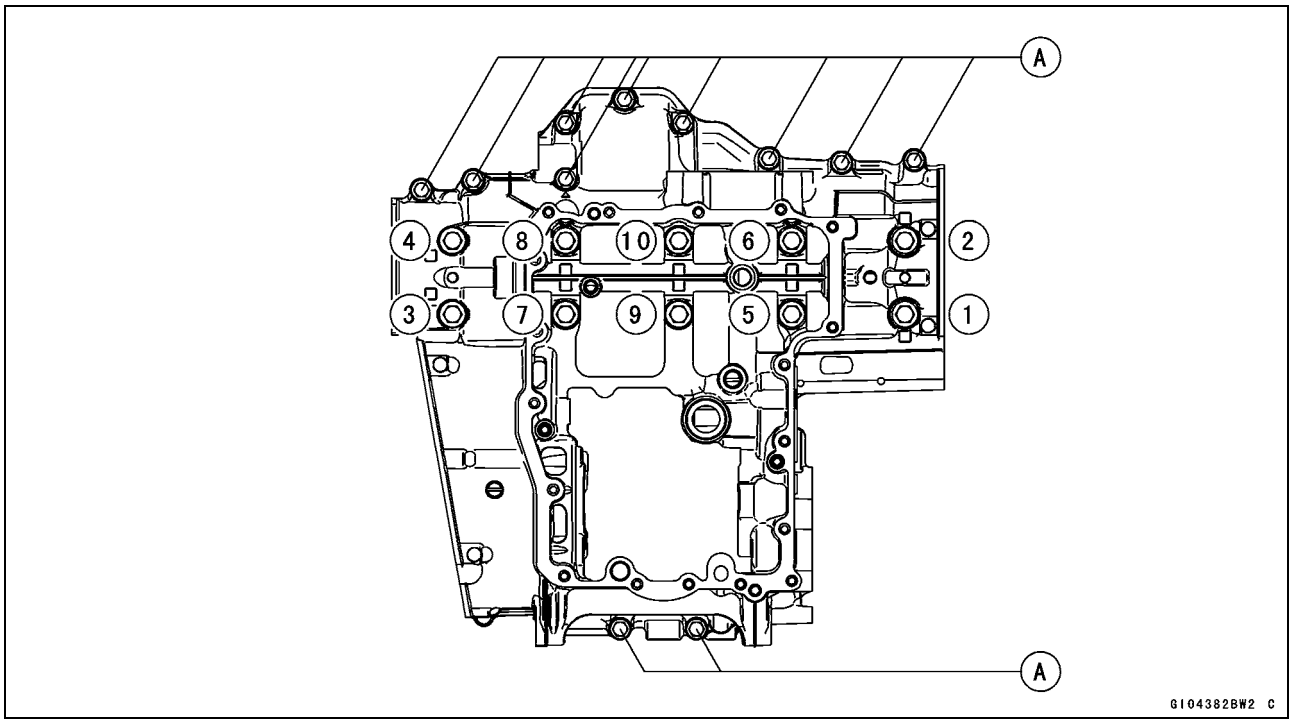
- Remove the lower crankcase bolts, following the specified sequence.

○Firstly, loosen the M7 bolts [A].

○Lastly, loosen the M9 bolts as shown sequence [1 ~ 10].

- Tap lightly around the crankcase mating surface with a plastic mallet, and split the crankcase.

○Take care not to damage the crankcase.



Crankcase Assembly

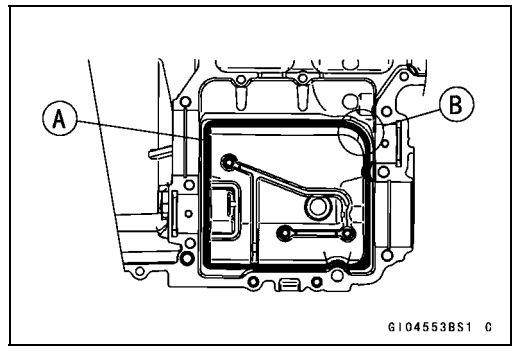
NOTICE
The upper and lower crankcase halves are machined at the factory in the assembled state, so the crankcase halves must be replaced as a set.

- With a high flash-point solvent, clean off the mating surfaces of the crankcase halves and wipe dry.
- Using compressed air, blow out the oil passages in the crankcase halves.

- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the breather plate mating surface [A] 1 mm (0.04 in.) or more thick, and then install the breather plate.

○Apply liquid gasket start from the corner area [B] as shown.

Sealant - Liquid Gasket, TB1207B: 92104-2068



NOTE

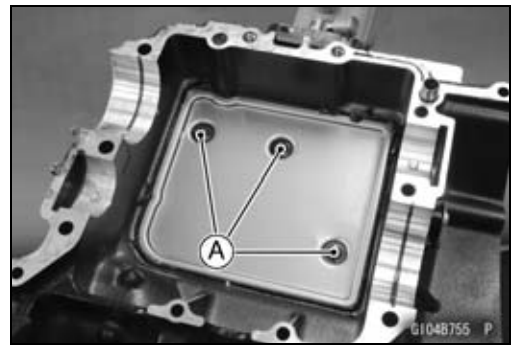
○*Make the application finish within 7 minutes when the liquid gasket to the mating surface of the breather plate is applied.*

○*Moreover fit the plate and tighten the bolts just after application of the liquid gasket.*

Crankcase Splitting

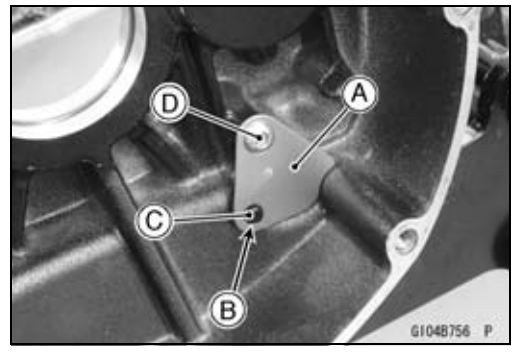
- Apply a non-permanent locking agent to the threads of the breather plate bolts [A] and tighten them.

  Torque - Breather Plate Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)



- Install the breather side plate [A] so that the plate hole [B] fit the projection [C] of the upper crankcase.
- Apply a non-permanent locking agent to the threads of the breather side plate bolt [D] and tighten it.

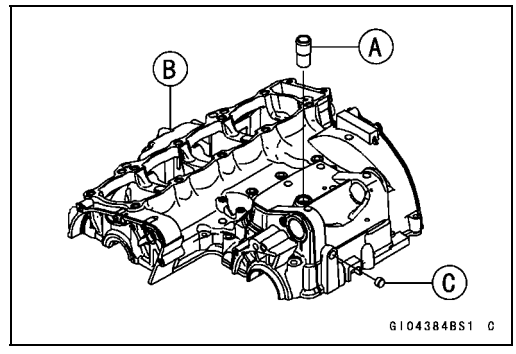
  Torque - Breather Side Plate Bolt: 6.0 N·m (0.61 kgf·m, 53 in·lb)



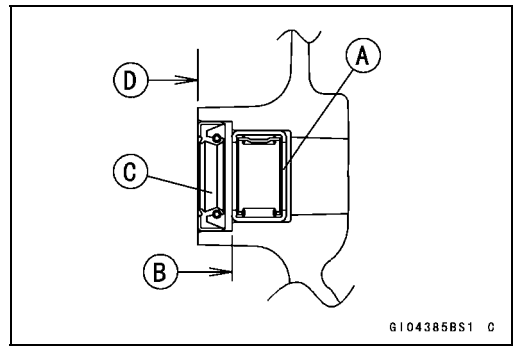
- Press the fitting [A] in the upper crankcase [B] until it is bottomed.

  Special Tool - Bearing Driver Set: 57001-1129

- Press the plug [C] in the upper crankcase so that the plug is deeper than crankcase surface.



- Press the new needle bearing [A] for the shift shaft so that its marked side faces outside and its surface [B] is flush with the end of the hole.
- Install the new oil seal [C] so that its surface [D] is flush with the end of the hole.
- Apply grease to the oil seal lips.

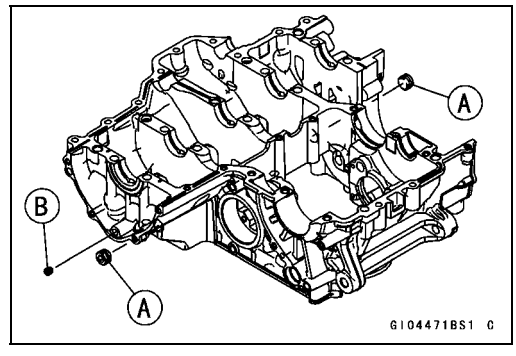


- Apply a non-permanent locking agent to the oil passage plugs [A], and tighten them.

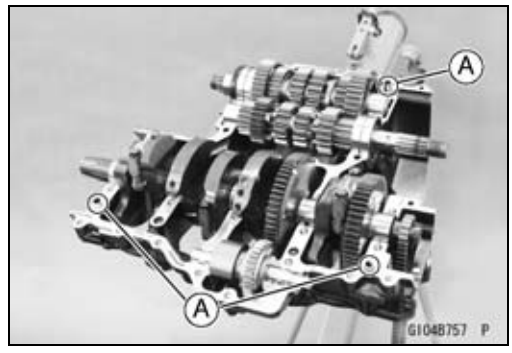
  Torque - Oil Passage Plugs: 20 N·m (2.0 kgf·m, 15 ft·lb)

- Install the oil passage plug [B] in the lower crankcase, and tighten it.

  Torque - Oil Passage Plug: 10 N·m (1.0 kgf·m, 89 in·lb)



Crankcase Splitting



● Install:
Crankshaft (see Crankshaft Installation)
Connecting Rods (see Connecting Rod Installation)
Balancer (see Balancer Installation)
Transmission Shafts (see Transmission Shaft Installation)
Dowel Pins [A]
Shift Drum (see Shift Drum and Fork Installation)
Shift Forks and Shift Rods (see Shift Drum and Fork Installation)

● Before fitting the lower case on the upper case, check the following.
○Be sure to hang the camshaft chain on the crankshaft.
○Check to see that the shift drum and transmission gears are in the neutral position.

● Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
● Apply liquid gasket [A] to the mating surface of the lower crankcase half.

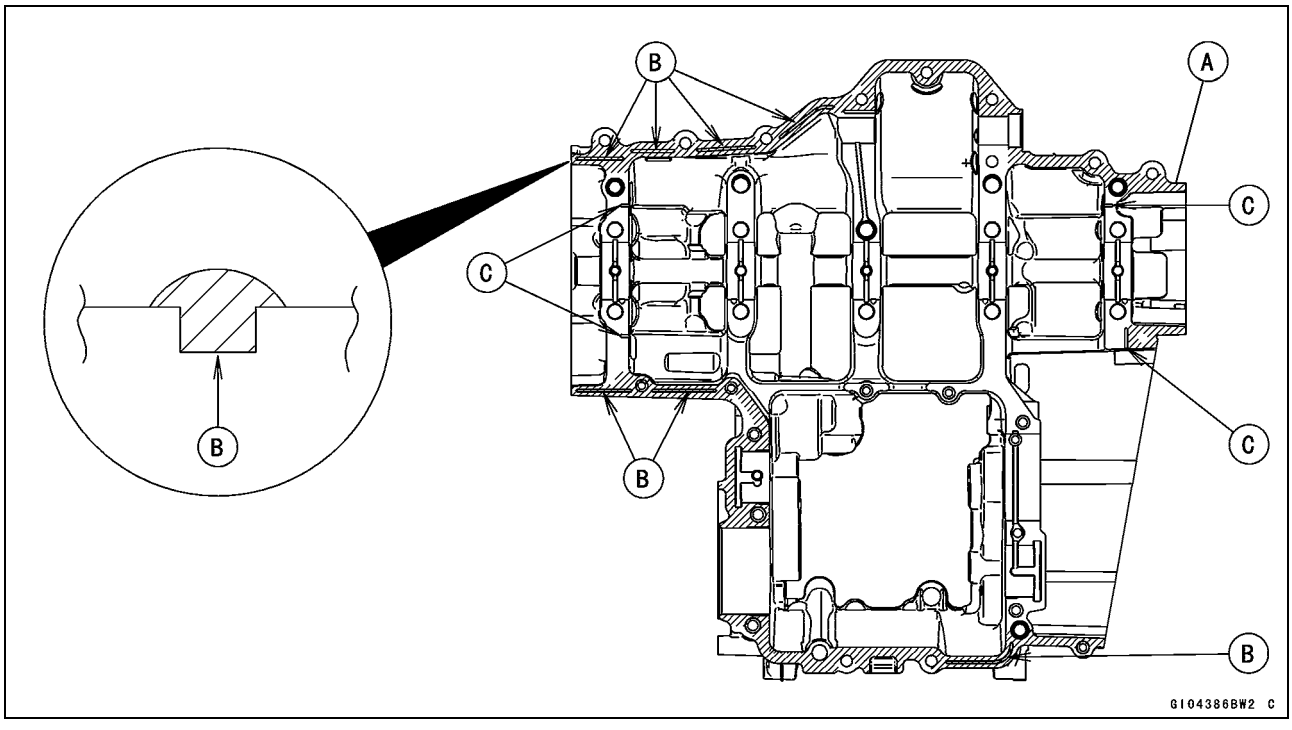
Sealant - Liquid Gasket, TB1216B: 92104-1064

NOTE

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

NOTICE

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



Crankcase Splitting

● Fit the lower crankcase to the upper crankcase.

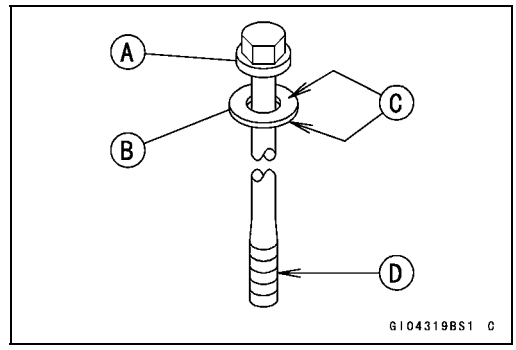
NOTE

○*Make the application finish within 20 minutes when the liquid gasket to the mating surface of the lower crankcase half is applied.*

○*Moreover fit the case and tighten the bolts just after application of the liquid gasket.*

● The M9 bolts [A] have copper plated washers [B], replace them with new ones.

● Apply molybdenum disulfide oil solution to both sides [C] of the copper plated washer and threads [D] of the M9 bolts.



● Tighten the lower crankcase bolts using the following steps.

○Following the sequence numbers on the lower crankcase half, tighten the M9 bolts [1 ~ 10] with copper plated washers.

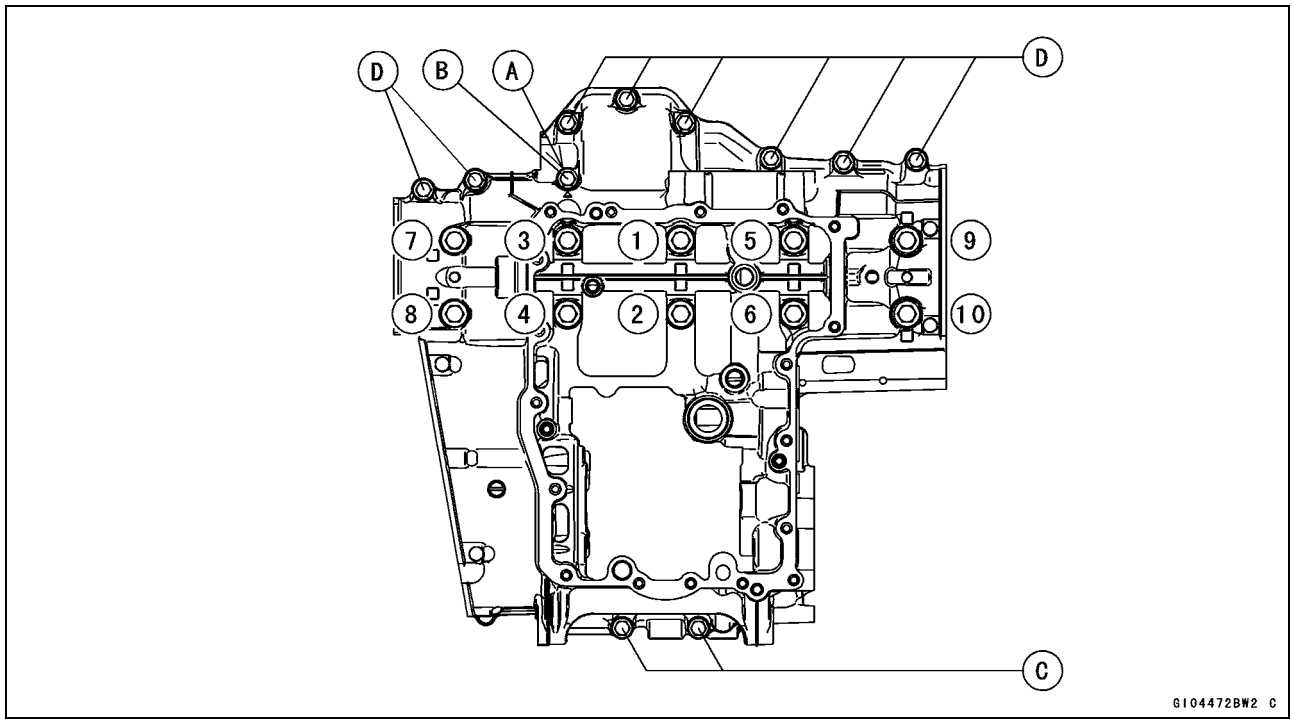
Torque - Crankcase Bolts (M9): 44 N·m (4.5 kgf·m, 32 ft·lb)

○Replace the washer [A] with a new one.

○Tighten the M7 bolts.

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

L = 60 mm (2.36 in.) [B]
L = 50 mm (1.97 in.) [C]
L = 45 mm (1.77 in.) [D]



Crankcase Splitting

● Tighten the upper crankcase bolts using the following steps.

○Tighten the M8 bolts [A].

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

○Replace the washer [B] with a new one.

○Tighten the M7 bolts.

L = 85 mm (3.35 in.) [C]

L = 50 mm (1.97 in.) [D]

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

○Tighten the M6 bolts.

L = 68 mm (2.69 in.) [E]

L = 40 mm (1.57 in.) [F]

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

● After tightening all crankcase bolts, check the following items.

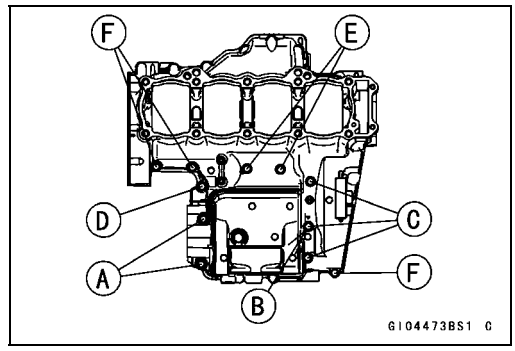
○Wipe up the liquid gasket that seeps out around the crankcase mating surface.

○Crankshaft and transmission shafts turn freely.

○While spinning the output shaft, gears shift smoothly from the 1st to 6th gear, and 6th to 1st.

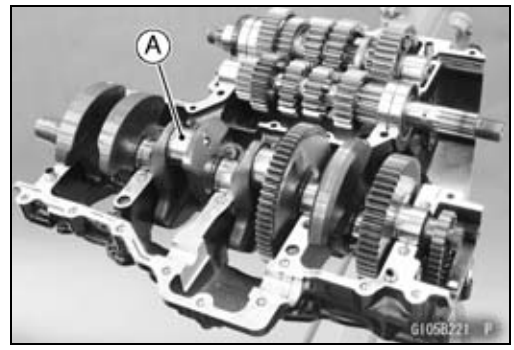
○When the output shaft stays still, the gear can not be shifted to 2nd gear or other higher gear positions.

● Install the removed parts (see appropriate chapters).



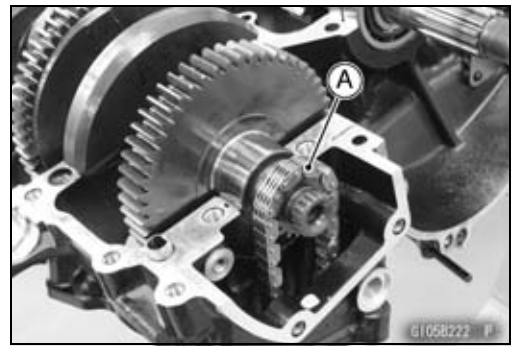
Crankshaft and Connecting Rods

Crankshaft Removal



- Split the crankcase (see Crankcase Splitting).
- Remove:
  Connecting Rods (see Connecting Rod Removal)
  Balancer (see Balancer Removal)
  Crankshaft [A]

Crankshaft Installation

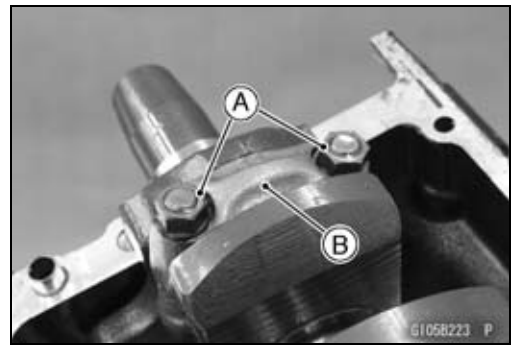


NOTICE

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 solution to the crankshaft main bearing inserts.
- Install the crankshaft with the camshaft chain [A] hanging on it.
- Install the removed parts (see appropriate chapters).

Connecting Rod 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.*

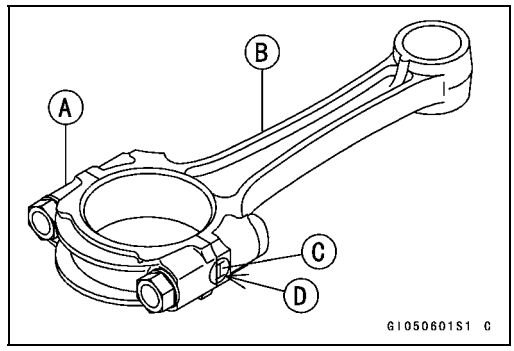
- Remove the connecting rods from the crankshaft.

NOTICE

Discard the connecting rod bolts. To prevent damage to the crankpin surfaces, do not allow the connecting rod bolts to bump against the crankpins.

Crankshaft and Connecting Rods

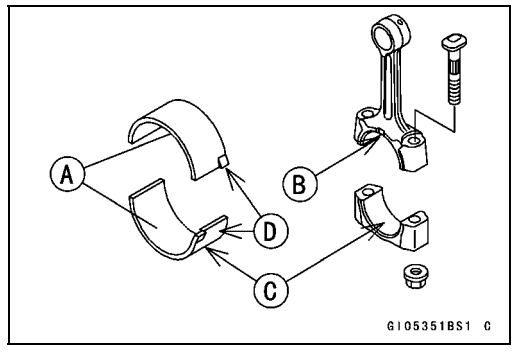
Connecting Rod Installation



NOTICE
To minimize vibration, the connecting rods should have the same weight mark.

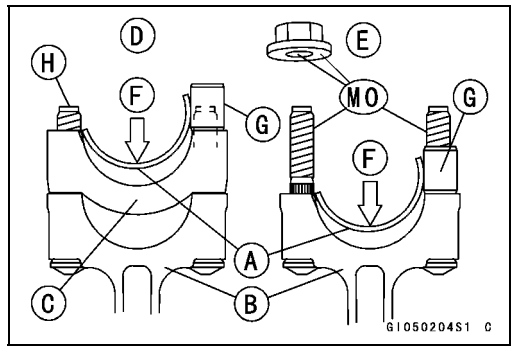
Big End Cap [A]
Connecting Rod [B]
Weight Mark, Alphabet [C]
Diameter Mark [D]: "○" or no mark

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



- Apply molybdenum disulfide oil solution [A] to the inner surfaces of upper and lower bearing inserts.
- Apply molybdenum disulfide grease to the connecting rod big end inside surface [B].
- Do not apply any grease or oil to the cap inside and cap insert outside [C].
- Install the inserts so that their nails [D] are on the same side and fit them into the recess of the connecting rod and cap.

NOTICE
Wrong application of oil and grease could cause bearing damage.



○When installing the inserts [A], be careful not to damage the insert surface with the edge of the connecting rod [B] or the cap [C]. One way to install inserts is as follows.
Installation [D] to Cap
Installation [E] to Connecting Rod
Push [F]
Spare Dowel Pin [G]
Connecting Rod Bolts [H]

- Remove debris and clean the surface of inserts.
- Install the cap on the connecting rod, aligning the weight and diameter marks.
- Apply molybdenum disulfide oil solution [MO] to the threads and seating surfaces of the big end nuts and bolts.

Crankshaft and Connecting Rods

● 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.

(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

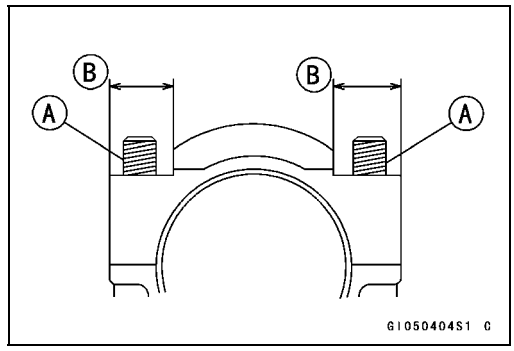
Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the bolts, nuts, and connecting rods in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean them.

NOTICE

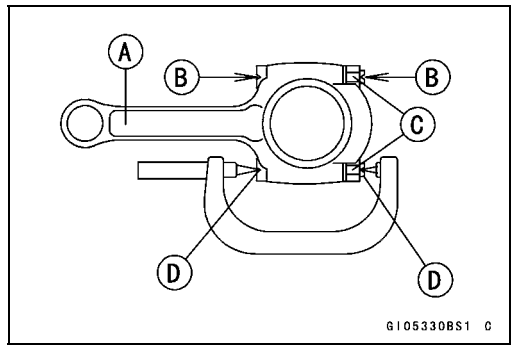
Immediately dry the bolts and nuts with compressed air after cleaning.
Clean and dry the bolts and nuts completely.

Crankshaft and Connecting Rods

● Install new bolts and nuts in reused connecting rod.
★If the connecting rod assy was replaced, use the bolts and nuts attached to the new connecting rod assy.
● Apply a small amount of molybdenum disulfide oil solution to the following portions.
Threads [A] of Bolts and Nuts
Seating Surfaces [B] of Nuts and Connecting Rod Caps



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



Bolt Length after tightening – Bolt Length before tightening = Bolt Stretch

Connecting Rod Bolt Stretch
Usable Range: 0.20 ~ 0.32 mm (0.0079 ~ 0.0126 in.)

● Check the length of the connecting rod bolts.
★If the stretch is more than the usable range, the bolt has stretched too much. An overelongated bolt may break in use.

(2) Rotation Angle Method
★If you 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

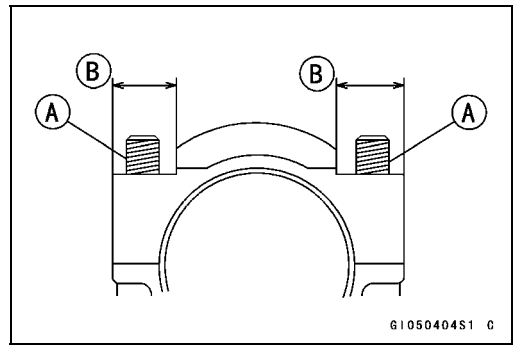
Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the bolts, nuts, and connecting rods in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean them.

NOTICE

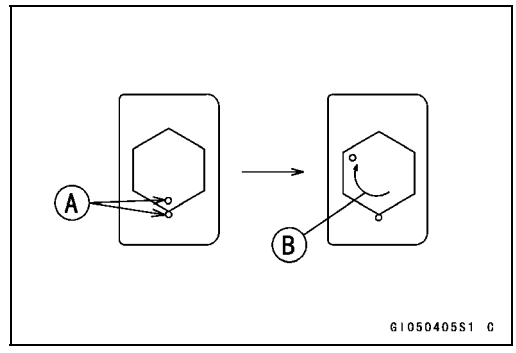
Immediately dry the bolts and nuts with compressed air after cleaning.
Clean and dry the bolts and nuts completely.

Crankshaft and Connecting Rods

● Install new bolts and nuts in reused connecting rods.
★If the connecting rod assy was replaced, use the bolts and nuts attached to the new connecting rod assy.
● Apply a small amount of molybdenum disulfide oil solution to the following portions.
Threads [A] of Bolts and Nuts
Seating Surfaces [B] of Nuts and Connecting Rod Caps

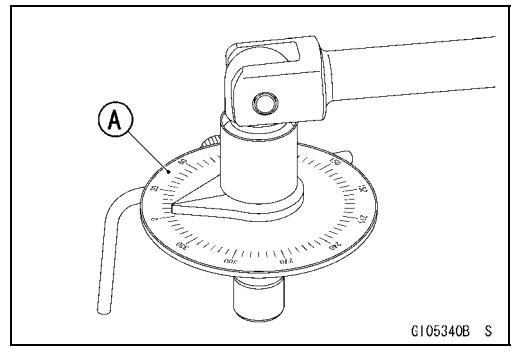


● First, tighten the nuts to the specified torque. See the table below.
● Next, tighten the nuts **120° ±5°** .
○Mark [A] the connecting rod big end caps and nuts so that nuts can be turned 120° [B] properly.
○Tighten the hexagon nut by 2 corners.



Connecting Rod Assy	Bolt	Nut	Torque + Angle N·m (kgf·m, ft·lb)
New	Use the bolts attached to new con-rod.	Attached to new con-rod	22 (2.2, 16) + 120°
		New	20 (2.0, 15) + 120°
Used	Replace the bolts with new ones.	Used	26 (2.7, 19) + 120°
		New	26 (2.7, 19) + 120°

○The nuts can be tightened by using a torque angle gauge [A].

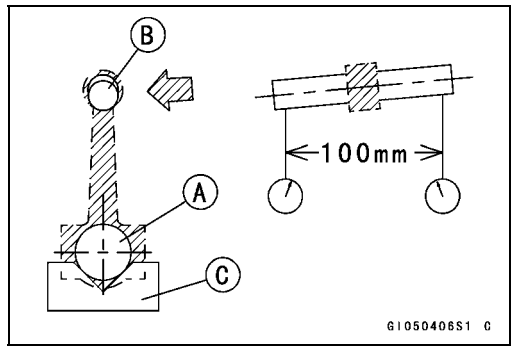


Crankshaft/Connecting Rod Cleaning

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

Crankshaft and Connecting Rods

Connecting Rod Bend Inspection

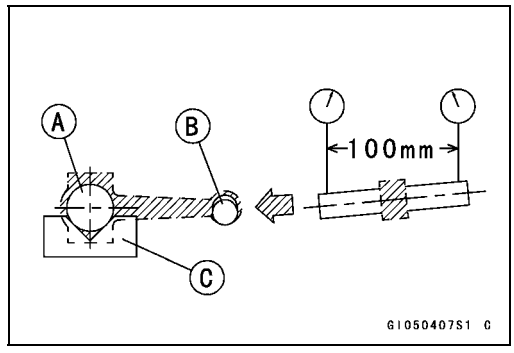


- Remove the connecting rod big end bearing inserts, and reinstall the connecting rod big end cap.
- Select an arbor [A] of the same diameter as the connecting rod big end, and insert the arbor through the connecting rod big end.
- Select an arbor of the same diameter as the piston pin and at least 100 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

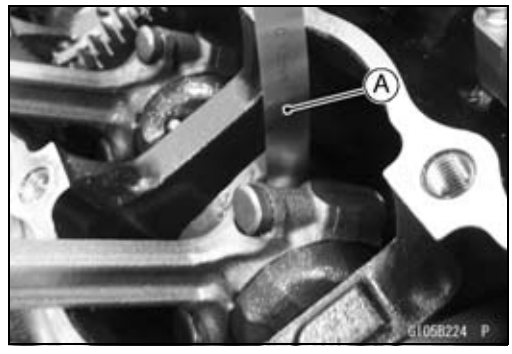


- With the big-end arbor [A] still on V block [C], hold the connecting rod horizontally and measure the amount that the arbor [B] varies from being paralleled with the surface plate over a 100 mm (3.94 in.) length of the arbor to determine the amount of connecting rod twist.

★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.

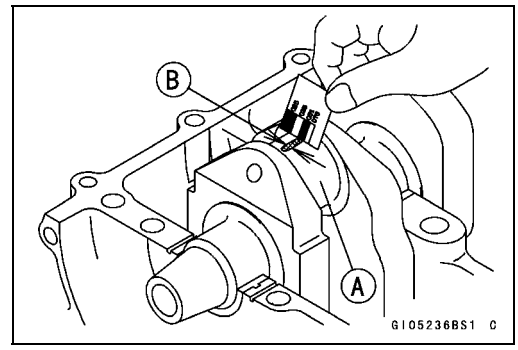
○Insert a thickness gauge [A] between the big end and either crank web to determine clearance.

Connecting Rod Big End Side Clearance
Standard: 0.13 ~ 0.38 mm (0.0051 ~ 0.0150 in.)
Service Limit: 0.6 mm (0.024 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 (press gauge) to crankpin width. Place a strip on the crankpin parallel to the crankshaft installed in the correct position.
- Tighten the connecting rod big end nuts to the specified torque (see Connecting Rod Installation).

NOTE

○*Do not move the connecting rod and crankshaft during clearance measurement.*

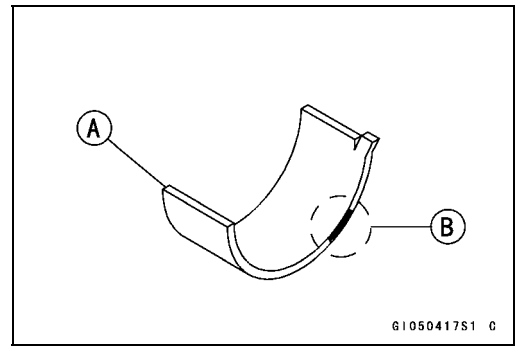
- Remove the connecting rod big end again, measure each clearance between the bearing insert and crankpin [A] using plastigage (press gauge) [B].

NOTICE
After measurement, replace the connecting rod bolts.

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.

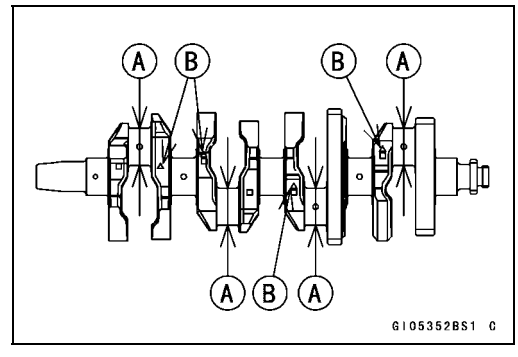
★If the clearance is between 0.061 mm (0.0024 in.) and the service limit (0.10 mm, 0.0039 in.), replace the bearing inserts [A] with inserts painted blue [B]. Check insert/crankpin clearance with the plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum 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 (1.357 in.)



★If any crankpin has worn past the service limit, replace the crankshaft with a new one.

★If the measured crankpin diameters [A] are not less than the service limit, but do not coincide with the original diameter markings [B] on the crankshaft, make new marks on it.

Crankpin Diameter Marks

None 34.484 ~ 34.492 mm (1.3576 ~ 1.3579 in.)

○ 34.493 ~ 34.500 mm (1.3580 ~ 1.3583 in.)

△: Crankpin Diameter Marks, "○" or no mark.

Crankshaft and Connecting Rods

- Measure the connecting rod big end inside diameter, and mark each connecting rod big end in accordance with the inside diameter.
- Tighten the connecting rod big end nuts to the specified torque (see Connecting Rod Installation).

NOTE

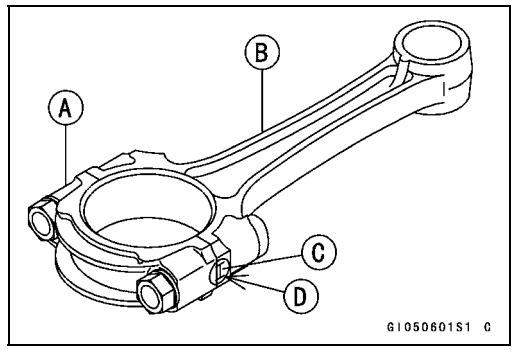
○*The mark already on the big end should almost coincide with the measurement.*

Connecting Rod Big End Inside Diameter Marks

None 37.500 ~ 37.508 mm (1.4764 ~ 1.4766 in.)

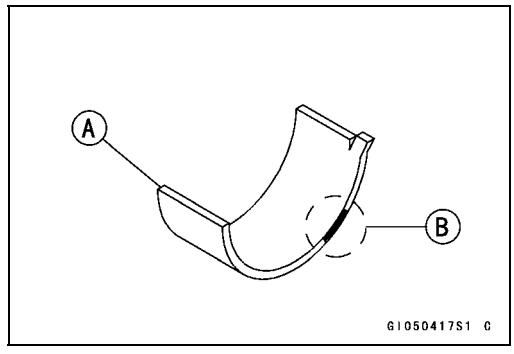
○ 37.509 ~ 37.516 mm (1.4767 ~ 1.4770 in.)

Big End Cap [A]
Connecting Rod [B]
Weight Mark, Alphabet [C]
Diameter Mark (Around Weight Mark) [D]: "○" or no mark



- Select the proper bearing insert [A] in accordance with the combination of the connecting rod and crankshaft coding.
  Size Color [B]

Con-rod Big End Inside Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Size Color	Part Number
None	○	Brown	92139-0124
None	None	Black	92139-0123
○	○		
○	None	Blue	92139-0122



- Install the new inserts in the connecting rod and check insert/crankpin clearance with the plastigage.

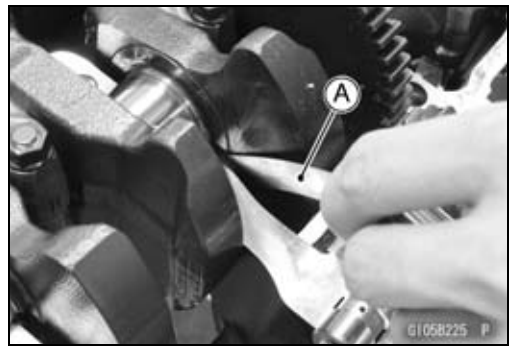
Crankshaft Side Clearance Inspection

- Insert a thickness gauge [A] between the crankcase main bearing and the crank web at the #3 journal to determine clearance.

★If the clearance exceeds the service limit, replace the crankcase halves as a set.

NOTE

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



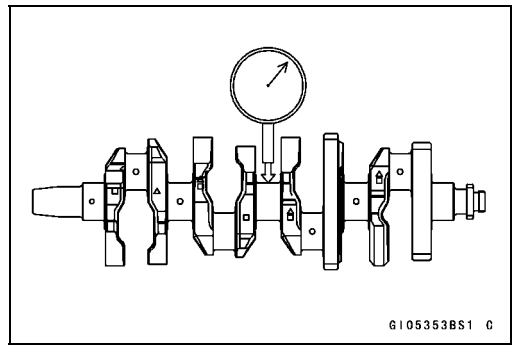
Crankshaft Side Clearance

Standard: 0.09 ~ 0.19 mm (0.0035 ~ 0.0075 in.)

Service Limit: 0.39 mm (0.0154 in.)

Crankshaft and Connecting Rods

Crankshaft Runout Inspection



- Measure the crankshaft runout.

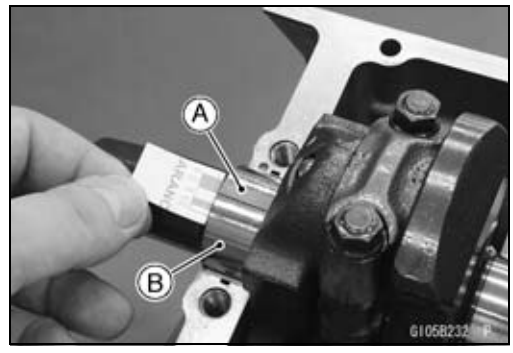
★If the measurement exceeds the service limit, replace the crankshaft.

Crankshaft Runout

Standard: TIR 0.02 mm (0.0008 in.) or less

Service Limit: TIR 0.05 mm (0.0020 in.)

Crankshaft Main Bearing Insert/Journal Wear Inspection



- Split the crankcase (see Crankcase Splitting).
- Cut strips of plastigage (press gauge) to journal width.
- Place a strip on each journal parallel to the crankshaft installed in the correct position.
- Tighten the crankcase bolts to the specified torque (see Crankcase Assembly).

NOTE

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

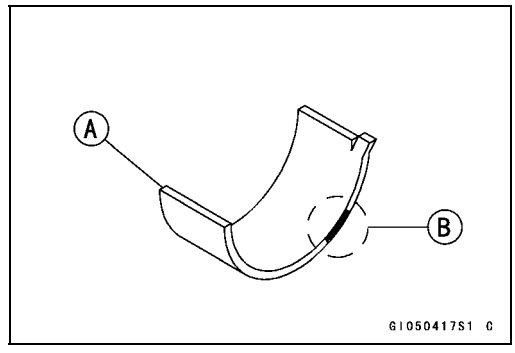
○*Journal clearance less than 0.025 mm (0.00098 in.) can not be measured by plastigage [A], however, using genuine parts maintains the minimum standard clearance.*

- Split the crankcase again, measure each clearance between the bearing insert and journal [B] using plastigage (press gauge).

Crankshaft Main Bearing Insert/Journal Clearance

Standard: 0.010 ~ 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.

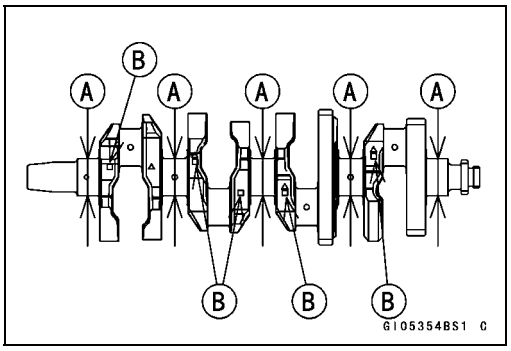
★If the clearance exceeds the service limit, measure the diameter of the crankshaft main journal.

Crankshaft and Connecting Rods

Crankshaft Main Journal Diameter
Standard: 34.984 ~ 35.000 mm (1.3773 ~ 1.3780 in.)
Service Limit: 34.96 mm (1.376 in.)

★If any journal has worn past the service limit, replace the crankshaft with a new one.

★If the measured journal diameters [A] are not less than the service limit, but do not coincide with the original diameter markings [B] on the crankshaft, make new marks on it.



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.

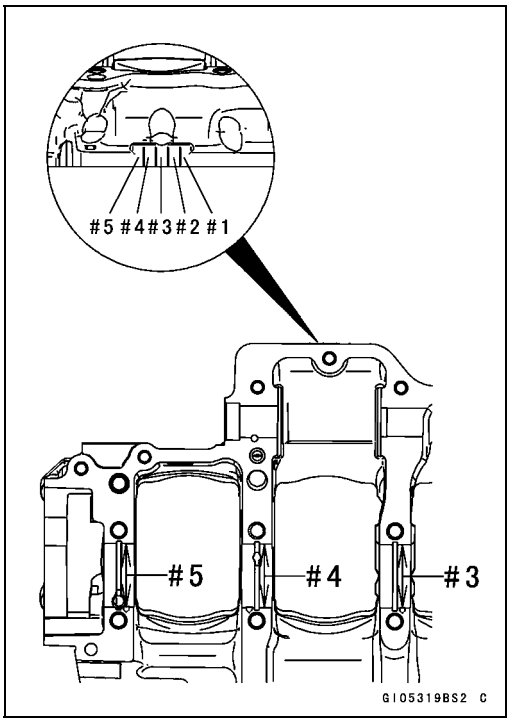
● Measure the main bearing inside diameter, and mark the upper crankcase half in accordance with the inside diameter.
Crankcase Main Bearing Inside Diameter Marks: “○” or no mark.

● Tighten the crankcase bolts to the specified torque (see Crankcase Assembly).

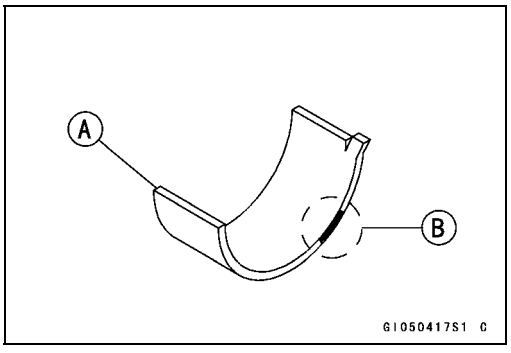
NOTE

○*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 ~ 1.4963 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]



Crankshaft and Connecting Rods

Crankcase Main Bearing Inside Diameter Marking	Crankshaft Main Journal Diameter Marking	Bearing Insert*		
		Size Color	Part Number	Journal Nos.
○	1	Brown	92139-0034	2, 4
			92139-0219	1, 3, 5
None	1	Black	92139-0033	2, 4
○	None		92139-0218	1, 3, 5
None	None	Blue	92139-0032	2, 4
			92139-0217	1, 3, 5

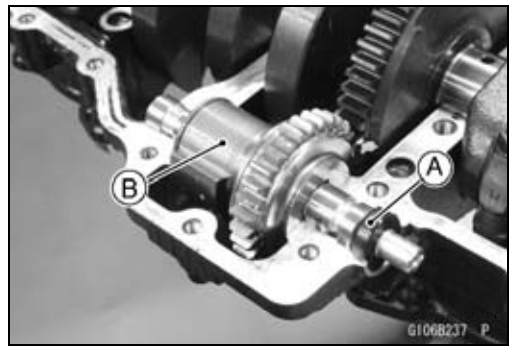
* The bearing inserts for Nos. 2 and 4 journals have an oil groove, respectively.

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

Balancer

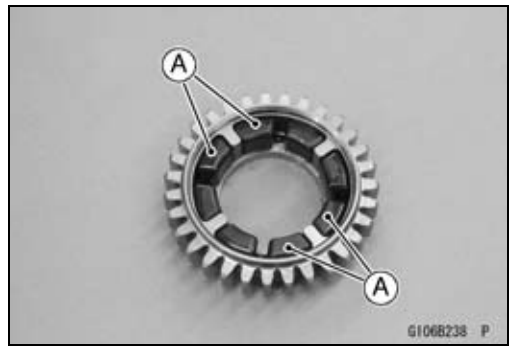
Balancer Removal

- Split the crankcase (see Crankcase Splitting).
- Remove:
  Oil Seal [A]
  Balancer [B]



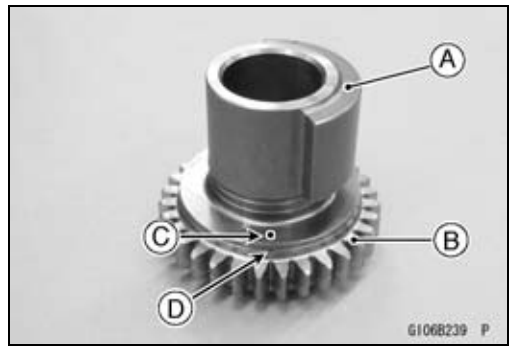
Balancer Installation

- Check that the rubber dampers [A] are in place as shown.

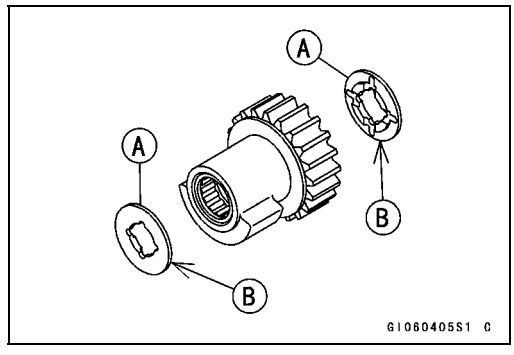


- Apply molybdenum disulfide oil solution to the damper contact portions of the balancer weight [A].
- Install the balancer weight into the gear [B].

○Align the punch mark [C] of the balancer weight with the groove [D] of the gear.

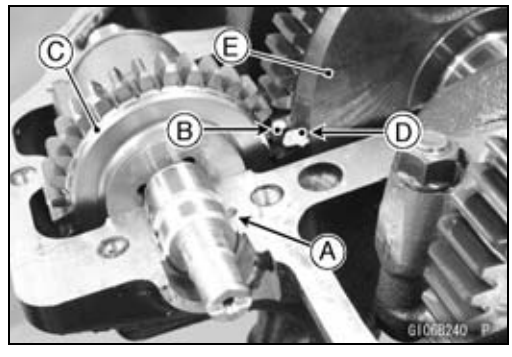


- Apply molybdenum disulfide oil solution to the needle bearings. Insert the needle bearings.
- Fit the washers [A] on both ends of the weight and gear assembly. The projected sides [B] face inward.



- Insert the pin [A] as shown.
- Set the balancer on the upper crankcase half.

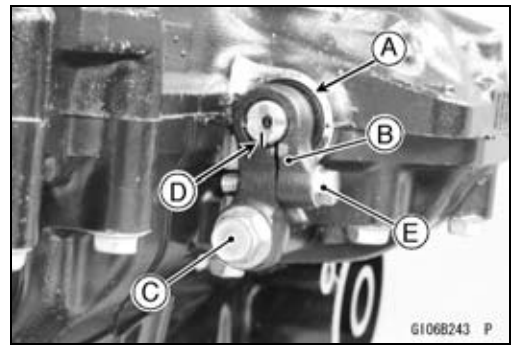
○Align the punch mark [B] on the balancer gear [C] with the mark [D] on the balancer drive gear [E] of crankshaft.



Balancer

- Assemble the crankcase (see Crankcase Assembly).
- Fill the oil seal lips with grease.
- Install the new oil seal [A] so that its surface is flush with the surface of the crankcase.
- Install the balancer shaft clamp lever [B].
- Apply a non-permanent locking agent to the threads of the balancer shaft clamp lever bolt [C].
- Tighten:

Torque - Balancer Shaft Clamp Lever Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)



- Turn the balancer shaft so that its mark [D] faces downward.
- Check that the balancer shaft clamp lever is in contact with the oil seal.
- Tighten:

Torque - Balancer Shaft Clamp Bolt [E]: 10 N·m (1.0 kgf·m, 89 in·lb)

Balancer Adjustment

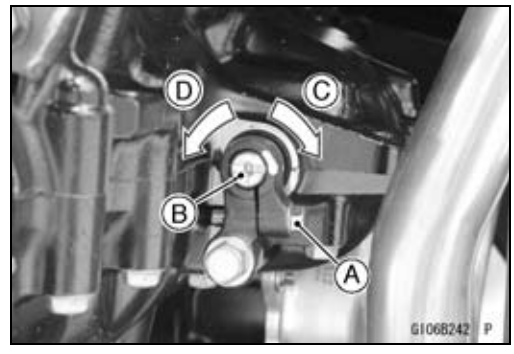
- Remove the right lower fairing (see Lower Fairing Removal in the Frame chapter).
- Start the engine and warm it up thoroughly.
- Adjust the balancer gear backlash with the engine idling. The amount of backlash can be changed by turning the balancer shaft which has eccentric journals.

○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.

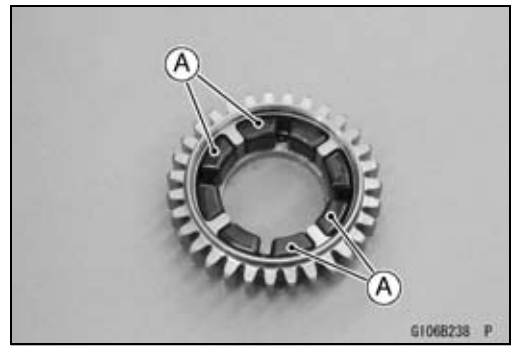
Torque - Balancer Shaft Clamp Bolt: 10 N·m (1.0 kgf·m, 89 in·lb)



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.



Starter Motor Clutch

Starter Motor Clutch Removal/Installation

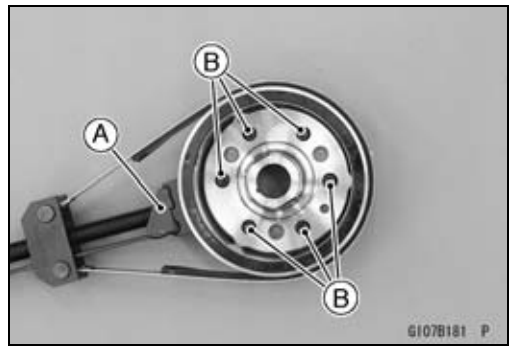
● Refer to the Starter Motor Clutch Disassembly/Assembly.

Starter Motor Clutch Disassembly

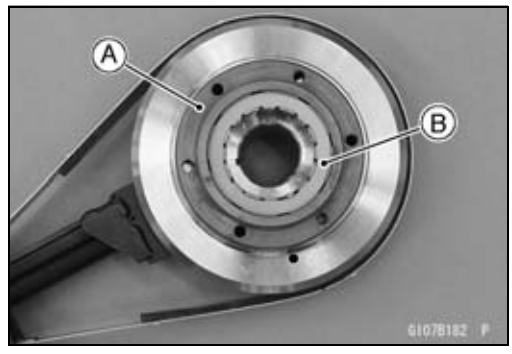
● Remove the alternator rotor (see Alternator Rotor Removal in the Electrical System chapter).
● Hold the alternator rotor with the flywheel holder [A].

Special Tool - Flywheel Holder: 57001-1313

● Remove the starter motor clutch bolts [B].



● Remove:
Starter Motor Clutch Housing [A]
Starter Motor Clutch [B]



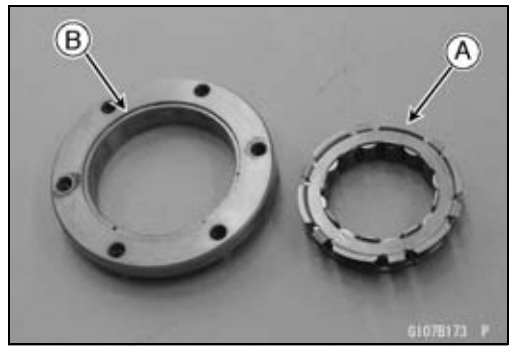
Starter Motor Clutch Assembly

● Install the starter motor clutch to the housing so that the flange [A] fit to the housing groove [B].
● Hold the alternator rotor with the flywheel holder.

Special Tool - Flywheel Holder: 57001-1313

● Apply a non-permanent locking agent to the threads of the starter motor clutch bolts and tighten them.

Torque - Starter Motor Clutch Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)

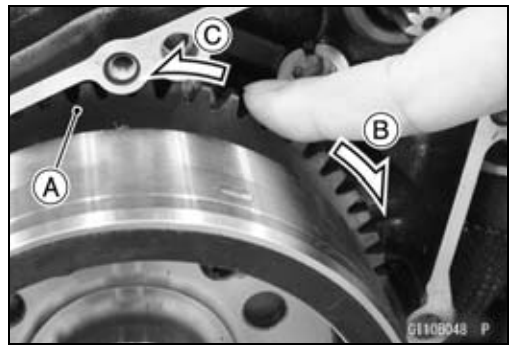


Starter Motor Clutch Inspection

● Remove:
Alternator Cover (see Alternator Cover Removal in the Electrical System chapter)
Starter Idle Gear and Shaft
● Turn the starter motor clutch gear [A] by hand. The starter motor clutch gear should turn clockwise [B] freely, but should not turn counterclockwise [C].
★If the starter motor clutch does not operate as it should or if it makes noise, go to the next step.
● Disassemble the starter motor clutch, and visually inspect the clutch parts.
★If there is any worn or damaged part, replace it.

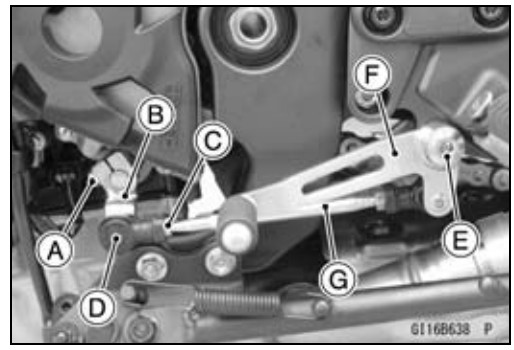
NOTE

○*Examine the starter motor clutch gear as well. Replace it if it worn or damaged.*



External Shift Mechanism

Shift Pedal Removal



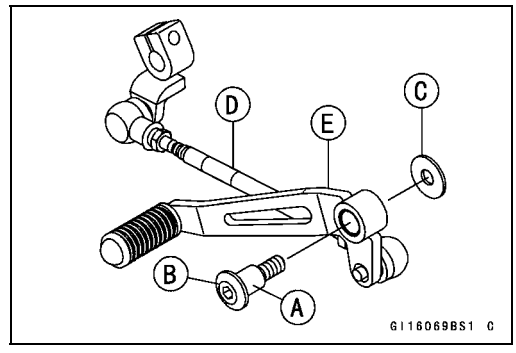
- Remove:
  Shift Lever Clamp Bolt [A]
  Shift Lever [B]

★If the tie-rod is removed from the shift pedal and shift lever, note the following.

○The following portions have left-hand threads.
  Locknut [C] of Shift Lever Side
  Ball Joint [D] of Shift Lever

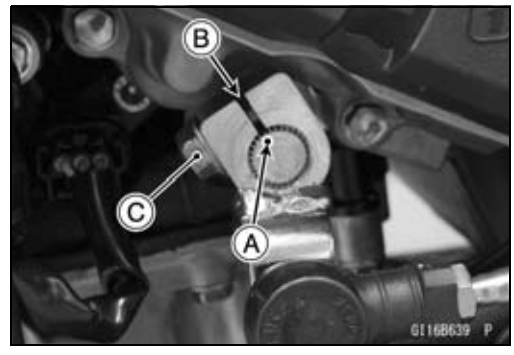
- Remove:
  Shift Pedal Mounting Bolt [E]
  Shift Pedal [F] with Tie-Rod [G]
  Washer

Shift Pedal Installation



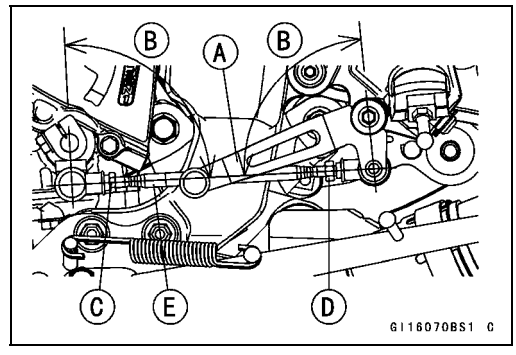
- Apply grease to the sliding surface [A] on the shift pedal mounting bolt [B].
- Install:
  Washer [C]
  Tie-Rod [D] and Shift Pedal [E]
- Tighten:

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



- Align the punch mark [A] on the shift shaft with the slit [B] of the shift lever.
- Apply a non-permanent locking agent to the threads of the shift lever clamp bolt [C] and tighten it.

Torque - Shift Lever Clamp Bolt: 10 N·m (1.0 kgf·m, 89 in·lb)



- After installation, confirm that the shift pedal [A] is positioned as shown.
  About 90° [B]

★If the pedal position is different, adjust it as follows.

○To adjust the pedal position, loosen the front locknut [C] (left-hand threads) and rear locknut [D], and then turn the tie-rod [E].

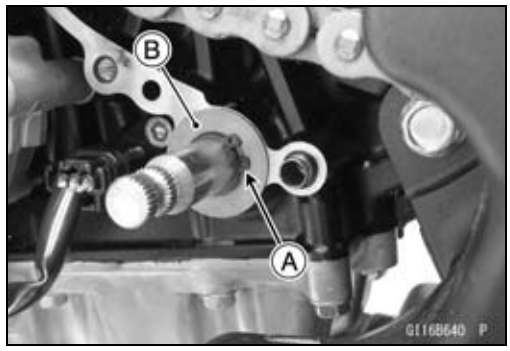
○Tighten the locknuts securely.

External Shift Mechanism

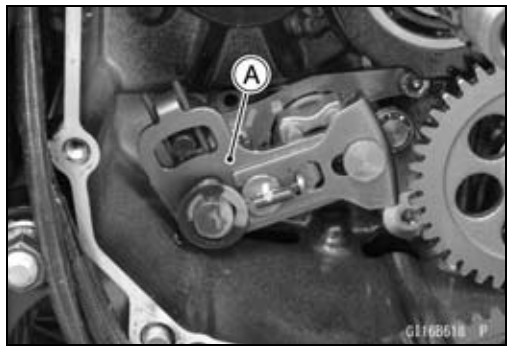
External Shift Mechanism Removal

● Remove:
Engine Sprocket Cover (see Engine Sprocket Removal in the Final Drive chapter)
Shift Lever (see Shift Pedal Removal)
Clutch (see Clutch Removal in the Clutch chapter)
Circlip [A]
Washer [B]

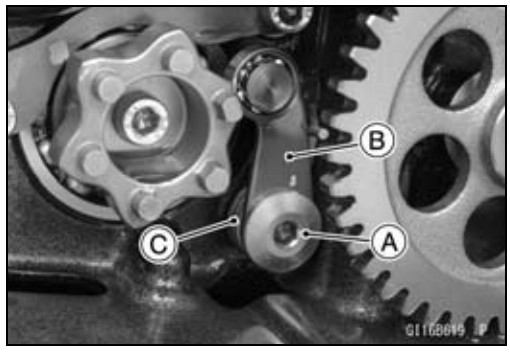
Special Tool - Outside Circlip Pliers: 57001-144



● Remove the shift shaft assembly [A].

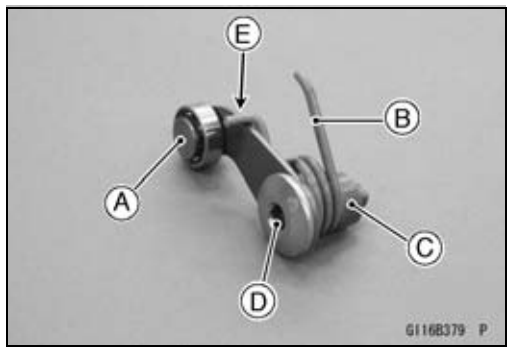


● Remove:
Gear Positioning Lever Bolt [A]
Gear Positioning Lever [B]
Collar and Spring [C]



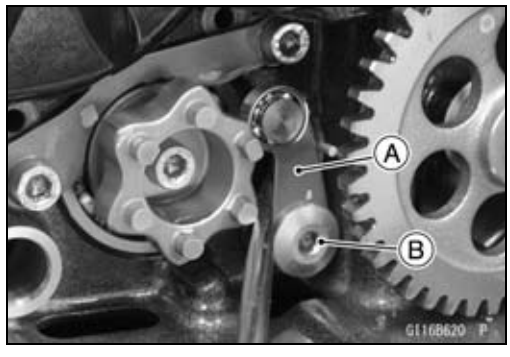
External Shift Mechanism Installation

● Assemble the following parts as shown.
Gear Positioning Lever [A]
Spring [B]
Collar [C]
Gear Positioning Lever Bolt [D]
○Hang the spring end [E] to the gear positioning lever.



● While prying the gear positioning lever [A], tighten the gear positioning lever bolt [B].

Torque - Gear Positioning Lever Bolt: 12 N·m (1.2 kgf·m, 106 in·lb)

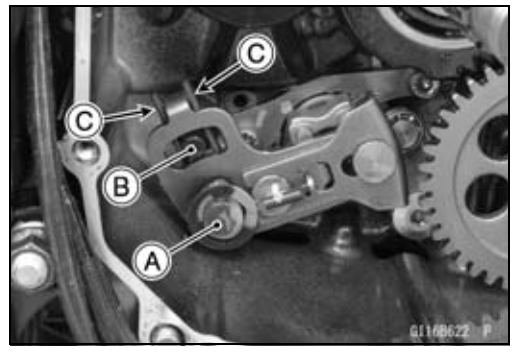


External Shift Mechanism

● Apply grease to the lips of the oil seal [A].



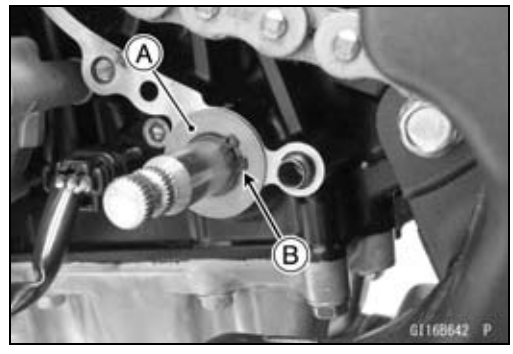
● Install the shift shaft [A] so that the return spring pin [B] fits between the spring [C].



● Install the washer [A].
● Replace the circlip [B] with a new one, and install it.

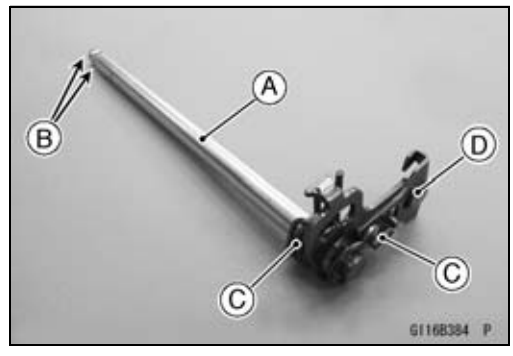
Special Tool - Outside Circlip Pliers: 57001-144

○Fit the circlip into the groove of the shift shaft securely.
● Install the removed parts (see appropriate chapters).



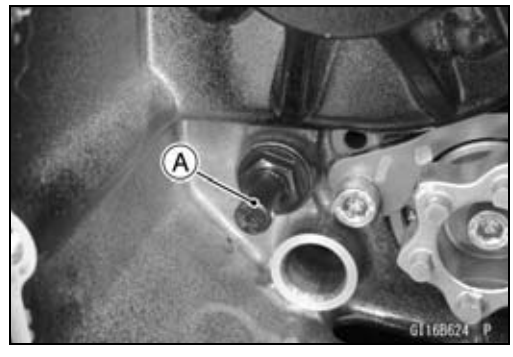
External Shift Mechanism Inspection

● Examine the shift shaft [A] for any damage.
★If the shaft is bent, straighten or replace it.
★If the serration [B] are damaged, replace the shaft.
★If the springs [C] are damaged in any way, replace them.
★If the shift mechanism arm [D] is damaged in any way, replace the shift shaft.



● Check the return spring pin [A] is not loose.
★If it is loose, unscrew it, apply a non-permanent locking agent to the threads, and tighten it.

Torque - Shift Shaft Return Spring Pin: 39 N·m (4.0 kgf·m, 29 ft·lb)



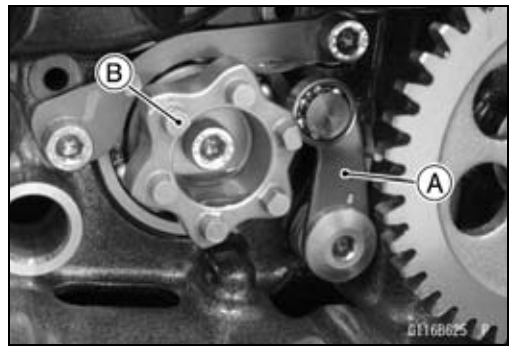
External Shift Mechanism

- Check the gear positioning lever [A] and its spring for breaks or distortion.

★If the lever or spring are damaged in any way, replace them.

- Visually inspect the shift drum cam [B].

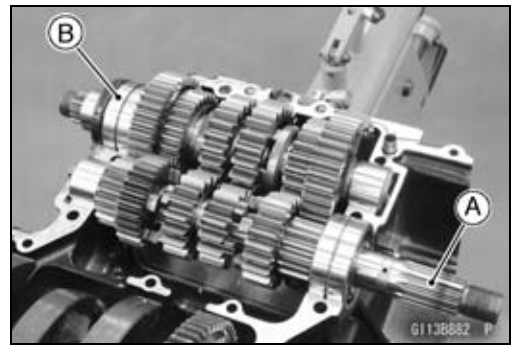
★If it is badly worn or shows any damage, replace it.



Transmission

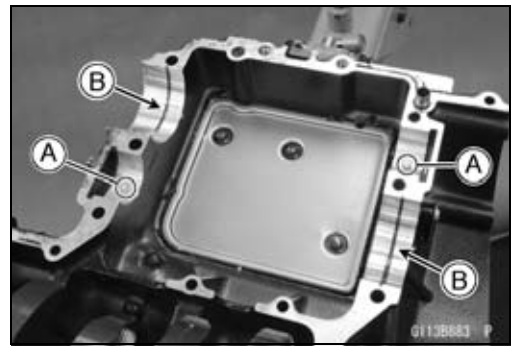
Transmission Shaft Removal

- Split the crankcase (see Crankcase Splitting).
- Remove the drive shaft [A] and output shaft [B].



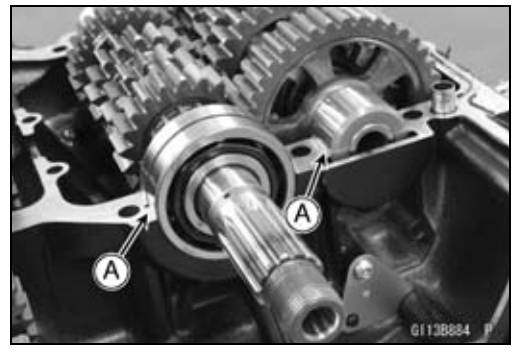
Transmission Shaft Installation

- Check to see that the set pins [A] and set rings [B] are in place.

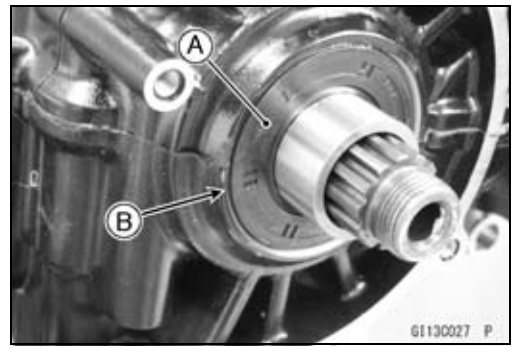


- Apply molybdenum disulfide oil solution to the transmission gears.
- Install the drive shaft and output shaft into the upper crankcase half.
- Apply engine oil to the bearings.

○The bearing set pins and rings must match properly with the holes or grooves in the bearing outer races or bearings. When they are properly matched, there is no clearance [A] between the crankcase and the bearing outer races or bearings.



- Assemble the crankcase (see Crankcase Assembly).
- Replace the oil seal [A] with a new one.
- Apply grease to the oil seal lips.
- Apply soap and water solution to the outer circumference of the oil seal so that it will go into place smoothly.
- Press in the oil seal into the crankcase so that the surface of the oil seal is flush with the surface [B] of the crankcase.



Transmission Shaft Disassembly

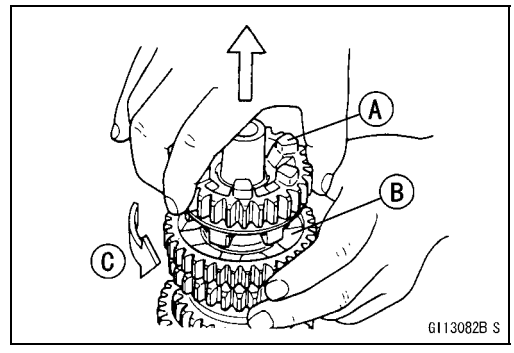
- Remove the transmission shafts (see Transmission Shaft Removal).
- Remove the circlips, and disassemble the transmission shafts.

Special Tool - Outside Circlip Pliers: 57001-144

- The 5th gear [A] on the output shaft has three steel balls assembled into it for the positive neutral finder mechanism. Remove the 5th gear.

○Set the output shaft in a vertical position holding the 3rd gear [B].

○Spin the 5th gear quickly [C] and pull it off upward.

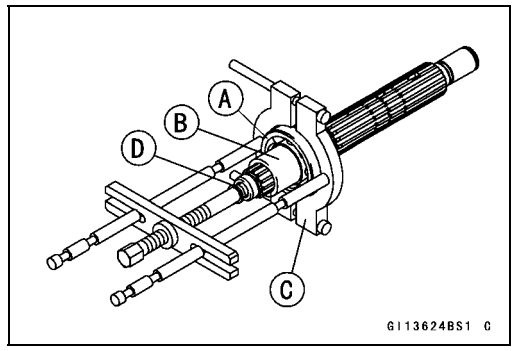


Transmission

- Remove the ball bearing [A] from each shafts and collar [B] from output shaft.

  Special Tools - Bearing Puller [C]: 57001-135
  Bearing Puller Adapter [D]: 57001-317

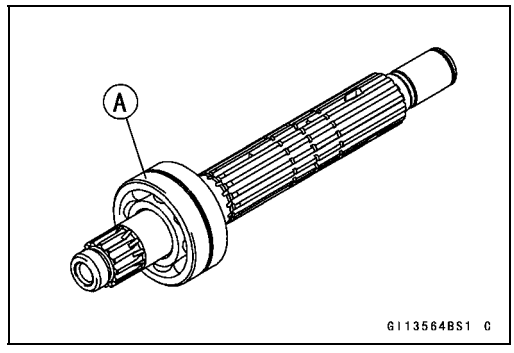
- Discard the bearing and collar (output shaft).



Transmission Shaft Assembly

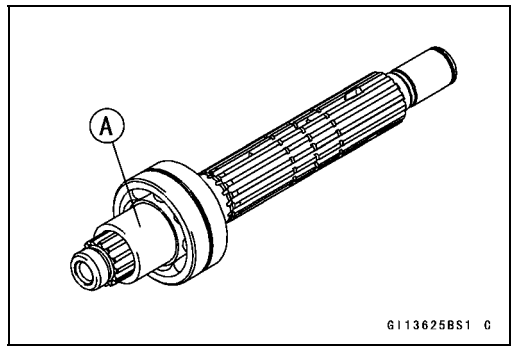
- Install the new ball bearing [A] on the each shaft, using the bearing driver.

  Spacial Tool - Bearing Driver, ϕ32: 57001-382

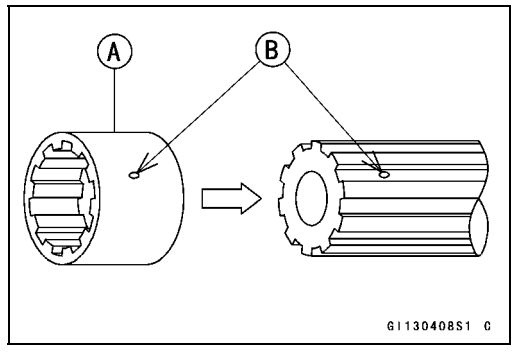


- Install the collar [A] on the output shaft, using the bearing driver.

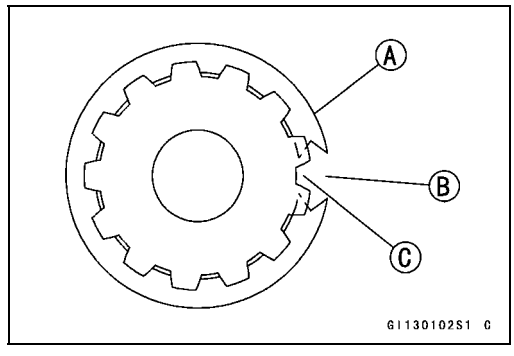
  Special Tool - Bearing Driver, ϕ32: 57001-382



- Apply engine oil to the bushings, ball bearings and shafts.
- Install the gear bushings [A] on the shaft with their holes [B] aligned.



- Replace any circlips removed with new ones.
- Install the circlips [A] so that the opening [B] is aligned with a spline groove [C].



Transmission

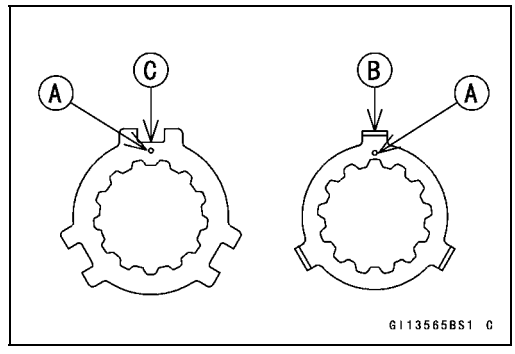
- The drive shaft gears can be recognized by size: the gear with the smallest diameter is 1st gear, and the largest one is 6th gear. Be sure that all parts are put back in the correct sequence and all circlips and washers are properly in place.
- Install the 3rd/4th gear onto the drive shaft with their 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 2nd and 3rd/4th gear bushings onto the output shaft with their oil holes aligned.

NOTE

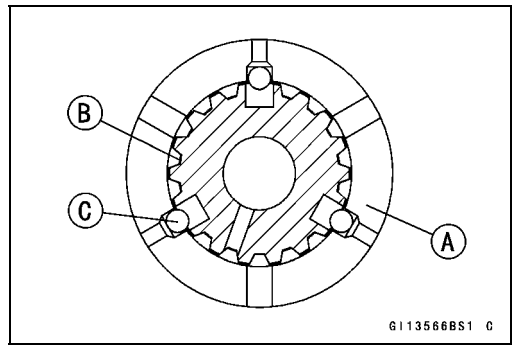
○*When the toothed washers are assembled onto the each shaft, note the following.*

○*Align the punch marks [A] of the toothed washers (only on drive shaft).*

○*When the tangs [B] of the toothed washer shall be assembled, they should be installed into the notch [C] of the toothed washer (see Page 9-36).*



- Fit the steel balls into the 5th gear holes in the output shaft, aligning the holes as shown.
  5th Gear [A]
  Output Shaft [B]
  Steel Balls [C]



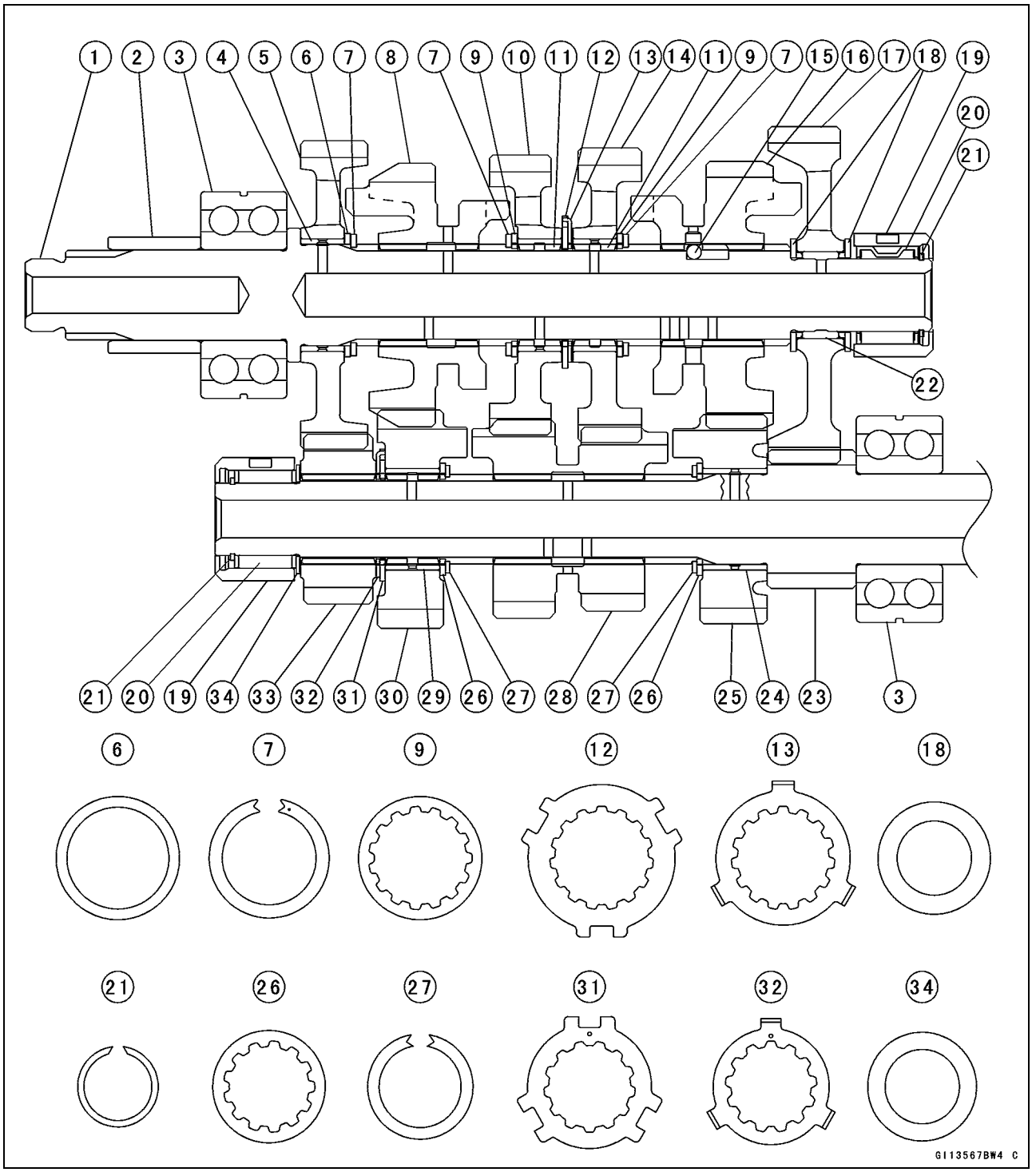
NOTICE

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 doesn't come out of the output shaft when moving it up and down by hand.

- Check that each gear spins or slides freely on the transmission shafts without binding after assembly.

Transmission



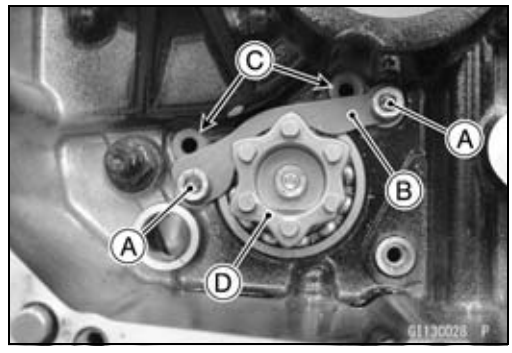
Transmission

1. Output Shaft
2. Collar
3. Ball Bearings
4. Bushing
5. 2nd Gear (39 T)
6. Washer (ϕ34 × ϕ28.1)
7. Circlips (ϕ33 × ϕ25.9)
8. Top Gear (31 T)
9. Toothed Washer (ϕ34)
10. 4th Gear (25 T)
11. Bushings
12. Toothed Washer (ϕ40.5)
13. Toothed Washer (ϕ37)
14. 3rd Gear (24 T)
15. Steel Balls
16. 5th Gear (26 T)
17. Low Gear (39 T)
18. Washers (ϕ31 × ϕ20.5)
19. Races
20. Needle Bearings
21. Circlips (ϕ22.2 × ϕ18.7)
22. Needle Bearing
23. Low Gear (15 T) (Drive Shaft)
24. Bushing
25. 5th Gear (21 T)
26. Toothed Washers (ϕ31)
27. Circlips (ϕ29 × ϕ22.6)
28. 3rd/4th Gear (15 T/18 T)
29. Bushing
30. Top Gear (28 T)
31. Toothed Washer (ϕ34.2)
32. Toothed Washer (ϕ32)
33. 2nd Gear (20 T)
34. Washer (ϕ30 × ϕ20.5)

Transmission

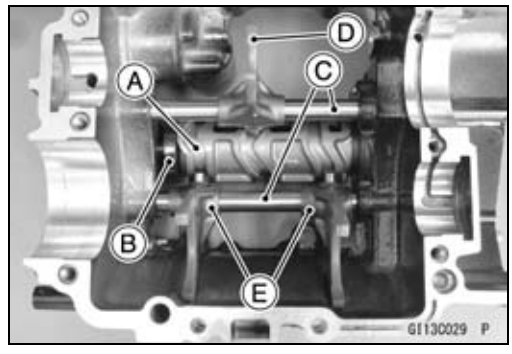
Shift Drum and Fork Removal

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



- Remove:
  Lower Crankcase Half (see Crankcase Splitting)
  Transmission Shafts (see Transmission Shaft Removal)
  Gear Positioning Lever (see External Shift Mechanism Removal)
  Shift Drum Bearing Holder Bolts [A]
  Shift Drum Bearing Holder [B]
- Pull out the shift rods [C], and remove the shift forks.
- Pull out the shift drum [D].

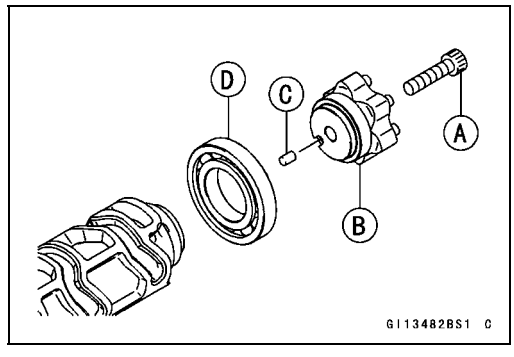
Shift Drum and Fork Installation



- Apply engine oil to the shift drum, forks and rods.
- Install the shift drum [A].
  ○Take care not to damage the magnet part [B] of the shift drum.
- Install the shift rods [C] and shift forks, note the following.
  ○The rods are identical.
  ○Position the one with shortest ears [D] on the drive shaft and place the pin in the center groove in the shift drum.
  ○The two forks [E] on the output shaft are identical.
  ○Install the forks so that its “0061” and “0062” side faces engine left side.
- Apply a non-permanent locking agent to the threads of the shift drum bearing holder bolts, and tighten them.

  Torque - Shift Drum Bearing Holder Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)
- Install the removed parts (see appropriate chapters).

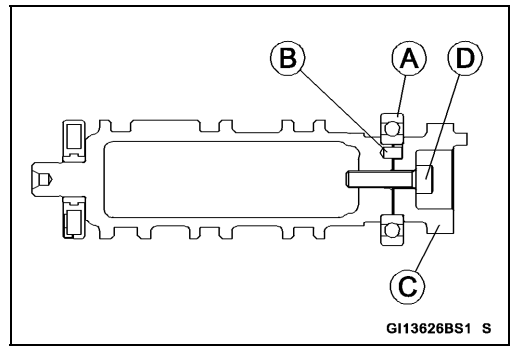
Shift Drum Disassembly



- Remove the shift drum (see Shift Drum and Fork Removal).
- While holding the shift drum with a vise, remove the shift drum cam holder bolt [A].
- Remove:
  Shift Drum Cam [B]
  Dowel Pin [C]
  Ball Bearing [D]

Transmission

Shift Drum Assembly



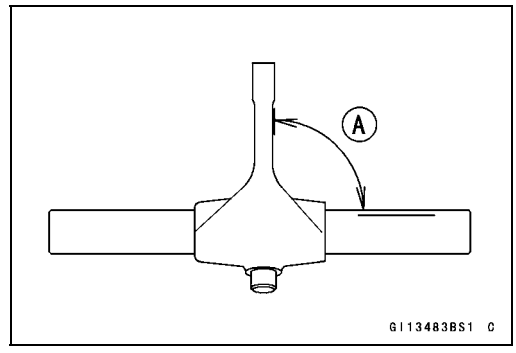
- Install:
  Ball Bearing [A]
  Dowel Pin [B] and Shift Drum Cam [C]

○Align the pin with the groove in the shift drum cam.

- Apply a non-permanent locking agent to the threads of the shift drum cam holder bolt [D] and tighten it.

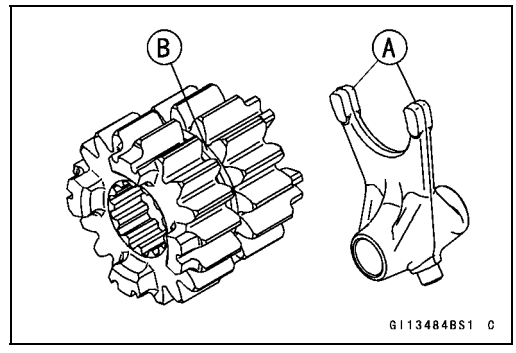
Torque - Shift Drum Cam Holder Bolt: 12 N·m (1.2 kgf·m, 106 in·lb)

Shift Fork Bending Inspection



- Visually inspect the shift forks, and replace any fork that is bent. A bent fork could cause difficulty in shifting, or allow the transmission to jump out of gear when under power.
  90° [A]

Shift Fork/Gear Groove Wear Inspection



- Measure the thickness of the shift fork ears [A], and measure the width of the gear grooves [B].

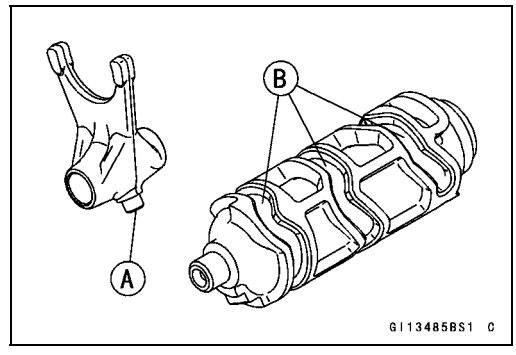
★If the thickness of a shift fork ear is less than the service limit, the shift fork must be replaced.

Shift Fork Ear Thickness
Standard: 5.9 ~ 6.0 mm (0.232 ~ 0.236 in.)
Service Limit: 5.8 mm (0.23 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: 6.3 mm (0.25 in.)

Shift Fork Guide Pin/Drum Groove Wear Inspection



- Measure the diameter of each shift fork guide pin [A], and measure the width of each shift drum groove [B].

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

Shift Fork Guide Pin Diameter
Standard: 6.9 ~ 7.0 mm (0.272 ~ 0.276 in.)
Service Limit: 6.8 mm (0.27 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 (0.29 in.)

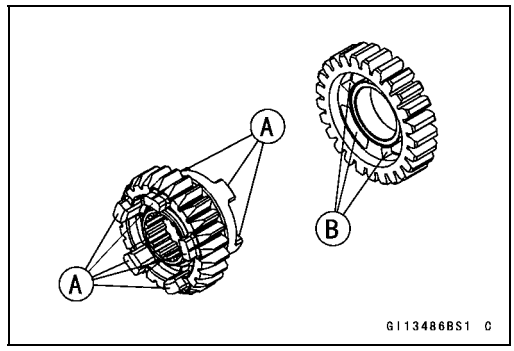
★If the shift drum has been replaced, replace the gear position sensor as a set.

Transmission

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.



Ball Bearing, Needle Bearing, and Oil Seal

Ball and Needle Bearing Replacement

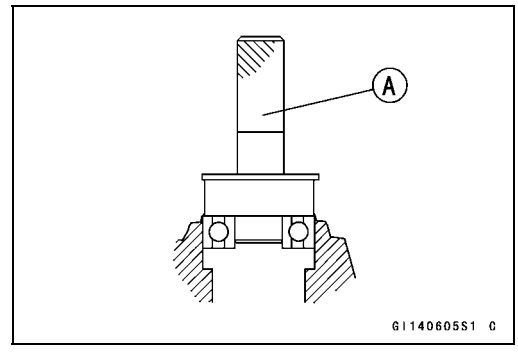
NOTICE
Do not remove the ball or needle bearings unless it is necessary. Removal may damage them.

● Using a press or puller, remove the ball bearing and/or needle bearings.

NOTE

○*In the absence of the above mentioned tools, satisfactory results may be obtained by heating the case to approximately 93°C (200°F) max., and tapping the bearing in or out.*

NOTICE
Do not heat the case with a torch. This will warp the case. Soak the case in oil and heat the oil.



● Using a press and the bearing driver set [A], install the new ball bearing until it stops at the bottom of its housing.

○The new needle bearings must be pressed into the crankcase so that the end is flush with the end of the hole.

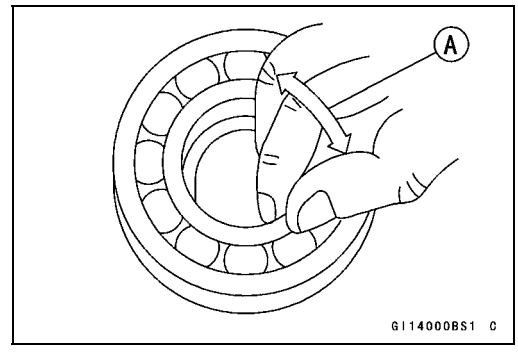
Special Tool - Bearing Driver Set: 57001-1129

Ball and Needle Bearing Wear Inspection

NOTICE
Do not remove the bearings for inspection. Removal may damage them.

● Check the ball bearings.

○Since the ball bearings are made to extremely close tolerances, the wear must be judged by feel rather than measurement. Clean each bearing in a high flash-point solvent, dry it (do not spin the bearing while it is dry), and oil it with engine oil.



○Spin [A] the bearing by hand to check its condition.

★If the bearing is noisy, does not spin smoothly, or has any rough spots, replace it.

● Check the needle bearings.

○The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.

★If there is any doubt as to the condition of a needle bearing, replace it.

Oil Seal Inspection

● Inspect the oil seals.

★Replace it if the lips are misshapen, discolored (indicating that the rubber has deteriorated), hardened or otherwise damaged.

Wheels/Tires

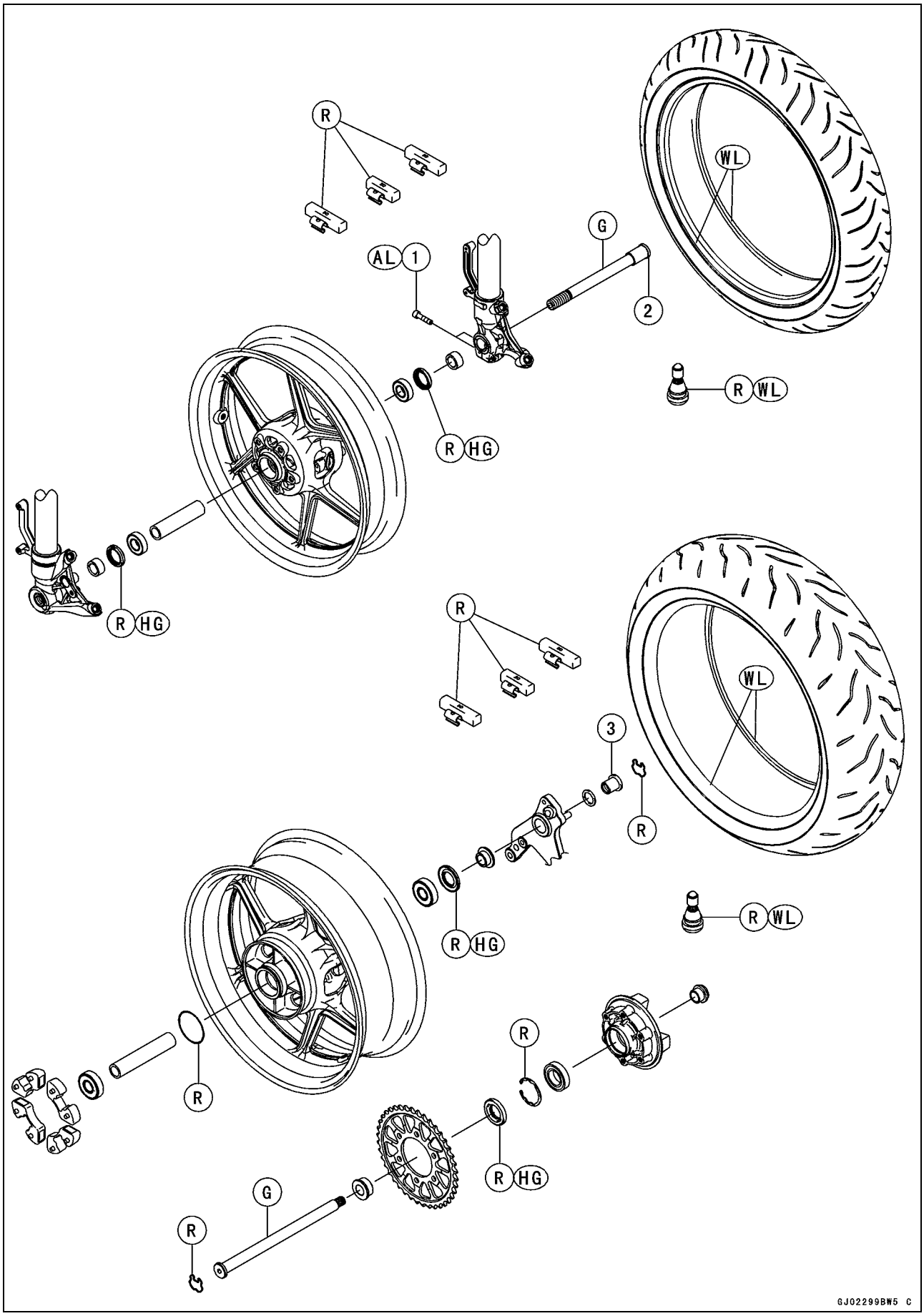
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Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Axle Clamp Bolts	20	2.0	15	AL
2	Front Axle	110	11.2	81.1	G
3	Rear Axle Nut	100	10.2	73.8	

AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque.
G: Apply grease.
HG: Apply high-temperature grease.
R: Replacement Parts
WL: Apply soap and water solution or rubber lubricant.

Specifications

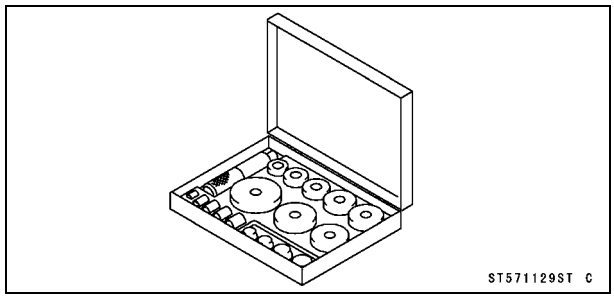
Item	Standard	Service Limit
Wheels (Rims)		
Rim Runout:		
Axial	TIR 0.5 mm (0.02 in.) or less	TIR 1.0 mm (0.04 in.)
Radial	TIR 0.8 mm (0.03 in.) or less	TIR 1.0 mm (0.04 in.)
Axle Runout/100 mm (3.94 in.):		
Front	TIR 0.03 mm (0.001 in.) or less	TIR 0.2 mm (0.008 in.)
Rear	TIR 0.1 mm (0.004 in.) or less	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	17M/C × MT3.50	– – –
Rear	17M/C × MT6.00	– – –
Tires		
Air Pressure (when Cold):		
Front	Up to 195 kg (430 lb) load: 250 kPa (2.50 kgf/cm², 36 psi)	– – –
Rear	Up to 195 kg (430 lb) load: 290 kPa (2.90 kgf/cm², 42 psi)	– – –
Tread Depth:		
Front	3.6 mm (0.14 in.)	1 mm (0.04 in.) (AT, CH, DE) 1.6 mm (0.06 in.)
Rear	5.8 mm (0.23 in.)	Up to 130 km/h (80 mph): 2 mm (0.08 in.) Over 130 km/h (80 mph): 3 mm (0.12 in.)
Standard Tires:		
Front:		
Make	BRIDESTONE	– – –
Type	BATTLAX, S20F N	– – –
Size	120/70ZR17M/C (58W)	– – –
Rear:		
Make	BRIDESTONE	– – –
Type	BATTLAX, S20R N	– – –
Size	190/50ZR17M/C (73W)	– – –

⚠ WARNING

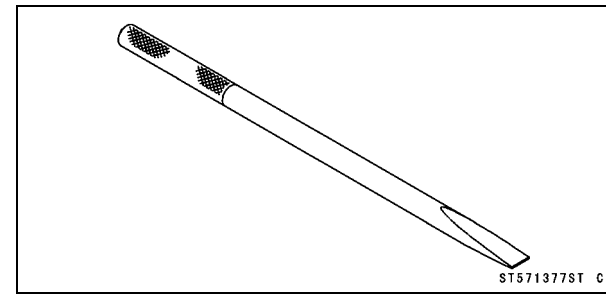
Some replacement tires may adversely affect handling and cause an accident resulting in serious injury or death. To ensure proper handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.

Special Tools

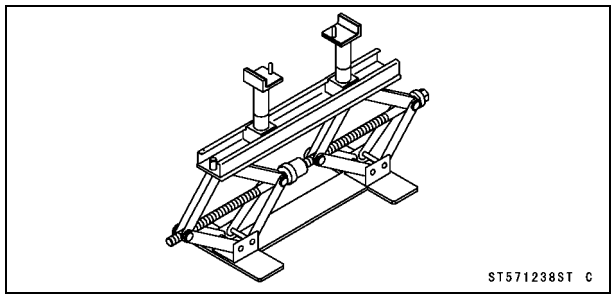
Bearing Driver Set:
57001-1129



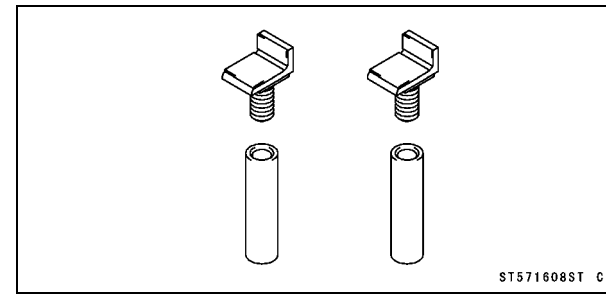
Bearing Remover Shaft, ϕ13:
57001-1377



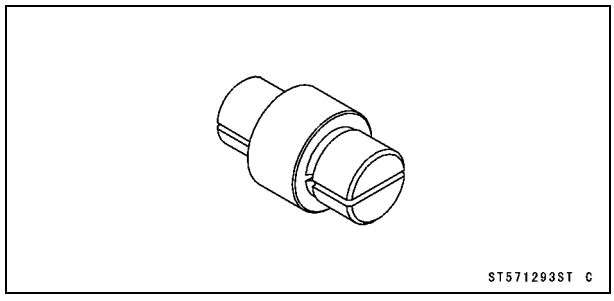
Jack:
57001-1238



Jack Attachment:
57001-1608

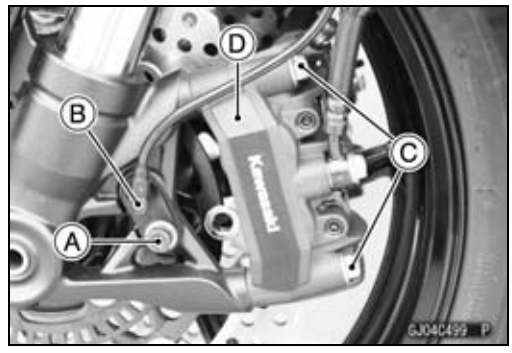


Bearing Remover Head, ϕ20 × ϕ22:
57001-1293

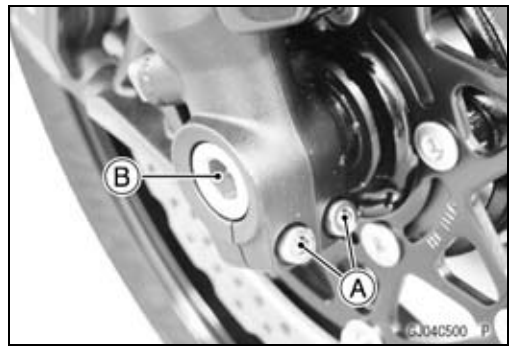


Wheels (Rims)

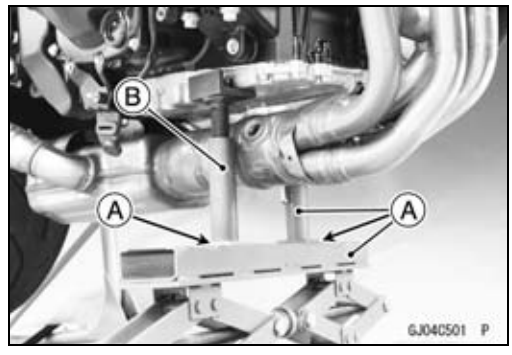
Front Wheel Removal



- Remove:
  Front Wheel Rotation Sensor Bolt [A]
  Front Wheel Rotation Sensor [B]
  Front Caliper Mounting Bolts [C] (Both Sides)
  Front Caliper [D] (Both Sides)



- Loosen:
  Front Axle Clamp Bolts [A]
  Front Axle [B]



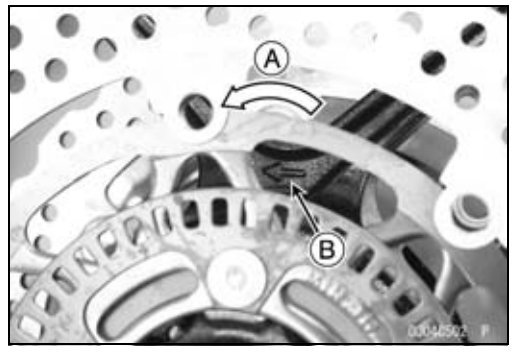
- Remove:
  Lower Fairings (see Lower Fairing Removal in the Frame chapter)
  Oxygen Sensor (see Oxygen Sensor Removal in the Electrical System chapter)
- Raise the front wheel off the ground.

Special Tools - Jack [A]: 57001-1238
Jack Attachment [B]: 57001-1608

- Pull out the front axle to the right and drop the front wheel out of the front forks.

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

Front Wheel Installation



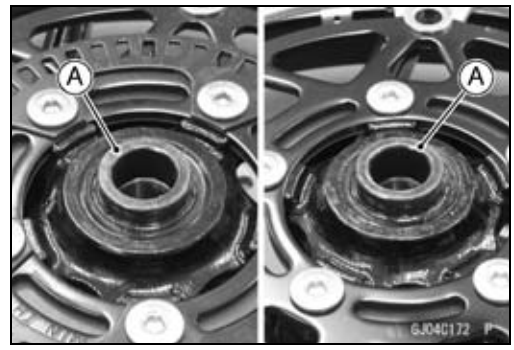
NOTE

○*The direction of the wheel rotation [A] is shown by an arrow [B] on the wheel spoke.*

- Check the wheel rotation mark on the front wheel and install it.

Wheels (Rims)

● Apply high-temperature grease to the grease seal lips.
● Fit the collar [A] on the both sides of the hub.
○The collars are identical.



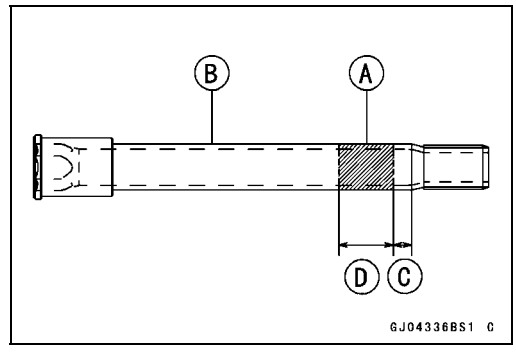
● Apply a thin coat of grease [A] to the front axle [B].
About 10 mm (0.4 in.) [C]
About 30 mm (1.2 in.) [D]

NOTE

○*Do not apply grease to the threads of the axle.*

● Insert the front axle from the right side.
● Tighten:

Torque - Front Axle: 110 N·m (11.2 kgf·m, 81.1 ft·lb)



● Before tightening the front axle clamp bolts [A] on the right front fork leg, pump the front fork up and down 4 or 5 times to allow the right front front fork leg to seat on the front axle.

NOTE

○*Put a block in front of the front wheel to stop moving.*

● Tighten:

Torque - Front Axle Clamp Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)

NOTE

○*Tighten the two clamp bolts alternately two times to ensure even tightening torque.*



● Install the removed parts (see appropriate chapters).
● Check the front brake effectiveness (see Brake Operation Inspection in the Periodic Maintenance chapter).

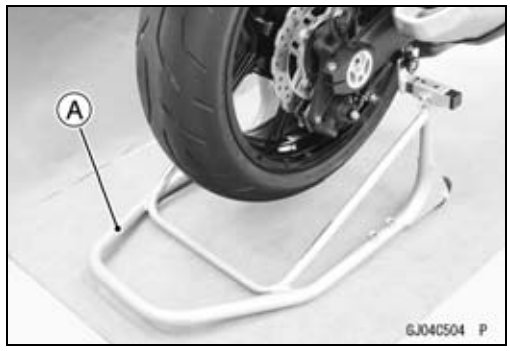
⚠ WARNING

After servicing, it takes several applications of the brake lever before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever is obtained by pumping the lever until the pads are against the disc.

Wheels (Rims)

Rear Wheel Removal

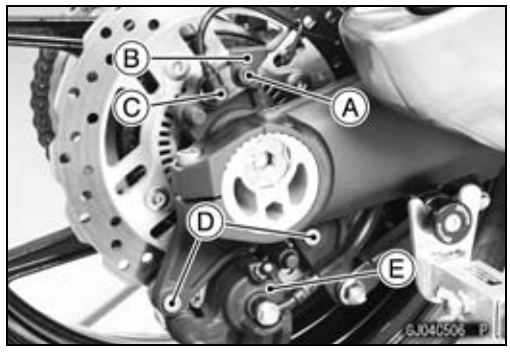
- Raise the rear wheel off the ground with the stand [A].



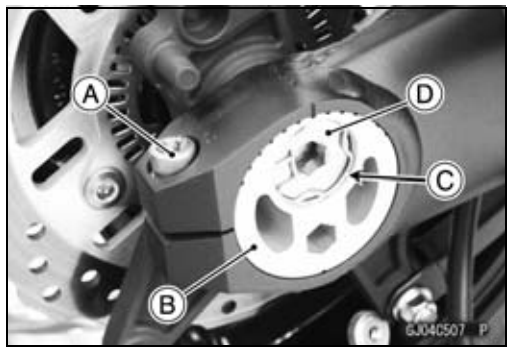
- Loosen the torque link nuts [A] lightly to turn the chain adjuster easily.



- Remove:
  Rear Wheel Rotation Sensor Bolt [A]
  Guide [B]
  Rear Wheel Rotation Sensor [C]
  Rear Caliper Mounting Bolts [D]
  Rear Caliper [E]



- Loosen the chain adjuster clamp bolt [A] on both sides.
- Turn the chain adjuster [B] to make the chain slack.
- Remove:
  Retaining Ring [C] (Both Sides)
  Rear Axle Nut [D]
  Washer



- Remove:
  Rear Axle [A] (from Left Side)



Wheels (Rims)

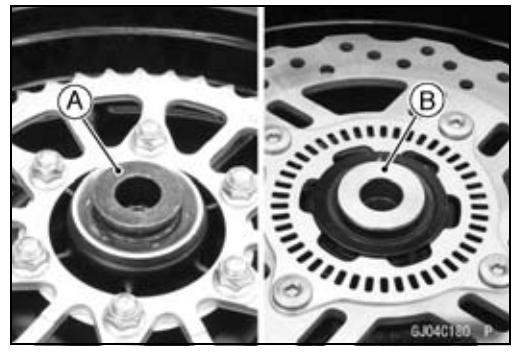
- Remove the drive chain [A] from the rear sprocket toward the left.
- Move the rear wheel back and remove it.



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] (ϕ40 × ϕ35)
  Right Side Collar [B] (ϕ41 × ϕ28)
- Engage the drive chain with the rear sprocket.

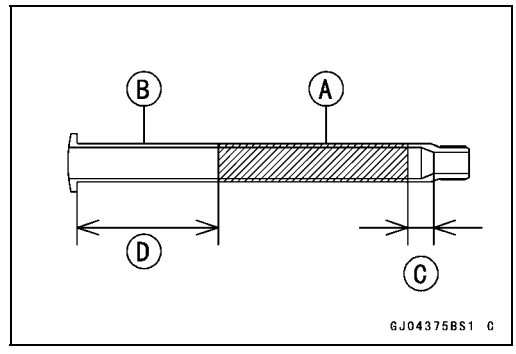


- Apply a thin coat of grease [A] to the rear axle [B].
  About 10 mm (0.4 in.) [C]
  About 70 mm (2.8 in.) [D]

NOTE

○*Do not apply grease to the thread portion of the axle.*

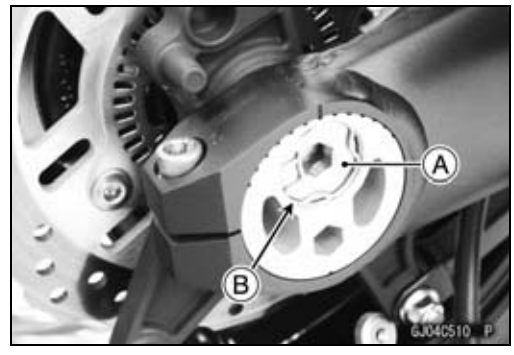
★If the rear axle nut adhere, wipe off any grease.



- Insert the rear axle from the left side of the wheel.
- Align the hole of the brake holder with hole of the rear wheel.
- Install:
  Washer
  Rear Axle Nut [A]
- Before tightening the rear axle nut, check that the scale on the left and right adjusters set the same position.
- Tighten:

  Torque - Rear Axle Nut: 100 N·m (10.2 kgf·m, 73.8 ft·lb)

- Replace the retaining rings [B] with new ones, and install them.



Wheels (Rims)

- Adjust the drive chain slack after installation (see Drive Chain Slack Inspection in the Periodic Maintenance chapter).
- Install the removed parts (see appropriate chapters).
- Check the rear brake effectiveness (see Brake Operation Inspection in the Periodic Maintenance chapter).

⚠ WARNING

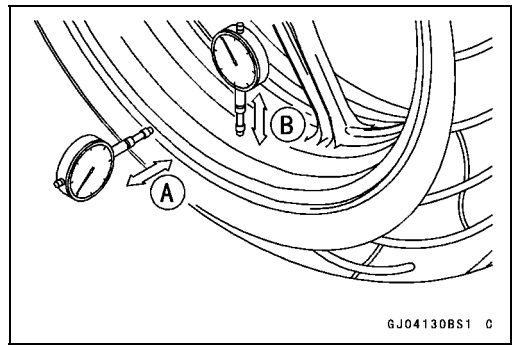
After servicing, it takes several applications of the brake pedal before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake pedal is obtained by pumping the pedal until the pads are against the disc.

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:

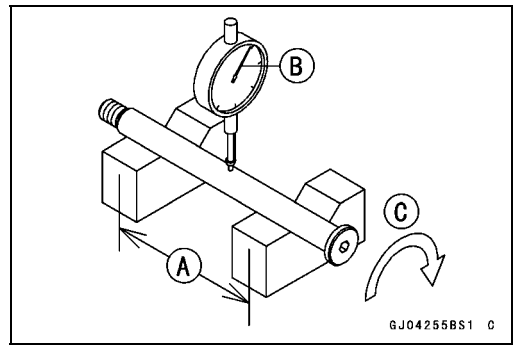
Axial	**TIR 1.0 mm (0.04 in.)**
Radial	**TIR 1.0 mm (0.04 in.)**

⚠ 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.

Wheels (Rims)

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.

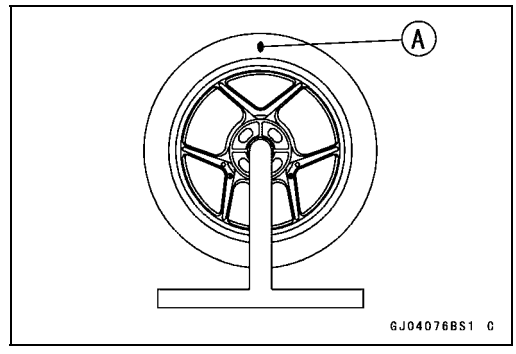
- Place the axle in V blocks that are 100 mm (3.94 in.) [A] apart, and set a dial gauge [B] on the axle at a point halfway between the blocks. Turn [C] the axle to measure the runout. The difference between the highest and lowest dial readings is the amount of runout.

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

Axle Runout/100 mm (3.94 in.)
Standard:

Front	**TIR 0.03 mm (0.001 in.) or less**
Rear	**TIR 0.1 mm (0.004 in.) or less**
Service Limit:	**TIR 0.2 mm (0.008 in.)**

Balance Inspection

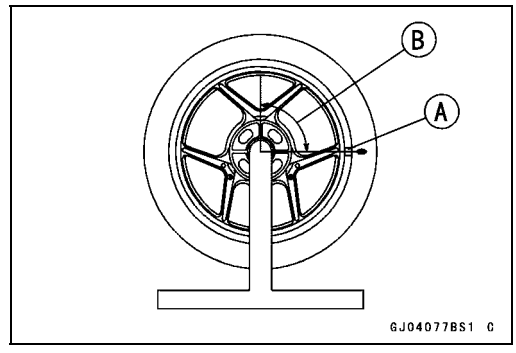


- Remove the front and rear wheels (see Front/Rear Wheel Removal).
- Support the wheel so that it can be spun freely.
- Spin the wheel lightly, and mark [A] the wheel at the top when the wheel stops.

○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



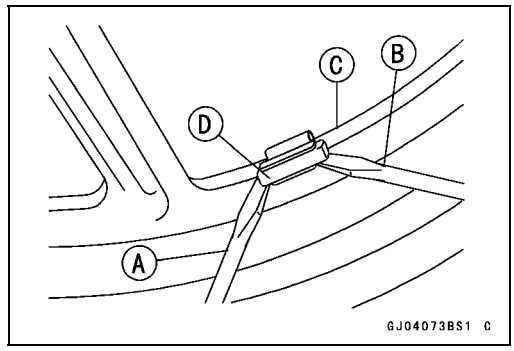
- If the wheel always stops in one position, provisionally attach a balance weight [A] on the rim at the marking using adhesive tape.
- Rotate the wheel 1/4 turn [B], and see whether or not the wheel stops in this position. If it does, the correct balance weight is being used.

★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.

Wheels (Rims)

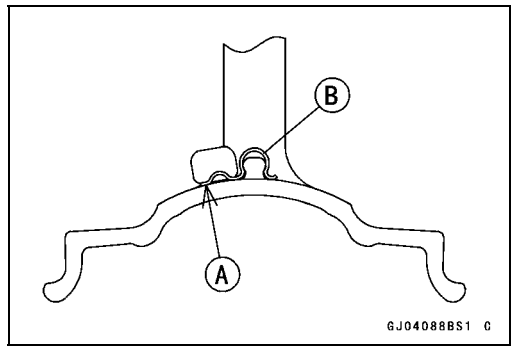
Balance Weight Removal



- Insert a flat tip screwdrivers [A] [B] between the rib [C] and weight [D] as shown.
- Pry the balance weight with two screwdrivers and remove the balance weight.
- Discard the used balance weight.

NOTICE
Do not tap the screwdrivers. The rim could be damaged.

Balance Weight Installation



- Check if the weight portion has any play on the blade [A] and clip [B].

★If it does, discard it.

⚠ WARNING
Unbalanced wheels can create an unsafe riding condition. If the balance weight has any play on the rib of the rim, the blade and/or clip have been stretched. Replace the loose balance weight. Do not reuse used balance weight.

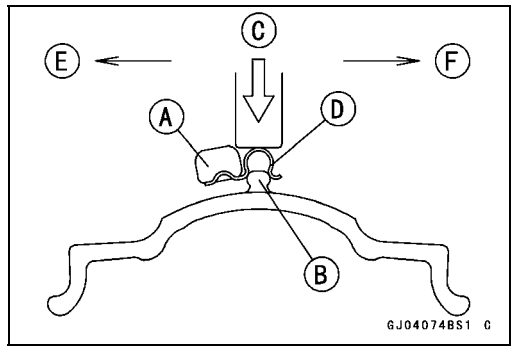
Balance Weight

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.*

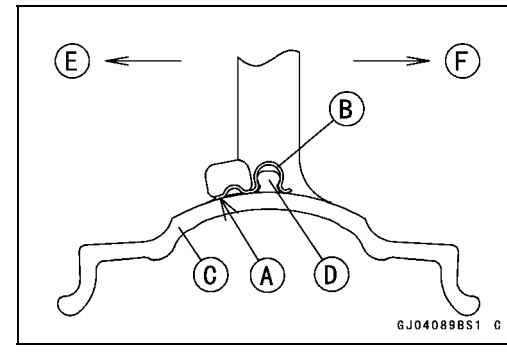


- Slip the balance weight [A] onto the rib [B] by pushing or lightly hammering [C] the clip [D].
  Left Side [E]
  Right Side [F]

Wheels (Rims)

● 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

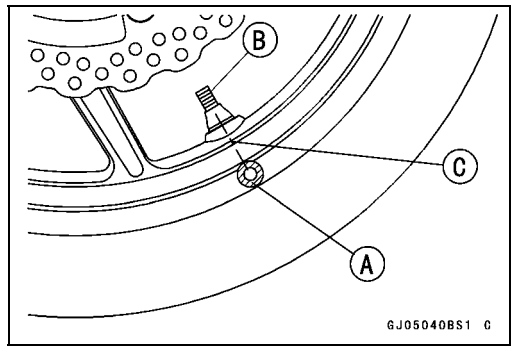
Air Pressure Inspection/Adjustment

- 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.

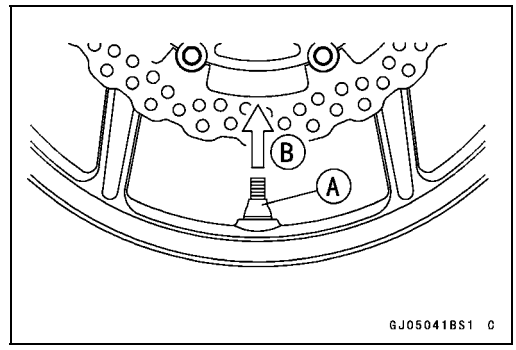
- Inspect the rim and tire, and replace them if necessary.
- Clean the sealing surfaces of the rim and tire, and smooth the sealing surfaces of the rim with a fine emery cloth if necessary.
- Remove the air valve and discard it.

NOTICE
Replace the air valve whenever the tire is replaced. Do not reuse the air valve.

Tires

● Install a new valve in the rim.

○Remove the valve cap, lubricate the stem seal [A] with a soap and water solution or rubber lubricant, and pull [B] the valve stem through the rim from the inside out until it snaps into place.

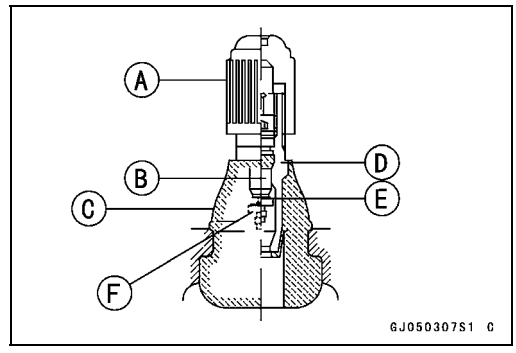


NOTICE

Do not use engine oil or petroleum distillates to lubricate the stem because they will deteriorate the rubber.

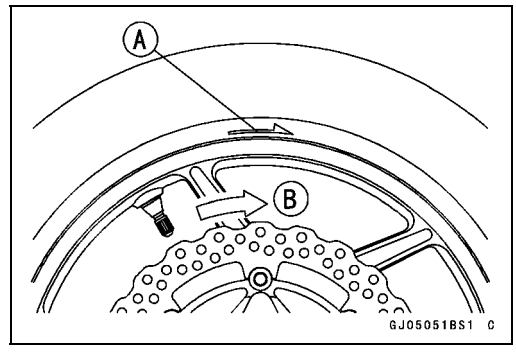
○The air valve is as shown.

Valve Cap [A]
Valve Core [B]
Stem Seal [C]
Valve Stem [D]
Valve Seat [E]
Valve Opened [F]



● Check the tire rotation mark on the front and rear tires and install them on the rim accordingly.

Tire Rotation Mark [A]
Rotating Direction [B]

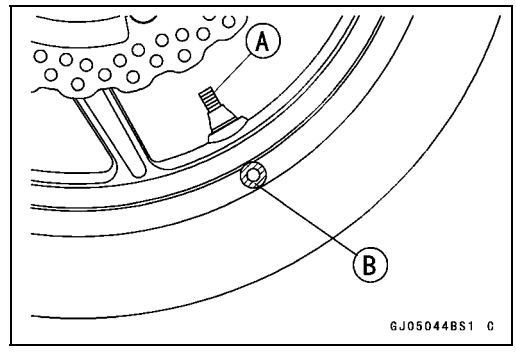


● Position the tire on the rim so that the valve [A] align with the tire balance mark [B] (the chalk mark made during removal, or the yellow paint mark on a new tire).

● Install the tire bead over the rim flange using a suitable commercially available tire changer.

● Lubricate the tire beads and rim flanges with a soap and water solution or rubber lubricant to help seat the tire beads in the sealing surfaces of the rim while inflating the tire.

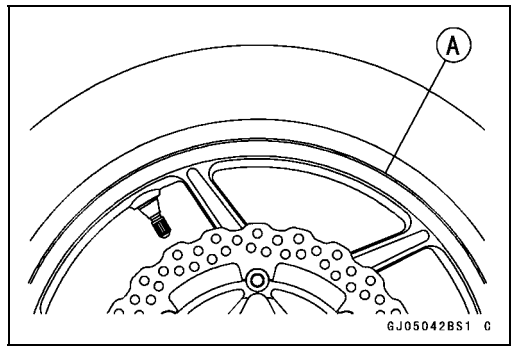
● Center the rim in the tire beads, and inflate the tire with compressed air until the tire beads seat in the sealing surfaces.



⚠ WARNING

Overinflating a tire can cause it to explode, causing serious injury or death. Be sure to install the valve core whenever inflating the tire, and do not inflate the tire to more than 400 kPa (4.0 kgf/cm², 57 psi).

Tires



- Check to see that the rim lines [A] on both sides of the tire sidewalls are parallel with the rim flanges.

★If the rim flanges and tire sidewall rim lines are not parallel, remove the valve core.

- Lubricate the rim flanges and tire beads.
- Install the valve core and inflate the tire again.
- After the tire beads seat in the rim flanges, check for air leakage.

○Inflate the tire slightly above standard inflation.

○Use a soap and water solution or submerge the tire, and check for bubbles that would indicate leakage.

- Adjust the air pressure to the specified pressure (see Air Pressure Inspection in the Periodic Maintenance chapter).
- Install the air valve cap.
- Adjust the wheel balance (see Balance Adjustment).

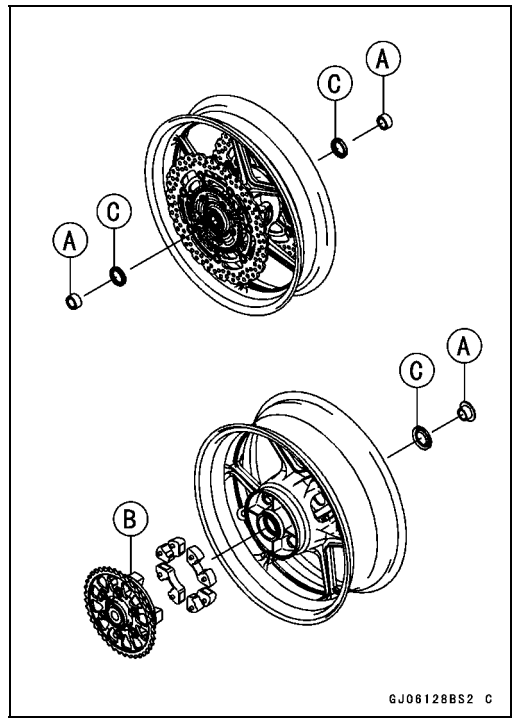
Tire Repair

Currently two types of repair for tubeless tires have come into wide use. One type is called a temporary (external) repair which can be carried out without removing the tire from the rim, and the other type is called permanent (internal) repair which requires tire removal. It is generally understood that higher running durability is obtained by permanent (internal) repairs than by temporary (external) ones. Also, permanent (internal) repairs have the advantage of permitting a thorough examination for secondary damage not visible from external inspection of the tire. For these reasons, Kawasaki does not recommend temporary (external) repair. Only appropriate permanent (internal) repairs are recommended. Repair methods may vary slightly from make to make. Follow the repair methods indicated by the manufacturer of the repair tools and materials so that safe results can be obtained.

Hub Bearing

Hub Bearing Removal

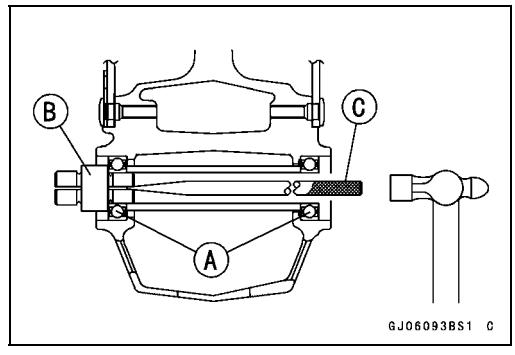
- Remove the wheels (see Front/Rear Wheel Removal), and take out the following.
  Collars [A]
  Coupling [B] (Out of rear hub)
  Grease Seals [C]



- 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.



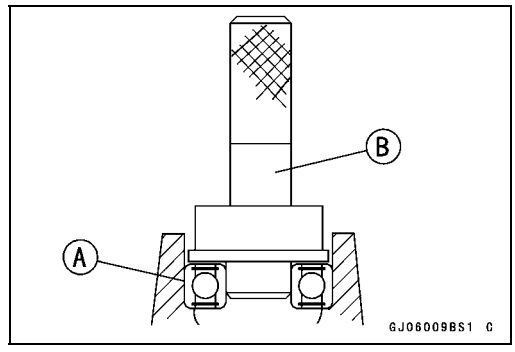
Special Tools - Bearing Remover Head, ϕ20 × ϕ22 [B]: 57001-1293
Bearing Remover Shaft, ϕ13 [C]: 57001-1377

Hub Bearing Installation

- Before installing the hub bearings, blow any dirt or foreign particles out of the hub with compressed air to prevent contamination of the bearings.
- Replace the bearings with new ones.
- Install the bearings by using the bearing driver set which does not contact the bearing inner race.

NOTE

○*Install the bearings so that the marked side faces out.*



- Press in each right the bearing [A] until they are bottomed.

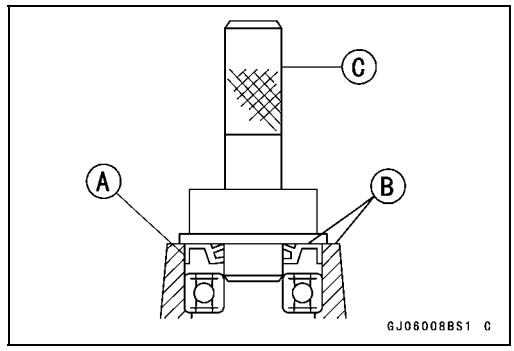
Special Tool - Bearing Driver Set [B]: 57001-1129

Hub Bearing

● 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

● Install the removed parts (see appropriate chapters).

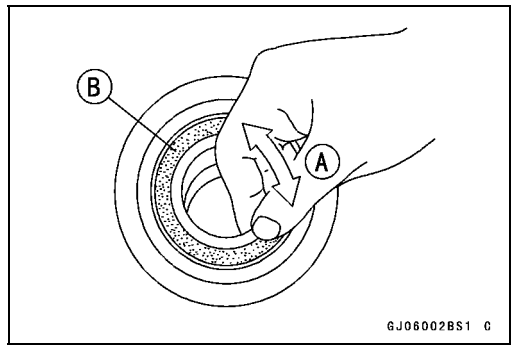


Hub Bearing Inspection

Since the hub bearings are made to extremely close tolerances, the clearance can not normally be measured.

NOTE

○*Do not remove any bearings for inspection. If any bearings are removed, they will need to be replaced with new ones.*



● Turn each bearing in the hub back and forth [A] while checking for plays, roughness, or binding.
★If bearing play, roughness, or binding is found, replace the bearing.
● Examine the bearing seal [B] for tears or leakage.
★If the seal is torn or is leaking, replace the bearing.

Hub Bearing Lubrication

NOTE

○*Since the hub bearings are packed with grease and sealed, lubrication is not required.*

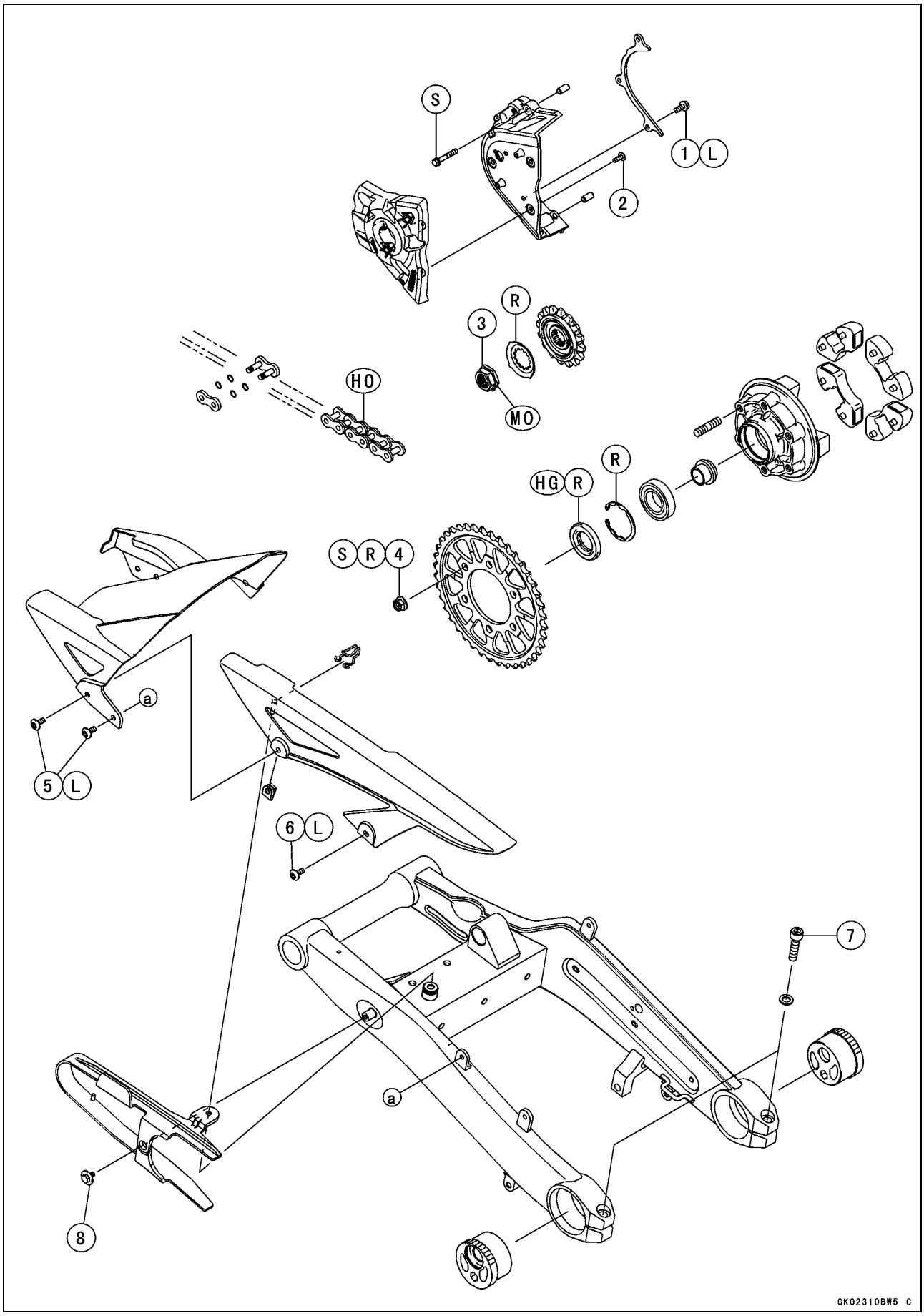
Final Drive

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Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Chain Guide Bolts	10	1.0	89 in·lb	L
2	Engine Sprocket Outer Cover Screws	0.70	0.07	6.2 in·lb	
3	Engine Sprocket Nut	147	15.0	108	MO
4	Rear Sprocket Nuts	60	6.1	44	R, S
5	Mud Guard Bolts	4.0	0.41	35 in·lb	L
6	Chain Cover Bolts	4.0	0.41	35 in·lb	L
7	Chain Adjuster Clamp Bolts	65	6.6	48	
8	Chain Guide Mounting Bolt	4.0	0.41	35 in·lb	

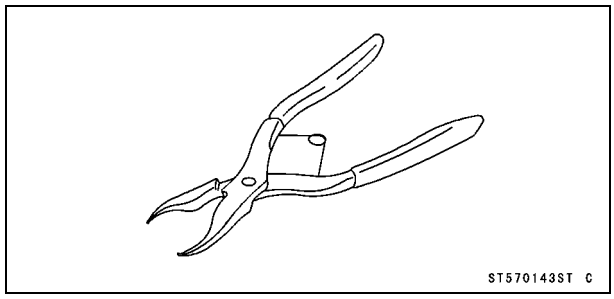
HG: Apply high-temperature grease.
HO: Apply heavy oil.
L: Apply a non-permanent locking agent.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
S: Follow the specified tightening sequence.

Specifications

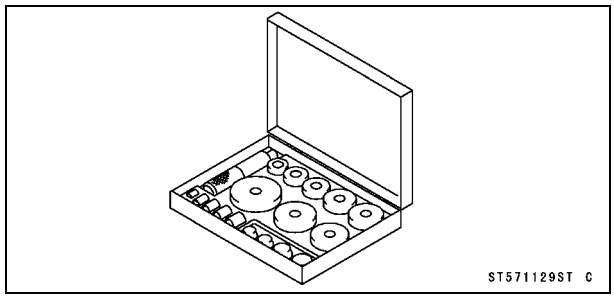
Item	Standard	Service Limit
Drive Chain		
Drive Chain Slack	20 ~ 30 mm (0.8 ~ 1.2 in.)	– – –
Drive Chain Wear (20-link Length)	317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)	319 mm (12.6 in.)
Standard Chain:		
Make	ENUMA	– – –
Type	EK525ZX	– – –
Link	112 links	– – –
Link Pin Outside Diameter (When drive chain replacing)	5.6 ~ 6.0 mm (0.22 ~ 0.24 in.)	– – –
Link Plates Outside Width (When drive chain replacing)	20.35 ~ 20.55 mm (0.8012 ~ 0.8091 in.)	– – –
Sprockets		
Rear Sprocket Warp	TIR 0.4 mm (0.016 in.) or less	TIR 0.5 mm (0.020 in.)

Special Tools

Inside Circlip Pliers:
57001-143



Bearing Driver Set:
57001-1129



Drive Chain

Drive Chain Slack Inspection

● Refer to the Drive Chain Slack Inspection in the Periodic Maintenance chapter.

Drive Chain Slack Adjustment

● Refer to the Drive Chain Slack Adjustment in the Periodic Maintenance chapter.

Wheel Alignment Inspection/Adjustment

● Refer to the Wheel Alignment Inspection in the Periodic Maintenance chapter.

Drive Chain Wear Inspection

● Refer to the Drive Chain Wear Inspection in the Periodic Maintenance chapter.

Drive Chain Lubrication

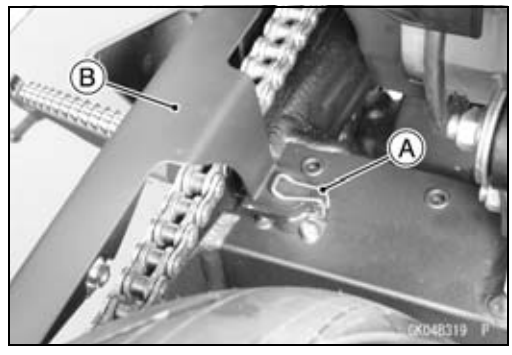
● Refer to the Drive Chain Lubrication Condition Inspection in the Periodic Maintenance chapter.

Drive Chain Removal

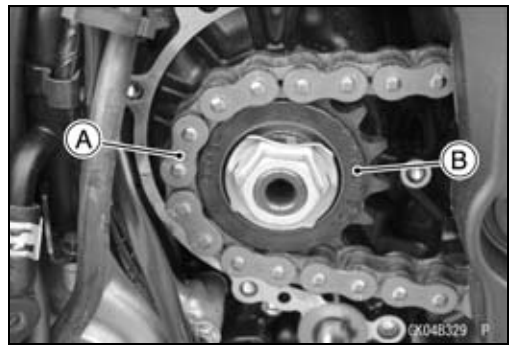
● Remove:
Mud Guard (see Mud Guard Removal in the Frame chapter)
Rear Wheel (see Rear Wheel Removal in the Wheels/Tires chapter)
Chain Cover Bolt [A]



● Remove:
Clamp [A]
Chain Cover [B]
Swingarm (see Swingarm Removal in the Suspension chapter)

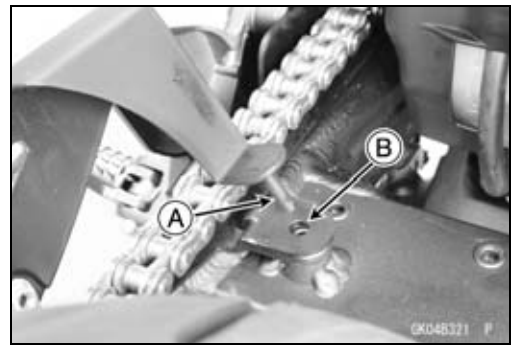


● Remove the engine sprocket cover (see Engine Sprocket Removal).
● Remove the drive chain [A] from the engine sprocket [B], and take it off the chassis.

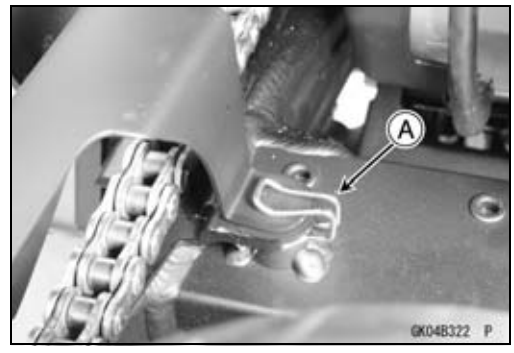


Drive Chain

Drive Chain Installation



- Install the drive chain to the engine sprocket.
- Install:
  Swingarm (see Swingarm Installation in the Suspension chapter)
  Rear Wheel (see Rear Wheel Installation in the Wheels/Tires chapter)
  Engine Sprocket Cover (see Engine Sprocket Installation)
- Insert the projection [A] on the chain cover into the swingarm hole [B].



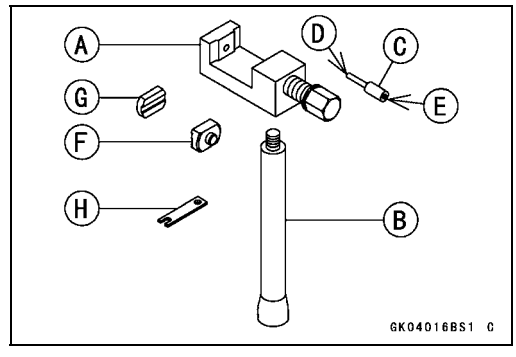
- Install the clamp [A] as shown.
- Apply a non-permanent locking agent to the threads of the chain cover bolt and tighten it.
- Adjust the drive chain slack after installing the chain (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).

Drive Chain Replacement

- Remove:
  Engine Sprocket Cover (see Engine Sprocket Removal)
  Mud Guard (see Mud Guard Removal in the Frame chapter)
  Chain Cover (see Drive Chain Removal)

NOTICE
For safety, if the drive chain shall be replaced, replace it using a recommended tool.

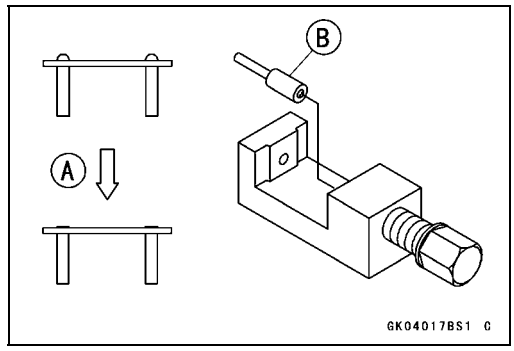
Recommended Tool - Type: EK Joint Tool #50
Brand: ENUMA



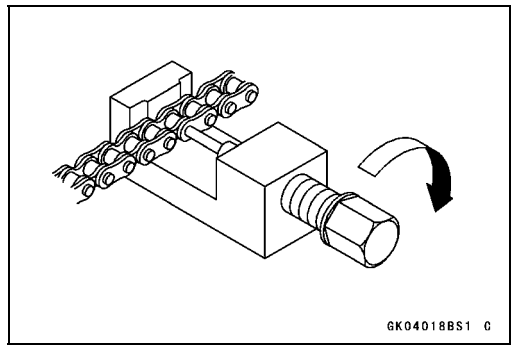
Body [A]
Handlebar [B]
Cutting and Riveting Pin [C]
For Cutting [D]
For Riveting [E]
Plate Holder (A) [F]
Plate Holder (B) [G]
Gauge [H]

Drive Chain

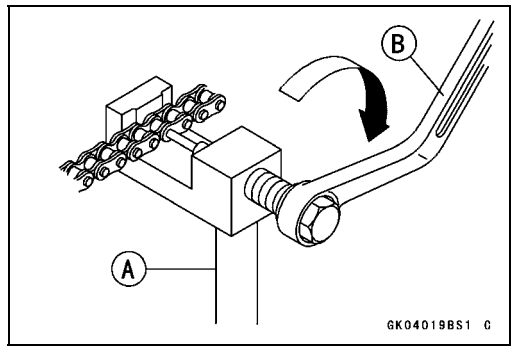
- Grind [A] the pin head to make it flat.
- Set the cutting and riveting pin [B] as shown.



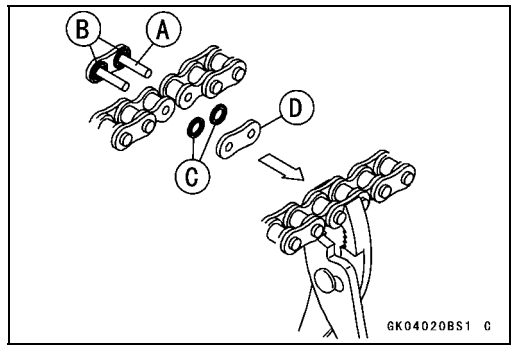
- Screw the pin holder until it touches the chain pin.
- Be sure that the cutting pin hits center of the chain pin.



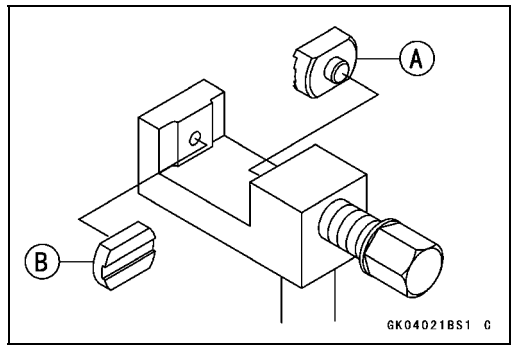
- Screw the handlebar [A] into the body.
- Turn the pin holder with the wrench [B] clockwise to extract the chain pin.



- 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 [D] so that the mark faces out.
- Push the link plate by hand or plier to fix it.
- Be sure to set the grease seals correctly.

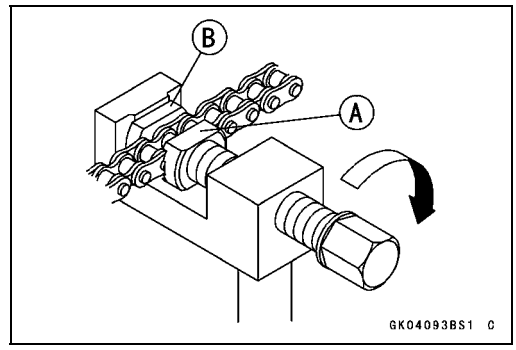


- Set the plate holder (A) [A] and plate holder (B) [B] on the body.

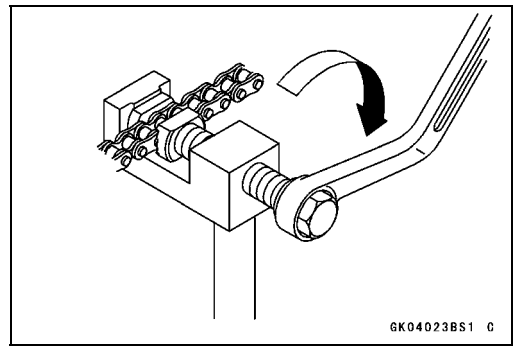


Drive Chain

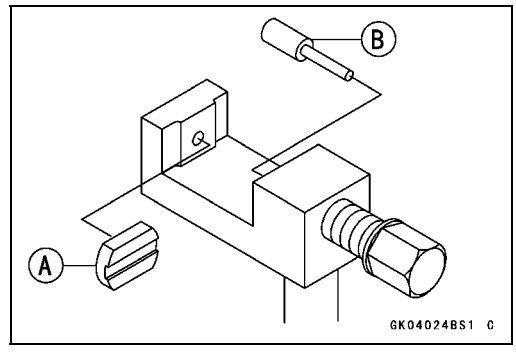
- Fit the plate holder (A) [A] to the link plate.
- Turn the pin holder by hand until the plate holder (B) [B] touches the other link plate.



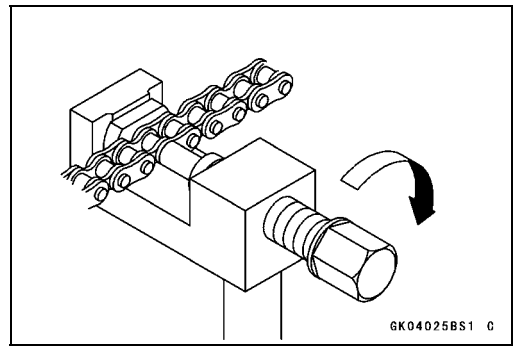
- Turn the pin holder by a wrench clockwise until two pins of link come into groove of the plate holder (A).
- Take off the plate holder.



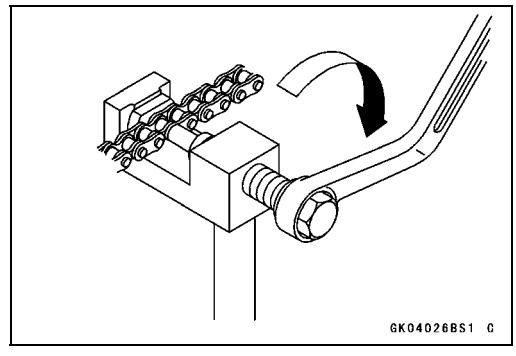
- Set the plate holder (B) [A] and cutting and riveting pin [B] as shown.



- Turn the pin holder until the riveting pin touches the link pin.



- Turn the wrench clockwise until the tip of riveting pin hits to the link pin.
- Rivet it.
- Same work for the other link pin.



Drive Chain

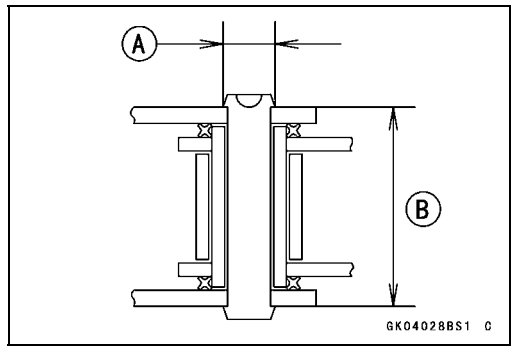
- After staking, check the staked area of the link pin for cracks.
- Measure the outside diameter [A] of the link pin and link plates width [B].

Link Pin Outside Diameter
Standard: 5.6 ~ 6.0 mm (0.22 ~ 0.24 in.)

Link Plates Outside Width
Standard: 20.35 ~ 20.55 mm (0.8012 ~ 0.8091 in.)

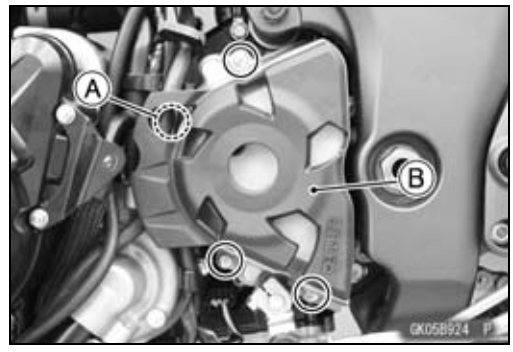
★If the reading exceeds the specified length, cut and rejoin the chain again.

- 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 removed parts (see appropriate chapters).

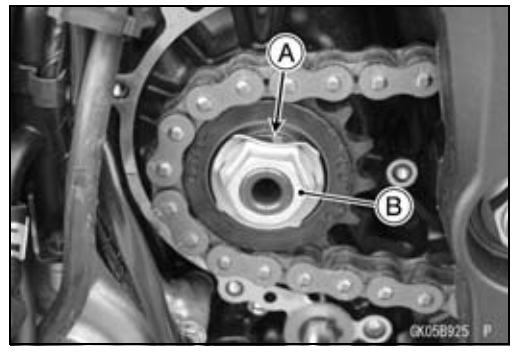


Sprocket, Coupling

Engine Sprocket Removal



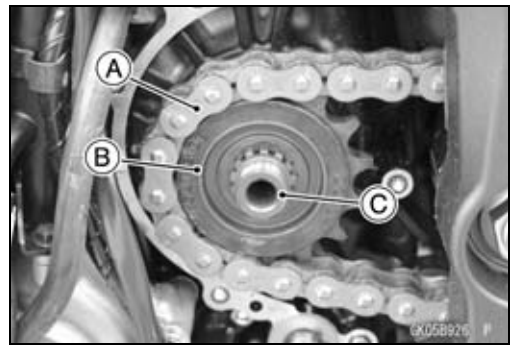
- Remove:
  Left Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Engine Sprocket Cover Bolts [A]
  Engine Sprocket Cover [B]



- Flatten out the bended washer [A].
- Remove the engine sprocket nut [B] and washer.

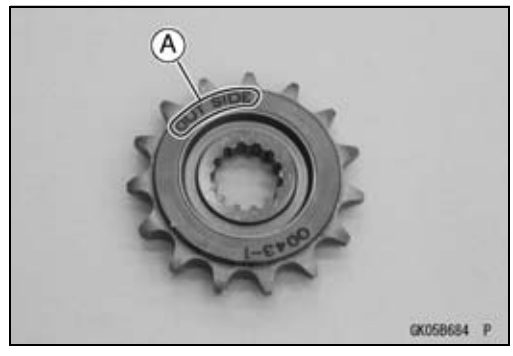
NOTE

○*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).
- Remove the drive chain from the rear sprocket toward the right.
- Disengage the drive chain [A] from the engine sprocket [B].
- Pull the engine sprocket off the output shaft [C].

Engine Sprocket Installation



- Replace the sprocket washer.
- Install the engine sprocket so that “OUT SIDE” letters [A] face outward.
- Apply molybdenum disulfide oil solution to the threads and the seating surface of the engine sprocket nut.
- Tighten:

Torque - Engine Sprocket Nut : 147 N·m (15.0 kgf·m, 108 ft·lb)

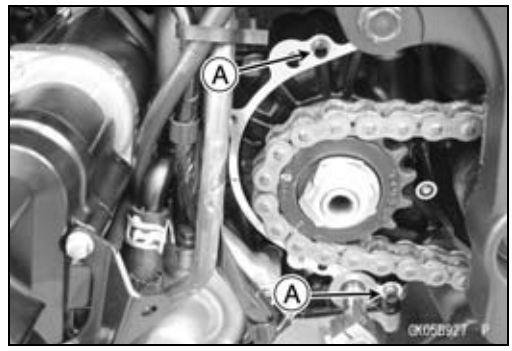
NOTE

○*Tighten the engine sprocket nut while applying the rear brake.*

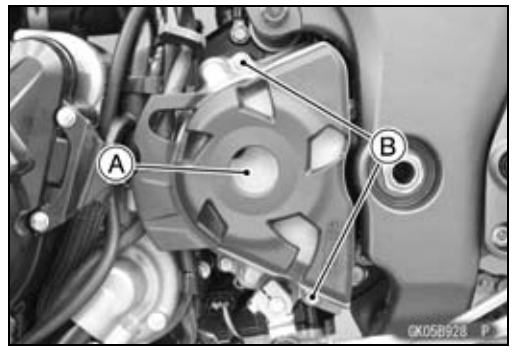
- After torquing the engine sprocket nut, bend the one side of the washer over the nut.
- Adjust the drive chain slack after installing the engine sprocket (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).

Sprocket, Coupling

● Install:
Dowel Pins [A]

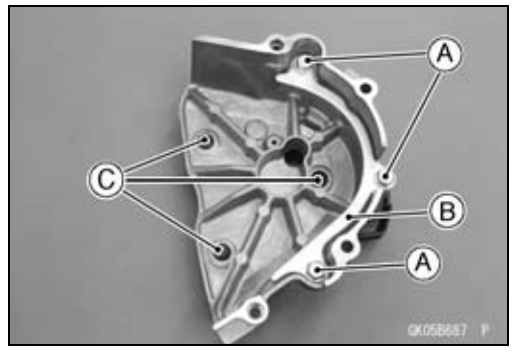


● Install:
Engine Sprocket Cover [A]
● Tighten the engine sprocket cover bolts.
○First tighten the two bolts [B] at the dowel pin positions.



Engine Sprocket Cover Disassembly

● Remove:
Engine Sprocket Cover (see Engine Sprocket Removal)
Chain Guide Bolts [A]
Chain Guide [B]
Engine Sprocket Outer Cover Screws [C]
● Separate the engine sprocket outer cover and inner cover.



Engine Sprocket Cover Assembly

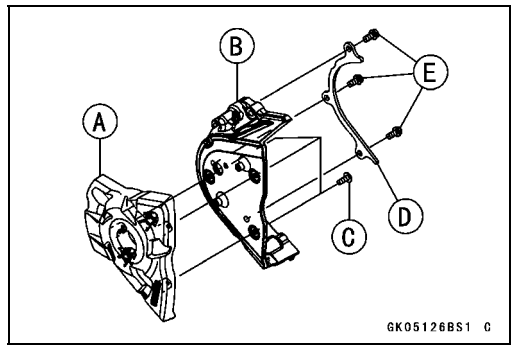
● Install the engine sprocket outer cover [A] to the inner cover [B].
● Tighten:

Torque - Engine Sprocket Outer Cover Screws [C]: 0.70 N·m (0.07 kgf·m, 6.2 in·lb)

● Install the chain guide [D].
● Apply a non-permanent locking agent to the threads of the chain guide bolts [E], and tighten them.

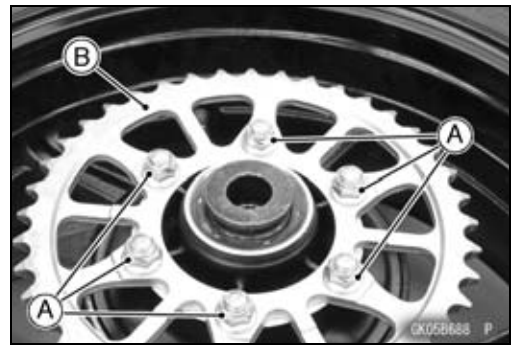
Torque - Chain Guide Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)

● Install:
Engine Sprocket Cover (see Engine Sprocket Installation)



Sprocket, Coupling

Rear Sprocket Removal

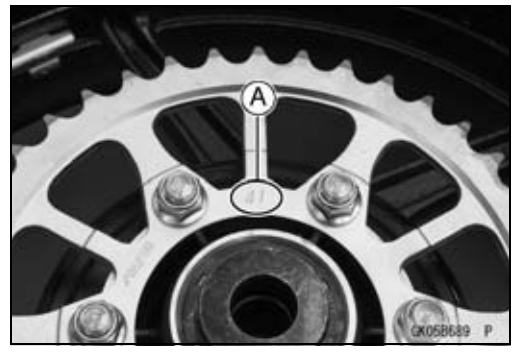


- Remove the rear wheel (see Rear Wheel Removal in the Wheels/Tires chapter).

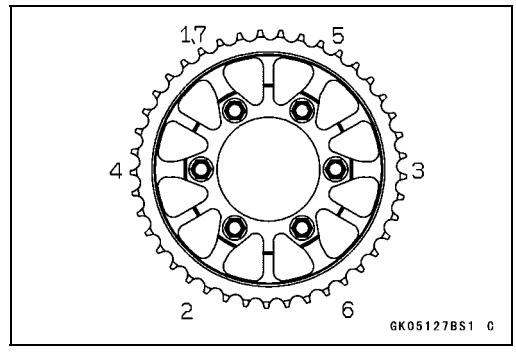
NOTICE
Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

- Remove:
  Rear Sprocket Nuts [A]
  Rear Sprocket [B]

Rear Sprocket Installation



- Install the sprocket facing the tooth number marking [A] outward.

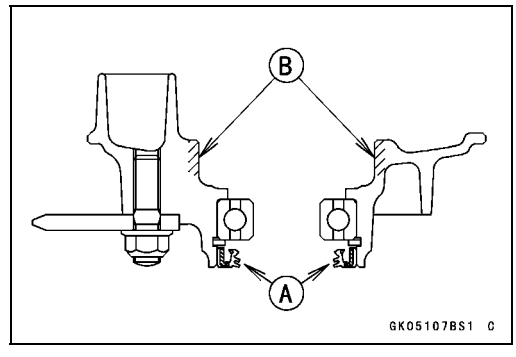


- Replace the rear sprocket nuts with new ones.
- Tighten the rear sprocket nuts following the specified tightening sequence [1 ~ 7].

  Torque - Rear Sprocket Nuts: 60 N·m (6.1 kgf·m, 44 ft·lb)

- Install the rear wheel (see Rear Wheel Installation in the Wheels/Tires chapter).

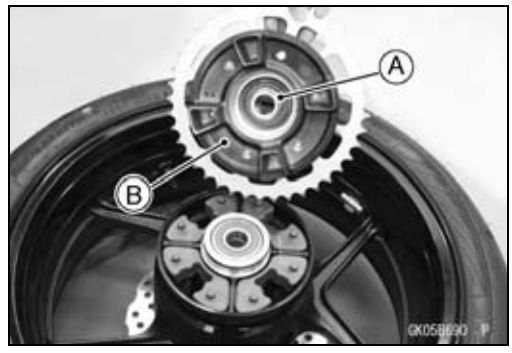
Coupling Installation



- Apply high-temperature grease to the following.
  Coupling Grease Seal Lips [A]
  Coupling Internal Surface [B]

Sprocket, Coupling

● Install:
Collar [A]
Coupling [B]



Coupling Bearing Removal

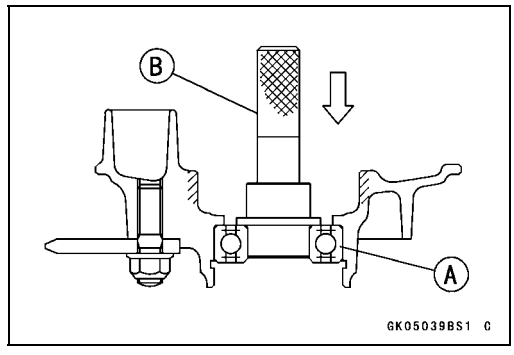
● Remove:
Coupling
Grease Seal
Circlip [A]

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



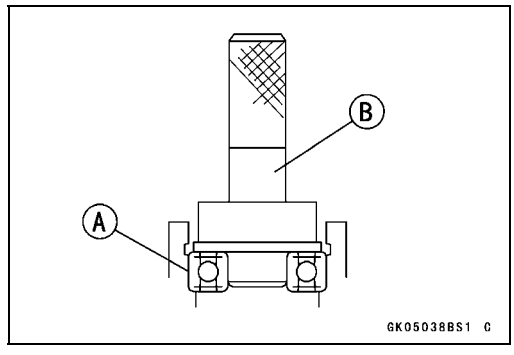
Coupling Bearing Installation

● Replace the bearing with a new one.
● Press in the bearing [A] until it is bottomed.

Special Tool - Bearing Driver Set [B]: 57001-1129

● Replace the circlip with a new one.

Special Tool - Inside Circlip Pliers: 57001-143



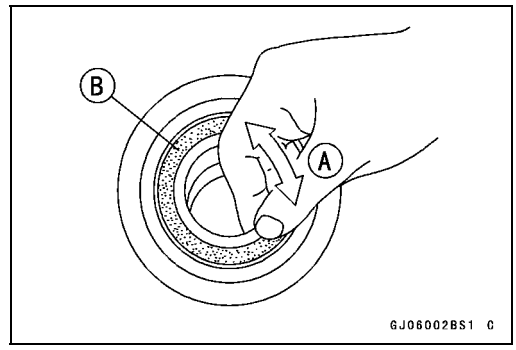
● Replace the grease seal with a new one.
● Press in the grease seal so that the seal surface is flush with the end of the hole.
○Apply high-temperature grease to the grease seal lip.

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.

- Examine the bearing seal [B] for tears or leakage.

★If the seal is torn or is leaking, replace the bearing.

Coupling Bearing Lubrication

NOTE

○*Since the coupling bearing is packed with grease and sealed, lubrication is not required.*

Coupling Damper Inspection

- Remove the rear wheel coupling, and inspect the rubber dampers [A].
- Replace the damper if it appears damaged or deteriorated.

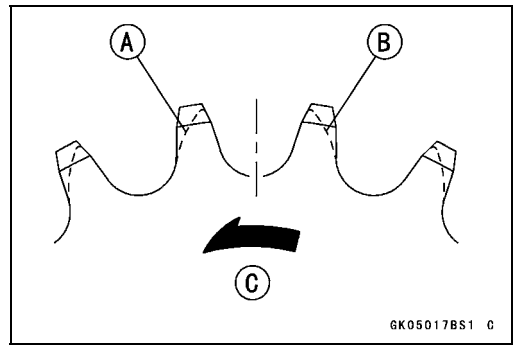


Sprocket Wear Inspection

- 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]

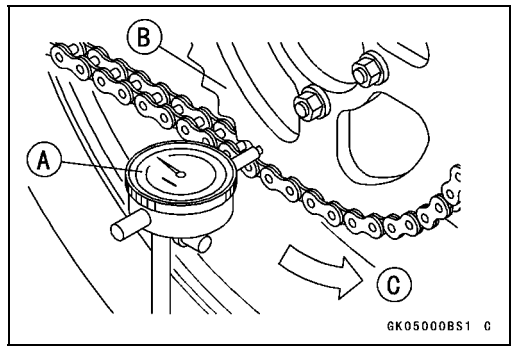


NOTE

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

Sprocket, Coupling

Rear Sprocket Warp Inspection



- Raise the rear wheel off the ground with the stand so that it will turn freely.
- Set a dial gauge [A] against the rear sprocket [B] near the teeth as shown, and rotate [C] the rear wheel to measure the sprocket runout (warp). The difference between the highest and lowest dial gauge readings is the amount of runout (warp).

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

Rear Sprocket Warp

Standard: TIR 0.4 mm (0.016 in.) or less

Service Limit: TIR 0.5 mm (0.020 in.)

Brakes

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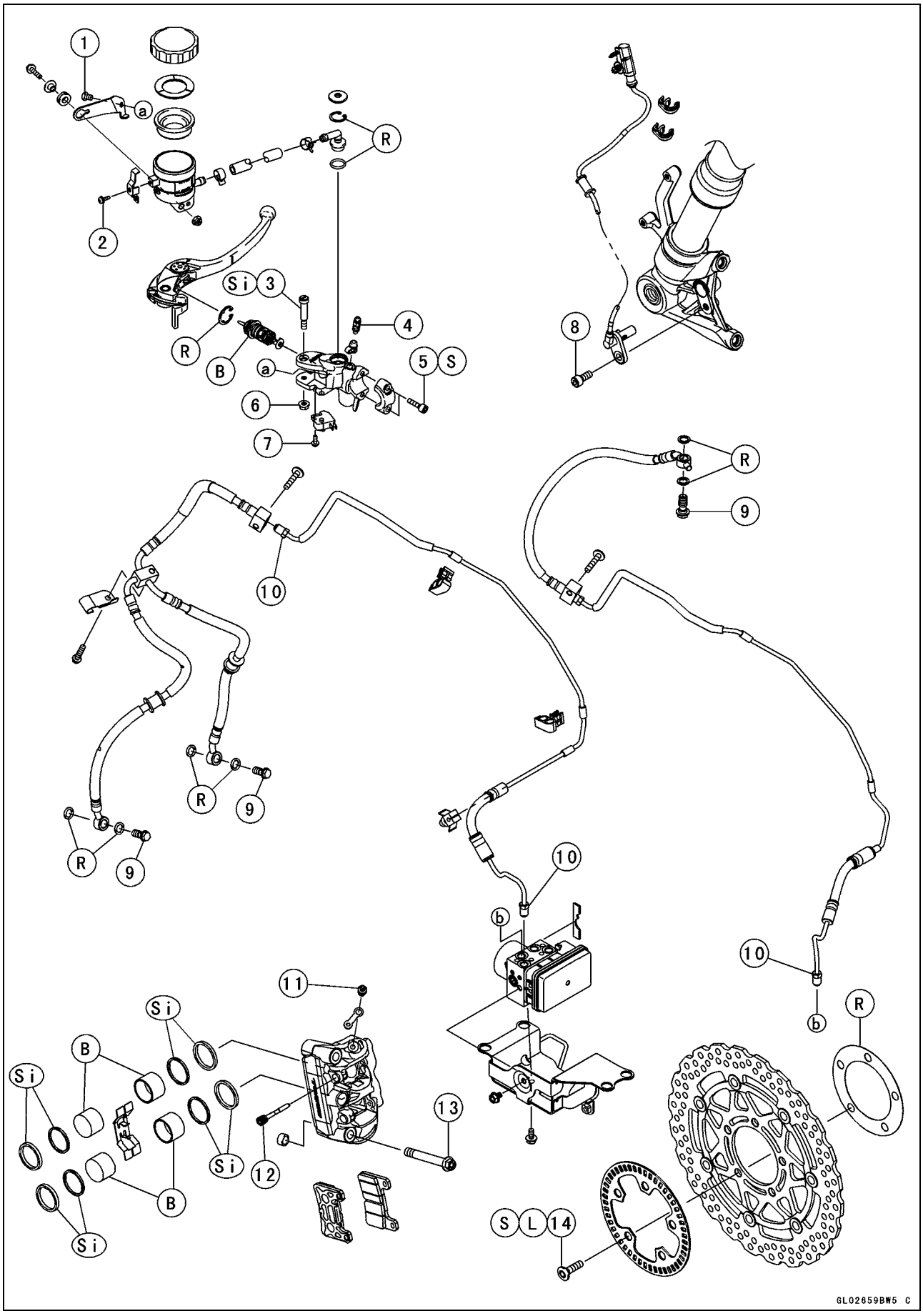
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Exploded View

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Exploded View

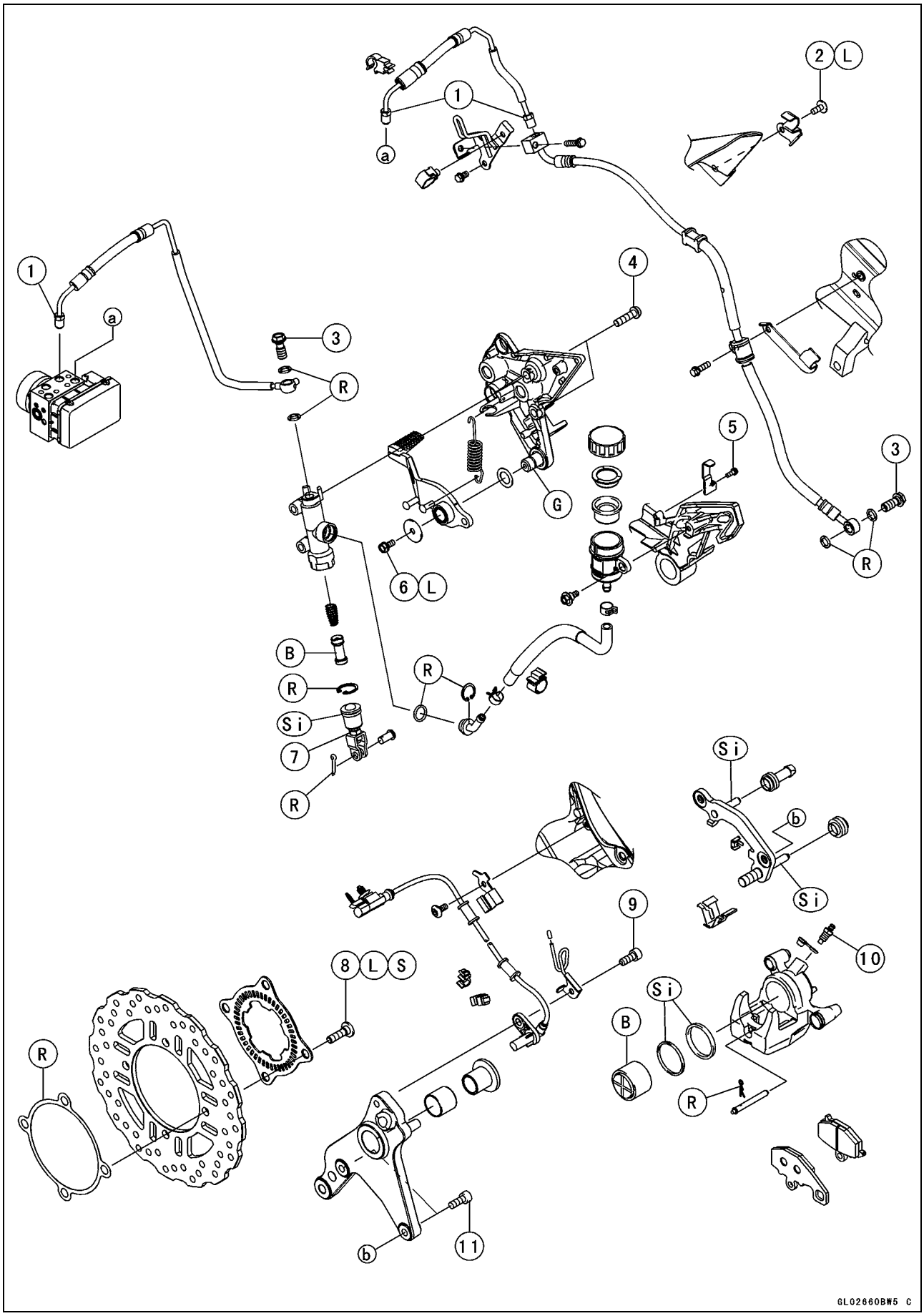


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Brake Reservoir Bracket Bolt	8.8	0.90	78 in·lb	
2	Front Brake Reservoir Cap Stopper Screw	1.5	0.15	13 in·lb	
3	Brake Lever Pivot Bolt	1.0	0.10	8.9 in·lb	Si
4	Front Master Cylinder Bleed Valve	5.4	0.55	48 in·lb	
5	Front Master Cylinder Clamp Bolts	11	1.1	97 in·lb	S
6	Brake Lever Pivot Bolt Locknut	5.9	0.60	52 in·lb	
7	Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
8	Front Wheel Rotation Sensor Bolt	25	2.5	18	
9	Brake Hose Banjo Bolts	25	2.5	18	
10	Brake Pipe Joint Nuts	18	1.8	13	
11	Bleed Valves	8.0	0.82	71 in·lb	
12	Front Brake Pad Pins	15	1.5	11	
13	Front Caliper Mounting Bolts	35	3.6	26	
14	Front Brake Disc Mounting Bolts	28	2.9	21	L, S

B: Apply brake fluid.
L: Apply a non-permanent locking agent.
R: Replacement Parts
S: Follow the specified tightening sequence.
Si: Apply silicone grease.

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Brake Pipe Joint Nuts	18	1.8	13	
2	Mud Guard Bolt	4.0	0.41	35 in·lb	L
3	Brake Hose Banjo Bolts	25	2.5	18	
4	Rear Master Cylinder Mounting Bolts	25	2.5	18	
5	Rear Brake Reservoir Cap Stopper Screw	1.5	0.15	13 in·lb	
6	Brake Pedal Bolt	9.0	0.92	80 in·lb	L
7	Rear Master Cylinder Push Rod Locknut	17	1.7	13	
8	Rear Brake Disc Mounting Bolts	28	2.9	21	L, S
9	Rear Wheel Rotation Sensor Bolt	25	2.5	18	
10	Bleed Valve	8.0	0.82	71 in·lb	
11	Rear Caliper Mounting Bolts	25	2.5	18	

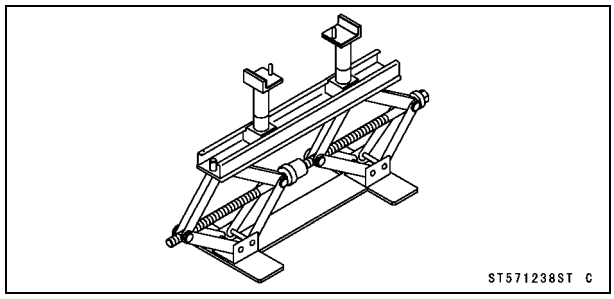
B: Apply brake fluid.
G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts
S: Follow the specified tightening sequence.
Si: Apply silicone grease.

Specifications

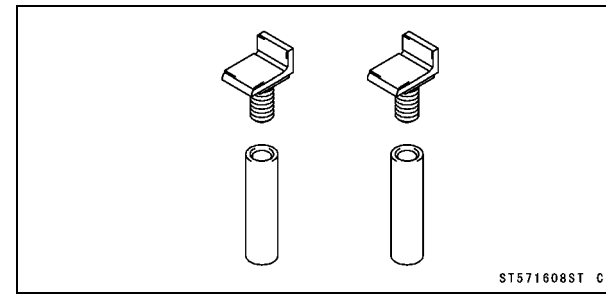
Item	Standard	Service Limit
Brake Lever, Brake Pedal		
Brake Lever Position	6-way adjustable (to suit rider)	– – –
Brake Lever Free Play	Non-adjustable	– – –
Pedal Free Play	Non-adjustable	– – –
Pedal Position	About 62 mm (2.4 in.) below footpeg top	– – –
Brake Pads		
Lining Thickness:		
Front	4.0 mm (0.16 in.)	1 mm (0.04 in.)
Rear	5.0 mm (0.20 in.)	1 mm (0.04 in.)
Brake Discs		
Thickness:		
Front	5.3 ~ 5.7 mm (0.21 ~ 0.22 in.)	5.0 mm (0.20 in.)
Rear	5.8 ~ 6.2 mm (0.23 ~ 0.24 in.)	5.5 mm (0.22 in.)
Runout:		
Front	– – –	TIR 0.3 mm (0.01 in.)
Rear	– – –	TIR 0.2 mm (0.008 in.)
Brake Fluid		
Grade	DOT4	– – –
ABS		
ABS Hydraulic Unit:		
Make	BOSCH	– – –
Wheel Rotation Sensor Air Gap:		
Front	0.1 ~ 2.1 mm (0.004 ~ 0.083 in.)	– – –
Rear	0.1 ~ 1.7 mm (0.004 ~ 0.067 in.)	– – –
CAN Communication Line Resistance	30 ~ 70 Ω	– – –
CAN Communication Line/Ground Resistance	4 ~ 30 kΩ	– – –

Special Tools

Jack:
57001-1238



Jack Attachment:
57001-1608



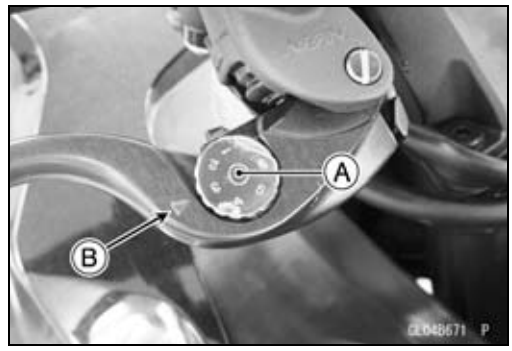
Brake Lever, Brake Pedal

Brake Lever Position Adjustment

The brake lever adjuster has 6 positions so that the brake lever position can be adjusted to suit the operator's hand.

● Push the lever forward and turn the adjuster [A] to align the number with the arrow mark [B] on the lever.

○ The distance from the grip to the lever is minimum at number 6 and maximum at number 1.



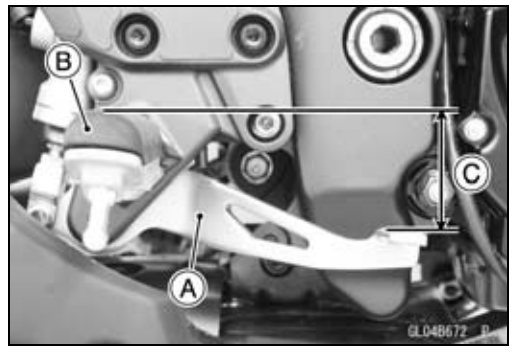
Brake Pedal Position Inspection

● Check that the brake pedal [A] is in the correct position.
Footpeg [B]

Pedal Position

Standard: About 62 mm (2.4 in.) [C] below top of footpeg

★ If it is incorrect, adjust the brake pedal position.



Brake Pedal Position Adjustment

NOTE

○ *Usually it is not necessary to adjust the pedal position, but always adjust it when the push rod locknut has been loosened.*

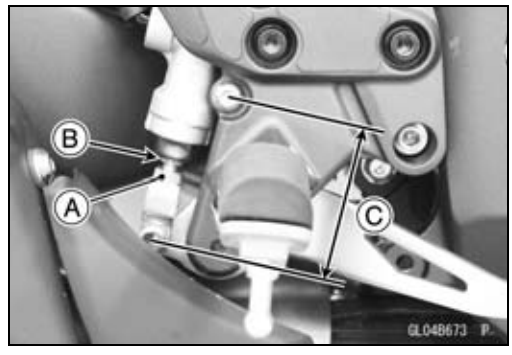
● Loosen the locknut [A] and turn the push rod with the hex head [B] to achieve the correct pedal position.

★ If the length [C] shown is **70 ±1 mm (2.76 ±0.04 in.)**, the pedal position will be within the standard range.

● Tighten:

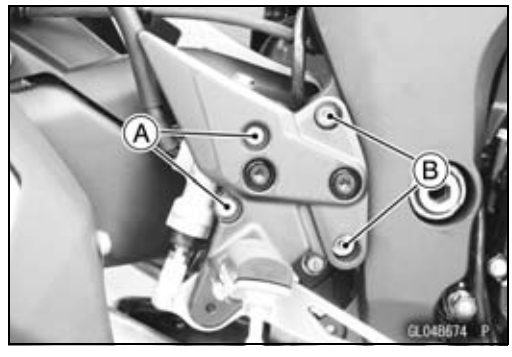
Torque - Rear Master Cylinder Push Rod Locknut: 17 N·m (1.7 kgf·m, 13 ft·lb)

● Check the brake light switch operation (see Brake Light Switch Operation Inspection in the Periodic Maintenance chapter).



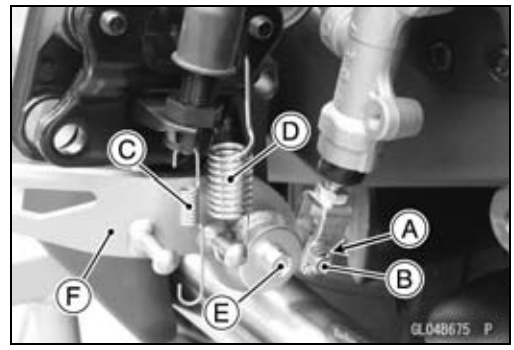
Brake Pedal Removal

● Remove:
Rear Lower Fairing (see Rear Lower Fairing Removal in the Frame chapter)
Rear Master Cylinder Mounting Bolts [A]
Right Front Footpeg Bracket Bolts [B]



Brake Lever, Brake Pedal

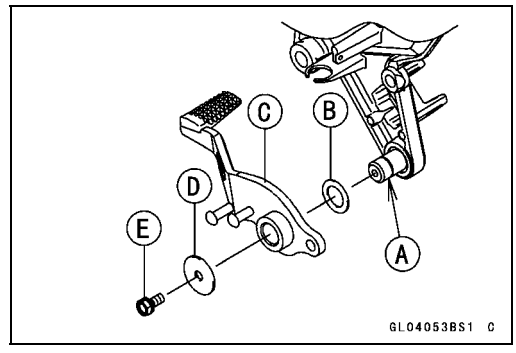
● Remove:
Cotter Pin [A]
Joint Pin [B]
Rear Brake Light Switch Spring [C]
Return Spring [D]
Brake Pedal Bolt [E]
Brake Pedal [F]



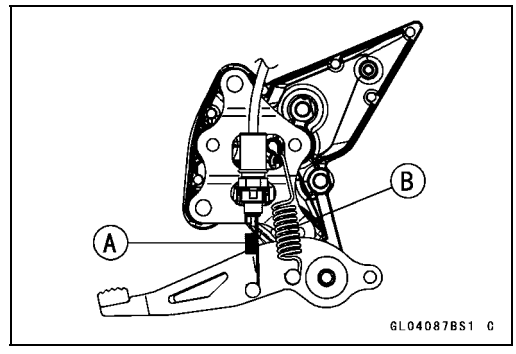
Brake Pedal Installation

● Apply grease to the footpeg pivot shaft [A].
● Install:
Washer [B]
Brake Pedal [C]
Washer [D]
● Apply a non-permanent locking agent to the threads of the brake pedal bolt [E], and tighten it.

Torque - Brake Pedal Bolt: 9.0 N·m (0.92 kgf·m, 80 in·lb)



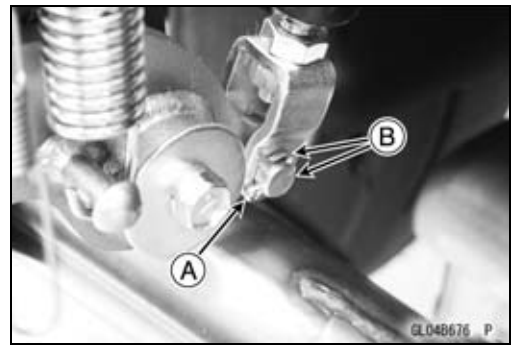
● Hook the shorter end of the rear brake light switch spring [A] on the brake light switch.
● Hook the upper end of the return spring [B] on the footpeg bracket hook.
○Face the both lower spring ends forward.



● Replace the cotter pin [A] with a new one.
● Insert the cotter pin and bend the pin ends [B].
● Install the front footpeg bracket.
● Tighten:

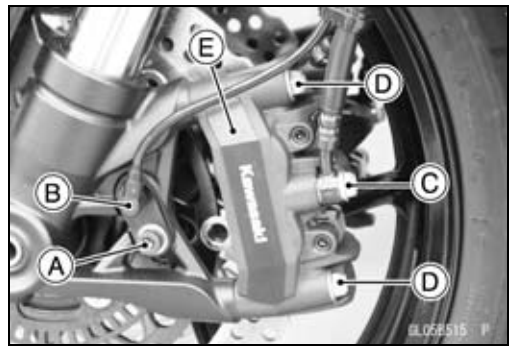
Torque - Front Footpeg Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

● Check that the rear brake light switch spring is installed correctly.
● Check the brake pedal position (see Brake Pedal Position Inspection).



Calipers

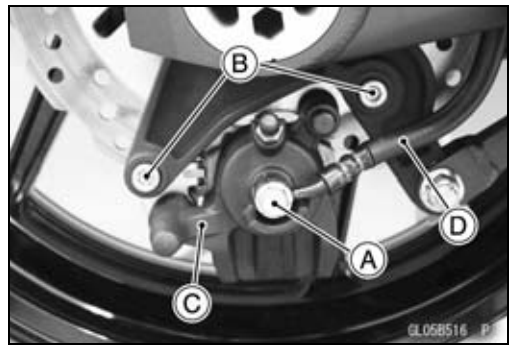
Front Caliper Removal



- Remove:
  Bolt [A]
  Front Wheel Rotation Sensor [B]
- Loosen the banjo bolt [C] at the brake hose lower end, and tighten it loosely.
- Remove the caliper mounting bolts [D], and detach the caliper [E] from the disc.
- Remove the banjo bolt and disconnect 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.

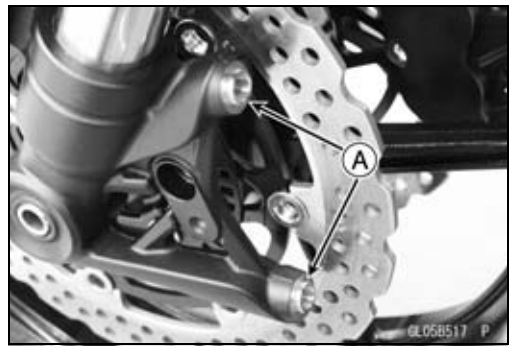
Rear Caliper Removal



- Loosen the banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Remove the caliper mounting bolts [B], and detach the caliper [C] from the disc.
- Remove the banjo bolt and disconnect the brake hose [D] from the caliper (see Brake Hose and Pipe Replacement in the Periodic Maintenance chapter).

NOTICE
Immediately wash away any brake fluid that spills.

Caliper Installation



- Install the caliper and brake hose lower end.
  - For the front caliper, be sure to install the collars [A] on the fork leg and fit the holes of the front caliper to the collars.
  - Replace the washers on each side of hose fitting with new ones.
  - Touch the brake hoses to the stopper of the caliper.
- Tighten:

Torque - Caliper Mounting Bolts
Front: 35 N·m (3.6 kgf·m, 26 ft·lb)
Rear: 25 N·m (2.5 kgf·m, 18 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.

Calipers

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.

Caliper Fluid Seal Damage Inspection

The fluid seal (piston seal) [A] is placed around the piston to maintain clearance between the pad and the disc. If the seal is in a poor condition, it could lead the pad to wear excessively or the brake to drag, which may cause the temperature of the discs or the brake fluid to increase.

● Replace the fluid seal if it exhibits any of the conditions listed below.

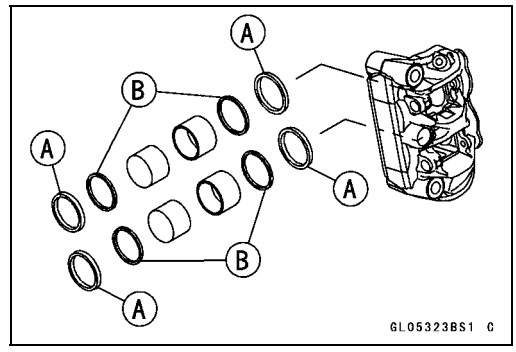
○Brake fluid leakage around the pad.

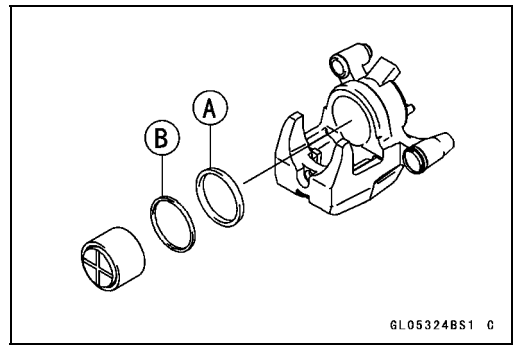
○Brakes overheat.

○Considerable difference in inner and outer pad wear.

○Seal and piston are stuck together.

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





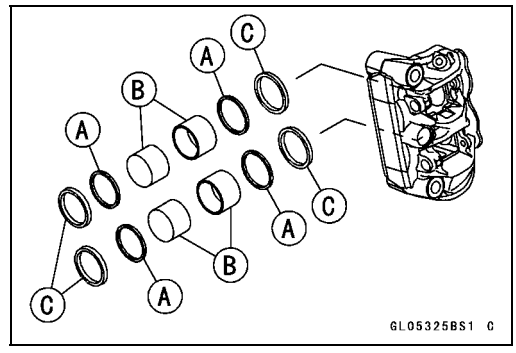
Caliper Dust Seal Damage Inspection

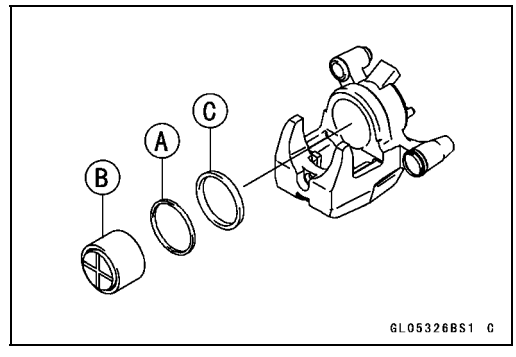
● Check that the dust seals [A] are not cracked, worn, swollen, or otherwise damaged.

★If they show any damage, replace the dust seals with new ones.

Pistons [B]

Fluid Seals [C]



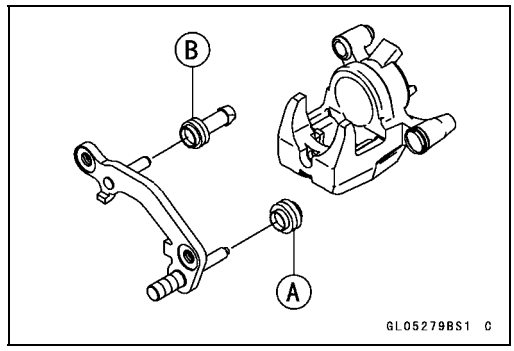


Calipers

Rear Caliper Dust Boot and Friction Boot Damage Inspection

- Check that the dust boot [A] and friction boot [B] are not cracked, worn, swollen, or otherwise damaged.

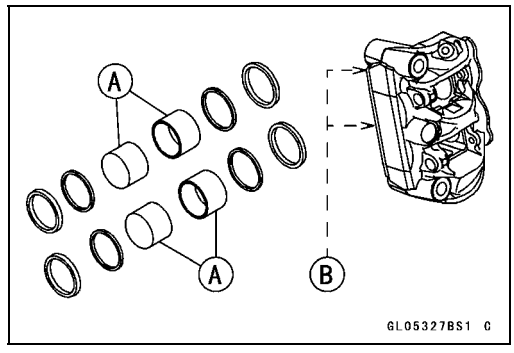
★If they show any damage, replace it.

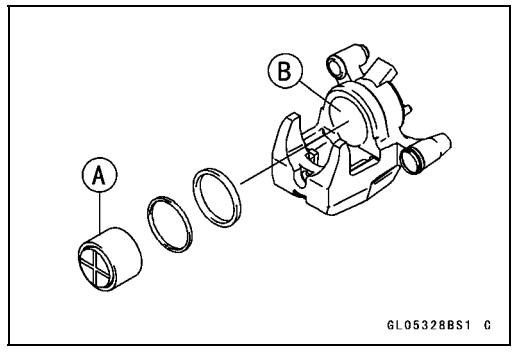


Caliper Piston and Cylinder Damage Inspection

- Visually inspect the pistons [A] and cylinder surfaces [B].

★Replace the caliper if the cylinder and piston are badly scores or rusty.





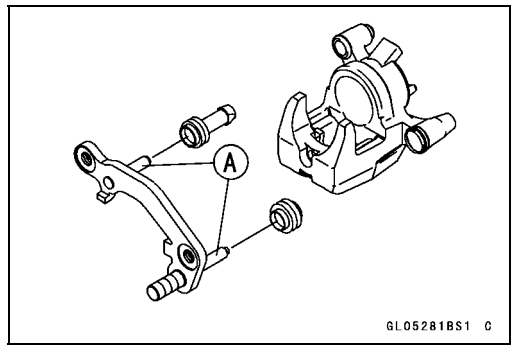
Rear Caliper Holder Shaft Wear Inspection

The caliper body must slide smoothly on the caliper holder shafts [A]. If the body does not slide smoothly, one pad will wear more than the other, pad wear will increase, and constant drag on the disc will raise brake and brake fluid temperature.

- Check to see that the caliper holder shafts are not badly worn or stepped, and that the rubber 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 holder.



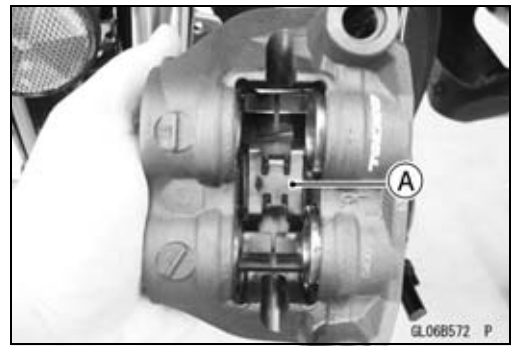
Brake Pads

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.



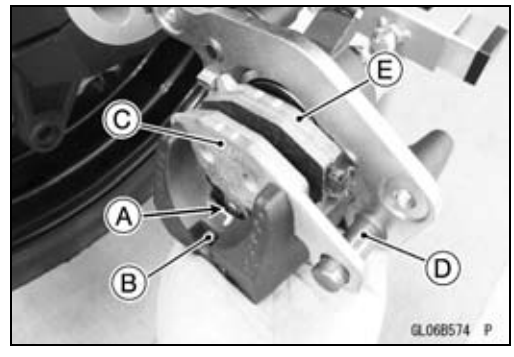
- Install the brake pads [A] on the pad spring correctly.
- ○Fit the pad into the groove of the caliper as shown.
- Install the pad pins while pushing the brake pads lightly.
- Tighten the pad pins temporarily.
- Install the front caliper (see Caliper Installation).
- Tighten:

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.

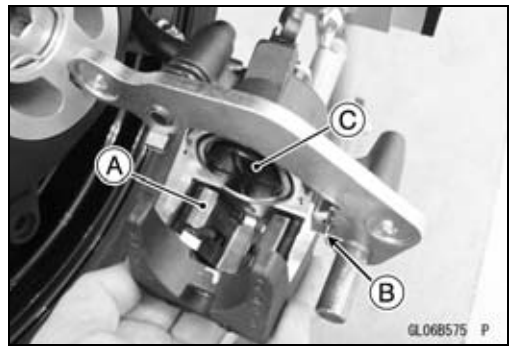
Rear Brake Pad Removal



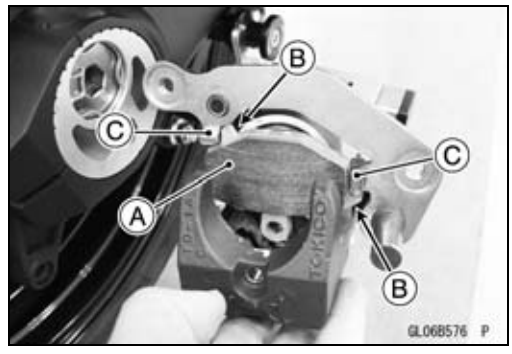
- Remove the rear caliper with the hose installed (see Rear Caliper Removal).
- Remove:
  Clip [A]
  Pad Pin [B]
- Remove the brake pad [C] of the jaw side from the holder shaft [D], then remove the other pad [E].

Brake Pads

Rear Brake Pad Installation



- Check that the pad spring [A], guide [B] and insulator [C] are in place on the caliper and holder.
- Push the caliper piston in by hand as far as it will go.



- Install the brake pad [A] on the piston side first, then install the other pad on the holder shaft.

○Fit the projections [B] of the piston side pad into the recesses [C] of the caliper holder.

- Install the pad pin while pushing the brake pad of the jaw side lightly.
- Install a new clip.

○The clip must be “outside” of the pad.

- Install the rear caliper (see Rear Caliper Installation).

⚠ WARNING

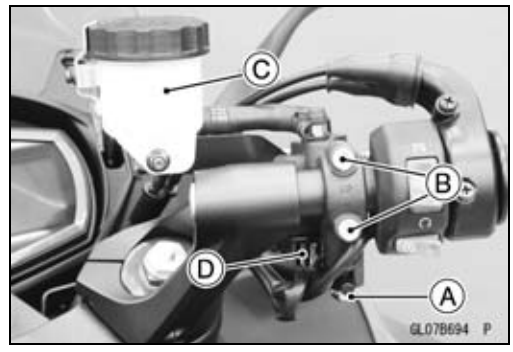
After servicing, it takes several applications of the brake pedal before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake pedal is obtained by pumping the pedal 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

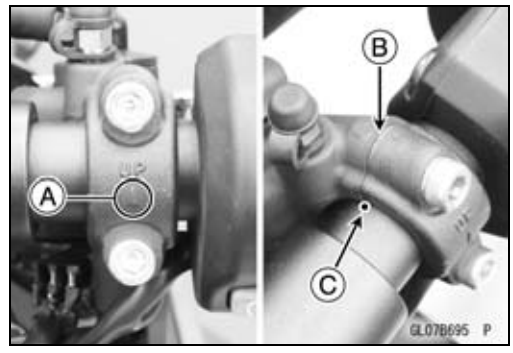
Front Master Cylinder Removal



- Remove the banjo bolt [A] to disconnect 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 [C] as an assembly with the reservoir, brake lever, and brake light switch installed.
- Disconnect the front brake light switch connector [D].

NOTICE
Immediately wash away any brake fluid that spills.

Front Master Cylinder Installation



- Install the master cylinder clamp so that the arrow mark [A] faces upward.
- Set the front master cylinder to match its mating surface [B] to the punch mark [C] 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.
- Replace the washers that are on each side of the hose fitting with new ones.
- Install the brake hose.

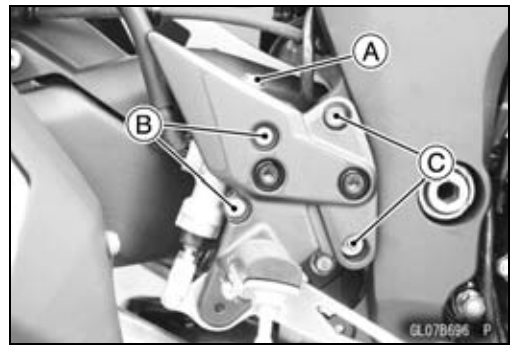
○Touch the brake hose to the stopper of the front master cylinder.

- Tighten:

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

- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

Rear Master Cylinder Removal



- Remove the brake hose banjo bolt [A] and disconnect the brake hose (see Brake Hose and Pipe Replacement in the Periodic Maintenance chapter).

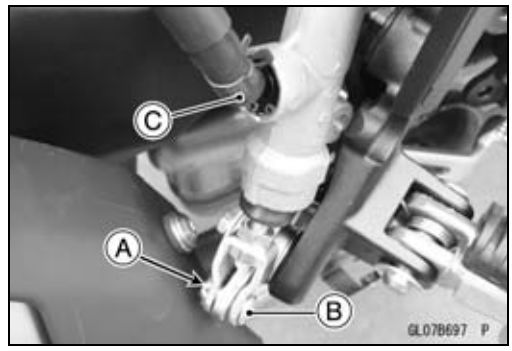
NOTICE
Immediately wash away any brake fluid that spills.

- Remove:

Rear Lower Fairing (see Rear Lower Fairing Removal in the Frame chapter)
Rear Master Cylinder Mounting Bolts [B]
Front Footpeg Bracket Bolts [C]

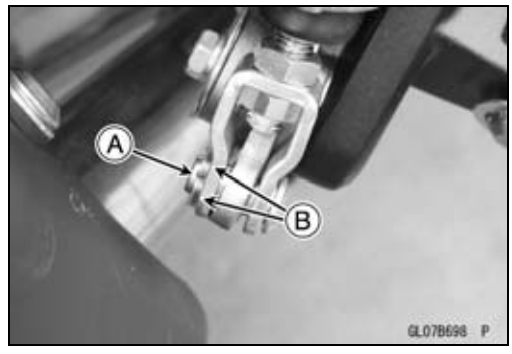
Master Cylinder

- Remove:
  Cotter Pin [A]
  Joint Pin [B]
- Slide the clamp [C].
- Disconnect the reservoir hose lower end, and drain the brake fluid into a container.



Rear Master Cylinder Installation

- Replace the cotter pin [A] with a new one.
- Insert the cotter pin and bend the pin ends [B].

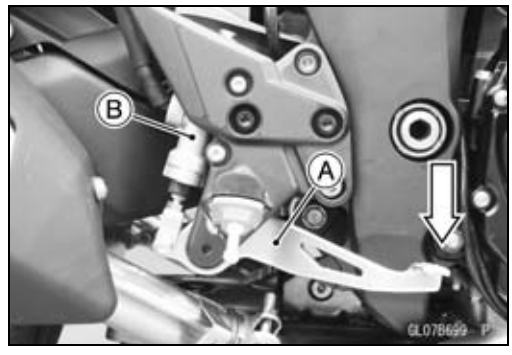


- Tighten:

Torque - Front Footpeg Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)
Rear Master Cylinder Mounting Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

NOTE

○*Depress the brake pedal [A] and then align the holes of the master cylinder [B].*
○*After installation, check that the rear brake light switch spring is hooked on the brake pedal.*



- Replace the washers that are on each side of hose fitting with new ones.
- Install the brake hose.

○Touch the brake hose to the stopper of the rear master cylinder.

- Tighten:

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

- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.
- Install:
  Rear Lower Fairing (see Rear Lower Fairing Installation in the Frame chapter)

Front Master Cylinder Disassembly

- Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.

Rear Master Cylinder Disassembly

- Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.

Master Cylinder Assembly

- Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.

Master Cylinder

Master Cylinder Inspection (Visual Inspection)

- Remove the master cylinders (see Front/Rear Master Cylinder Removal).
- Disassemble the front and rear master cylinders (see Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter).
- Check that there are no scratches, rust or pitting on the inner wall [A] of each master cylinder and on the outside of each piston [B].

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

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

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

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

- Check the dust covers [E] for damage.

★If they are damaged, replace them.

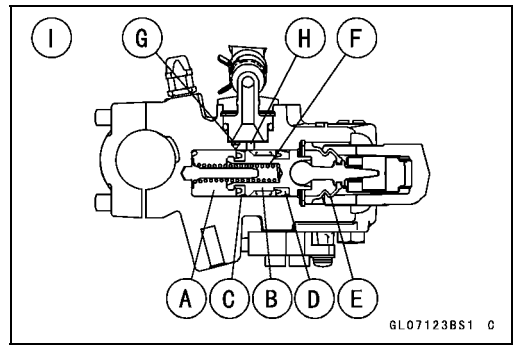
- Check the piston return springs [F] for any damage.

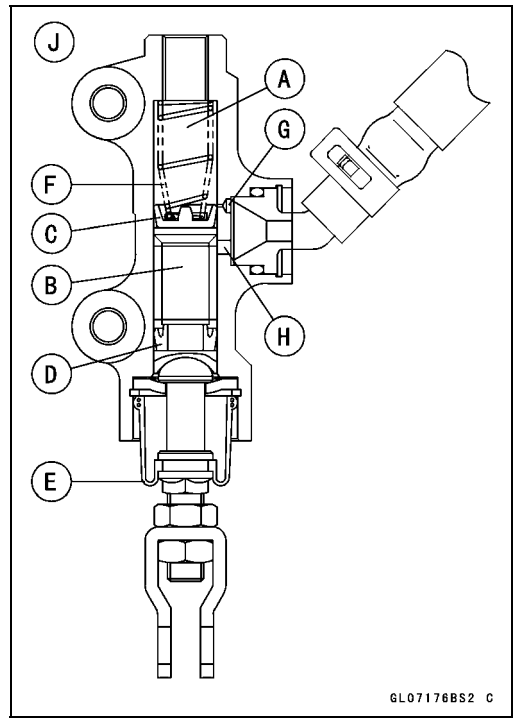
★If the springs are damaged, replace them.

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

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

Front Master Cylinder [I]
Rear Master Cylinder [J]

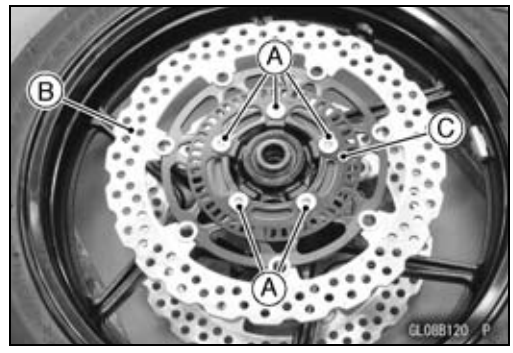




Brake Disc

Brake Disc Removal

- Remove the wheels (see Front/Rear Wheel Removal in the Wheels/Tires chapter).
- Remove the brake disc mounting bolts [A], and take off the disc [B].
- Remove the wheel rotation sensor rotor [C].



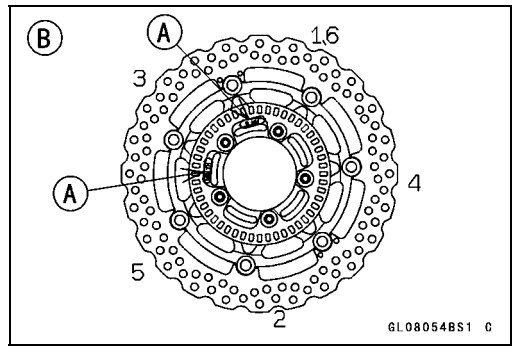
Brake Disc Installation

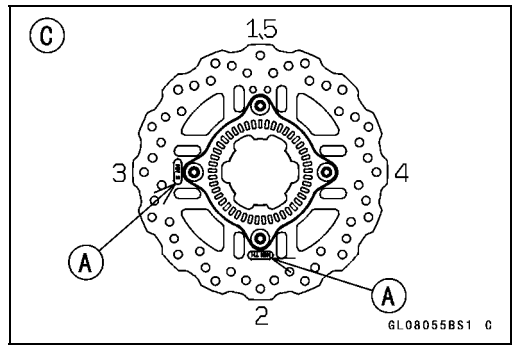
- Replace the gaskets with new ones.
- Install the brake disc on the wheel so that the marked side [A] faces out.
- Install the wheel rotation sensor rotor on the brake disc so that the marked side faces out.
- Apply a non-permanent locking agent to the threads of the front and rear brake disc mounting bolts.
- Tighten the front and rear brake disc mounting bolts following the specified tightening sequence.

  Front Brake Discs [B]

  Rear Brake Disc [C]

Torque - Brake Disc Mounting Bolts: 28 N·m (2.9 kgf·m, 21 ft·lb)



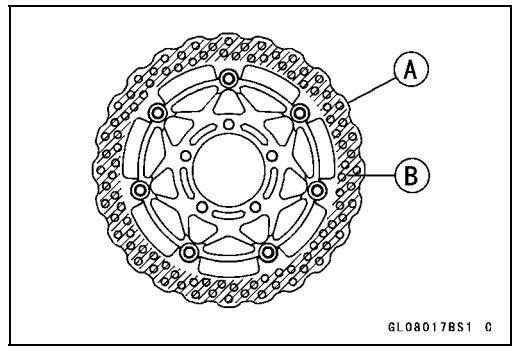


Brake Disc Wear Inspection

- Measure the thickness of each disc [A] at the point where it has worn the most.

★If the disc has worn past the service limit, replace it.

Measuring Area [B]



Brake Discs Thickness

Standard:

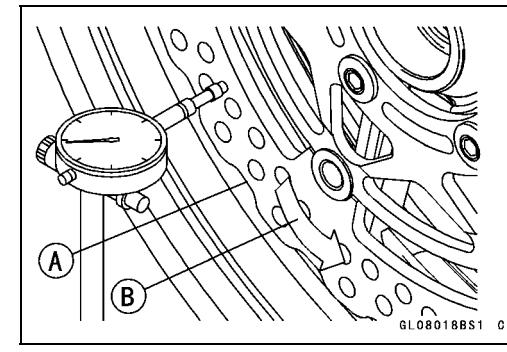
Front	**5.3 ~ 5.7 mm (0.21 ~ 0.22 in.)**
Rear	**5.8 ~ 6.2 mm (0.23 ~ 0.24 in.)**

Service Limit:

Front	**5.0 mm (0.20 in.)**
Rear	**5.5 mm (0.22 in.)**

Brake Disc

Brake Disc Warp Inspection



● Raise the front/rear wheel off the ground.

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

○For front disc inspection, turn the handlebars fully to one side.

● Set up a dial gauge against the disc [A] as shown and measure disc runout, while turning [B] the wheel by hand.

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

Disc Runout

Standard:	**– – –**
Service Limit:	
Front	**TIR 0.3 mm (0.01 in.)**
Rear	**TIR 0.2 mm (0.008 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.

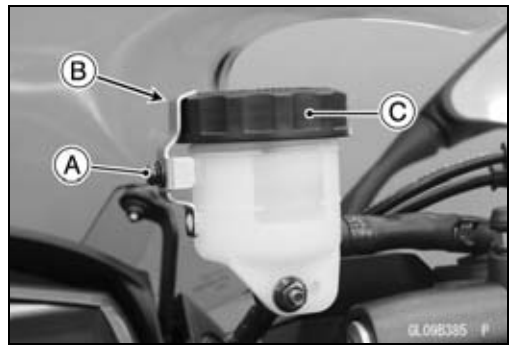
⚠ WARNING

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.

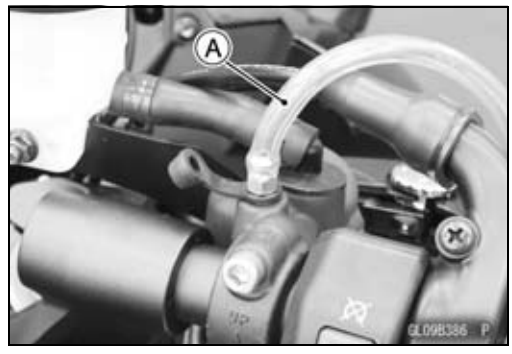
NOTE

○*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:
  Front Brake Reservoir Cap Stopper 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.

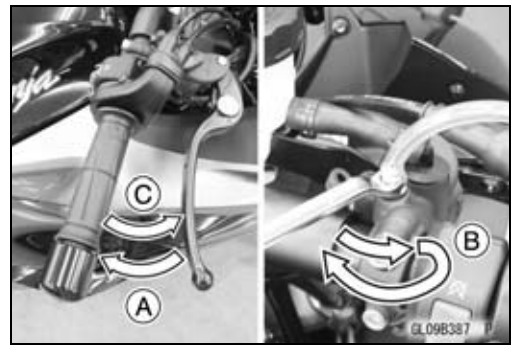


- Remove the rubber cap from the bleed valve on the front master cylinder.
- Attach a clear plastic hose [A] to the bleed valve, and run the other end of the hose into a container.



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].



NOTICE

After pumping the brake lever several times, releasing it without opening and closing of the bleed valve may cause brake fluid to be blown back from the master cylinder reservoir. Brake fluid spilt on painted surfaces and plastic parts will quickly damage them. Be sure to open and close the bleed valve.

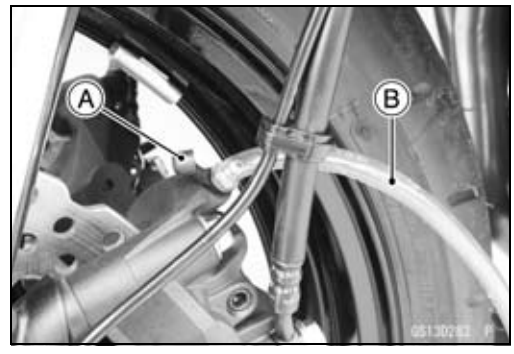
NOTE

○*The fluid level must be checked often during the bleeding operation and replenished with fresh brake fluid as necessary. If the fluid in the reservoir runs completely out any time during bleeding, the bleeding operation must be done over again from the beginning since air will have entered the line.*

● Remove the clear plastic hose.
● Tighten the bleed valve, and install the rubber cap.

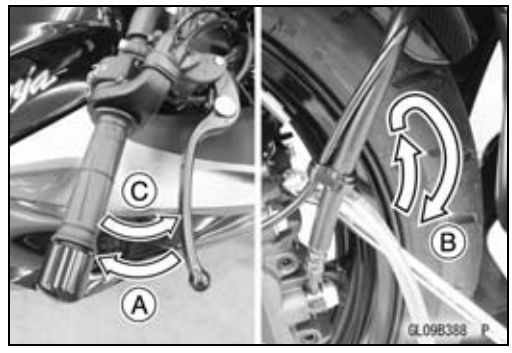
Torque - Front Master Cylinder Bleed Valve: 5.4 N·m (0.55 kgf·m, 48 in·lb)

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



Brake Fluid

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

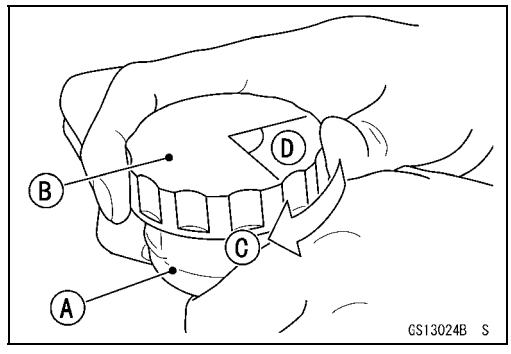


NOTE

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

● Remove the clear plastic hose.
● Install:
Diaphragm
Diaphragm Plate
Front Brake Reservoir Cap

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



● Tighten:

Torque - Front Brake Reservoir Cap Stopper Screw: 1.5 N·m (0.15 kgf·m, 13 in·lb)

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

Torque - Bleed Valves: 8.0 N·m (0.82 kgf·m, 71 in·lb)

● Check the fluid level (see Brake Fluid Level Inspection in the Periodic Maintenance chapter).
● After bleeding is done, check the brake for good braking power, no brake drag, and no fluid leakage.

Brake Fluid

⚠ WARNING

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

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

Brake Hose

Brake Hose Removal/Installation

- Refer to the Brake Hose and Pipe Replacement in the Periodic Maintenance chapter.

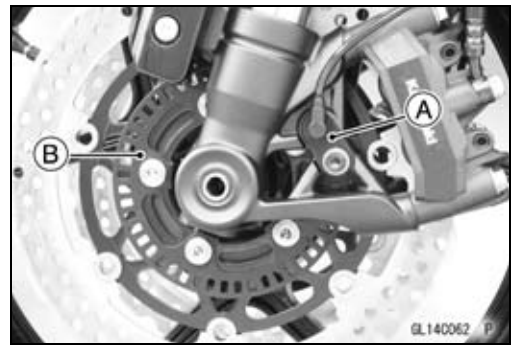
Brake Hose and Pipe Inspection

- Refer to the Brake Hose and Pipe Damage and Installation Condition Inspection in the Periodic Maintenance chapter.

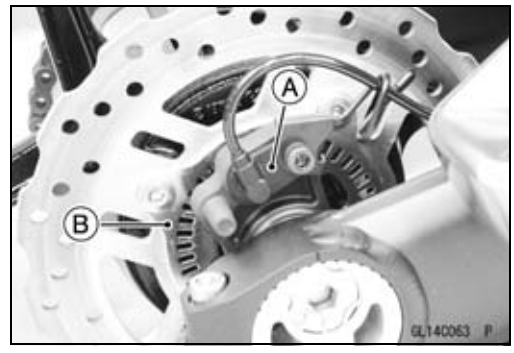
Anti-Lock Brake System

Parts Location

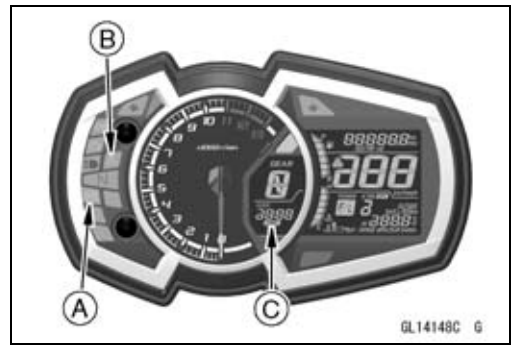
Front Wheel Rotation Sensor [A]
Front Wheel Rotation Sensor Rotor [B]



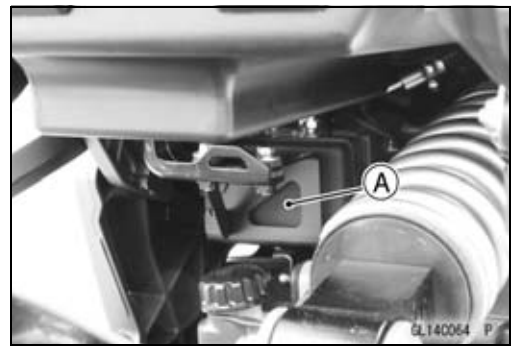
Rear Wheel Rotation Sensor [A]
Rear Wheel Rotation Sensor Rotor [B]



Yellow ABS Indicator (LED) [A]
Yellow Warning Indicator Light (LED) [B]
KIBS Indicator [C]



ABS Hydraulic Unit [A]

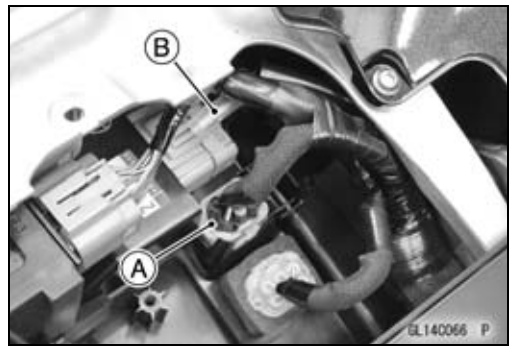


Fuse Box (2) [A]



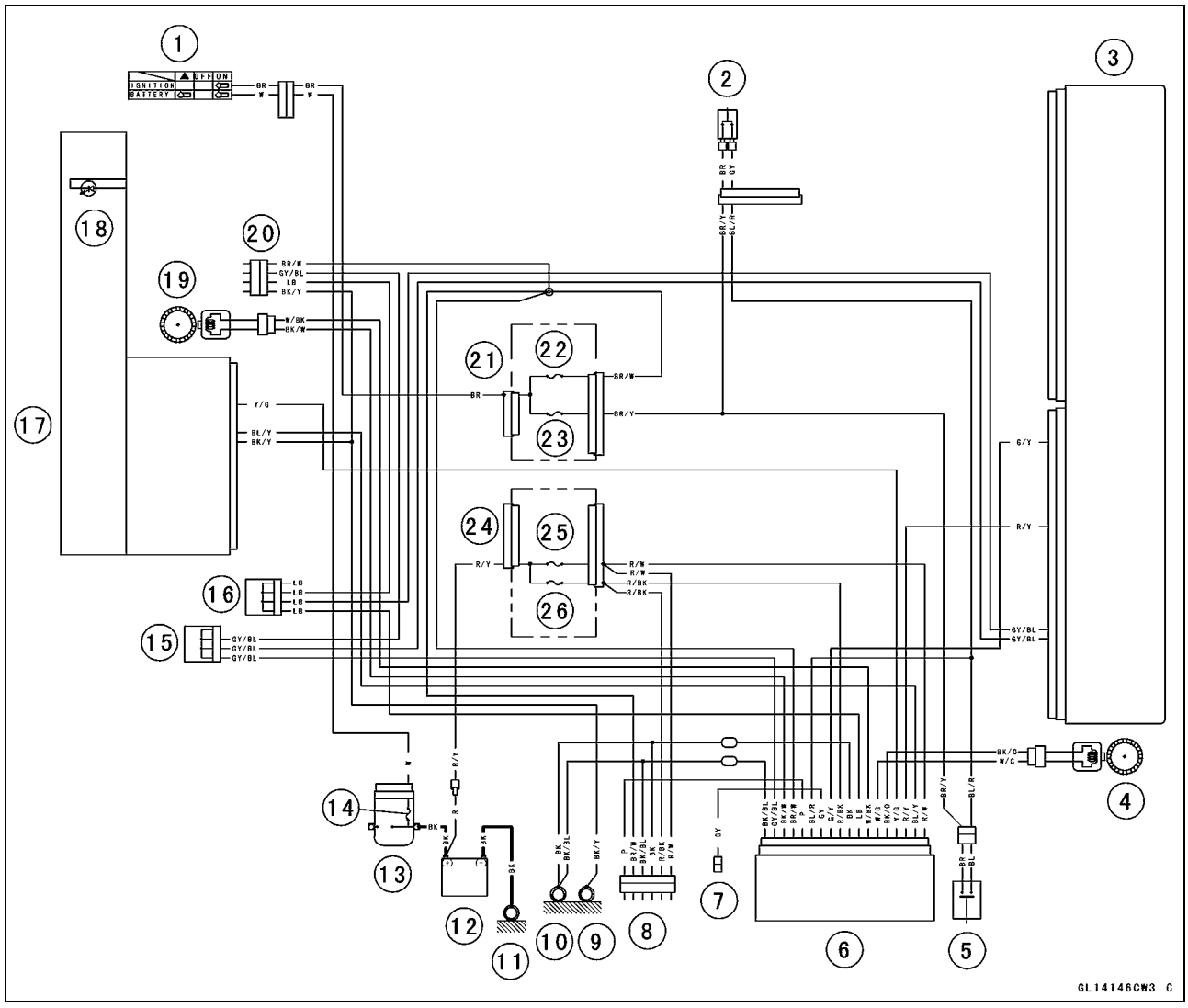
Anti-Lock Brake System

ABS Kawasaki Diagnosis System Connector [A]
ABS Self-diagnosis Terminal [B]



Anti-Lock Brake System

ABS System Wiring Diagram



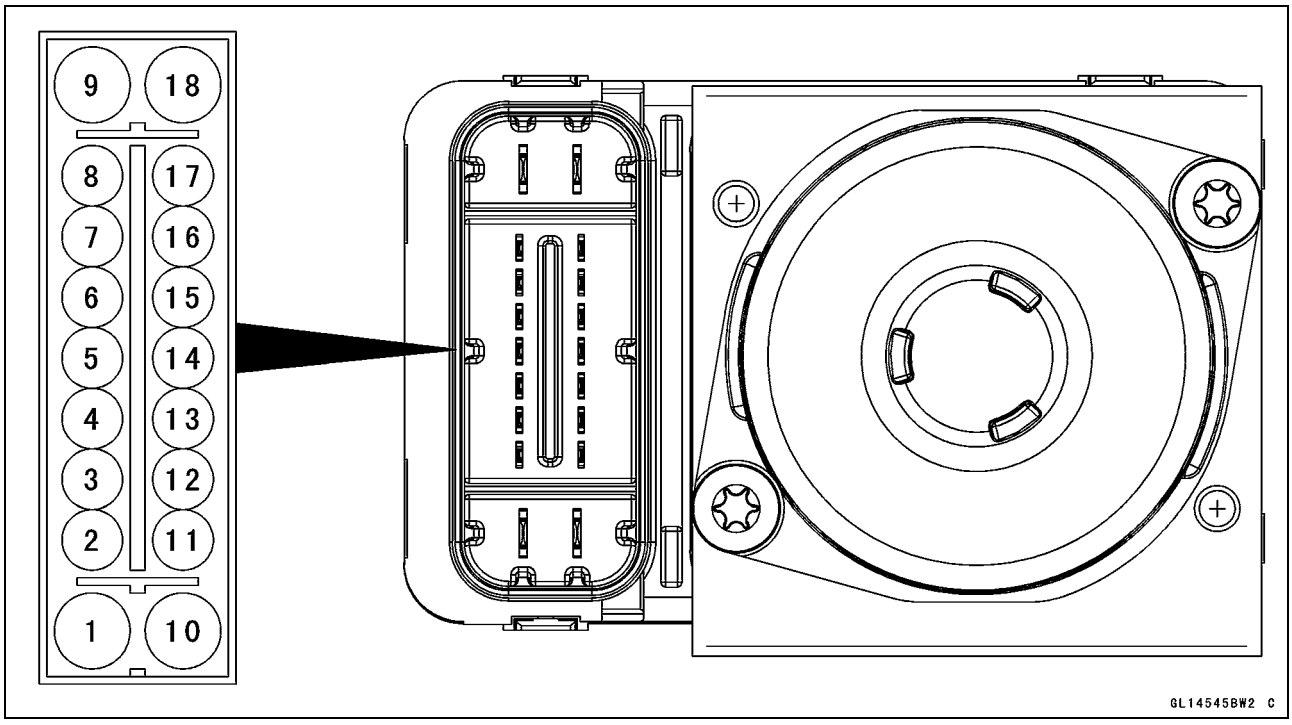
1. Ignition Switch
2. Front Brake Light Switch
3. ECU
4. Rear Wheel Rotation Sensor
5. Rear Brake Light Switch
6. ABS Hydraulic Unit
7. ABS Self-diagnosis Terminal
8. ABS Kawasaki Diagnosis System Connector
9. Frame Ground (4)
10. Frame Ground (3)
11. Engine Ground
12. Battery 12 V 8 Ah
13. Starter Relay
14. Main Fuse 30 A
15. Joint Connector (1)
16. Joint Connector (2)
17. Meter Unit
18. Yellow ABS Indicator (LED)
19. Front Wheel Rotation Sensor
20. IMU
21. Fuse Box (1)
22. Ignition Fuse 15 A
23. Brake Light/Horn Fuse 7.5 A
24. Fuse Box (2)
25. ABS Motor Relay Fuse 25 A
26. ABS Solenoid Valve Relay Fuse 15 A

○Color Codes:

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

Anti-Lock Brake System

ABS Hydraulic Unit Terminal Names



1. Ground: BK/BL
2. CAN Communication Line (High): GY/BL
3. Front Wheel Rotation Sensor Signal Input: BK/W
4. Power Supply: BR/W
5. ABS Kawasaki Diagnosis System Terminal: P
6. Front and Rear Brake Light Switch Signal: BL/R
7. ABS Self-diagnosis Terminal: GY
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/BK
13. Power Supply to Rear Wheel Rotation Sensor: W/G
14. Rear Wheel Rotation Sensor Signal Input: BK/O
15. KIBS Indicator: Y/G
16. Rear Wheel Rotation Sensor Signal Output: R/Y
17. Yellow ABS Indicator (LED): BL/Y
18. Power Supply to ABS Motor Relay: R/W

Anti-Lock Brake System

ABS Servicing Precautions

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

- This ABS 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 ABS hydraulic unit.
- To prevent damage to the ABS parts, do not disconnect the battery cables or any other electrical connections when the ignition switch is on or while the engine is running.
- Take care not to short the leads that are directly connected to the battery positive (+) terminal to the chassis ground.
- Do not turn the ignition switch on while any of the ABS electrical connectors are disconnected. The ABS hydraulic unit memorizes service codes.
- Do not spray water on the electrical parts, ABS parts, connectors, leads and wiring.
- If a transceiver is installed on the motorcycle, make sure that the operation of the ABS system is not influenced by electric wave radiated from the antenna. Locate the antenna as far as possible away from the ABS hydraulic unit.
- Whenever the ABS electrical connections are to be disconnected, first turn off the ignition switch.
- The ABS parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
- The ABS parts cannot be disassembled. Even if a fault is found, do not try to disassemble and repair the ABS parts, replace it.
- The ABS has many brake lines, pipes, and leads. And the ABS cannot detect problems with the conventional braking system (brake disc wear, unevenly worn brake pad, and other mechanical faults). To prevent trouble, check the brake lines and pipes for correct routing and connection, the wiring for correct routing, and the brakes for proper braking power. Be sure to check for fluid leakage, and bleed the brake line thoroughly.

Anti-Lock Brake System

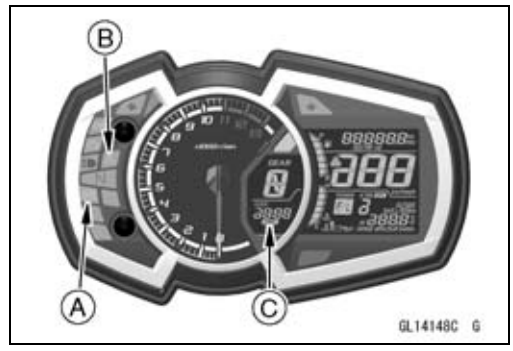
⚠ WARNING

Air in the brake lines diminish braking performance and can cause an accident resulting in injury or death. If any of the brake line fittings, including the ABS hydraulic unit joint nuts, or the bleed valve is opened at any time, the air must be bled completely from the brake line. If the brake lever has a soft or "spongy" feeling mushy when it is applied, there might be air in the brake lines or the brake may be defective. Do not operate the vehicle and service the brake system immediately.

NOTICE

Do not ride the motorcycle with air in the brake line, or the ABS could malfunction.

○The yellow ABS indicator (LED) [A], yellow warning indicator light (LED) [B] and KIBS indicator [C] may light if the tire pressure is incorrect, a non-recommended tire is installed, or the wheel is deformed. If the indicator light lights, remedy the problem and clear the service code.



⚠ WARNING

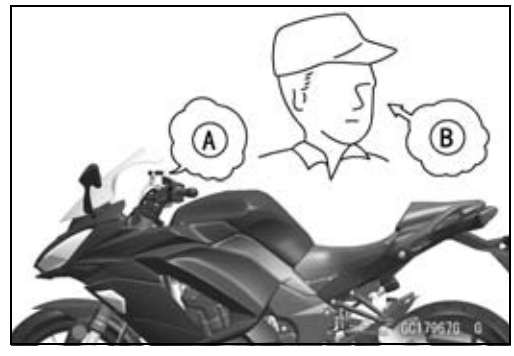
Use of non-recommended tires may cause malfunctioning of ABS and can lead to extended braking distance resulting in an accident causing serious injury or death. Always use recommended standard tires for this motorcycle.

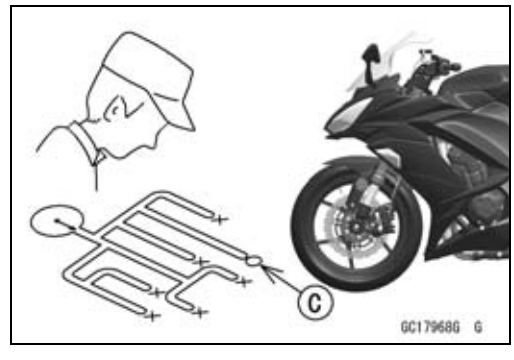
Anti-Lock Brake System

- The yellow ABS indicator (LED) may come on if the engine is run with the motorcycle on its stand and the transmission in gear. If the indicator comes on, just turn the ignition switch off, then clear service code 42, which indicates a “Faulty front wheel rotation sensor.”
- When the ABS operates, the ABS makes noise and the rider feels the reaction force on the brake lever and brake pedal. This is a normal condition. It informs the rider that the ABS is operating normally.
- Service codes detected once by the ABS hydraulic unit will be memorized in the ABS hydraulic unit. Therefore, after maintenance work is finished, be sure to erase the service codes. Do not erase the service codes during troubleshooting. Wait until all the checks and repair work are finished to prevent duplication of previous service codes and unnecessary maintenance work.
- Before delivering the motorcycle to the customer, be sure to erase any service codes which might be stored in the ABS hydraulic unit. Using the self-diagnosis feature, make sure that the yellow ABS indicator (LED) lights. A fully charged battery is a must for conducting reliable self-diagnosis. Test run the motorcycle at a speed of more than 20 km/h (12 mph) to see that the yellow ABS indicator (LED), yellow warning indicator light (LED) and KIBS indicator do not come on. Finally, test run the motorcycle at a speed of more than 30 km/h (20 mph) and brake suddenly to see that the motorcycle stops without loss of steering control and the ABS operates normally (The reaction force generated is felt in the brake lever and pedal.). This completes the final inspection.

ABS Troubleshooting Outline

When an abnormality in the system occurs, the yellow ABS indicator (LED) and yellow warning indicator light (LED) light up and the KIBS indicator are displayed on the LCD to alert the rider. In addition, the nature of the fault is stored in the memory of the ABS hydraulic unit and when in the self-diagnosis mode, the service code [A] is indicated by the number of times the yellow ABS indicator (LED) blinks. The service codes stored in memory are not erased until the mode has been changed to the fault erase mode after the fault has been corrected. Therefore, after correcting the problem, always erase the service codes and then run the self-diagnosis program to confirm normal signal output. When, due to a malfunction, the yellow ABS indicator (LED), yellow warning indicator light (LED) and KIBS indicator remains lit, get a thorough understanding of the background before starting the repair work. Ask the rider about the conditions [B] under which the problem occurred and try to determine the cause [C]. Do not rely solely on the ABS self-diagnosis function, use common sense; check the brakes for proper braking power, and brake fluid level, search for leaks, etc.





Anti-Lock Brake System

Even when the ABS is operating normally, the yellow ABS indicator (LED) and yellow warning indicator light (LED) may light up and the KIBS indicator are displayed on the LCD under the conditions listed below. Turn the ignition switch off to go off the indicator light and the KIBS indicator. If the motorcycle runs without erasing the service code, the indicator and yellow warning indicator light (LED) may light up and the KIBS indicator are displayed on the LCD again.

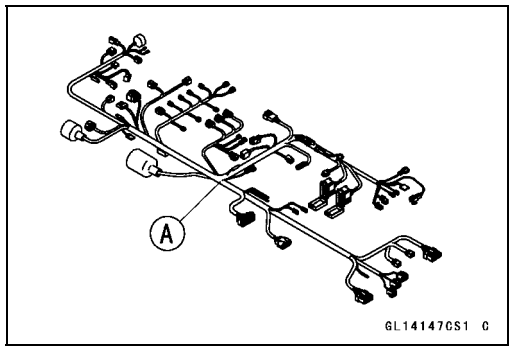
○After continuous riding on a rough road.
○When the engine is started with the stand raised and the transmission engaged, and the rear wheel turns.
○When accelerating so abruptly that the front wheel leaves the ground.
○When the ABS has been subjected to strong electrical interference.
○When tire pressure is abnormal. Adjust tire pressure.
○When a tire different in size from the standard size is being used. Replace with standard size.
○When the wheel is deformed. Replace the wheel.

Much of the ABS troubleshooting work consists of confirming continuity of the wiring. The ABS parts are assembled and adjusted by the manufacturer, so there is no need to disassemble or repair them. Replace the ABS hydraulic unit.

The basic troubleshooting procedures are listed below.

● Carry out pre-diagnosis inspections as a preliminary inspection.
● Determine the fault using the self-diagnosis function.
● Check wiring and connections from the ABS hydraulic unit connector to the suspected faulty ABS part, using a tester.

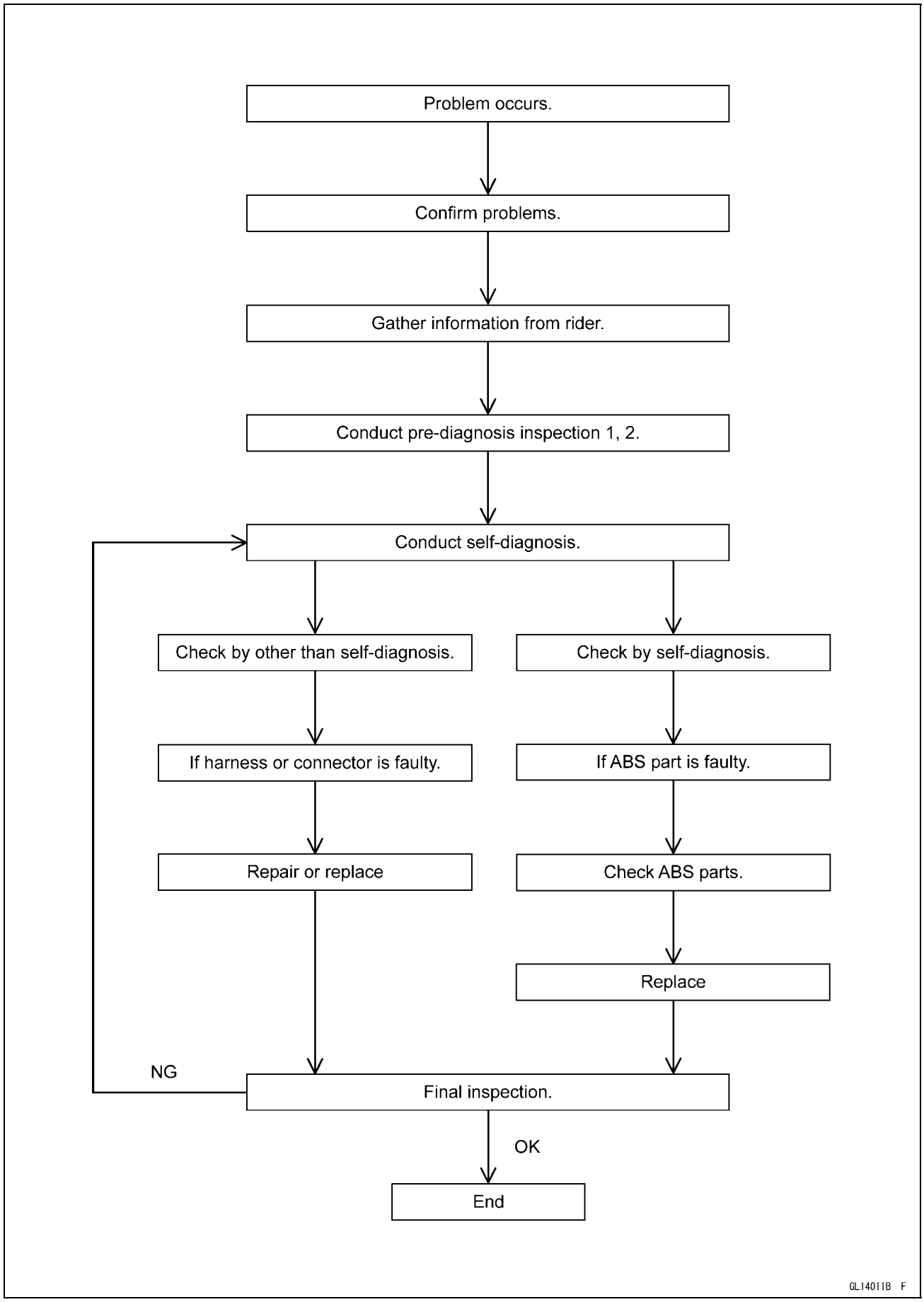
● Visually inspect the wiring for signs of burning or fraying.
★If any wiring is poor, replace the damaged wiring.
● Pull each connector apart and inspect it for corrosion, dirt and damage.
★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.
● Check the wiring for continuity.
○Use the wiring diagram to find the ends of the lead which is suspected of being a problem.
○Connect a tester between the ends of the leads.
★If the tester does not read about 0 Ω, the lead is defective. Replace the main harness [A] if necessary.



● Narrow down suspicious parts and close in on the faulty ABS part by repeating the continuity tests.
★If no abnormality is found in the wiring or connectors, the ABS parts are the next likely suspects. Check each part one by one.
★If an abnormality is found, replace the affected ABS part.

Anti-Lock Brake System

ABS Diagnosis Flow Chart



Inquiries to Rider

○Each rider reacts to problems in different ways, so it is important to confirm what kind of problem the rider is experiencing.
○Try to find out exactly what problem occurs under exactly what conditions by asking the rider; knowing this information may help you reproduce the problem in the workshop.
○The diagnosis sheet will help prevent you from overlooking any key information, so always use it.

Sample Diagnosis Sheet 1

Rider Name: ……..…….. Registration No. (license plate No.): ……
Date of registration: …..…….. Model: ……
Vin No.: ….……..……..... Odometer reading: …….. km or miles
Engine No.: ..…….. Odometer reading when problem first occured: …… km or miles

Question	Description			Answer	Advice to customer
Which statement/s best describes the fault with the ABS system?	*Yellow ABS indicator light (LED) illuminated?*	*Flashing*			A fault has been detected with the ABS system.
		Continuous			
		Not working			
	ABS not working				Further inspection by technician required.
	ABS operates too frequently				Continuous riding on rough or un-even surfaces can cause the ABS to operate more frequently.
	Stopping distance too long				
	Does the wheel lock when you apply the brakes				Further inspection by technician required.
	Brake can't be released				
	Other				
Do the front and rear brake levers feel normal during application?	*Normal*				Further inspection by technician required.
	Abnormal	*Long stroke (lever feels soft and moves back close to the handle bar)*			This indicates a probable fault with the braking system and should be inspected immediately.
		Limited stroke (lever feels hard and has little movement)			
		Pulsing/vibrating			
	Which lever? (front, rear or both)				
When does the fault occur?	*During start up / stationary*	*(Is a centre stand or service stand used)*			If the motorcycle engine is left running whilst on its centre or service stand, mechanical drag can cause the rear wheel to rotate. If the rear wheel rotates the ABS system may detect a fault. Turning off the ignition switch and restarting should reset the yellow ABS indicator light (LED) if no problems are detected. However the service code will be stored in the ABS ECU and should be reset by the dealer.
	Driving below 6 km/h (4mph) (Speeds vary depending on model)				The ABS system is not active at these speeds.
	Driving above 6 km/h (4mph) (Speeds vary depending on model)				This may be normal ABS operation if the road conditions are poor.
	When slowing or stopping (Rate of brake application)	*Gradual braking*	*front only*		
			rear only		
			both brakes		
		During abrupt braking	*front only*		Abrupt braking may cause the ABS to function early as the suspension may not have had enough time to react to the situation.
			rear only		
			both brakes		
		There is no specific pattern			
	Other				

Question	Description		Answer	Advice to customer
How often does the fault occur?	*Every time ignition is switched on*			Further inspection by technician required.
	Every time the brakes are used (Continually)			
	No regularity (Intermittent)			
	Other			
During which riding conditions does the fault occur?	*Highway riding*	*Any comment on riding style maybe applicable.*		Braking and handling characteristics can vary with vehicle speed, therefore ABS operation during braking at highway speed may be more frequent.
	City riding			Accelerating abruptly between traffic signals so that the front wheel leaves the ground can trigger the ABS warning indicator. Normal riding on good condition roads should allow the yellow ABS indicator light (LED) to reset automatically.
	Minor/country roads riding			Continuous riding on rough or uneven surfaces can cause the ABS to operate more frequently.
	Cross country riding			Continuous riding on loose or off road surfaces can trigger the ABS warning indicator. Normal riding on good condition roads should allow the yellow ABS indicator light (LED) to reset automatically.
	Track/closed circuit riding			Excessive use of the ABS system due to continuous fast riding can trigger the ABS warning indicator. Normal riding on good condition roads should allow the yellow ABS indicator light (LED) to reset automatically.
	All			Further inspection by technician required.
In what road conditions does the problem occur?	*Dry*			Further inspection by technician required.
	Wet			In wet conditions it is possible that the ABS is operating normally
	Snow/Ice			In snow/icy conditions it is possible that the ABS is operating normally
	Loose/rough surface (gravel)			On loose/rough surfaces it is possible that the ABS is operating normally
Motorcycle condition	*Has the machine been regularly serviced according to the periodic maintenance schedule?*			If the service history is incomplete it is possible that a fault may become apparent. For example, failure to replace the brake fluid during periodic maintenance can cause the hydraulic unit to become internally damaged.
	Have there been any previous braking problems?			Any previous braking problems may be related to the ABS complaint. It is important that the customer provides as much information as possible so that diagnosis can be made as quickly as possible.
	Have any aftermarket parts been fitted?	*OE Tires and brakes?*		Further inspection by technician required.
	Have the daily safety checks been carried out? (tire pressures / condition etc.)			Worn tires or tires with incorrect pressures can cause an ABS fault. It is important to regularly check both tire condition and pressure.

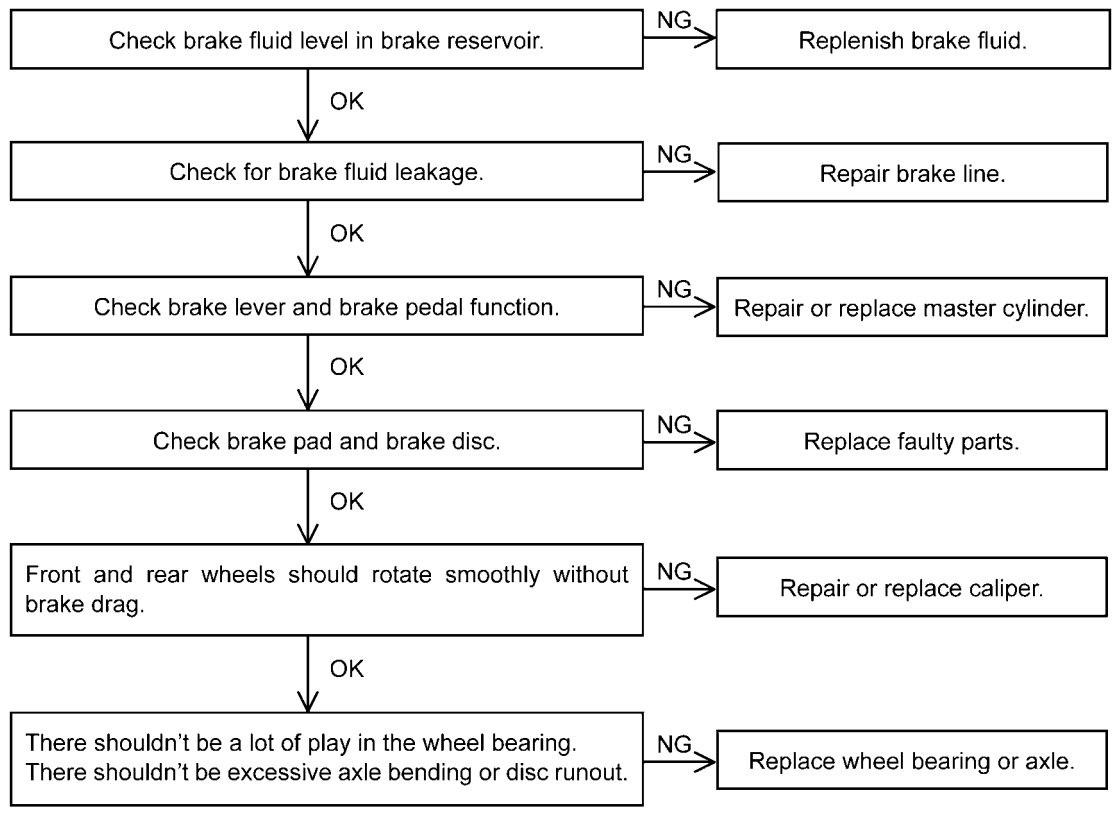
Dealer Findings

Sample Diagnosis Sheet 2

Question/Action	Description		Answer	Advice to technician
Review customer feedback information	*Carefully analyze the information that has been collected from the customer. Use this information to help you perform your initial diagnosis.*			
Check to see if any diagnostic codes are present	*1*			If codes are present refer to service manual.
	2			
	3			
	4			
	5			
Inspect the following	*Battery voltage*			The ABS is designed to be used with a 12 V sealed battery as its power source. Only use the battery specified by the service manual as a power source. If low battery voltage is detected service codes: B52 or B53 will be displayed.
	Tires type/size		Front ..... Rear	Refer to service manual.
	Tire pressures		Front ..... Rear	
	Tire condition		Front ..... Rear	Excessive or abnormal wear can be recognized as an ABS fault.
	Wheel rotation sensor air gap		Front ..... Rear	Refer to service manual. Also check that the wheel orientation is correct.
	Wheel condition (damaged or deformed)		Front ..... Rear	Refer to service manual.
	Brake system general condition		Front ..... Rear	Pad wear/Front and rear operation/Condition of hoses etc.
	Brake disc run-out		Front ..... Rear	Refer to service manual.
Additional information on the yellow ABS indicator light (LED)	*Continuous*	*Stays on all the time while ignition on*		Check for diagnostic trouble codes.
		Turns off when first moving off but turns on again and stays on		
		Turns on when brake(s) are operated		
		Other:		
	Not working	*Turns off soon after moving off*		Test the operation of the light by turning on the ignition. If the light fails to illuminate ensure that the bike is equipped with ABS before inspecting the meter panel for faults as per the service manual.
		Turns off after riding for a while		
		Other:		
	How many times does it flash per 10 seconds?		5, 15, or 20	By flashing the ABS unit is indicating additional fault codes that may not be listed in the service manual. Please carefully count the number of flashes per 10 seconds before contacting Kawasaki. *(Kawasaki may request a video of the flashing sequence)*
			Other: ..... times	

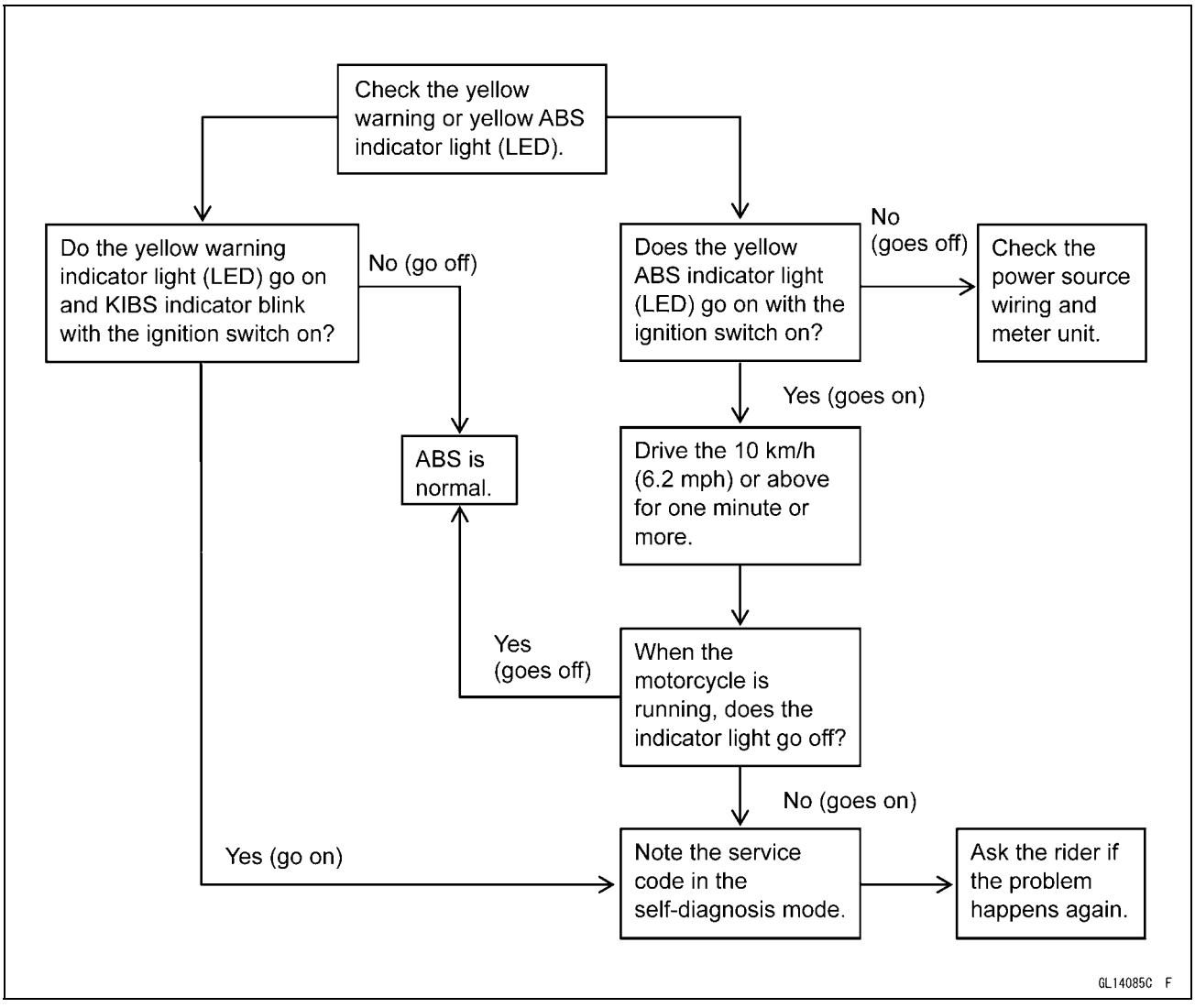
Anti-Lock Brake System

Pre-Diagnosis Inspection 1



Anti-Lock Brake System

Pre-Diagnosis Inspection 2

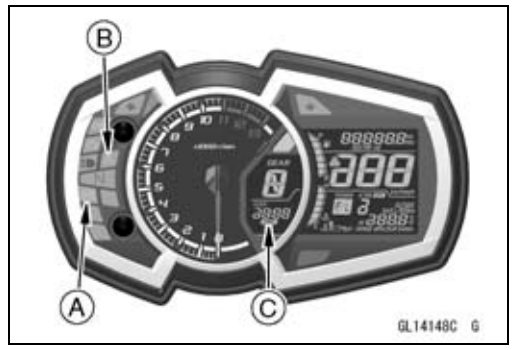


Self-diagnosis Outline

When the yellow ABS indicator light (LED) has blinked or goes on, the ABS hydraulic unit memorizes and stores the service code (23 codes including “Normal Code”) for the service person to troubleshoot easily. The service code memory is powered directly by the battery and cannot be canceled by the ignition switch.

The ABS hydraulic unit can memorize up to 6 service codes. Further service codes are memorized after erasing the preceding 6 service codes. If there is no fault, only the start code 12 is shown, indicating that “The ABS is normal.”

Self-diagnosis Procedures



○When a problem occurs with the ABS system, the yellow ABS indicator (LED) [A] lights.

○When a problem occurs with the KIBS system, the yellow warning indicator (LED) [B] lights and KIBS indicator [C] blinks.

NOTE

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

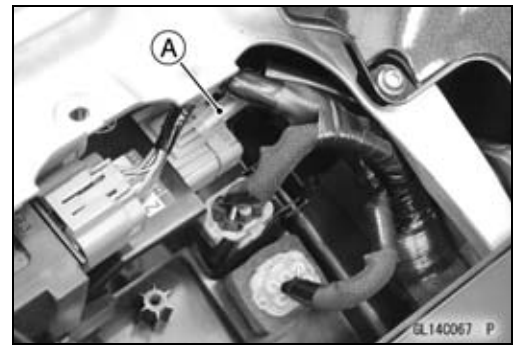
○*The motorcycle is stopped.*

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

Anti-Lock Brake System

- Remove the front seat (see Front Seat Removal in the Frame chapter).
- Ground the self-diagnosis terminal [A] (Gray) to the battery (–) terminal, using a suitable lead.
- Turn the ignition switch on.

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



Service Code Clearing Procedures

- Start the service code erase mode with the following procedure.

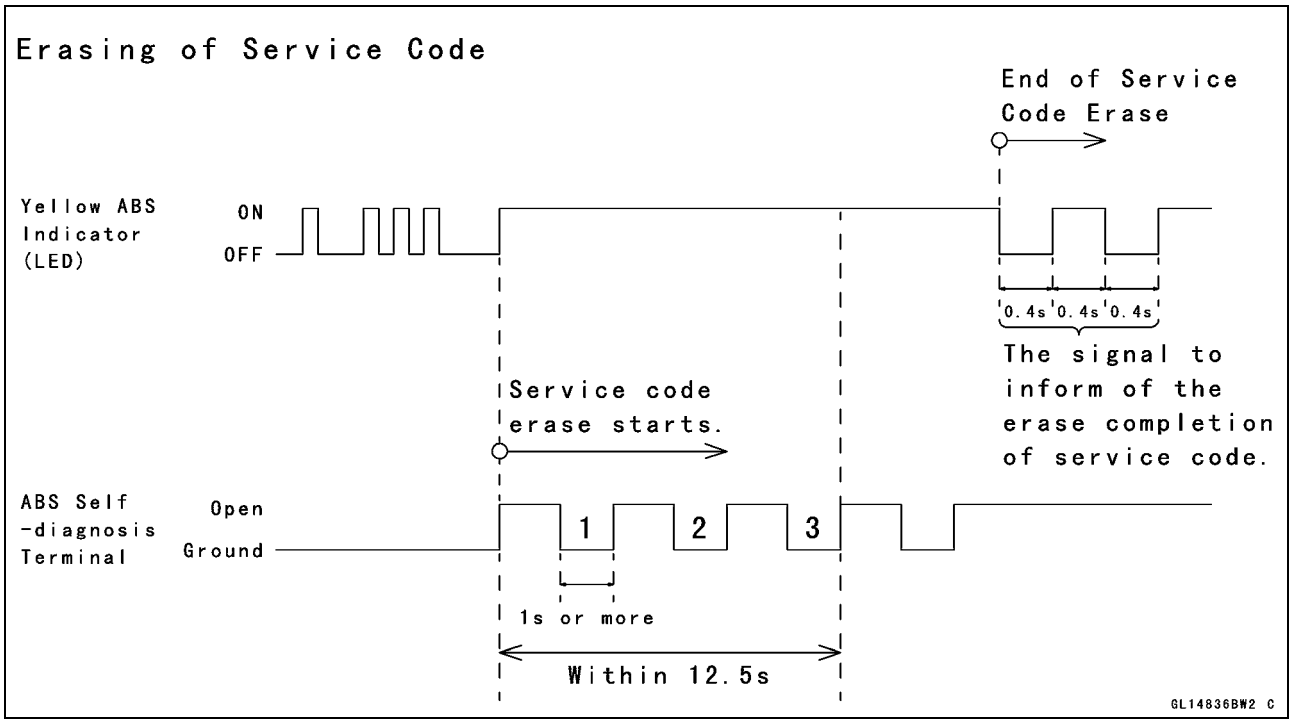
○The erase mode starts when the ABS self-diagnosis terminal is disconnected from the battery (–) terminal after starting the self-diagnosis mode.

○The service code can be erased by grounding and ungrounding (each time for at least one second) the ABS self-diagnosis terminal three times within about 12.5 seconds after starting the erase mode.

○The yellow ABS indicator (LED) remains lit during the erase mode.

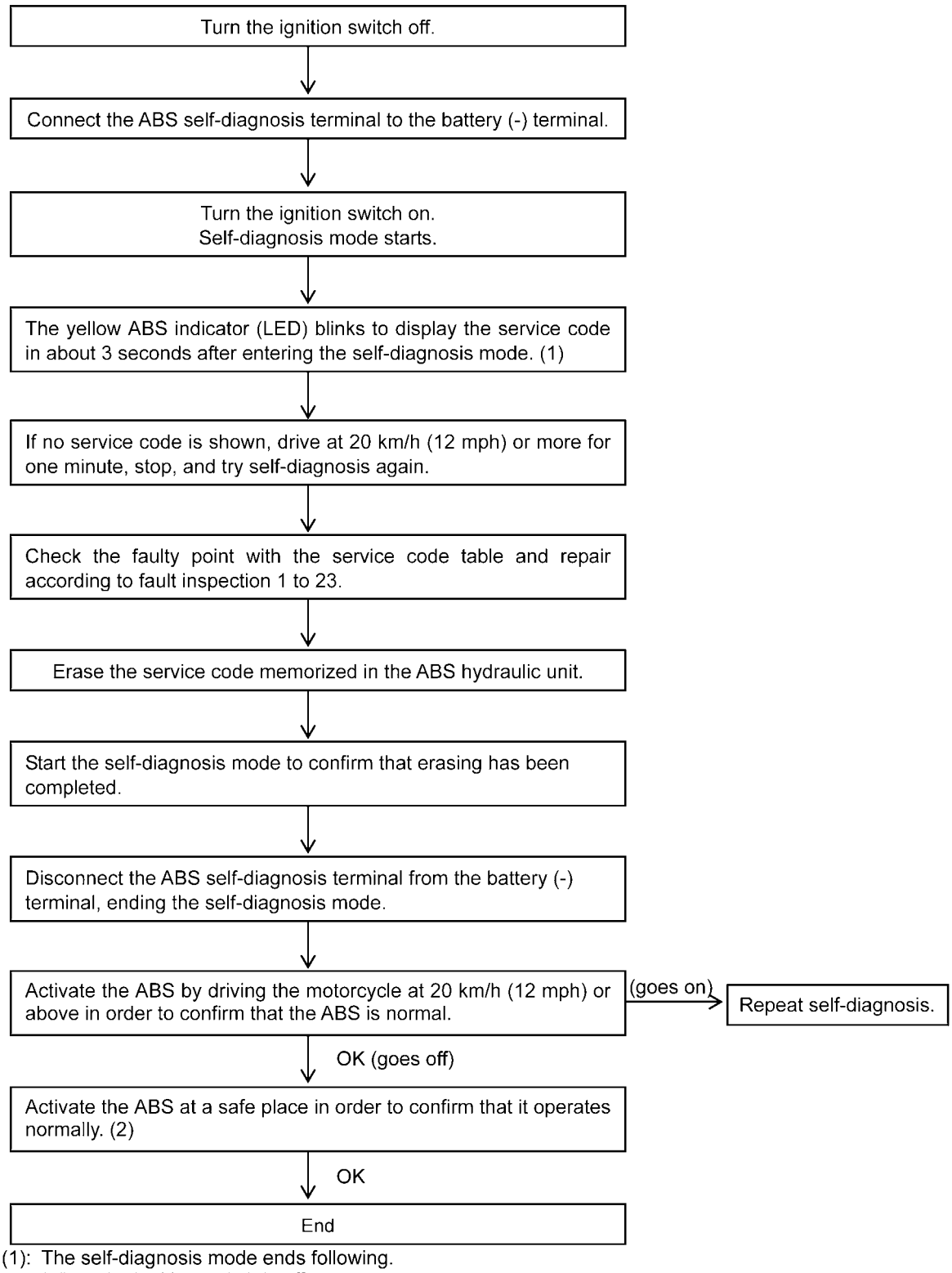
○After erasing, the yellow ABS indicator (LED) blinks and lights.

○Once erasing is finished, enter the self-diagnosis mode again to confirm that the service codes have been erased. If the ABS has been reset and all codes have been erased, only start code 12 will be shown.


Erasing of Service Code
End of Service Code Erase
Yellow ABS Indicator (LED)
ON
OFF
0.4s 0.4s 0.4s
The signal to inform of the erase completion of service code.
Service code erase starts.
ABS Self -diagnosis Terminal
Open
Ground
1
2
3
1s or more
Within 12.5s
GL14836BW2 C

Anti-Lock Brake System

Self-diagnosis Flow Chart



(1): The self-diagnosis mode ends following.
When the ignition switch is off.
When the motorcycle is driven while in the self-diagnosis mode.
When the self-diagnosis terminal disconnects.

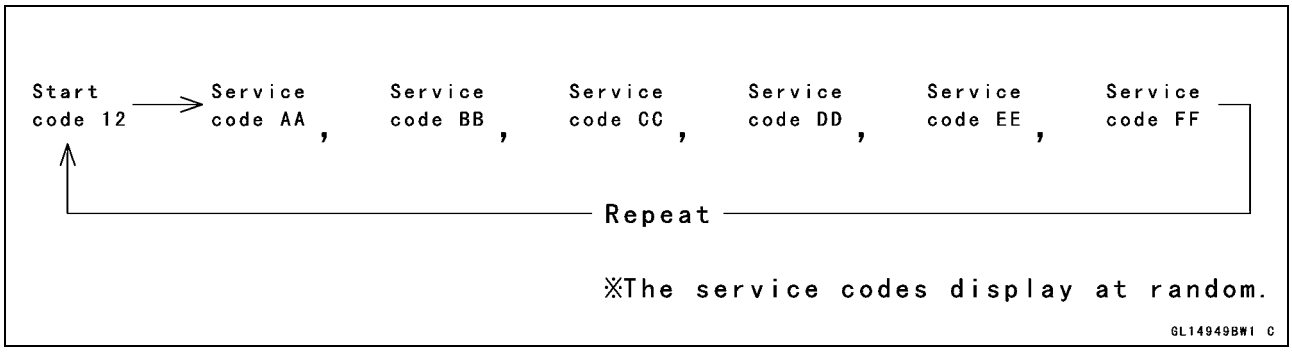
(2): Apply brake suddenly at 30 km/h (19 mph) or more to confirm that the motorcycle stops smoothly and steady with pulsation on the brake lever and pedal.

GL14149C F

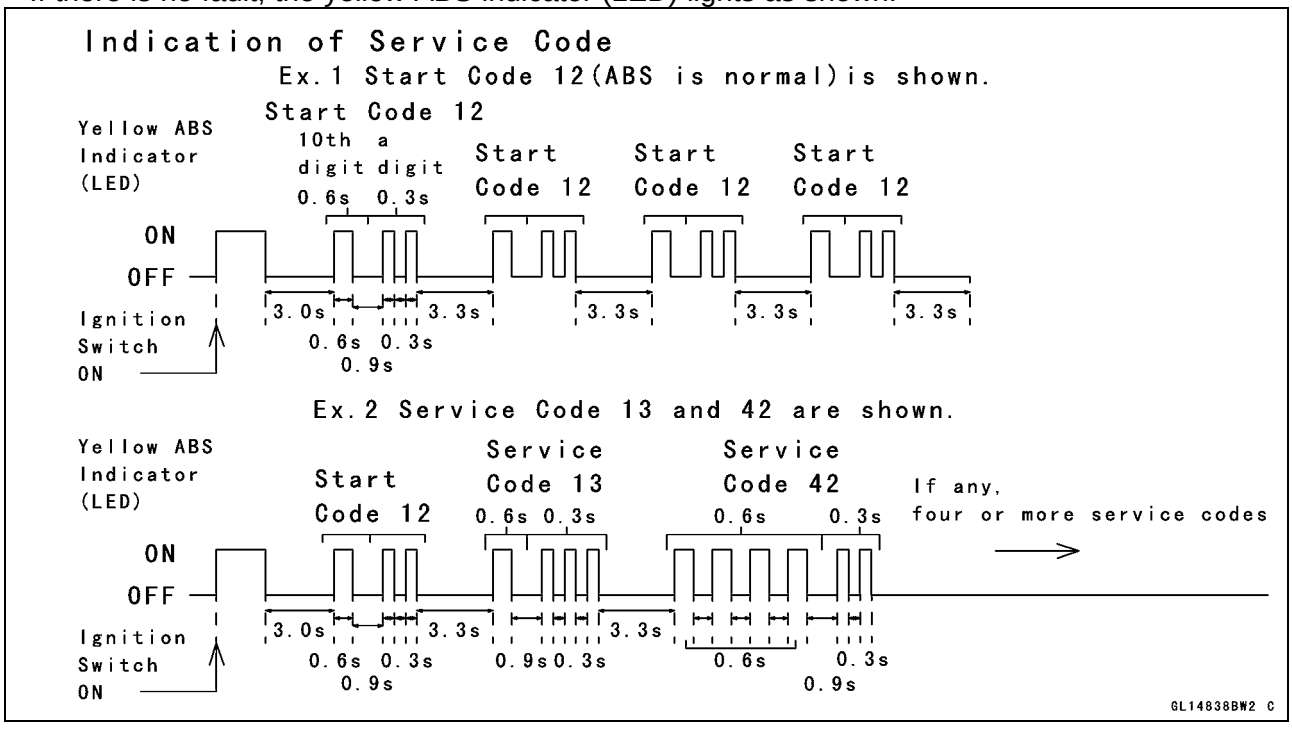
Anti-Lock Brake System

How to Read Service Codes

○Service codes are shown by a series of long and short blinks of the yellow ABS indicator light (LED) as shown below.
○Read 10th digit and unit digit as the yellow ABS indicator light (LED) blinks.
○When there are a number of faults, a maximum of 6 service codes can be stored and the display will begin starting from the last service code entered.
○For the display pattern, first, start code 12 is shown, next up to 6 service codes, then the display is repeated from the start code once again.



○If there is no fault, the yellow ABS indicator (LED) lights as shown.

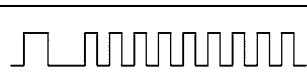
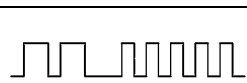
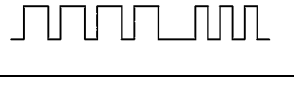
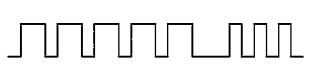
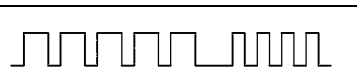
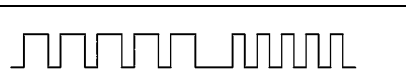
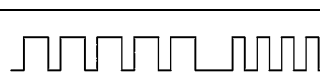


How to Erase Service Codes

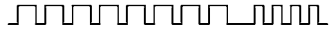
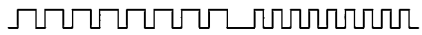
○Even if the ignition switch is turned to OFF, the battery or the ABS hydraulic unit are disconnected, all service codes remain in the ABS hydraulic unit.
○Refer to the Service Code Clearing Procedure for the service code erasure.

Anti-Lock Brake System

Service Code Table

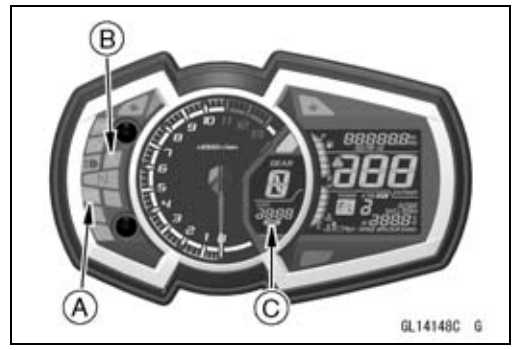
Service Code	Yellow ABS Indicator Light (LED)	Problems
12		Start code (not fault)
13		Rear inlet solenoid valve trouble (shorted or open, stuck valve)
14		Rear outlet solenoid valve trouble (shorted or open, stuck valve)
17		Front inlet solenoid valve trouble (shorted or open, stuck valve)
18		Front outlet solenoid valve trouble (shorted or open, stuck valve)
19		ABS solenoid valve relay trouble (wiring shorted or open, stuck relay)
25		Front, rear tire abnormal (substandard tire, deformation wheel, sensor rotor teeth number wrong)
35		ABS motor relay trouble (wiring shorted, open or lock, stuck relay)
42		Front wheel rotation sensor signal abnormal (sensor or rotor missing, too large clearance, rotor tooth worn or missing)
43		Front wheel rotation sensor wiring abnormal (wiring shorted or open)
44		Rear wheel rotation sensor signal abnormal (sensor or rotor missing, too large clearance, rotor tooth worn or missing)
45		Rear wheel rotation sensor wiring abnormal (wiring shorted or open)
52		Power supply voltage abnormal (low-voltage)
53		Power supply voltage abnormal (over-voltage)
54		ABS solenoid valve relay supply voltage (low voltage)
55		ECU trouble (ECU operation abnormal)
57		CAN communication (transmission)/CAN bus monitor malfunction
62		ABS hydraulic unit - FI ECU communication error

Anti-Lock Brake System

Service Code	Yellow ABS Indicator Light (LED)	Problems
63		ABS hydraulic unit - IMU communication error
83		Output fluid pressure sensor (front brake) trouble (voltage abnormal, wiring shorted or open)
84		Output fluid pressure sensor (front brake) trouble (offset abnormal)
89		Power supply voltage for fluid pressure sensor abnormal (voltage abnormal, wiring shorted or open)
94		IMU malfunction

Anti-Lock Brake System

Yellow ABS and Yellow Warning Indicator Lights (LED) Inspection



○In this model, the yellow ABS indicator light (LED) [A], yellow warning indicator light (LED) [B] and KIBS indicator [C] go on or blink by the data sent from the ABS hydraulic unit.

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

Yellow ABS Indicator Light (LED), Yellow Warning Indicator Light (LED) and KIBS Indicator Function

Status	Brake Condition	Yellow ABS Indicator Light (LED)	Yellow Warning Indicator Light (LED)	KIBS Indicator
Normal	**KIBS**	Goes off	Goes off	Goes off
IMU error*1	**KIBS**	Goes off	Goes on	Blinks
Engine information communication error	**ABS**	Goes off	Goes off	Blinks
Battery voltage decreases	**Low voltage ABS*2**	Blinks	Goes on	Goes off
ABS error	**Normal brake**	Goes on	Goes off	Goes off

*1: When the IMU is malfunctioned, the IMU indicator blinks.

*2: The mode of “Low voltage ABS” controls ABS while reducing the load to the battery.

NOTE

○*When the yellow ABS indicator light (LED) 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).*

Solenoid Valve Inspection (Service Code 13, 14, 17, 18)



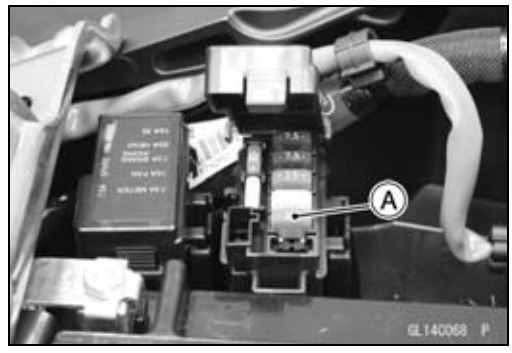
● Recheck the service code indication; erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.

★If the yellow ABS indicator (LED) [A] light, the solenoid valve in the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.

★If the yellow ABS indicator (LED) does not light, ABS system is normal (service code is not stored; temporary failure.).

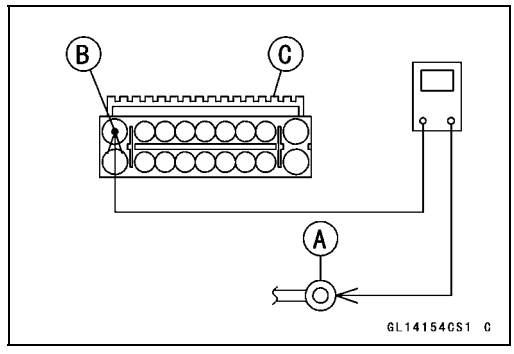
Anti-Lock Brake System

ABS Solenoid Valve Relay Inspection (Service Code 19)



- Remove:
  Front Seat (see Front Seat Removal in the Frame chapter)
- Check the ABS solenoid valve relay fuse (15 A) [A] (see Fuse Inspection in the Electrical System chapter).

★If the fuse is good, check the wiring continuity between the positive (+) terminal [A] of the battery and terminal 9 [B] in the ABS hydraulic unit lead connector [C].
★If there is not the continuity in the lead, replace or repair the main harness.
★If there is the continuity in the lead, go to next step.



- Recheck the service code indication; erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.

★If the yellow ABS indicator (LED) [A] lights, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.
★If the yellow ABS indicator (LED) does not light, ABS system is normal (service code is not stored; temporary failure.).



Front, Rear Wheel Rotation Difference Abnormal (Service Code 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 and Clogging with Foreign Matter of Sensor Rotor (see Wheel Rotation Sensor Inspection)

★If the all parts correct, recheck the service code indication; erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.

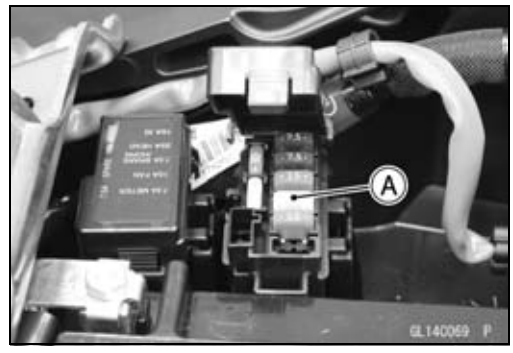
Anti-Lock Brake System

★If the yellow ABS indicator (LED) [A] lights, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.
★If the yellow ABS indicator (LED) does not light, ABS system is normal (service code is not stored; temporary failure.).

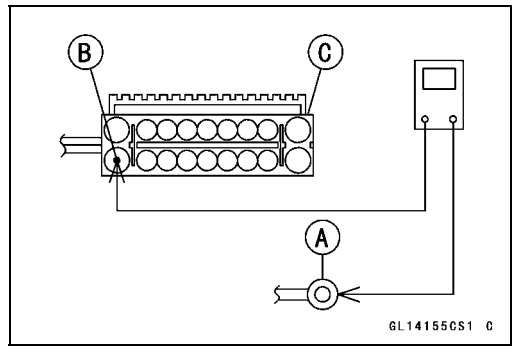


ABS Motor Relay Inspection (Service Code 35)

● Remove:
Front Seat (see Front Seat Removal in the Frame chapter)
● Check the ABS motor relay fuse (25 A) [A] (see Fuse Inspection in the Electrical System chapter).



★If the fuse is good, check the wiring continuity between the positive (+) terminal [A] of the battery and terminal 18 [B] in the ABS hydraulic unit lead connector [C].
★If there is not the continuity in the lead, replace or repair the main harness.
★If there is the continuity in the lead, go to next step.



● Recheck the service code indication; erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.
★If the yellow ABS indicator (LED) [A] lights, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.
★If the yellow ABS indicator (LED) does not light, ABS system is normal (service code is not stored; temporary failure.).



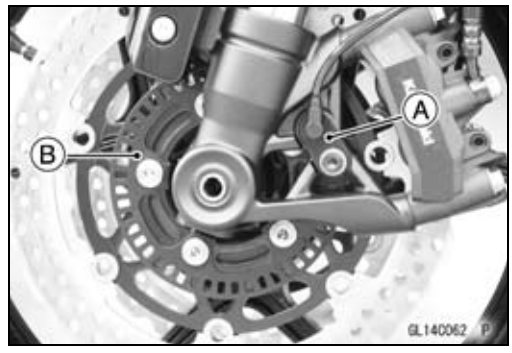
Front Wheel Rotation Sensor Signal Abnormal (Service Code 42)

● Measure the air gap between the front wheel rotation sensor and sensor rotor (see Wheel Rotation Sensor Air Gap Inspection).
● Check the front wheel rotation sensor (see Wheel Rotation Sensor Inspection).
★If both inspections are good, go to next step.

Anti-Lock Brake System

- Check that there is iron or other magnetic deposits between the sensor [A] and sensor rotor [B], and the sensor rotor slots for obstructions.
- Check the installation condition of the sensor for looseness.
- Check the sensor rotor tip for deformation or damage (e.g., chipped sensor rotor teeth).

★If the 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.



- Recheck the service code indication; erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.

★If the yellow ABS indicator (LED) [A] lights, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.
★If the yellow ABS indicator (LED) does not light, ABS system is normal (service code is not stored; temporary failure.).



Front Wheel Rotation Sensor Wiring Inspection (Service Code 43)

- Disconnect:
  ABS Hydraulic Unit Connector (see ABS Hydraulic Unit Removal)
  Front Wheel Rotation Sensor Connector (see Front Wheel Rotation Sensor Removal)

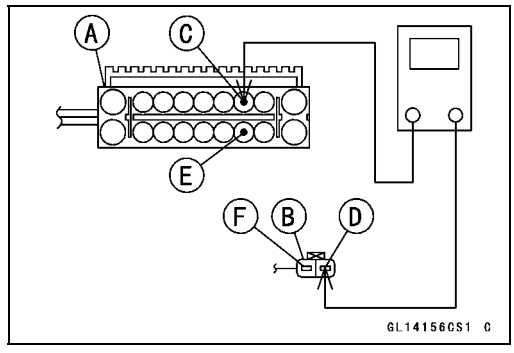
- Check the wiring continuity between main harness connectors.

Wiring Continuity Inspection

ABS Hydraulic Unit Connector [A] ←→ **Front Wheel Rotation Sensor Connector [B]**

ABS Hydraulic Unit Terminal 3 [C] ←→ Sensor Terminal [D]

ABS Hydraulic Unit Terminal 12 [E] ←→ Sensor Terminal [F]



★If there is not the continuity in the lead, replace or repair the main harness.
★If the wiring is good, go to next step.

- Recheck the service code indication; erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.

★If the yellow ABS indicator (LED) [A] lights, replace the front wheel rotation sensor (see Front Wheel Rotation Sensor Removal).
★Still, when it is not good, replace the ABS hydraulic unit.
★If the yellow ABS indicator (LED) does not light, ABS system is normal (service code is not stored; temporary failure.).



Anti-Lock Brake System

Rear Wheel Rotation Sensor Signal Abnormal (Service Code 44)

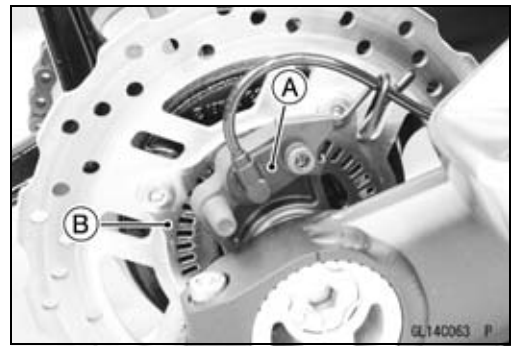
- Measure the air gap between the rear wheel rotation sensor and sensor rotor (see Wheel Rotation Sensor Air Gap Inspection).
- Check the rear wheel rotation sensor (see Rear Wheel Rotation Sensor Inspection).

★If both inspections are good, go to next step.

- Check that there is iron or other magnetic deposits between the sensor [A] and sensor rotor [B], and the sensor rotor slots for obstructions.
- Check the installation condition of the sensor for looseness.
- Check the sensor rotor tip for deformation or damage (e.g., chipped sensor rotor teeth).

★If the 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.



- Recheck the service code indication; erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.

★If the yellow ABS indicator (LED) [A] lights, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.

★If the yellow ABS indicator (LED) does not light, ABS system is normal (service code is not stored; temporary failure.).



Rear Wheel Rotation Sensor Wiring Inspection (Service Code 45)

- Disconnect:
  ABS Hydraulic Unit Connector (see ABS Hydraulic Unit Removal)
  Rear Wheel Rotation Sensor Connector (see Rear Wheel Rotation Sensor Removal)

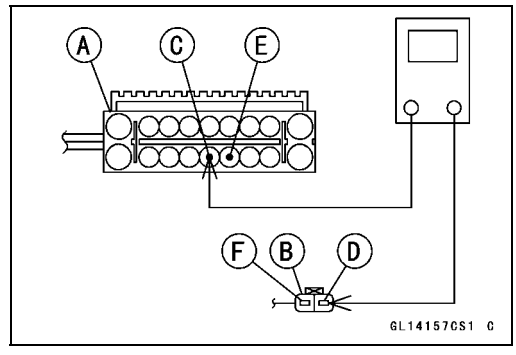
- Check the wiring continuity between main harness connectors.

Wiring Continuity Inspection

ABS Hydraulic Unit Connector [A] ←→ **Rear Wheel Rotation Sensor Connector [B]**

ABS Hydraulic Unit Terminal 14 [C] ←→ Sensor Terminal [D]

ABS Hydraulic Unit Terminal 13 [E] ←→ Sensor Terminal [F]



★If there is not the continuity in the lead, replace or repair the main harness.

★If the wiring is good, go to next step.

● Recheck the service code indication; erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.
★If the yellow ABS indicator (LED) [A] lights, replace the rear wheel rotation sensor (see Rear Wheel Rotation Sensor Removal).
★Still, when it is not good, replace the ABS hydraulic unit.
★If the yellow ABS indicator (LED) does not light, ABS system is normal (service code is not stored; temporary failure.).



Power Supply Voltage Abnormal (Low-Voltage) (Service Code 52)

● Check the battery condition (see Charging Condition Inspection in the Electrical System chapter)
★If the battery is good condition, go to next step.

● Recheck the service code indication; erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.
★If the yellow ABS indicator (LED) [A] lights, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.
★If the yellow ABS indicator (LED) does not light, ABS system is normal (service code is not stored; temporary failure.).



Power Supply Voltage Abnormal (Over-Voltage) (Service Code 53)

● Check the charging voltage (see Charging Voltage Inspection in the Electrical System chapter).
★If the charging voltage is good, go to next step.

● Recheck the service code indication; erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.
★If the yellow ABS indicator (LED) [A] lights, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.
★If the yellow ABS indicator (LED) does not light, ABS system is normal (service code is not stored; temporary failure.).



ABS Solenoid Valve Relay Supply Voltage Inspection (Low-Voltage) (Service Code 54)

● Check the charging voltage (see Charging Voltage Inspection in the Electrical System chapter).
★If the charging voltage is good, go to next step.

Anti-Lock Brake System

● Recheck the service code indication; erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.
★If the yellow ABS indicator (LED) [A] lights, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.
★If the yellow ABS indicator (LED) does not light, ABS system is normal (service code is not stored; temporary failure.).



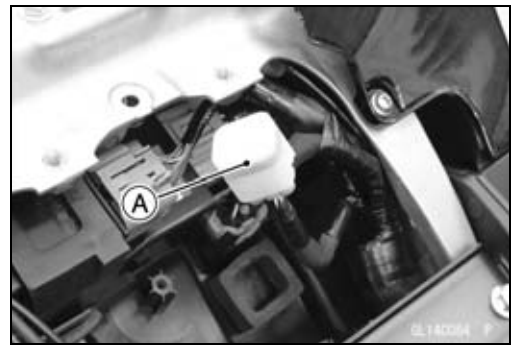
ECU Inspection (Service Code 55)

● Recheck the service code indication; erase the service code, perform the pre-diagnosis inspection 1 and 2, and retrieve the service code.
★If the yellow ABS indicator (LED) [A] lights, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.
★If the yellow ABS indicator (LED) does not light, ABS system is normal (service code is not stored; temporary failure.).



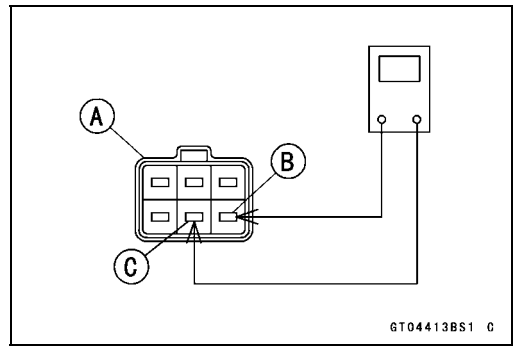
CAN Communication (Transmission)/CAN Bus OFF Monitor Inspection (Service Code 57)

● Remove:
Front Seat (see Front Seat Removal in the Frame chapter)
Immobilizer (Equipped Models)/Kawasaki Diagnostic System Connector Cap [A]



● Measure the CAN communication line resistance.
Immobilizer (Equipped Models)/Kawasaki Diagnostic System Connector [A]
GY/BL Terminal [B]
LB Terminal [C]

CAN Communication Line Resistance
Standard: 30 ~ 70 Ω



★If the reading is out of the standard, go to Check 1.
★If the reading is the standard, go to Check 2.

Check 1

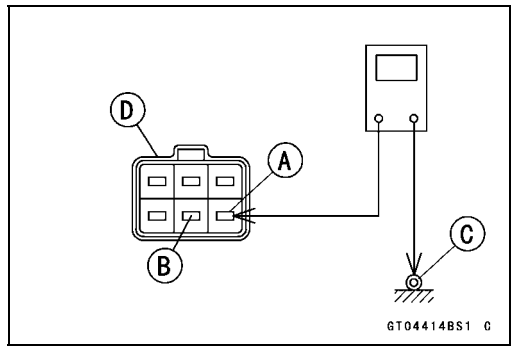
● Check the CAN communication line resistance of following parts.
Meter Unit (see Meter Unit Inspection in the Electrical System chapter)
ECU (see CAN Communication Line Resistance Inspection in the Fuel System (DFI) chapter)

Check 2

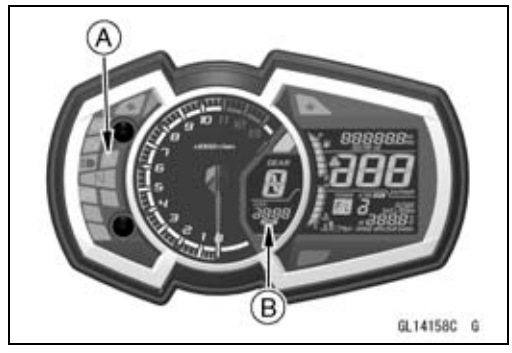
● Measure the resistance between the GY/BL [A] or LB [B] terminal and ground [C].
Immobilizer (Equipped Models)/Kawasaki Diagnostic System Connector [D]

CAN Communication Line/Ground Resistance
Standard: 4 ~ 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).
★If the yellow warning indicator (LED) [A] and KIBS indicator [B] go on or blink even if all checks are ended, replace the ABS hydraulic unit.
★If the yellow warning indicator (LED) and KIBS indicator go off, the KIBS system normal (temporary failure).

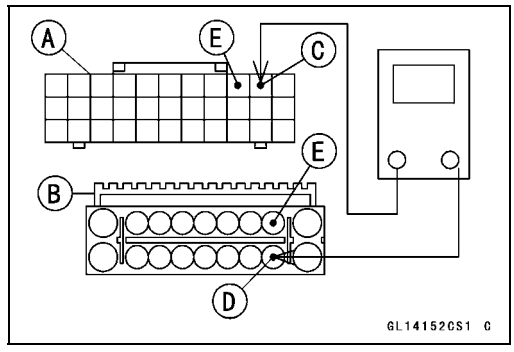


ECU Communication Line Inspection (Service Code 62)

● Check the wiring continuity between the main harness connectors.
● Disconnect:
ECU Connector (see ECU Removal in the Fuel System (DFI) chapter)
ABS Hydraulic Unit Connector (see ABS Hydraulic Unit Removal in the Brakes chapter)

Wiring Continuity Inspection
ECU Connector [A] ←→ ABS Hydraulic Unit Connector [B]
ECU Terminal 10 [C] ←→ ABS Hydraulic Unit Terminal 11 [D]
ECU Terminal 9 [E] ←→ ABS Hydraulic Unit Terminal 2 [F]

★If the wiring is open, replace or repair the harness (see ABS System 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, go to next step.

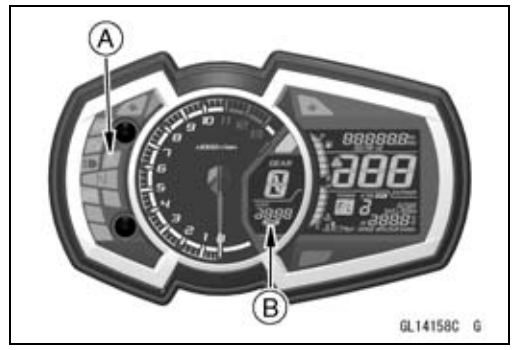


Anti-Lock Brake System

- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider).

★If the yellow warning indicator (LED) [A] and KIBS indicator [B] go on or blink even if all checks are ended, replace the ABS hydraulic unit.

★If the yellow warning indicator (LED) and KIBS indicator go off, the KIBS system normal (temporary failure).



IMU Communication Line Inspection (Service Code 63)

- Check the wiring continuity between the main harness connectors.
- Disconnect:

  IMU Connector (see IMU Removal in the Fuel System (DFI) chapter)

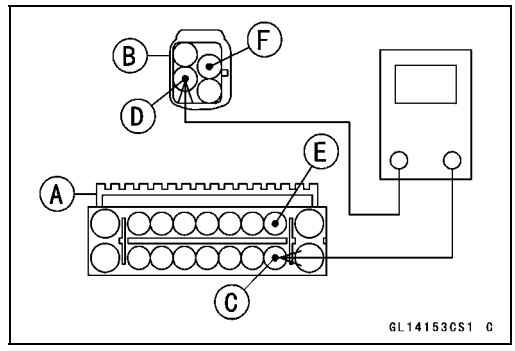
  ABS Hydraulic Unit Connector (see ABS Hydraulic Unit Removal in the Brakes chapter)

Wiring Continuity Inspection

ABS Hydraulic Unit Connector [A] ←→ IMU Connector [B]

ABS Hydraulic Unit Terminal 11 [C] ←→ Sensor Connector [D]

ABS Hydraulic Unit Terminal 2 [E] ←→ Sensor Connector [F]



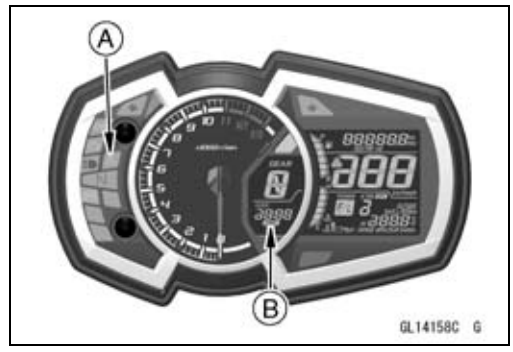
★If the wiring is open, replace or repair the harness (see ABS System Circuit).

★If the wiring is good, go to next step.

- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider).

★If the yellow warning indicator (LED) [A] and KIBS indicator [B] go on or blink even if all checks are ended, replace the ABS hydraulic unit.

★If the yellow warning indicator (LED) and KIBS indicator go off, the KIBS system normal (temporary failure).



Output Fluid Pressure Sensor (Front Brake) Wiring Inspection (Service Code 83)

- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider).

★If the yellow ABS indicator (LED) [A] lights, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.

★If the yellow ABS indicator (LED) does not light, ABS system is normal (service code is not stored; temporary failure.).



Anti-Lock Brake System

Output Fluid Pressure Sensor (Front Brake) Offset Abnormal (Service Code 84)



- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider).

★If the yellow ABS indicator (LED) [A] lights, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.

★If the yellow ABS indicator (LED) does not light, ABS system is normal (service code is not stored; temporary failure.).

Fluid Pressure Sensor Supply Voltage Inspection (Service Code 89)

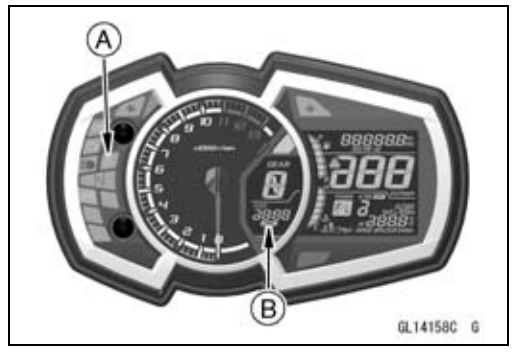


- Perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider).

★If the yellow ABS indicator (LED) [A] lights, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.

★If the yellow ABS indicator (LED) does not light, ABS system is normal (service code is not stored; temporary failure.).

IMU Inspection (Service Code 94)



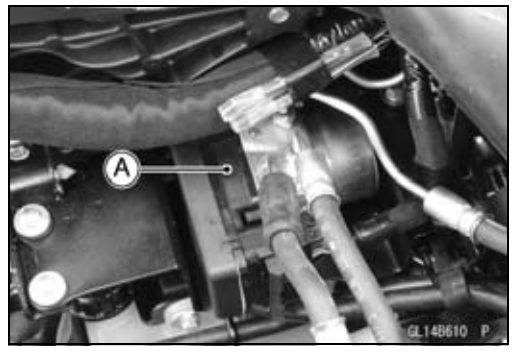
- Check the IMU power supply voltage (see IMU Power Supply Inspection).

★If the IMU is good, perform the Pre-Diagnosis Inspection 1 and 2 (see Inquiries to Rider).

★If the yellow warning indicator (LED) [A] and KIBS indicator [B] go on or blink even if all checks are ended, replace the ABS hydraulic unit.

★If the yellow warning indicator (LED) and KIBS indicator go off, the KIBS system normal (temporary failure).

ABS Hydraulic Unit Removal



NOTICE
The ABS hydraulic unit [A] has been adjusted and set with precision at the factory. Therefore, it should be handled carefully, never struck sharply, as with a hammer, or allowed to fall on a hard surface. **Be careful not to get water or mud on the ABS hydraulic unit.**

- Drain the brake fluid from the front and rear brake lines.

○Drain the brake fluid through the bleed valve by pumping the brake lever and pedal.

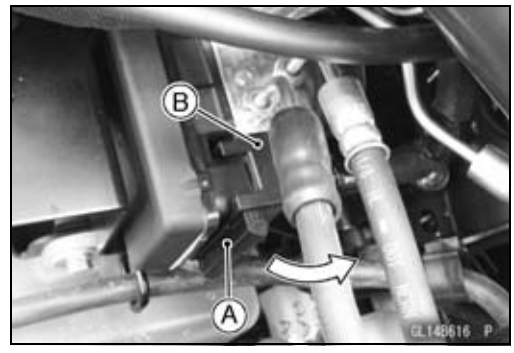
Anti-Lock Brake System

- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Battery Case (see Battery Case Removal in the Frame chapter)
- Clean the ABS hydraulic unit.

NOTICE

Clean all fittings on the ABS hydraulic unit and the rear master cylinder because dirt around the banjo bolts could contaminate the brake fluid in the line during removal/installation.
Spread over a shop towel around the ABS hydraulic unit before removing the brake line so that brake fluid does not leak on the parts.

- Pull the lever [A] backward to disconnect the ABS hydraulic unit connector [B].



- Loosen the brake pipe joint nuts [A] with the flare nut wrench.
- Disconnect the brake pipe from the ABS hydraulic unit.

NOTICE

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

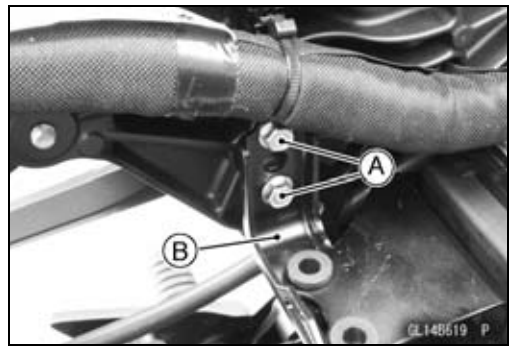


- Remove:
  Bolts [A]

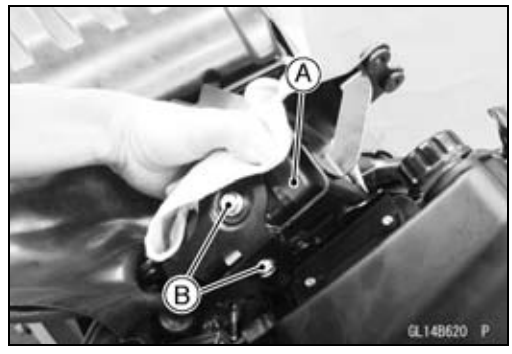


Anti-Lock Brake System

- Remove:
  Bolts [A]
  Bracket [B]



- Pull up the ABS hydraulic unit [A].
- Remove:
  Bolts [B]
  ABS Hydraulic Unit



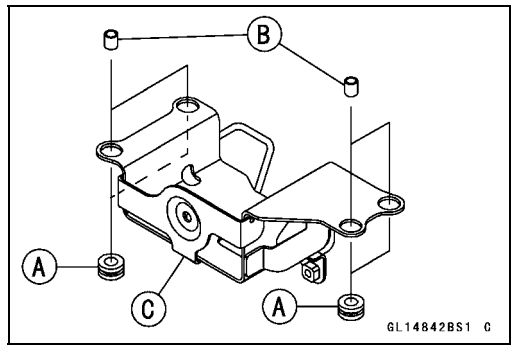
NOTICE
The ABS hydraulic unit has been adjusted and set with precision at the factory. Do not try to disassemble and repair the ABS hydraulic unit.

ABS Hydraulic Unit Installation

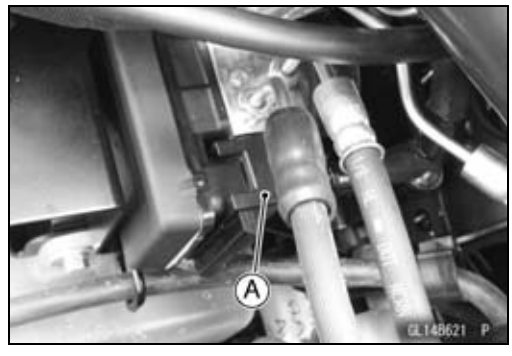
NOTICE
Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.

- Installation is the reverse of removal.
- Be sure to install the dampers [A] and collars [B] on the bracket [C].
- Install the brake pipes (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Tighten the brake pipe joint nuts with the flare nut wrench.

Torque - Brake Pipe Joint Nuts: 18 N·m (1.8 kgf·m, 13 ft·lb)



- Pull the lever forward to connect the ABS hydraulic unit connector [A].
- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.



ABS Hydraulic Unit Inspection

- Remove the ABS hydraulic unit (see ABS Hydraulic Unit Removal).
- Visually inspect the ABS hydraulic unit.

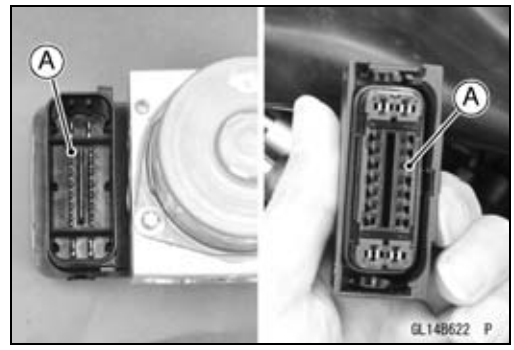
★Replace the ABS hydraulic unit if any of them are cracked, or otherwise damaged.

Anti-Lock Brake System

- Visually inspect the connector terminals [A].

★Replace the ABS hydraulic unit or main harness if either of the terminals are cracked, bent, or otherwise damaged.

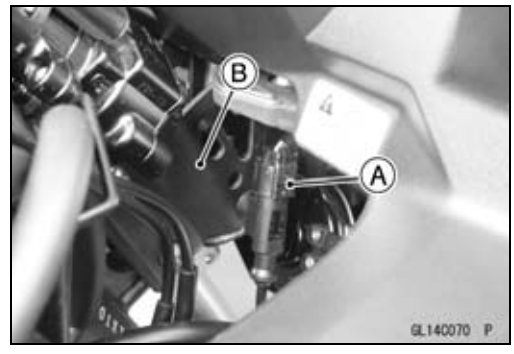
★If the ABS hydraulic unit connector is clogged with mud or dust, blow it off with compressed air.



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.**

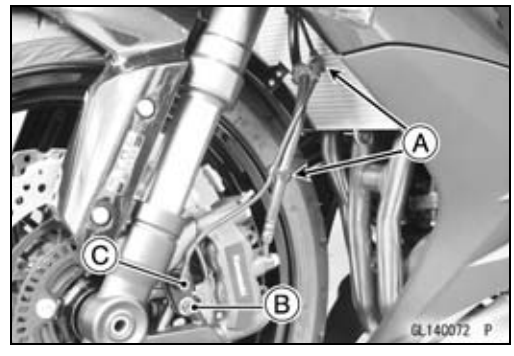
- Disconnect the front wheel rotation sensor lead connector [A].
- Remove the front wheel rotation sensor from the windshield bracket assembly [B].



- Clear the sensor lead from the clamps [A].



- Clear the sensor lead from the clamps [A].
- Remove:
  Bolt [B]
  Front Wheel Rotation Sensor [C]



Front Wheel Rotation Sensor Installation

- Installation is the reverse of removal.
- When installing the sensor which is fastened by bolt, tighten the bolt after placing the sensor on the bottom surface completely.

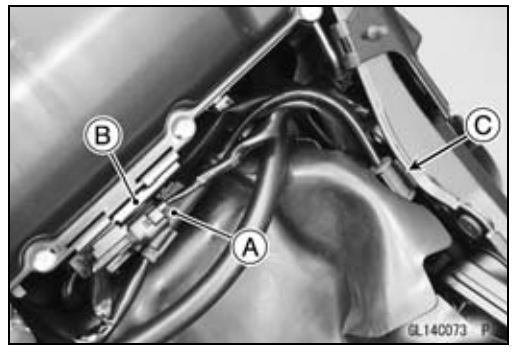
Torque - Front Wheel Rotation Sensor Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

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

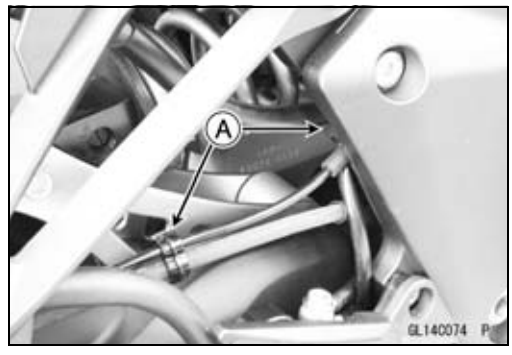
Rear Wheel Rotation Sensor Removal

NOTICE
The wheel rotation sensor should be handled carefully, never struck sharply, as with a hammer, or allowed to fall on a hard surface since the wheel rotation sensor is precision made. Be careful not to get water or mud on the wheel rotation sensor. **Do not try to disassemble or repair the wheel rotation sensor.**

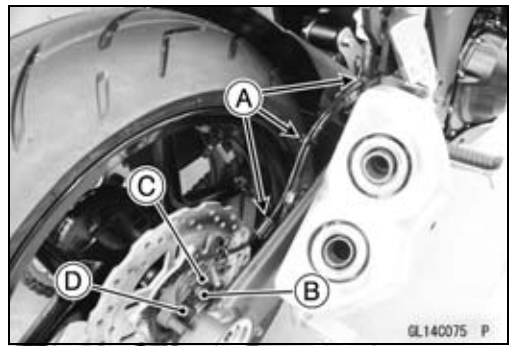
- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
- Disconnect the rear wheel rotation sensor lead connector [A].
- Remove the rear wheel rotation sensor from the connector bracket [B].
- Clear the sensor lead from the clamp [C].



- Clear the sensor lead from the clamps [A].



- Clear the sensor lead from the clamps [A].
- Remove:
  Bolt [B]
  Clamp [C]
  Rear Wheel Rotation Sensor [D]



Anti-Lock Brake System

Rear Wheel Rotation Sensor Installation

- Installation is the reverse of removal.
- When installing the sensor which is fastened by bolt, tighten the bolt after placing the sensor on the bottom surface completely.

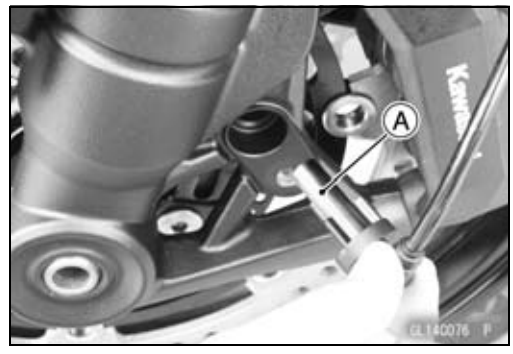
Torque - Rear Wheel Rotation Sensor Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

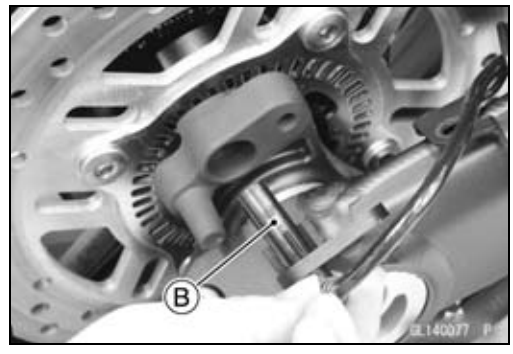
○Run the lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Wheel Rotation Sensor Inspection

- Remove the front wheel rotation sensor [A] from the front fork.
- Remove the rear wheel rotation sensor [B] from the caliper bracket.
- Visually inspect the wheel rotation sensors.

★Replace the wheel rotation sensor if it is cracked, bent, or otherwise damaged.





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]

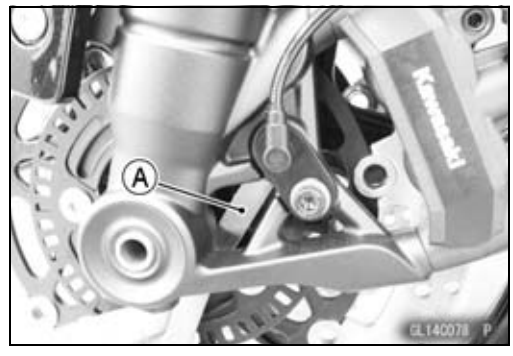
Air Gap
Standard:

Front	**0.1 ~ 2.1 mm (0.004 ~ 0.083 in.)**
Rear	**0.1 ~ 1.7 mm (0.004 ~ 0.067 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).



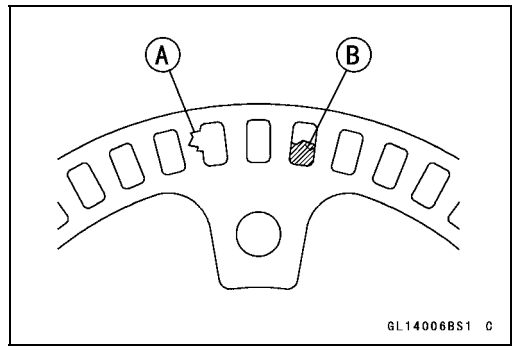


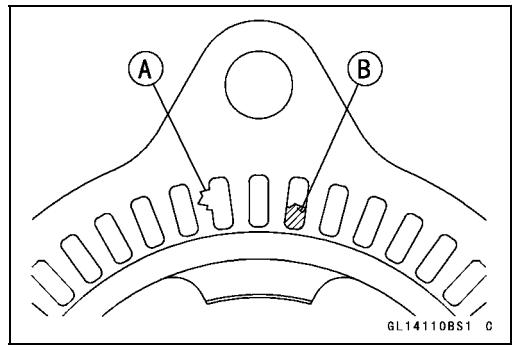
Wheel Rotation Sensor Rotor Inspection

- 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.





ABS Solenoid Valve Relay Fuse (15 A) Removal

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

ABS Motor Relay Fuse (25 A) Removal

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

Fuse Installation

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

Fuse Inspection

- Remove the fuses (see ABS Solenoid Valve Relay Fuse (15 A)/ABS Motor Relay Fuse (25 A) Removal).
- Refer to the Fuse Inspection in the Electrical System chapter.

Suspension

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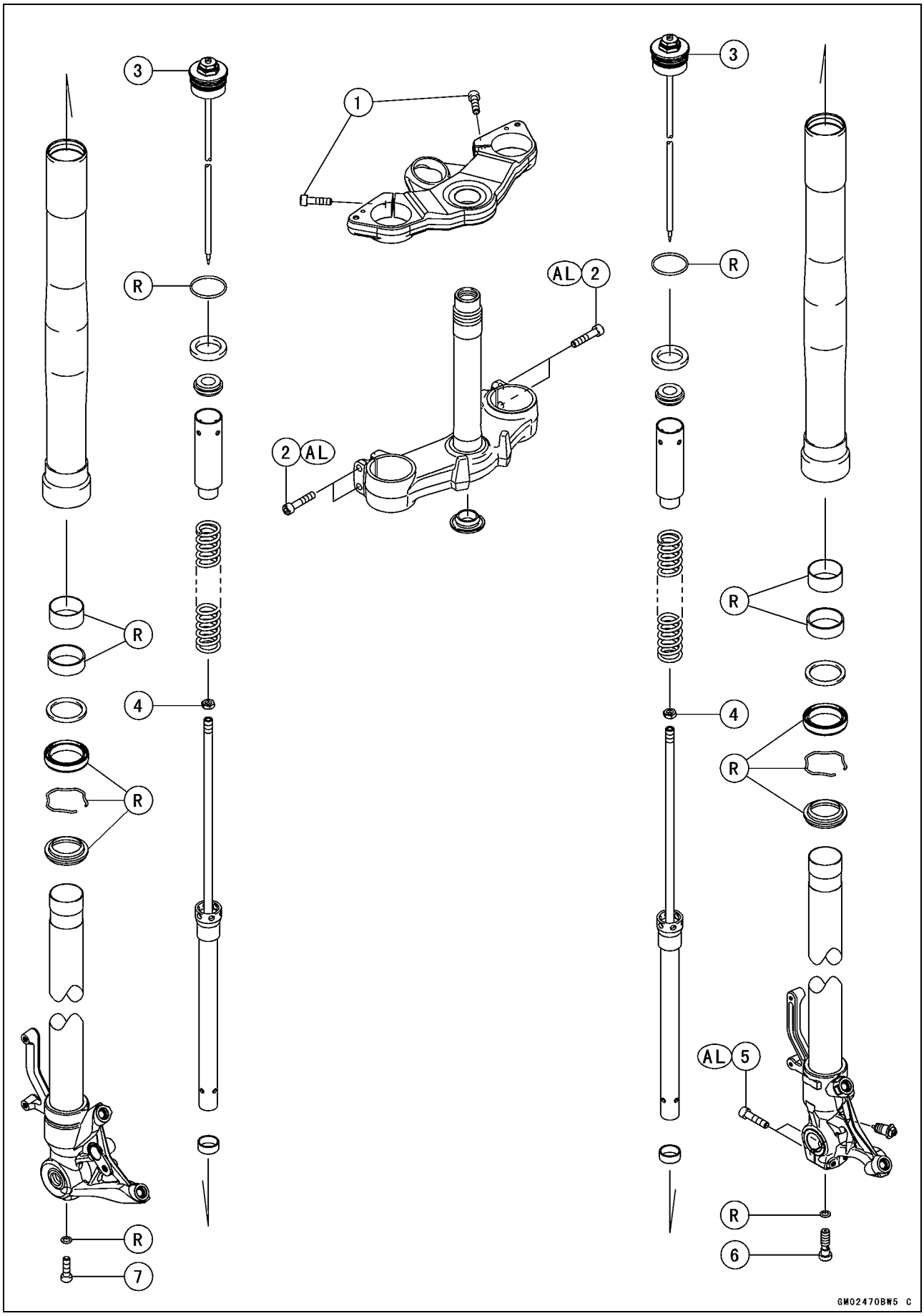
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Exploded View

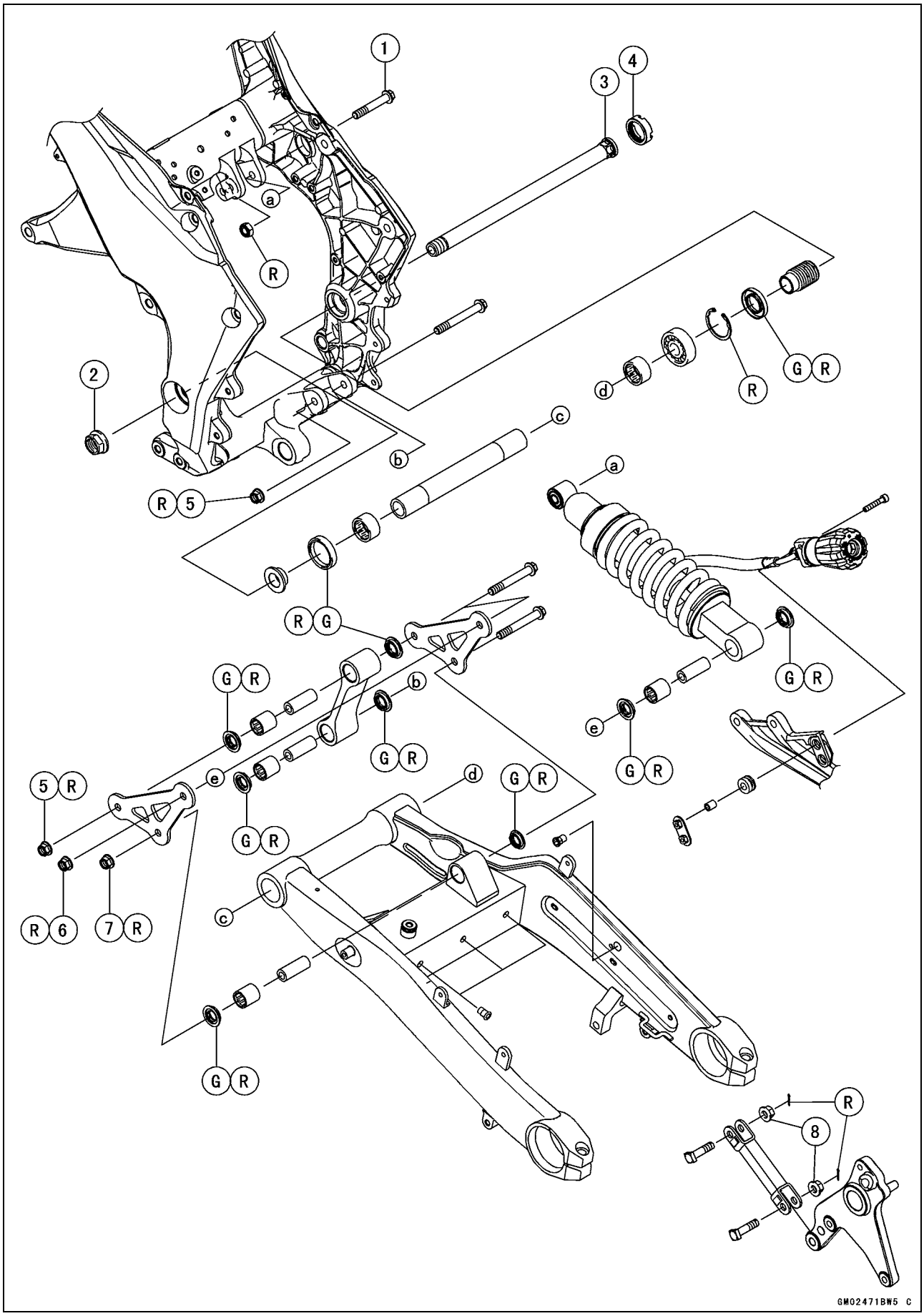


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Upper Front Fork Clamp Bolts	20	2.0	15	
2	Lower Front Fork Clamp Bolts	25	2.5	18	AL
3	Front Fork Top Plugs	34	3.5	25	
4	Piston Rod Nuts	20	2.0	15	
5	Front Axle Clamp Bolts	20	2.0	15	AL
6	Right Front Fork Bottom Allen Bolt	35	3.6	26	
7	Left Front Fork Bottom Allen Bolt	20	2.0	15	

AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque.
R: Replacement Parts

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Upper Rear Shock Absorber Bolt	35	3.6	26	
2	Swingarm Pivot Shaft Nut	110	11.2	81.1	
3	Swingarm Pivot Shaft	20	2.0	15	
4	Swingarm Pivot Adjusting Collar Locknut	100	10.2	73.8	
5	Tie-rod Nuts	35	3.6	26	R
6	Lower Rear Shock Absorber Nut	35	3.6	26	R
7	Rocker Arm Nut	35	3.6	26	R
8	Torque Link Nuts	35	3.6	26	

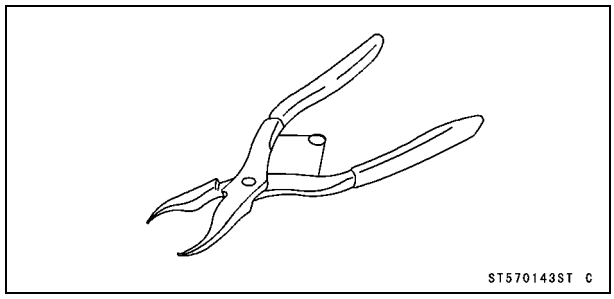
G: Apply grease.
R: Replacement Parts

Specifications

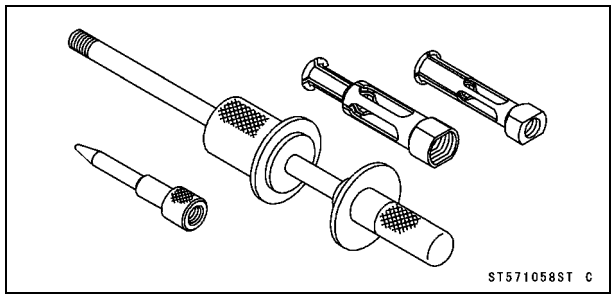
Item	Standard
Front Fork (Per One Unit)	
Fork Inner Tube Diameter	ϕ41 mm (1.6 in.)
Air Pressure	Atmospheric pressure (non-adjustable)
Rebound Damper Setting	2 3/4 turns out from the fully clockwise position (Usable Range: 0 ←→ 3 1/2 turns out)
Compression Damper Setting (Right Side Only)	1 3/4 turns out from the fully clockwise position (Usable Range: 0 ←→ 3 turns out)
Fork Spring Preload Setting	5 turns in from the fully counterclockwise position (Usable Range: 0 ←→ 15 turns in)
Suspension Oil	Kawasaki SS-47 or equivalent
Amount:	
When Changing Oil	Approx. 415 mL (14.0 US oz.)
After Disassembly and Completely Dry	487 ±2.5 mL (16.5 ±0.085 US oz.)
Fork Oil Level	96 ±2 mm (3.8 ±0.08 in.) (fully compressed, below from the top of outer tube)
Fork Spring Free Length	313 mm (12.3 in.) (Service Limit: 307 mm (12.1 in.))
Rear Shock Absorber	
Rebound Damper Setting (Other than BR model of the ZX1000WJ Early Model)	2 1/2 turns out from the fully clockwise position (Usable Range: 0 ←→ 2 1/2 turns out)
(BR Model of the ZX1000WJ Early Model)	2 turns out from the fully clockwise position (Usable Range: 0 ←→ 2 1/2 turns out)
Spring Preload Setting Position	8 clicks from the fully counterclockwise position (Usable Range: 0 ←→ 40 clicks)
Gas Pressure	980 ~ 1 280 kPa (10.00 ~ 13.05 kgf/cm^2, 142.1 ~ 185.6 psi, non-adjustable)

Special Tools

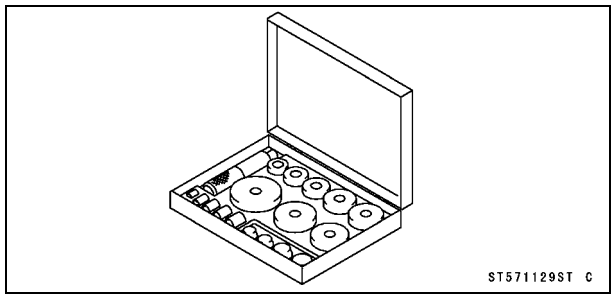
Inside Circlip Pliers:
57001-143



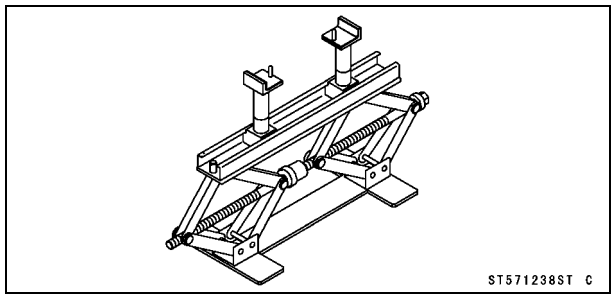
Oil Seal & Bearing Remover:
57001-1058



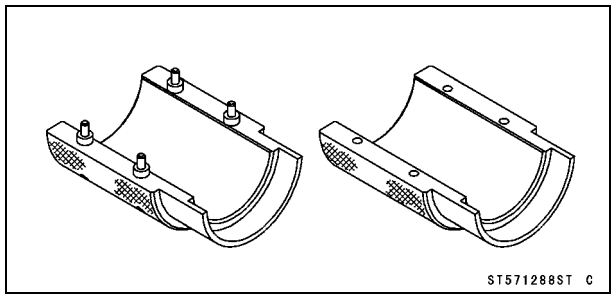
Bearing Driver Set:
57001-1129



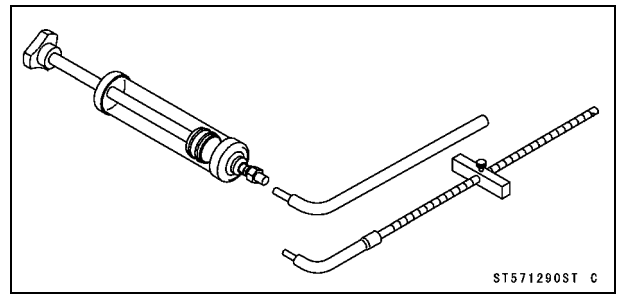
Jack:
57001-1238



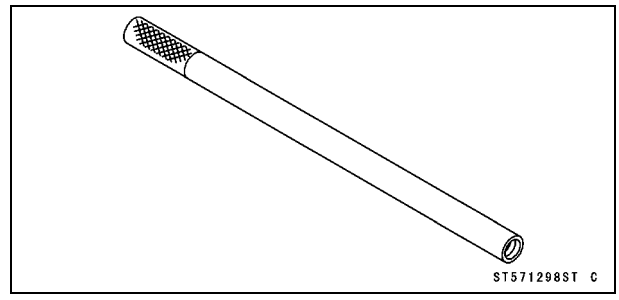
Fork Oil Seal Driver, ϕ41:
57001-1288



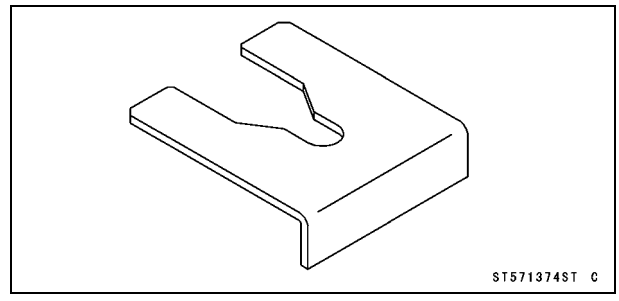
Fork Oil Level Gauge:
57001-1290



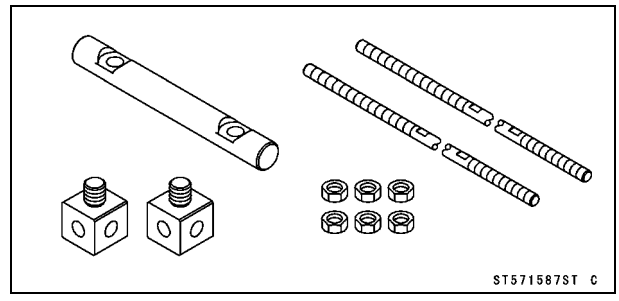
Fork Piston Rod Puller, M10 × 1.0:
57001-1298



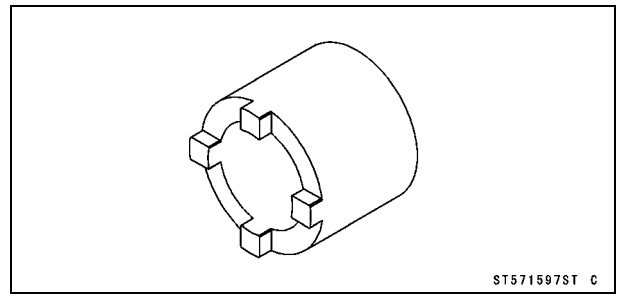
Fork Spring Stopper:
57001-1374



Fork Spring Compressor:
57001-1587

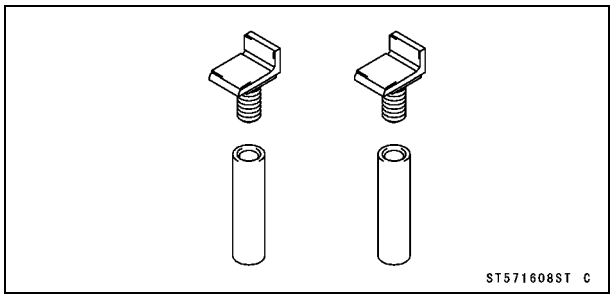


Swingarm Pivot Nut Wrench:
57001-1597

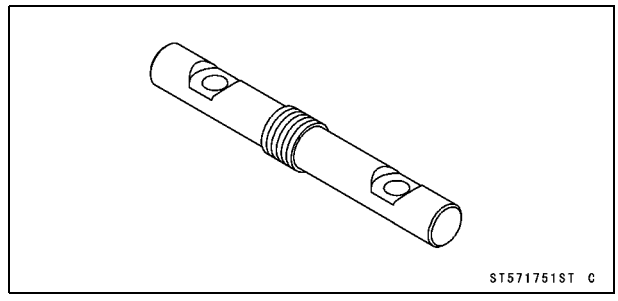


Special Tools

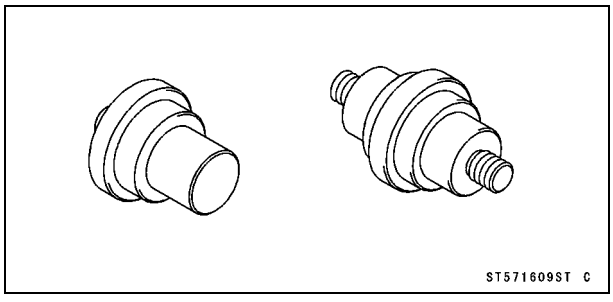
Jack Attachment:
57001-1608



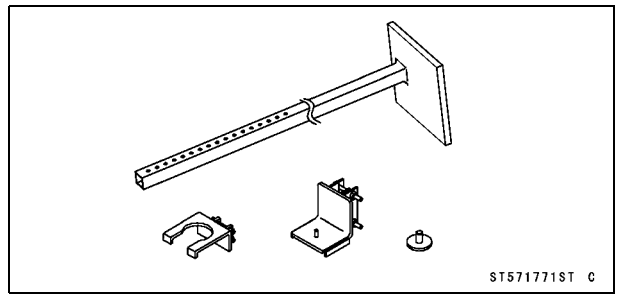
Bar:
57001-1751



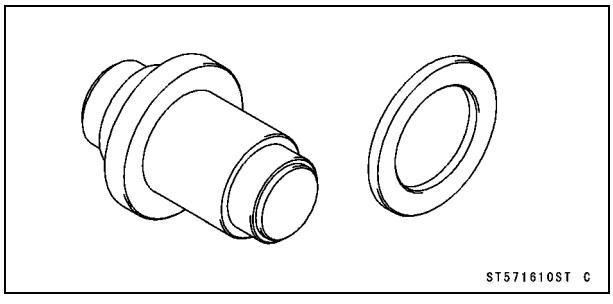
Needle Bearing Driver, ϕ17/ϕ18:
57001-1609



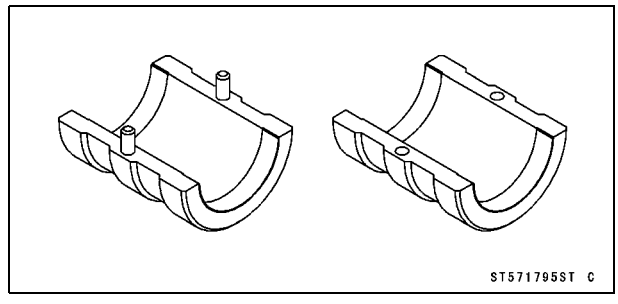
Fork Spring Compressor:
57001-1771



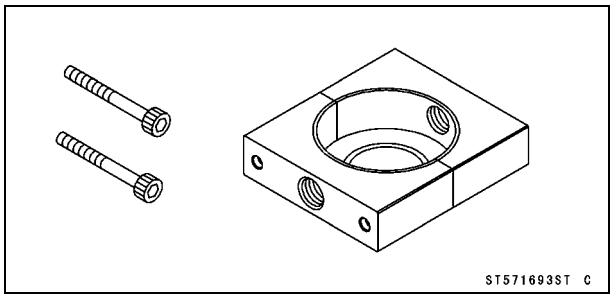
Needle Bearing Driver, ϕ28:
57001-1610



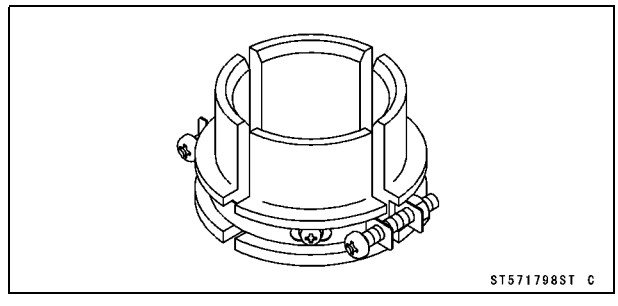
Fork Oil Seal Driver Weight, ϕ26 ~ϕ46:
57001-1795



Clamp:
57001-1693



Fork Oil Seal Driver Attachment, ϕ36 ~ϕ46:
57001-1798



Front Fork

Rebound Damping Force Adjustment



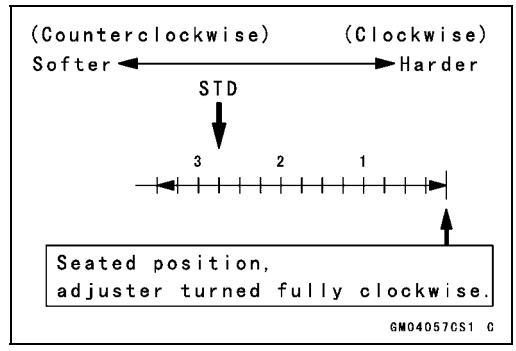
- To adjust the rebound damping force, turn the rebound damping adjuster [A].

○The standard adjuster setting is the **2 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
3 1/2 turns out	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
0	Strong	Hard	Heavy	Bad	High

Spring Preload Adjustment



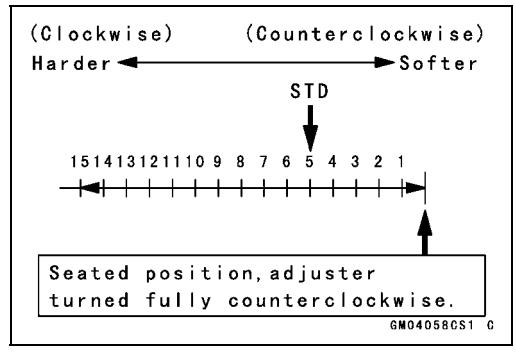
- To adjust the spring preload, turn the spring preload adjuster [A].

○The standard adjuster setting is the **5 turns in** from the fully counterclockwise position.

⚠ 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.

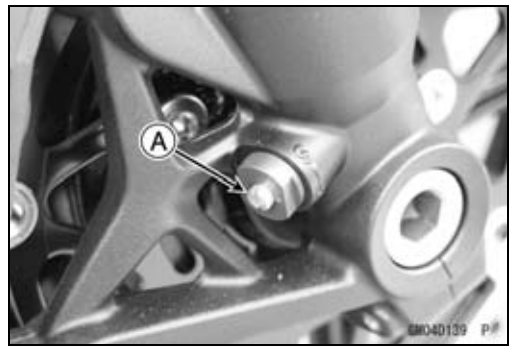


Spring Action

Adjuster Position	Damping Force	Setting	Load	Road	Speed
0	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
15 turns in	Strong	Hard	Heavy	Bad	High

Front Fork

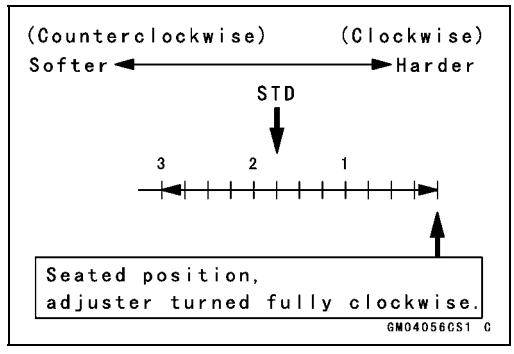
Compression Damping Force Adjustment (Right Side Only)



- To adjust the compression damping force, turn the compression damping adjuster [A].

○The standard adjuster setting is the **1 3/4 turns out** from the fully clockwise position.

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

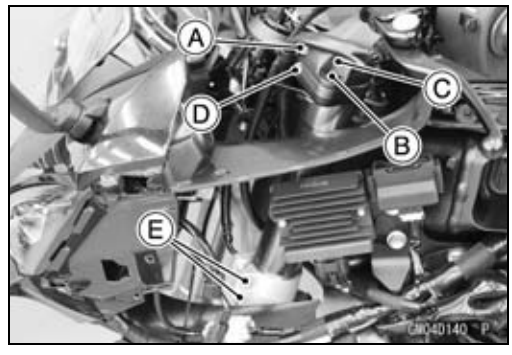


Compression Damping Force Adjustment

Adjuster Position	Damping Force	Setting	Load	Road	Speed
3 turns out	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
0	Strong	Hard	Heavy	Bad	High

Front Fork Removal (Each Fork Leg)

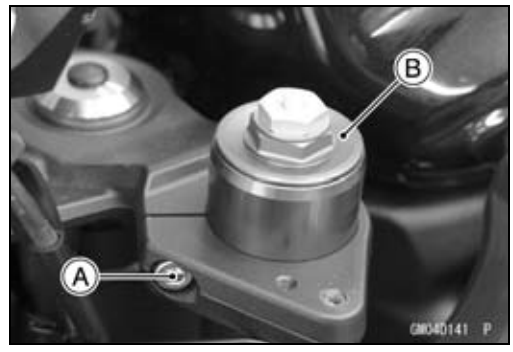
- Remove:
  Lower Fairings (see Lower Fairing Removal in the Frame chapter)
  Front Wheel (see Front Wheel Removal in the Wheels/Tires chapter)
  Front Fender (see Front Fender Removal in the Frame chapter)



- Loosen the handlebar holder clamp bolt [A].
- Remove:
  Handlebar Holder Positioning Bolt [B]
  Handlebar Holder [C]
- Loosen the upper front fork clamp bolt [D] and lower front fork clamp bolts [E].

Front Fork

★If fork leg is to be disassembled, loosen the upper front clamp bolt [A] and front fork top plug [B].



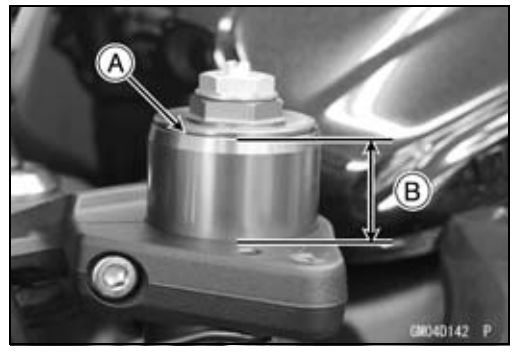
NOTE

○*Loosen the front fork top plug after loosening the upper front fork clamp bolt.*

○Loosen the lower front fork clamp bolts.
● With a twisting motion, work the fork leg down and out.

Front Fork Installation

● Install the fork so that the top end [A] of the outer tube as shown.
27.9 mm (1.10 in.) [B]



● Tighten:

Torque - Lower Front Fork Clamp Bolts : 25 N·m (2.5 kgf·m, 18 ft·lb)
Front Fork Top Plugs: 34 N·m (3.5 kgf·m, 25 ft·lb)
Upper Front Fork Clamp Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)

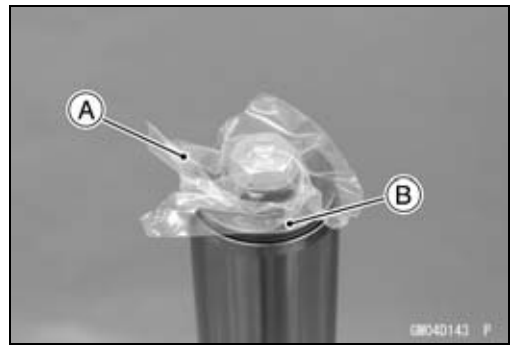
NOTE

○*Tighten the top plug before tightening the upper front fork clamp bolt.*
○*Tighten the two lower front fork clamp bolts alternately two times to ensure even tightening torque.*

● 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)

Fork Oil Change

● Remove the front fork (see Front Fork Removal).
● Hold the inner tube lower end in a vice.
● Place a plastic bag [A] over the top plug [B] to protect the top plug.
● Unscrew the top plug out of the outer tube.



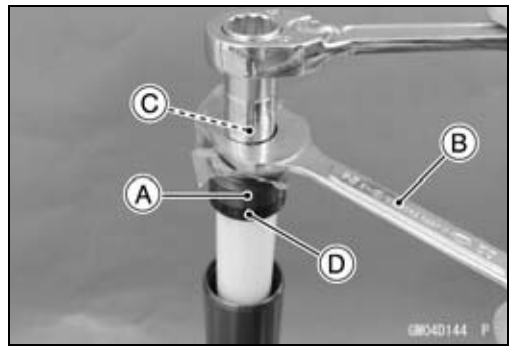
Front Fork

- Holding the top plug [A] with a wrench [B], tighten the spring preload adjuster [C].

NOTE

○*After tightening, lift the top plug to make the space.*

- Slide down the damper [D].

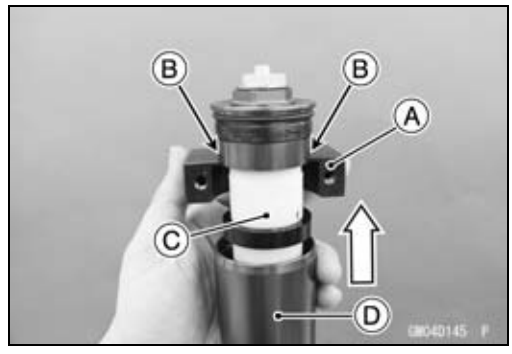


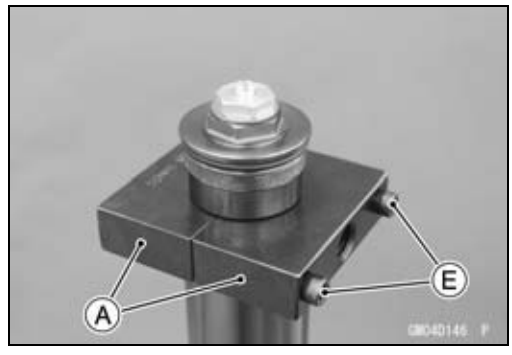
- Install the clamps [A] as shown.

NOTE

○*Set the cutout [B] of the clamp to the slider [C], pull up the outer tube [D] to hold it by the clamps, and then tighten the two bolts [E]. The outer tube is used as a guide.*

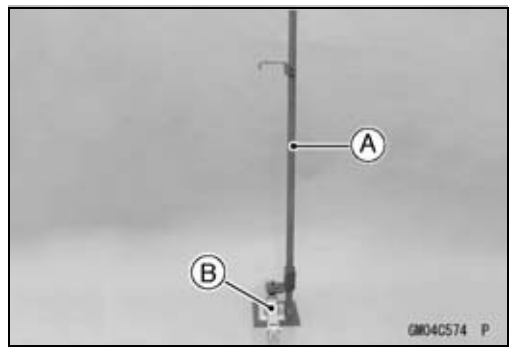
Special Tool - Clamp: 57001-1693



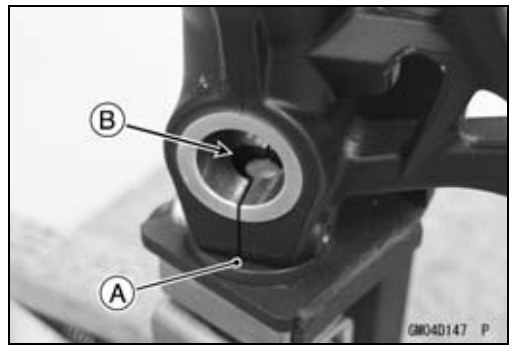


- Set the fork spring compressor [A] and a suitable jack [B] as shown.

Special Tool - Fork Spring Compressor: 57001-1771

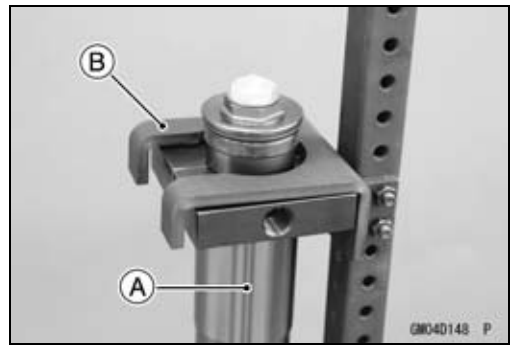


- Insert the projection of the protector [A] into the front fork bottom hole [B].



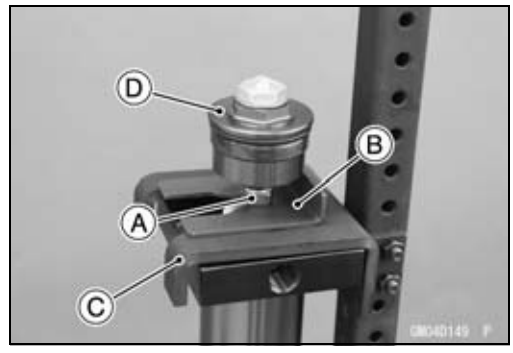
Front Fork

● Set the front fork [A] under the holder [B].
● Lift up the suitable jack, and hold the front fork.

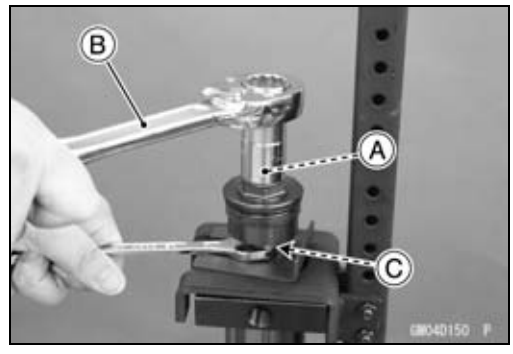


● Lift up the suitable jack until the piston rod nut [A] comes out.
● Insert the fork spring stopper [B] between the piston rod nut and the holder [C] while holding up the top plug [D].

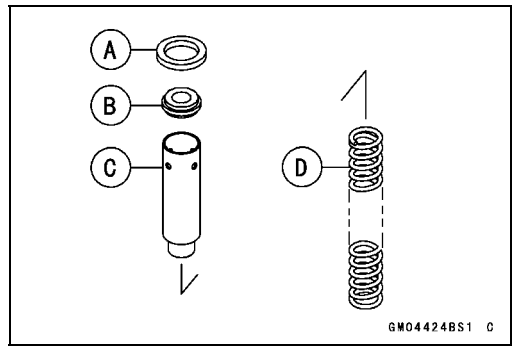
Special Tool - Fork Spring Stopper: 57001-1374



● Holding the spring preload adjuster [A] with a wrench [B], loosen the piston rod nut [C].
● Remove:
Top Plug with Rebound Damping Adjuster Rod

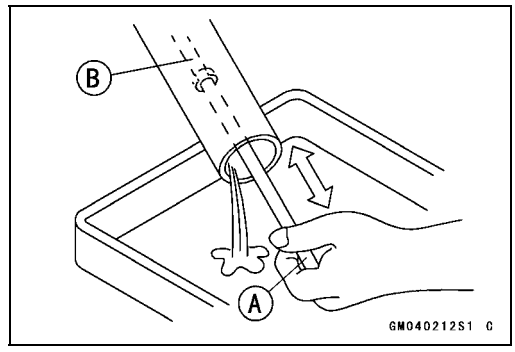


● Remove the front fork from the fork spring compressor.
● Remove:
Damper [A]
Slider [B]
Collar [C]
Fork Spring [D]



● Drain the fork oil into a suitable container.
○Using the piston rod puller [A], pump the piston rod [B] up and down at least ten times to expel the oil from the fork.

Special Tool - Fork Piston Rod Puller, M10 × 1.0: 57001 -1298



Front Fork

● Hold the fork tube upright, press the outer tube [A] and the piston rod all the way down.
● Pour in the type and amount of fork oil specified.

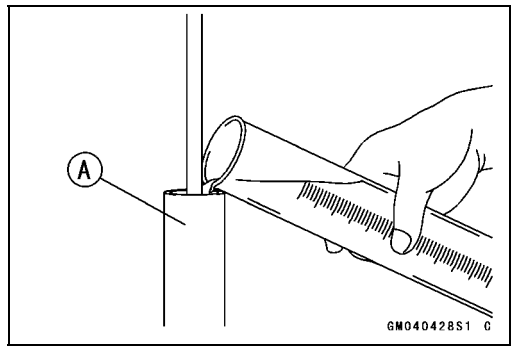
Suspension Oil - SS-47 (1 L): 44091-0010

Amount (Per Side):

When changing oil: Approx. 415 mL (14.0 US oz.)

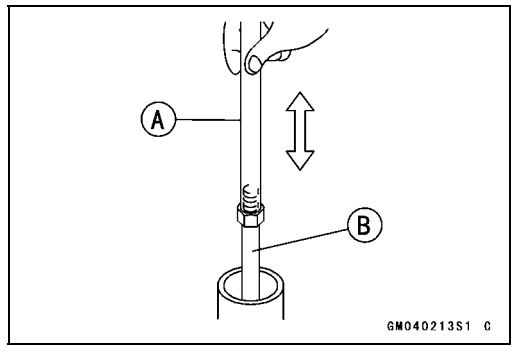
After disassembly and completely dry:

487 ±2.5 mL (16.5 ±0.085 US oz.)



★If necessary, measure the oil level as follows.
○Hold the inner tube vertically in a vise.
○Using the piston rod puller [A], move the piston rod [B] up and down more than ten times in order to expel all the air from the fork oil.

Special Tool - Fork Piston Rod Puller, M10 × 1.0: 57001 -1298



○Remove the piston rod puller.
○Wait until the oil level settles.
○With the fork fully compressed and the piston rod fully pushed in, insert a tape measure or rod into the inner tube, and measure the distance from the top of the outer tube to the oil.

Oil Level (fully compressed, without spring)

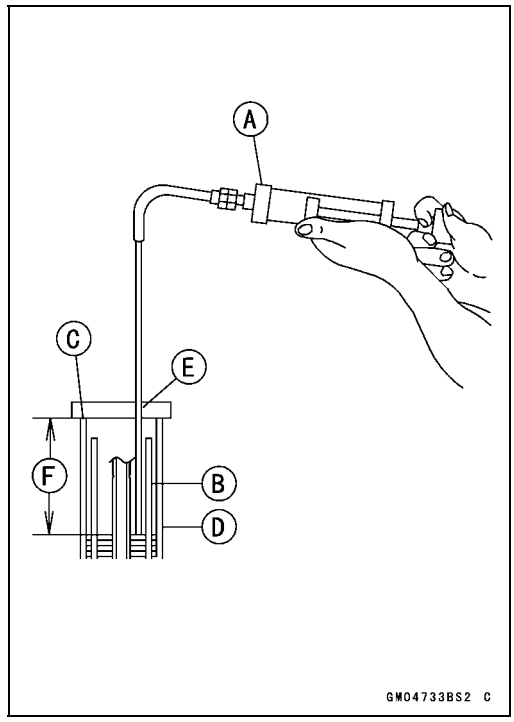
Standard:

96 ±2 mm (3.8 ±0.08 in.) (from the top of the outer tube)

NOTE

○*Fork oil lever may also be measured using the fork oil level gauge.*

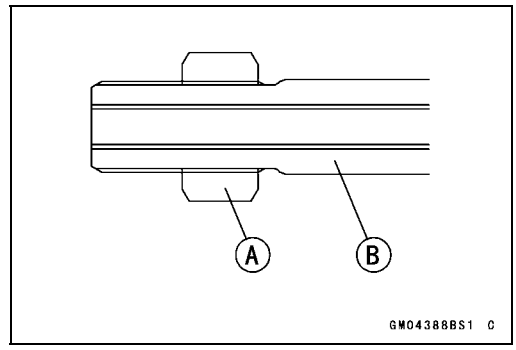
Special Tool - Fork Oil Level Gauge [A]: 57001-1290



○With the fork fully compressed and without fork spring, insert the gauge tube into the inner tube [B] and position the stopper across the top end [C] of the outer tube [D].
○Set the gauge stopper [E] so that its lower side shows the oil level distance specified [F].
○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.

Front Fork

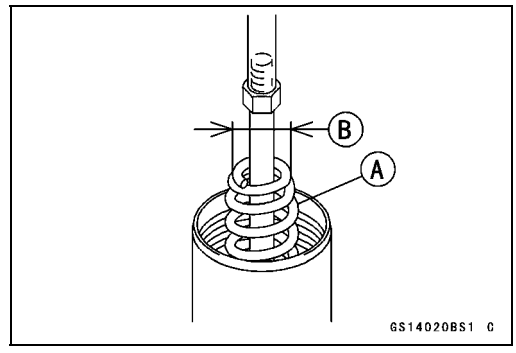
● Screw on the piston rod nut [A] fully to the piston rod [B].



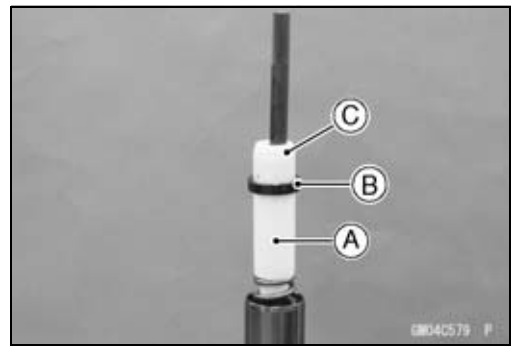
● Screw the fork piston rod puller onto the end of the piston rod.

Special Tool - Fork Piston Rod Puller, M10 × 1.0: 57001 -1298

● Pull the puller up above the outer tube top.
● Install the fork spring [A] with the smaller end [B] facing upward.



● Install:
Collar [A]
Damper [B]
Slider [C]

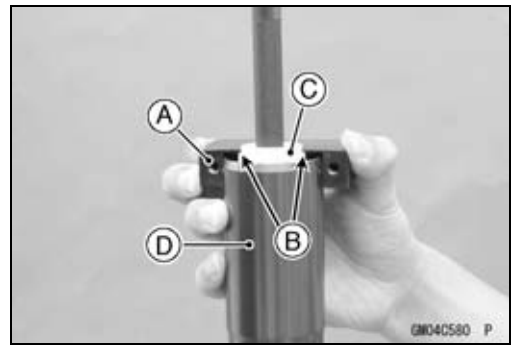


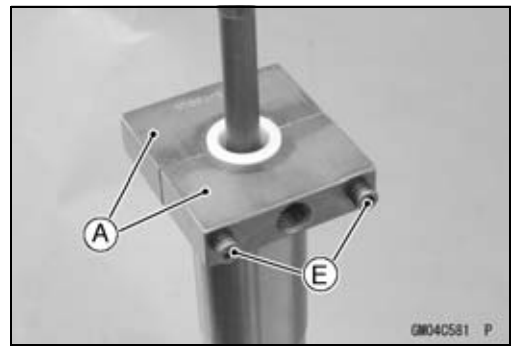
● Install the clamps [A] as shown.

Special Tool - Clamp: 57001-1693

NOTE

○*Set the cutout [B] of the clamp to the slider [C], pull up the outer tube [D] to hold it by the clamps, and then tighten the two bolts [E]. The outer tube is used as a guide.*

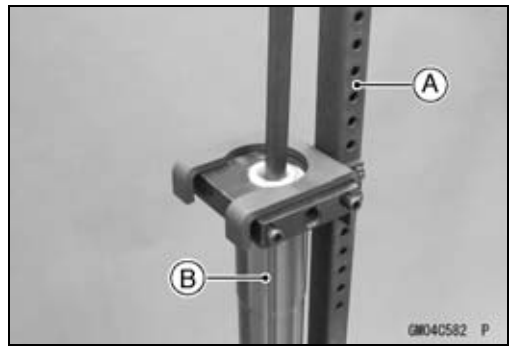




Front Fork

- Set the fork spring compressor [A], front fork [B], protector and suitable jack.
- Lift up the suitable jack until the piston rod nut comes out.

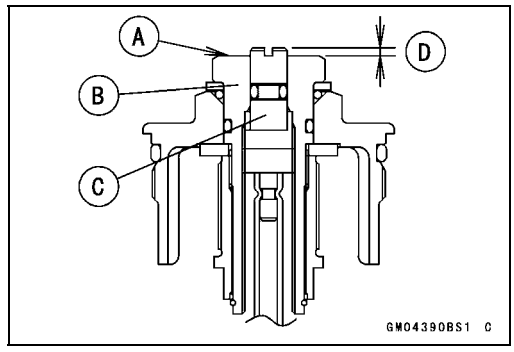
Special Tool - Fork Spring Compressor: 57001-1771



- Hold up the fork piston rod puller.
- Insert the fork spring stopper between the piston rod nut and the holder while holding up the fork piston rod puller.

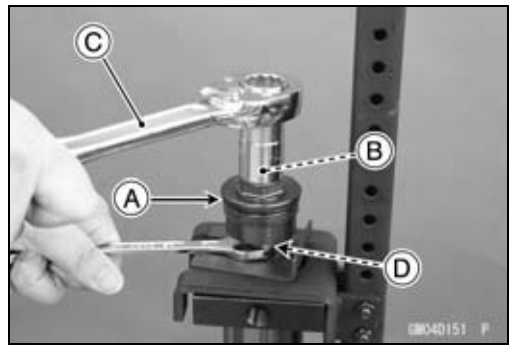
Special Tool - Fork Spring Stopper: 57001-1374

- Remove the fork piston rod puller.
- Check the distance between the upper end [A] of the spring preload adjuster [B] and rebound damping adjuster [C] with a pair of vernier caliper.
  1.5 mm (0.059 in.) [D]



- Insert the rebound damping adjuster rod into the hole of the piston rod.
- Screw in the top plug until it stops onto the piston rod.
- Replace the O-ring [A] on the top plug with a new one.
- Holding the spring preload adjuster [B] with a wrench [C], tighten the piston rod nut [D] against the top plug.

Torque - Piston Rod Nuts: 20 N·m (2.0 kgf·m, 15 ft·lb)



- Remove the fork spring stopper.
- Remove the front fork from the fork spring compressor.
- Raise the outer tube and screw the top plug into it.
- Install the front fork (see Front Fork Installation).
- Adjust the spring preload (see Spring Preload Adjustment).
- Adjust the rebound damping force (see Rebound Damping Force Adjustment).

Front Fork

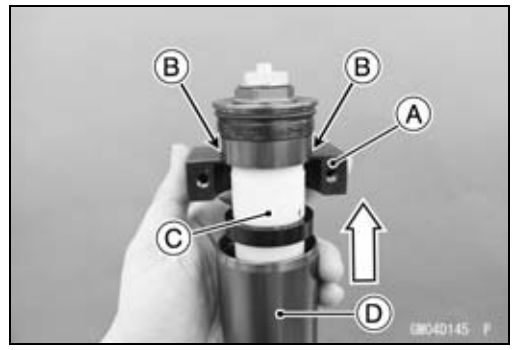
If using the fork spring compressor (57001-1587).

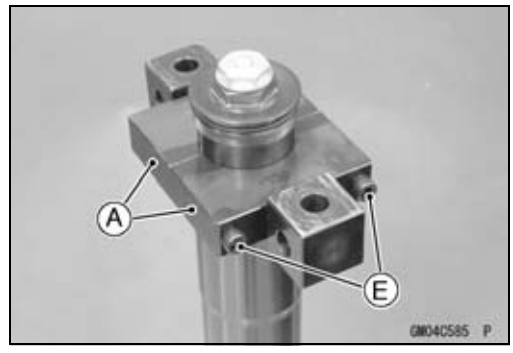
● Install the clamps [A] as shown.

NOTE

○*Set the cutout [B] of the clamp to the slider [C], pull up the outer tube [D] to hold it by the clamps, and then tighten the two bolts [E]. The outer tube is used as a guide.*

Special Tools - Fork Spring Compressor: 57001-1587
Clamp : 57001-1693

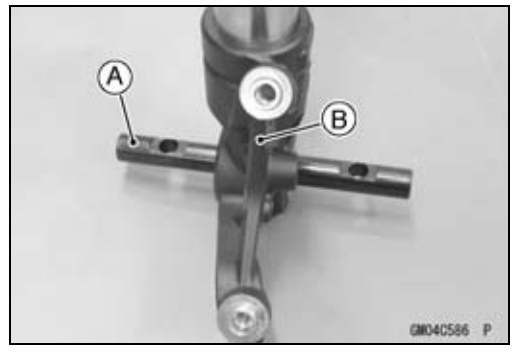




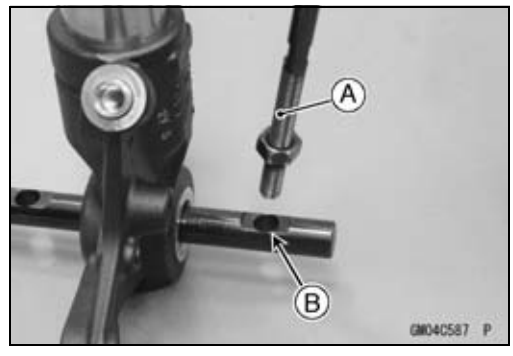
● Insert the holder bar [A] into the axle hole of the front fork [B].

Special Tool - Bar: 57001-1751 (For Left Fork Leg)

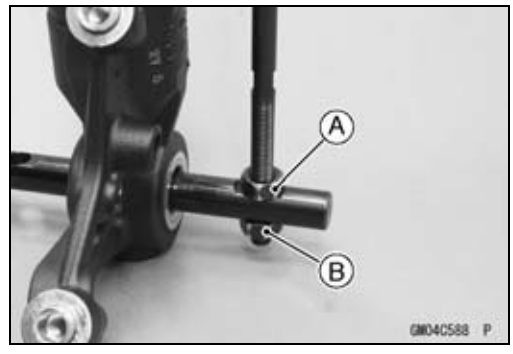
○Position the bar left and right and evenly.



● Insert the compression shaft and install the nut.
● Insert the lower end of the compression shaft [A] into the hole [B] of the holder bar.

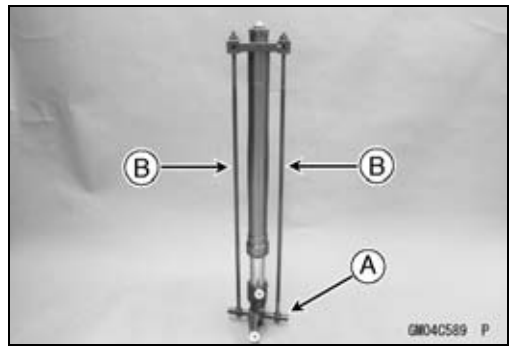


● Screw the adjust nut [A] onto the compression shaft as shown.
● Screw the locknut [B].
● Set the other side compression shaft same process.

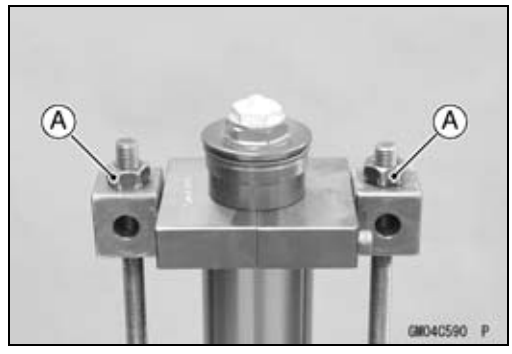


Front Fork

● Set the holder bar [A] and compression shafts [B].

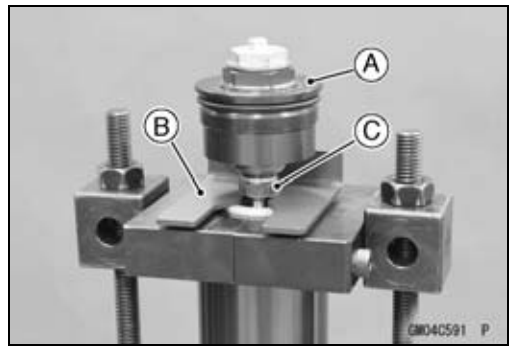


● Screw in the nuts [A] until the piston rod nut comes out.

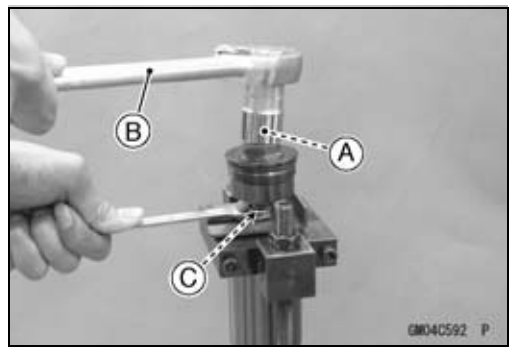


● While holding up the top plug [A], insert the fork spring stopper [B] between the piston rod nut [C] and the slider.

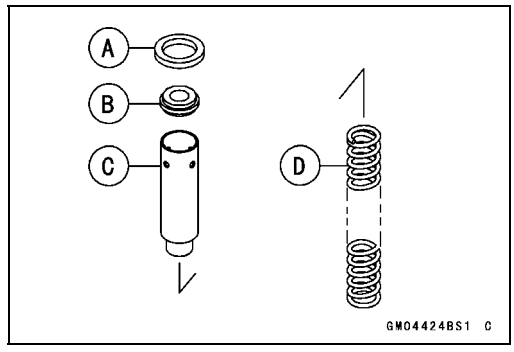
Special Tool - Fork Spring Stopper: 57001-1374



● Holding the spring preload adjuster [A] with a wrench [B], loosen the piston rod nut [C].



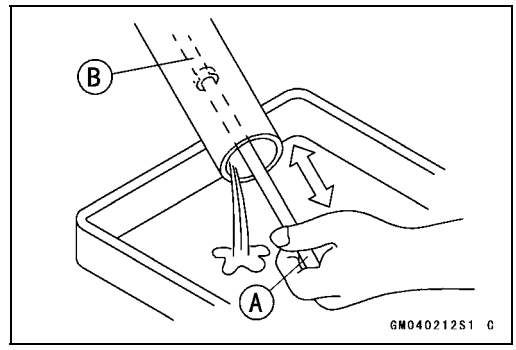
● Remove:
Top Plug with Rebound Damping Adjuster Rod
Damper [A]
Slider [B]
Collar [C]
Fork Spring [D]



Front Fork

● Drain the fork oil into a suitable container.
○Using the piston rod puller [A], pump the piston rod [B] up and down at least ten times to expel the oil from the fork.

Special Tool - Fork Piston Rod Puller, M10 × 1.0: 57001 -1298



● Hold the fork tube upright, press the outer tube [A] and the piston rod all the way down.
● Pour in the type and amount of fork oil specified.

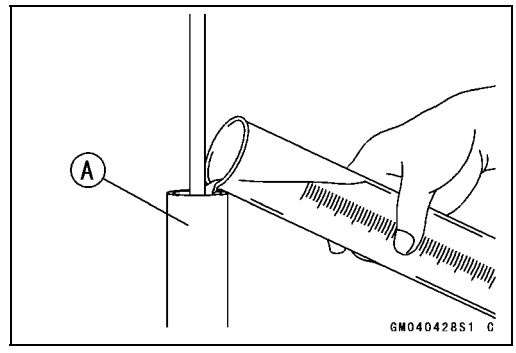
Suspension Oil - SS-47 (1 L): 44091-0010

Amount (Per Side):

When changing oil: Approx. 415 mL (14.0 US oz.)

After disassembly and completely dry:

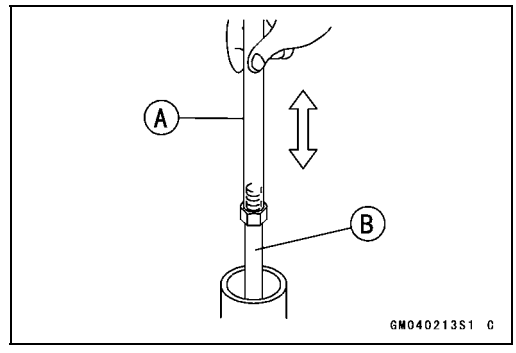
487 ±2.5 mL (16.5 ±0.085 US oz.)



★If necessary, measure the oil level as follows.
○Hold the inner tube vertically in a vise.
○Using the piston rod puller [A], move the piston rod [B] up and down more than ten times in order to expel all the air from the fork oil.

Special Tool - Fork Piston Rod Puller, M10 × 1.0 [A]: 57001 -1298

○Remove the piston rod puller.
○Wait until the oil level settles.
○With the fork fully compressed and the piston rod fully pushed in, insert a tape measure or rod into the inner tube, and measure the distance from the top of the outer tube to the oil.



Front Fork

Oil Level (fully compressed, without spring)
Standard:

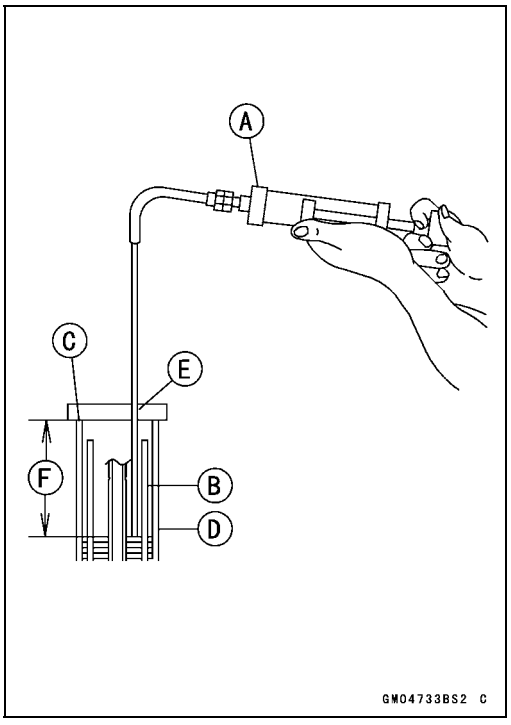
96 ±2 mm (3.8 ±0.08 in.) (from the top of the outer tube)

NOTE

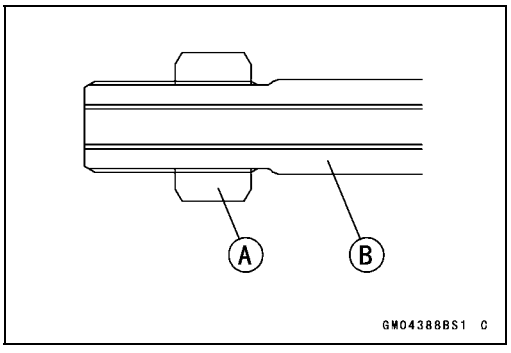
○*Fork oil level may also be measured using the fork oil level gauge.*

Special Tool - Fork Oil Level Gauge [A]: 57001-1290

○With the fork fully compressed and without fork spring, insert the gauge tube into the inner tube [B] and position the stopper across the top end [C] of the outer tube [D].
○Set the gauge stopper [E] so that its lower side shows the oil level distance specified [F].
○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.



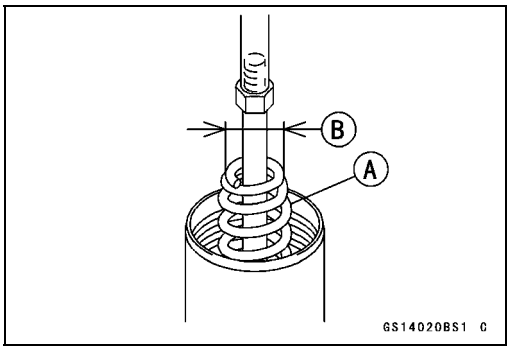
● Screw on the piston rod nut [A] fully to the piston rod [B].



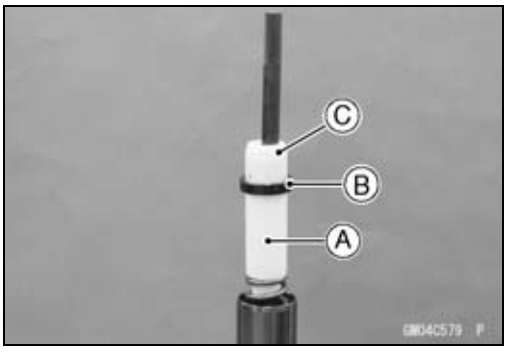
● Screw the fork piston rod puller onto the end of the piston rod.

Special Tool - Fork Piston Rod Puller, M10 × 1.0: 57001 -1298

● Pull the puller up above the outer tube top.
● Install the fork spring [A] with the smaller end [B] facing upward.



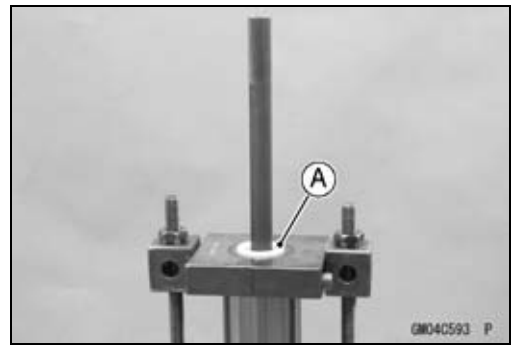
● Install:
Collar [A]
Damper [B]
Slider [C]



Front Fork

- Set the fork spring compressor on the slider [A] using the outer tube as a guide.

Special Tools - Fork Spring Compressor: 57001-1587
Clamp: 57001-1693



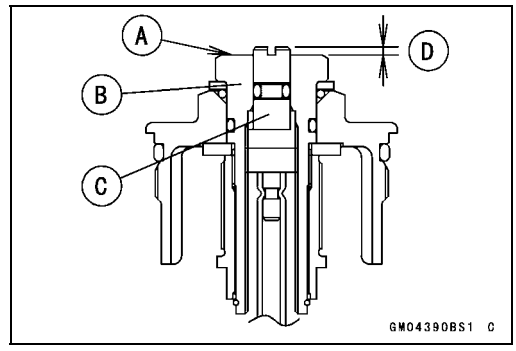
NOTE

○*Set the cutout of the clamp to the slider.*

- While holding up the piston rod puller, insert the fork spring stopper between the piston rod nut and the slider.

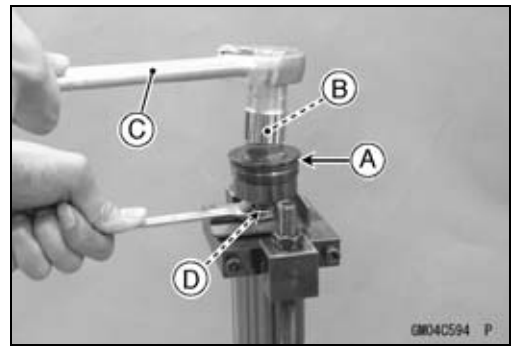
Special Tool - Fork Spring Stopper: 57001-1374

- Remove the piston rod puller.
- Check the distance between the upper end [A] of the spring preload adjuster [B] and rebound damping adjuster [C] with a pair of vernier caliper.
  1.5 mm (0.059 in.) [D]

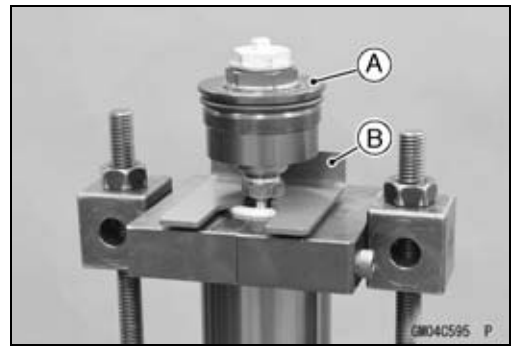


- Insert the rebound damping adjuster rod into the hole of the piston rod.
- Screw in the top plug until it stops onto the piston rod.
- Replace the O-ring [A] on the top plug with a new one.
- Holding the spring preload adjuster [B] with a wrench [C], tighten the piston rod nut [D] against the top plug.

Torque - Piston Rod Nuts: 20 N·m (2.0 kgf·m, 15 ft·lb)

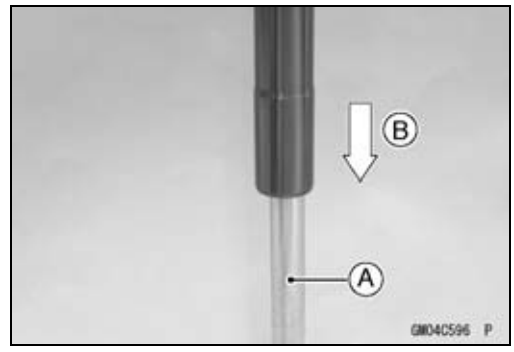


- While holding up the top plug [A], pull out the fork spring stopper [B].
- Remove the fork spring compressor.
- Raise the outer tube and screw the top plug into it.
- Install the front fork (see Front Fork Installation).
- Adjust the spring preload (see Spring Preload Adjustment).
- Adjust the rebound damping force (see Rebound Damping Force Adjustment).



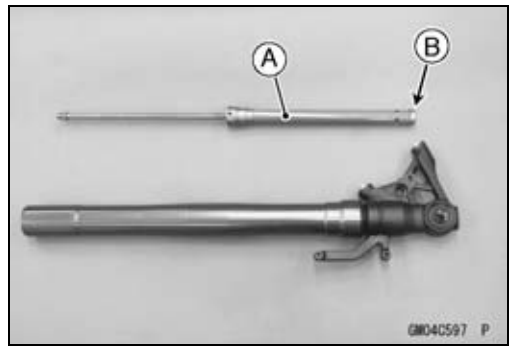
Front Fork Disassembly

- Remove the front fork (see Front Fork Removal).
- Drain the fork oil (see Fork Oil Change).
- Install the suitable pipe (ϕ26 ~ ϕ32) [A] into the cylinder unit.
- Set the fork leg inverted.
- While pushing down [B] the fork leg, loosen the bottom Allen bolt.
- Remove the Allen bolt and gasket.

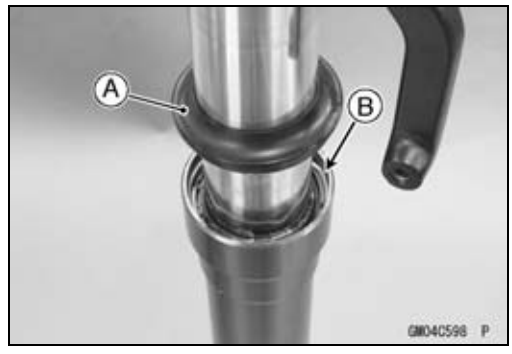


Front Fork

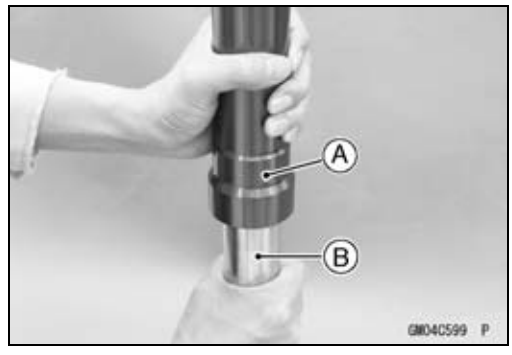
● Take the cylinder unit [A] and center ring plate [B] out of the inner tube.
○Do not disassemble the cylinder unit.



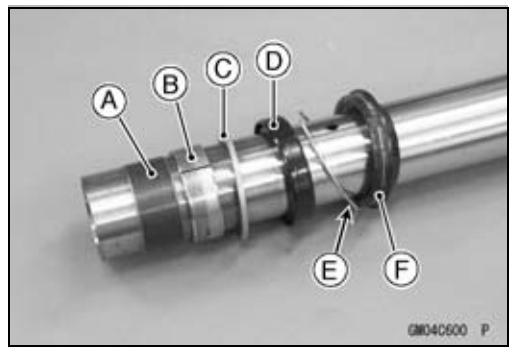
● Separate the inner tube from the outer tube as follows.
○Slide up the dust seal [A].
○Remove the retaining ring [B] from the outer tube.



○Holding the outer tube [A] by hand, pull the inner tube [B] several times to pull out the outer tube.

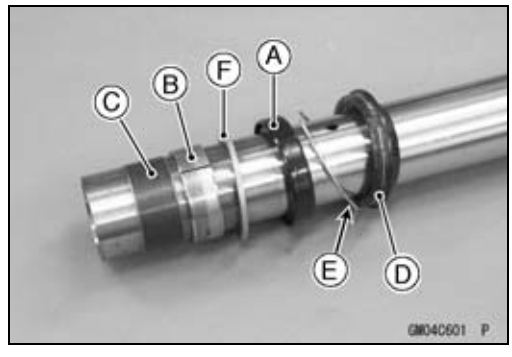


● Remove the following parts from the inner tube.
Inner Tube Guide Busing [A]
Outer Tube Guide Busing [B]
Washer [C]
Oil Seal [D]
Retaining Ring [E]
Dust Seal [F]



Front Fork Assembly

● Replace the following parts with new ones.
Oil Seal [A]
Outer Tube Guide Bushing [B]
Inner Tube Guide Bushing [C]
Dust Seal [D]
Retaining Ring [E]
Bottom Allen Bolt Gasket
● Install the following parts onto the inner tube.
Dust Seal
Retaining Ring
Oil Seal
Washer [F]
Outer Tube Guide Bushing
Inner Tube Guide Bushing



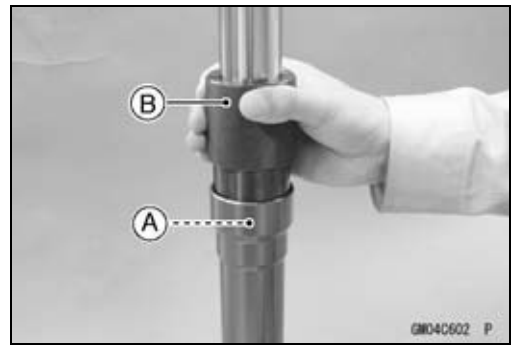
Front Fork

● Insert the inner tube to the outer tube.
● Fit the new outer tube guide bushing [A] into the outer tube.

NOTE

○*When assembling the new outer tube guide bushing, hold the washer against the new outer tube guide bushing and tap the washer with the fork oil seal driver [B] until it stops.*

Special Tools - Fork Oil Seal Driver, ϕ41: 57001-1288
or Fork Oil Seal Driver Weight, ϕ26 ~ ϕ46: 57001-1795
Fork Oil Seal Driver Attachment, ϕ36 ~ ϕ46: 57001-1798

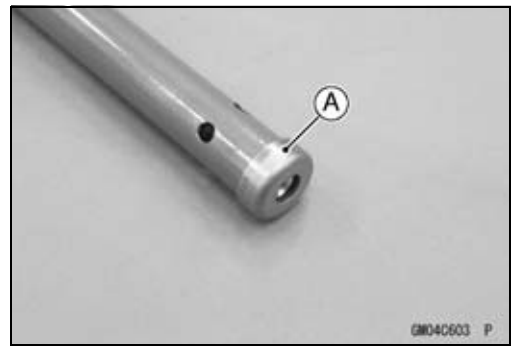


● Install the oil seal by using the fork oil seal driver.

Special Tools - Fork Oil Seal Driver, ϕ41: 57001-1288
or Fork Oil Seal Driver Weight, ϕ26 ~ ϕ46: 57001-1795
Fork Oil Seal Driver Attachment, ϕ36 ~ ϕ46: 57001-1798

● Install the retaining ring and dust seal into the outer tube.

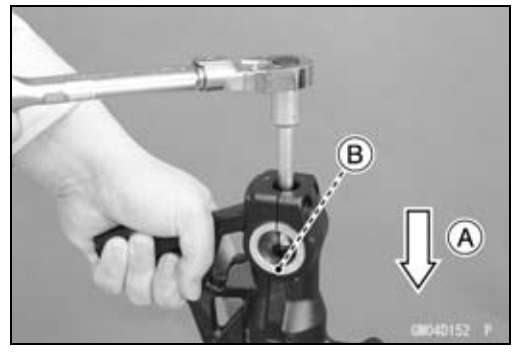
● Install the center ring plate [A] on the cylinder unit.
● Insert the center ring plate and cylinder unit as a set into the inner tube.



● Insert the suitable pipe into the cylinder unit.
● While pushing down [A] the fork leg, tighten the front fork bottom Allen bolt [B].
● Tighten:

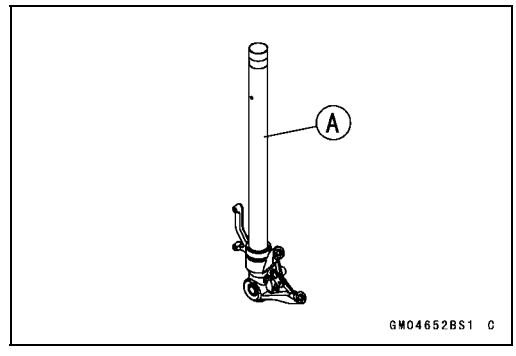
Torque - Right Front Fork Bottom Allen Bolt: 35 N·m (3.6 kgf·m, 26 ft·lb)
Left Front Fork Bottom Allen Bolt: 20 N·m (2.0 kgf·m, 15 ft·lb)

● Pour in the specified type of oil (see Fork Oil Change).



Inner Tube, Outer Tube Inspection

● Visually inspect the inner tube [A].
★If there is any damage, replace the inner tube. Since damage to the inner tube damages the oil seal and dust seal, replace the oil seal and dust seal whenever the inner tube is replaced.

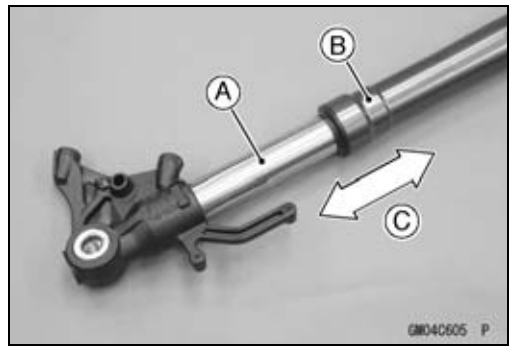


NOTICE
If the inner tube is badly bent or creased, replace it. Excessive bending, followed by subsequent straightening, can weaken the inner tube.

Front Fork

● Temporarily assemble the inner tube [A] and outer tube [B], and pump [C] them back and forth manually to check for smooth operation.

★If you feel binding or catching, the inner and outer tubes must be replaced.



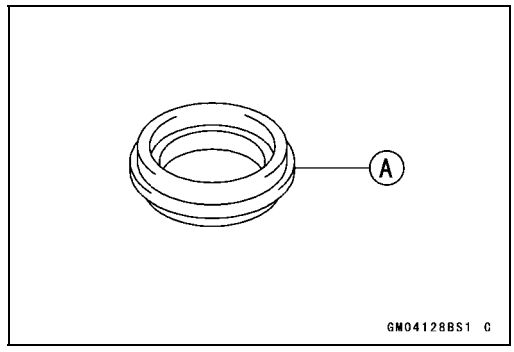
⚠ WARNING

A straightened inner or outer fork tube may fall in use, possibly causing an accident resulting in serious injury or death. Replace a badly bent or damaged inner or outer tube and inspect the other tube carefully before reusing it.

Dust Seal Inspection

● Inspect the dust seal [A] for any signs of deterioration or damage.

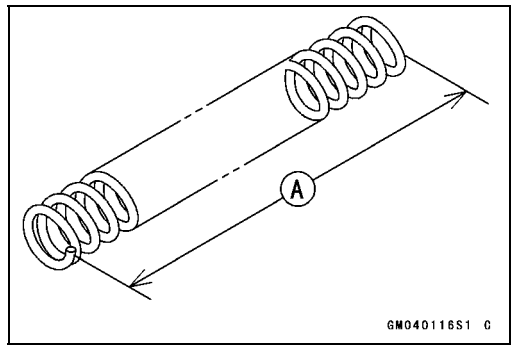
★Replace it if necessary.



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.



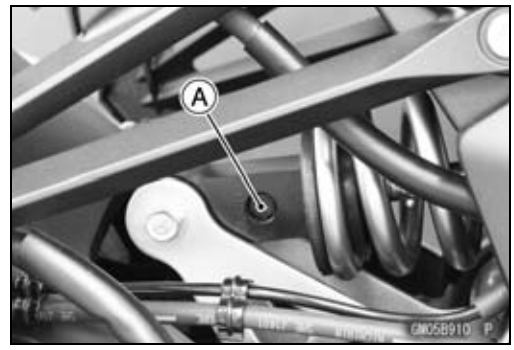
Spring Free Length

Standard:	**313 mm (12.3 in.)**
Service Limit:	**307 mm (12.1 in.)**

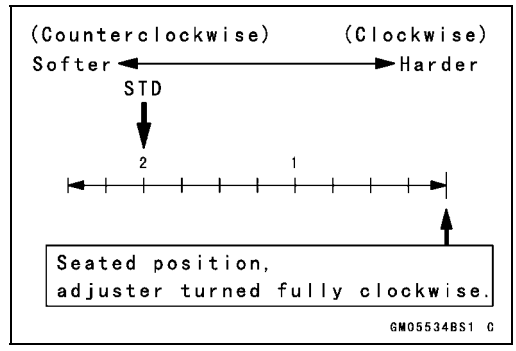
Rear Shock Absorber

Rebound Damping Force Adjustment

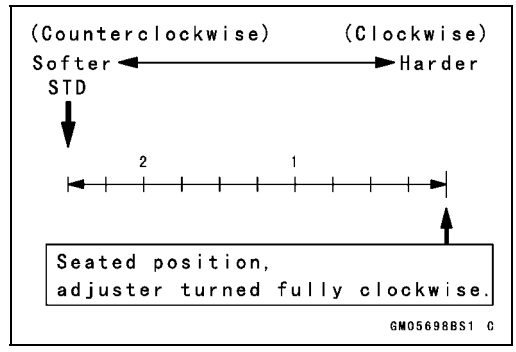
● To adjust the rebound damping force, turn the rebound damping adjuster [A] to the desired position.



○The standard adjuster setting is the **2 1/2 turns out** from the fully clockwise position (Other than BR model of the ZX1000WJ Early Model).



○The standard adjuster setting is the **2 turns out** from the fully clockwise position (BR Model of the ZX1000WJ Early Model).



Rebound Damping Force Adjustment

Adjuster Position	Damping Force	Setting	Load	Road	Speed
2 1/2 turns out	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
0	Strong	Hard	Heavy	Bad	High

Rear Shock Absorber

Spring Preload Adjustment



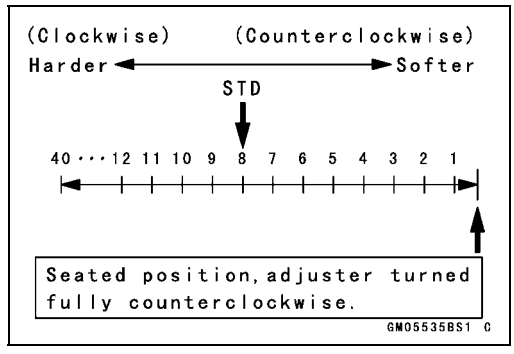
- To adjust the spring preload, turn in the adjuster [A] until you feel a click to the desired position.

○The standard adjuster setting is the **8 clicks** from the fully counterclockwise position.

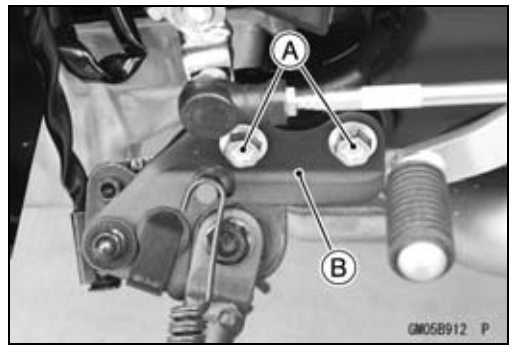
★If the spring action feels too soft, adjust it.

Spring Preload Adjustment

Adjuster Position	Damping Force	Setting	Load	Road	Speed
0 clicks	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
40 clicks	Strong	Hard	Heavy	Bad	High



Rear Shock Absorber Removal



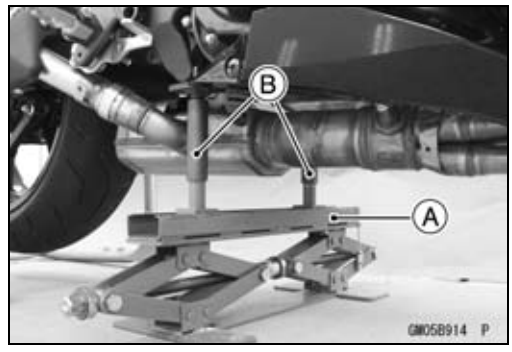
- Support the motorcycle with the stand.
- Remove:
  Side Stand Bracket Bolts [A]
  Side Stand Bracket [B] with Side Stand

- Squeeze the brake lever slowly and hold it with a band [A].



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

Special Tools - Jack [A]: 57001-1238
Jack Attachment [B]: 57001-1608

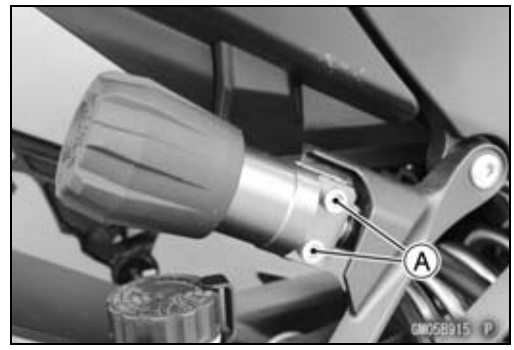


⚠ WARNING

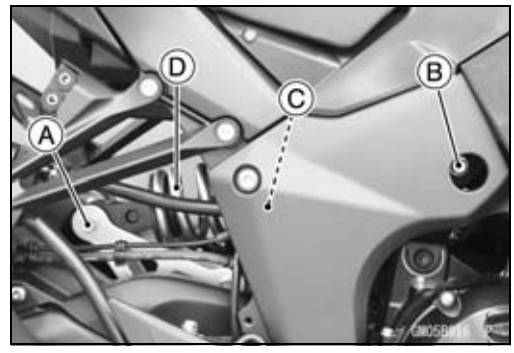
When raising the rear wheel off the ground with the jack and removing part(s) from the motorcycle, be sure to hold the front brake, or the motorcycle may fall over. It could cause an accident and injury.

Rear Shock Absorber

● Remove:
Spring Preload Adjuster Bolts [A]
Bracket



● Remove:
Lower Rear Shock Absorber Nut and Bolt [A]
Upper Rear Shock Absorber Bolt [B]
● Clear the spring preload adjustor hose from the guide [C].
● Remove the rear shock absorber [D] rearward.

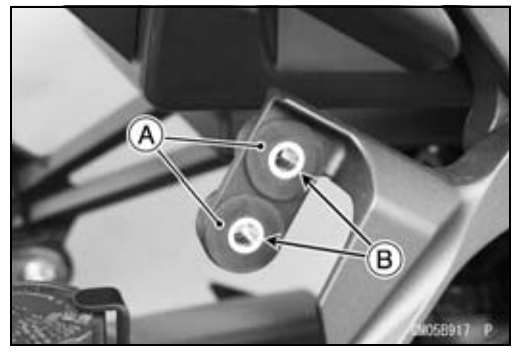


Rear Shock Absorber Installation

● Replace the rear shock absorber nuts with new ones.
● Tighten:

Torque - Upper Rear Shock Absorber Bolt: 35 N·m (3.6 kgf·m, 26 ft·lb)
Lower Rear Shock Absorber Nut: 35 N·m (3.6 kgf·m, 26 ft·lb)

● Run the spring preload adjuster hose correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
● Be sure to install the dampers [A] and collars [B] on the right rear footpeg bracket.
○When installing the dampers, face the small diameter side outward.
● Install the bracket.
● Tighten the spring preload adjuster bolts.
● Install the removed parts (see appropriate chapters).



Rear Shock Absorber Inspection

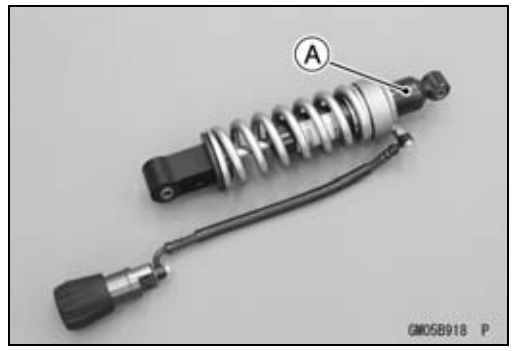
● Remove the rear shock absorber (see Rear Shock Absorber Removal).
● Visually inspect the following items.
Oil Leakage
Crack or Dent
★If there is any damage to the rear shock absorber, replace it.
● Visually inspect the rubber bushing.
★If it show any signs of damage, replace it.

Rear Shock Absorber

Rear Shock Absorber Scrapping

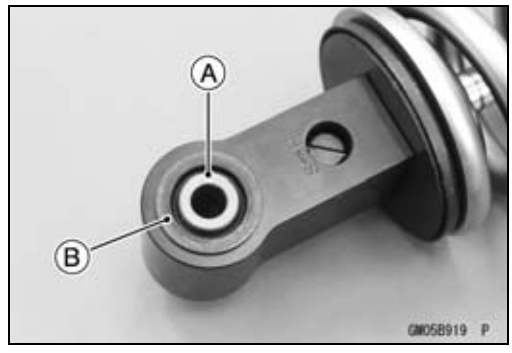
⚠ WARNING

Since the rear shock absorber contains nitrogen gas, do not incinerate the rear shock absorber without first releasing the gas or it may explode. Before a rear shock absorber is scrapped, drill a hole at the point [A] shown to release the nitrogen gas completely. Wear safety glasses when drilling the hole, as the gas may blow out bits of drilled metal when the hole opens.



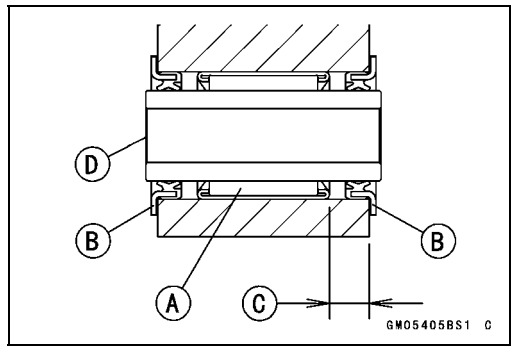
Rear Shock Absorber Bearing Removal

- Remove:
  Rear Shock Absorber (see Rear Shock Absorber Removal)
  Sleeve [A]
  Grease Seals [B]
- Remove the needle bearing, using a suitable tool.



Rear Shock Absorber Bearing Installation

- Replace the needle bearing [A] and grease seals [B] with new ones.
- Install the needle bearing position as shown.
  7.5 mm (0.30 in.) [C]
- Apply plenty of grease to the lips of the grease seals.
- Install the grease seals and sleeve [D].

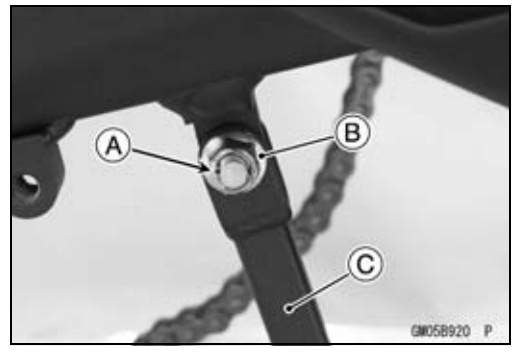


Swingarm

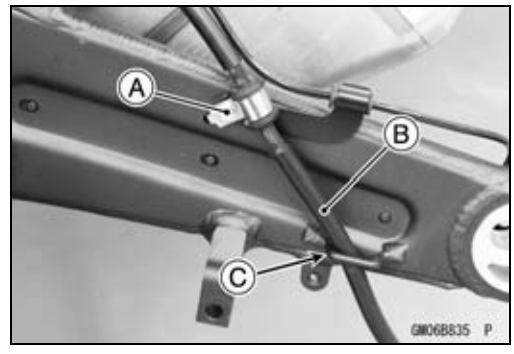
Swingarm Removal

- Remove:
  Rear Brake Hose Lower End (see Rear Caliper Removal in the Brakes chapter)
  Rear Wheel (see Rear Wheel Removal in the Wheels/Tires chapter)
  Mud Guard (see Mad Guard Removal in the Frame chapter)
  Chain Cover (see Drive Chain Replacement in the Final Drive chapter)
  Rocker Arm (see Rocker Arm Removal)

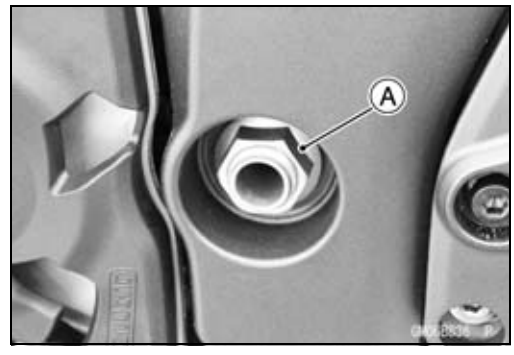
- Remove:
  Cotter Pin [A]
  Torque Link Bolt and Nut [B]
  Torque Link [C]



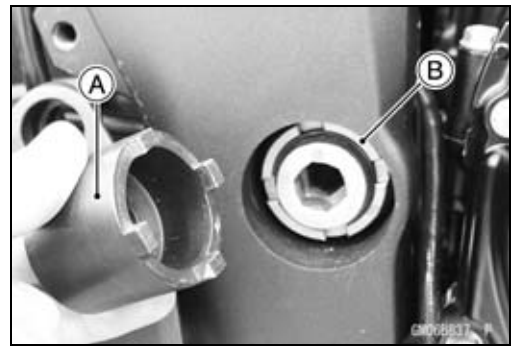
- Remove:
  Brake Hose Clamp Bolt [A]
- Clear the brake hose [B] from the guide [C] on the swingarm.



- Remove the swingarm pivot shaft nut [A].

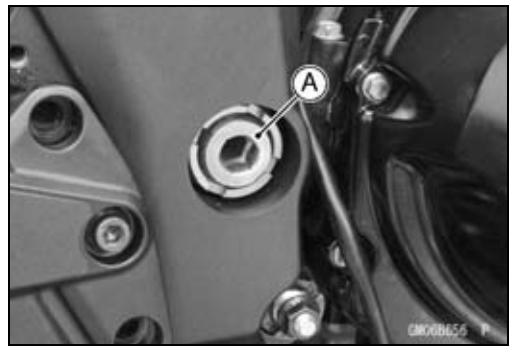


- Using the swingarm pivot nut wrench [A], loosen the swingarm pivot adjusting collar locknut [B].
  Special Tool - Swingarm Pivot Nut Wrench: 57001-1597



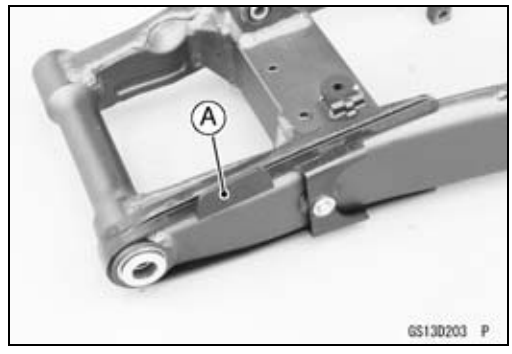
Swingarm

● Turn the swingarm pivot shaft [A] counterclockwise to free the adjusting collar from the swingarm.
○Make the gap between the adjusting collar and swingarm.
● Pull out the pivot shaft to the right side and remove the swingarm.

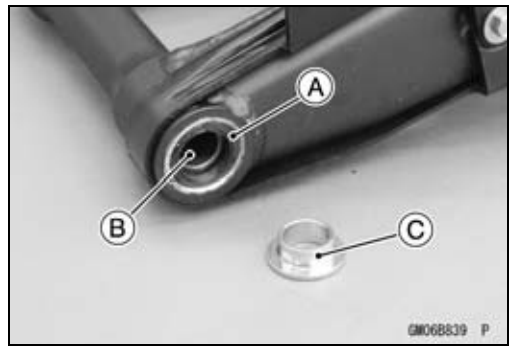


Swingarm Installation

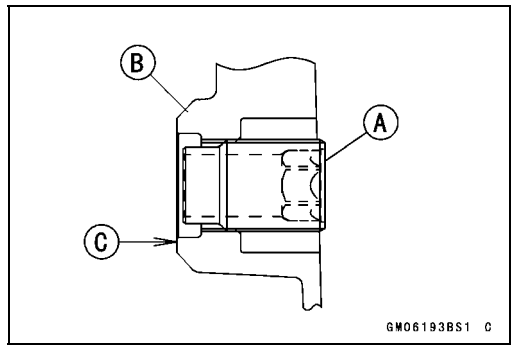
● Visually inspect the chain guide [A].
★Replace the chain guide if it shows any signs of abnormal wear or damage.



● Apply grease to the lips of the grease seals [A].
● Be sure to install the grease seals and sleeve [B] to the swingarm.
● Fit the collar [C] on the grease 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].

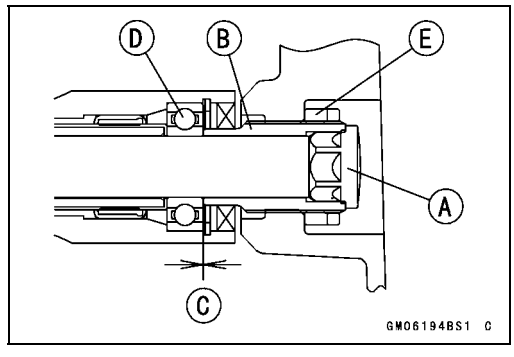


● Install the swingarm and insert the swingarm pivot shaft [A] into the adjusting collar [B] from the right side, and tighten the pivot shaft.

NOTE

○*Tighten the swingarm pivot shaft until the clearance [C] between the ball bearing [D] and collar comes 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: 100 N·m (10.2 kgf·m, 73.8 ft·lb)

Swingarm

● Tighten the swingarm pivot shaft nut.

Torque - Swingarm Pivot Shaft Nut: 110 N·m (11.2 kgf·m, 81.1 ft·lb)

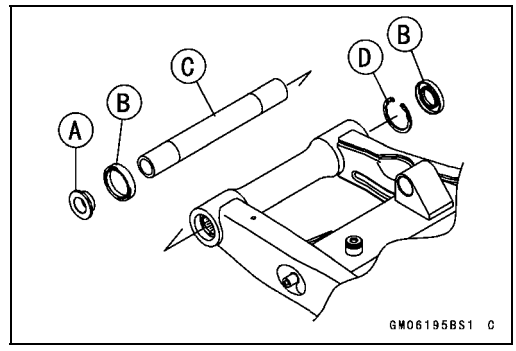
● Move the swingarm up and down to check for abnormal friction.

● Install the removed parts (see appropriate chapters).

Swingarm Bearing Removal

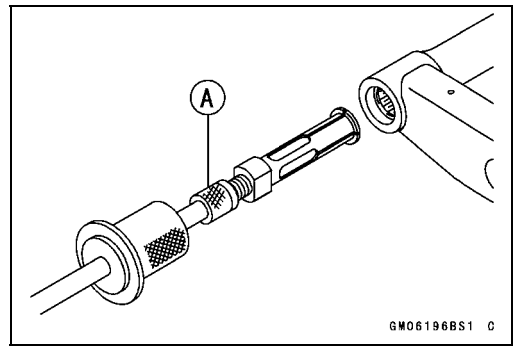
● Remove:
Swingarm (see Swingarm Removal)
Collar [A]
Grease Seals [B]
Sleeve [C]
Circlip (Right Side) [D]

Special Tool - Inside Circlip Pliers: 57001-143



● Remove the ball bearing and needle bearings.

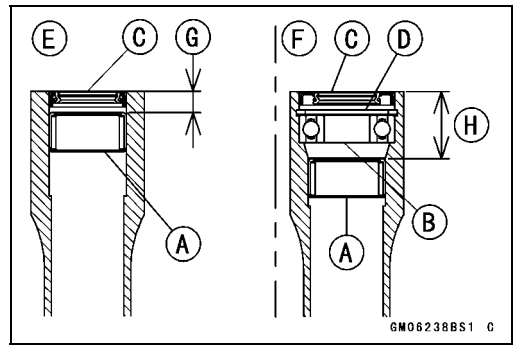
Special Tool - Oil Seal & Bearing Remover [A]: 57001-1058



Swingarm Bearing Installation

● Replace the needle bearings [A], ball bearing [B], grease seals [C] and circlip [D] with new ones.

● Install the needle bearings, ball bearing, grease seals and circlip as shown.
Left Side [E]
Right Side [F]
9.5 mm (0.37 in.) [G]
29.5 mm (1.16 in.) [H]



NOTE

○*Install the needle and ball bearings so that the marked side faces out.*

Special Tool - Needle Bearing Driver, ϕ28: 57001-1610

○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

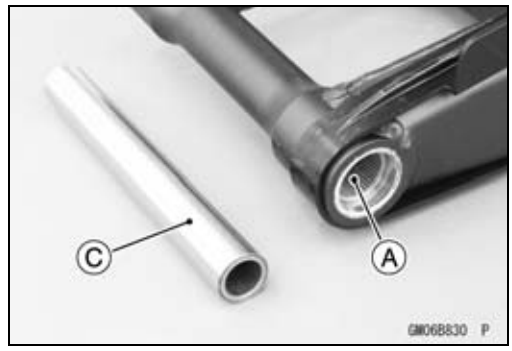
○Press in the grease seals so that seal surface is flushed with the end of housing.

Special Tool - Bearing Driver Set: 57001-1129

Swingarm

Swingarm Bearing, Sleeve Inspection

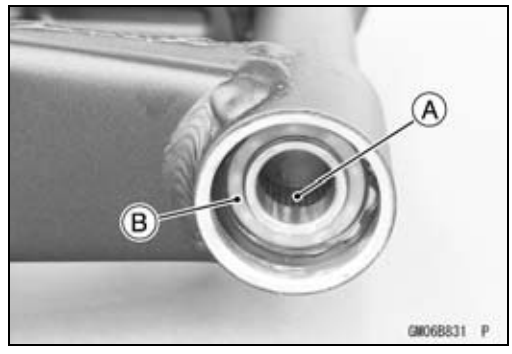
NOTICE
Do not remove the bearings for inspection. Removal may damage them.



- Inspect the needle bearings [A] and ball bearing [B] 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 [C] show any sings of abnormal wear, discoloration, or damage, replace them as a set.

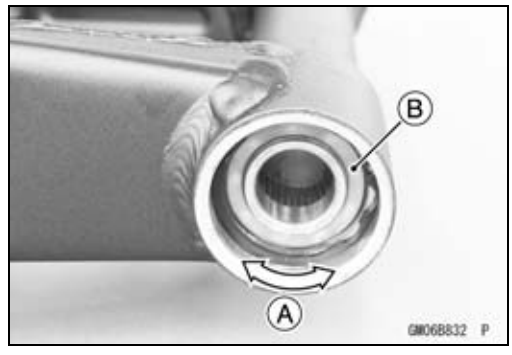


- Turn the bearing in the swingarm back and forth [A] while checking for plays, roughness, or binding.

★If bearing play, roughness, or binding is found, replace the bearing.

- Examine the bearing seal [B] for tears or leakage.

★If the seal is torn or is leaking, replace the bearing.



Swingarm Bearing Lubrication

NOTE

○*Since the bearings are packed with grease and sealed, lubrication is not required.*

Chain Guide Inspection

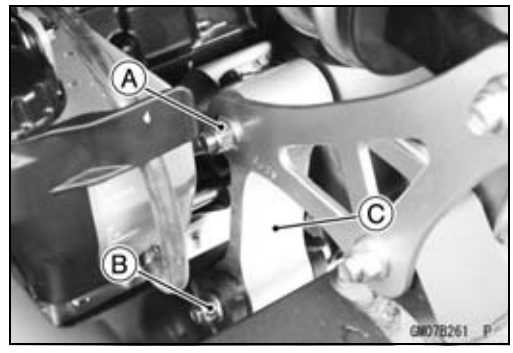
- Refer to the Chain Guide Wear Inspection in the Periodic Maintenance chapter.

Tie-Rod, Rocker Arm

Tie-Rod Removal



- Remove:
  Mud Guard (see Mud Guard Removal in the Frame chapter)
- Squeeze the brake lever slowly and hold it with a band [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

⚠ WARNING

When raising the rear wheel off the ground with the jack and removing part(s) from the motorcycle, be sure to hold the front brake, or the motorcycle may fall over. It could cause an accident and injury.

- Remove:
  Upper Tie-Rod Bolt and Nut [A]
  Lower Tie-Rod Bolt and Nut [B]
  Tie-Rod [C]

Tie-Rod Installation

- Apply grease to the inside of the grease seals.
- Install the tie-rod.
- Replace the tie-rod nuts with new ones.
- Tighten:

Torque - Tie-rod Nuts: 35 N·m (3.6 kgf·m, 26 ft·lb)

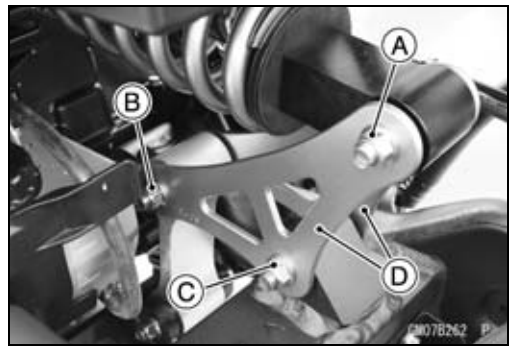
- Install the removed parts (see appropriate chapters).

Rocker Arm Removal



- Remove:
  Mud Guard (see Mud Guard Removal in the Frame chapter)
- Squeeze the brake lever slowly and hold it with a band [A].

Tie-Rod, Rocker Arm



- Raise the rear wheel off the ground with the jack (see Rear Shock Absorber Removal).

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

⚠ WARNING

When raising the rear wheel off the ground with the jack and removing part(s) from the motorcycle, be sure to hold the front brake, or the motorcycle may fall over. It could cause an accident and injury.

- Remove:
  Lower Rear Shock Absorber Bolt and Nut [A]
  Upper Tie-Rod Bolt and Nut [B]
  Rocker Arm Bolt and Nut [C]
  Rocker Arms [D]

Rocker Arm Installation

- Apply grease to the inside of the oil seals.
- Replace the following nuts with new ones.
  Rocker Arm Nut
  Upper Tie-Rod Nut
  Lower Rear Shock Absorber Nut
- Install the rocker arms so that the marked side faces left side.
- Tighten:

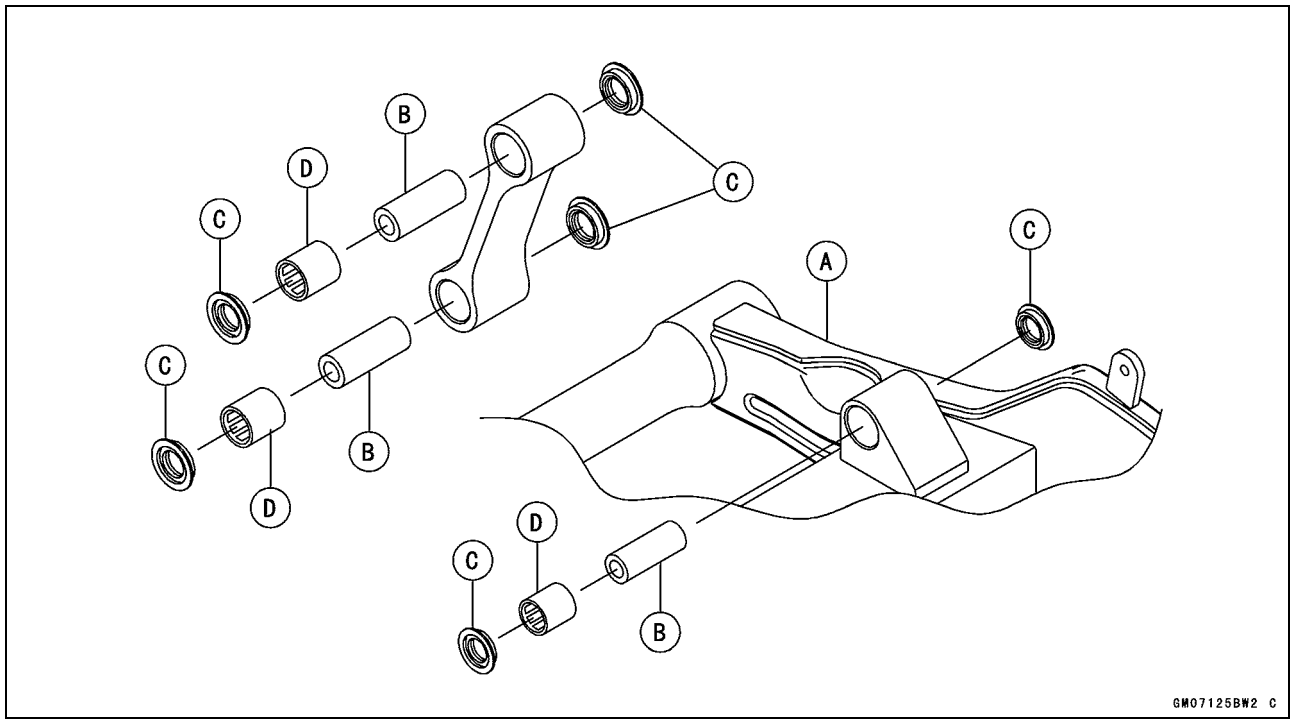
Torque - Rocker Arm Nut: 35 N·m (3.6 kgf·m, 26 ft·lb)
Tie-Rod Nut: 35 N·m (3.6 kgf·m, 26 ft·lb)
Lower Rear Shock Absorber Nut: 35 N·m (3.6 kgf·m, 26 ft·lb)

- Install the removed parts (see appropriate chapters).

Tie-Rod, Rocker Arm

Tie-Rod and Rocker Arm Bearing Removal

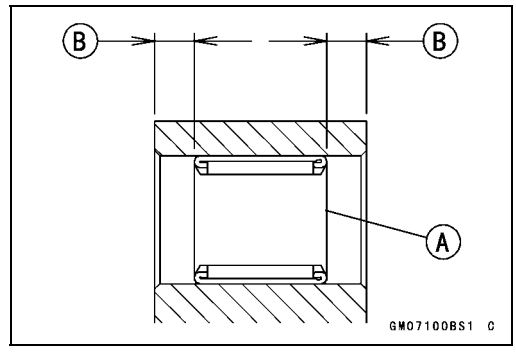
● Remove:
Tie-Rod (see Tie-Rod Removal)
Rocker Arms (see Rocker Arm Removal)
Swingarm [A] (see Swingarm Removal)
Sleeves [B]
Grease Seals [C]
● Remove the needle bearings [D], using a suitable tool.



GM07125BW2 C

Tie-Rod and Rocker Arm Bearing Installation

● Replace the needle bearing [A] and grease seals with new ones.
● Install the needle bearings position as shown.
○Screw the needle bearing driver into the driver holder.
○Insert the needle bearing driver into the needle bearing and press the needle bearing.
7.5 mm (0.30 in.) [B]



GM07100BS1 C

NOTE

○*For a bearing of inner diameter ϕ17, select the pressing side of the needle bearing driver according to its pressing depth.*

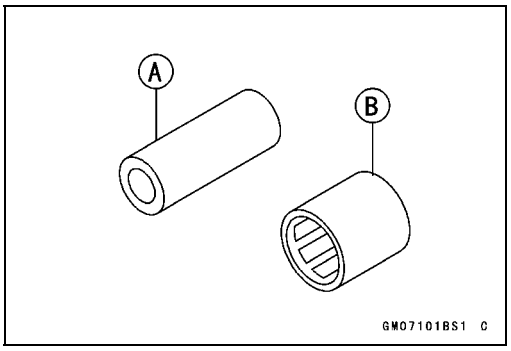
Special Tools - Bearing Driver Set: 57001-1129
Needle Bearing Driver, ϕ17/ϕ18: 57001-1609

● Apply plenty of grease to the lips of the grease seals.
● Install the grease seals.

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

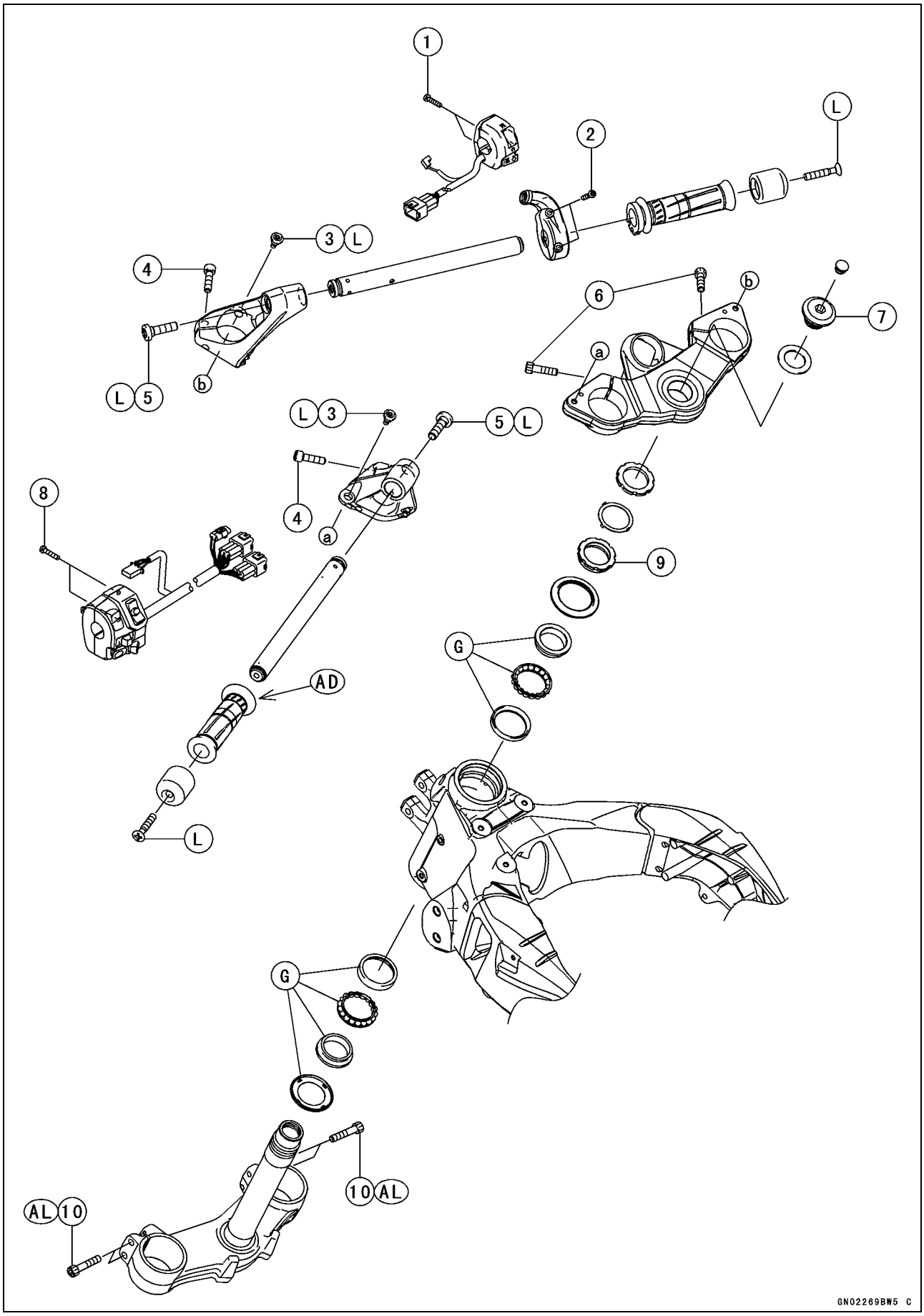
○*Since the bearings are packed with grease, lubrication is not required.*

Steering

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Exploded View



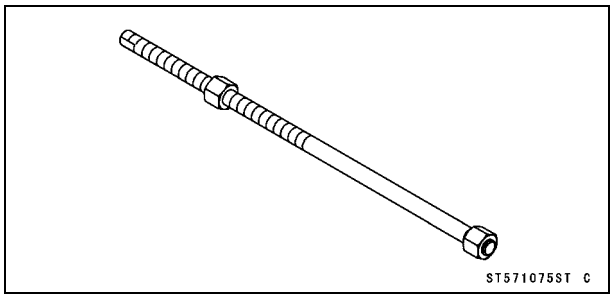
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Right Switch Housing Screws	3.5	0.36	31 in·lb	
2	Throttle Case Bolts	3.5	0.36	31 in·lb	
3	Handlebar Holder Positioning Bolts	10	1.0	89 in·lb	L
4	Handlebar Holder Clamp Bolts	25	2.5	18	
5	Handlebar Bolts	35	3.6	26	L
6	Upper Front Fork Clamp Bolts	20	2.0	15	
7	Steering Stem Head Bolt	110	11.2	81.1	
8	Left Switch Housing Screws	3.5	0.36	31 in·lb	
9	Steering Stem Nut	30	3.1	22	
10	Lower Front Fork Clamp Bolts	25	2.5	18	AL

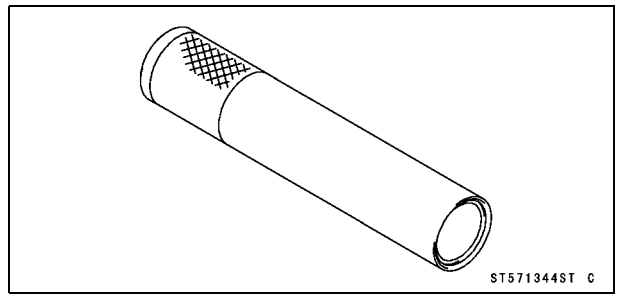
AD: Apply adhesive.
AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque.
G: Apply grease.
L: Apply a non-permanent locking agent.

Special Tools

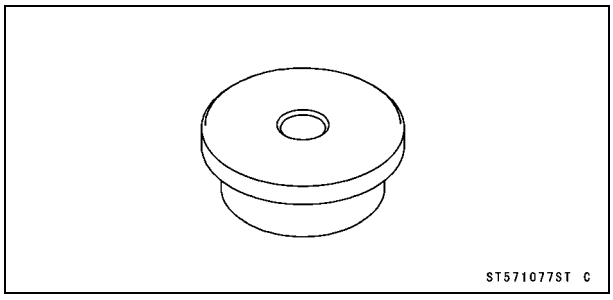
Head Pipe Outer Race Press Shaft:
57001-1075



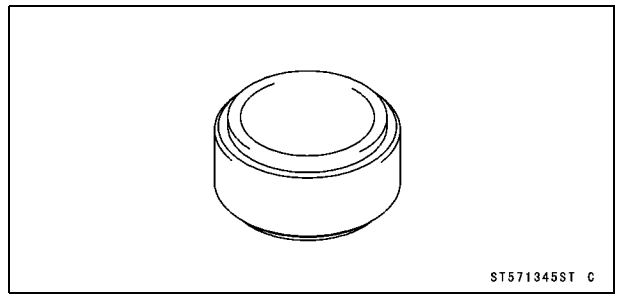
Steering Stem Bearing Driver, ϕ42.5:
57001-1344



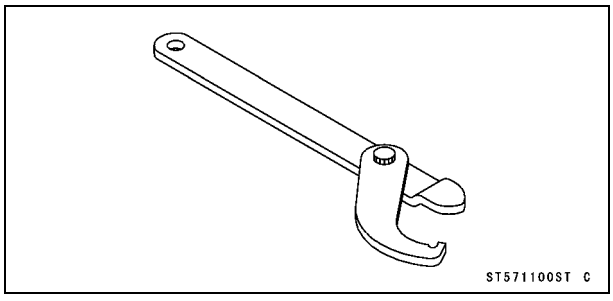
Head Pipe Outer Race Driver, ϕ54.5:
57001-1077



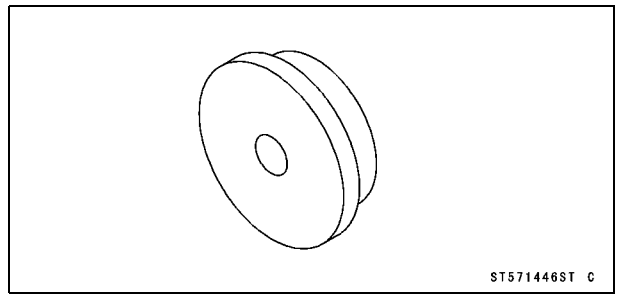
Steering Stem Bearing Driver Adapter, ϕ41.5:
57001-1345



Steering Stem Nut Wrench:
57001-1100



Head Pipe Outer Race Driver, ϕ55:
57001-1446



Steering

Steering Inspection

- Refer to the Steering Play Inspection in the Periodic Maintenance chapter.

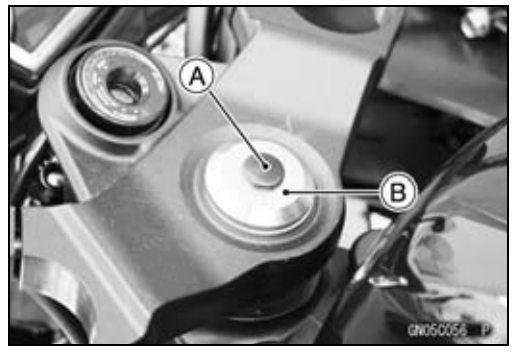
Steering Adjustment

- Refer to the Steering Play Adjustment in the Periodic Maintenance chapter.

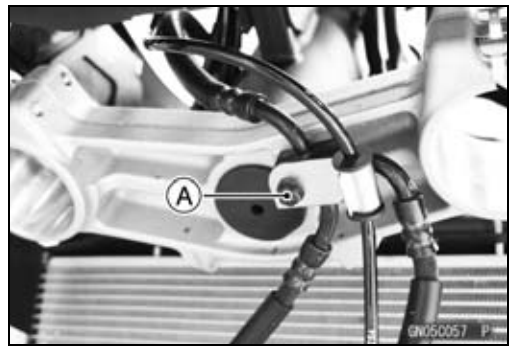
Steering Stem

Stem, Stem Bearing Removal

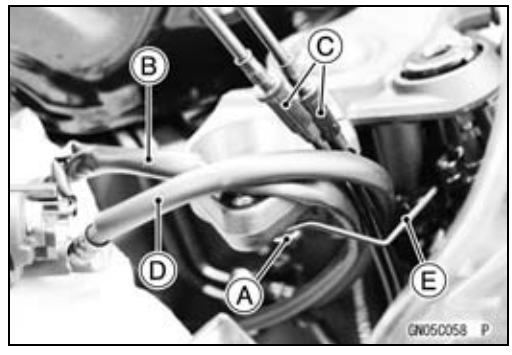
- Remove:
  Lower Fairings (see Lower Fairing Removal in the Frame chapter)
  Handlebar Holders (see Handlebar Removal)
  Steering Stem Head Bolt Plug [A]
  Steering Stem Head Bolt [B] and Washer



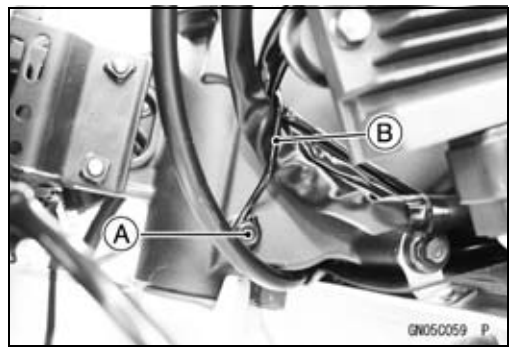
- Remove:
  Front Forks (see Front Fork Removal in the Suspension chapter)
  Brake Hose Fitting Bolt [A]



- Remove the bolt [A].
- Free the lead [B], throttle cables [C] and brake hose [D] from the guide [E].



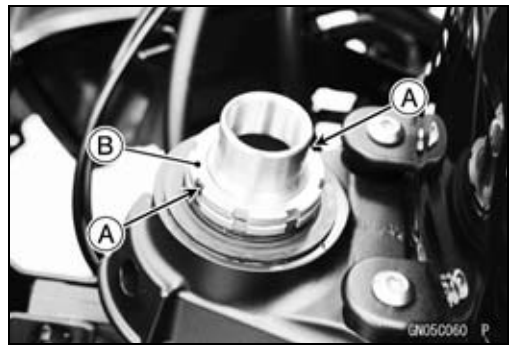
- Remove:
  Bolts [A]
  Guide [B]
  Steering Stem Head



- Bend the claws [A] of claw washer straighten.
- Remove the steering stem locknut [B].

  Special Tool - Steering Stem Nut Wrench: 57001-1100

- Remove the claw washer.

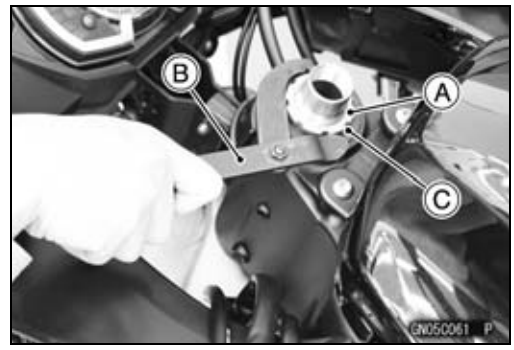


Steering Stem

- Pushing up the stem base, and remove the steering stem nut [A].

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

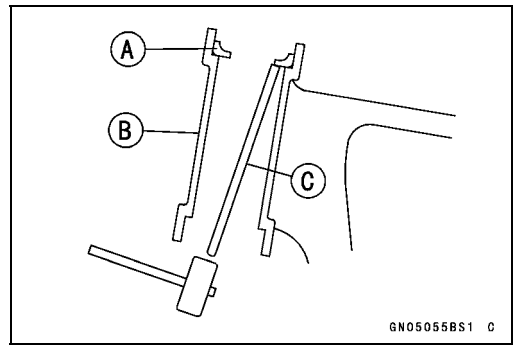
- Remove:
  Steering Stem
  Stem Cap [C]
  Upper Ball Bearing Inner Race and Ball Bearing



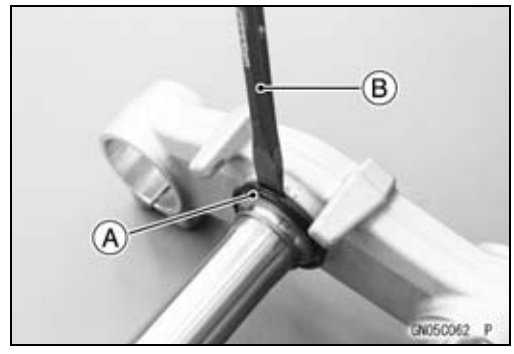
- To remove the ball bearing outer races [A] pressed into the head pipe [B], insert a bar [C] into the recesses of head pipe, and applying it to both recess alternately hammer it to drive the race out.

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.*



- Remove the lower ball bearing from the steering stem.
- Remove the lower ball bearing inner race (with its oil seal) [A] which is pressed onto the steering stem with a suitable commercially available chisel [B].

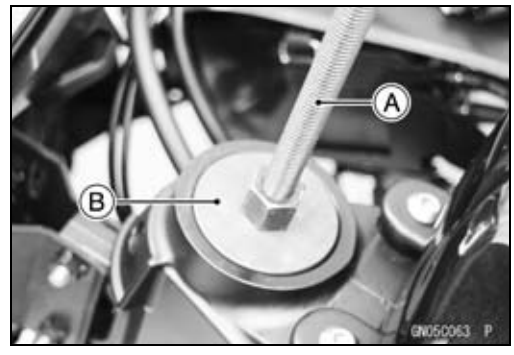


Stem, Stem Bearing Installation

- Replace the bearing outer races with new ones.
- Drive them into the head pipe at the same time.

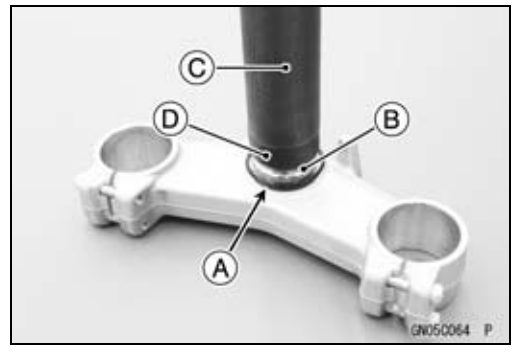
Special Tools - Head Pipe Outer Race Press Shaft [A]: 57001-1075
Head Pipe Outer Race Driver, ϕ54.5: 57001-1077
Head Pipe Outer Race Driver, ϕ55 [B]: 57001-1446

- Apply grease to the outer races.



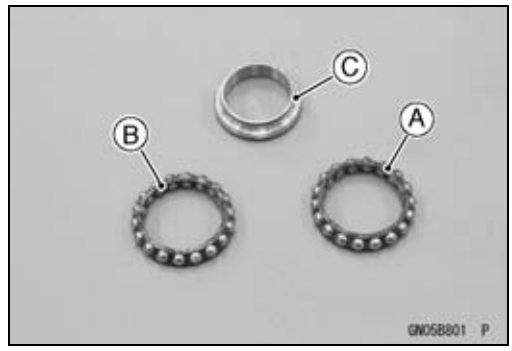
- Replace the bearing inner races and oil seal with new ones.
- Apply grease to the oil seal.
- Install the oil seal [A] on the steering stem.
- Apply grease to the stem and hammer the lower ball bearing inner race [B].

Special Tools - Steering Stem Bearing Driver, ϕ42.5 [C]: 57001-1344
Steering Stem Bearing Driver Adapter, ϕ41.5 [D]: 57001-1345

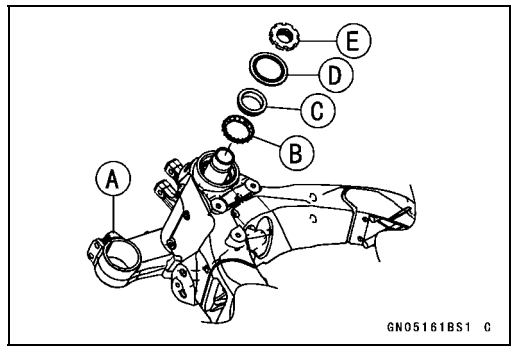


Steering Stem

● 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].



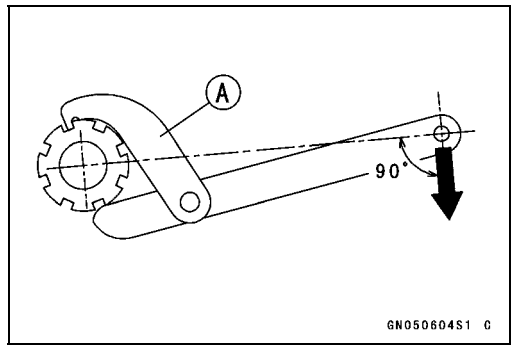
● Install the stem [A] through the head pipe and install the ball bearing [B] and inner race [C] on it.
● Install:
Stem Cap [D]
Steering Stem Nut [E]



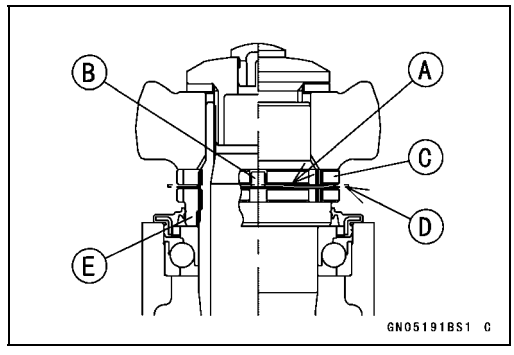
● Settle the bearings in place as follows.
○Tighten the steering stem nut with **65 N·m (6.6 kgf·m, 48 ft·lb)** of torque first, and loosen it a fraction of a turn until it turns lightly. Afterward tighten it again with specified torque using a steering stem nut wrench [A].

Special Tool - Steering Stem Nut Wrench: 57001-1100

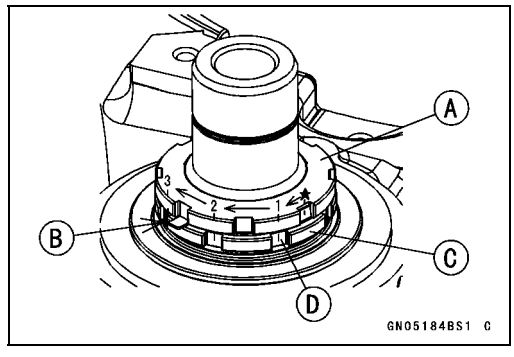
Torque - Steering Stem Nut: 30 N·m (3.1 kgf·m, 22 ft·lb)



● Install the claw washer [A] so that its bent claws [B] faces upward, and engage the bent claws with the grooves of steering stem locknut [C].
● Hand tighten the steering stem locknut until it contacts against the claw washer.
● Check if the straight claws [D] of the claw washer aligned with the grooves of the steering stem nut [E].



In case of the claws positioned between the grooves:
● Tighten the steering stem locknut [A] until the straight claws aligned with 3rd grooves [B] of the steering stem nut [C].
○Count the number of groove from the **first** aligned groove [D] as shown.
● Bend the two straight claws downward into the groove of the steering stem nut.



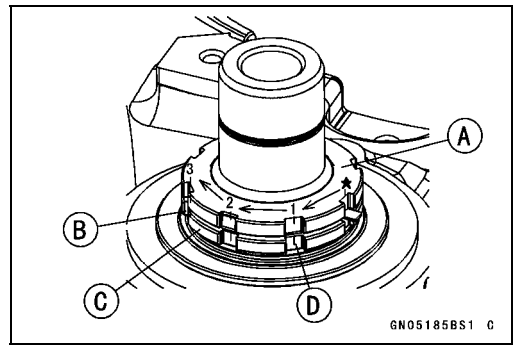
Steering Stem

In case of the claws aligned with the grooves:

- Tighten the steering stem locknut [A] until the straight claws aligned with 3rd grooves [B] of the steering stem nut [C].

○Count the number of groove from the **next** aligned groove [D] as shown.

- Bend the two straight claws downward into the groove of the steering stem nut.



- Install the stem head.
- Install the washer, and temporary tighten the steering stem head bolt.
- Install the front forks (see Front Fork Installation in the Suspension chapter).

NOTE

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

○*Tighten the two lower front fork clamp bolts alternately two times to ensure even tightening torque.*

Torque - Upper Front Fork Clamp Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)
Steering Stem Head Bolt: 110 N·m (11.2 kgf·m, 81.1 ft·lb)
Lower Front Fork Clamp Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

⚠ WARNING

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

- Install the removed parts (see appropriate chapters).

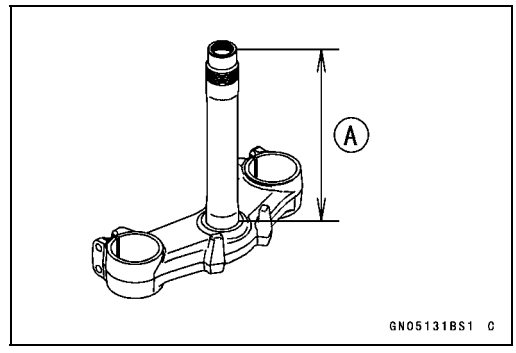
Steering Stem Bearing Lubrication

- Refer to the Steering Stem Bearing Lubrication in the Periodic Maintenance chapter.

Steering Stem Warp Inspection

- Whenever the steering stem is removed, or if the steering can not be adjusted for smooth action, check the steering stem for straightness.

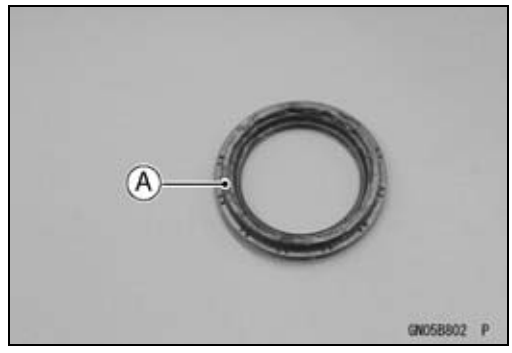
★If the steering stem [A] is bent, replace the steering stem.



Steering Stem

Stem Cap Deterioration, Damage Inspection

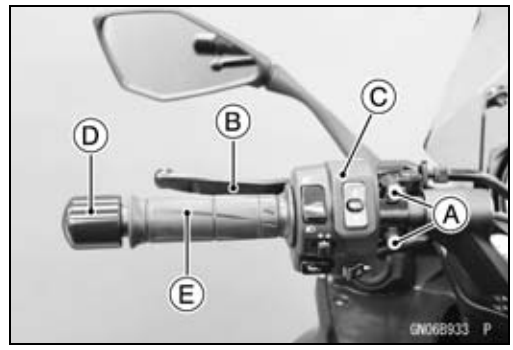
★Replace the stem cap if its oil seal [A] shows damage.



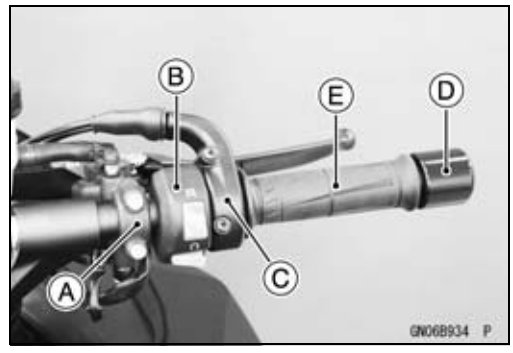
Handlebar

Handlebar Removal

- Remove:
  Clutch Lever Clamp Bolts [A]
  Clutch Lever Assembly [B]
  Left Switch Housing [C]
  Handlebar Weight [D]
  Left Handlebar Grip [E]



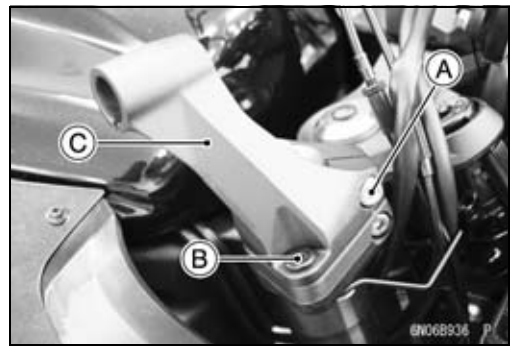
- Remove:
  Front Master Cylinder [A] (see Front Master Cylinder Removal in the Brakes chapter)
  Right Switch Housing [B]
  Throttle Case [C]
  Handlebar Weight [D]
  Throttle Grip [E]



- Remove:
  Handlebar Bolt [A]
  Handlebar



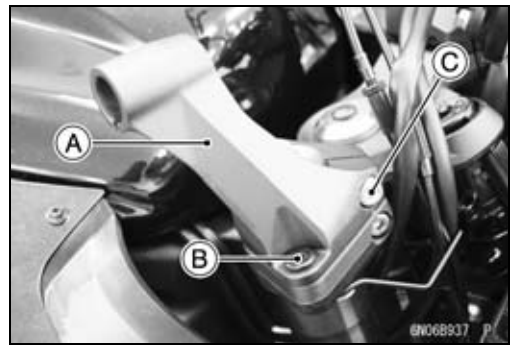
- Loosen the handlebar holder clamp bolt [A].
- Remove:
  Handlebar Holder Positioning Bolt [B]
  Handlebar Holder [C]



Handlebar Installation

- Install the handlebar holder [A] on the steering stem head.
- Apply a non-permanent locking agent to the threads of the handlebar holder positioning bolt [B].
- Tighten:

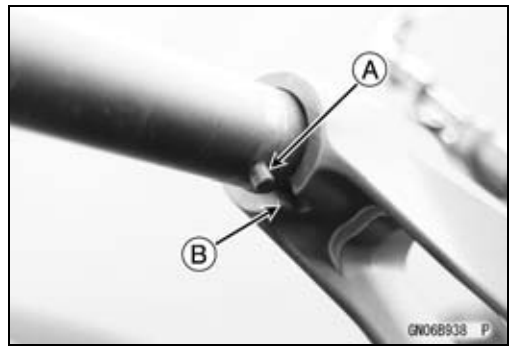
Torque - Handlebar Holder Positioning Bolt: 10 N·m (1.0 kgf·m, 89 in·lb)
Handlebar Holder Clamp Bolt [C]: 25 N·m (2.5 kgf·m, 18 ft·lb)



Handlebar

- Fit the pin [A] of the handlebar to the recess [B] of the handlebar holder.
- Apply a non-permanent locking agent to the threads of the handlebar bolt.
- Tighten:

Torque - Handlebar Bolt: 35 N·m (3.6 kgf·m, 26 ft·lb)



- Using a high flash-point solvent, clean off any oil or dirt that may be on the adhesive coating area. Dry them with a clean cloth.
- Apply adhesive to the inside of the left handlebar grip.
- Install the left handlebar grip, throttle grip and left/right handlebar weight.

○Wipe off any protruding abhesive cement.

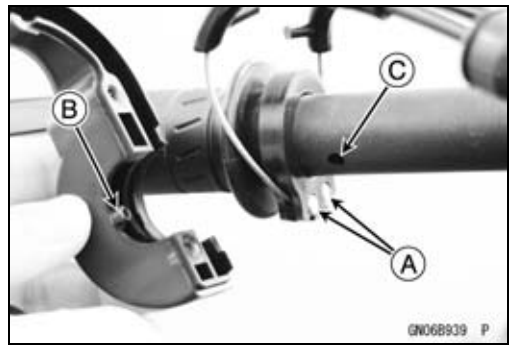
- Apply a non-permanent locking agent to the threads of the handlebar weight screws, and tighten them.

- Install the throttle cable tips [A].
- Install the throttle case.

○Fit the projection [B] into a hole [C] in the handlebar.

- Tighten:

Torque - Throttle Case Bolts: 3.5 N·m (0.36 kgf·m, 31 in·lb)

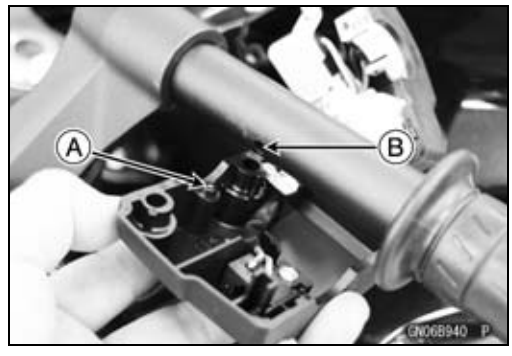


- Install the left and right switch housings.

○Fit the projection [A] into a hole [B] in the handlebar.

- Tighten:

Torque - Switch Housing Screws: 3.5 N·m (0.36 kgf·m, 31 in·lb)



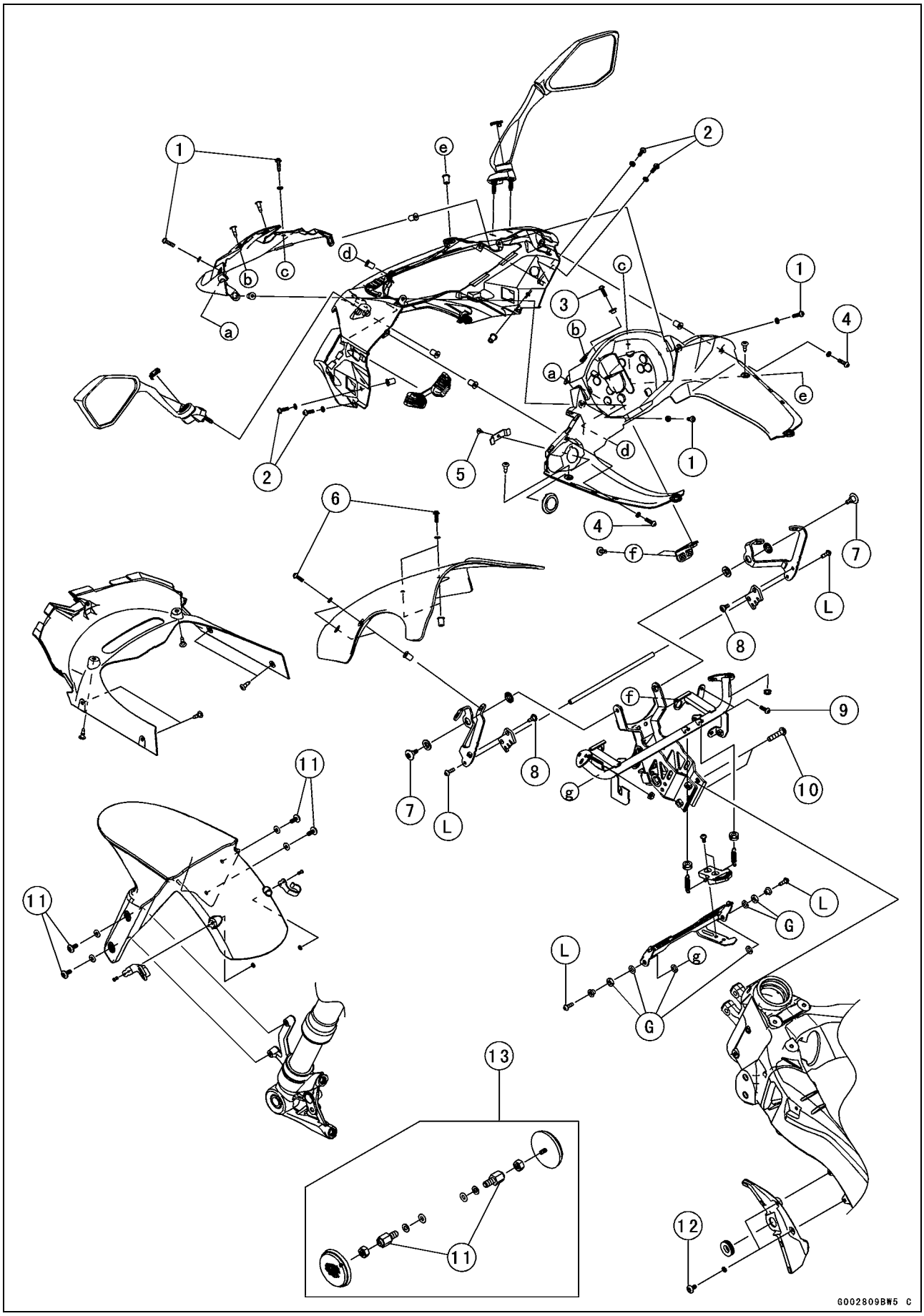
- Install:
  Clutch Lever Assembly (see Clutch Lever Assembly Installation in the Clutch chapter)
  Front Master Cylinder (see Front Master Cylinder Installation in the Brakes chapter)
- Run the leads, cables and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Frame

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Exploded View

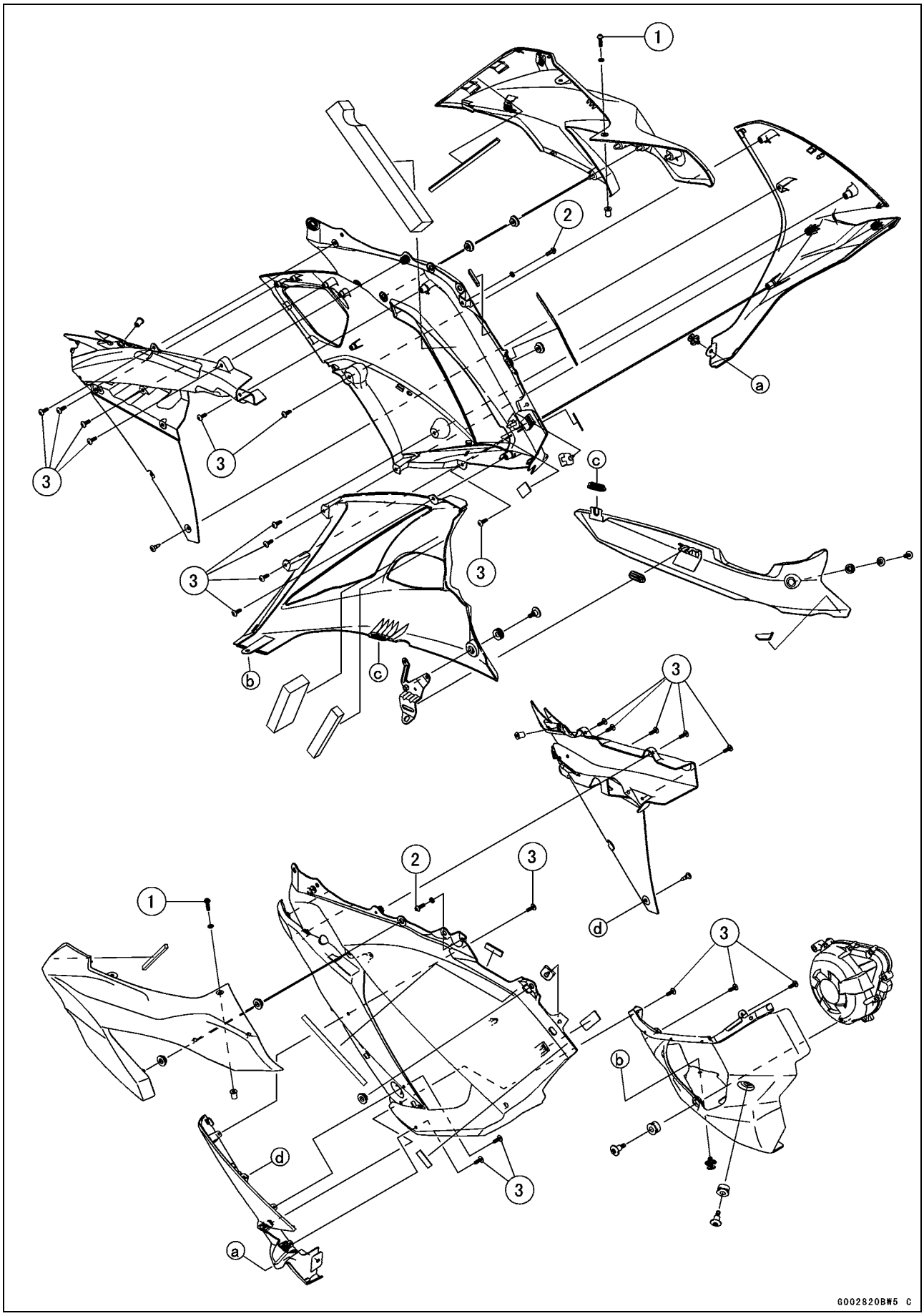


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Windshield Bracket Cover Bolts	0.50	0.05	4.4 in·lb	
2	Lower Fairing Bolts (Front)	0.50	0.05	4.4 in·lb	
3	Meter Cover Bolt (L = 16 mm)	3.0	0.31	27 in·lb	
4	Meter Cover Bolts (L = 20 mm)	0.50	0.05	4.4 in·lb	
5	Socket Cover Screw	1.2	0.12	11 in·lb	
6	Windshield Bolts	0.40	0.04	3.5 in·lb	
7	Stay Assembly Mounting Bolts	6.9	0.70	61 in·lb	
8	Stopper Mounting Bolts	4.2	0.43	37 in·lb	
9	Upper Fairing Bolts	0.50	0.05	4.4 in·lb	
10	Windshield Bracket Assembly Mounting Bolts	25	2.5	18	
11	Front Fender Mounting Bolts	4.0	0.41	35 in·lb	
12	Left Lower Side Fairing Mounting Bolts	3.0	0.31	27 in·lb	

13. Other than PH and TH models
G. Apply grease.
L: Apply a non-permanent locking agent.

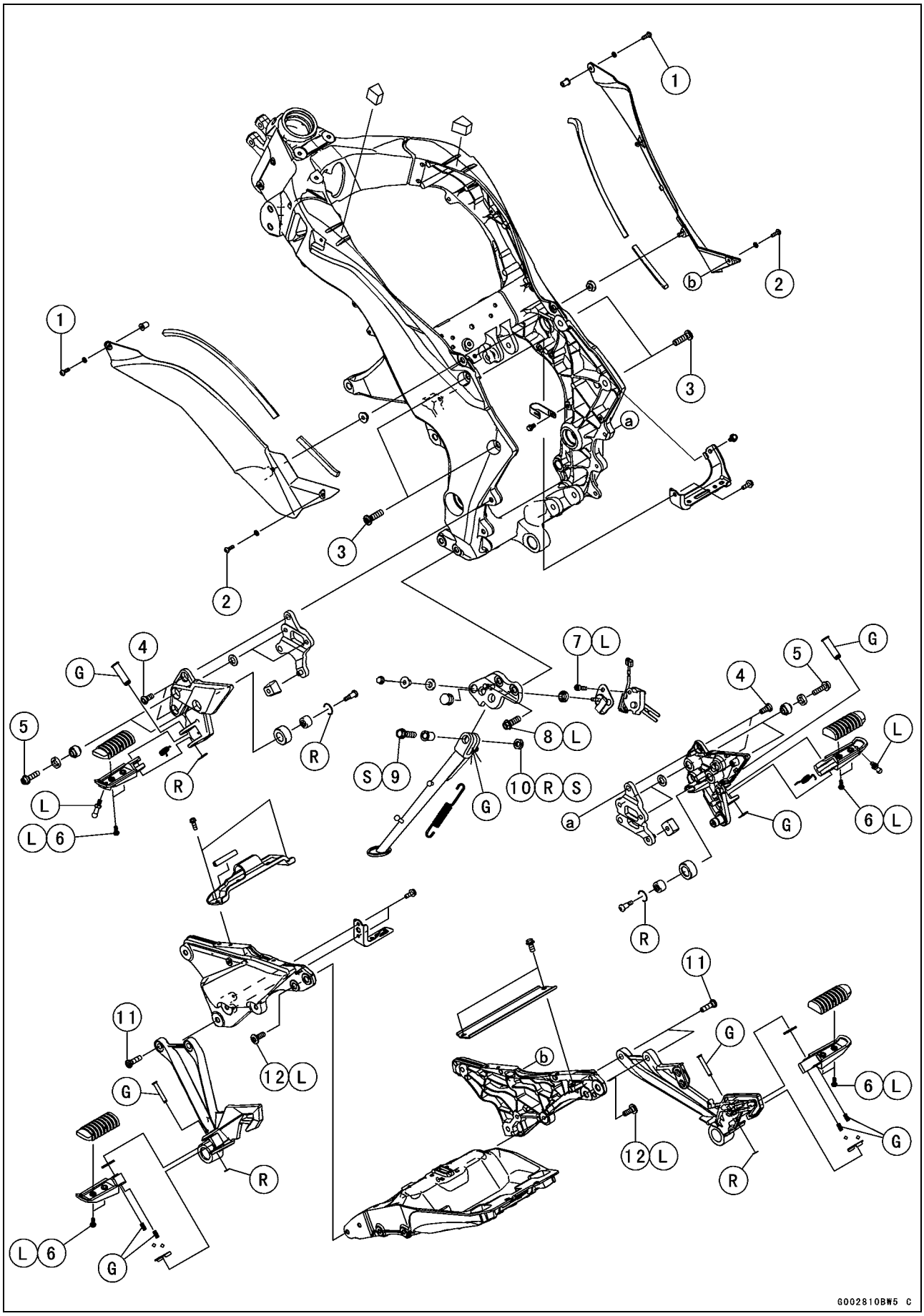
Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Middle Fairing Bolt	0.50	0.05	4.4 in·lb	
2	Lower Fairing Bolts (Rear)	3.0	0.31	27 in·lb	
3	Lower Fairing Assembly Screws	1.2	0.12	11 in·lb	

Exploded View

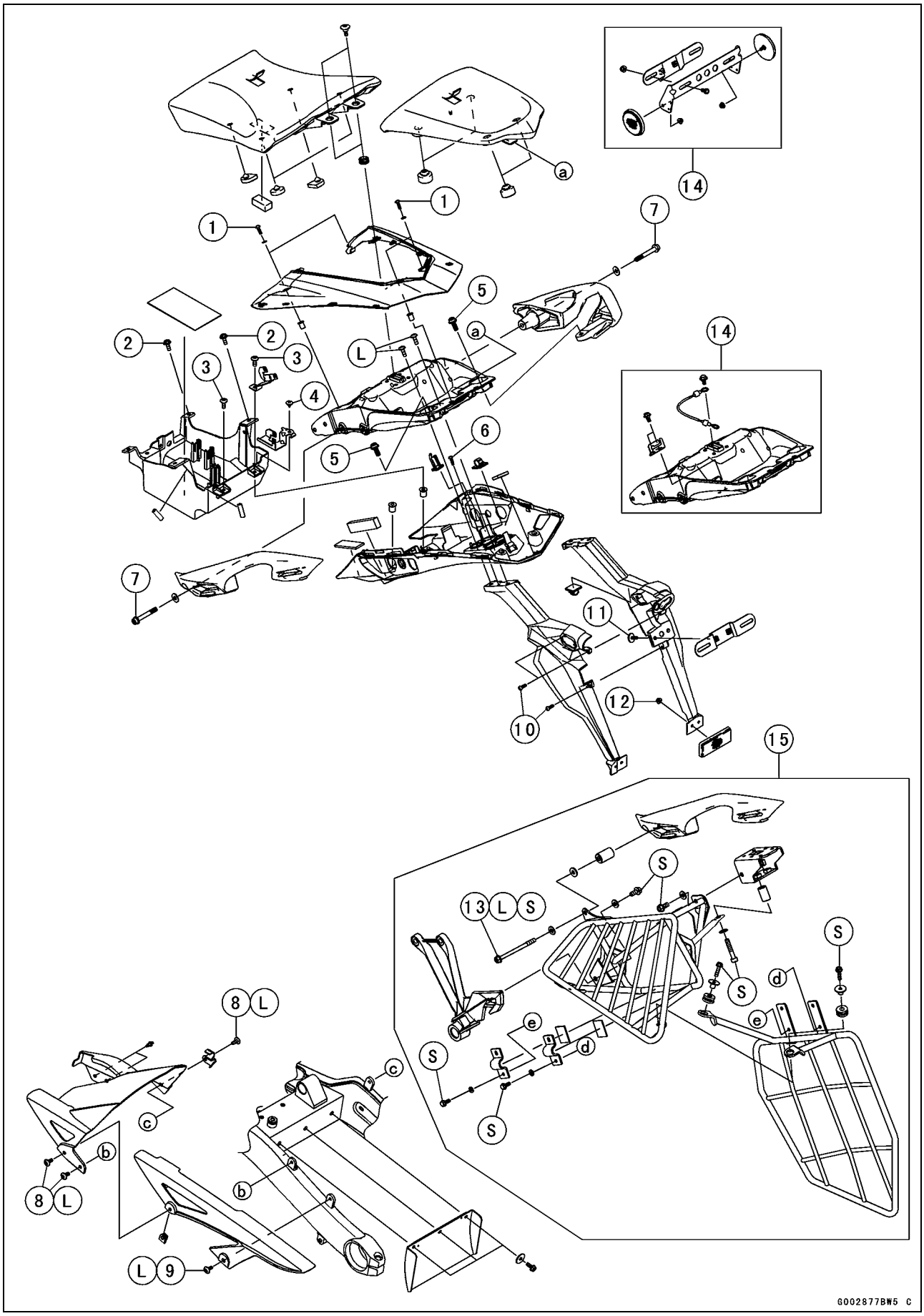


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Side Cover Bolts (Front)	0.50	0.05	4.4 in·lb	
2	Side Cover Bolts (Rear)	3.0	0.31	27 in·lb	
3	Rear Frame Bracket Bolts	45	4.6	33	
4	Front Footpeg Bracket Bolts	25	2.5	18	
5	Front Footpeg Sub Bracket Bolts	25	2.5	18	
6	Step Mounting Screws	3.0	0.31	27 in·lb	L
7	Side Stand Switch Bolt	9.0	0.92	80 in·lb	L
8	Side Stand Bracket Bolts	50	5.1	37	L
9	Side Stand Bolt	30	3.1	22	S
10	Side Stand Nut	45	4.6	33	R, S
11	Rear Footpeg Bracket Bolts	25	2.5	18	
12	Rear Frame Bolts	25	2.5	18	L

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

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Seat Cover Bolts	0.50	0.05	4.4 in·lb	
2	Battery Case Bolts (Front)	4.0	0.41	35 in·lb	
3	Battery Case Bolts (Rear)	1.0	0.10	8.9 in·lb	
4	Connector Bracket Screw	1.2	0.12	11 in·lb	
5	Grab Rail Mounting Bolts (L = 20 mm)	25	2.5	18	
6	Flap Mounting Screws	1.2	0.12	11 in·lb	
7	Grab Rail Mounting Bolts (L = 60 mm)	25	2.5	18	
8	Mud Guard Bolts	4.0	0.41	35 in·lb	L
9	Chain Cover Bolts	4.0	0.41	35 in·lb	L
10	Flap Screws	1.2	0.12	11 in·lb	
11	License Plate Bracket Mounting Bolts	4.0	0.41	35 in·lb	
12	Reflector Nut	3.0	0.31	27 in·lb	
13	Grab Rail Mounting Bolt (L = 100 mm)	25	2.5	18	L, S

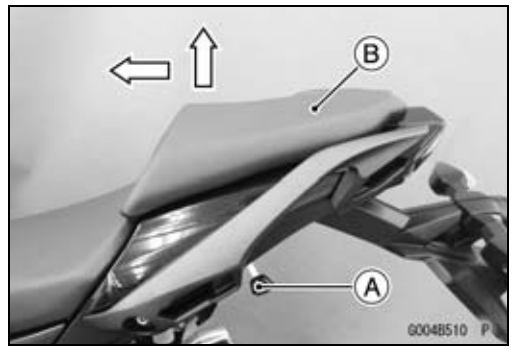
14. US, CA, and CAL Models
15. IN (with Saree Guard equipped model)

L: Apply a non-permanent locking agent.
S: Follow the specified tightening sequence.

Seats

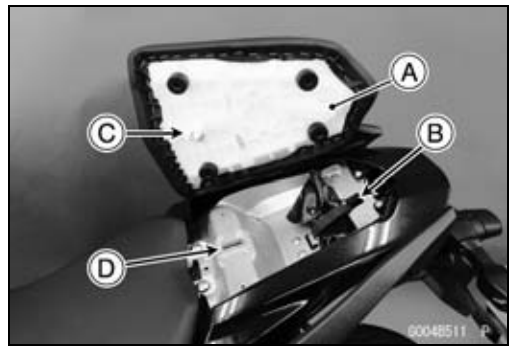
Rear Seat Removal

- Insert the ignition switch key [A] into the seat lock.
- Pull up the front part of the seat [B] while turning the key clockwise, and remove it forward.



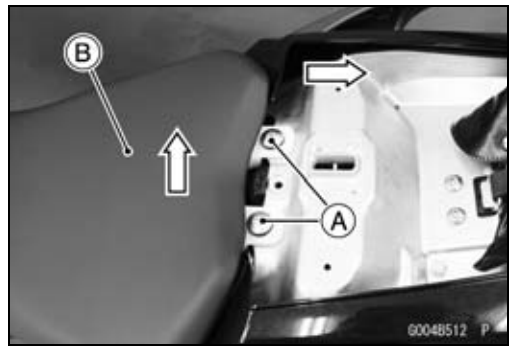
Rear Seat Installation

- Insert the rear seat hook [A] under the rear frame [B].
- Insert the seat hook [C] into the latch hole [D].
- Push down the front part of the seat until the lock clicks.



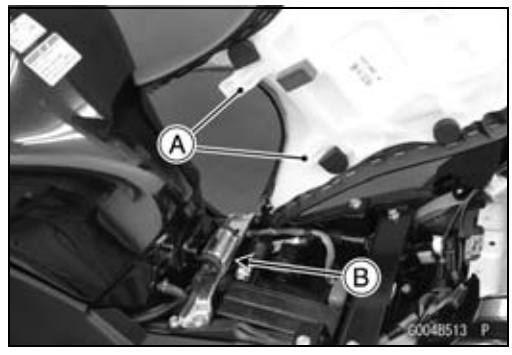
Front Seat Removal

- Remove:
  Rear Seat (see Rear Seat Removal)
  Bolts [A]
- Remove the front seat [B] by pulling the rear of it up and backward.



Front Seat Installation

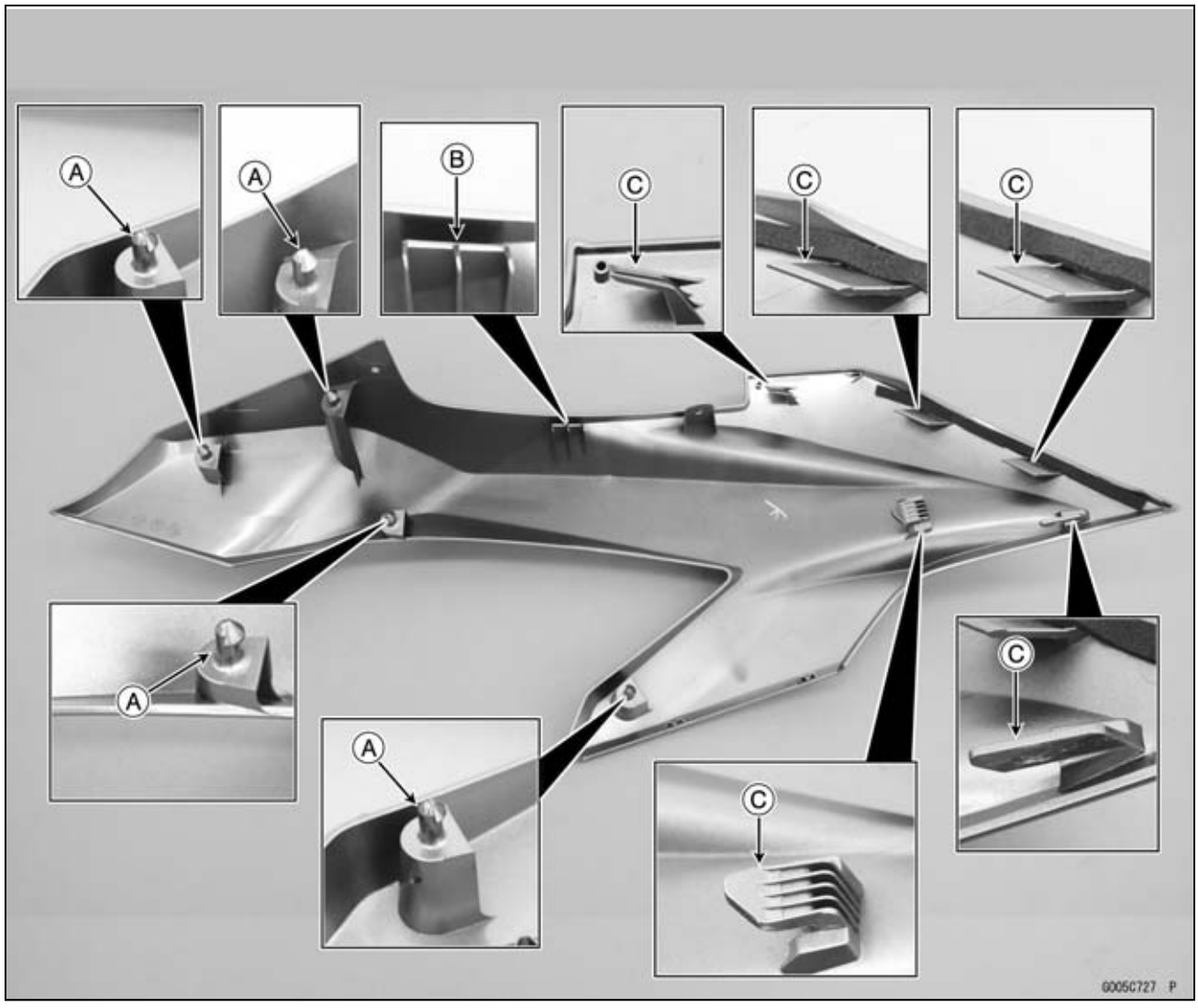
- Insert the front seat hooks [A] under the fuel tank bracket [B].
- Tighten the bolts.



Fairings

Middle Fairing Removal

Projections [A]
Tab [B]
Hooks [C]

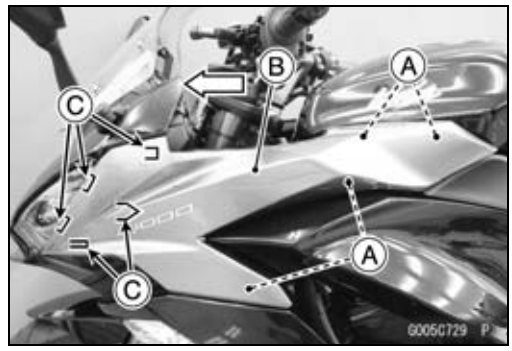


- Remove:
  Middle Fairing Bolt [A]
  Quick Rivet [B]



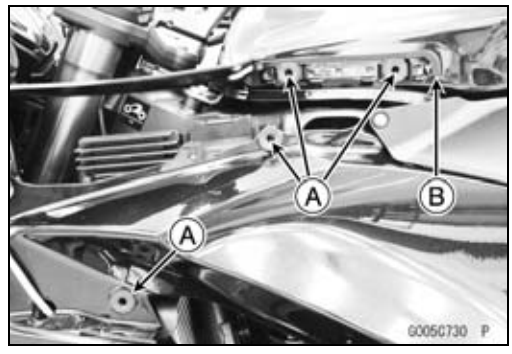
Fairings

- Clear the projections [A] of the middle fairing [B] from the grommets.
- Pull the middle fairing forward to clear the hooks [C] from the upper fairing.
- Remove the middle fairing.

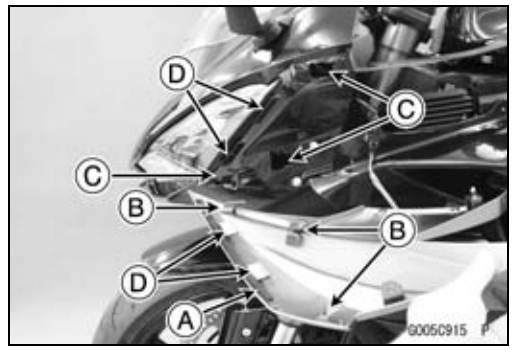


Middle Fairing Installation

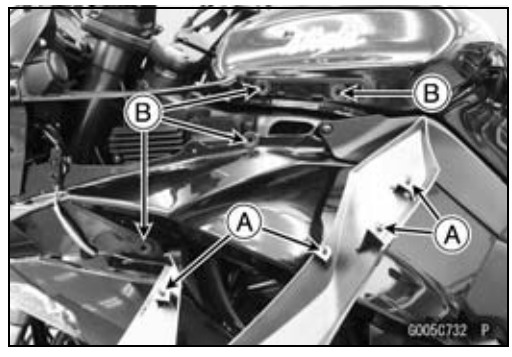
- Check that the grommets [A] and damper [B] are in place.



- Check that the damper [A] is in place.
- Insert the hooks [B] of the middle fairing into the holes [C].
- Slide the middle fairing rearward to fit the hooks [D].

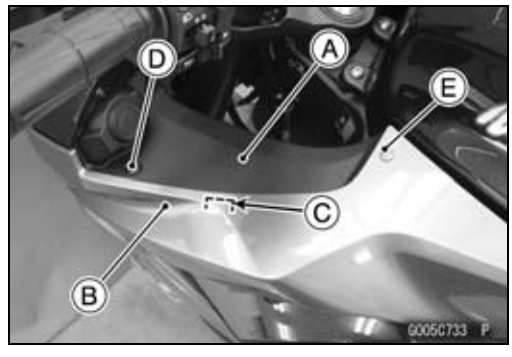


- Insert the projections [A] of the middle fairing into the grommets [B].



- Insert the meter cover [A] between middle fairing [B] and tab [C].
- Install the quick rivet [D].
- Tighten:

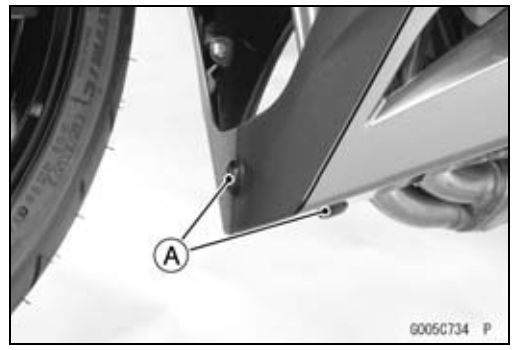
Torque - Middle Fairing Bolt [E]: 0.50 N·m (0.05 kgf·m, 4.4 in·lb)



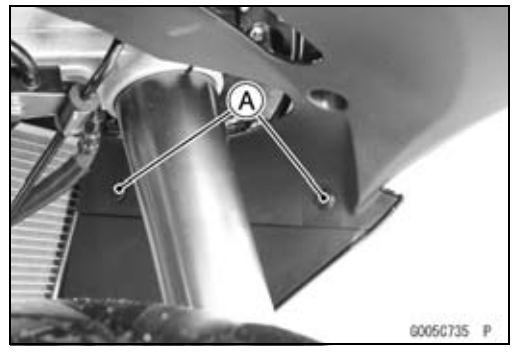
Fairings

Lower Fairing Removal

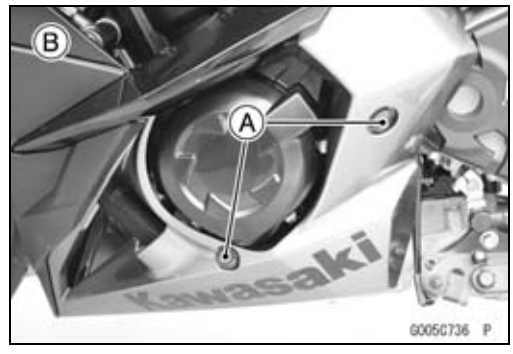
- Remove:
  Middle Fairing (see Middle Fairing Removal)
  Side Cover (see Side Cover Removal)
  Rear Lower Fairing (see Rear Lower Fairing Removal)
  Quick Rivets [A]

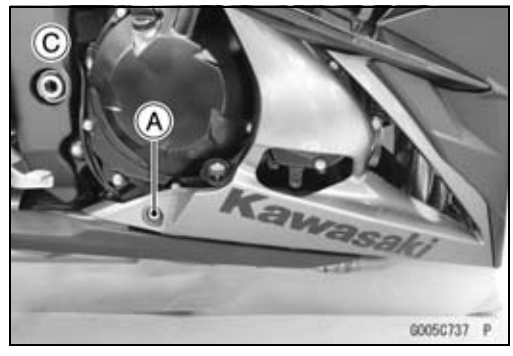


- Remove:
  Quick Rivets [A] (Both Sides)

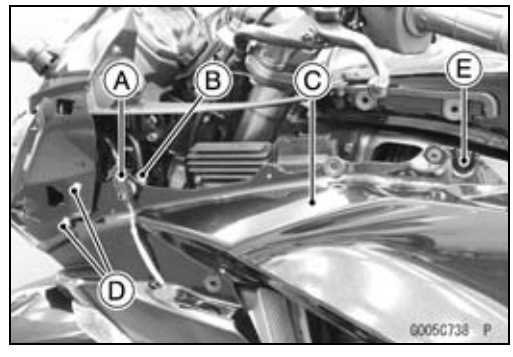


- Remove the bolts [A].
  Left Side [B]
  Right Side [C]





- Disconnect:
  Turn Signal Light Lead Connector [A]
  Outside Temperature Sensor Connector [B] (Left Side only)
- Remove the turn signal light lead connector from lower fairing [C].
- Remove:
  Lower Fairing Bolts (Front) [D]
  Lower Fairing Bolt (Rear) [E]



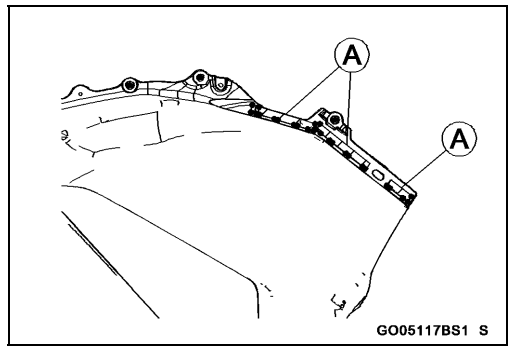
Fairings

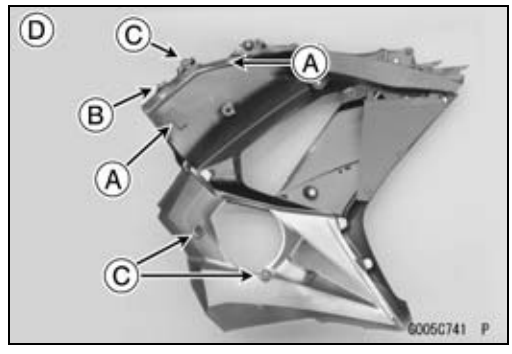
- Pulling out the lower fairing [A] to clear the projection [B].
- Remove the hook [C] from the frame.
- Pull the lower fairing rearward to clear the hooks [D].
- Remove the lower fairing.

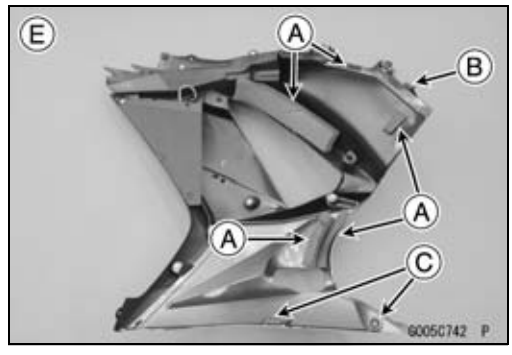


Lower Fairing Installation

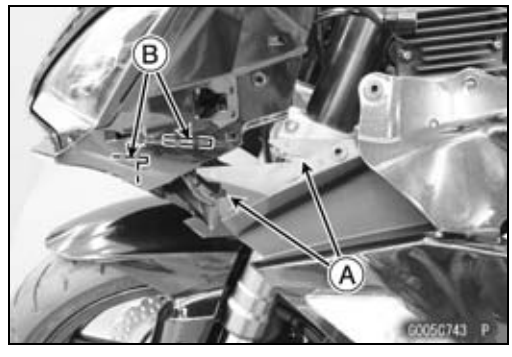
- Installation is the reverse of removal.
- Check that the following parts are in place on the lower fairing.
  Pads [A]
  Dampers [B]
  Grommets [C]
  Left Side [D]
  Right Side [E]







- Insert the hooks [A] of the lower fairing into the hooks [B] of the upper fairing.

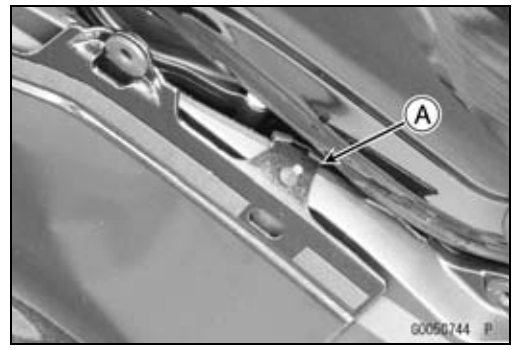


Fairings

- Hang the hook [A] to the frame.
- Insert the projection into the grommet.
- Tighten:

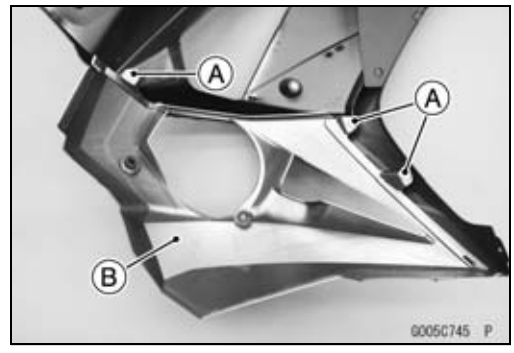
Torque - Lower Fairing Bolts (Front): 0.50 N·m (0.05 kgf·m, 4.4 in·lb)
Lower Fairing Bolt (Rear): 3.0 N·m (0.31 kgf·m, 27 in·lb)

- Install the removed parts (see appropriate chapters).

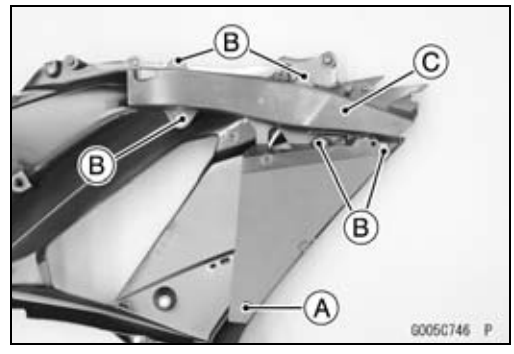


Lower Fairing Disassembly

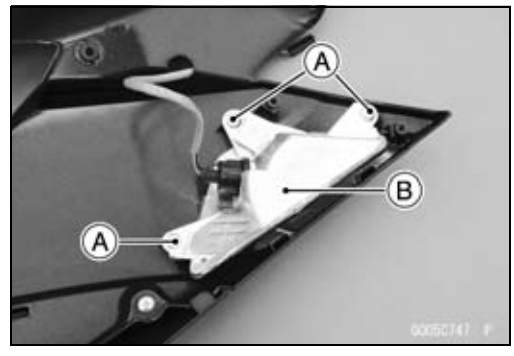
- Remove:
  Lower Fairing (see Lower Fairing Removal)
  Lower Fairing Assembly Screws [A]
  Lower Fairing Lower [B]



- Remove:
  Quick Rivet [A]
  Lower Fairing Assembly Screws [B]
  Inner Fairing [C]

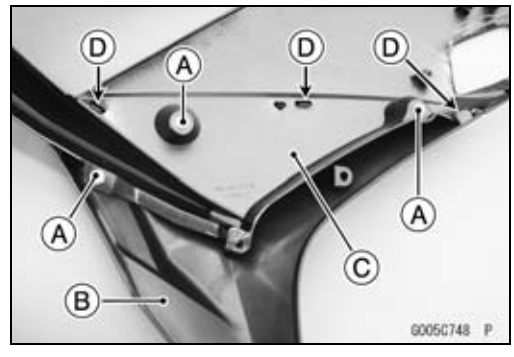


- Remove:
  Front Turn Signal Light Mounting Screws [A]
  Front Turn Signal Light [B]



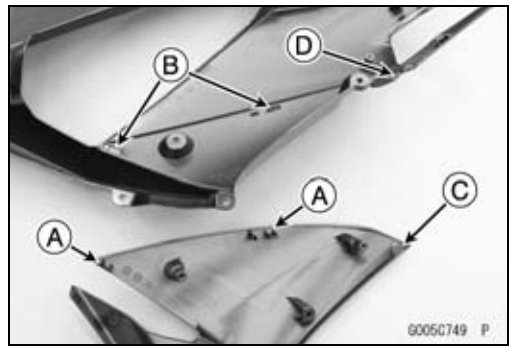
- Remove:
  Lower Fairing Assembly Screws [A]
  Slat Fairing [B]
  Lower Fairing Upper [C]

○Clear the hooks [D] of the slat fairing from the lower fairing upper.



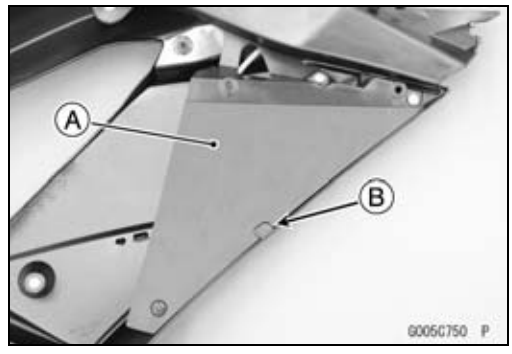
Fairings

Lower Fairing Assembly



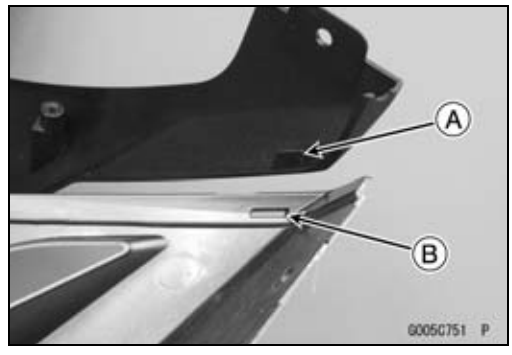
- Assembly is the reverse of disassembly.
- Insert the hooks [A] into the slots [B].
- Hang the hook [C] to the hook [D].
- Tighten:

Torque - Lower Fairing Assembly Screws: 1.2 N·m (0.12 kgf·m, 11 in·lb)



- Insert the inner fairing [A] washer the tab [B] of slot fairing.
- Tighten:

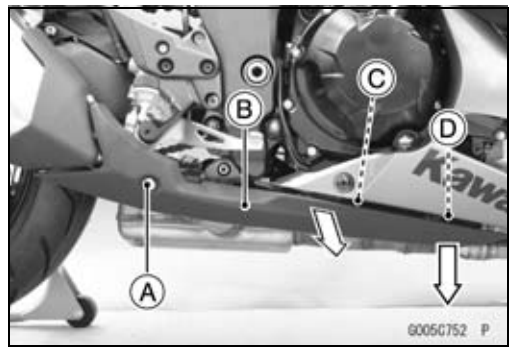
Torque - Lower Fairing Assembly Screws: 1.2 N·m (0.12 kgf·m, 11 in·lb)



- Insert the tab [A] into the slot [B].
- Tighten:

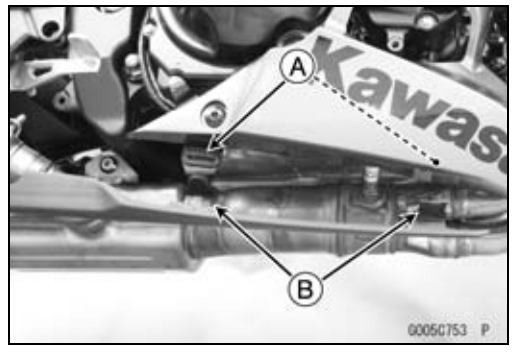
Torque - Lower Fairing Assembly Screws: 1.2 N·m (0.12 kgf·m, 11 in·lb)

Rear Lower Fairing Removal



- Remove the bolt [A].
- Pull the rear lower fairing [B] outward to clear the projection [C].
- Pull the rear lower fairing downward to clear the projection [D].

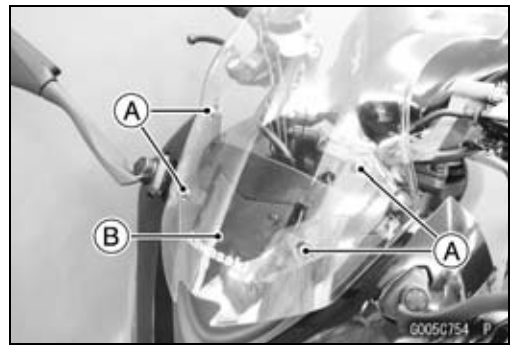
Rear Lower Fairing Installation



- Check that the grommets [A] are in place.
- Insert the projections [B] into the grommets.
- Tighten the bolt.

Fairings

Windshield Removal



- Remove:
  Windshield Bolts [A] with Washers
  Windshield [B]

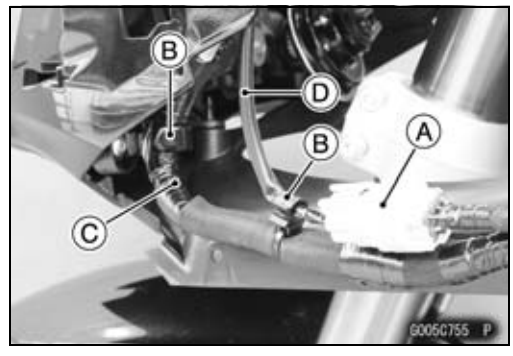
Windshield Installation

- Installation is the reverse of removal.
- Tighten:

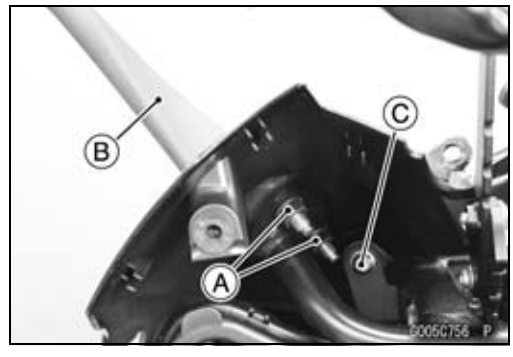
Torque - Windshield Bolts: 0.40 N·m (0.04 kgf·m, 3.5 in·lb)

Upper Fairing Removal

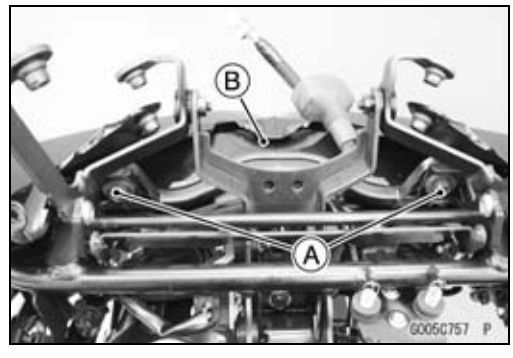
- Remove:
  Lower Fairing (see Lower Fairing Removal)
  Meter Cover (see Meter Cover Removal)



- Disconnect the headlight lead connector [A].
- Open the clamps [B], free the main harness [C] and headlight lead [D].



- Remove:
  Nuts [A] (Both Sides)
  Rear View Mirror [B] (Both Sides)
  Upper Fairing Bolt [C] (Both Sides)



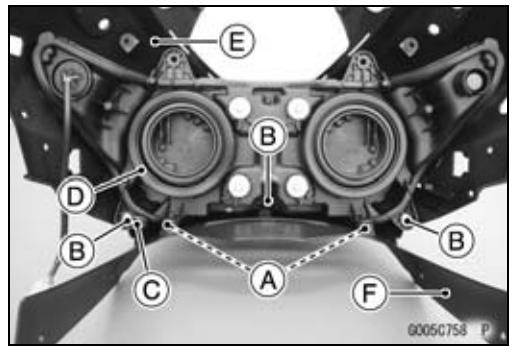
- Remove:
  Bolts [A] and Nuts
- Remove the upper fairing [B] with the headlight.

Upper Fairing Installation

- Installation is the reverse of removal.
- Run the leads and harness correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

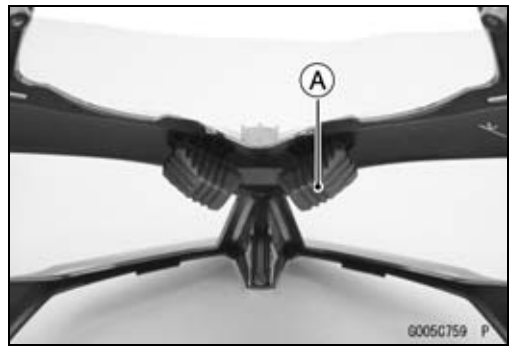
Fairings

Upper Fairing Disassembly

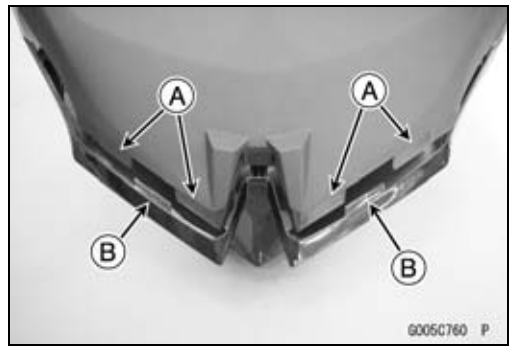


- Remove:
  Upper Fairing (see Upper Fairing Removal)
  Quick Rivets [A]
  Headlight Screws [B]
  Clamp [C]
  Headlight [D]
  Upper Fairing [E]
  Upper Inner Fairing [F]

Upper Fairing Assembly



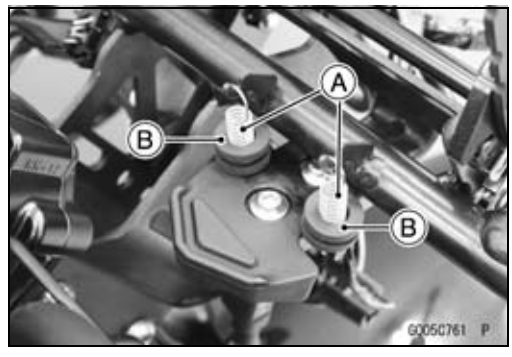
- Assembly is the reverse of disassembly.
- Check that the damper [A] is in place on the upper fairing.



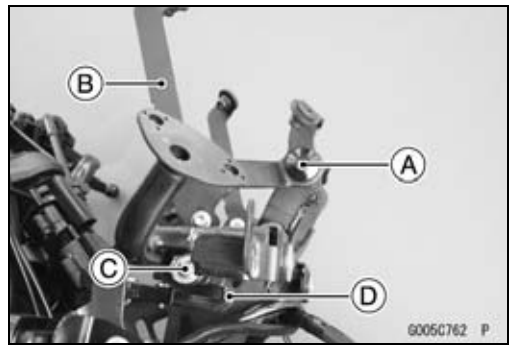
- Insert the tabs [A] of the upper inner fairing into the inside of the upper fairing.
- Insert the tabs [B] of the upper fairing into the inside of the upper inner fairing.
- Tighten:

Torque - Headlight Screws: 1.2 N·m (0.12 kgf·m, 11 in·lb)

Windshield Bracket Disassembly



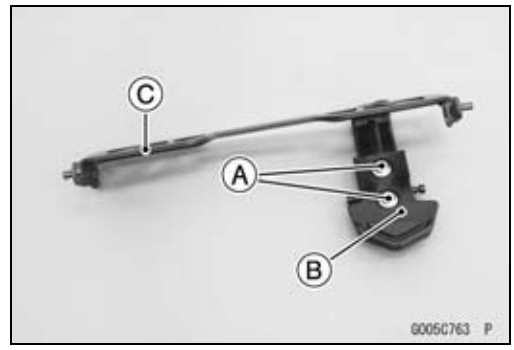
- Remove:
  Upper Fairing (see Upper Fairing Removal)
  Springs [A] with Dampers [B]



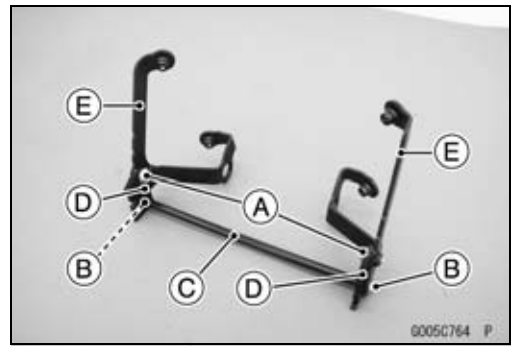
- Remove:
  Stay Assembly Mounting Bolt [A] and Collars (Both Sides)
  Stay Assembly [B]
  Adjust Knob Assembly Bolt [C], Collar, Damper and Washers (Both Sides)
  Adjust Knob Assembly [D]

Fairings

● Remove:
Bolts [A]
Adjust Knob [B]
Adjust Knob Bracket [C]

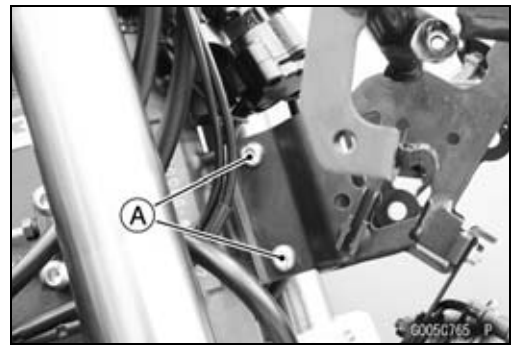


● Remove:
Stopper Mounting Bolts [A]
Stay Shaft Bolts [B]
Stay Shaft [C]
Stoppers [D]
Stays [E]

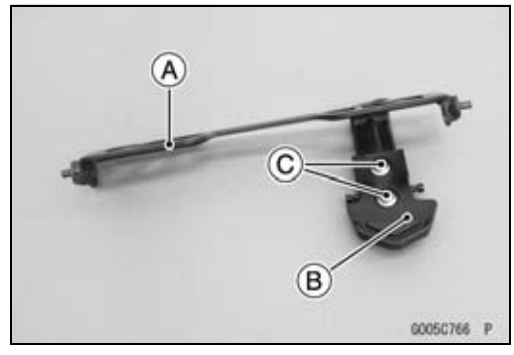


Windshield Bracket Assembly

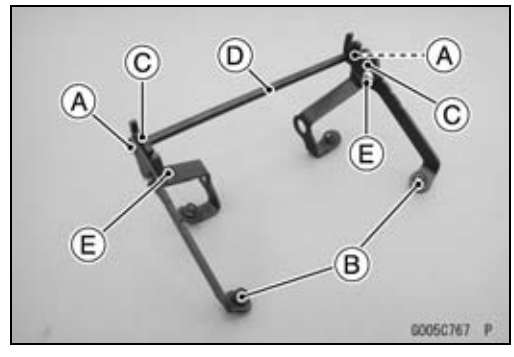
● Confirm that the upper fairing bracket has been firmly installed by the windshield bracket assembly mounting bolts [A].



● Assemble the adjust knob assembly as shown.
Adjust Knob Bracket [A]
Adjust Knob [B]
Bolts [C]

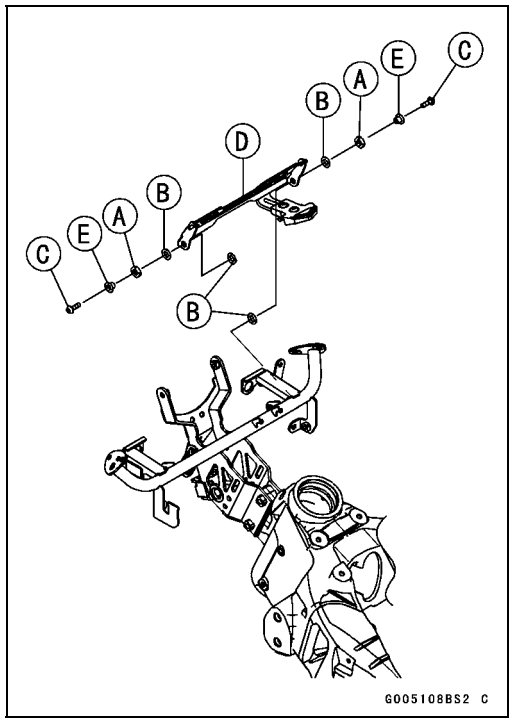


● Apply a non-permanent locking agent to the threads of the stay shaft bolts [A].
● Assemble the stay assembly as shown.
Stays [B]
Stoppers [C]
Stay Shaft [D]
Stay Shaft Bolts
Stopper Mounting Bolts [E]
○Do not tighten firmly the stopper mounting bolts at this time.



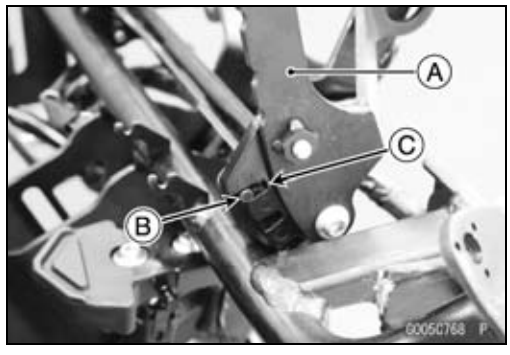
Fairings

- Apply grease to the dampers [A] and washers [B].
- Apply a non-permanent locking agent to the threads of the adjust knob assembly bolts [C].
- Install:
  Adjust Knob Assembly [D]
  Washers
  Dampers
  Collars [E]
- Tighten the adjust knob assembly bolts.



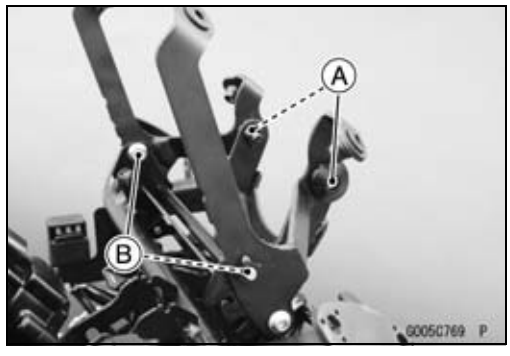
- Install the stay assembly [A].

○Fit the pin [B] of the adjust knob assembly into the groove [C] of the stopper (Both Sides).



- Install:
  Stay Assembly Mounting Bolts [A] and Collars
- Tighten the following bolts while the pins fit in the stoppers.

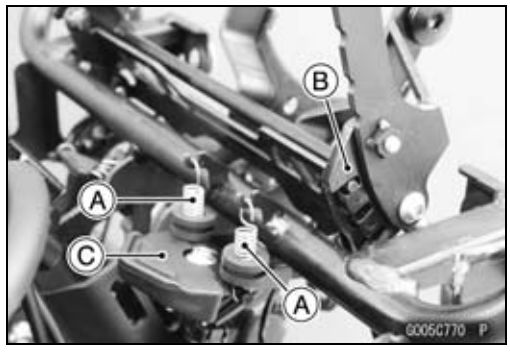
Torque - Stay Assembly Mounting Bolts: 6.9 N·m (0.70 kgf·m, 61 in·lb)
Stopper Mounting Bolts [B]: 4.2 N·m (0.43 kgf·m, 37 in·lb)



- Install:
  Springs [A] with Dampers
- Confirm that the position of the windshield stoppers [B] change smoothly and surely (Both Sides).

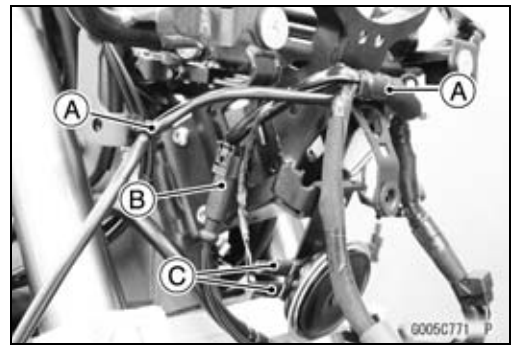
○Push the adjust knob [C] and change the positions of the windshield stoppers.

★If the windshield stoppers do not move smoothly reassemble the windshield bracket.

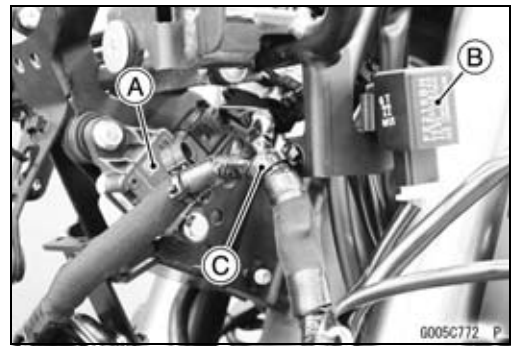


Fairings

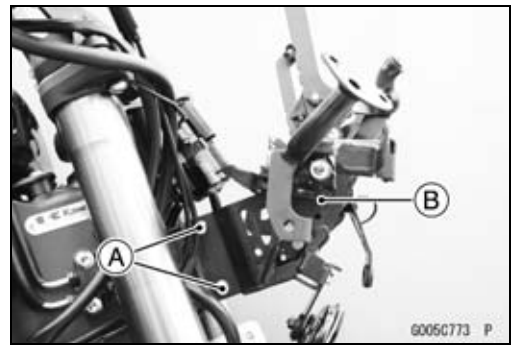
Windshield Bracket Assembly Removal



- Remove:
  Upper Fairing (see Upper Fairing Assembly Removal)
  Canister (see Evaporative Emission Control System Inspection in the Periodic Maintenance chapter)
- Open the clamps [A].
- Remove the front wheel rotation sensor lead connector [B] from the wind shield bracket assembly.
- Disconnect:
  Horn Lead Connectors [C]



- Remove:
  IMU [A] (see IMU Removal in the Fuel System chapter)
  Turn Signal Relay [B]
- Open the clamp [C].



- Remove:
  Windshield Bracket Assembly Bolts [A]
  Windshield Bracket Assembly [B]

Windshield Bracket Assembly Installation

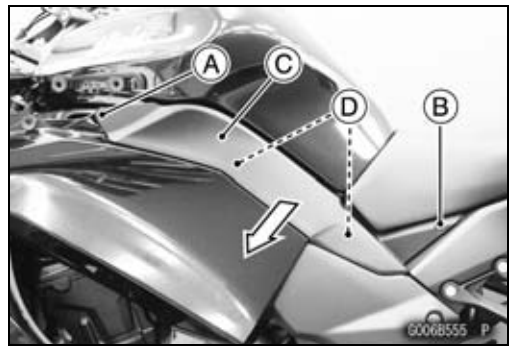
- Installation is the reverse of removal.

Torque - Windshield Bracket Assembly Mounting Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

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

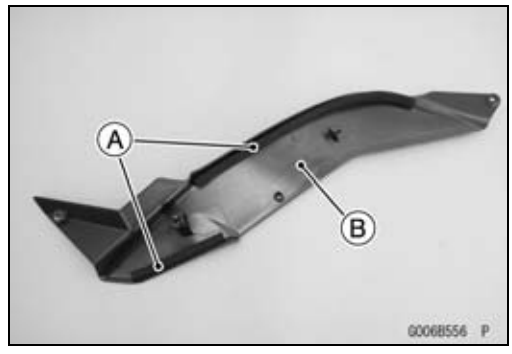
Covers

Side Cover Removal

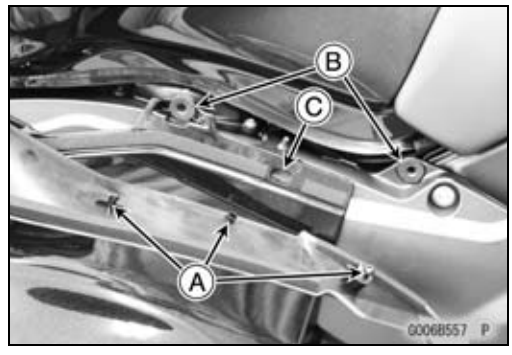


- Remove:
  Middle Fairing (see Middle Fairing Removal)
  Side Cover Bolt (Front) [A] with Washer
  Side Cover Bolt (Rear) [B] with Washer
- Pull the side cover [C] outward to clear the projections [D].

Side Cover Installation



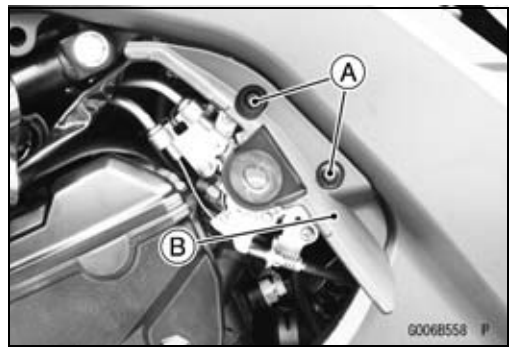
- Check that the pads [A] are in place on the side cover [B].



- Insert the projections [A] into the grommets [B] and hole [C].
- Tighten the bolts with washers.

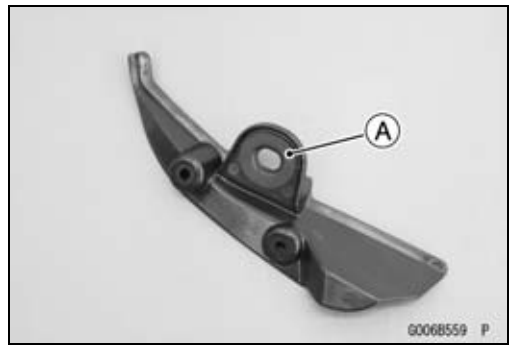
Torque - Side Cover Bolt (Front): 0.50 N·m (0.05 kgf·m, 4.4 in·lb)
Side Cover Bolt (Rear): 3.0 N·m (0.31 kgf·m, 27 in·lb)

Left Lower Side Fairing Removal



- Remove:
  Left Lower Fairing (see Lower Fairing Removal)
  Bolts [A] with Washers
  Left Lower Side Fairing [B]

Left Lower Side Fairing Installation

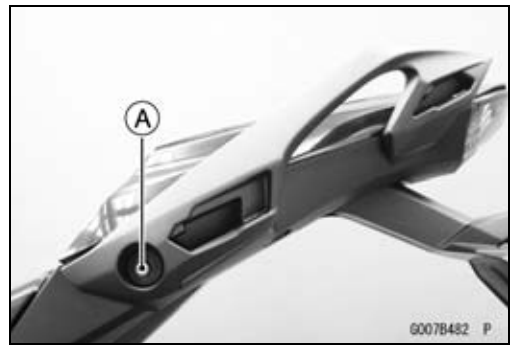


- Installation is the reverse of removal.
- Be sure to install the damper [A].

Covers

Seat Cover Removal

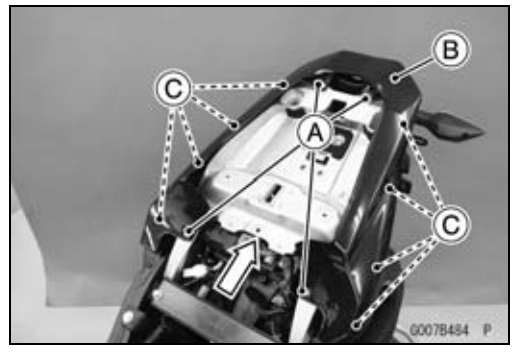
- Remove:
  Seats (see Rear/Front Seat Removal)
  Grab Rail Mounting Bolt (L = 60 mm) [A] and Washer (Both Sides)



- Remove:
  Grab Rail Mounting Bolt (L = 20 mm) [A] (Both Sides)
  Grab Rail [B] (Both Sides)



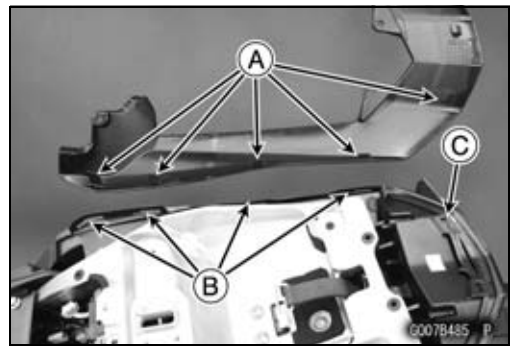
- Remove:
  Bolts [A] with Washers
- Pull the seat cover [B] rearward to clear the hooks [C].



Seat Cover Installation

- Installation is the reverse of removal.
- Insert the hooks [A] into the slots [B] and damper [C] on both sides.
- Tighten:

Torque - Grab Rail Mounting Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)



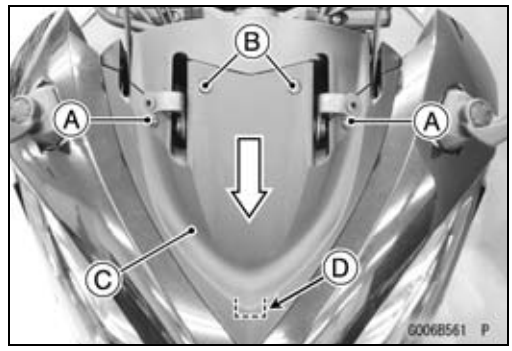
Meter Cover Removal

- Remove:
  Middle Fairing (see Middle Fairing Removal in the Frame chapter)
  Windshield (see Windshield Removal)
  Windshield Bracket Cover Bolts [A] with Washers

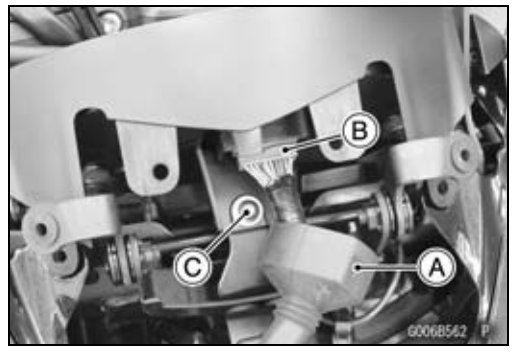


Covers

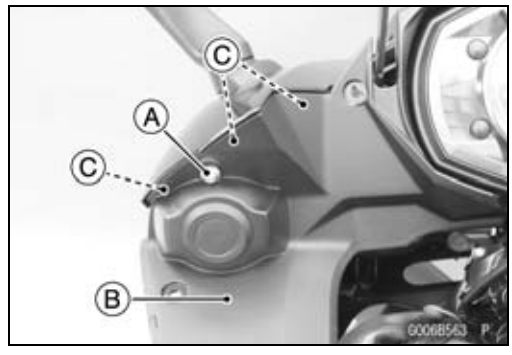
- Remove:
  Windshield Bracket Cover Bolts [A] with Washers
  Quick Rivets [B]
- Pull the windshield bracket cover [C] downward to clear the hook [D] from the upper fairing.



- Slide the dust cover [A].
- Disconnect the meter connector [B].
- Remove:
  Meter Cover Bolt (L = 16 mm) [C]



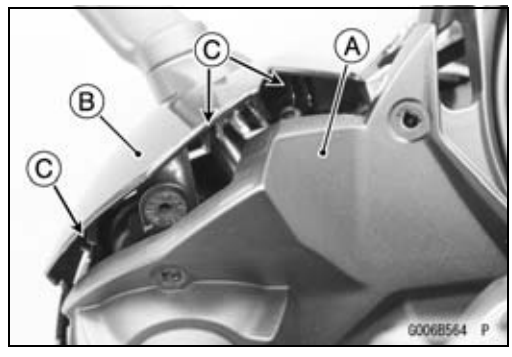
- Remove:
  Meter Cover Bolt (L = 20 mm) [A] (Both Sides)
- Pull the meter cover [B] rearward to clear the hooks [C] of the upper fairing on both sides.



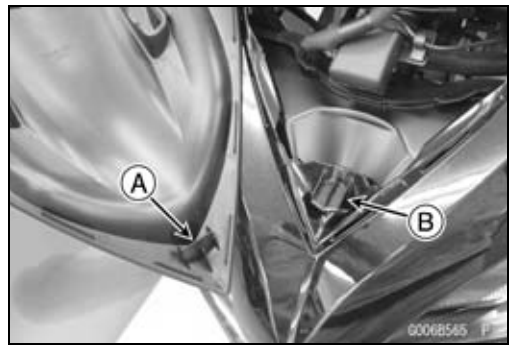
Meter Cover Installation

- Installation id the reverse of removal.
- Insert the meter cover [A] between upper fairing [B] and hooks [C].
- Tighten:

Torque - Meter Cover Bolts (L = 20 mm): 0.50 N·m (0.05 kgf·m, 4.4 in·lb)
Meter Cover Bolt (L = 16 mm): 3.0 N·m (0.31 kgf·m, 27 in·lb)



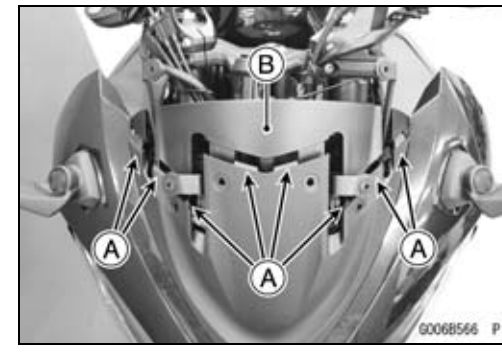
- Hang the hook [A] of windshield bracket cover to tab [B] of the upper fairing.



Covers

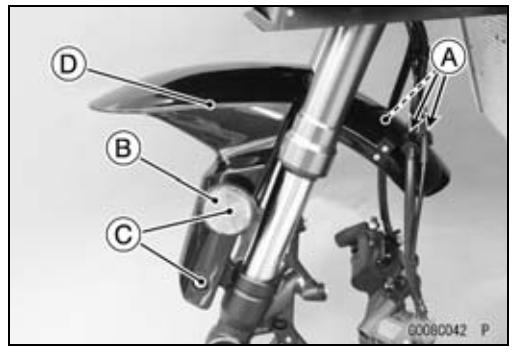
- Insert the tabs [A] into the inside of meter cover [B].
- Tighten:

Torque - Windshield Bracket Cover Bolts: 0.50 N·m (0.05 kgf·m, 4.4 in·lb)



Fenders

Front Fender Removal



- Remove:
  Front Wheel (see Front Wheel Removal in the Wheels/Tires chapter)
- Clear the brake hoses and front wheel rotation sensor lead from the clamps [A].
- Remove:
  Reflector [B] with Washer (Both Sides, other than PH and TH models)
  Front Fender Mounting Bolts [C] with Washers (Both Sides)
  Front Fender [D]

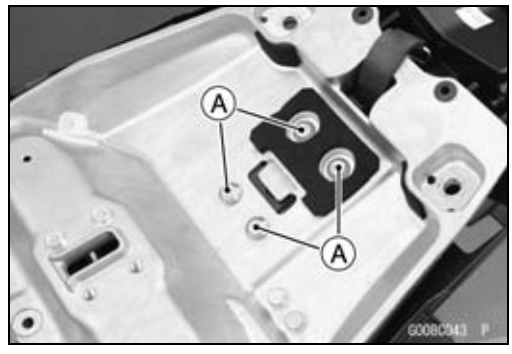
Front Fender Installation

- Installation is the reverse of removal.
- Tighten:

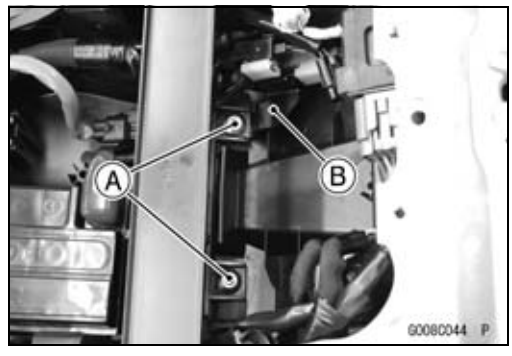
Torque - Front Fender Mounting Bolts: 4.0 N·m (0.41 kgf·m, 35 in·lb)

- Run the brake hoses and front wheel rotation sensor lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

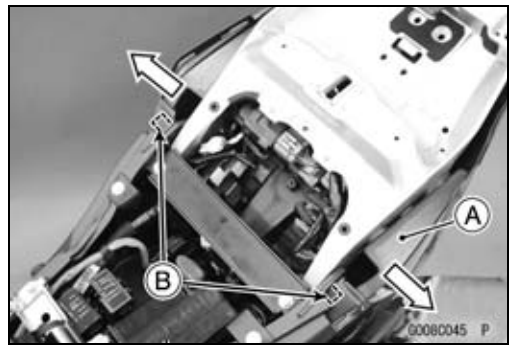
Flap and Rear Fender Removal



- Remove:
  Seats (see Front/Rear Seat Removal)
  Seat Cover (see Seat Cover Removal)
  Owner's Tool
  Rear Fender Mounting Bolts [A]



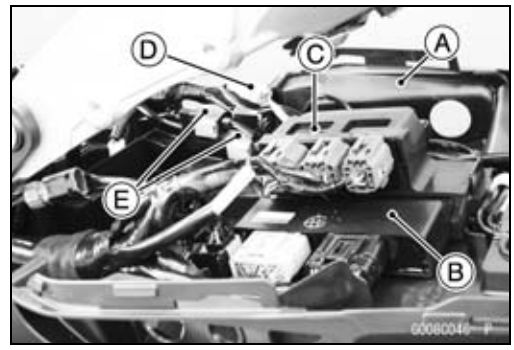
- Remove:
  Battery Case Bolts (Rear) [A]
  Bracket [B]



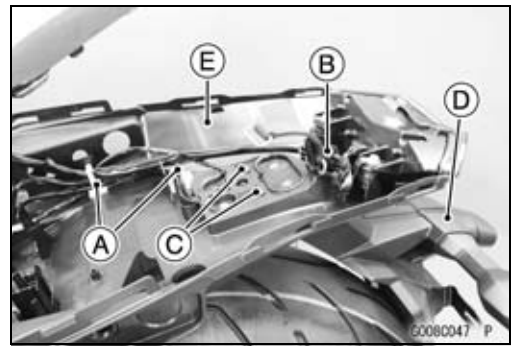
- Pull the rear fender [A] outward to clear the projections [B].

Fenders

- Push the rear fender [A] downward.
- Remove:
  ECU [B] with Relay Box [C]
- Disconnect:
  License Plate Light Lead Connector [D]
  Turn Signal Light Lead Connectors [E]

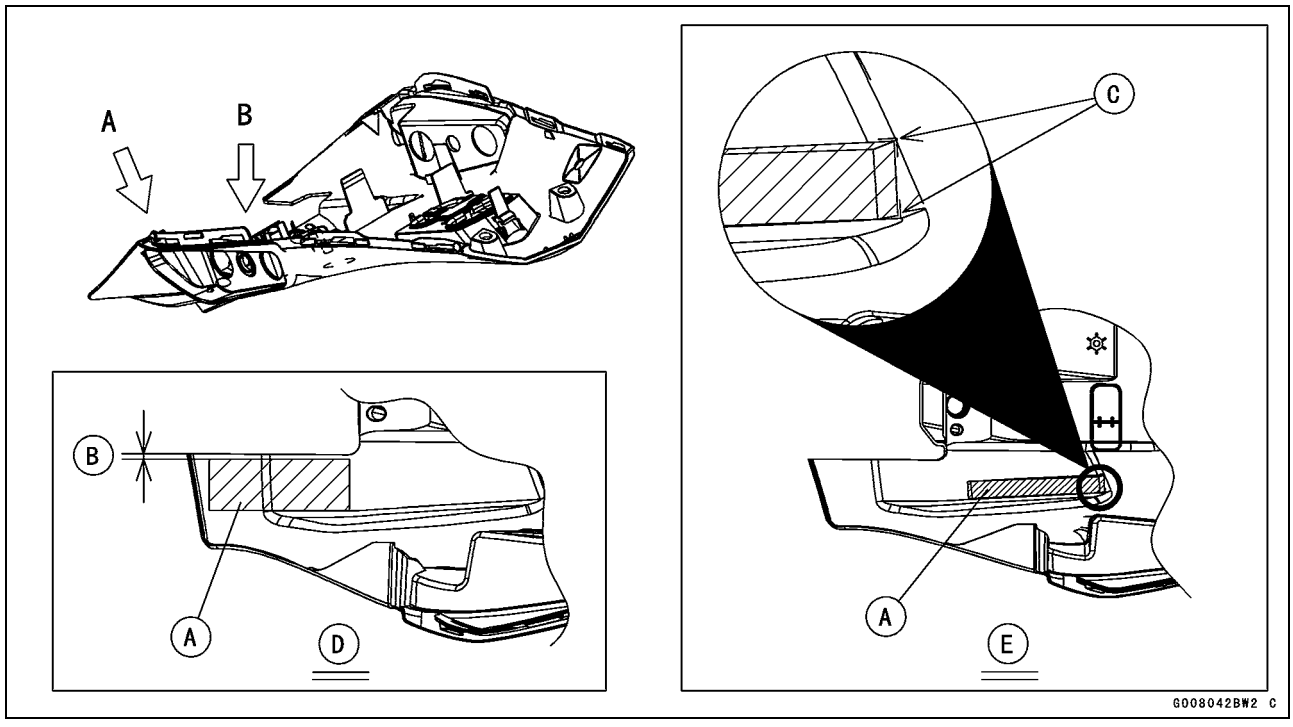


- Free the leads from the clamps [A].
- Disconnect:
  Tail/Brake Light Lead Connector [B]
- Remove:
  Flap Mounting Screws [C]
  Flap [D]
  Rear Fender [E]



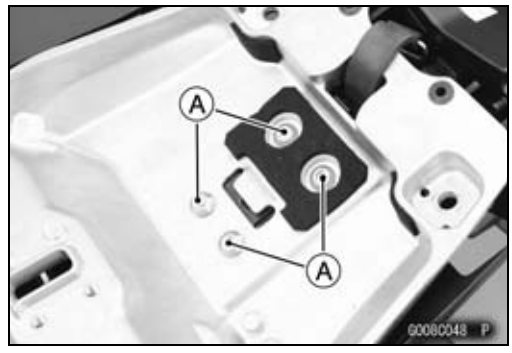
Flap and Rear Fender Installation

- Installation is the reverse of removal.
- When installing the pads [A], install them as shown.
  [B] 3 mm (0.12 in.)
  [C] Align the edge of the pad with the lines of the rear fender.
  [D] View A
  [E] View B



Fenders

- Run the cables, leads, harness and hose correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Apply a non-permanent locking agent to the threads of the rear fender mounting bolts [A], and tighten them securely.



Frame

Frame Inspection

● Visually inspect the frame for cracks, dents, bending, or warp.

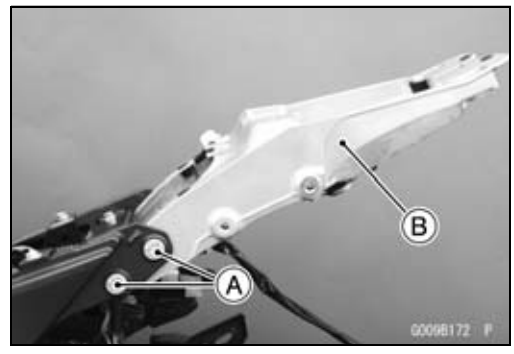
★If there is any damage to the frame, replace it.

⚠ WARNING

A repaired frame may fail in use, possibly causing an accident resulting in injury or death. If the frame is bent, dented, cracked, or warped, replace it.

Rear Frame Removal

● Remove:
Rear Fender (see Flap and Rear Fender Removal)
Rear Frame Bolts [A] (Both Sides)
Rear Frame [B]



Rear Frame Installation

● Apply a non-permanent locking agent to the threads of the rear frame bolts.

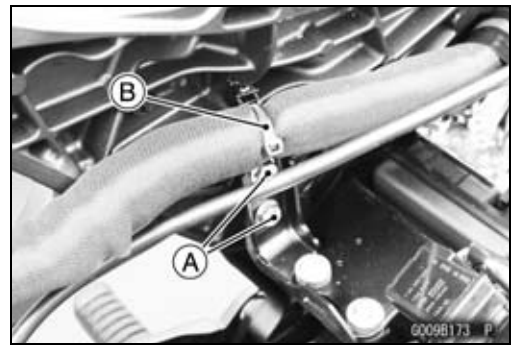
● Tighten:

Torque - Rear Frame Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

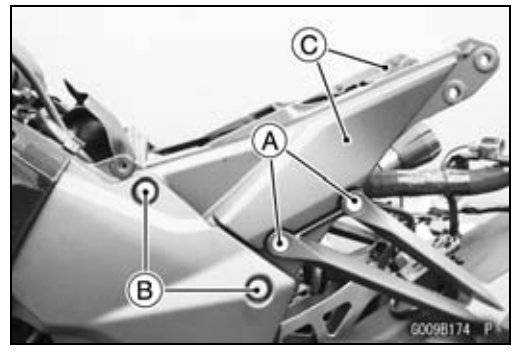
● Install the removed parts (see appropriate chapters).

Rear Frame Bracket Removal

● Remove:
Side Covers (see Side Cover Removal)
Battery Case (see Battery Case Removal)
Rear Frame (see Rear Frame Removal)
Bolts [A]
Clamp [B] (Left Side only)



● Remove:
Rear Footpeg Bracket Bolts [A] (Both Sides)
Rear Frame Bracket Bolts [B] (Both Sides)
Rear Frame Brackets [C]



Rear Frame Bracket Installation

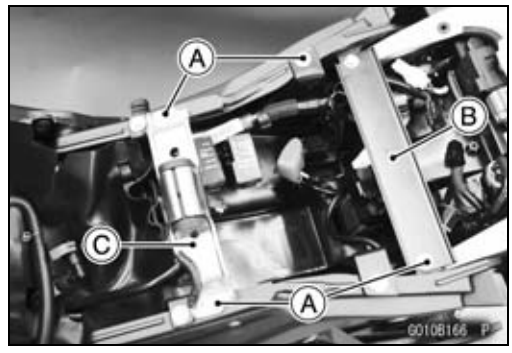
● Tighten:

Torque - Rear Frame Bracket Bolts: 45 N·m (4.6 kgf·m, 33 ft·lb)
Rear Footpeg Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

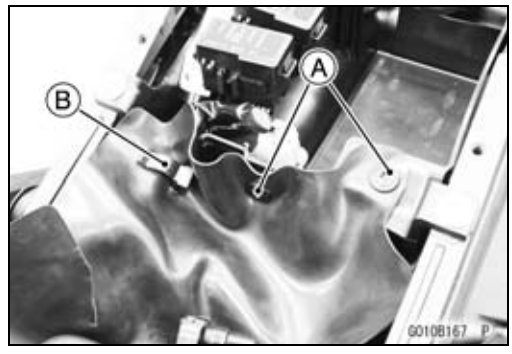
● Install the removed parts (see appropriate chapters).

Battery Case

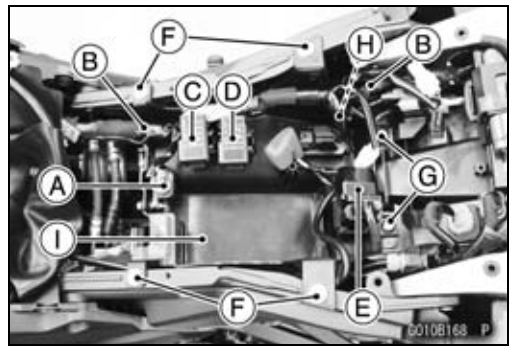
Battery Case Removal



- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Battery (see Battery Removal in the Electrical System chapter)
  Bolts [A]
  Bracket [B]
  Fuel Tank Bracket [C]



- Remove:
  Screw Rivets [A]
  Clamp [B]



- Disconnect:
  Vehicle-down Sensor Lead Connector [A]
- Cut the bands [B].
- Remove:
  Fuse Box (1) [C]
  Fuse Box (2) [D]
  Starter Relay [E]
  Battery Case Bolts (Front) [F]
  Battery Case Bolts (Rear) [G]
  Connector Bracket Screw [H]
  Brackets
  Battery Case [I]

Battery Case Installation

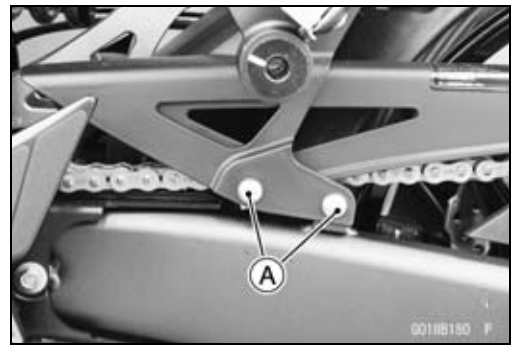
- Installation is the reverse of removal.
- Run the cables, leads, harness and hose correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Tighten:

Torque - Connector Bracket Screw: 1.2 N·m (0.12 kgf·m, 11 in·lb)
Battery Case Bolts (Front): 4.0 N·m (0.41 kgf·m, 3.5 in·lb)
Battery Case Bolts (Rear): 1.0 N·m (0.10 kgf·m, 8.9 in·lb)

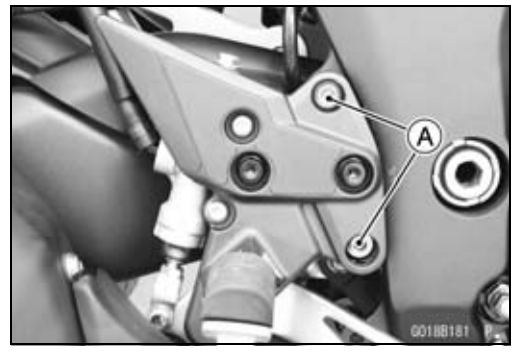
- Install the removed parts (see appropriate chapters).

Guard

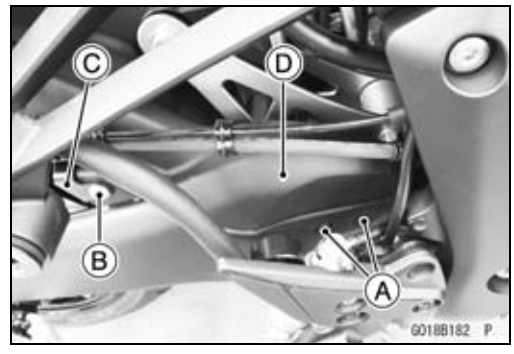
Mud Guard Removal



- Remove:
  Muffler Bodies (see Muffler Body Removal in the Engine Top End chapter)
  Mud Guard Mounting Bolts [A]



- Remove:
  Right Front Footpeg Bracket Bolts [A]



- Remove:
  Quick Rivets [A]
  Mud Guard Mounting Bolt [B]
  Bracket [C]
  Mud Guard [D]

Mud Guard Installation

- Installation is the reverse of removal.
- Apply a non-permanent locking agent to the threads of the mud guard mounting bolts, and tighten them securely.
- Tighten:

Torque - Front Footpeg Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

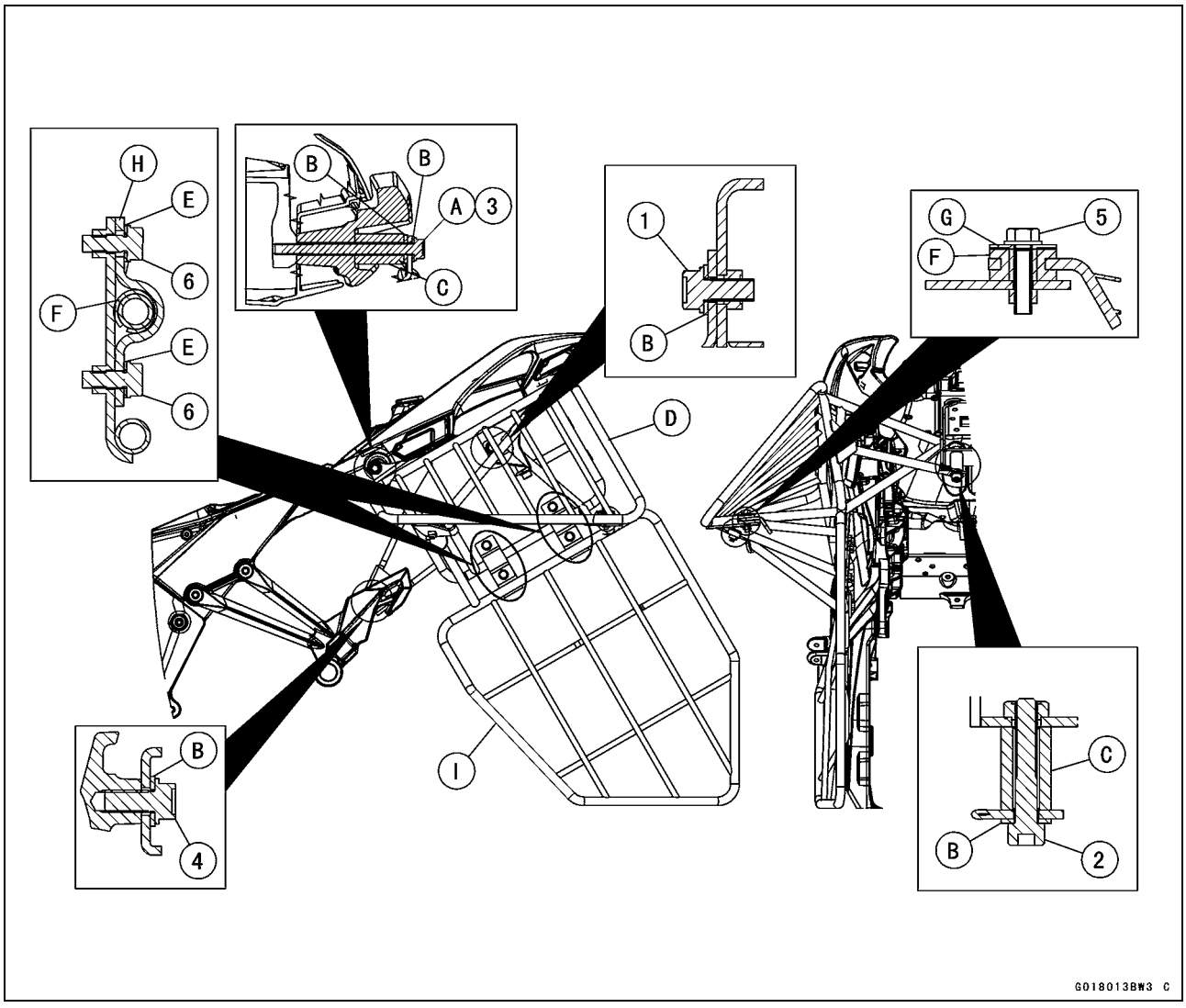
Guard

Saree Guard Installation (Equipped Model)

- Apply a non-permanent locking agent to the threads of the grab rail mounting bolt (L = 100 mm) [A].
- Install the washers [B], collars [C] and upper saree guard [D] as shown.
- Temporarily install the bolts [1 ~ 4] loosely by hand.
- Tighten the bolts temporarily by following the sequence [1 ~ 4].
- Tighten the bolts [1 ~ 4] securely.

Torque - Grab Rail Mounting Bolt (L = 100 mm): 25 N·m (2.5 kgf·m, 18 ft·lb)

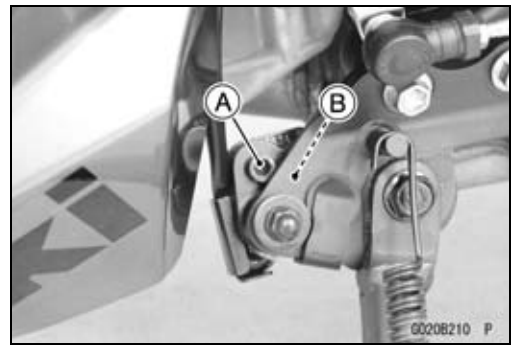
- Install the washers [E], dampers [F], collars [G], brackets [H] and lower saree guard [I] as shown.
- Temporarily install the bolts [5 ~ 6] loosely by hand.
- Tighten the bolts [5 ~ 6] securely.



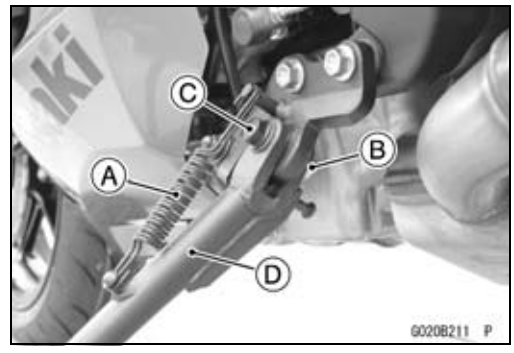
Side Stand

Side Stand Removal

- Raise the rear wheel off the ground with a stand.
- Remove:
  Side Stand Switch Bolt [A]
  Side Stand Switch [B]



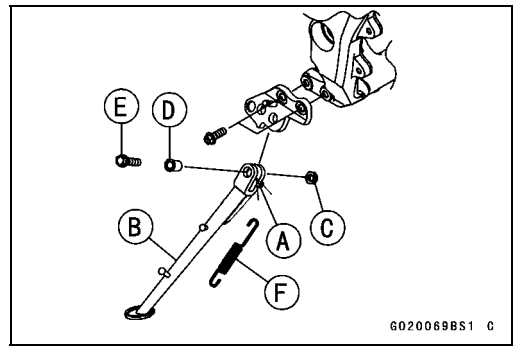
- Remove:
  Spring [A]
  Side Stand Nut [B]
  Side Stand Bolt [C]
  Collar
  Side Stand [D]



Side Stand Installation

- Apply grease to the sliding area [A] of the side stand [B].
- Replace the side stand nut [C] with a new one.
- Install:
  Side Stand
  Collar [D]
- Tighten the side stand bolt [E] first, and then the side stand nut.

Torque - Side Stand Bolt: 30 N·m (3.1 kgf·m, 22 ft·lb)
Side Stand Nut: 45 N·m (4.6 kgf·m, 33 ft·lb)



- Hook the spring [F] so that the long spring end faces upward.

○Install the spring hook direction as shown.

- Install the side stand switch.
- Apply a non-permanent locking agent to the thread of the side stand switch bolt, and tighten it.

Torque - Side Stand Switch Bolt: 9.0 N·m (0.92 kgf·m, 80 in·lb)

Electrical System

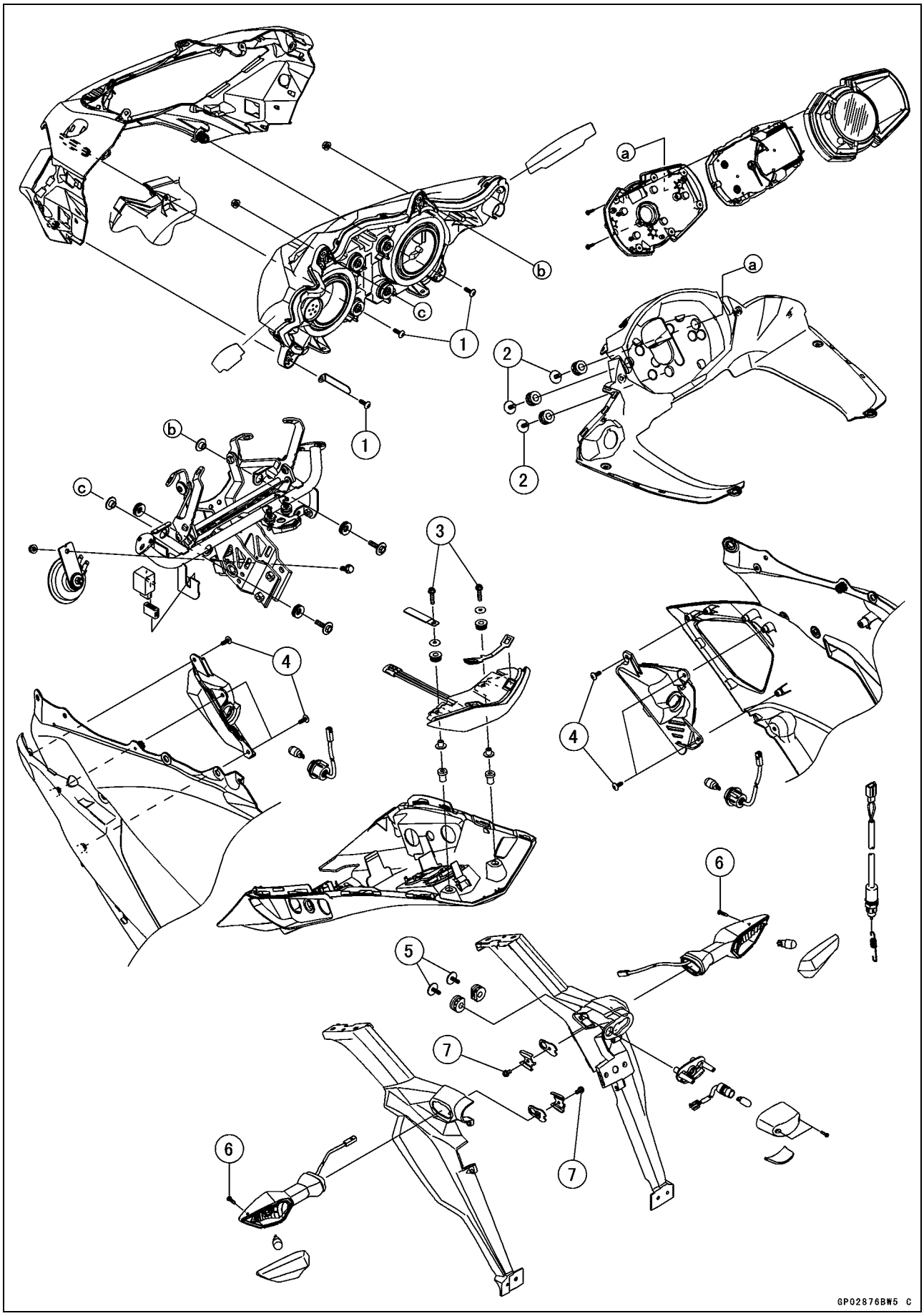
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30 A Main/15 A ECU Fuse Removal..... 16-111
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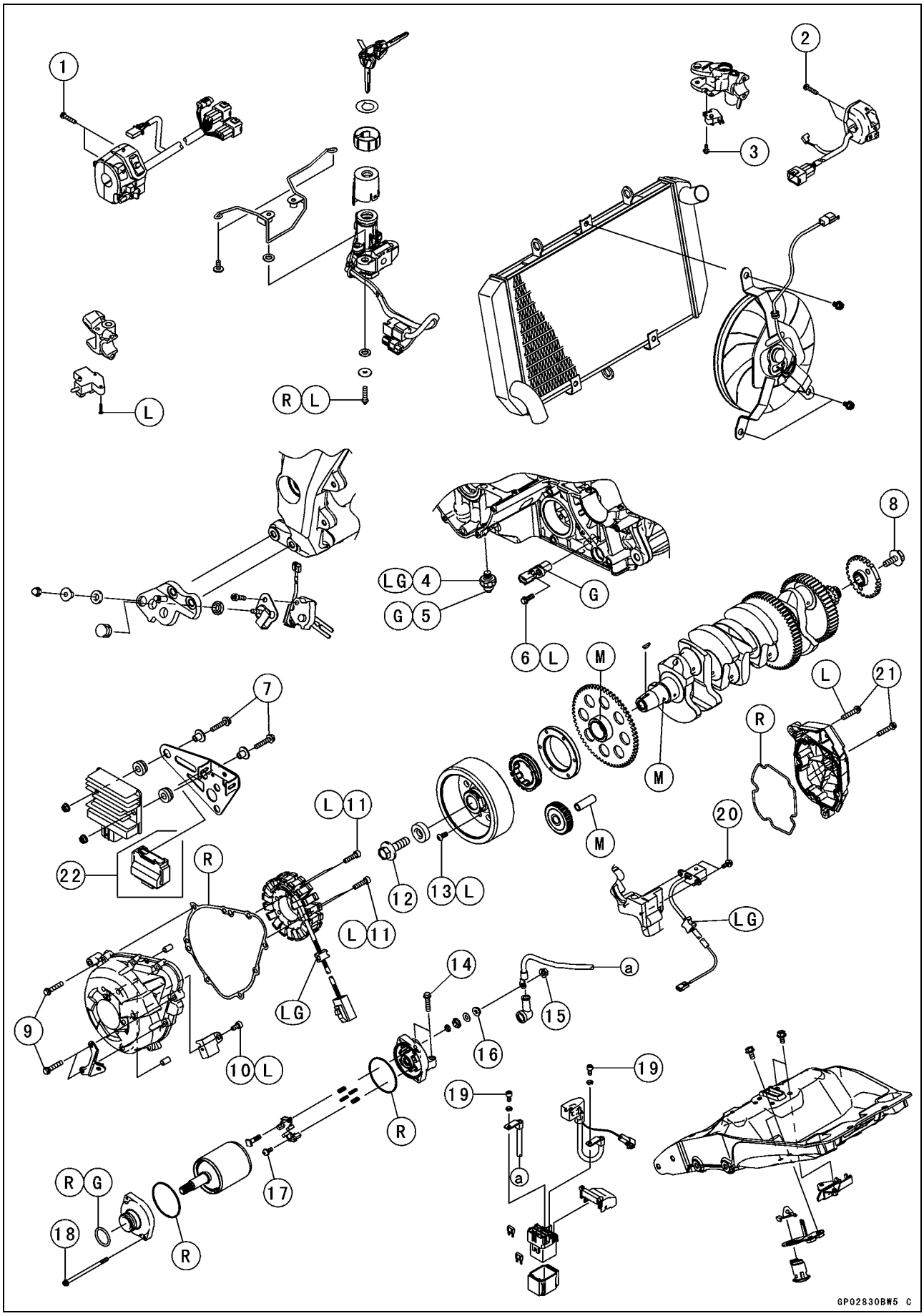
Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Headlight 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 Bolts	0.50	0.05	4.4 in·lb	
4	Front Turn Signal Light Screws	1.2	0.12	11 in·lb	
5	License Plate Light Mounting Screws	1.2	0.12	11 in·lb	
6	Turn Signal Light Lens Screw	1.0	0.10	8.9 in·lb	
7	Rear Turn Signal Light Mounting Screws	1.2	0.12	11 in·lb	

Exploded View

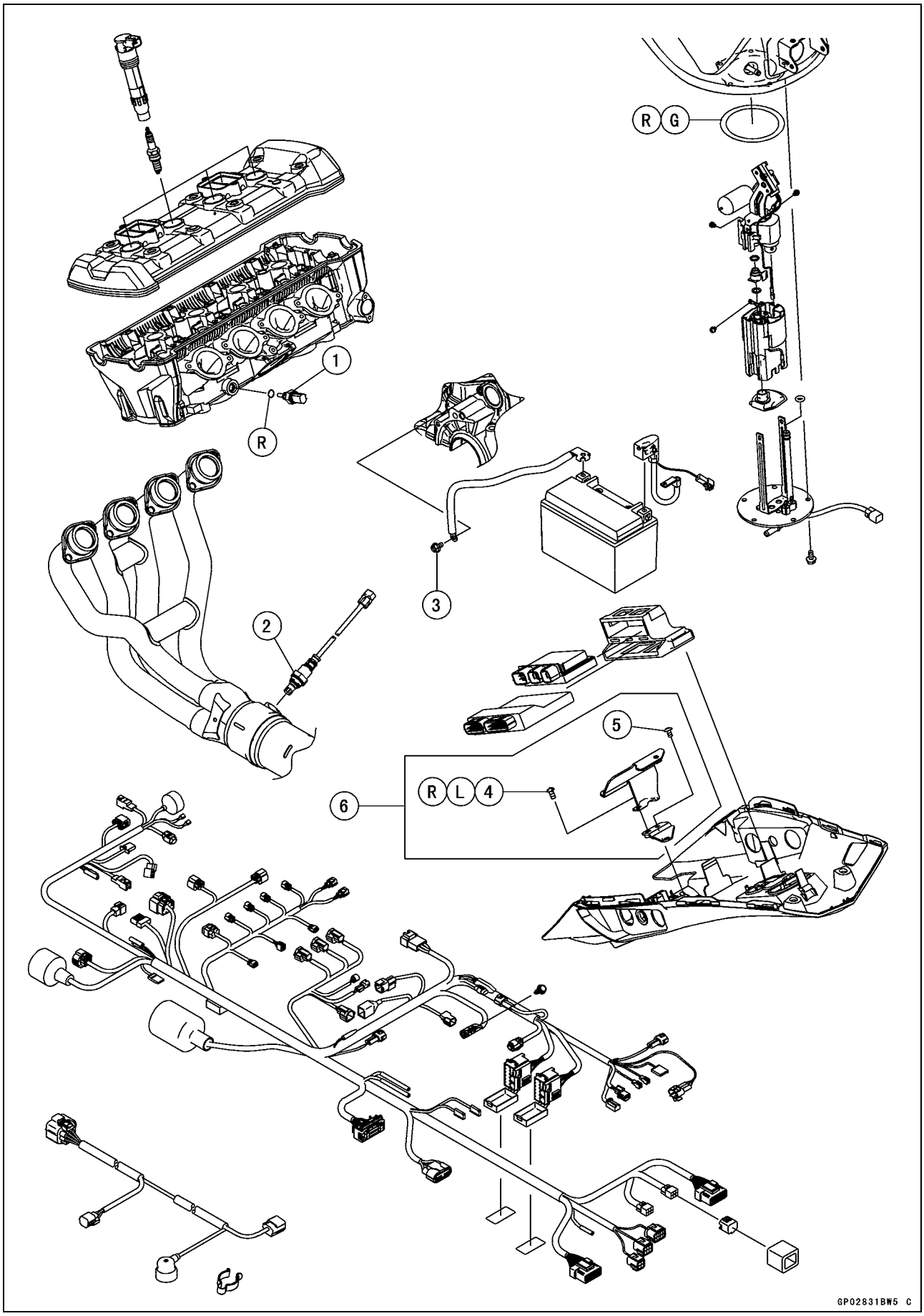


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Left Switch Housing Screws	3.5	0.36	31 in·lb	
2	Right Switch Housing Screws	3.5	0.36	31 in·lb	
3	Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
4	Oil Pressure Switch	15	1.5	11	LG
5	Oil Pressure Switch Terminal Bolt	2.0	0.20	18 in·lb	G
6	Gear Position Sensor Bolt	10	1.0	89 in·lb	L
7	Regulator/Rectifier Bolts	9.8	1.0	87 in·lb	
8	Timing Rotor Bolt	39	4.0	29	
9	Alternator Cover Bolts	12	1.2	106 in·lb	
10	Alternator Lead Holding Plate Bolt	12	1.2	106 in·lb	L
11	Stator Coil Bolts	12	1.2	106 in·lb	L
12	Alternator Rotor Bolt	155	15.8	114	
13	Starter Motor Clutch Bolts	12	1.2	106 in·lb	L
14	Starter Motor Mounting Bolts	10	1.0	89 in·lb	
15	Starter Motor Cable Terminal Nut	6.0	0.61	53 in·lb	
16	Starter Motor Terminal Locknut	11	1.1	97 in·lb	
17	Brush Holder Screw	3.8	0.39	34 in·lb	
18	Starter Motor Through Bolts	5.0	0.51	44 in·lb	
19	Starter Relay Terminal Bolts	5.1	0.52	45 in·lb	
20	Crankshaft Sensor Bolts	6.0	0.61	53 in·lb	
21	Crankshaft Sensor Cover Bolts	12	1.2	106 in·lb	L (1)

22. Immobilizer System Equipped Models
G: Apply grease.
L: Apply a non-permanent locking agent.
LG: Apply liquid gasket.
M: Apply molybdenum disulfide grease.
R: Replacement Parts

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Water Temperature Sensor	12	1.2	106 in·lb	
2	Oxygen Sensor	45	4.6	33	
3	Engine Ground Cable Terminal Bolt	10	1.0	89 in·lb	
4	ECU Guard Bolts	4.0	0.41	35 in·lb	L, R
5	ECU Guard Bracket Screw	1.2	0.12	11 in·lb	

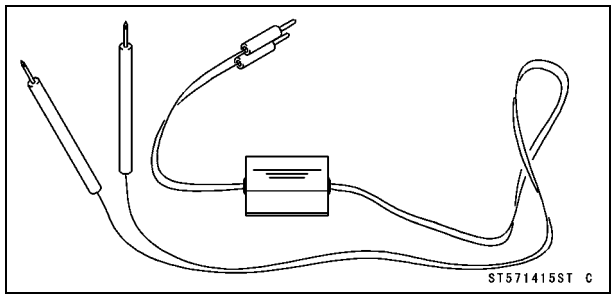
6. EUR Model
G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts

Specifications

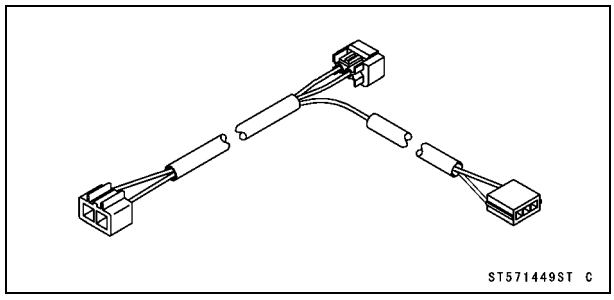
Item	Standard
Battery	
Type	Sealed Battery
Model Name	YTX9-BS
Capacity	12 V 8 Ah (10 HR)
Voltage	12.8 V or more
Gross Weight	2.9 kg (6.4 lb)
Electrolyte Volume	0.40 L (24 cu in.)
Charging System	
Type	Three-phase AC
Charging Voltage (Regulator/Rectifier Output Voltage)	DC 14.3 ~ 14.7 V @25°C (77°F)
Alternator Output Voltage	AC 42 V or more @4 000 r/min (rpm)
Stator Coil Resistance	0.18 ~ 0.27 Ω @20°C (68°F)
Ignition System	
Spark Plug:	
Type	NGK CR9EIA-9
Gap	0.8 ~ 0.9 mm (0.031 ~ 0.035 in.)
Stick Coil:	
Primary Winding Resistance	1.1 ~ 1.5 Ω @20°C (68°F)
Secondary Winding Resistance	6.4 ~ 9.6 kΩ @20°C (68°F)
Primary Peak Voltage	100 V or more
Crankshaft Sensor:	
Resistance	376 ~ 564 Ω @20°C (68°F)
Peak Voltage	2.0 V or more
Electric Starter System	
Starter Motor:	
Brush Length	12 mm (0.47 in.) [Service Limit: 6.5 mm (0.26 in.)]
Air Switching Valve	
Resistance	20 ~ 24 Ω @20°C (68°F)
Switches and Sensors	
Rear Brake Light Switch Timing	ON after about 10 mm (0.39 in.) pedal travel
Engine Oil Pressure Switch Connections	When engine is stopped: ON When engine is running: OFF
Water Temperature Sensor Resistance	in the text
Fuel Level Sensor Resistance:	
Full Position	9.6 ~ 12.4 Ω
Empty Position	222 ~ 228 Ω

Special Tools and Sealant

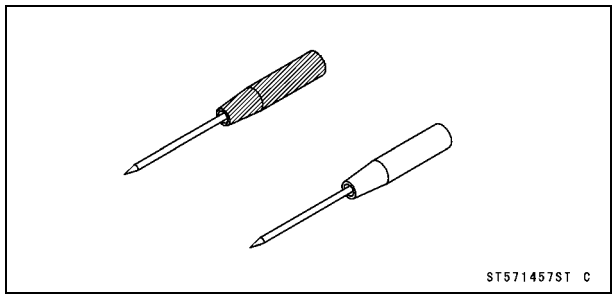
Peak Voltage Adapter:
57001-1415



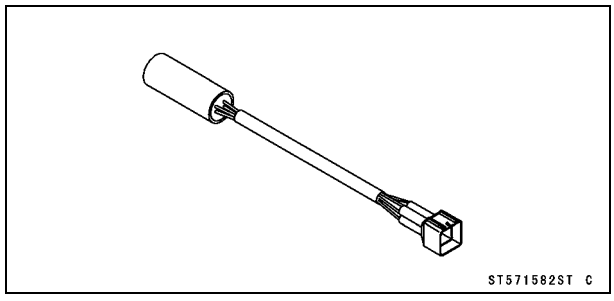
Lead Wire - Peak Voltage Adapter:
57001-1449



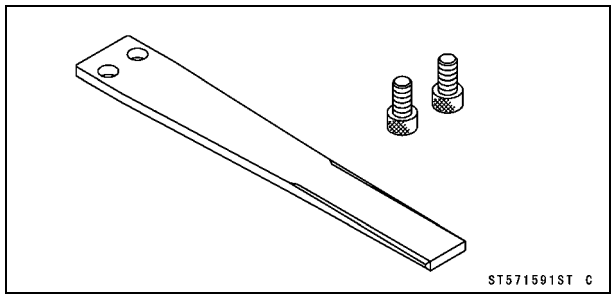
Needle Adapter Set:
57001-1457



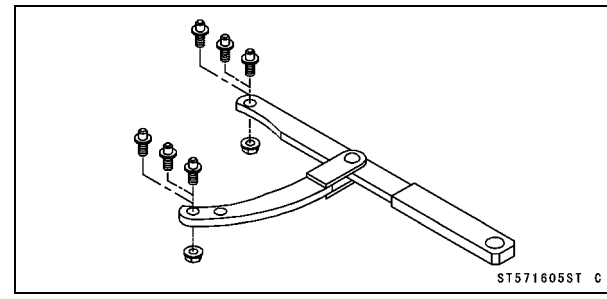
Key Registration Unit:
57001-1582



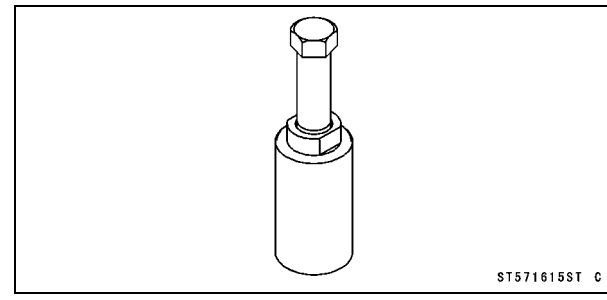
Grip:
57001-1591



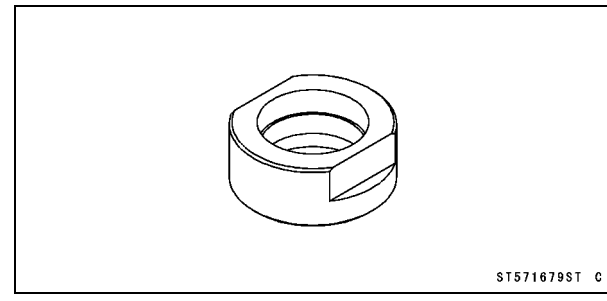
Flywheel & Pulley Holder:
57001-1605



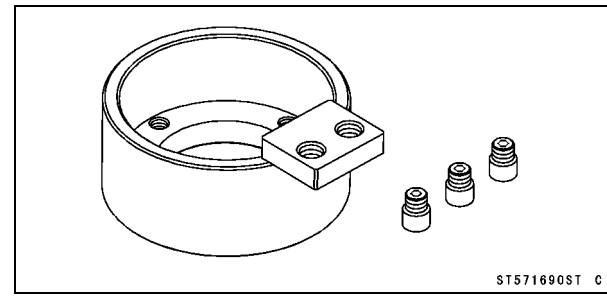
Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5:
57001-1615



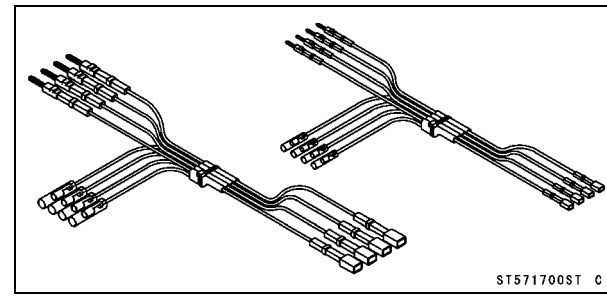
Stopper:
57001-1679



Rotor Holder:
57001-1690

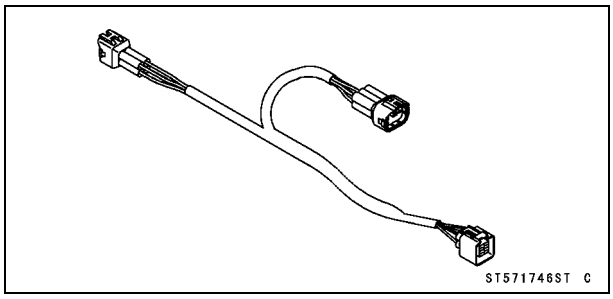


Measuring Adapter:
57001-1700

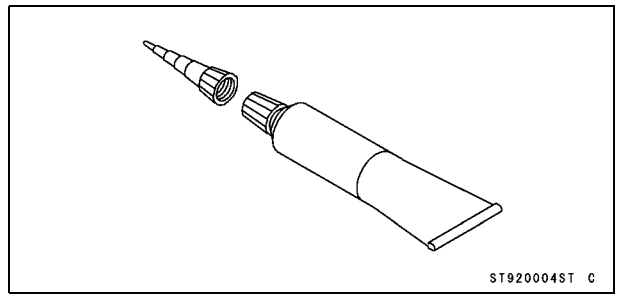


Special Tools and Sealant

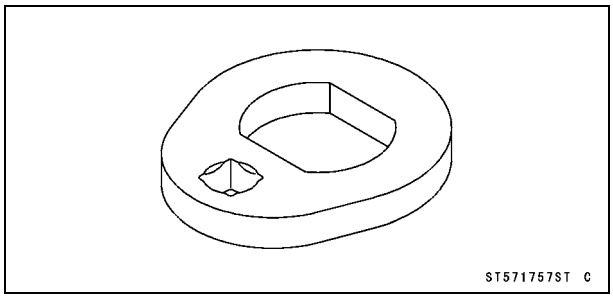
Key Registration Adapter:
57001-1746



Liquid Gasket, TB1211F:
92104-0004

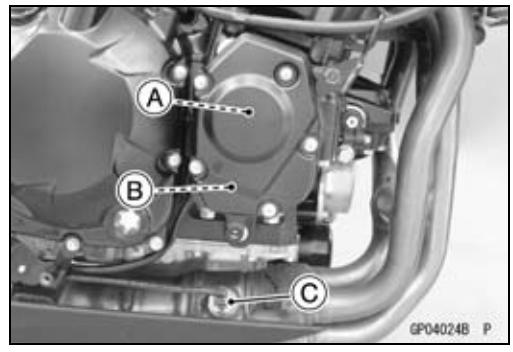


Rotor Holder:
57001-1757

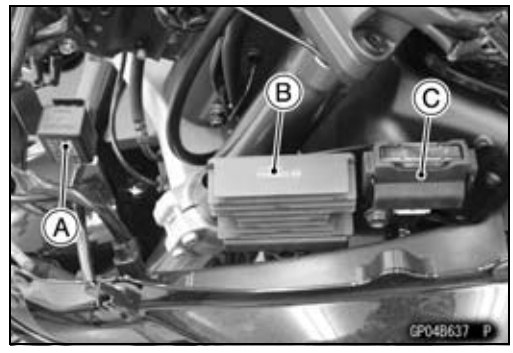


Parts Location

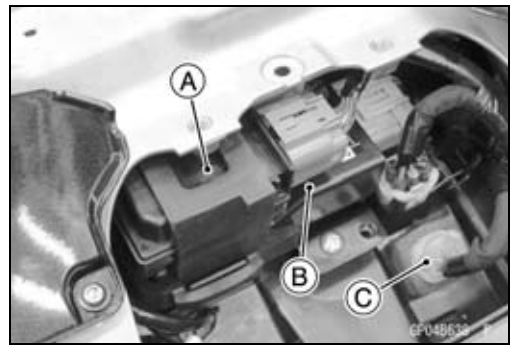
Timing Rotor [A]
Crankshaft Sensor [B]
Oxygen Sensor [C]



Turn Signal Relay [A]
Regulator/Rectifier [B]
Immobilizer Amplifier (Immobilizer Equipped Models) [C]



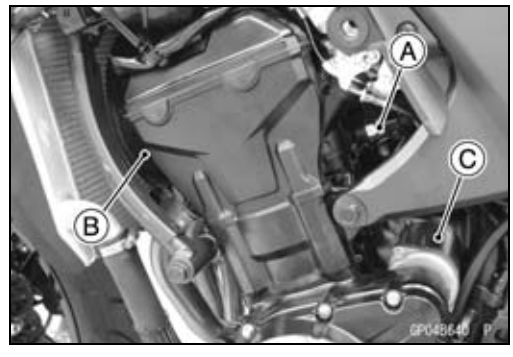
Relay Box [A]
ECU [B]
Immobilizer/Kawasaki Diagnostic System Connector [C]



Rear Brake Light Switch [A]

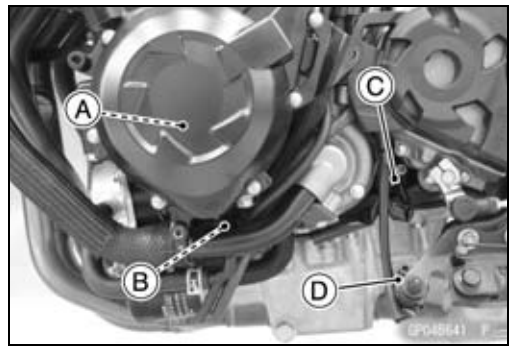


Water Temperature Sensor [A]
Radiator Fan Motor [B]
Stater Motor [C]

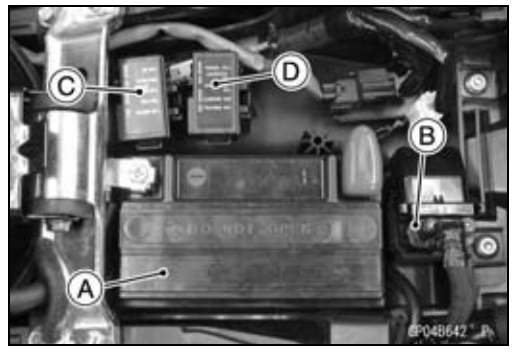


Parts Location

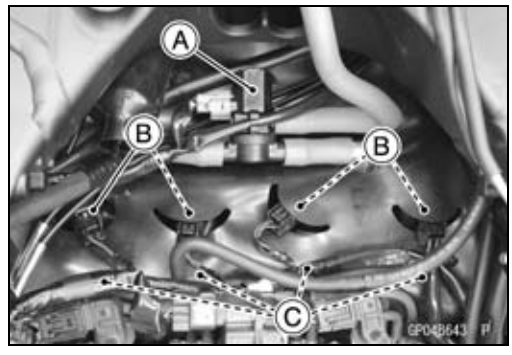
Alternator [A]
Oil Pressure Switch [B]
Gear Position Sensor [C]
Side Stand Switch [D]



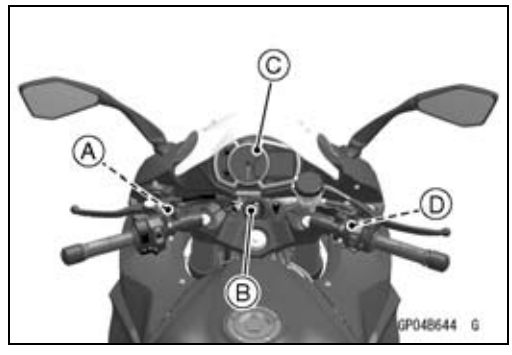
Battery 12 V 8 Ah [A]
Starter Relay [B]
Fuse Box (1) [C]
Fuse Box (2) [D]



Air Switching Valve [A]
Stick Coils [B]
Spark Plugs [C]



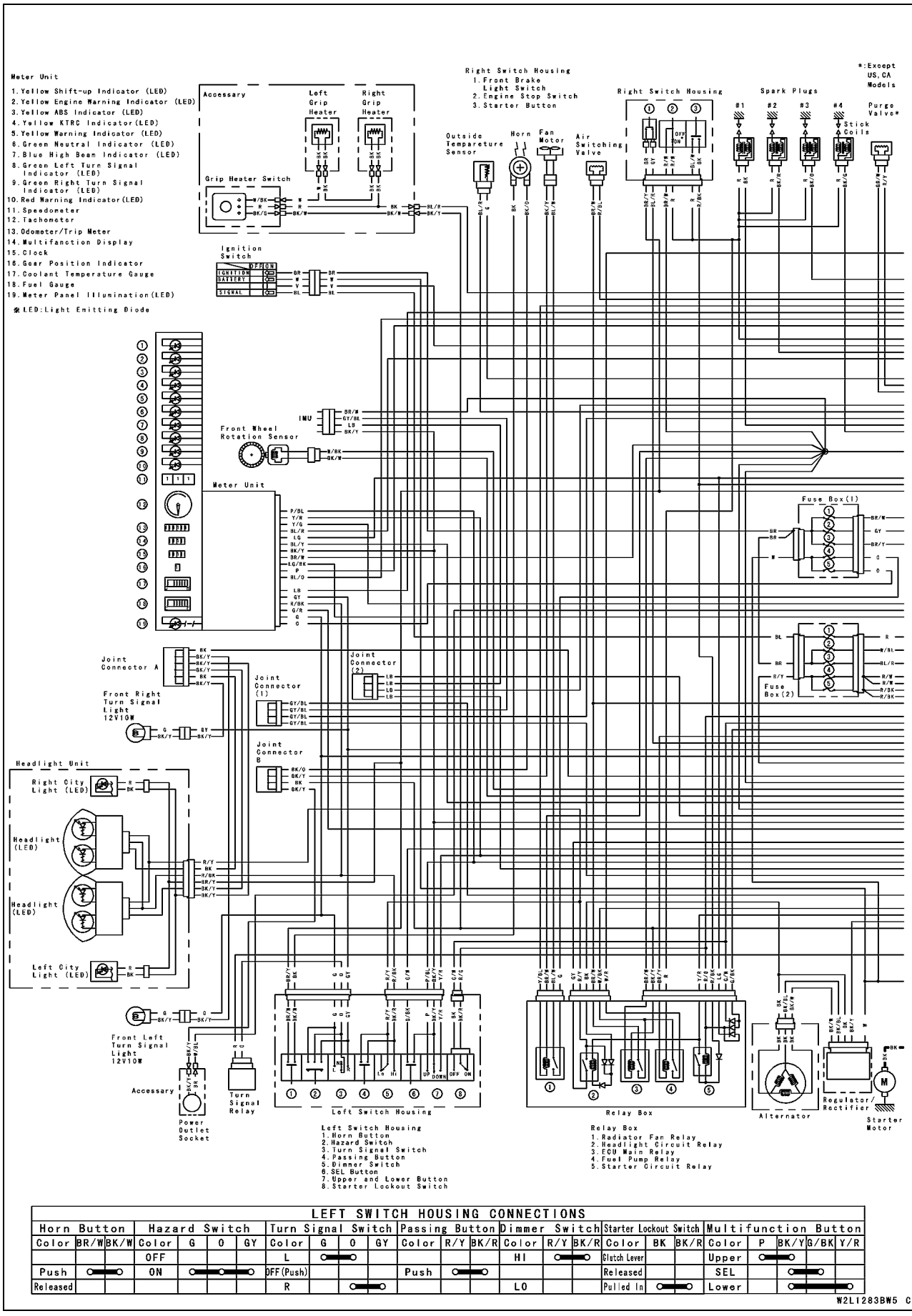
Starter Lockout Switch [A]
Ignition Switch [B] (Immobilizer Equipped Models: Including Immobilizer Antenna)
Meter Unit [C]
Front Brake Light Switch [D]



Parts Location

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Wiring Diagram (US, CA and CAL Models)

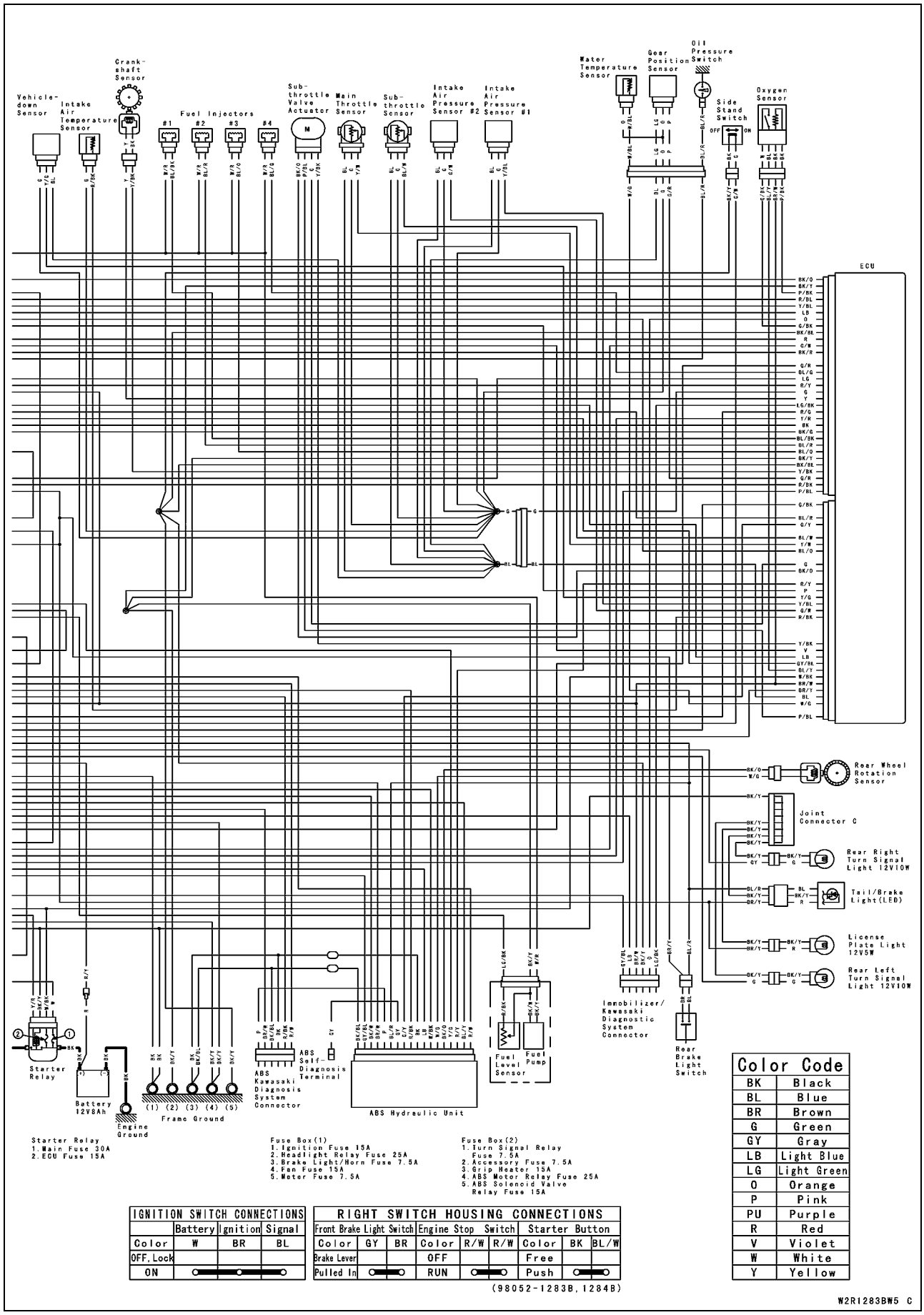


LEFT SWITCH HOUSING CONNECTIONS

Horn Button			Hazard Switch				Turn Signal Switch				Passing Button			Dimmer Switch			Starter Lockout Switch			Multifunction Button				
Color	BR/W	BK/W	Color	G	O	GY	Color	G	O	GY	Color	R/Y	BK/R	Color	R/Y	BK/R	Color	BK	BK/R	Color	P	BK/Y	G/BK	Y/R
			OFF				L							HI			Clutch Lever			Upper				
Push			ON				OFF (Push)				Push						Released			SEL				
Released							R							LO			Pulled In			Lower				

W2L1283BW5 C

Wiring Diagram (US, CA and CAL Models)



IGNITION SWITCH CONNECTIONS			
	Battery	Ignition	Signal
Color	W	BR	BL
OFF, Lock			
ON	●	●	●

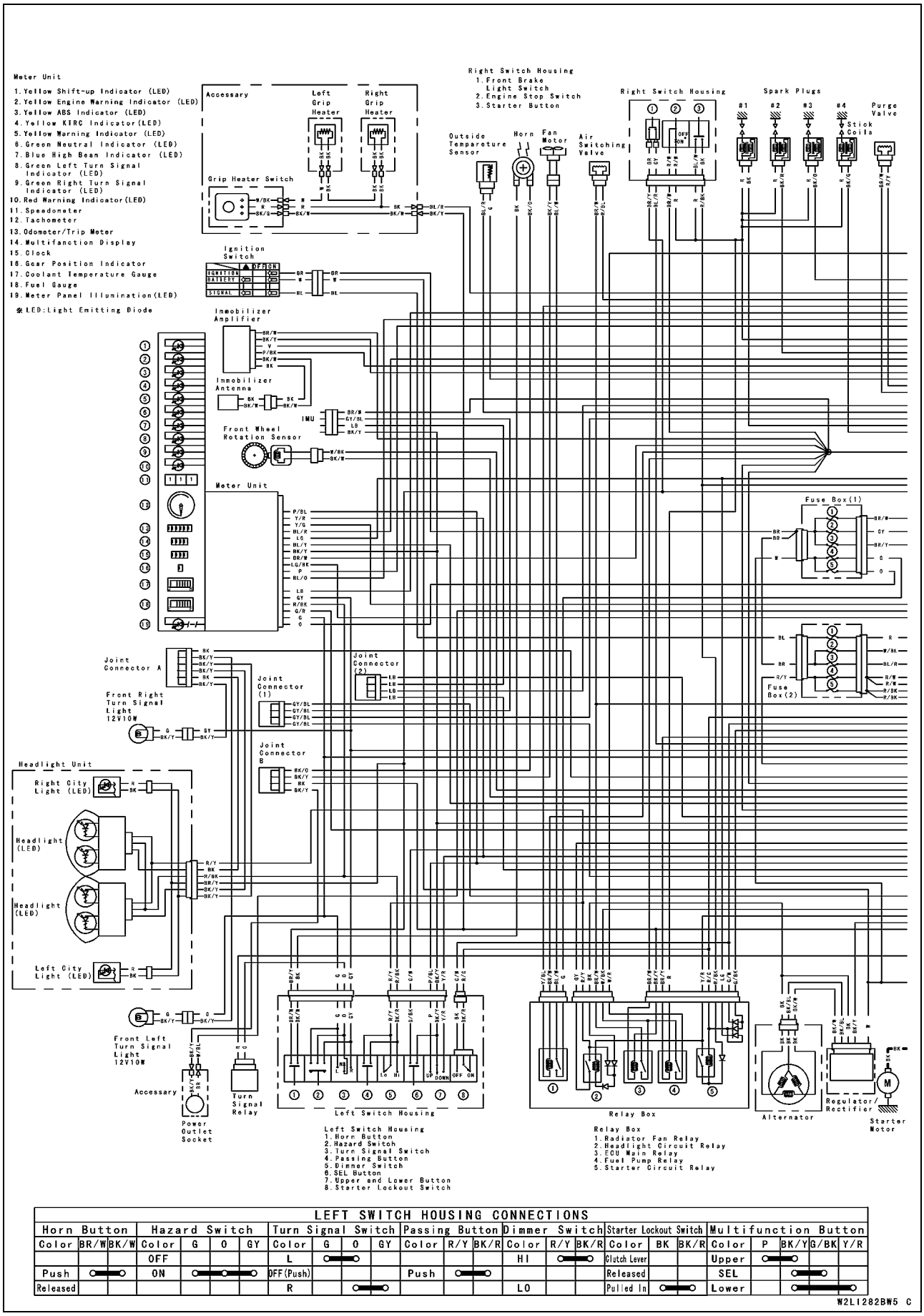
RIGHT SWITCH HOUSING CONNECTIONS								
Front Brake Light Switch			Engine Stop Switch			Starter Button		
Color	GY	BR	Color	R/W	R/W	Color	BK	BL/W
Brake Lever			OFF			Free		
Pulled In	●		RUN	●		Push	●	

Color Code	
BK	Black
BL	Blue
BR	Brown
G	Green
GY	Gray
LB	Light Blue
LG	Light Green
O	Orange
P	Pink
PU	Purple
R	Red
V	Violet
W	White
Y	Yellow

(98052-1283B, 1284B)

W2R1283BW5 C

Wiring Diagram (Other than US, CA and CAL Models)

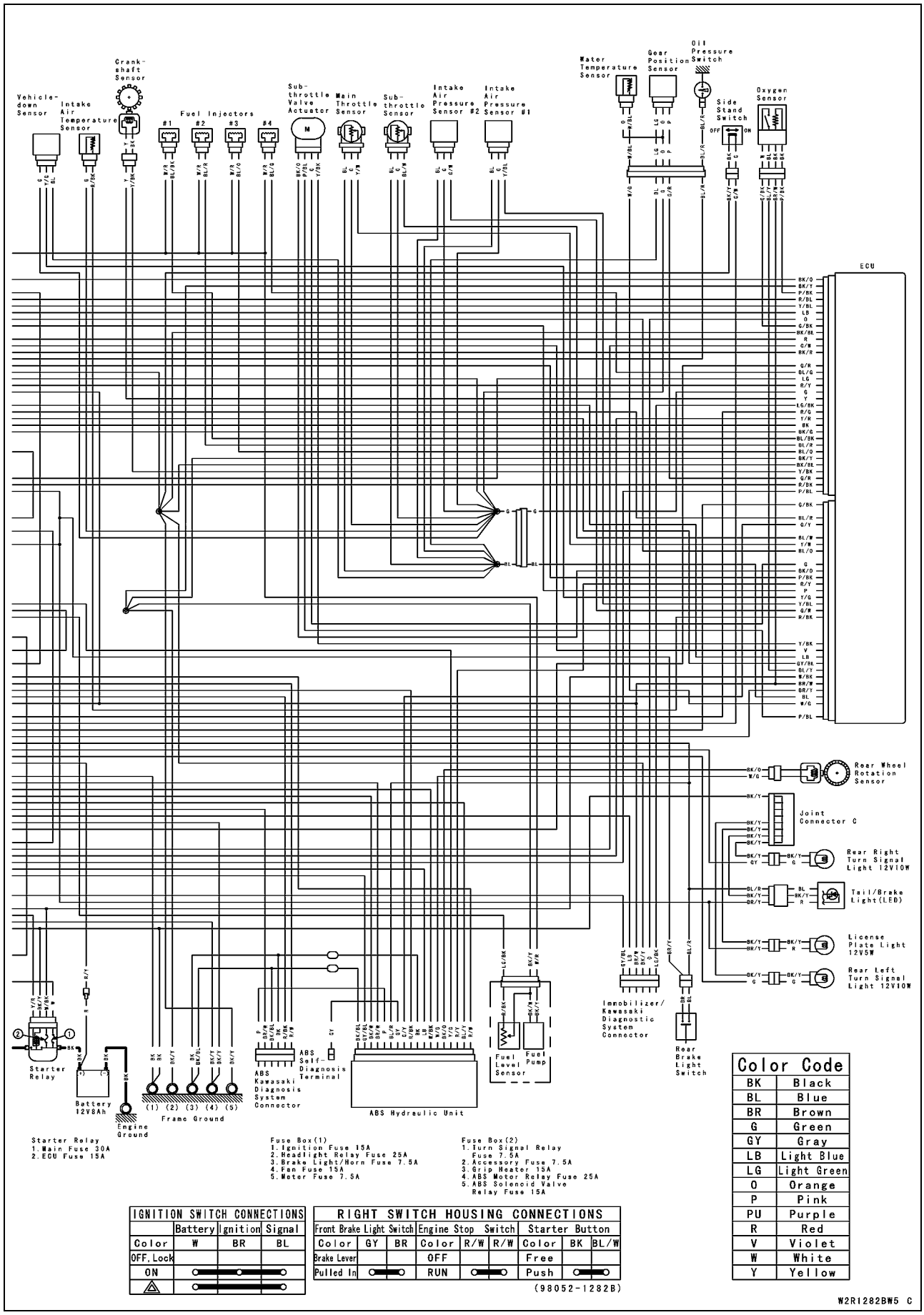


LEFT SWITCH HOUSING CONNECTIONS

Horn Button			Hazard Switch				Turn Signal Switch				Passing Button			Dimmer Switch			Starter Lockout Switch			Multifunction Button				
Color	BR/W	BK/W	Color	G	O	GY	Color	G	O	GY	Color	R/Y	BK/R	Color	R/Y	BK/R	Color	BK	BK/R	Color	P	BK/Y	G/BK	Y/R
			OFF				L		●					HI		●	Clutch Lever			Upper		●		
Push		●	ON		●		OFF(Push)				Push		●				Released			SEL			●	
Released							R			●				LO			Pulled In		●	Lower			●	

W2L1282BW5 C

Wiring Diagram (Other than US, CA and CAL Models)



IGNITION SWITCH CONNECTIONS			
	Battery	Ignition	Signal
Color	W	BR	BL
OFF, Lock			
ON	●	●	●
△	●		●

RIGHT SWITCH HOUSING CONNECTIONS								
Front Brake Light Switch			Engine Stop Switch			Starter Button		
Color	GY	BR	Color	R/W	R/W	Color	BK	BL/W
Brake Lever			OFF			Free		
Pulled In	●		RUN	●		Push	●	

(98052-1282B)

Color Code	
BK	Black
BL	Blue
BR	Brown
G	Green
GY	Gray
LB	Light Blue
LG	Light Green
O	Orange
P	Pink
PU	Purple
R	Red
V	Violet
W	White
Y	Yellow

W2R1282BW5 C

Precautions

There are a number of important precautions that are musts when servicing electrical systems. Learn and observe all the rules below.

- Do not reverse the battery cable connections. This will burn out the diodes on the electrical parts.
- Always check battery condition before condemning other parts of an electrical system. A fully charged battery is a must for conducting accurate electrical system tests.
- The electrical parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
- To prevent damage to electrical parts, do not disconnect the battery cables or any other electrical connections when the ignition switch is on, or while the engine is running.
- Because of the large amount of current, never keep the starter button pushed when the starter motor will not turn over, or the current may burn out the starter motor windings.
- Take care not to short the cables that are directly connected to the battery positive (+) terminal to the chassis ground.
- Troubles may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the failure. If the failure was caused by some other item or items, they must be repaired or replaced, or the new replacement will soon fail again.
- Make sure all connectors in the circuit are clean and tight, and examine wires for signs of burning, fraying, etc. Poor wires and bad connections will affect electrical system operation.
- Measure coil and winding resistance when the part is cold (at room temperature).

Electrical Wiring

Wiring Inspection

- Visually inspect the wiring for signs of burning, fraying, etc.

★If any wiring is poor, replace the damaged wiring.

- Pull each connector [A] apart and inspect it for corrosion, dirt, and damage.

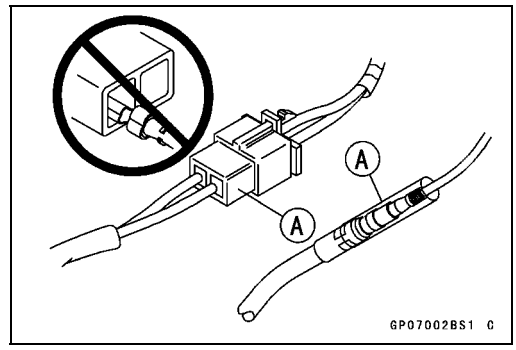
★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.

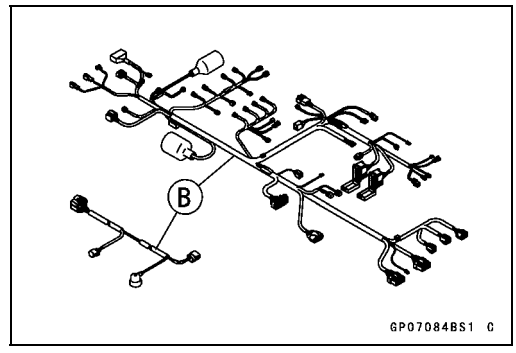
- Check the wiring for continuity.

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

○Connect a tester between the ends of the leads.

★If the tester does not read about 0 Ω, the lead is defective. Replace the lead or the wiring harness [B] if necessary.





Battery

Battery Removal



- Turn the ignition switch off.
- Remove:
  Front Seat (see Front Seat Removal in the Frame chapter)
- Disconnect the negative (–) cable [A].

NOTICE
Be sure to disconnect the negative (–) cable first.

- Slide out the positive (+) terminal cap [B] and disconnect the positive (+) cable [C].
- Remove the battery.

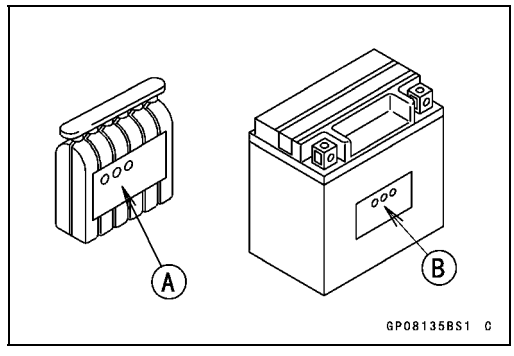
Battery Installation



- Turn the ignition switch off.
- Put the battery into the battery case.
- Connect the positive (+) cable [A] first.
- Connect the negative (–) cable [B].
- Apply a light coat of grease on the terminals to prevent corrosion.
- Cover the positive (+) terminal with the cap [C].
- Install the front seat (see Front Seat Installation in the Frame chapter).

Battery Activation

Electrolyte Filling



- Make sure that the model name [A] of the electrolyte container matches the model name [B] of the battery. These names must be the same.

Battery Model Name

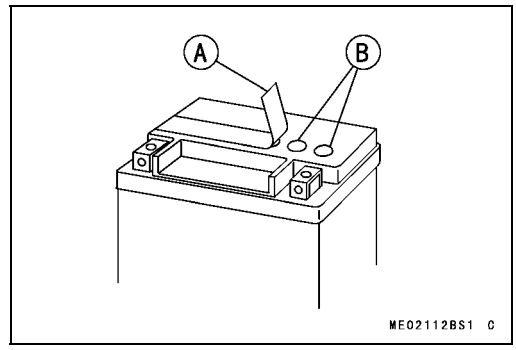
ZX1000W: YTX9-BS

NOTICE
Each battery comes with its own specific electrolyte container; using the wrong container may overfill the battery with incorrect electrolyte, which can shorten battery life and deteriorate battery performance. Be sure to use the electrolyte container with the same model name as the battery since the electrolyte volume and specific gravity vary with the battery type.

Battery

NOTICE

Do not remove the aluminum sealing sheet [A] from the filler ports [B] until just prior to use. Be sure to use the dedicated electrolyte container for correct electrolyte volume.



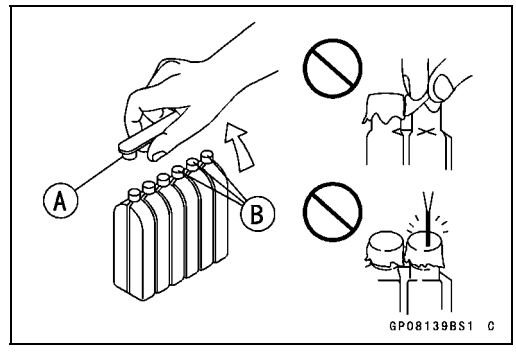
⚠ DANGER

Sulfuric acid in battery electrolyte can cause severe burns. To prevent burns, wear protective clothing and safety glasses when handling electrolyte. If the electrolyte comes in contact with your skin or eyes, wash the area with liberal amounts of water and seek medical attention for more severe burns.

- Place the battery on a level surface.
- Check to see that the sealing sheet has no peeling, tears, or holes in it.
- Remove the sealing sheet.

NOTE

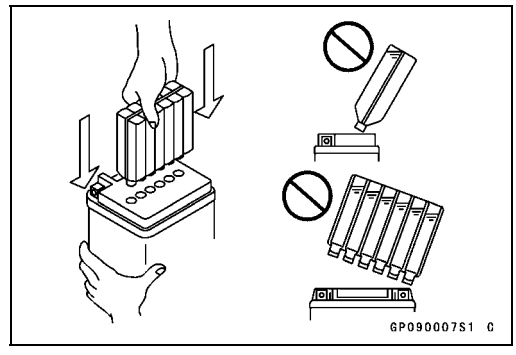
○*The battery is vacuum sealed. If the sealing sheet has leaked air into the battery, it may require a longer initial charge.*



- Remove the electrolyte container from the vinyl bag.
- Detach the strip of caps [A] from the container and set aside, these will be used later to seal the battery.

NOTE

○*Do not pierce or otherwise open the sealed cells [B] of the electrolyte container. Do not attempt to separate individual cells.*



- Place the electrolyte container upside down with the six sealed cells into the filler ports of the battery. Hold the container level, push down to break the seals of all six cells. You will see air bubbles rising into each cell as the ports fill.

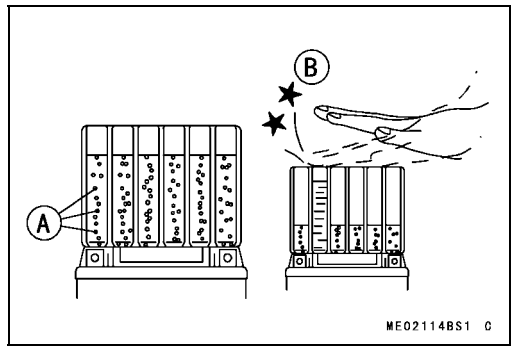
NOTE

○*Do not tilt the electrolyte container.*

Battery

● Check the electrolyte flow.

★If no air bubbles [A] are coming up from the filler ports, or if the container cells have not emptied completely, tap the container [B] a few times.



NOTE

○*Be careful not to have the battery fall down.*

● Keep the container in place. Don't remove the container from the battery, the battery requires all the electrolyte from the container for proper operation.

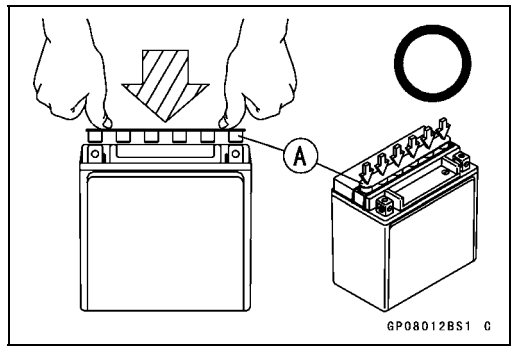
NOTICE

Removal of the container before it is completely empty can shorten the service life of the battery. Do not remove the container until it is completely empty.

● After filling, let the battery sit for 20 ~ 60 minutes with the electrolyte container kept in place, which is required for the electrolyte to fully permeate into the plates.

● Make sure that the container cells have emptied completely, and remove the container from the battery.

● Place the strip of caps [A] loosely over the filler ports, press down firmly with both hands to seat the strip of caps into the battery (don't pound or hammer). When properly installed, the strip of caps will be level with the top of the battery.

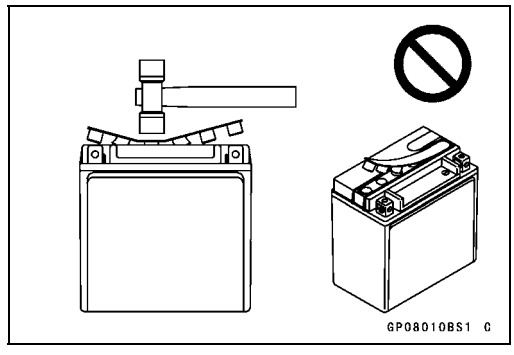


NOTICE

Once the strip of caps is installed onto the battery, never remove the caps, nor add water or electrolyte to the battery.

NOTE

○*Charging the battery immediately after filling can shorten service life.*



Battery

Initial Charge

● Newly activated sealed batteries require an initial charge.

Standard Charge: 0.9 A × 5 ~ 10 hours

★If using a recommended battery charger, follow the charger's instructions for newly activated sealed battery.

Kawasaki-recommended chargers:
Battery Mate 150-9
OptiMate PRO 4-S/PRO S/PRO2
Yuasa MB-2040/2060
Christie C10122S

★If the above chargers are not available, use equivalent one.

● Let battery sit 30 minutes after initial charge, then check voltage using a voltmeter. (Voltage immediately after charging becomes temporarily high. For accurate measuring, let the battery sit for given time.)

NOTE

○*Charging rates will vary depending on how long the battery has been stored, temperature, and the type of charger used. If voltage is not at least 12.8 V, repeat charging cycle.*

○*To ensure maximum battery life and customer satisfaction, it is recommended the battery be load tested at three times its amp-hour rating for 15 seconds.*
Re-check voltage and if less than 12.8 V repeat the charging cycle and load test. If still below 12.8 V the battery is defective.

Precautions

1) No need of topping-up
No topping-up is necessary in this battery until it ends its life under normal use. Forcibly prying off the seal cap to add water is very dangerous. Never do that.

2) Refreshing charge.
If an engine will not start, a horn sounds weak, or lamps are dim, it indicates the battery has been discharged. Give refresh charge for 5 to 10 hours with charge current shown in the specification (see Refreshing Charge).
When a fast charge is inevitably required, do it following precisely the maximum charge current and time conditions indicated on the battery.

NOTICE

This battery is designed to sustain no unusual deterioration if refresh-charged according to the method specified above. However, the battery's performance may be reduced noticeably if charged under conditions other than given above. Never remove the seal cap during refresh charge.
If by chance an excessive amount of gas is generated due to overcharging, the relief valve releases the gas to keep the battery normal.

3) When you do not use the motorcycle for months.
Give a refresh charge before you store the motorcycle and store it with the negative cable removed. Give a refresh charge **once a month** during storage.

4) Battery life.
If the battery will not start the engine even after several refresh charges, the battery has exceeded its useful life. Replace it (Provided, however, the vehicle's starting system has no problem).

Battery

⚠ DANGER

Batteries produce an explosive gas mixture of hydrogen and oxygen that can cause serious injury and burns if ignited. Keep the battery away from sparks and open flames during charging. When using a battery charger, connect the battery to the charger before turning on the charger. This procedure prevents sparks at the battery terminals which could ignite any battery gases. The electrolyte contains sulfuric acid. Be careful not to have it touch your skin or eyes. If touched, wash it off with liberal amount of water and seek medical attention for more severe burns.

Interchange

A sealed battery can fully display its performance only when combined with a proper vehicle electric system. Therefore, replace a sealed battery only on a motorcycle which was originally equipped with a sealed battery.

Be careful, if a sealed battery is installed on a motorcycle which had an ordinary battery as original equipment, the sealed battery's life will be shortened.

Charging Condition Inspection

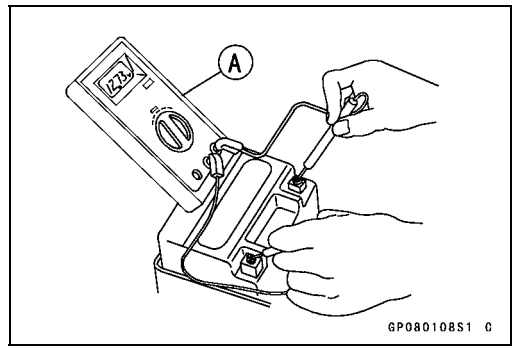
○Battery charging condition can be checked by measuring battery terminal voltage with a digital meter [A].

● Remove:
Battery (see Battery Removal)

● Measure the battery terminal voltage.

NOTE

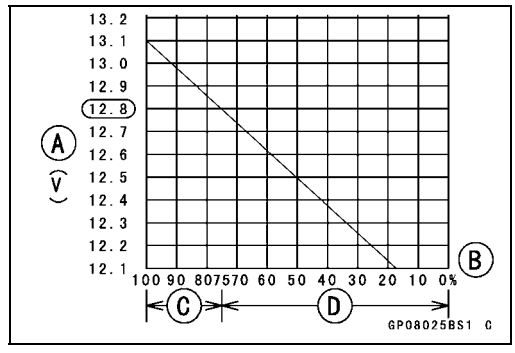
○*Measure with a digital voltmeter which can be read one decimal place voltage.*



★If the reading is 12.8 V or more, no refresh charge is required, however, if the read is below the specified, refresh charge is required.

Battery Terminal Voltage
Standard: 12.8 V or more

Terminal Voltage (V) [A]
Battery Charge Rate (%) [B]
Good [C]
Refresh charge is required [D]



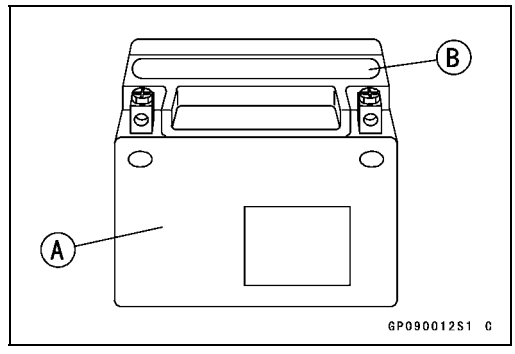
Refreshing Charge

● Remove the battery [A] (see Battery Removal).

● Do refresh charge by following method according to the battery terminal voltage.

⚠ WARNING

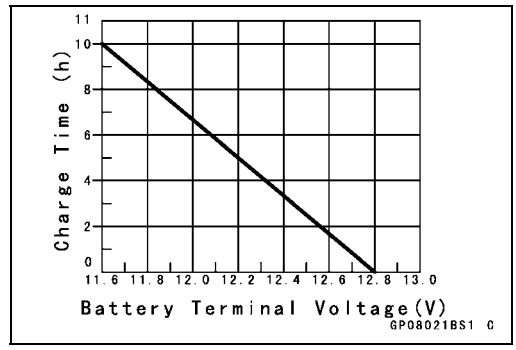
This battery is sealed type. Never remove sealing cap [B] even at charging. Never add water. Charge with current and time as stated below.



Battery

Terminal Voltage: 11.5 ~ less than 12.8 V
Standard Charge: 0.9 A × 5 ~ 10 h (see following chart)
Quick Charge: 4 A × 1 h

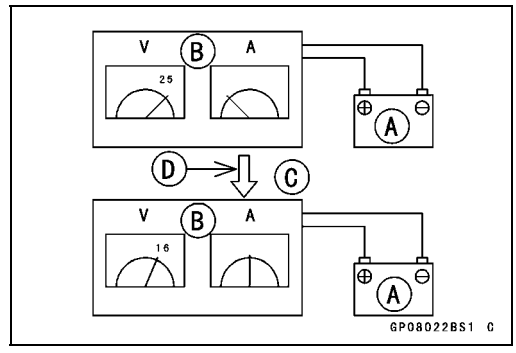
NOTICE
If possible, do not quick charge. If quick charge is done unavoidably, do standard charge later on.



Terminal Voltage: less than 11.5 V
Charging Method: 0.9 A × 20 h

NOTE

○*Increase the charging voltage to a maximum voltage of 25 V if the battery will not accept current initially. Charge for no more than 5 minutes at the increased voltage then check if the battery is drawing current. If the battery will accept current decrease the voltage and charge by the standard charging method described on the battery case. If the battery will not accept current after 5 minutes, replace the battery.*



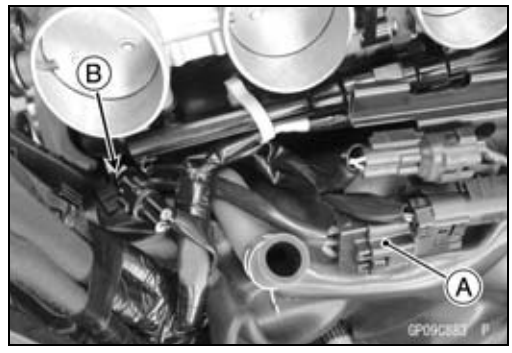
Battery [A]
Battery Charger [B]
Standard Value [C]
Current starts to flow [D]

● Determine the battery condition after refresh charge.
○Determine the condition of the battery left for 30 minutes after completion of the charge by measuring the terminal voltage according to the table below.

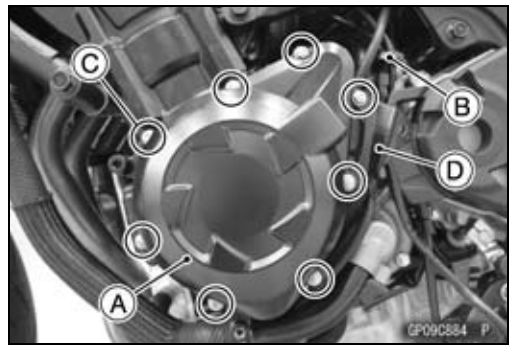
Criteria	Judgement
12.8 V or higher	Good
12.0 ~ lower than 12.8 V	Charge insufficient → Recharge
lower than 12.0 V	Unserviceable → Replace

Charging System

Alternator Cover Removal

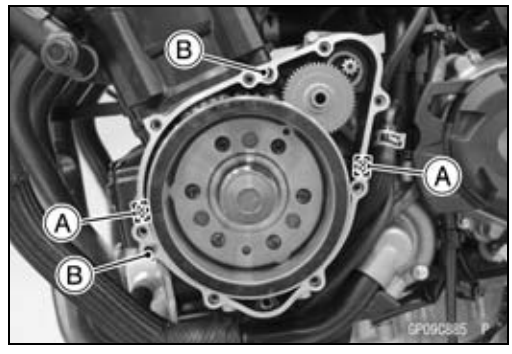


- Drain:
  Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter)
  Left Lower Fairing (see Lower Fairing Removal in the Frame chapter)
- Disconnect the alternator lead connector [A].
- Clear the alternator lead from the clamp [B].



- Place a suitable container under the alternator cover [A].
- Open the clamp [B].
- Remove:
  Alternator Cover Bolts [C]
  Bracket [D]
  Alternator Cover

Alternator Cover Installation



- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the alternator lead grommet and crankcase halves mating surface [A] on the front and rear sides of the cover mount.

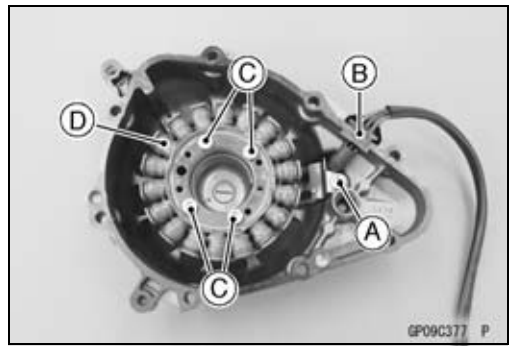
  Sealant - Liquid Gasket, TB1211F: 92104-0004

- Check that dowel pins [B] are in place on the crankcase.
- Replace the alternator cover gasket with a new one.
- Tighten:

  Torque - Alternator Cover Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)

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

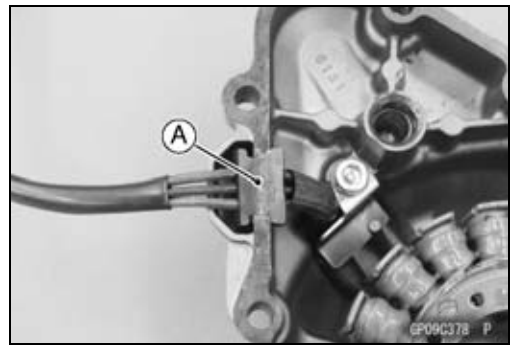
Stator Coil Removal



- Remove:
  Alternator Cover (see Alternator Cover Removal)
  Alternator Lead Holding Plate Bolt [A] and Plate
  Alternator Lead Grommet [B]
  Stator Coil Bolts [C]
- Remove the stator coil [D] from the alternator cover.

Charging System

Stator Coil Installation



- Apply a non-permanent locking agent to the threads of the stator coil bolts and tighten them.

  Torque - Stator Coil Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)

- Secure the alternator lead with a holding plate.
- Apply a non-permanent locking agent to the threads of the plate bolt and tighten it.

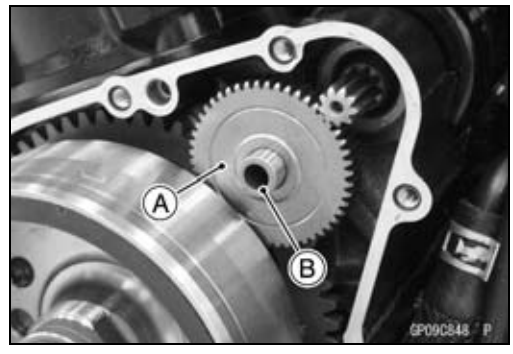
  Torque - Alternator Lead Holding Plate Bolt: 12 N·m (1.2 kgf·m, 106 in·lb)

- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the circumference of the alternator lead grommet [A], and fit the grommet into the notch of the cover securely.

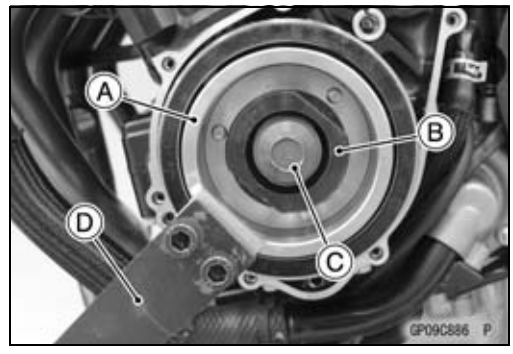
  Sealant - Liquid Gasket, TB1211F: 92104-0004

- Install the alternator cover (see Alternator Cover Installation).

Alternator Rotor Removal



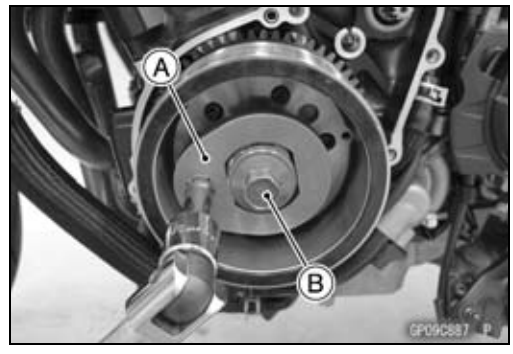
- Remove:
  Alternator Cover (see Alternator Cover Removal)
  Starter Idle Gear [A] and Shaft [B]



- Hold the alternator rotor steady with the rotor holder [A] and stopper [B].
- Remove the rotor bolt [C] and washer.

  Special Tools - Grip [D]: 57001-1591
  Stopper: 57001-1679
  Rotor Holder: 57001-1690

If using the rotor holder (57001-1757).

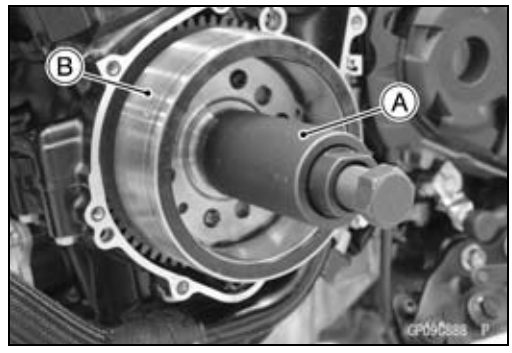


- Hold the alternator rotor steady with the rotor holder [A].
- Remove the rotor bolt [B] and washer.

  Special Tool - Rotor Holder: 57001-1757

● Using the flywheel puller [A], remove the alternator rotor [B] from the crankshaft.

Special Tool - Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5: 57001-1615

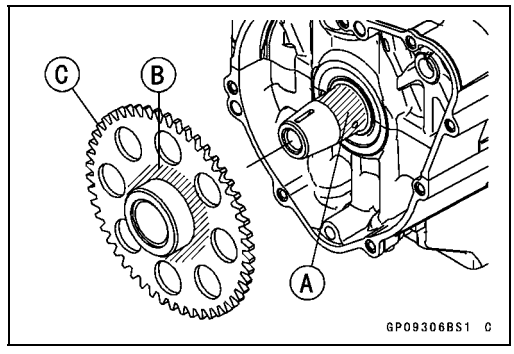


NOTICE

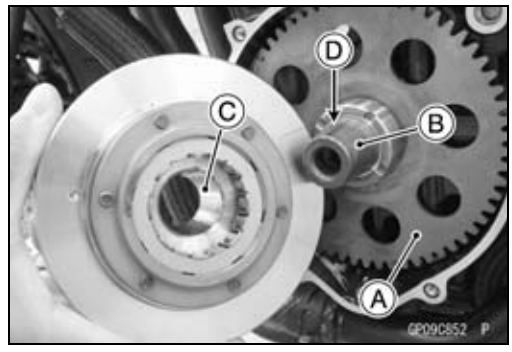
Do not attempt to strike the alternator rotor itself. Striking the rotor can cause the magnets to lose their magnetism.

Alternator Rotor Installation

● Apply a thin coat of molybdenum disulfide grease to the crankshaft [A] and the outer surface [B] of the starter clutch gear [C].



● Install the starter clutch gear [A].
● Using a cleaning fluid, clean off any oil or dirt on the following portions and dry them with a clean cloth.
Crankshaft Tapered Portion [B]
Alternator Rotor Tapered Portion [C]
● Fit the woodruff key [D] securely in the slot in the crankshaft before installing the alternator rotor.



● Install the alternator rotor [A] while turning [B] the starter clutch gear [C] clockwise.

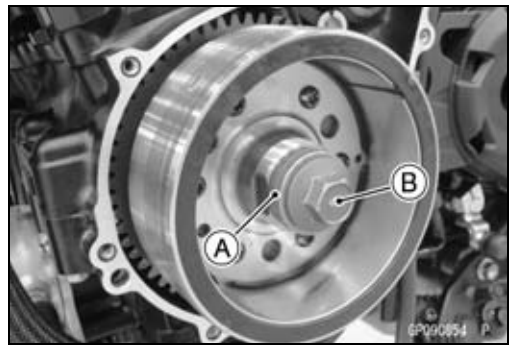


● Using a cleaning fluid, clean off any oil or dirt on the washer [A] and dry it with a clean cloth.
● Install the washer.

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.



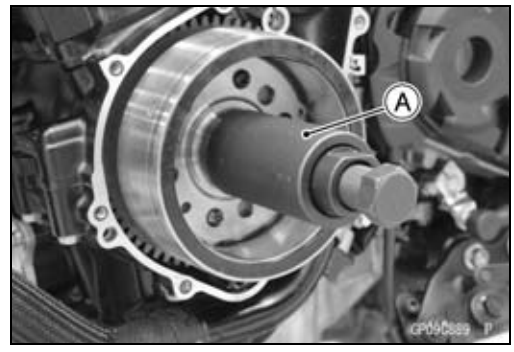
Charging System

- 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: 57001-1615

★If the rotor is not pulled out with 20 N·m (2.0 kgf·m, 15 ft·lb) of drawing torque, it is installed correctly.

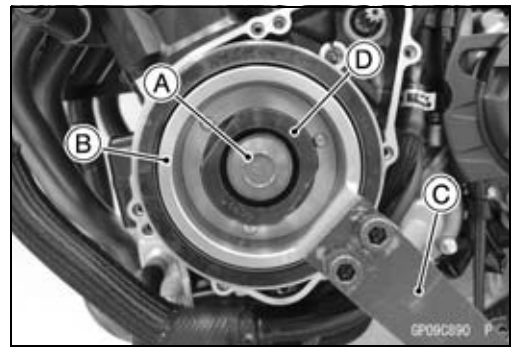
★If the rotor is pulled out with under 20 N·m (2.0 kgf·m, 15 ft·lb) of drawing torque, clean off any oil dirt or flaw of the crankshaft and rotor tapered portion, and dry them with a clean cloth. Then, confirm that it is not pulled out with above torque.



- Install the washer and rotor bolt.
- Tighten the alternator rotor bolt [A] while holding the alternator rotor steadily with the holder [B].

Special Tools - Grip [C]: 57001-1591
Stopper [D]: 57001-1679
Rotor Holder: 57001-1690

Torque - Alternator Rotor Bolt: 155 N·m (15.8 kgf·m, 114 ft·lb)

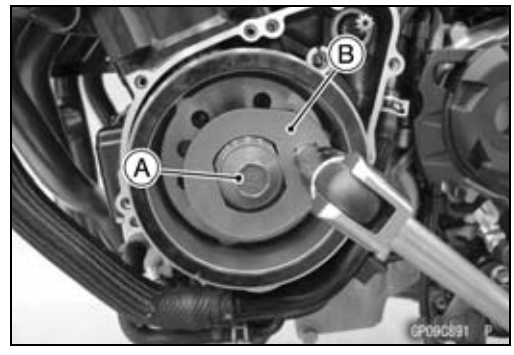


If using rotor holder (57001-1757).

- Install the washer and rotor bolt.
- Tighten the alternator rotor bolt [A] while holding the alternator rotor steadily with the holder [B].

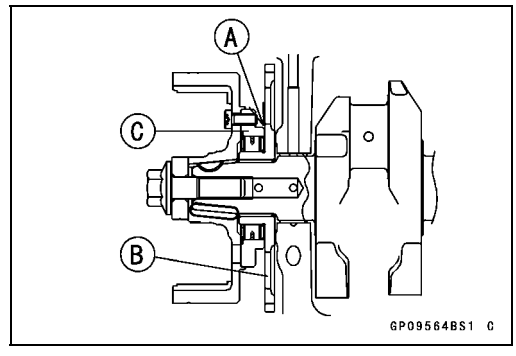
Special Tool - Rotor Holder: 57001-1757

Torque - Alternator Rotor Bolt: 155 N·m (15.8 kgf·m, 114 ft·lb)

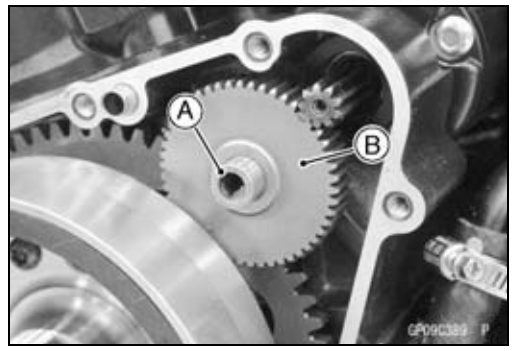


- Using a thickness gauge, make sure the clearance [A] between the starter clutch gear [B] and the starter clutch race [C] is 0.4 mm (0.02 in.) or more.

★If the clearance is less than 0.4 mm (0.02 in.), remove the rotor and starter clutch race, and then clean them thoroughly and reinstall them.

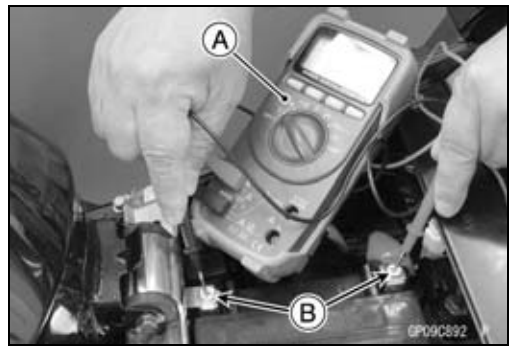


- Apply a thin coat of molybdenum disulfide grease to the shaft [A], and install it with the starter idle gear [B].
- Install the alternator cover (see Alternator Cover Installation).



Charging Voltage Inspection

- Check the battery condition (see Charging Condition Inspection).
- Warm up the engine to obtain actual alternator operating conditions.
- Remove the front seat (see Front Seat Removal in the Frame chapter).
- Check that the ignition switch is turned off, and connect a tester [A] to the battery terminals [B].
- Start the engine, and note the voltage readings at various engine speeds (except idling engine speed) with the headlight turned on and then turned off (To turn off the headlight, disconnect the headlight connector on the headlight unit.). The readings should show nearly battery voltage when the engine speed is low, and, as the engine speed rises, the readings should also rise. But they must be kept under the specified voltage.



Charging Voltage **@25°C (77°F)**

Connections		Reading
Tester (+) to	Tester (–) to	
Battery (+)	Battery (–)	DC 14.3 ~ 14.7 V

- Turn off the ignition switch to stop the engine, and disconnect the tester.

★If the charging voltage is kept between the values given in the table, the charging system is considered to be working normally.

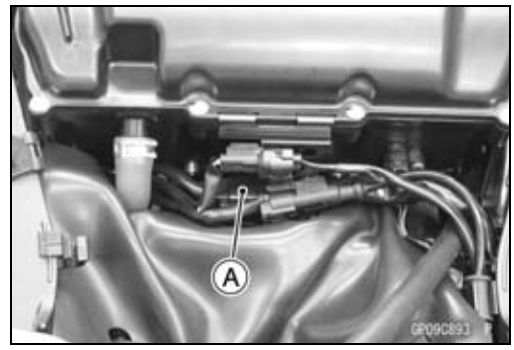
★If the charging voltage is much higher than the values specified in the table, the regulator/rectifier is defective or the regulator/rectifier leads are loose or open.

★If the charging voltage does not rise as the engine speed increases, then the regulator/rectifier is defective or the alternator output is insufficient for the loads. Check the alternator and regulator/rectifier to determine which part is defective.

Alternator Inspection

There are three types of alternator failures: short, open (wire burned out), or loss in rotor magnetism. A short or open in one of the coil wires will result in either a low output, or no output at all. A loss in rotor magnetism, which may be caused by dropping or hitting the alternator, by leaving it near an electromagnetic field, or just by aging, will result in low output.

Charging System



● To check the alternator output voltage, do the following procedures.
○Turn the ignition switch off.
○Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
○Disconnect the alternator lead connector [A].
○Connect a tester as shown in the table 1.
○Install the fuel tank temporary (see Fuel Tank Installation in the Fuel System (DFI) chapter).
○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 @4 000 r/min (rpm)

Connections		Reading
Tester (+) to	Tester (–) to	
One Black lead	Another Black lead	AC 42 V or more

★If the output voltage shows the value in the table, the alternator operates properly.
★If the output voltage shows a much lower reading than that given in the table, stop the engine and inspect the stator coil resistance.
● Check the stator coil resistance as follows.
○Stop the engine.
○Connect the tester as shown in the table 2.
○Note the readings (total 3 measurement).

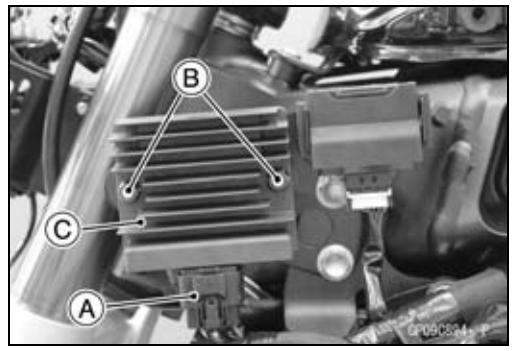
Table 2 Stator Coil Resistance @20°C (68°F)

Connections		Reading
Tester (+) to	Tester (–) to	
One Black lead	Another Black lead	0.18 ~ 0.27 Ω

● When measuring the resistance, use a tester that can measure the standard value.
★If there is more resistance than shown in the table, or no tester reading (infinity) for any two leads, the stator has an open lead and must be replaced. Much less than this resistance means the stator is shorted, and must be replaced.
● Measure the resistance between each of the black leads and chassis ground.
★Any tester reading less than infinity (∞) indicates a short, necessitating stator replacement.
★If the stator coils have normal resistance, but the voltage check showed the alternator to be defective; then the rotor magnets have probably weakened, and the rotor must be replaced.

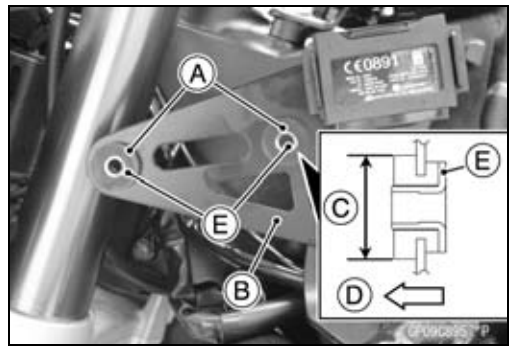
Charging System

Regulator/Rectifier Removal

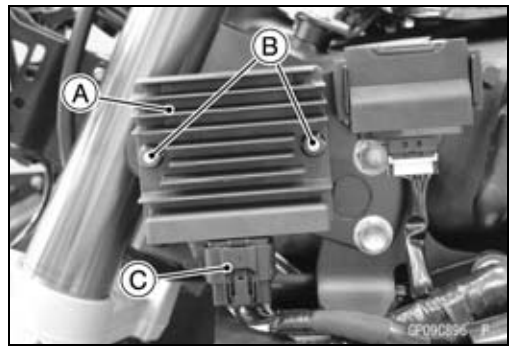


- Remove:
  Left Lower Fairing (see Lower Fairing Removal in the Frame chapter)
- Disconnect the connector [A].
- Remove:
  Regulator/Rectifier Bolts and Nuts [B]
  Regulator/Rectifier [C]

Regulator/Rectifier Installation



- Install the grommets [A] to the bracket [B] with its large diameter side [C] facing outward [D].
- Insert the collars [E] into the grommets from the inside.



- Install:
  Regulator/Rectifier [A]
  Regulator/Rectifier Bolts and Nuts [B]
- ○Install the regulator/rectifier bolts from inside.

Torque - Regulator/Rectifier Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Connect the connector [C] to the regulatory/rectifier.

Regulator/Rectifier Inspection

- Refer to the Charging System Troubleshooting for the Regulator/Rectifier Inspection.

Charging System Troubleshooting

- Before inspection, remove all accessories that consume electrical power.

NOTE

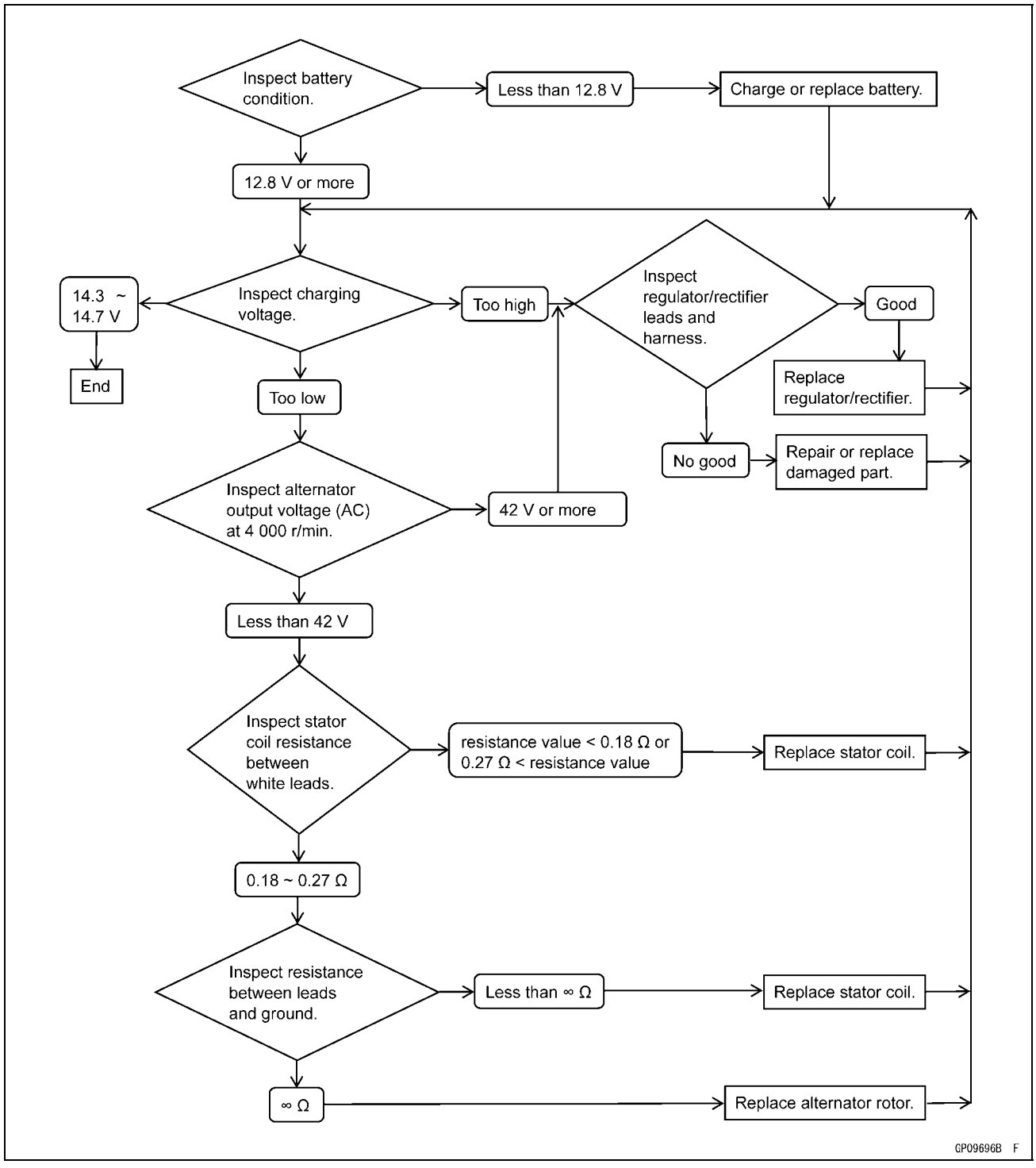
○*Even when the charging system is working properly, the battery may discharge if the motorcycle is equipped with too many accessories.*

- Pay attention to riding conditions and the customer's riding habits which could affect the charging system such as:

Frequent use at low engine speed
Frequent and unnecessary brake pedal dragging
→ Battery Discharged

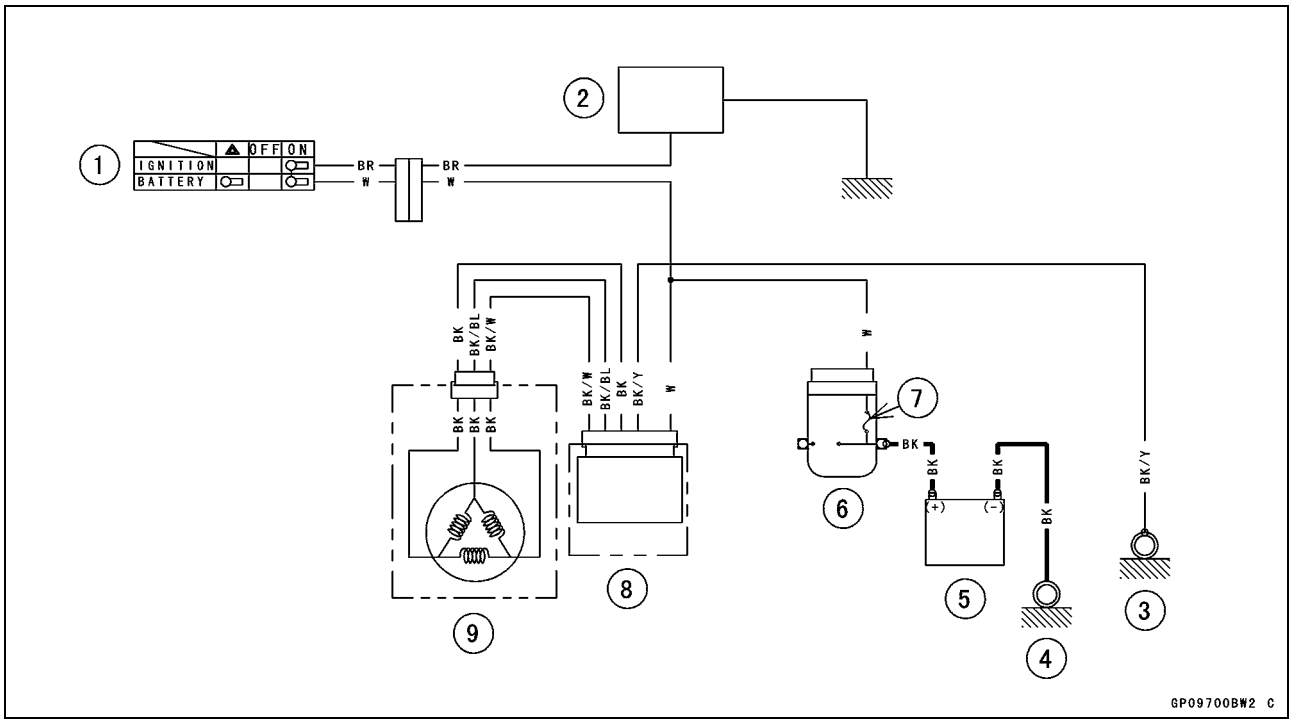
- Recharge the battery if it is discharged.

Charging System



Charging System

Charging System Circuit



1. Ignition Switch
2. Load
3. Frame Ground (4)
4. Engine Ground
5. Battery 12 V 8 Ah
6. Starter Relay
7. Main Fuse 30 A
8. Regulator/Rectifier
9. Alternator

Ignition System

⚠ WARNING

The ignition system produces extremely high voltage. Do not touch the spark plug, stick coil or stick coil lead while the engine is running, or you could receive a severe electrical shock.

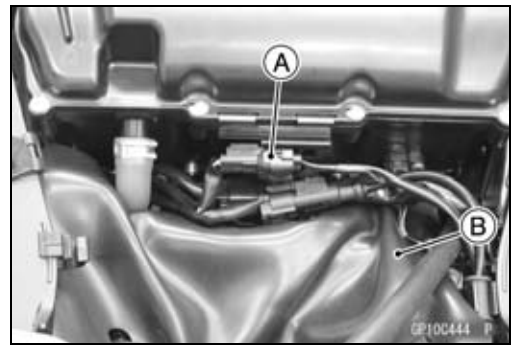
NOTICE

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.

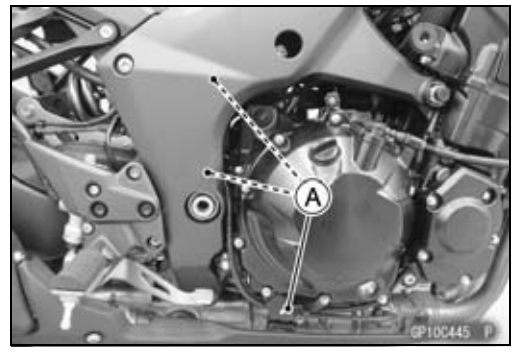
Crankshaft Sensor Removal

NOTICE

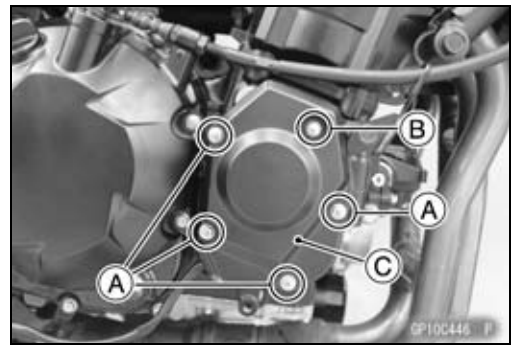
Never drop the sensor, especially on a hard surface. Such a shock to the sensor can damage it.



- Remove:
  Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
- Disconnect the crankshaft sensor lead connector [A].
- Turn up the heat insulation rubber plate [B] and free the clamp.

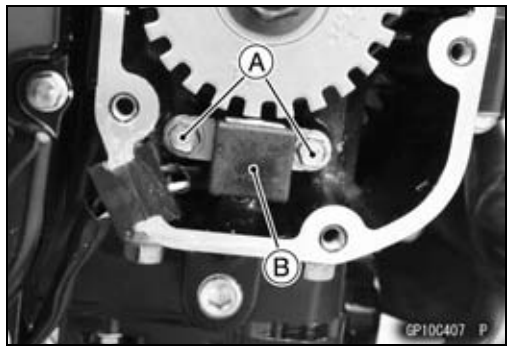


- Clear the crankshaft sensor lead from the clamps [A].



- Remove:
  Crankshaft Sensor Cover Bolts [A]
  Crankshaft Sensor Cover Bolts [B] (with a Dent on the Bolt Head)
  Crankshaft Sensor Cover [C]

● Remove:
Crankshaft Sensor Bolts [A]
Crankshaft Sensor [B]



Crankshaft Sensor Installation

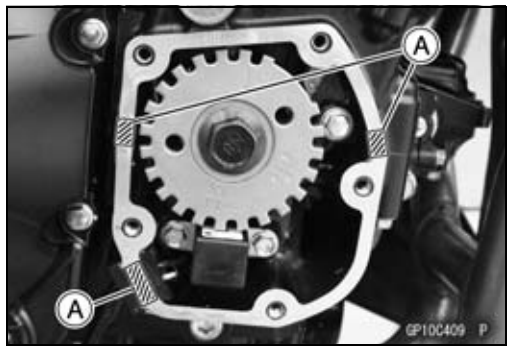
● Install the crankshaft sensor.
○When installing the sensor which is fastened by bolts, tighten the bolts after placing the sensor on the bottom surface completely.
● Tighten:

Torque - Crankshaft Sensor Bolts: 6.0 N·m (0.61 kgf·m, 53 in·lb)

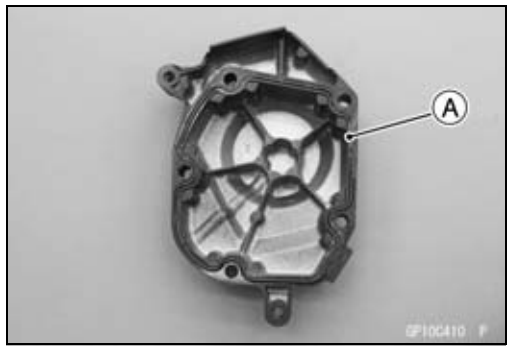
● Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
● Apply liquid gasket [A] to the crankshaft sensor lead grommet and crankcase halves mating surface on the front and rear sides of the crankshaft sensor cover mount.

Sealant - Liquid Gasket, TB1211F: 92104-0004





● Replace the O-ring [A] with a new one.

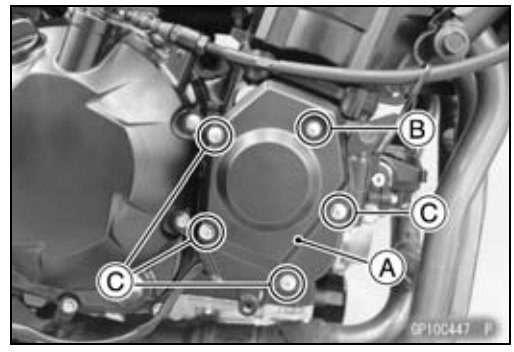


Ignition System

● Install:
Crankshaft Sensor Cover [A]
● Apply a non-permanent locking agent to the threads of the crankshaft sensor cover bolt [B] which has a dent on the bolt head.
● Tighten the crankshaft sensor cover bolts [B] [C].

Torque - Crankshaft Sensor Cover Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)

● Run the crankshaft sensor lead and clutch cable correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
● Install the removed parts (see appropriate chapters).



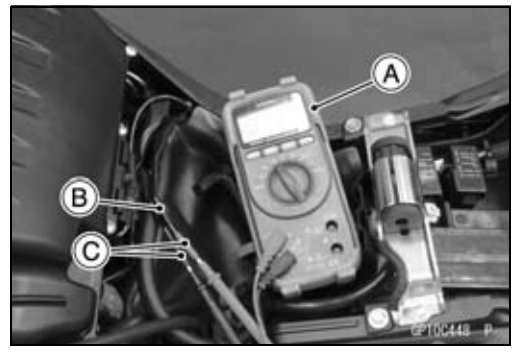
Crankshaft Sensor Inspection

● Disconnect the crankshaft sensor lead connector (see Crankshaft Sensor Removal).
● Set a tester [A], and connect it to the crankshaft sensor lead connector [B].

Special Tool - Needle Adapter Set [C]: 57001-1457

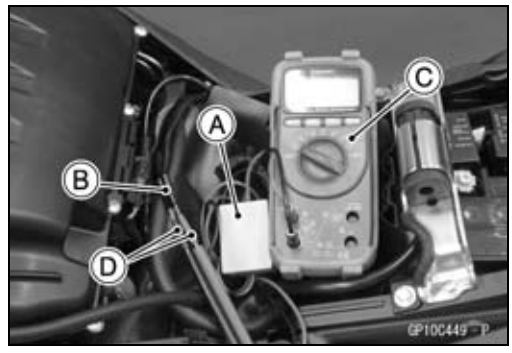
Crankshaft Sensor Resistance
Connections:
Tester (+) → Y lead
Tester (–) → BK lead
Standard: 376 ~ 564 Ω @20°C (68°F)

★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.
● 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 [B] (see Alternator Cover Removal).
- Set a tester [C], and connect it peak voltage adapter.

Special Tools - Peak Voltage Adapter: 57001-1415
Type: KEK-54-9-B
Needle Adapter Set [D]: 57001-1457

- Connect the adapter to the terminals of the crankshaft sensor lead connector.

Connections:

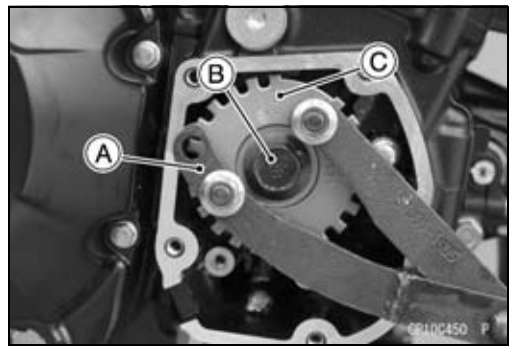
Crankshaft Sensor Lead		Peak Voltage Adapter		Tester
Y lead	←	R lead	→	(+)
BK lead	←	BK lead	→	(–)

- Turn the engine stop switch to run position.
- Turn the ignition switch on.
- Pushing the starter button, turn the engine 4 ~ 5 seconds with the transmission gear in neutral to measure the crankshaft sensor peak voltage.
- Repeat the measurement 5 or more times.

Crankshaft Sensor Peak Voltage
Standard: 2.0 V or more

★If the reading is less than the standard, inspect the crankshaft sensor (see Crankshaft Sensor Inspection).

Timing Rotor Removal

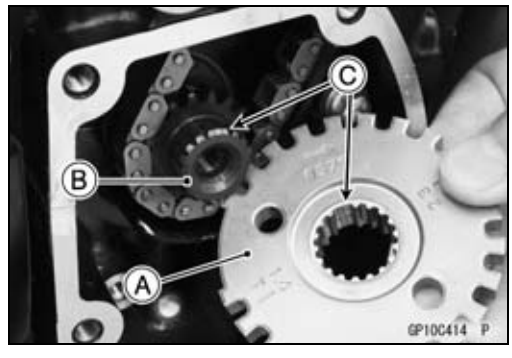


- Remove the crankshaft sensor (see Crankshaft Sensor Removal).
- Holding the timing rotor with the flywheel & pulley holder [A] and remove the timing rotor bolt [B].

Special Tool - Flywheel & Pulley Holder: 57001-1605

- Remove the timing rotor [C].

Timing Rotor Installation



- Install the timing rotor [A] on the crankshaft [B] with their teeth [C] aligned.
- Holding the timing rotor with the flywheel & pulley holder and tighten the timing rotor bolt.

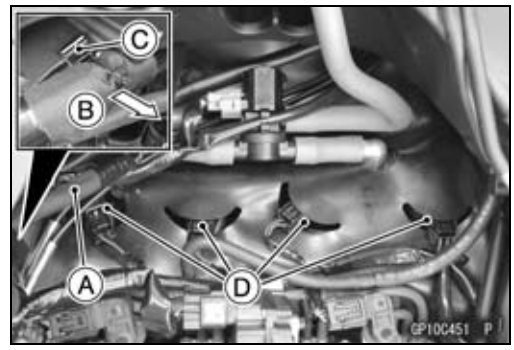
Torque - Timing Rotor Bolt: 39 N·m (4.0 kgf·m, 29 ft·lb)

Special Tool - Flywheel & Pulley Holder: 57001-1605

- Install the crankshaft sensor (see Crankshaft Sensor Installation).

Ignition System

Stick Coil Removal

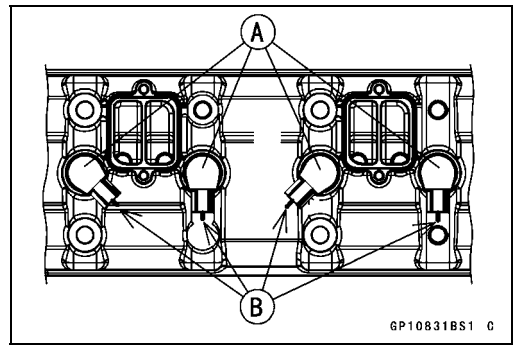


NOTICE
Never drop the stick coils, especially on a hard surface. **Such a shock to the stick coils can damage it.**

- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter)
- To ease the #1 stick coil removal, pull the main harness [A] to inward [B] and release the clamp [C] from the frame.
- Disconnect the connectors from the stick coils [D] and pull out the stick coils.

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

Stick Coil Installation

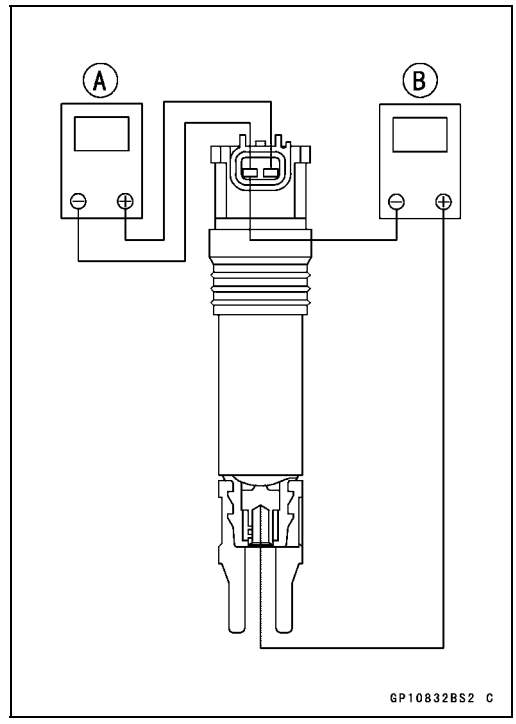


- Insert the stick coils [A] so that the coil heads align with the lines [B] on the cylinder head cover.

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 a tester between the coil terminals.

- Measure the secondary winding resistance [B] as follows.

○Connect the tester between the plug terminal and (–) coil terminal.

Stick Coil Winding Resistance

Primary Windings:	**1.1 ~ 1.5 Ω @20°C (68°F)**
Secondary Windings:	**6.4 ~ 9.6 kΩ @20°C (68°F)**

★If the tester does not read as specified, replace the coil.

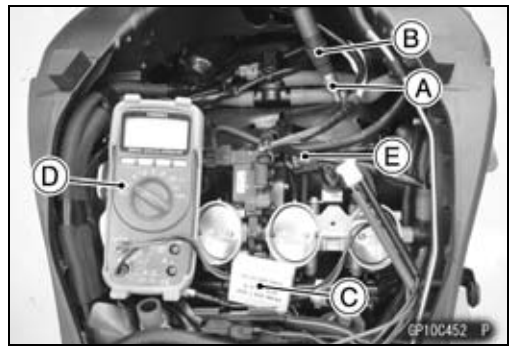
Stick Coil Primary Peak Voltage Inspection

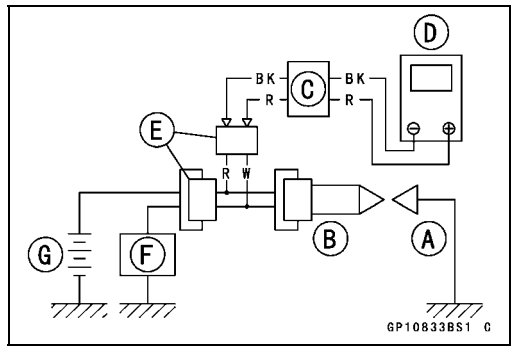
NOTE

○*Be sure the battery is fully charged.*

Ignition System

● Remove the stick coils (see Stick Coil Removal), but do not remove the spark plugs.
● Measure the primary peak voltage as follows.
○Install the new spark plug [A] into each stick coil [B], and ground them onto the engine.
○Connect the peak voltage adapter [C] into a tester [D].
○Connect the adapter to the lead wire-peak voltage adapter [E] which is connected between the stick coil connector and stick coil.
ECU [F]
Battery [G]





Special Tools - Peak Voltage Adapter: 57001-1415
Type: KEK-54-9-B
Lead Wire - Peak Voltage Adapter: 57001 -1449

Primary Lead Connection
Adapter (R, +) to lead wire-peak voltage adapter (W)
Adapter (BK, –) to lead wire-peak voltage adapter (R)

⚠ WARNING

To avoid extremely high voltage shocks, do not touch the spark plugs or tester connections.

● Turn the engine stop switch to run position.
● Turn the ignition switch on.
● Pushing the starter button, turn the engine 4 ~ 5 seconds with the transmission in neutral to measure the primary peak voltage.
● Repeat the measurements 5 times for one stick coil.

Stick Coil Primary Peak Voltage
Standard: 100 V or more

● Repeat the test for the other stick coil.
★If the reading is less than the specified value, check the following.
Stick Coils (see Stick Coil Inspection)
Crankshaft Sensor (see Crankshaft Sensor Inspection)
ECU (see ECU Power Supply Inspection in the Fuel System (DFI) chapter)

Spark Plug Removal

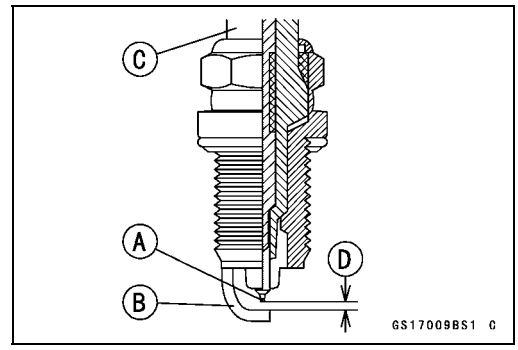
● Refer to the Spark Plug Replacement in the Periodic Maintenance chapter.

Spark Plug Installation

● Refer to the Spark Plug Replacement in the Periodic Maintenance chapter.

Ignition System

Spark Plug Condition Inspection



- Remove the spark plugs (see Spark Plug Replacement in the Periodic Maintenance chapter).
- Visually inspect the spark plugs.

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

★If the spark plug is dirtied or the carbon is accumulated, replace the spark plug.

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

★If the gap is incorrect, replace the spark plug.

Spark Plug Gap: 0.8 ~ 0.9 mm (0.031 ~ 0.035 in.)

- Use the standard spark plug or its equivalent.

Spark Plug: NGK CR9EIA-9

Interlock Operation Inspection

- Raise the rear wheel off the ground with the stand.
- Turn the engine stop switch on (run position).

1st Check

- Start the engine to the following conditions.

Condition:
Transmission Gear → 1st Position
Clutch Lever → Release
Side Stand → Down or Up

○Turn the ignition switch on and push the starter button.

○Then the starter motor should not turn when the starter system circuit is normality.

★If the engine is start, inspect the starter lockout switch, gear position sensor and relay box.

2nd Check

- Start the engine to the following conditions.

Condition:
Transmission Gear → 1st Position
Clutch Lever → Pulled in
Side Stand → Up

○Turn the ignition switch on and push the starter button.

○Then the starter motor should turn when the starter system circuit is normality.

★If the starter motor is not turn, inspect the starter lockout switch, side stand 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

Side Stand → Up

- Set the side stand on the ground, then the engine will stop.

★If the engine does not stop, inspect the gear position sensor, side stand switch and relay box.

★If their parts are normality, replace the ECU.

IC Igniter Inspection

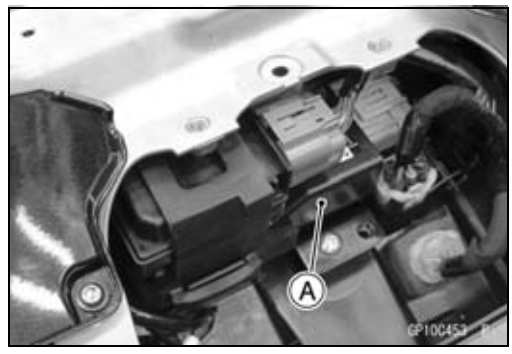
○The IC igniter is built in the ECU [A].

- Refer to the following items.

Interlock Operation Inspection (see Interlock Operation Inspection)

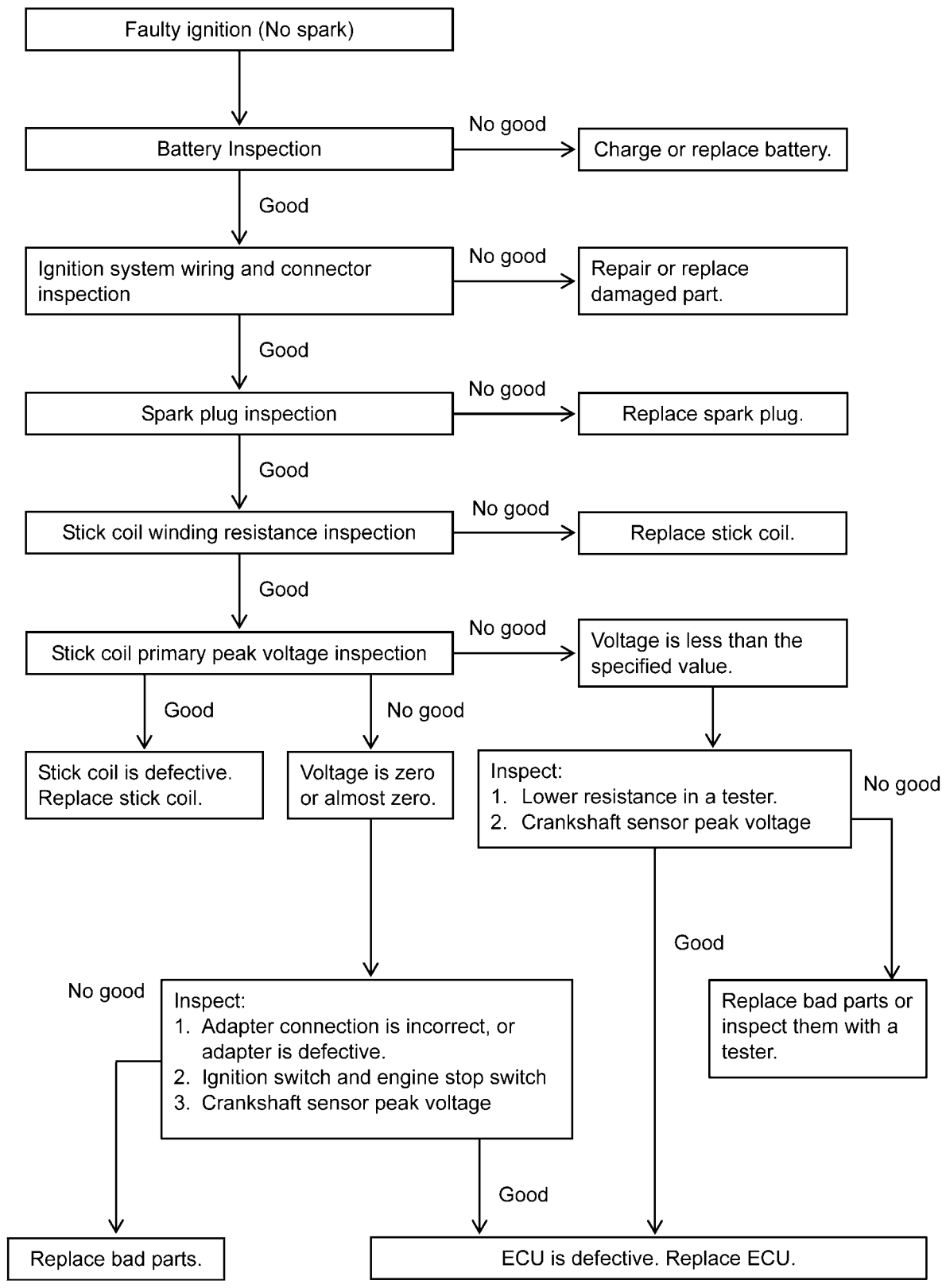
Ignition System Troubleshooting (see Ignition System section)

ECU Power Supply Inspection (see ECU Power Supply Inspection in the Fuel System (DFI) chapter)



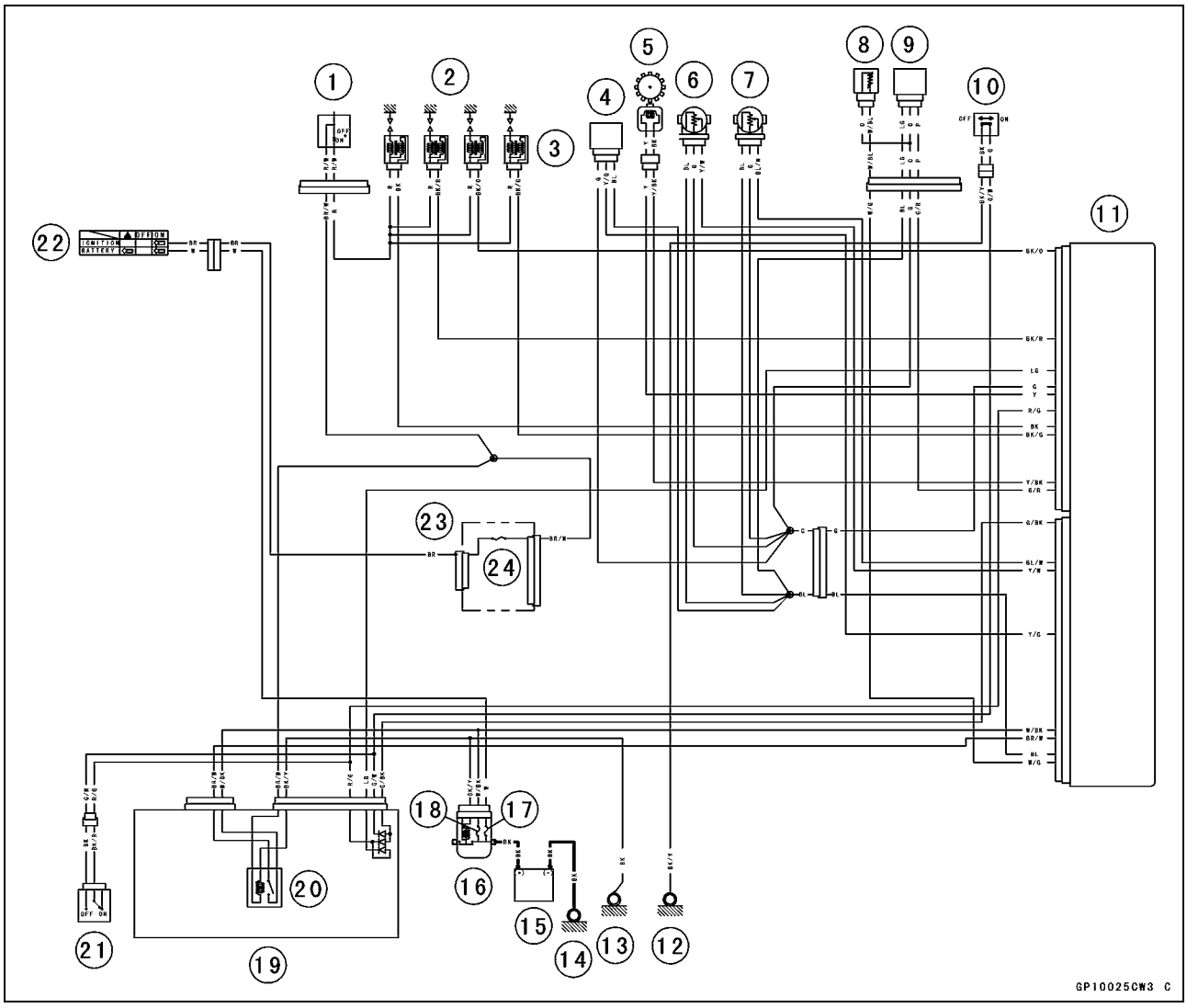
Ignition System

Ignition System Troubleshooting



Ignition System

Ignition System Circuit

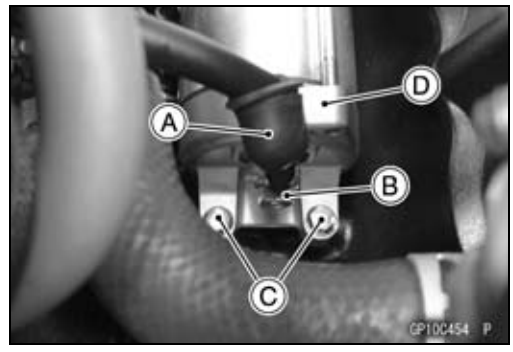


1. Engine Stop Switch
2. Spark Plugs
3. Stick Coils
4. Vehicle-down Sensor
5. Crankshaft Sensor
6. Main Throttle Sensor
7. Subthrottle Sensor
8. Water Temperature Sensor
9. Gear Position Sensor
10. Side Stand Switch
11. ECU
12. Frame Ground (5)
13. Frame Ground (1)
14. Engine Ground
15. Battery 12 V 8 Ah
16. Starter Relay
17. Main Fuse 30 A
18. ECU Fuse 15 A
19. Relay Box
20. ECU Main Relay
21. Starter Lockout Switch
22. Ignition Switch
23. Fuse Box (1)
24. Ignition Fuse 15 A

Electric Starter System

Starter Motor Removal

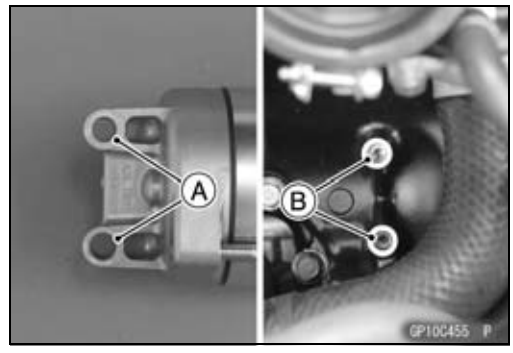
- Remove the throttle body assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter).
- Slide out the rubber cap [A].
- Remove:
  Starter Motor Cable Terminal Nut [B]
  Starter Motor Mounting Bolts [C]
  Starter Motor [D]



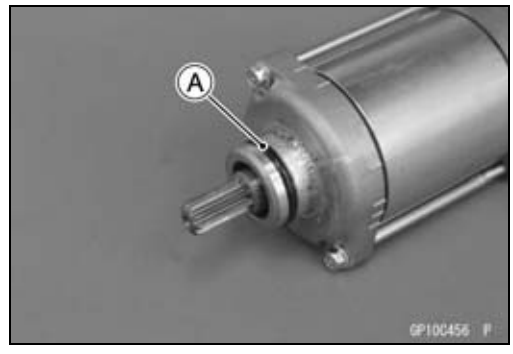
Starter Motor Installation

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 [B] where the starter motor is ground.



- Replace the O-ring [A] with a new one.
- Apply grease to the O-ring.
- Install the starter motor on the crankcase.



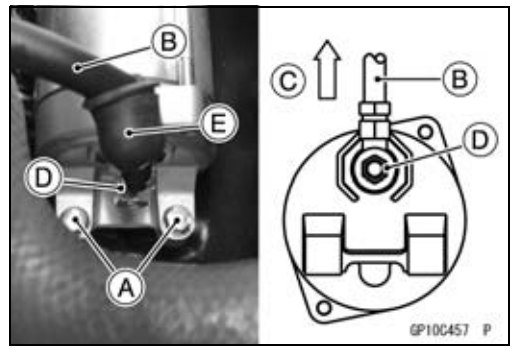
- Tighten the starter motor mounting bolts [A].

  Torque - Starter Motor Mounting Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)

- Connect the starter motor cable [B] to the terminal and position it vertically [C] as shown.
- Tighten the starter motor cable terminal nut [D].

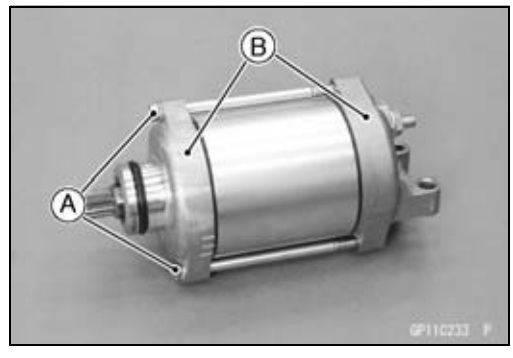
  Torque - Starter Motor Cable Terminal Nut: 6.0 N·m(0.61 kgf·m, 53 in·lb)

- Slide back the rubber cap [E] to the original position.
- Install the removed parts (see appropriate chapters).



Starter Motor Disassembly

- Remove:
  Starter Motor (see Starter Motor Removal)
  Starter Motor Through Bolts [A]
  End Covers [B]

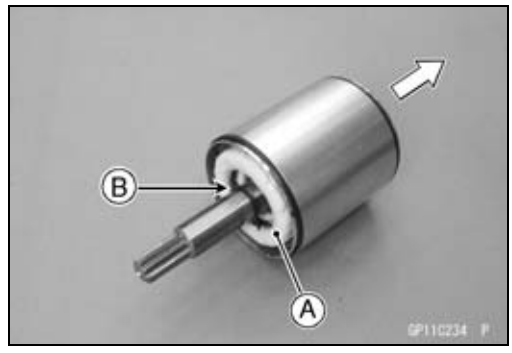


Electric Starter System

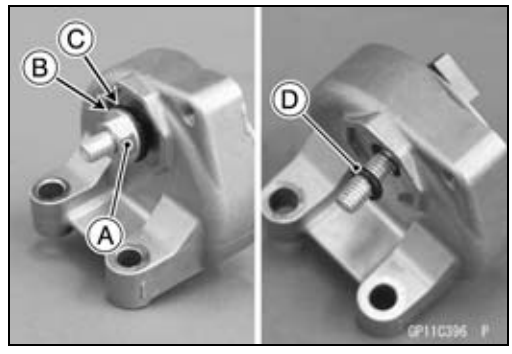
● Remove the armature [A] from the commutator side.

NOTE

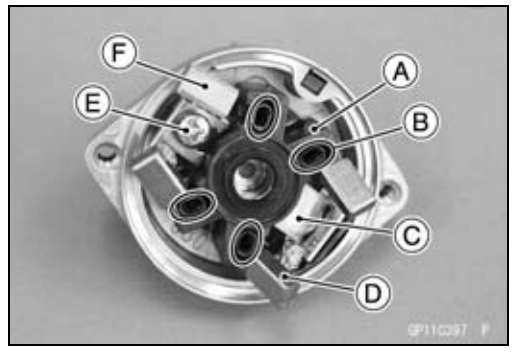
○*Do not remove the circlip [B] from the shaft.*



● Remove:
Starter Motor Terminal Locknut [A]
Washer [B]
Collar [C]
O-ring [D]

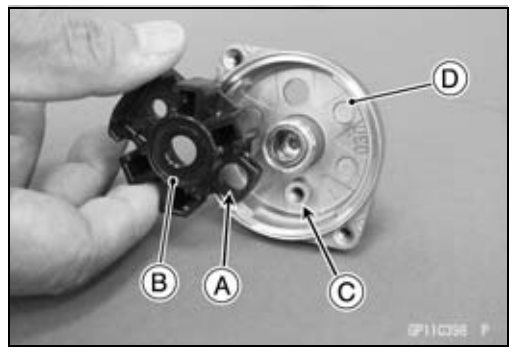


● Pull out the brushes from the brush holder [A].
● Remove:
Brush Springs [B]
Starter Motor Terminal [C]
Positive Brush Assy [D]
Brush Holder Screw [E]
Negative Brush Assy [F]
Brush Holder



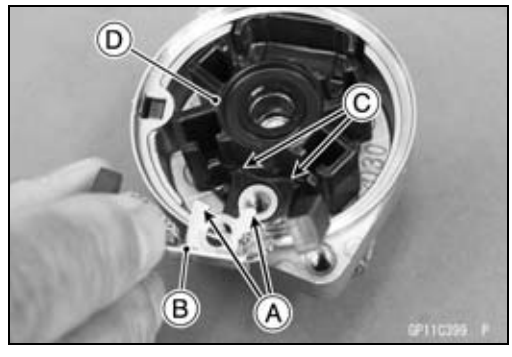
Starter Motor Assembly

● Align the hole [A] of the brush holder [B] to the boss [C] of the right-hand end cover [D].



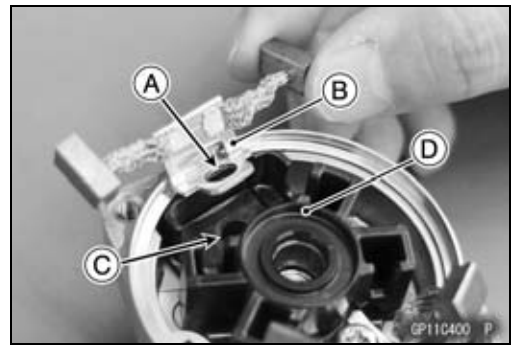
● Align the stoppers [A] of the negative brush assy [B] to the grooves [C] of the brush holder [D].
● Tighten:

Torque - Brush Holder Screw: 3.8 N·m (0.39 kgf·m, 34 in·lb)



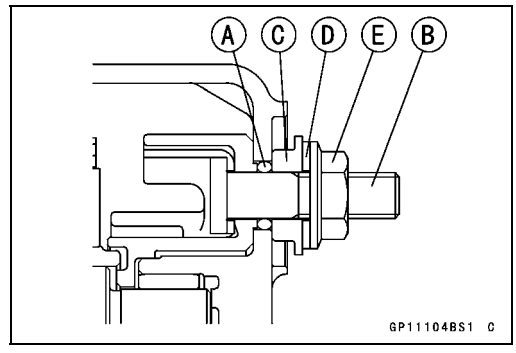
Electric Starter System

● Align the hole [A] of the positive brush assy [B] with the hole [C] of the brush holder [D].
● Insert the starter motor terminal through the holes.

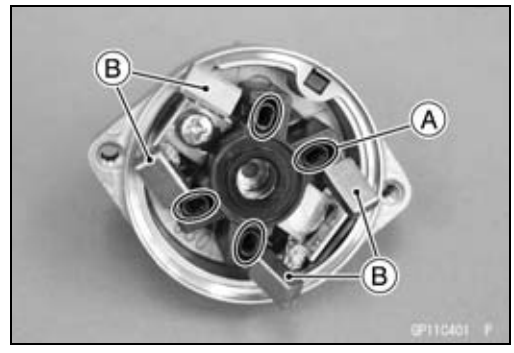


● Replace the O-ring [A] with a new one.
● Install the following parts to the starter motor terminal [B].
New O-ring
Collar [C]
Washer [D]
Starter Motor Terminal Locknut [E]
○Install the collar so that stepped side faces outward.
● Tighten:

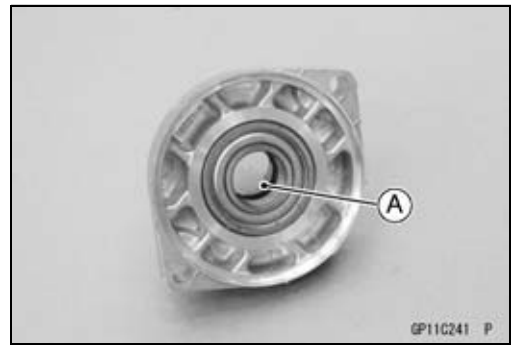
Torque - Starter Motor Terminal Locknut: 11 N·m (1.1 kgf·m, 97 in·lb)



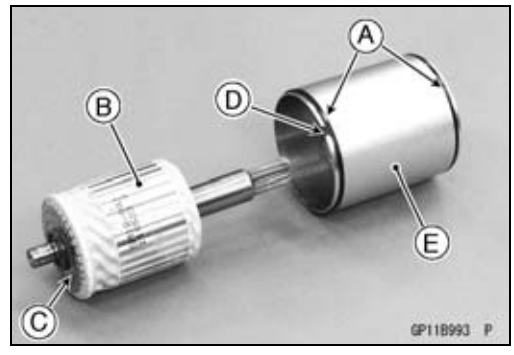
● Install the brush springs [A] and insert the brushes [B].



● Apply thin coat of grease to the oil seal [A].

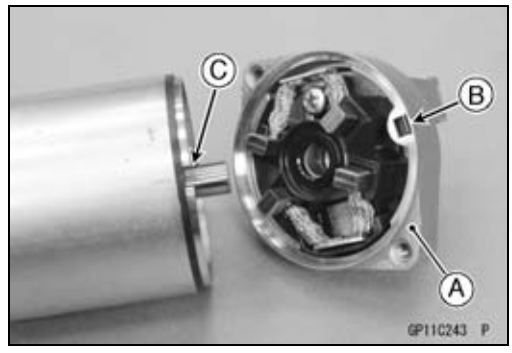


● Replace the O-rings [A] with new ones.
● Insert the armature [B] so that commutator side [C] faces hollow side [D] of the yoke [E].



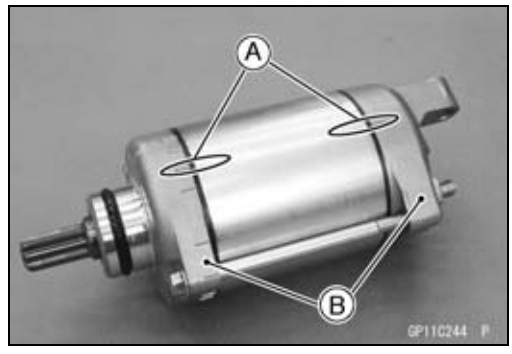
Electric Starter System

● Install the end cover [A] so that the stopper [B] is aligned with the hollow [C] of the yoke.



● Align the marks [A] to assembly the yoke and the end covers [B].
● Tighten the through bolts.

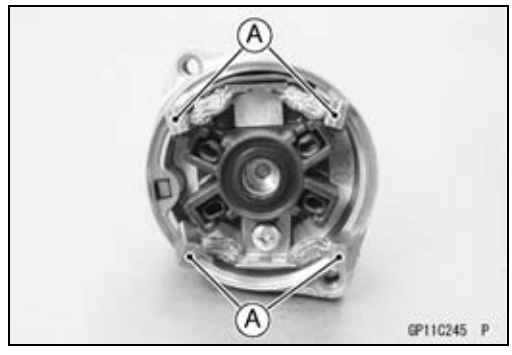
Torque - Starter Motor Through Bolts: 5.0 N·m (0.51 kgf·m, 44 in·lb)



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
Standard: 12 mm (0.47 in.)
Service Limit: 6.5 mm (0.26 in.)



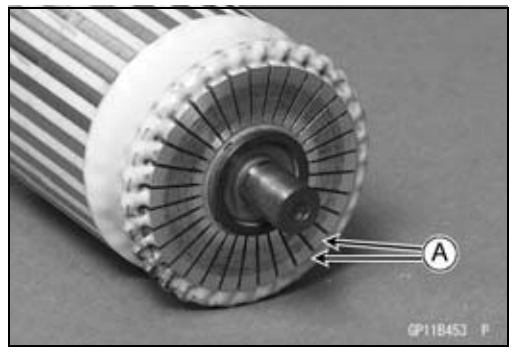
Commutator Cleaning and Inspection

● Clean the metallic debris off the between commutator segments [A].

NOTE

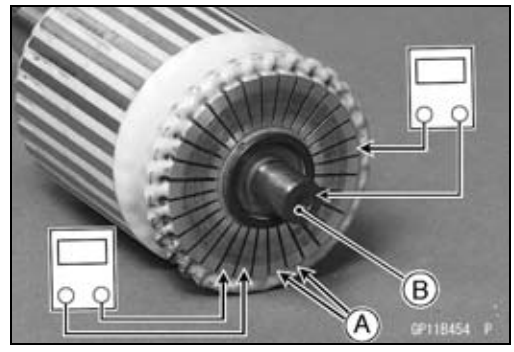
○*Do not use emery or sand paper on the commutator.*

● 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.



Electric Starter System

Armature Inspection



- Using a tester, measure the resistance between any two commutator segments [A].

★If there is a high resistance or no reading (∞) between any two segments, a winding is open and the starter motor must be replaced.

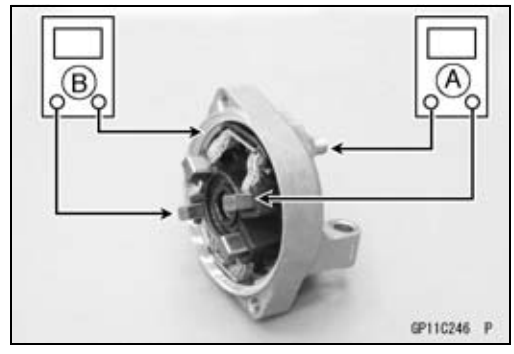
- Using the tester, measure the resistance between the segments and the shaft [B].

★If there is any reading at all, the armature has a short and the starter motor must be replaced.

NOTE

○*Even if the foregoing checks show the armature to be good, it may be defective in some manner not readily detectable with the tester. If all other starter motor and starter motor circuit components check good, but the starter motor still does not turn over or only turns over weakly, replace the starter motor with a new one.*

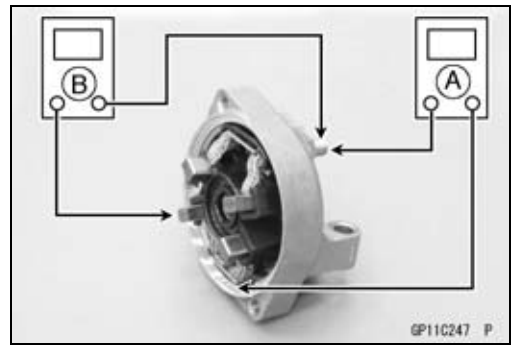
Brush Lead Inspection



- Using a tester, measure the resistance as shown.
  Terminal Bolt and Positive Brushes [A]
  Right-hand End Cover and Negative Brushes [B]

★If there is not close to zero ohms, the brush lead has an open. Replace the brush plate assy.

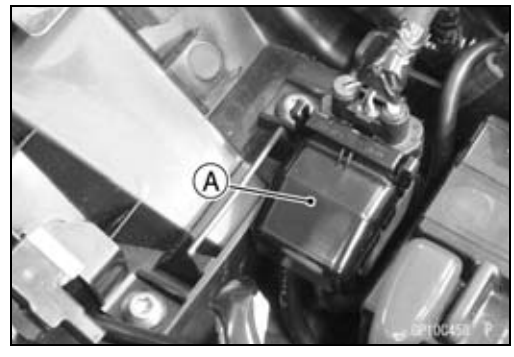
Right-hand End Cover Inspection



- Using a tester, measure the resistance as shown.
  Terminal Bolt and Right-hand End Cover [A]
  Terminal Bolt and Negative Brushes [B]

★If there is any reading, the brush assy and/or terminal bolt assy have a short. Replace the starter motor.

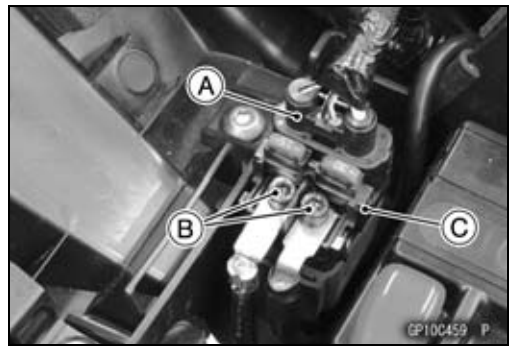
Starter Relay Inspection



- Remove:
  Front Seat (see Front Seat Removal in the Frame chapter)
  Battery Negative (–) Cable (see Battery Removal)
  Starter Relay Cover [A]

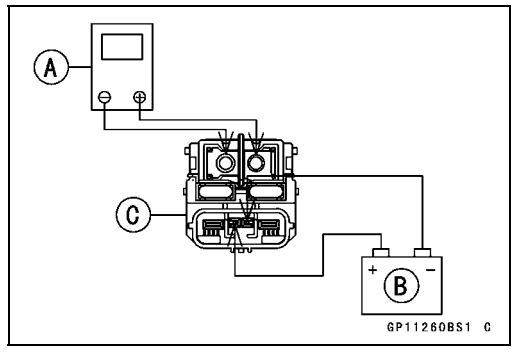
Electric Starter System

● Disconnect:
Connector [A]
● Remove:
Cable Terminal Bolts [B]
Starter Relay [C]



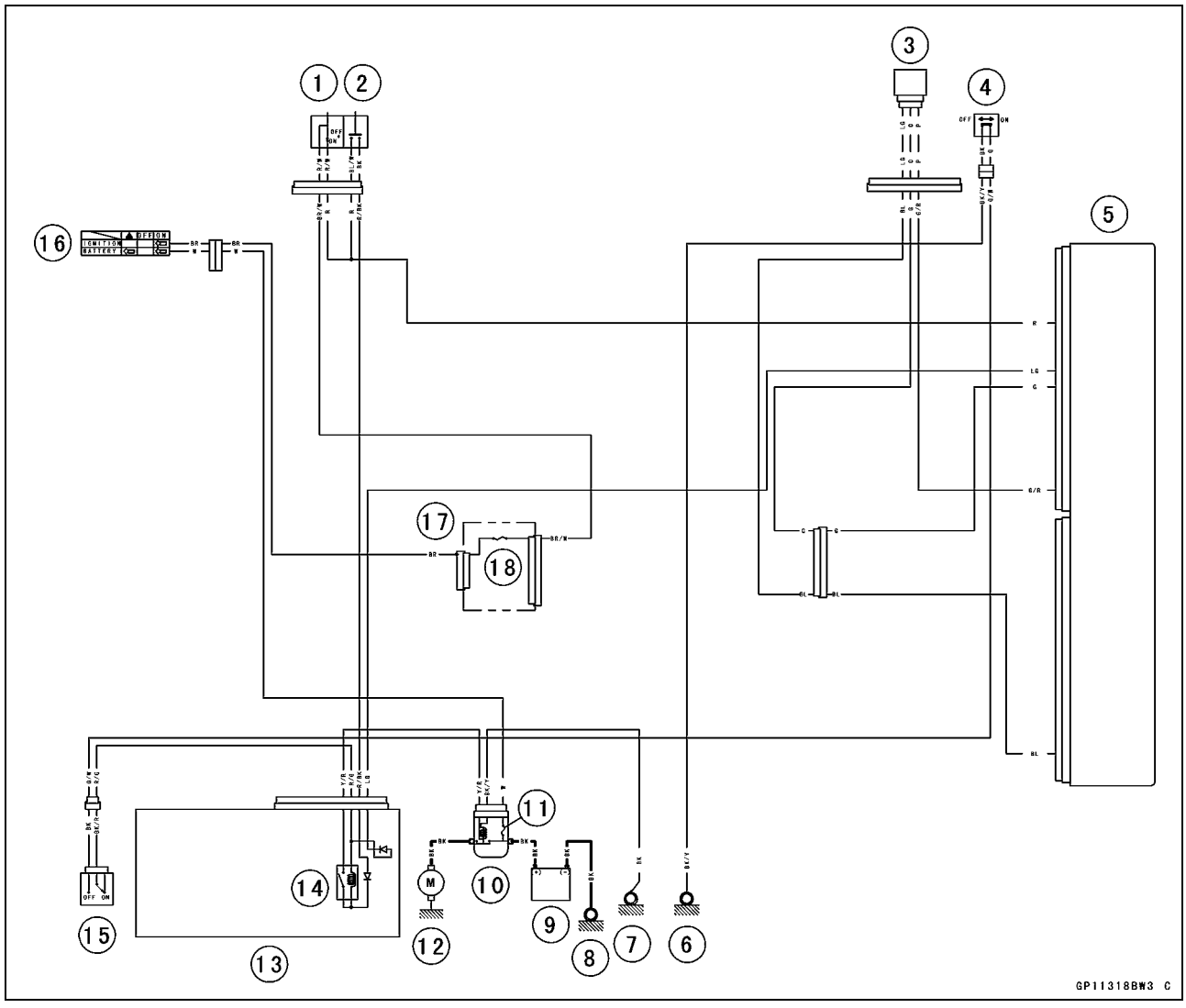
● Connect a tester [A] and 12 V battery [B] to the starter relay [C] as shown.
★If the relay does not work as specified, the relay is defective. Replace the relay.

Testing Relay
Criteria: When battery is connected → 0 Ω
When battery is disconnected → ∞ Ω



Electric Starter System

Electric Starter Circuit



1. Engine Stop Switch
2. Starter Button
3. Gear Position Sensor
4. Side Stand Switch
5. ECU
6. Frame Ground (5)
7. Frame Ground (1)
8. Engine Ground
9. Battery 12 V 8 Ah
10. Starter Relay
11. Main Fuse 30 A
12. Starter Motor
13. Relay Box
14. Starter Circuit Relay
15. Starter Lockout Switch
16. Ignition Switch
17. Fuse Box (1)
18. Ignition Fuse 15 A

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 (LED) Assembly Removal/Installation

- Refer to the Upper Fairing Disassembly/Assembly in the Frame chapter.

Headlight Harness Circuit Inspection

NOTE

○*If one of the LED in the headlight unit does not turn on, replace the headlight unit as an assembly.*

- Remove:
  Left Lower Fairing (see Lower Fairing Removal in the Frame chapter)
- Disconnect the headlight lead connector [A].
- Connect the measuring adapter [B] to the main harness connector [C] for the headlight unit.

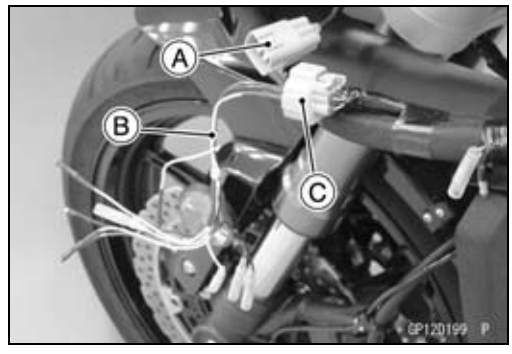
Special Tool - Measuring Adapter: 57001-1700

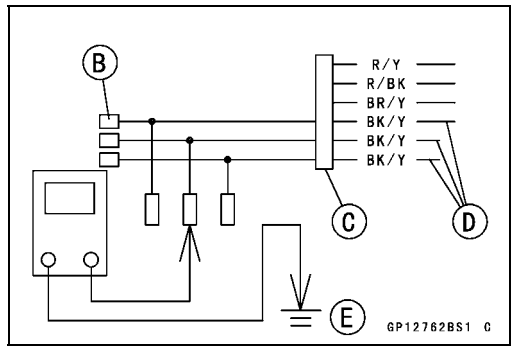
- Check the headlight wiring for continuity

Wiring Continuity Inspection

BK/Y Lead [D] ← → Ground [E]

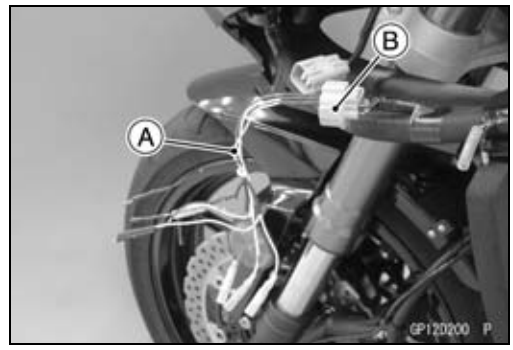
★If there is no continuity, the harness has an open circuit, and it must be repaired or replaced.





Lighting System

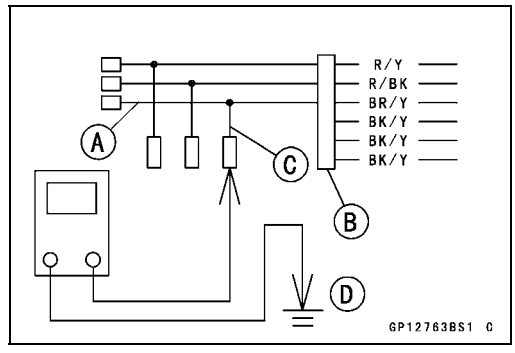
City Light Input Voltage Inspection



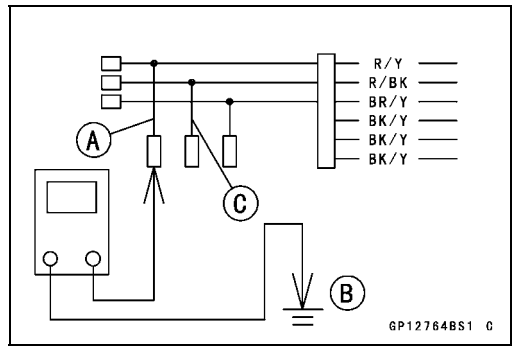
- Connect the measuring adapter [A] to the main harness connector [B] for the headlight unit.
- Connect a tester between the terminals as shown.

BR/Y Lead (+) [C] ← → Ground (–) [D]

- The battery voltage should appear after the ignition switch is turned on.



Headlight Lo Beam Input Voltage Inspection



- Connect a tester between the terminals as shown.

R/Y Lead (+) [A] ← → Ground (–) [B]

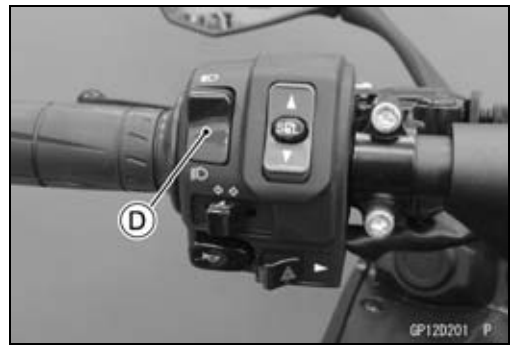
- Turn the ignition switch on.
- Push the starter button momentarily to turn the headlight relay on.
- The battery voltage should appear when the headlight relay turned on.

Headlight Hi Beam Input Voltage Inspection

- Connect a tester between the terminals as shown.

R/BK Lead (+) [C] ← → Ground (–)

- The battery voltage should appear after the dimmer switch [D] turned to high beam position.
- Turn the ignition switch off.



★If the headlight input voltage is out of the standard, check the followings:
Head light Fuse (see Fuse Inspection)
Brake/Horn Fuse (see Fuse Inspection)
Headlight Relay (see Relay Circuit Inspection)

★If the headlight relay and the fuses are good, check the headlight wiring for open or short circuit.

★If all measurements are within the standard, replace the headlight (LED) assembly (see Headlight (LED) Assembly Removal/Installation).

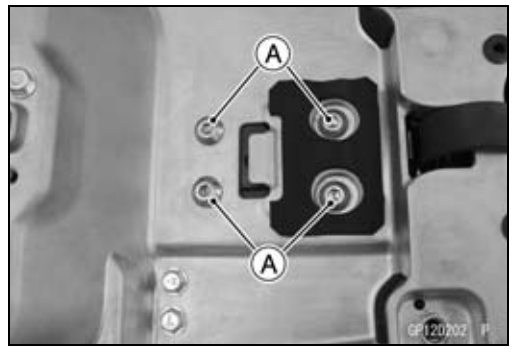
City Light (LED) Removal/Installation

- The city lights are integrated into the headlight unit. Refer to the headlight removal and installation.

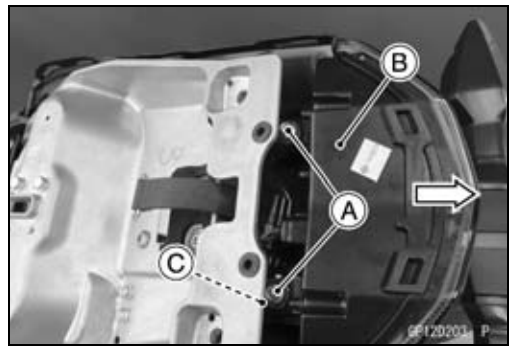
Lighting System

Tail/Brake Light (LED) Removal

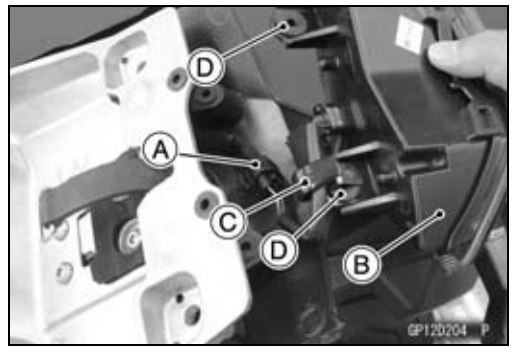
- Remove:
  Seat Covers (see Seat Cover Removal in the Frame chapter)
- Loosen the rear fender mounting bolts [A].



- Remove the bolts [A] and pull the tail/brake light (LED) unit [B] rearward with the clamp [C].

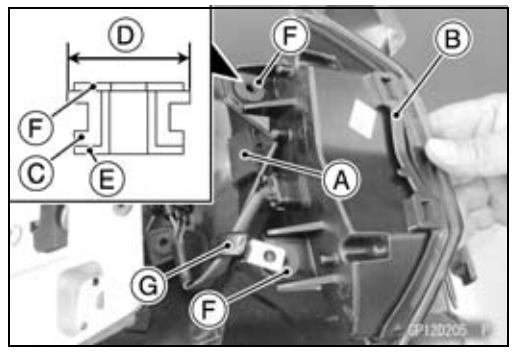


- Disconnect the tail/brake light lead connector [A].
- Remove:
  Tail/brake Light (LED) [B]
  Clamp [C]
  Washers [D] and Collars



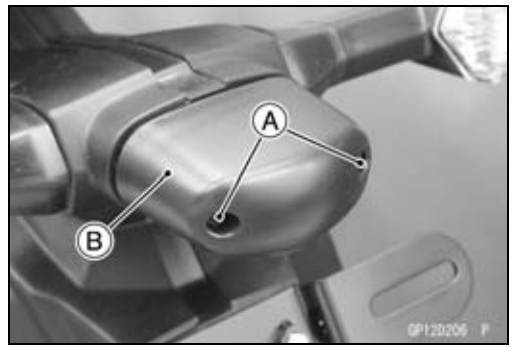
Tail/Brake Light (LED) Installation

- Installation is the reverse of removal.
- Make sure that the pads [A] and [B] are in place as shown.
- If removed, install the grommets [C] with its large diameter [D] side facing upward.
- Install:
  Collars [E]
  Washers [F]
  Clamp [G]
- Run the lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).



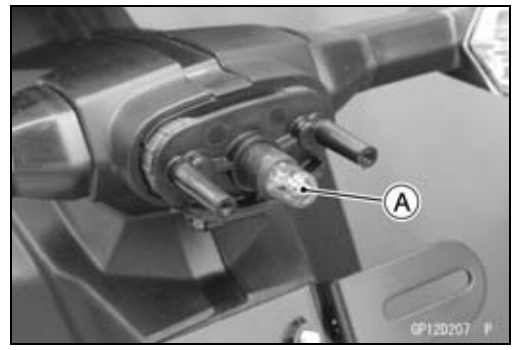
License Plate Light Bulb Replacement

- Remove:
  License Plate Light Cover Screws [A]
  License Plate Light Cover [B] and Lens



Lighting System

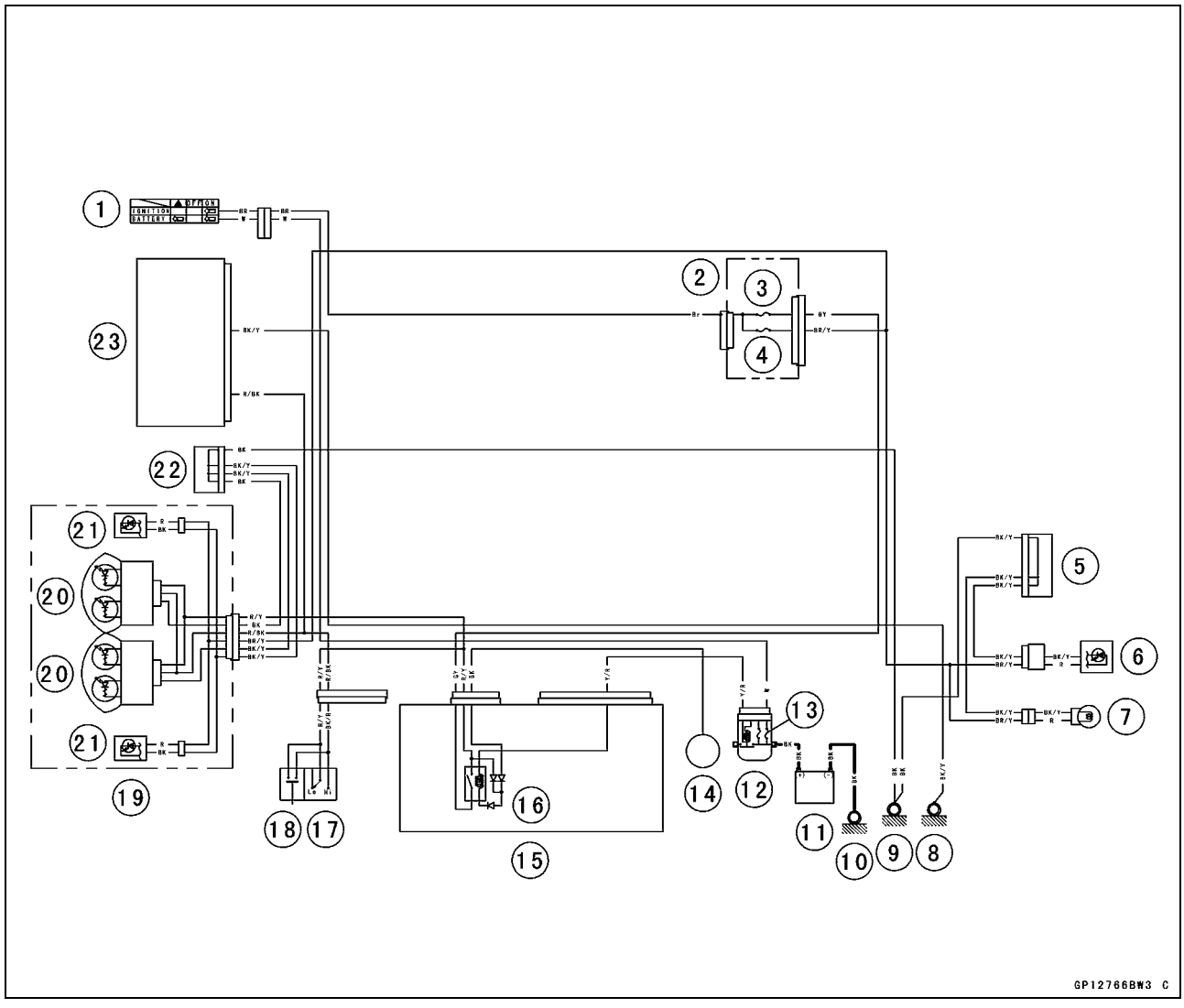
● Pull out the bulb [A] straight from the socket.



NOTICE
Do not turn the bulb. Pull the bulb out to prevent damage to the bulb. Do not use bulb rated for greater wattage then the specified valve.

● Replace the bulb with a new one.
● Insert the new bulb into the socket.
● Install the license plate light cover.
● Tighten the license plate light cover screws.

Headlight/Tail Light Circuit



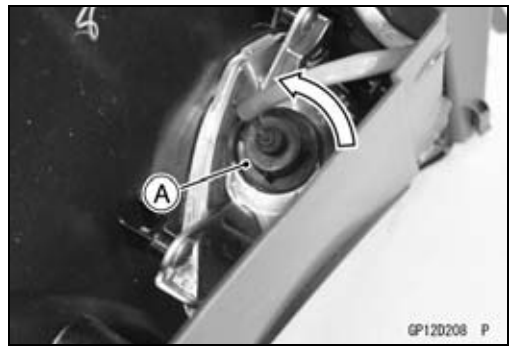
1. Ignition Switch
2. Fuse Box (1)
3. Headlight Relay Fuse 15 A
4. Brake Light/Horn Fuse 7.5 A
5. Joint Connector C
6. Tail/Brake Light (LED)
7. License Plate Light 12 V 5 W
8. Frame Ground (4)
9. Frame Ground (1)
10. Engine Ground
11. Battery 12 V 8 Ah
12. Starter Relay
13. Main Fuse 30 A
14. Alternator
15. Relay Box
16. Headlight Circuit Relay
17. Dimmer Switch
18. Passing Button
19. Headlight Unit
20. Headlights (LED)
21. City Lights (LED)
22. Joint Connector A
23. Meter Unit

Lighting System

Turn Signal Light Bulb Replacement

Front Turn Signal Light

- Remove:
  Meter Cover (see Upper Fairing Removal in the Frame chapter)
- Turn the socket [A] counterclockwise and pull out the socket together with the bulb.

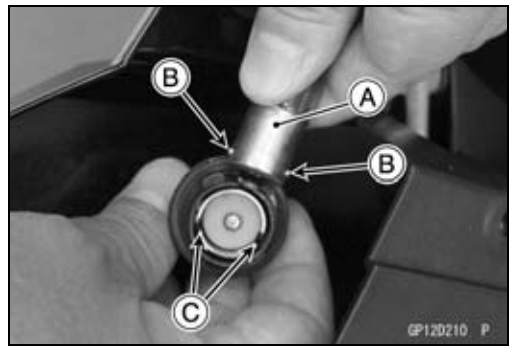


- Push and turn the bulb [A] counterclockwise and remove it.



- Insert the new bulb [A] by aligning its pins [B] with the grooves [C] in the socket, and turn the bulb clockwise.

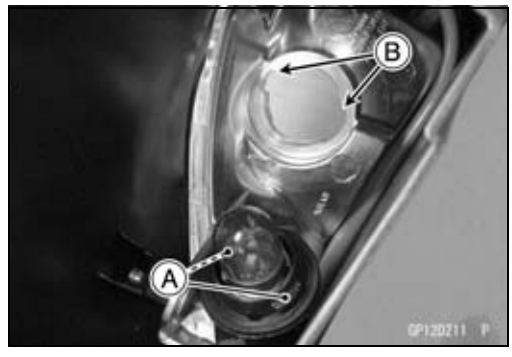
○Turn the bulb about 15°.



- Fit the projections [A] of the socket into the grooves [B] of the turn signal light.

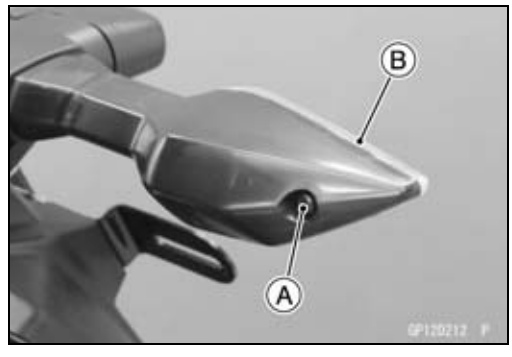
○Align the size of the projections with the grooves.

- Turn the socket clockwise until it stops.
- Install the removed parts (see appropriate chapters).



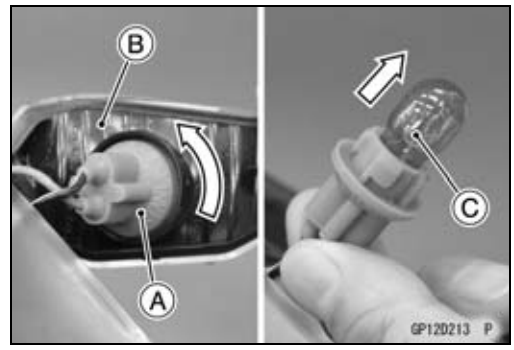
Rear Turn Signal Light

- Remove:
  Turn Signal Light Lens Screw [A]
  Turn Signal Light Lens Housing [B]



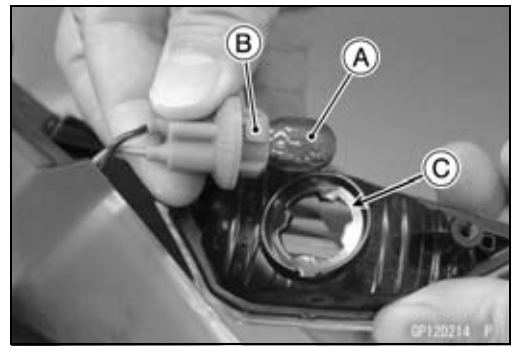
Lighting System

- Turn the socket [A] counterclockwise and remove the lens housing [B].
- Pull out the bulb [C] straight from the socket.



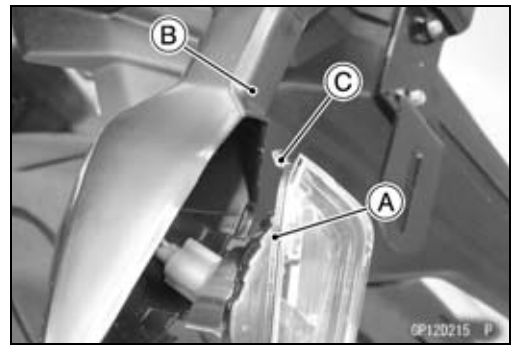
NOTICE
Do not turn the bulb. Pull the bulb out to prevent damage to the bulb. Do not use bulb rated for greater wattage then the specified valve.

- Replace the bulb [A] with a new one.
- Push the new bulb into the socket.
- Insert the socket by aligning its tabs [B] with the cutouts [C] of the lens.
- Turn the socket clockwise until it stops.



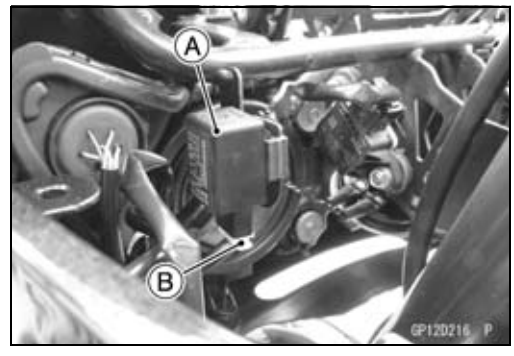
- Fit the lens housing [A] to the light case [B] by inserting the projection [C] on the lens housing to the inside of the light case.
- Tighten the turn signal light lens screw.

Torque - Tern Signal Light Lens Screw: 1.0 N·m (0.10 kgf·m, 8.9 in·lb)



Turn Signal Relay Inspection

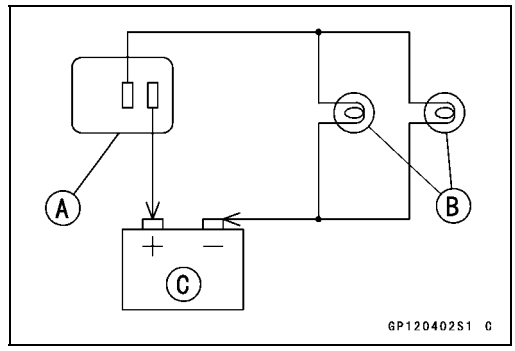
- Remove:
  Meter Cover (see Upper Fairing Removal in the Frame chapter)
- Remove the turn signal relay [A].
- Disconnect the turn signal relay connector [B].



Lighting System

● Connect one 12 V battery and turn signal lights as indicated, and count how many times the lights blink for one minute.
  Turn Signal Relay [A]
  Turn Signal Lights [B]
  12 V Battery [C]

★If the lights do not blink as specified, replace the turn signal relay.



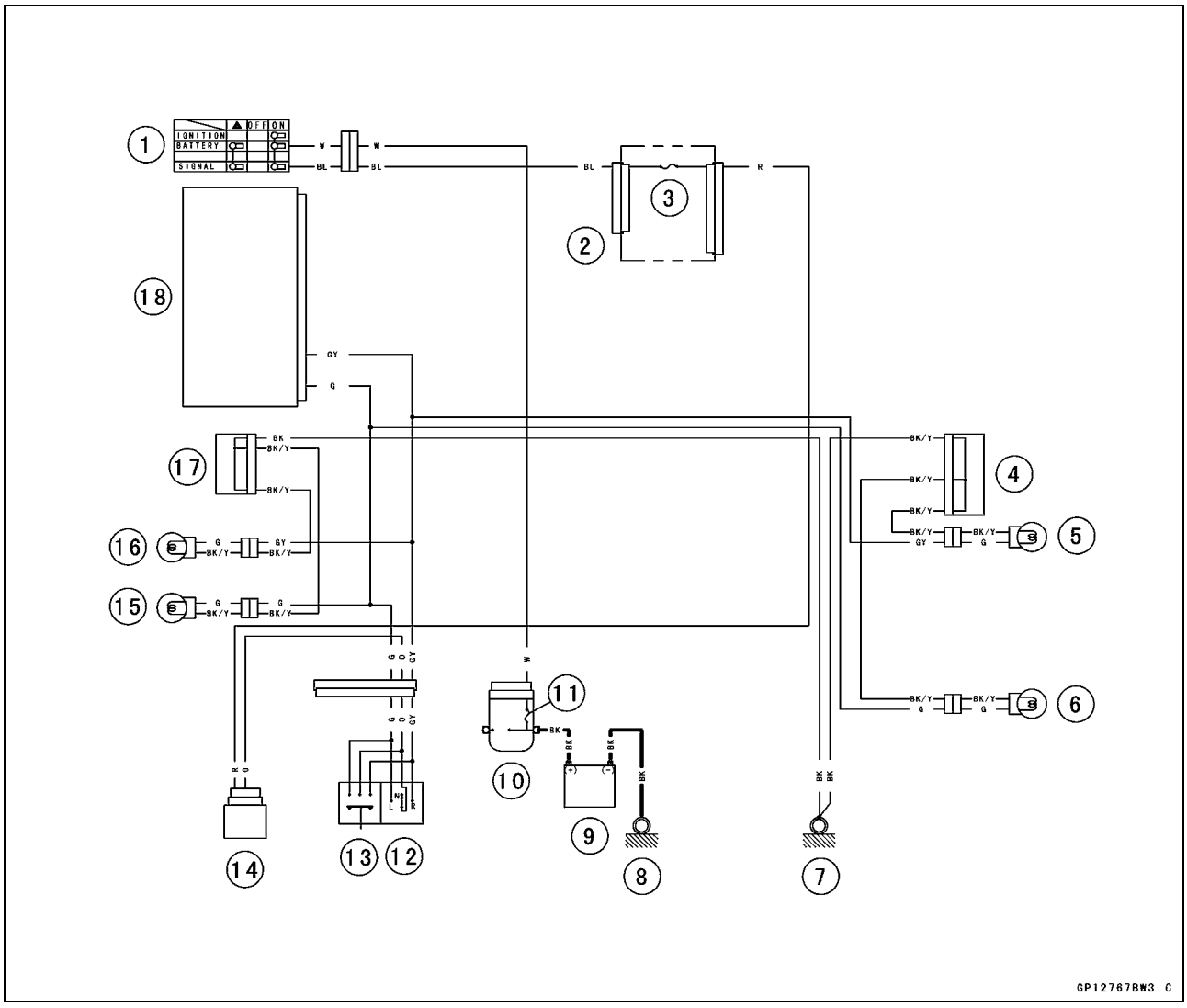
Testing Turn Signal Relay

Load		Blinking Times (c/m*)
The Number of Turn Signal Lights	Wattage (W)	
1**	10	140 ~ 250
2	20	75 ~ 95

(*): Cycle(s) per minute
(**): Correspond to “one light burned out.”

Lighting System

Turn Signal Light Circuit



1. Ignition Switch
2. Fuse Box (2)
3. Turn Signal Relay Fuse 7.5 A
4. Joint Connector C
5. Rear Right Turn Signal Light 12 V 10 W
6. Rear Left Turn Signal Light 12 V 10 W
7. Frame Ground (1)
8. Engine Ground
9. Battery 12 V 8 Ah
10. Starter Relay
11. Main Fuse 30 A
12. Turn Signal Switch
13. Hazard Switch
14. Turn Signal Relay
15. Front Left Turn Signal Light 12 V 10 W
16. Front Right Turn Signal Light 12 V 10 W
17. Joint Connector A
18. Meter Unit

Air Switching Valve

Air Switching Valve Operation Test

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

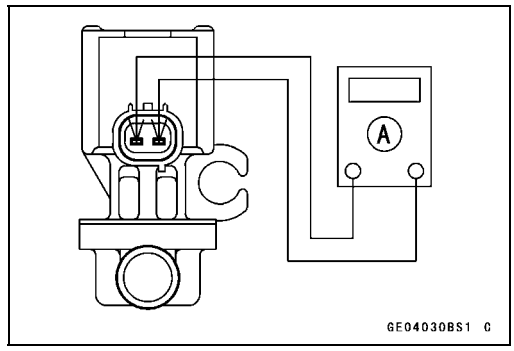
Air Switching Valve Unit Test

● Remove the air switching valve (see Air Switching Valve Removal in the Engine Top End chapter).

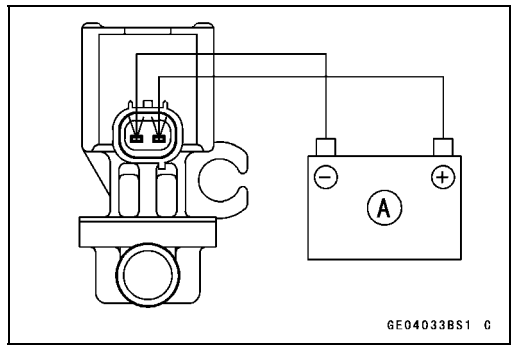
● Connect a tester [A] to the air switching valve terminals as shown.

Air Switching Valve Resistance
Standard: 20 ~ 24 Ω @20°C (68°F)

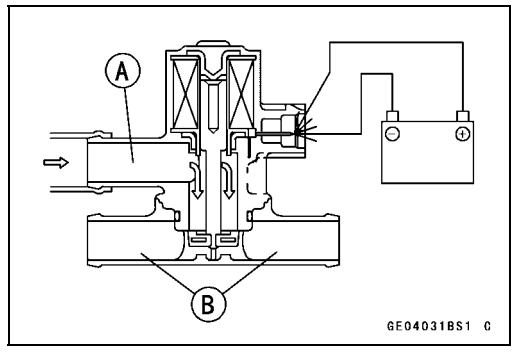
★If the resistance reading is out of the specified value, replace it with a new one.



● Connect the 12 V battery [A] to the air switching valve terminals as shown.



● Blow the air to the intake air duct [A], and make sure does not flow the blown air from the outlet air ducts [B].



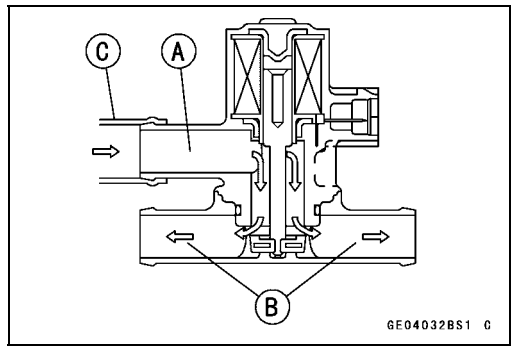
● Disconnect the 12 V battery.

● Blow the air to the intake air duct [A] again, and make sure flow the blown air from the outlet air ducts [B].

★If the air switching valve does not operate as described, replace it with a new one.

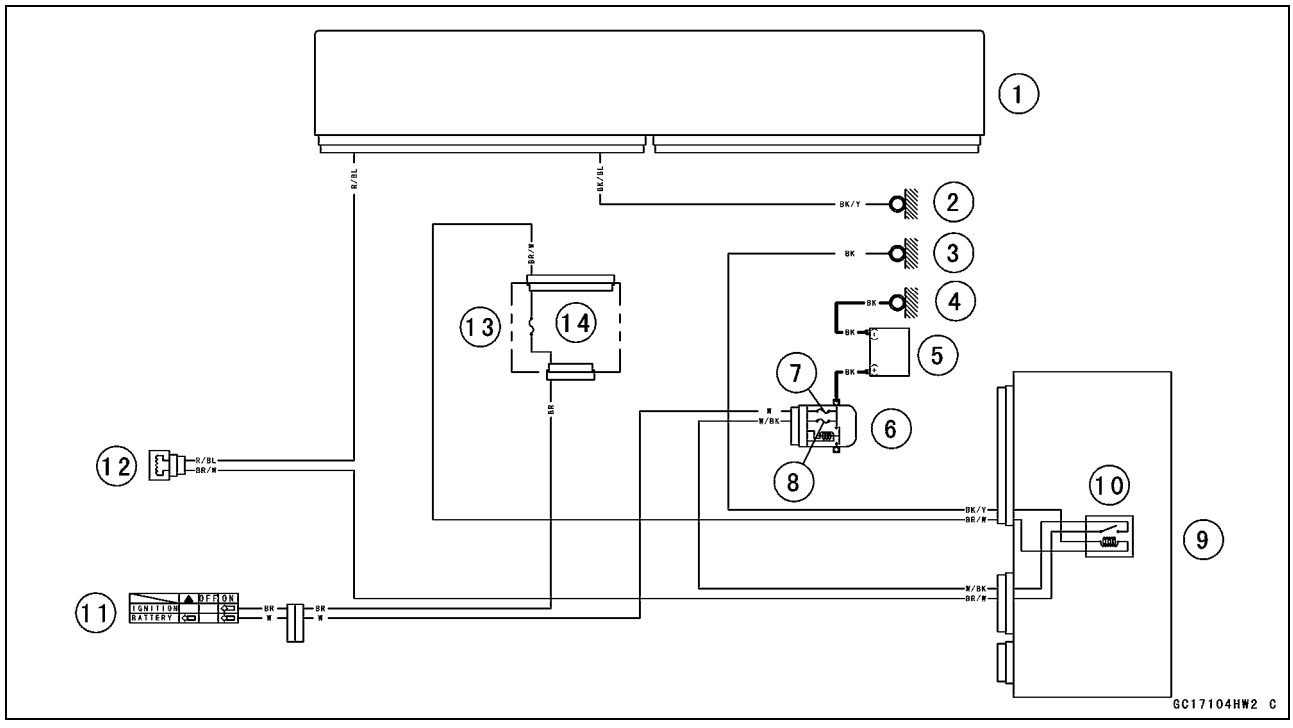
NOTE

○*To check air flow through the air switching valve, just blow through the air switching valve hose (intake side) [C].*



Air Switching Valve

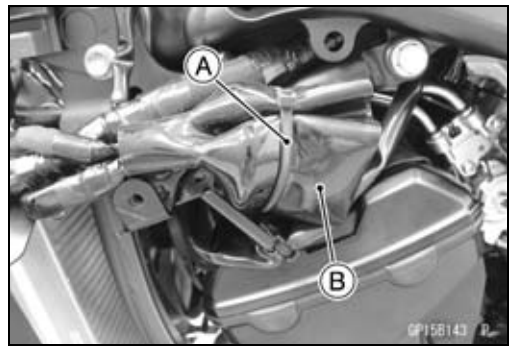
Air Switching Valve Circuit



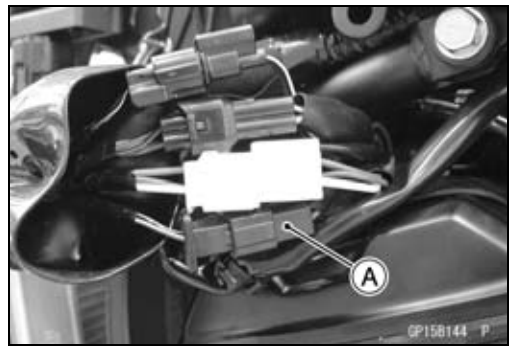
1. ECU
2. Frame Ground (5)
3. Frame Ground (1)
4. Engine Ground
5. Battery 12 V 8 Ah
6. Starter Relay
7. Main Fuse 30 A
8. ECU Fuse 15 A
9. Relay Box
10. ECU Main Relay
11. Ignition Switch
12. Air Switching Valve
13. Fuse Box (1)
14. Ignition Fuse 15 A

Radiator Fan System

Fan Motor Inspection



- Remove the left lower fairing (see lower Fairing Removal in the Frame chapter).
- Cut the band [A].
- Slide the dust cover [B].

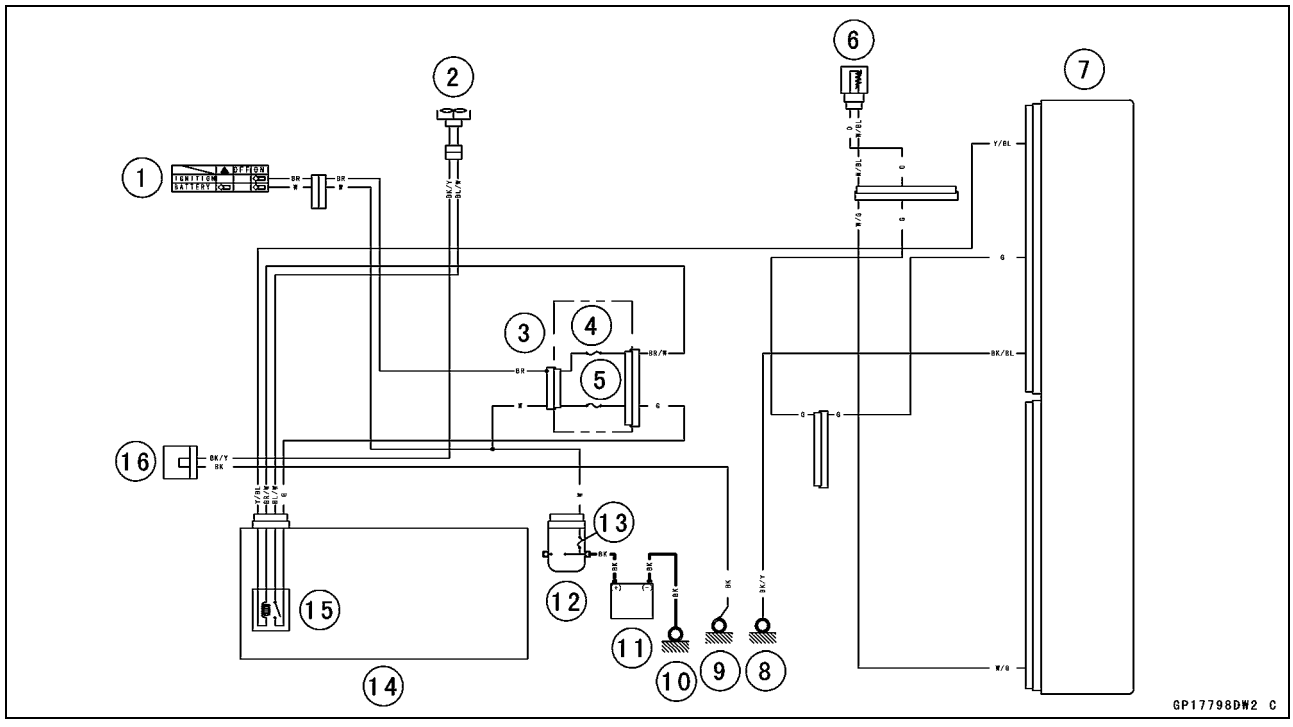


- Disconnect the fan motor lead connector [A].
- Using an auxiliary leads, supply battery power to the fan motor.

★If the fan does not rotate, the fan motor is defective and must be replaced.

Radiator Fan System

Radiator Fan Circuit

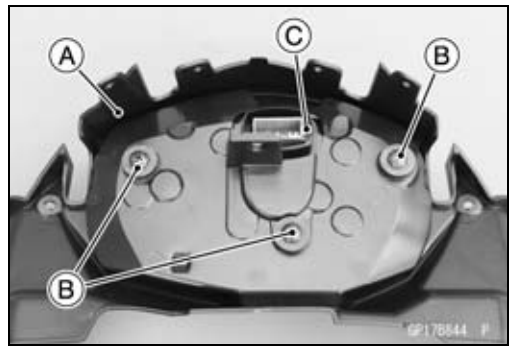


1. Ignition Switch
2. Fan Motor
3. Fuse Box (1)
4. Ignition Fuse 15 A
5. Fan Fuse 15 A
6. Water Temperature Sensor
7. ECU
8. Frame Ground (5)
9. Frame Ground (1)
10. Engine Ground
11. Battery 12 V 8 Ah
12. Starter Relay
13. Main Fuse 30 A
14. Relay Box
15. Radiator Fan Relay
16. Joint Connector B

Meter, Gauge, Indicator Unit

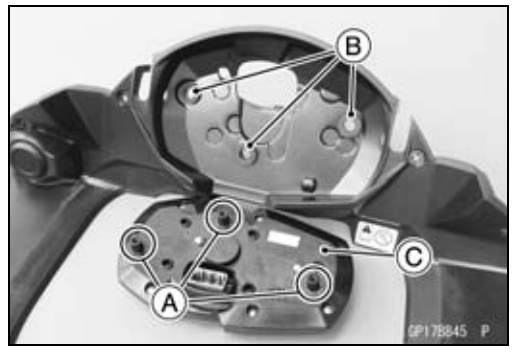
Meter Unit Removal

- Remove:
  Meter Cover [A] (see Upper Fairing Removal in the Frame chapter)
  Screw [B] and washer
  Meter Unit [C]



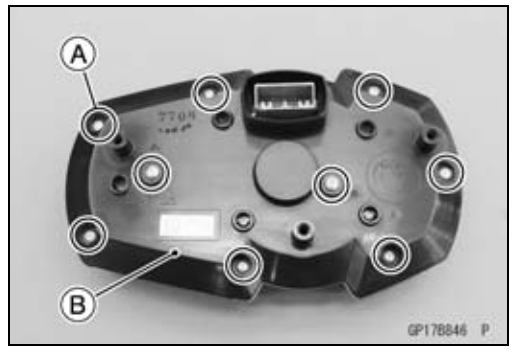
Meter Unit Installation

- Insert the projections [A] into the grommets [B] to install the meter unit [C].

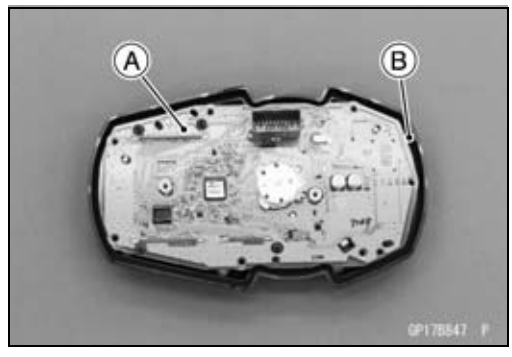


Meter Unit Disassembly/Assembly

- Remove:
  Meter Unit (see Meter Unit Removal)
  Screws [A]
  Lower Meter Cover [B]



- Separate the meter assembly [A] and upper meter cover [B].
- Apply is the reverse of disassembly.

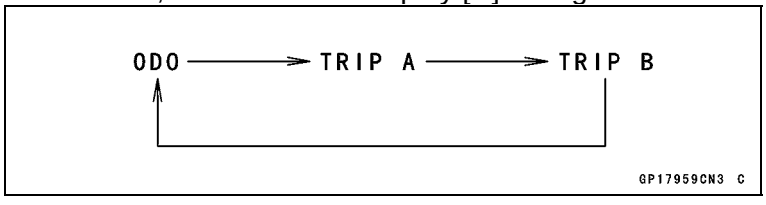


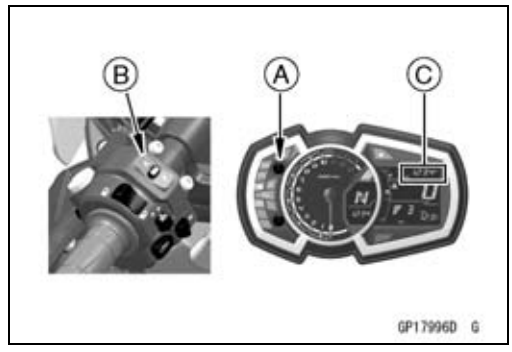
Meter Operation Inspection

Check 1: Meter Unit Switching Inspection

Display Mode Setting

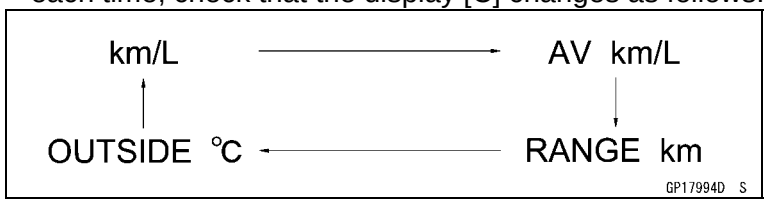
- Turn the ignition switch on and check the following.
- By pushing the upper meter button [A] or upper button [B] each time, check that the display [C] changes as follows.

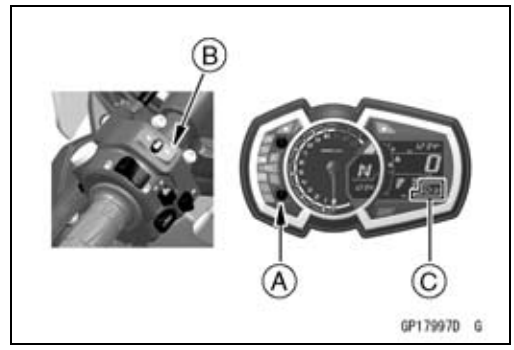




Meter, Gauge, Indicator Unit

● By pushing the lower meter button [A] or lower button [B] each time, check that the display [C] changes as follows.





Unit Setting

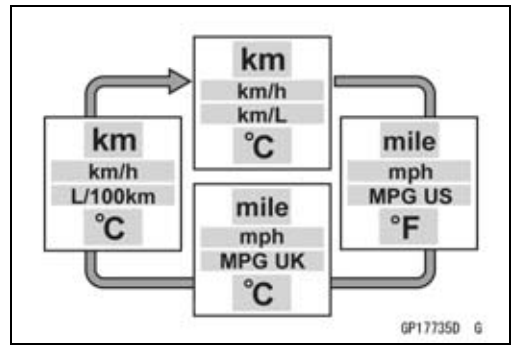
● Set the ODO mode by pushing the upper meter button or upper button.

● By pushing the lower meter button or lower button each time while the upper button pushed in, check that the display changes as shown.

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.*

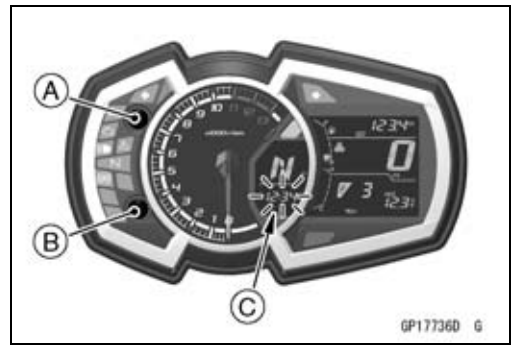
★If the display function does not work, replace the meter unit.



Clock Setting

● Push the upper meter button [A] and lower meter button [B] for more than two seconds.

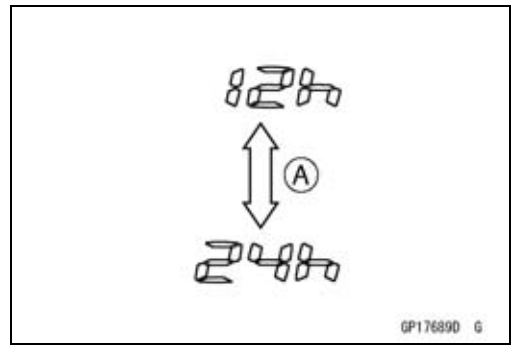
○The clock setting menu (hour and minute) should blink [C].



● Push the lower meter button and hold it.

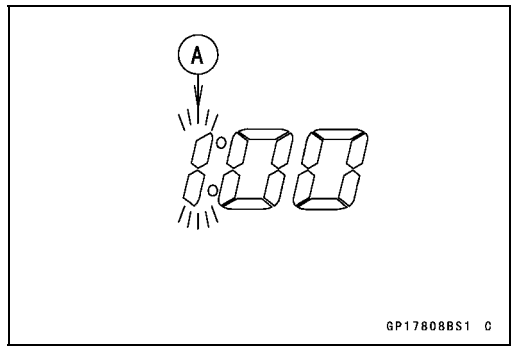
○“12h” or “24h” display is appeared.

● Push the upper meter button to select “12h” or “24h” [A].

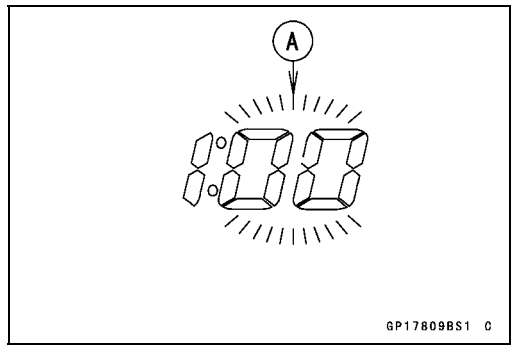


Meter, Gauge, Indicator Unit

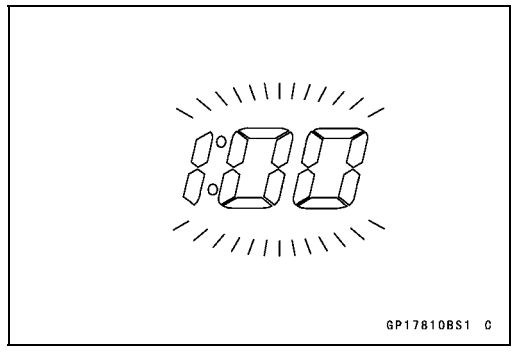
● Push the lower meter button.
○The hour display [A] starts blinking.
● By pushing the upper meter button each time, check that the hour display changes.



● By pushing the lower meter button, check that the hour display decides and minute display [A] starts blinking.
● By pushing the upper meter button each time, check that the minute display changes.

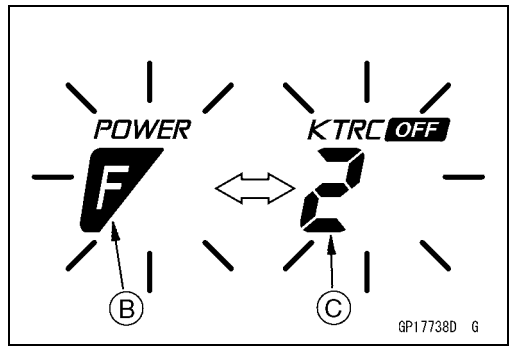


● By pushing the lower meter button, check that the hour and minute display start blinking.
● By pushing the upper meter button, check that the hour and minute display decide.
● When both hour and minute display is blinking, by pushing the lower meter button, check that the hour display start blinking. The clock returns the hour setting display.
★If the display function does not work, replace the meter unit.



Check 1-2: Left Switch Housing Switching Inspection
● Turn the ignition switch on.
● By pushing the “SEL” button [A] each time, check that the display selects POWER mode [B] or KTRC mode [C]. The selected mode will blinks.
★If the modes does not slected, check the following parts.
SEL Button (see Switch Inspection)
Wiring (see Meter Unit Circuit)
★If the above parts is good, replace the meter unit and/or ECU.



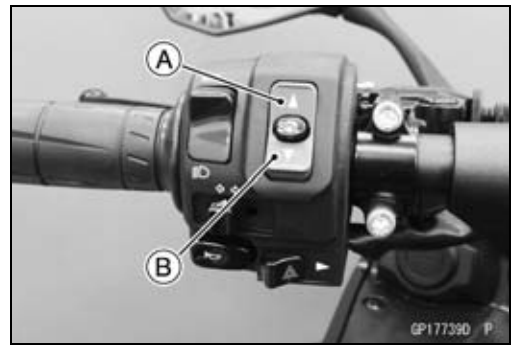


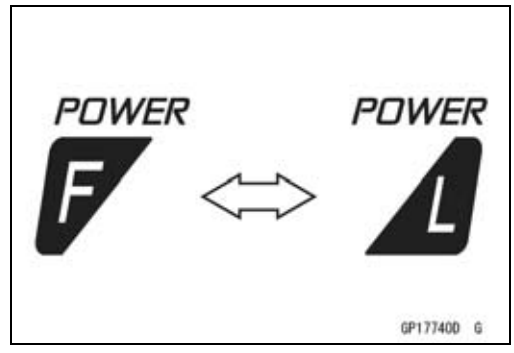
Meter, Gauge, Indicator Unit

- Select the POWER mode.
- By pushing the upper button [A] or lower button [B] each time, check that the POWER mode indicator changes to going on.

★If the POWER mode indicator function does not work or blinks, check the following parts.
Upper Button or Lower Button (see Switch Inspection)
Wiring (see Meter Unit Circuit)

★If the above parts is good, replace the meter unit.

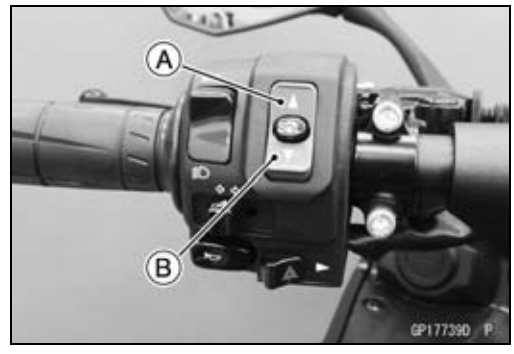


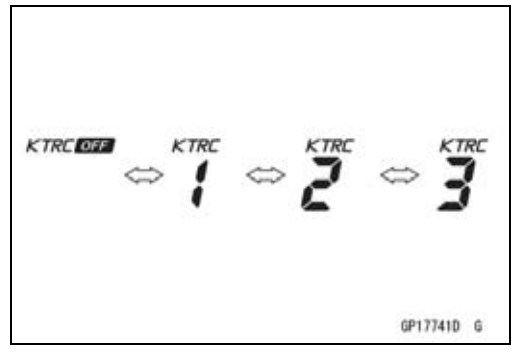


- Select the KTRC mode.
- By pushing the upper button [A] or lower button [B] each time, check that the KTRC mode indicator changes to going on.

★If the KTRC mode indicator function does not work or "–" blinks, check the following parts.
Upper Button or Lower Button (see Switch Inspection)
Wiring (see Meter Unit Circuit)

★If the above parts is good, replace the meter unit.

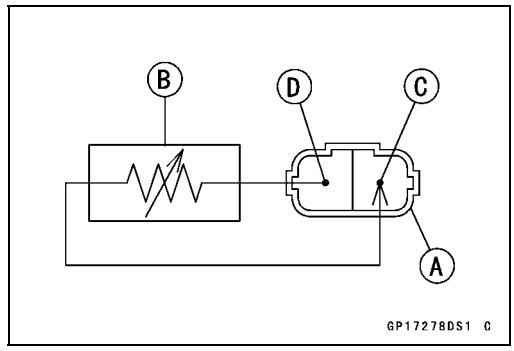




Meter, Gauge, Indicator Unit

Meter System Inspection

Check 2-1: Water Temperature Inspection



- Disconnect the water temperature sensor connector [A] (see Water Temperature Sensor Removal/Installation in the Fuel System (DFI) chapter).
- Connect the variable rheostat [B] to the W/BL lead [C] and O lead [D] terminals.

LCD Display	Resistance (kΩ)
– – –	1.231 or more
40°C (104°F)	1.136 ±0.095
100°C (212°F)	0.1553 ±0.0070
HI	0.1483 or less

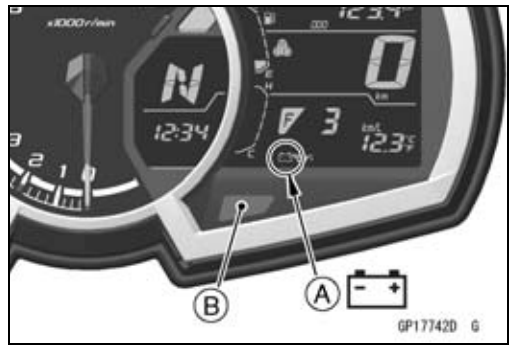
- Turn the ignition switch on.
- Read the temperature in the display.

○The display range is 40 ~ 119°C (104 ~ 247°F).

★If the temperature is out of the range, check the wiring (see Meter Circuit).

★If the wiring is good, replace the meter unit.

Check 2-2: Battery Warning Indicator Inspection

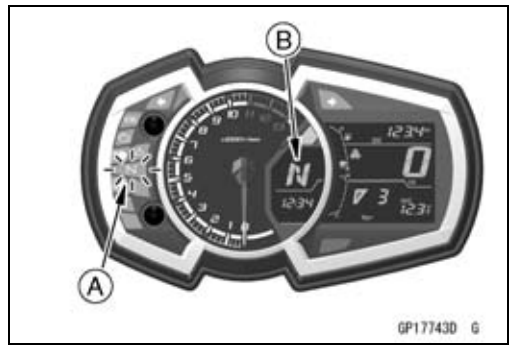


- When the battery condition is low voltage (10.8 ~ 11.2 V or less) or high voltage (15.5 ~ 16.5 V or more), the battery warning indicator [A] and red warning indicator (LED) [B] go on.

★If the battery warning indicator and red warning indicator (LED) go on, inspect the charging voltage (see Charging Voltage Inspection).

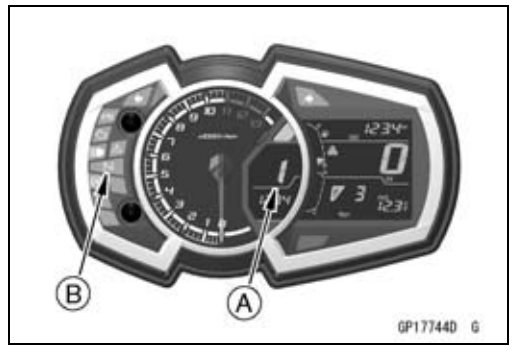
★If the charging voltage is good, replace the meter unit.

Check 2-3: Gear Position Indication Inspection



- Turn the ignition switch on and shift the transmission gear into neutral position.

○The green neutral indicator light (LED) [A] goes on, and the gear position indicator [B] should display “N.”



- Set the gear to the low position, and check that the display changes to “1” mark [A] and the green neutral indicator light (LED) [B] goes off.
- Using the rear stand, raise the rear wheel off the ground.
- Rotate the rear wheel by hand and change the gear position.
- Check that the display corresponding to each gear position (1, N, 2, 3, 4, 5 or 6) appears.

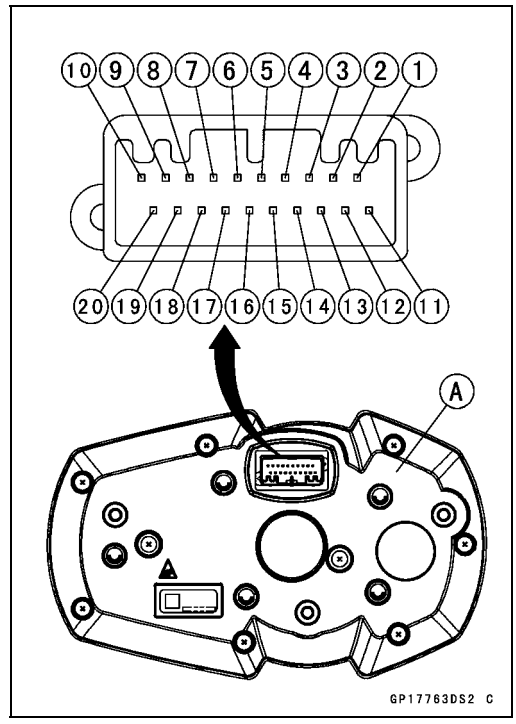
★If the display function does not work, check the following parts.

Gear Position Sensor (see Gear Position Sensor Input Voltage Inspection in the Fuel System (DFI) chapter)
Wiring (see Meter Unit Circuit)

★If the above parts are good, replace the meter unit and/or ECU.

Meter, Gauge, Indicator Unit

Meter Unit Inspection



- Remove the meter unit [A] (see Meter Unit Removal).

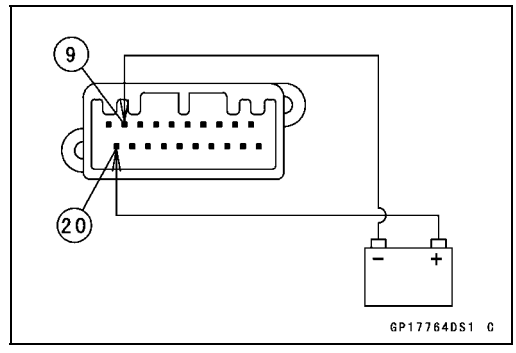
[1] Unused
[2] Unused
[3] Left Switch Housing Upper Button (–)
[4] Left Switch Housing Lower Button (–)
[5] KIBS Indicator (–)
[6] Red Warning Indicator (LED) (–)
[7] Green Neutral Indicator (LED) (–)
[8] Yellow ABS Indicator (LED) (–) [Equipped Models]
[9] Ground (–)
[10] Ignition (+)
[11] Fuel Level Sensor
[12] Rear Wheel Rotation Sensor Pulse
[13] ECU Communication Line
[14] Unused
[15] Tachometer Pulse
[16] Green Right Turn Signal Indicator (LED) (+)
[17] Blue High Beam Indicator (LED) (+)
[18] Yellow KTRC Indicator (LED) (–)
[19] Green Left Turn Signal Indicator (LED) (+)
[20] Battery (+)

NOTICE
Do not drop the meter unit. Do not short each terminal.

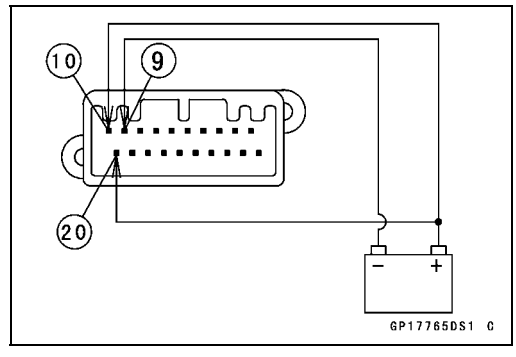
Check 3-1: Meter Unit Primary Operation Check

- Using the auxiliary leads, connect the 12 V battery to the meter unit connector as follows.

○Connect the battery positive (+) terminal to the terminal [20].
○Connect the battery negative (–) terminal to the terminal [9].

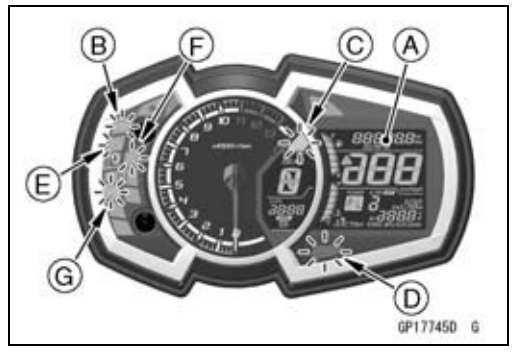


- Connect the terminal [10] to the battery (+) terminal.

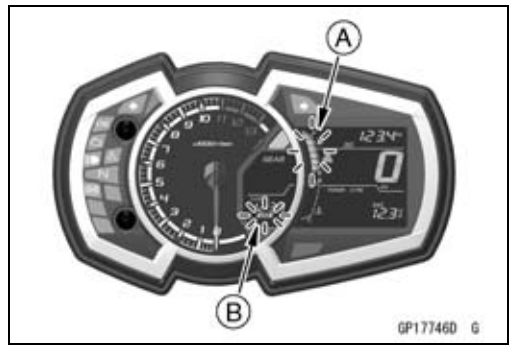


Meter, Gauge, Indicator Unit

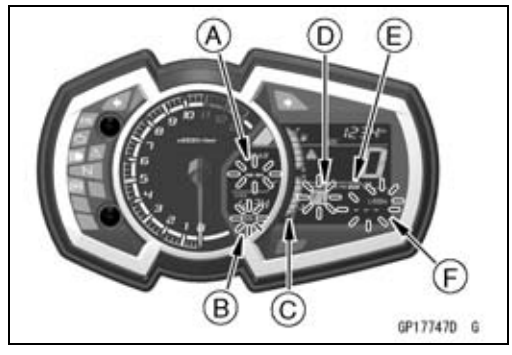
● Check the following items.
○The LCD display and meter illuminations should turn on.
○All the LCD segments [A] appear for few seconds.
○Following indicators are goes on for few seconds.
Yellow KTRC Indicator (LED) [B]
Yellow Shift-up Indicator (LED) [C]
Red Warning Indicator (LED) [D]
○Following indicators are remains on.
Yellow Engine Warning Indicator (LED) [E]
Yellow Warning Indicator (LED) [F]
Yellow ABS Warning Indicator (LED) [G] (if equipped)
★If the meter unit does not work properly, replace the meter assembly.



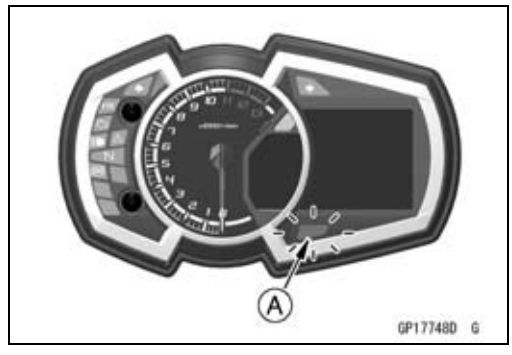
○Make sure that the following indicators on the LCD start blinking approx. 5 seconds after turning on the meter unit.
Fuel Level Gauge segments [A] and Indicator
KIBS Indicator [B]
★If the meter unit does not work properly, replace the meter assembly.



● Make sure that the following indicators on the LCD start blinking approx. 10 seconds after turning on the meter unit.
Gear Position Indicator with "- -" Message [A]
IMU Indicator [B]
All Segments of Water Temperature Gauge [C] and Indicator
Power Mode Indicator [D]
KTRC Mode Indicator [E]
Multifunction Display with "- -.-" Message [F]
★If the meter unit does not work properly, replace the meter assembly.



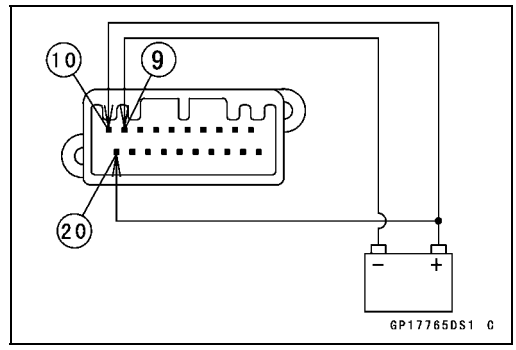
● Disconnect the terminal [10].
○All the LCD segments disappear.
○The red warning indicator (LED) [A] starts blinking (see Abstract section in the Immobilizer System).
★If the segments do not disappear, replace the meter unit.



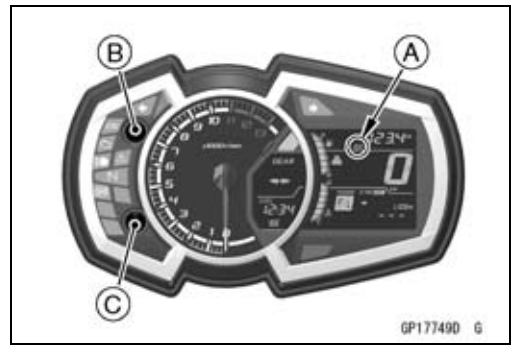
Meter, Gauge, Indicator Unit

Check 3-2: Meter Communication Line (Service Code 39) Check

- Connect the leads in the same circuit as Check 3-1.
- After 10 seconds, the gear position indicator starts blinking.



- Set the ODO mode [A] by pushing the upper meter button [B].
- Push the upper meter button and lower meter button [C] for more than 2 seconds.



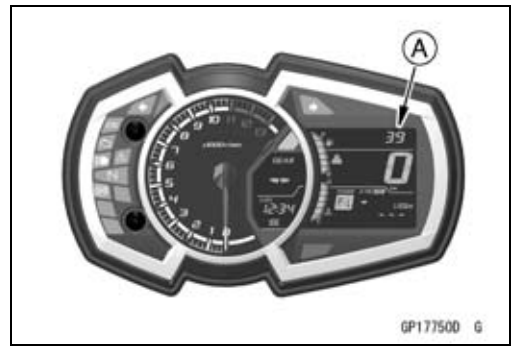
- Check the following items.

○The number “39” [A] in the display appears.

- Push the upper meter button and lower meter button again for more than 2 seconds.
- Check the following items.

○The display returns ODO mode from number “39.”

★If the meter unit does not work, replace the meter unit.



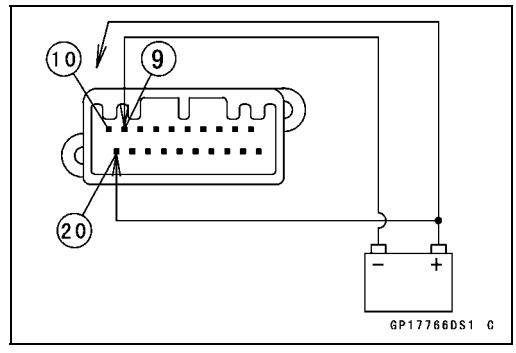
NOTE

○*The number “39” is service code of Self-Diagnosis (see Fuel System (DFI) chapter). It is the service code of the meter communication line error.*

○*The number “39” in the display disappear when the meter unit is connected to main harness of the normal motorcycle.*

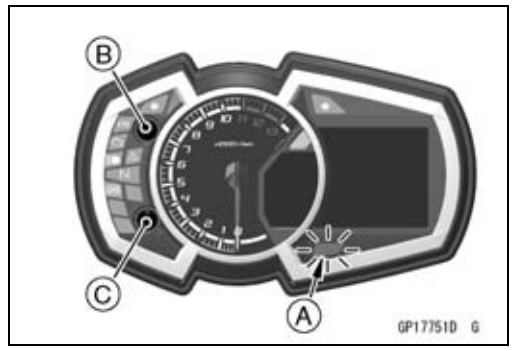
Check 3-3: Immobilizer Blinking Mode Inspection

- Connect the leads in the same circuit as Check 3-1.
- Disconnect the terminal [10].



Meter, Gauge, Indicator Unit

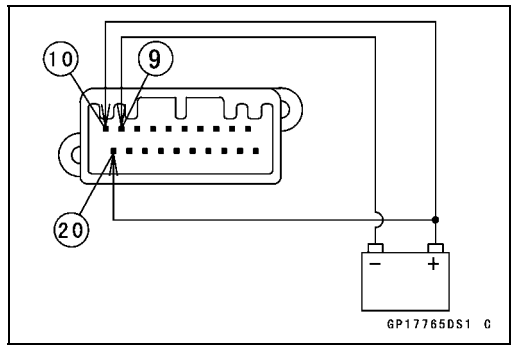
- Check that the red warning indicator (LED) [A] starts blinking (Immobilizer Warning Indicator Blinking Mode).
- Push the upper meter button [B] and lower meter button [C] more than 2 seconds, within 20 seconds after the terminal [6] disconnected.
- Check that the red warning indicator (LED) goes on 1 second, and then the indicator goes off (Immobilizer No Blinking Mode).



NOTE

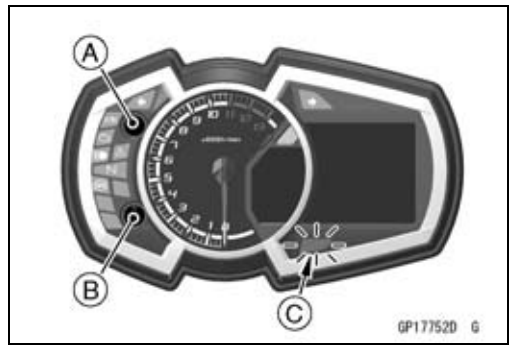
○*For this inspection, be sure the battery is 12.2 V or more. Immobilizer Blinking Mode does not work, when the battery voltage is less than 12 ±0.2 V.*

- Connect the terminal [10] to the battery (+) terminal.
- And then, disconnect the terminal [10].



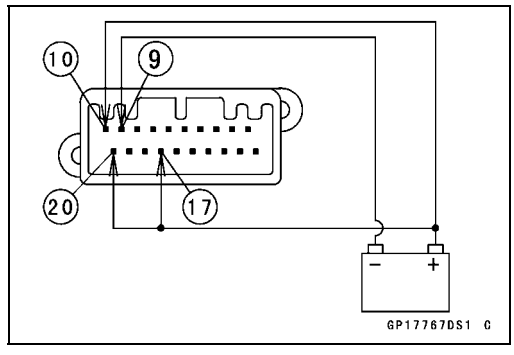
- Push the upper meter button [A] and lower meter button [B] more than 2 seconds, within 20 seconds after the terminal [10] disconnected.
- Check that the red warning indicator (LED) [C] goes on 1 second, and then the indicator starts blinking (Immobilizer Warning Indicator Blinking Mode).

★If the meter function does not work, replace the meter unit.



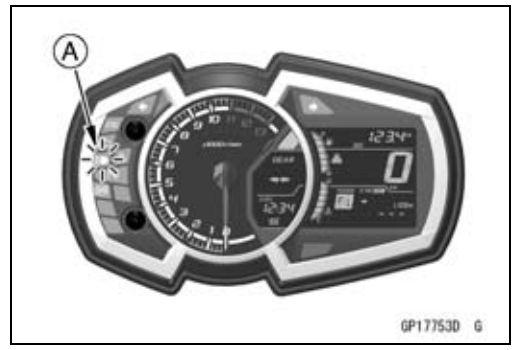
Check 3-4: Blue High Beam Indicator (LED) Inspection

- Connect the leads in the same circuit as Check 3-1.
- Connect the terminal [17] to the battery (+) terminal.

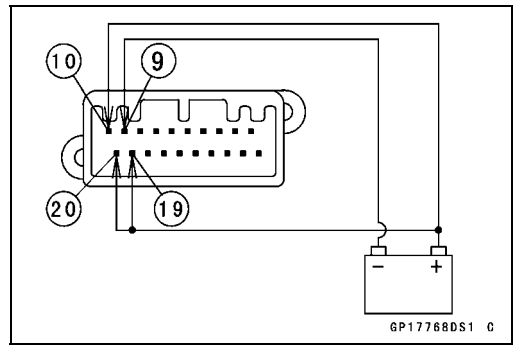


Meter, Gauge, Indicator Unit

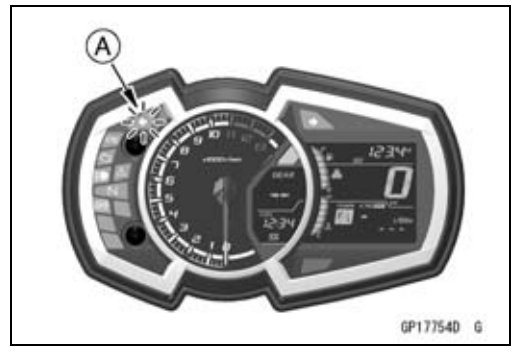
● Check that the blue high beam indicator (LED) [A] goes on.
★If the indicator (LED) does not go on, replace the meter unit.



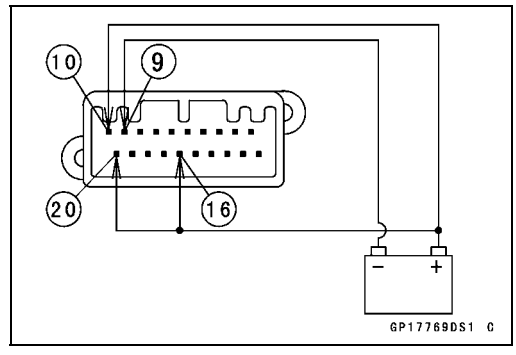
Check 3-5: Green Left Turn Signal Indicator (LED) Inspection
● Connect the leads in the same circuit as Check 3-1.
● Connect the terminal [19] to the battery (+) terminal.



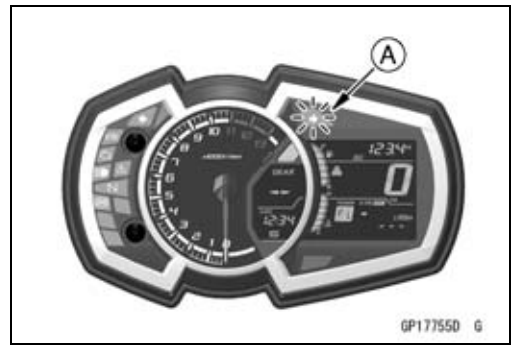
● Check that the green left turn signal indicator (LED) [A] goes on.
★If the indicator (LED) does not go on, replace the meter unit.



Check 3-6: Green Right Turn Signal Indicator (LED) Inspection
● Connect the leads in the same circuit as Check 3-1.
● Connect the terminal [16] to the battery (+) terminal.

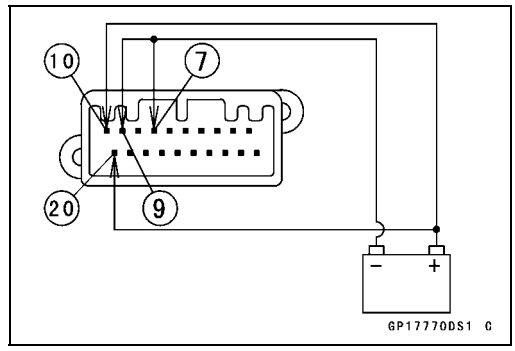


● Check that the green right turn signal indicator (LED) [A] goes on.
★If the indicator (LED) does not go on, replace the meter unit.



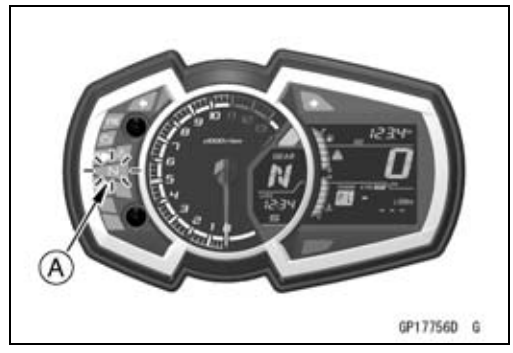
Meter, Gauge, Indicator Unit

Check 3-7: Green Neutral Indicator (LED) Inspection
- Connect the leads in the same circuit as Check 3-1.
- Connect the terminal [7] to the battery (–) terminal.



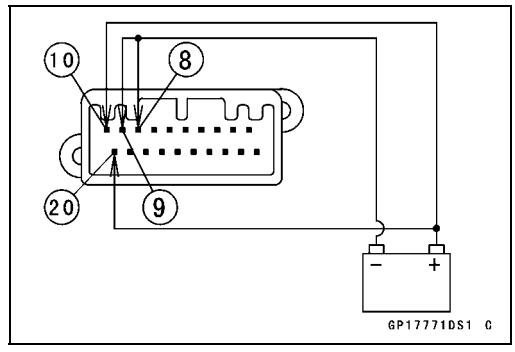
- Check that the green neutral indicator (LED) [A] goes on.

★If the indicator (LED) does not go on, replace the meter unit.



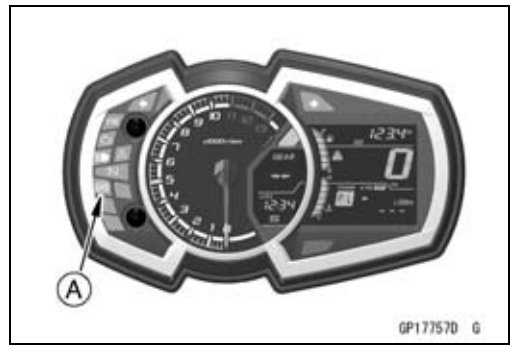
Check 3-8: Yellow ABS Indicator (LED) Inspection (Equipped Model)
- Connect the leads in the same circuit as Check 3-1.

○The yellow ABS indicator (LED) goes on.
- Connect the terminal [8] to the battery (–) terminal.

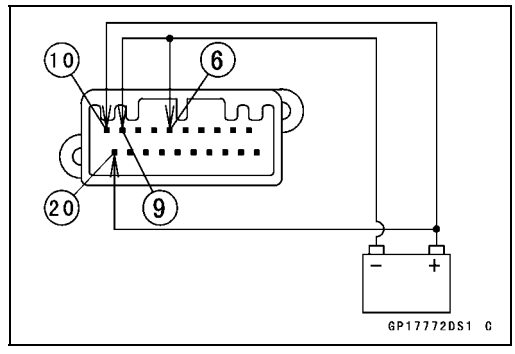


- Check that the yellow ABS indicator (LED) [A] goes off.

★If the indicator (LED) does not go off, replace the meter unit.

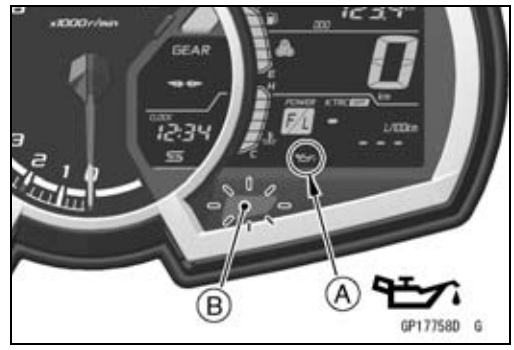


Check 3-9: Red Warning Indicator (LED) Inspection (Oil Pressure Warning)
- Connect the leads in the same circuit as Check 3-1.
- Connect the terminal [6] to the battery (–) terminal.

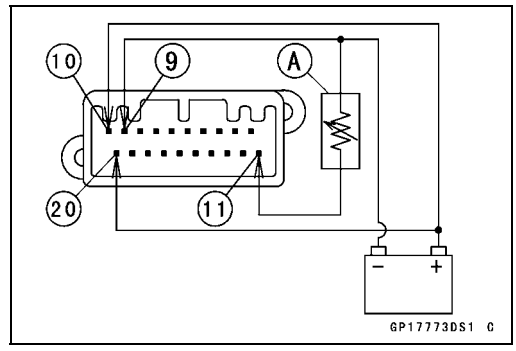


Meter, Gauge, Indicator Unit

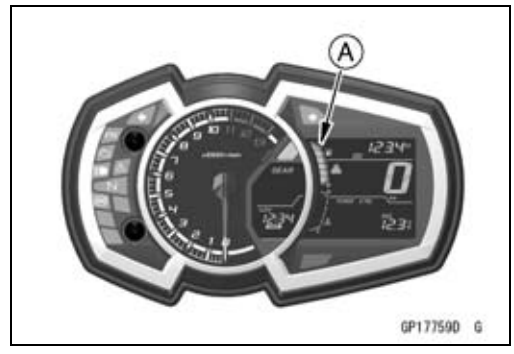
● Check that the oil pressure warning indicator [A] and red warning indicator (LED) [B] go on.
★If the oil pressure warning indicator and indicator (LED) do not go on, replace the meter unit.



Check 3-10: Fuel Gauge Inspection
● Connect the leads in the same circuit as Check 3-1.
○The all segments of the fuel gauge in the display will blink.
● Connect the variable rheostat [A] to the terminal [11] and the battery (–) terminal.



● Check that the number of segments on the fuel level gauge [A] matches the resistance value of the variable rheostat.
○When the terminal [11] is connected, 1 segment in the fuel level gauge should appear about every 15 seconds.



Variable Rheostat Resistance (Ω)	Display Segments
20	6 segments go on
40	5 segments go on
60	4 segments go on
80	3 segments go on
110	2 segments go on
170	1 segment goes on
210	1 segment blinks

★If the display function does not work, replace the meter assembly.

Meter, Gauge, Indicator Unit

Check 3-11: Speedometer Inspection

- Connect the leads in the same circuit as Check 3-1.
- The speed equivalent to the input frequency is indicated in the oscillator [A], if the square wave is input into terminal [12].

○Indicates approximately 60 km/h if the input frequency is approximately 370 Hz.

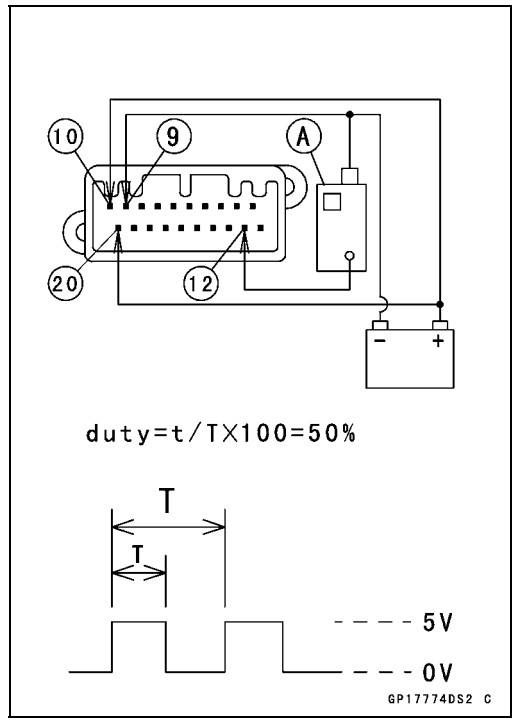
○Indicates approximately 60 mph if the input frequency is approximately 600 Hz.

★If the meter function does not work, replace the meter unit.

NOTE

○*The input frequency of the oscillator adds the integrated value of the odometer.*

○*The integrated value of the odometer cannot be reset.*



Check 3-12: Odometer Check

- Check the odometer with the speedometer check in the same way.

★If value indicated in the odometer is not added, replace the meter unit.

NOTE

○*The data is maintained even if the battery is disconnected.*

○*When the figures come to 999999, they are stopped and locked.*

○*The integrated value of the odometer cannot be reset.*



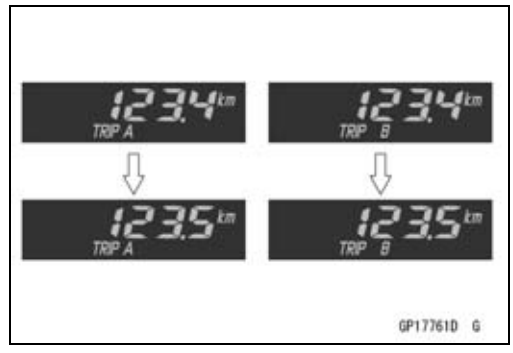
Check 3-13: Trip A/B Meter Check

- Check the trip meter with the speedometer in the same way.

★If value indicated in the trip meter is not added, replace the meter unit.

- Check that when the lower meter button is pushed for more than two seconds, the figure display turns to 0.0.

★If the figure display does not indicate 0.0, replace the meter unit.



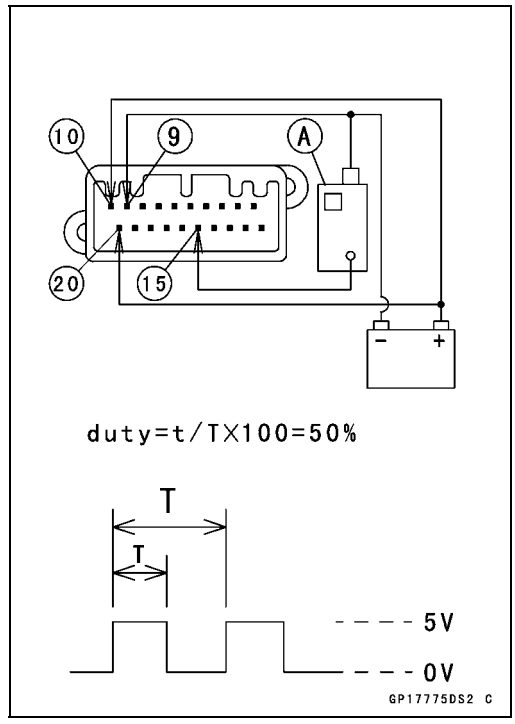
Meter, Gauge, Indicator Unit

Check 3-14: Tachometer Inspection

- Connect the leads in the same circuit as Check 3-1.
- The engine speed (rpm) equivalent to the input frequency is indicated in the oscillator [A], if the square wave is input into terminal [15].

○Indicates approximately 4 000 rpm if the input frequency is approximately 133 Hz.

★If the meter function does not work, replace the meter unit.



Check 3-15: Other Inspection

○The following items are displayed while running.
AVERAGE
CURRENT
RANGE
ECO Mark

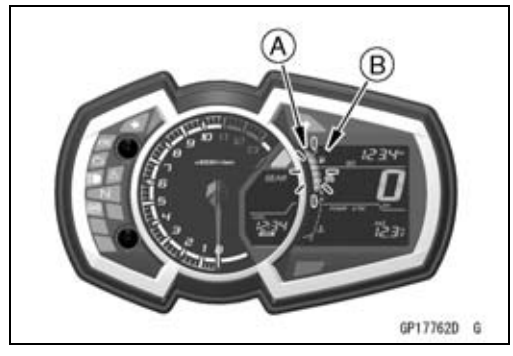
- When the above item is faulty indication check the following items.
  Wiring (see Wiring Inspection)
  ECU Communication Line (see ECU Communication Line Inspection in the Fuel System (DFI) chapter)
  Fuel Injectors (see Fuel Injectors section in the Fuel System (DFI) chapter)
  Rear Wheel Rotation Sensor (see Rear Wheel Rotation Sensor Signal (Service Code 24) section in the Fuel System (DFI) chapter)
  Crankshaft Sensor (see Crankshaft Sensor Inspection)

★If the above items are good, replace the meter unit and/or ECU.

Fuel Level Sensor Line Self-Diagnosis Mode Inspection

NOTE

○*Usually when the open or short of the fuel level sensor circuit is detected, it becomes the Fuel Level Sensor Line Self-Diagnosis Mode.*



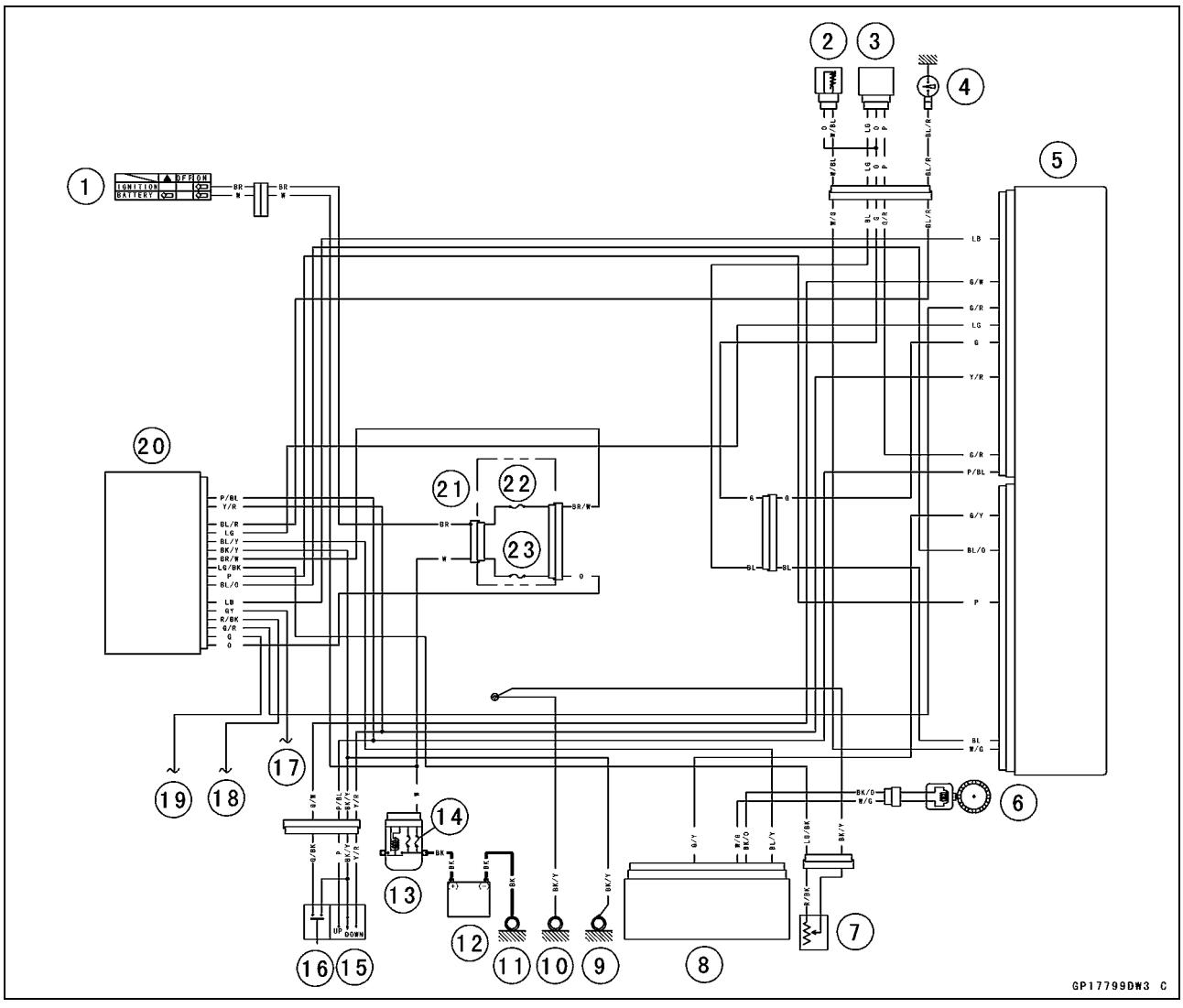
○The all segments of the fuel level gauge [A] and fuel level warning indicator [B] in the display will blink. (This function is Fuel Level Sensor Line Self-Diagnosis Mode.)

★If the meter enters the self-diagnosis mode when the meter is installed in the motorcycle, check the fuel level sensor (see Fuel Level Sensor Inspection) and wiring.

★If the fuel level sensor and wiring are good, replace the meter unit.

Meter, Gauge, Indicator Unit

Meter Circuit



1. Ignition Switch
2. Water Temperature Sensor
3. Gear Position Sensor
4. Oil Pressure Switch
5. ECU
6. Rear Wheel Rotation Sensor
7. Fuel Level Sensor
8. ABS Hydraulic Unit
9. Frame Ground (4)
10. Frame Ground (2)
11. Engine Ground
12. Battery 12 V 8 Ah
13. Starter Relay
14. Main Fuse 30 A
15. Upper and Lower Button
16. SEL Button
17. to Turn Signal Switch (Right)
18. to Dimmer Switch and Passing Button
19. to Turn Signal Switch (Left)
20. Meter Unit
21. Fuse Box (1)
22. Ignition Fuse 15 A
23. Meter Fuse 7.5 A

Immobilizer System (Equipped Models)

This motorcycle is equipped with an immobilizer system to protect the motorcycle from theft. This system provides a theft proof device by means of matching a code between the inbuilt key transponder and ECU. If the code does not match, ignition system, injectors, subthrottle valve actuator and exhaust butterfly valve actuator will not operate and the engine will not start.

Abstract

- Do not keep more than one immobilizer key of any system on a key ring. Jamming of the key code signal may occur and the operation of the system may be affected.
- The red warning indicator (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 meter buttons down for 2 seconds within 20 seconds of switching the ignition off.
- If all coded keys are lost the ECU and ignition switch will have to be replaced.
- The immobilizer system can not function until the ignition key code is registered in the ECU.
- A total of five keys can be registered in the ECU at any one time.

Operational Cautions

1. Do not put two keys of any immobilizer system on the same key ring.
2. Do not submerge any key in water.
3. Do not expose any key to excessively high temperature.
4. Do not place any key close to magnet.
5. Do not place a heavy item on any key.
6. Do not grind any key or alter its shape.
7. Do not disassemble the plastic part of any key.
8. Do not drop the key and/or apply any shocks to the key.
9. When a ignition key is lost, the user should go to his dealer to invalidate the lost key registration in the ECU.
10. When the all ignition keys are lost, the user should go to his dealer and have a new ECU installed and register the ignition keys.

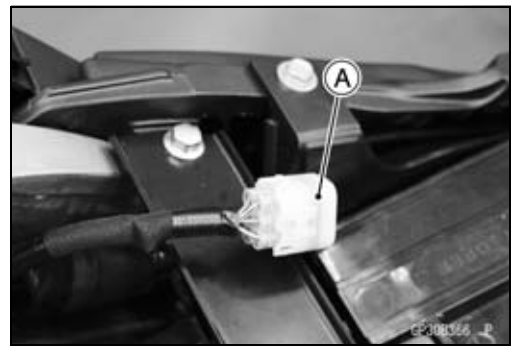
NOTE

○*No.9 and 10 are strongly recommended to the customer to ensure security of the motorcycle.*

Key Registration

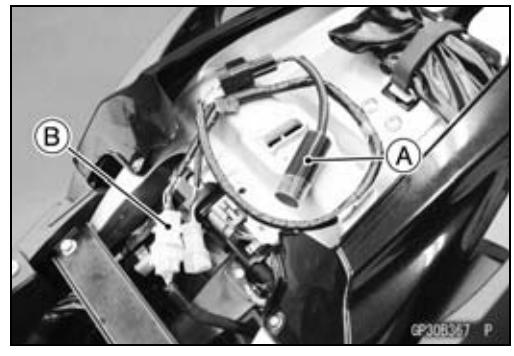
Case 1: When additional spare ignition key is required.

- Prepare a new spare ignition key.
- Cut the key in accordance with the shape of the current ignition key.
- Remove the front seat (see Front Seat Removal in the Frame chapter).
- Remove the immobilizer/Kawasaki diagnostic system connector cap [A].



- Connect the key registration unit [A] and key registration adapter [B] as shown.

Special Tools - Key Registration Unit: 57001-1582
Key Registration Adapter: 57001-1746

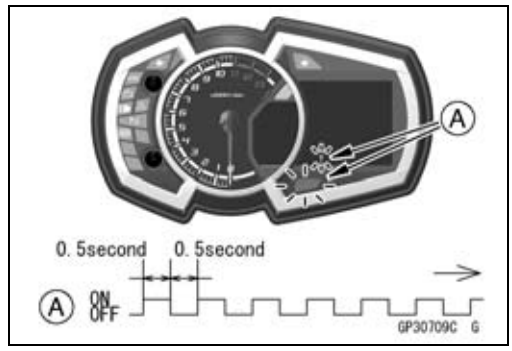


Immobilizer System (Equipped Models)

● Insert the registered ignition key to the ignition switch and turn it to “ON.”

Verified

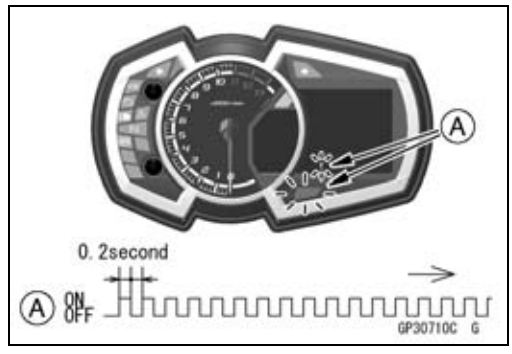
○The red warning indicator (LED) and immobilizer warning indicator [A] blink to display the registration mode (go to the next step).



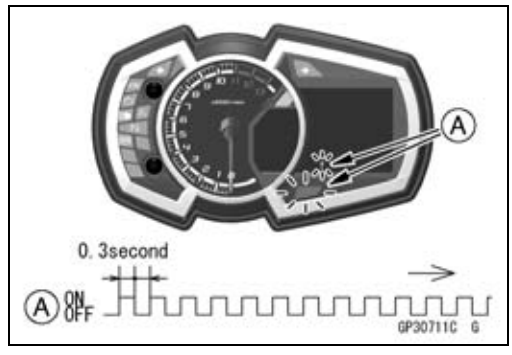
Not Verified

○The red warning indicator (LED) and immobilizer warning indicator [A] blink to display the collation error (refer to the following failure illustrations).

Immobilizer Amplifier Failure



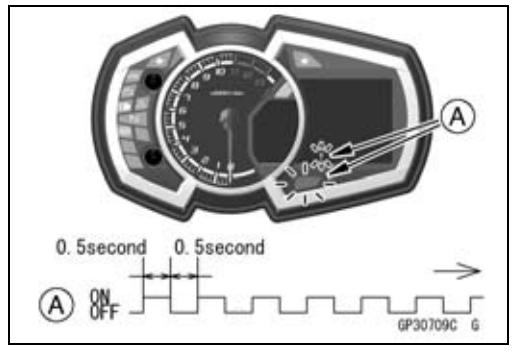
Registered Ignition Key Collation Error



● Turn the registered ignition key to “OFF” and remove the registered ignition key.

★If there are other registered ignition keys, they should all do the procedure above.

○The red warning indicator (LED) and immobilizer warning indicator [A] blink continuously to display that the ECU is in the registration mode for 15 seconds.



NOTE

○*Insert next key and turn it to “ON” within 15 seconds after previous key is turned to “OFF” and removed otherwise registration mode will be ended and the red warning indicator (LED) and immobilizer warning indicator stops blinking.*

○*To return to the registration mode start the registered ignition key(s) verification procedure. This applies to all ignition key registration.*

● Insert the ignition key 1 to the ignition switch and turn it to “ON.”

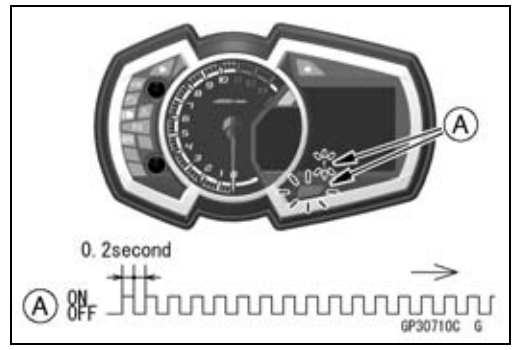
NOTE

○*Keep the other ignition key away from the immobilizer antenna.*

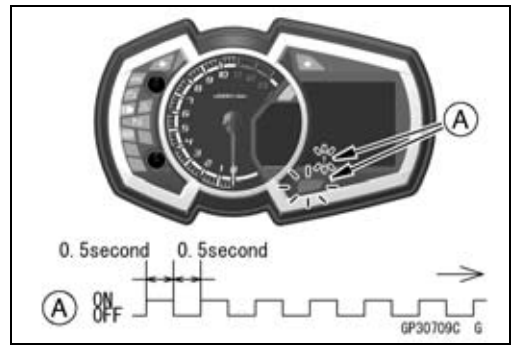
Immobilizer System (Equipped Models)

○If there is any problem in the registration, the red warning indicator (LED) and immobilizer warning indicator [A] blink to display the collation error.

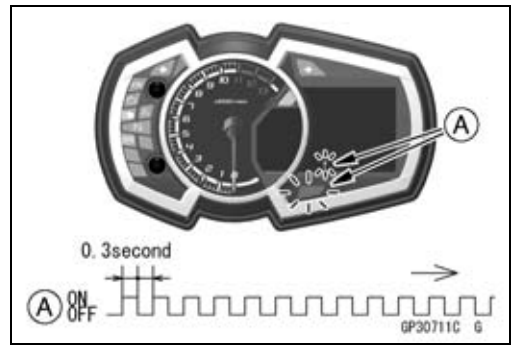
Immobilizer Amplifier Failure



When Registered Ignition Key is Inserted.

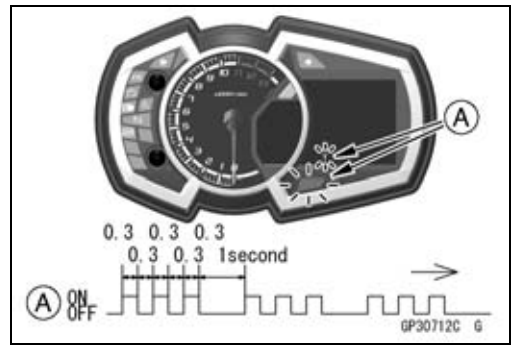


Ignition Key Collation Error



● The ignition key 1 is successfully registered in the ECU.

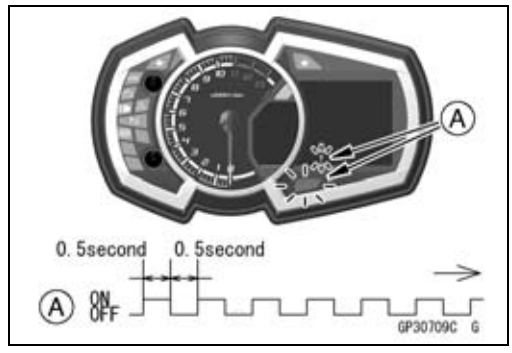
○The red warning indicator (LED) and immobilizer warning indicator [A] blink 3 times and stops for 1 second and then repeats this cycle.



Immobilizer System (Equipped Models)

● Turn the ignition key 1 to “OFF” and remove the ignition key 1.

○The red warning indicator (LED) and immobilizer warning indicator [A] blink to display the registration mode.



NOTE

○*Turn to “OFF” the ignition switch and wait for the period of 15 seconds or more. The registration mode automatically finishes and the red warning indicator (LED) and immobilizer warning indicator will switch off.*

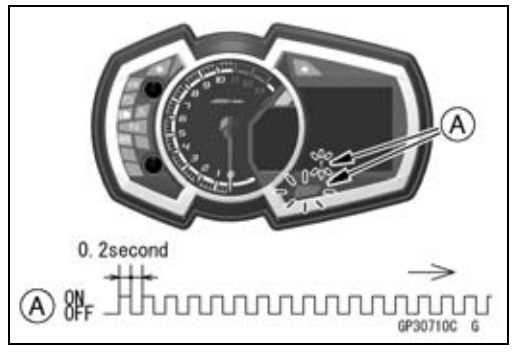
○*This procedure registered the registered ignition key and one ignition key.*

○*Continue with the procedure to register the second and later keys before the 15 seconds period has elapsed.*

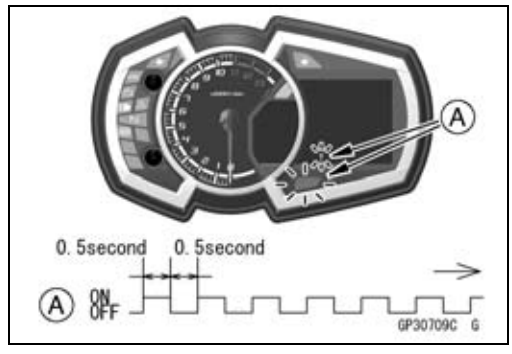
● Insert the ignition key 2 to the ignition switch and turn it to “ON.”

○If there is any problem in the registration, the red warning indicator (LED) and immobilizer warning indicator [A] blink to display the collation error.

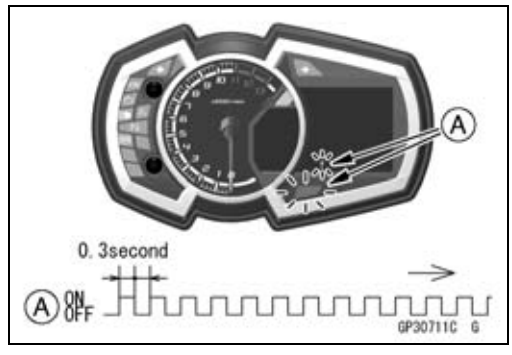
Immobilizer Amplifier Failure



When Registered Ignition Key is Inserted.

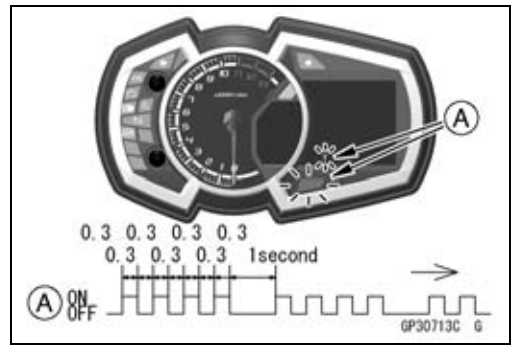


Ignition Key Collation Error



Immobilizer System (Equipped Models)

● The ignition key 2 is registered in the ECU.
○The red warning indicator (LED) and immobilizer warning indicator [A] blink 4 times and stops for 1 second and then repeats this cycle.
○This procedure has registered the 2 ignition keys.
● Continue with the procedure to register an additional one ignition key.



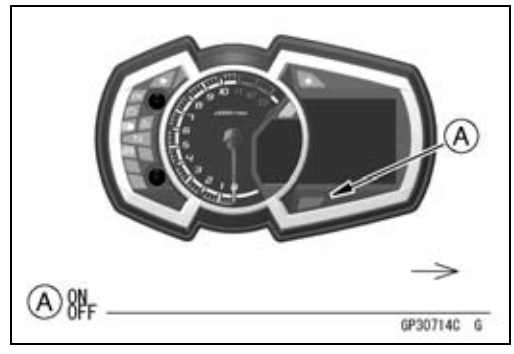
NOTE

○*The ECU can store up the five key codes.*

Red Warning Indicator (LED) and Immobilizer Warning Indicator Blink

	Indicators Blinks	Indicators Stop	Remarks
Ignition Key 3	5 times	1 second	Repeat

● Turn to “OFF” the ignition switch and wait for period of more than 15 seconds.
● The registration mode automatically ends.
● The red warning indicator (LED) [A] goes off.



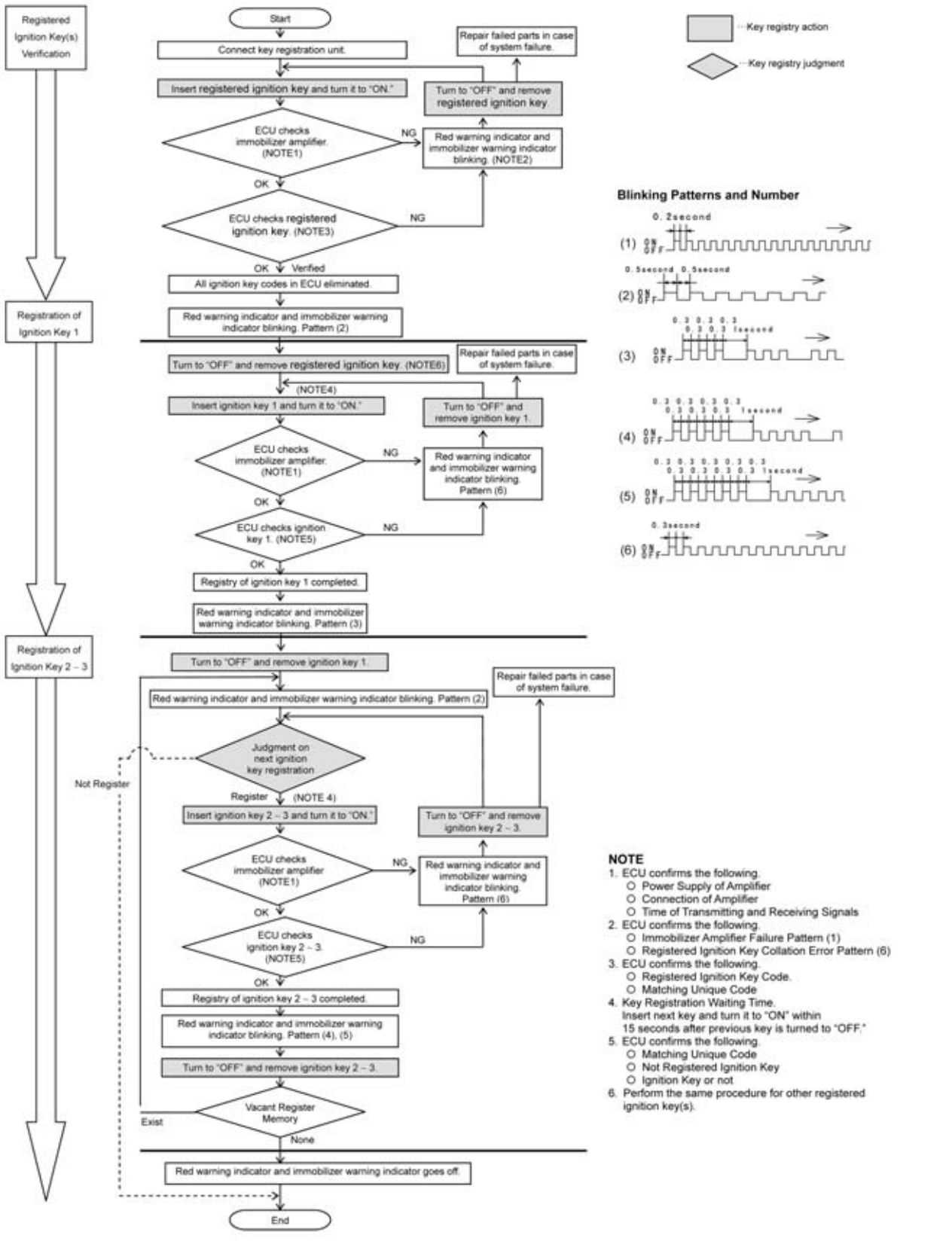
● Remove the key registration unit, key registration adapter and install the immobilizer/Kawasaki diagnostic system connector cap.

NOTE

○*Turn the ignition switch to “ON” with the registered ignition key.*
○*Check that the engine can be started using all registered ignition keys.*

Immobilizer System (Equipped Models)

Spare Ignition Key Registration Flow Chart

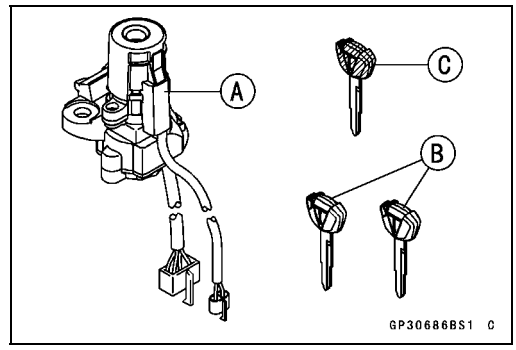


Immobilizer System (Equipped Models)

Case 2: When the ignition switch is faulty and to be replaced.

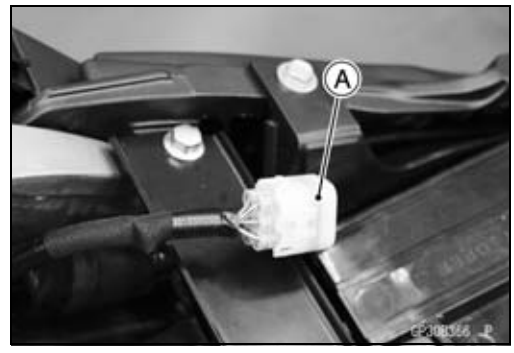
● Prepare a new ignition switch [A] and two new ignition keys [B].

○These parts are available as a set. Prepare the current registered ignition key [C].



● Remove:
Ignition Switch (see Immobilizer System Parts Replacement)
Front Seat (see Front Seat Removal in the Frame chapter)

● Remove the immobilizer/Kawasaki diagnostic system connector cap [A].



● Connect the key registration unit [A] and key registration adapter [B] as shown.

Special Tools - Key Registration Unit: 57001-1582
Key Registration Adapter: 57001-1746

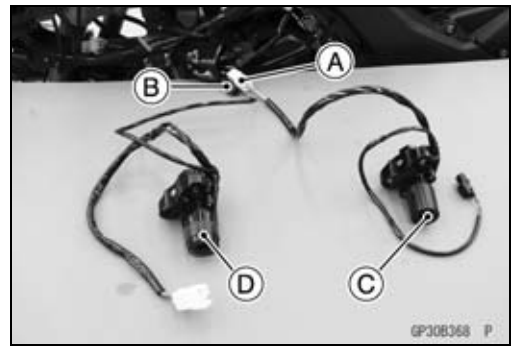


● Connect:
New Ignition Switch Lead Connector [A]
Current Immobilizer Antenna Lead Connector [B]

NOTE

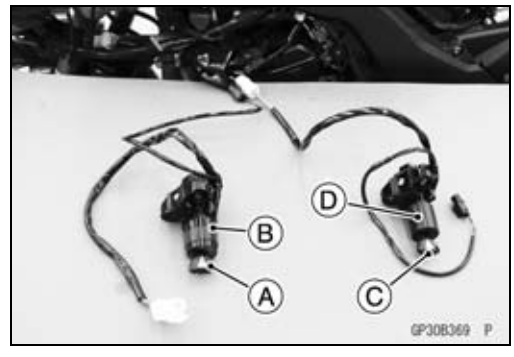
○*Keep the ignition switches more than 15 cm (5.9 in.).*

New Ignition Switch [C]
Current Ignition Switch [D]



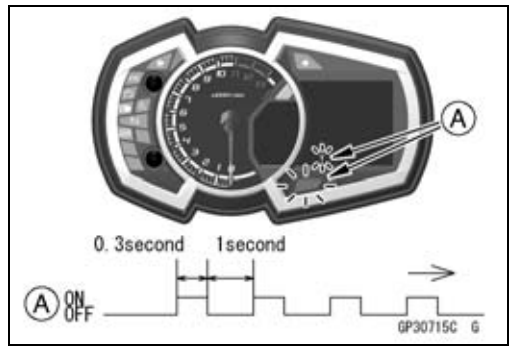
● Insert the current registered ignition key [A] at the current ignition switch [B].

● Insert the new ignition key 1 [C] to the new ignition switch [D] and turn it to “ON.”



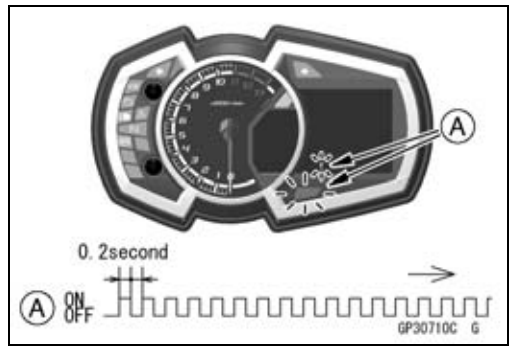
Immobilizer System (Equipped Models)

○The red warning indicator (LED) and immobilizer warning indicator [A] blink 1 time and stops for 1 second and repeats this cycle.

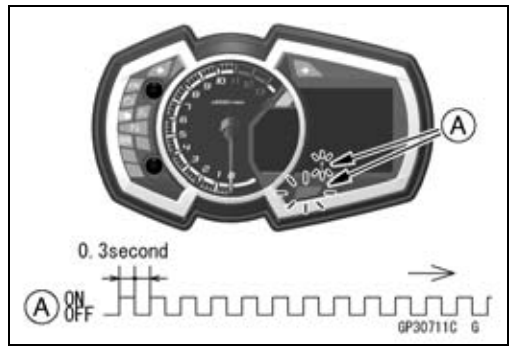


Not Verified

○The red warning indicator (LED) and immobilizer warning indicator [A] blink to display the collation error.
Immobilizer Amplifier Failure



Registered Ignition Key Collation Error



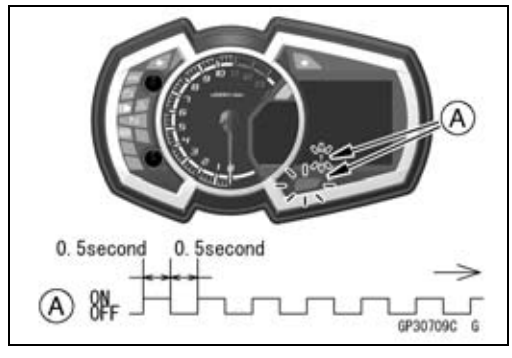
● Turn to “OFF” and remove the new ignition key 1.

NOTE

○*Insert the next key and turn it to “ON” within 15 seconds after previous key is turned to “OFF” and removed otherwise registration mode will be ended and the red warning indicator (LED) and immobilizer warning indicator stops blinking.*

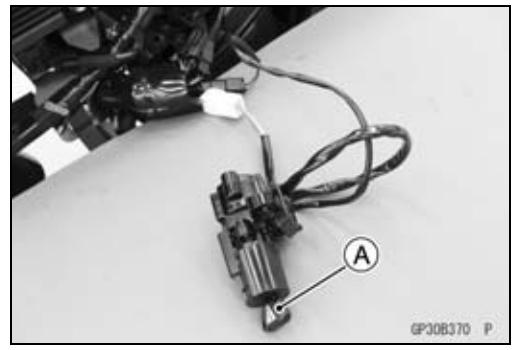
Verified

○The red warning indicator (LED) and immobilizer warning indicator [A] blink to display the ECU is in the registration mode (go to the next step).



Immobilizer System (Equipped Models)

- Disconnect the immobilizer antenna lead connector, then connect the antenna lead connector of the new ignition switch.
- Insert the ignition key 1 [A] again into the new ignition switch and turn it to “ON.”

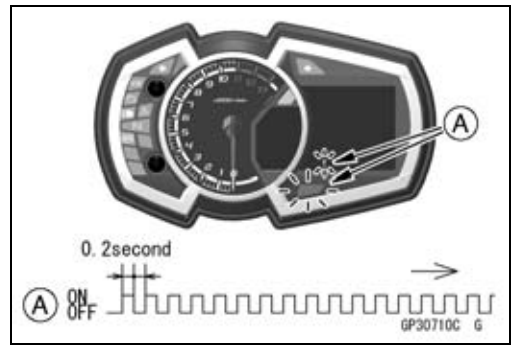


NOTE

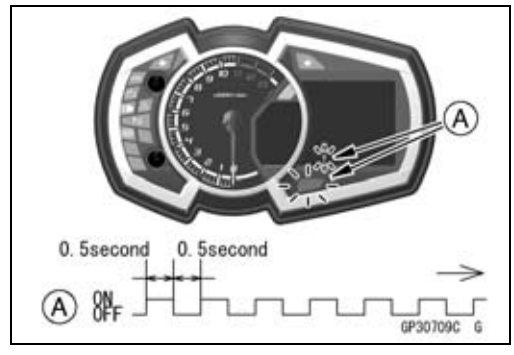
- *Insert the next key and turn it to “ON” within 15 seconds after previous key is turned to “OFF” and removed otherwise registration mode will be ended and the red warning indicator (LED) and immobilizer warning indicator stops blinking.*
- *To return to the registration mode start the registered ignition key verification procedure. This applies to all ignition key registration.*
- *Keep other ignition keys away from the ignition switch.*

- If there is any problem in the registration, the red warning indicator (LED) and immobilizer warning indicator [A] blink to display the collation error.

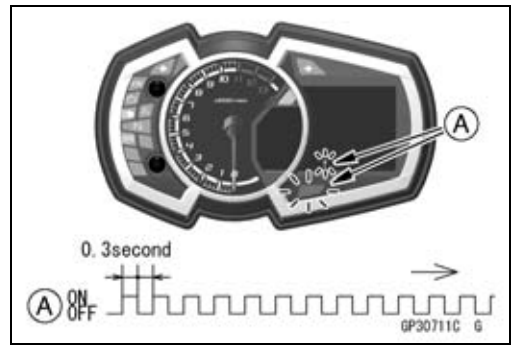
Immobilizer Amplifier Failure



When Registered Ignition Key is Inserted.

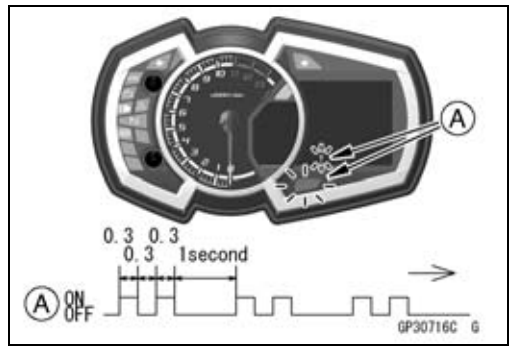


Ignition Key Collation Error



Immobilizer System (Equipped Models)

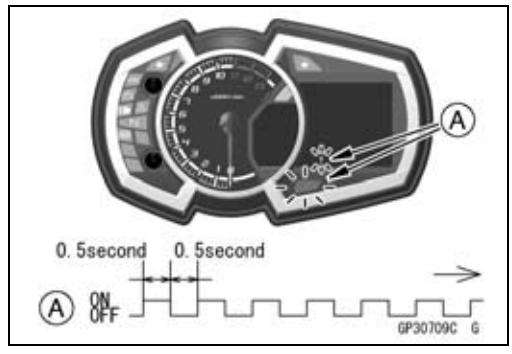
● The ignition key 1 is successfully registered in the ECU.
○The red warning indicator (LED) and immobilizer warning indicator [A] blink 2 times and stops for 1 second and then repeats this cycle to indicate successful registering of ignition key 1.



● Turn to “OFF” and remove ignition key 1.
○The red warning indicator (LED) and immobilizer warning indicator [A] blink to display the registration mode.

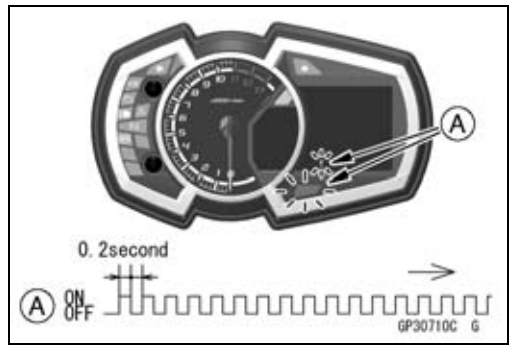
NOTE

○*Turn to “OFF” the ignition switch and wait for the period more than 15 seconds. The registration mode automatically ends and red warning indicator (LED) and immobilizer warning indicator go off.*
○*This procedure has , registered the registered ignition key and one ignition key.*
○*Continue the procedure to program the second and later keys.*

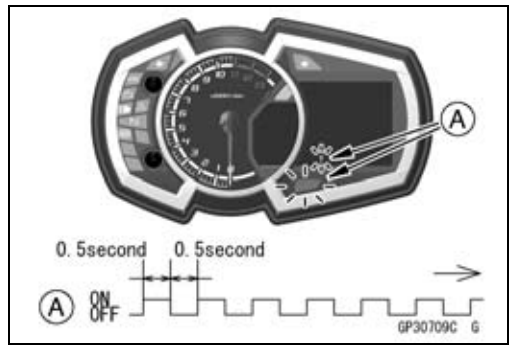


● Insert the ignition key 2 to the ignition switch and turn it to “ON.”

○If there is any problem in the registration, the red warning indicator (LED) and immobilizer warning indicator [A] blink to display the collation error.
Immobilizer Amplifier Failure

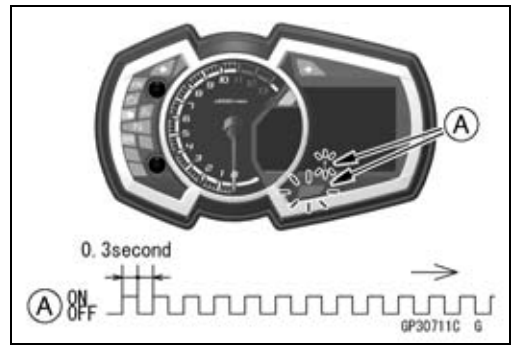


When Registered Ignition Key is Inserted.



Immobilizer System (Equipped Models)

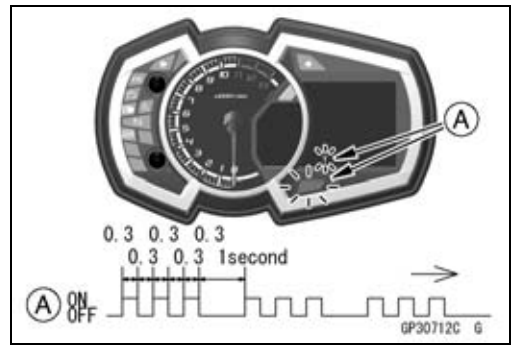
Ignition Key Collation Error



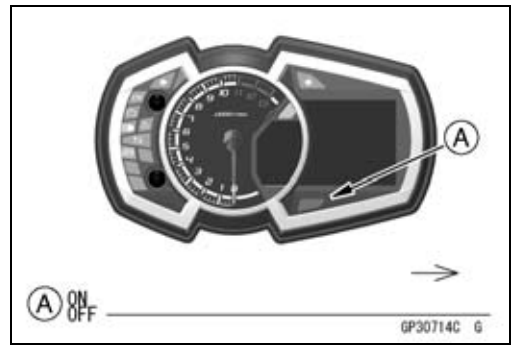
- The ignition key 2 is successfully registered in the ECU.

○The red warning indicator (LED) and immobilizer warning indicator [A] blink 3 times and stops for 1 second and then repeat this cycle to indicate successful programming of ignition key 2.

- Turn to “OFF” the ignition switch and wait for period more than 15 seconds.
- The registration mode automatically ends.



- The red warning indicator (LED) [A] goes off.



- Remove the key registration unit, key registration adapter and install the immobilizer/Kawasaki diagnostic system connector cap.

NOTE

○*Turn the ignition switch to “ON” with the registered ignition key.*

○*Check that the engine can be started using all registered ignition keys.*

- Install the new ignition switch (see Immobilizer System Parts Replacement).

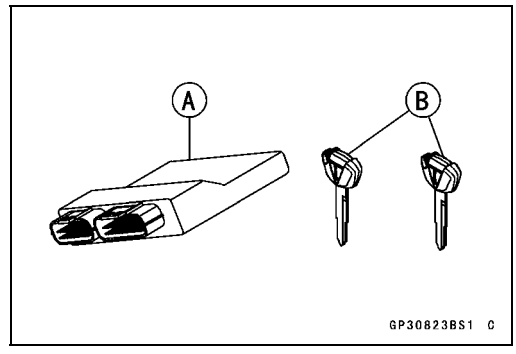
Case 3: When the ECU is faulty and has to be replaced.

- Prepare a new ECU [A] and current registered ignition key(s) [B].

NOTE

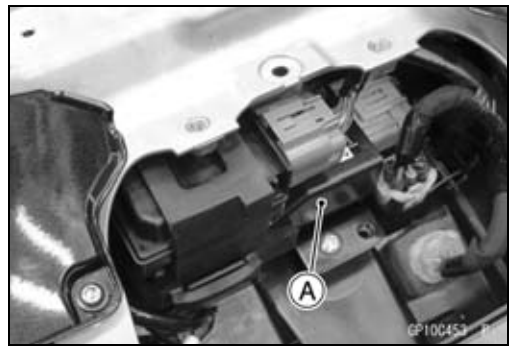
○*The key registration unit is not required.*

○*After replacing the ECU, be sure to register the 2 ignition keys. If the 2 keys are not registered, the engine can not be started.*



Immobilizer System (Equipped Models)

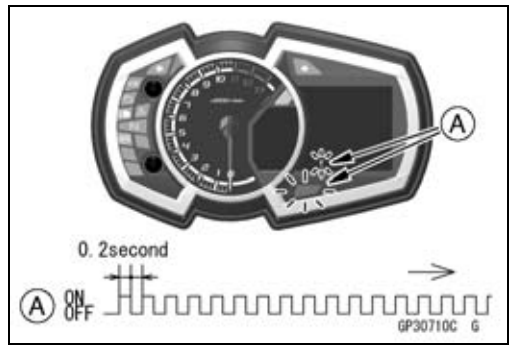
● Replace the ECU [A] (see ECU Removal/Installation in the Fuel System (DFI) chapter).



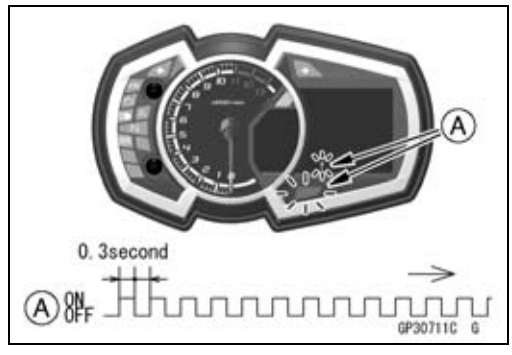
● Insert the current registered ignition key into the ignition switch and turn it to “ON.”

○If there is any problem in the registration, the red warning indicator (LED) and immobilizer warning indicator [A] blink to display the collation error.

Immobilizer Amplifier Failure

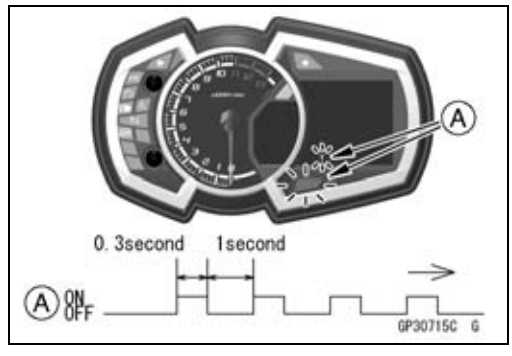


Registered Ignition Key Collation Error



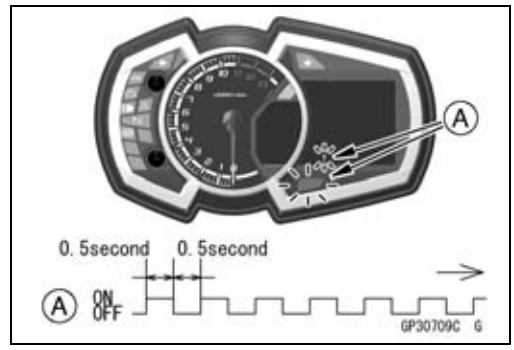
● The registered ignition key is registered in the ECU.

○The red warning indicator (LED) and immobilizer warning indicator [A] blink 1 time and stops for 1 second and the repeats this cycle to indicate successful registration of the registered ignition key.



Immobilizer System (Equipped Models)

● Turn to “OFF” the registered ignition key and remove it.
○The red warning indicator (LED) and immobilizer warning indicator [A] blink to display the registration mode.



NOTE

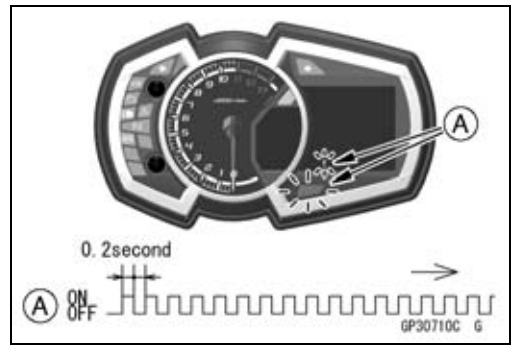
○*Insert next key and turn it to “ON” within 15 seconds after previous key is turned to “OFF” and removed otherwise registration mode will be ended and the red warning indicator (LED) and immobilizer warning indicator go off.*
○*To return to the registration mode start the registered ignition key verification procedure. This applies to all ignition key registration.*

● Insert the other remaining registered ignition key to the ignition switch and turn it to “ON.”

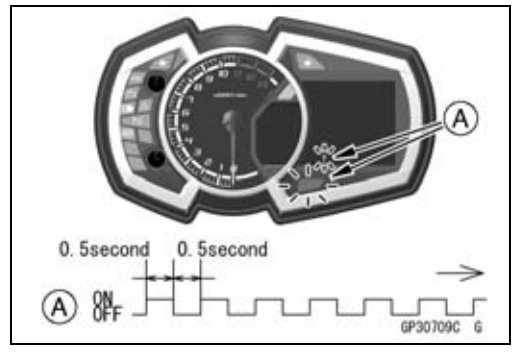
NOTE

○*Keep the other ignition keys away from the immobilizer antenna.*

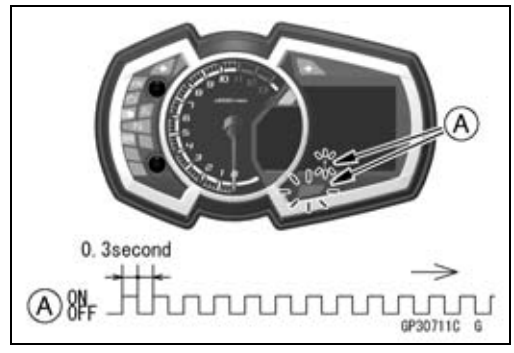
○If there is any problem in the registration, the red warning indicator (LED) and immobilizer warning indicator [A] blink to display the collation error.
Immobilizer Amplifier Failure



When Registered Ignition Key is Inserted.

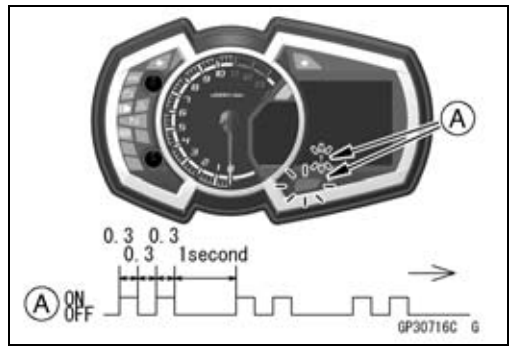


Ignition Key Collation Error



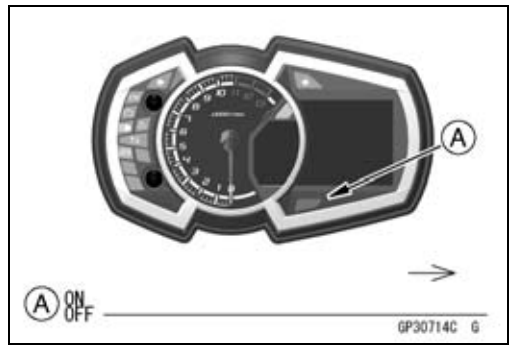
Immobilizer System (Equipped Models)

● The other remaining ignition key is registered in the ECU.
○The red warning indicator (LED) and immobilizer warning indicator [A] blink 2 times and stops for 1 second and then repeats this cycle to indicate successful registration of ignition key.



● Turn to “OFF” the ignition switch and wait for period more than 15 seconds.
● The registration mode automatically ends.

● The red warning indicator (LED) [A] goes off .



NOTE

○*Turn the ignition switch to “ON” with the registered ignition key.*
○*Check that the engine can be started using all registered ignition keys.*

Case 4: When all registered ignition keys are faulty or lost.

The all registered ignition keys replacement is considered very rare case. However if it is required, the following is necessary.

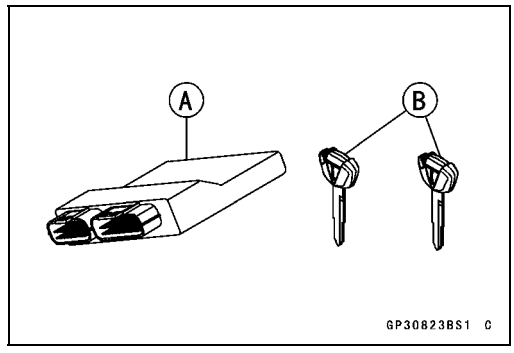
NOTE

○*The ECU must be replaced with a new one because the registered ignition key code that is registered in the current ECU can not be rewritten.*

● Prepare a new ECU [A] and 2 new ignition keys [B].

NOTE

○*The key registration unit is not required.*
○*After replacing the ECU, be sure to register the 2 ignition keys. If the 2 keys are not registered, the engine can not be started.*

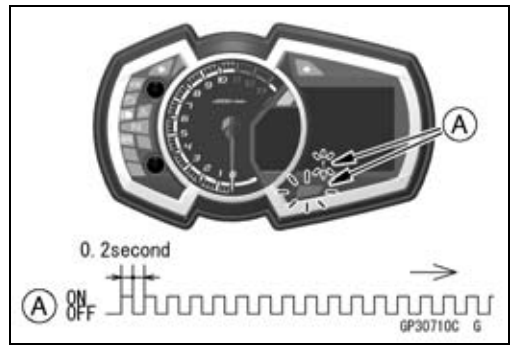


● Insert the first ignition key into the ignition switch and turn it to “ON.”

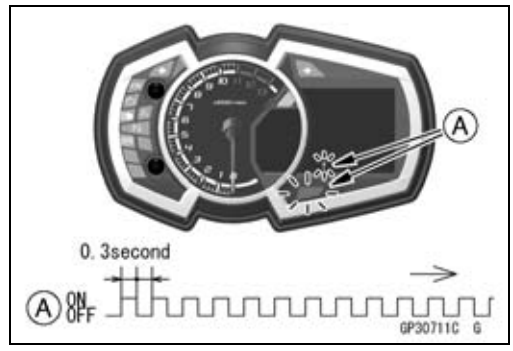
Immobilizer System (Equipped Models)

○If there is any problem in the registration, the red warning indicator (LED) and immobilizer warning indicator [A] blink to display the collation error.

Immobilizer Amplifier Failure

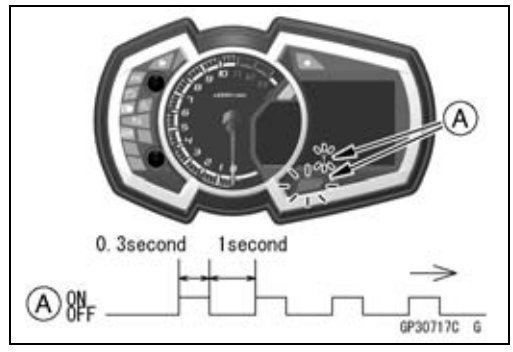


Ignition Key Collation Error



● The first ignition key is registered in the ECU.

○The red warning indicator (LED) and immobilizer warning indicator [A] blink 1 time and stops for 1 second and the repeats this cycle to indicate successful registration of the first ignition key.



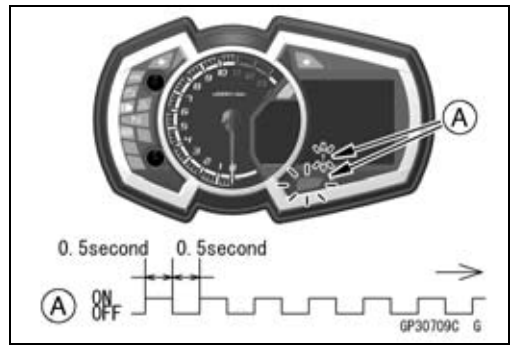
● Turn to “OFF” the first ignition key and remove it.

● The red warning indicator (LED) and immobilizer warning indicator [A] blink to display the registration mode.

NOTE

○*Insert next key and turn it to “ON” within 15 seconds after previous key is turned to “OFF” and removed otherwise registration mode will be ended and the red warning indicator (LED) and immobilizer warning indicator go off.*

○*To return to the registration mode start the registered ignition key verification procedure. This applies to all ignition key registration.*



● Insert the second ignition key to the ignition switch and turn it to “ON.”

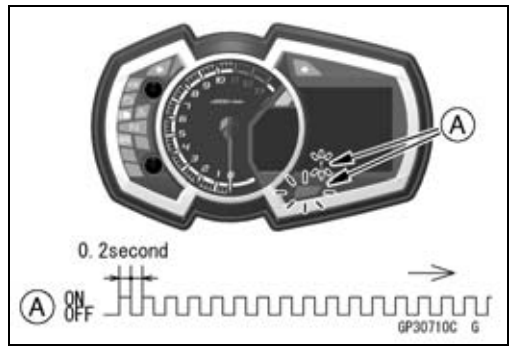
NOTE

○*Keep the other ignition keys away from the immobilizer antenna.*

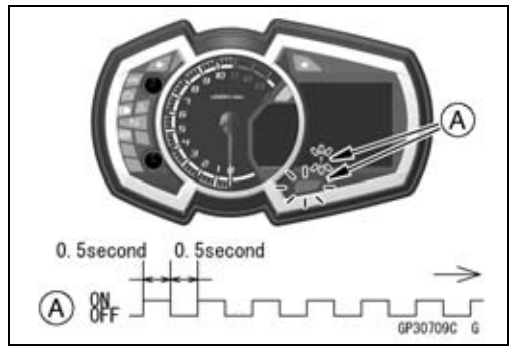
Immobilizer System (Equipped Models)

○If there is any problem in the registration, the red warning indicator (LED) and immobilizer warning indicator [A] blink to display the collation error.

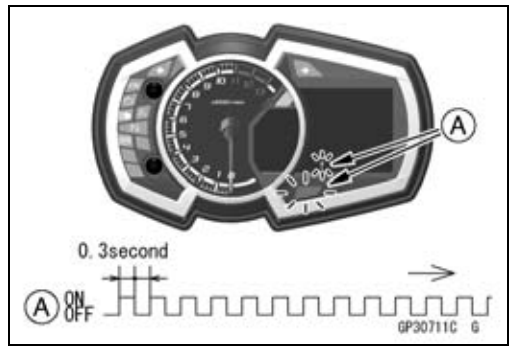
Immobilizer Amplifier Failure



When Registered Ignition Key is Inserted



Ignition Key Collation Error

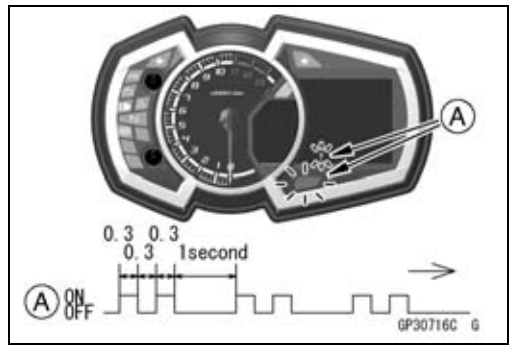


● The second ignition key is registered in the ECU.

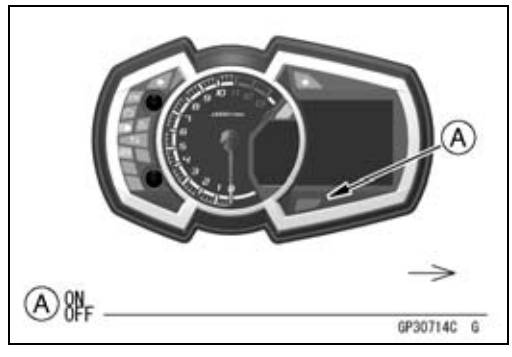
○The red warning indicator (LED) and immobilizer warning indicator [A] blink 2 times and stops for 1 second and then repeats this cycle to indicate successful registration of second ignition key.

● Turn to “OFF” the ignition switch and wait for period more than 15 seconds.

● The registration mode automatically ends.



● The red warning indicator (LED) [A] goes off.



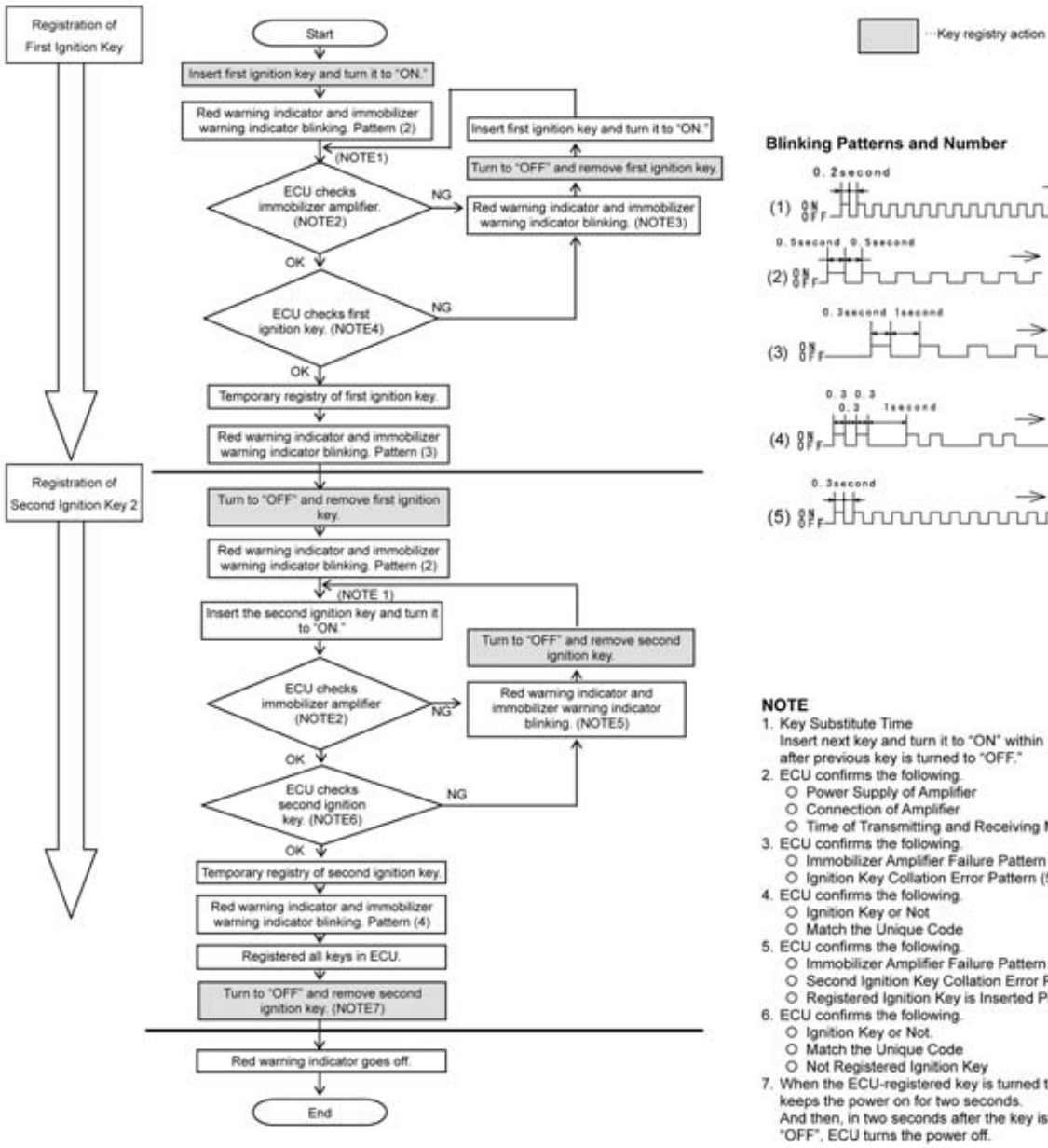
Immobilizer System (Equipped Models)

NOTE

- *Turn the ignition switch to “ON” with the registered ignition key.*
- *Check that the engine can be started using all registered ignition keys.*

Immobilizer System (Equipped Models)

All Keys Initial Registration Flow Chart



NOTE

1. Key Substitute Time
   Insert next key and turn it to "ON" within 15 seconds after previous key is turned to "OFF."
2. ECU confirms the following.
   - Power Supply of Amplifier
   - Connection of Amplifier
   - Time of Transmitting and Receiving Messages.
3. ECU confirms the following.
   - Immobilizer Amplifier Failure Pattern (1)
   - Ignition Key Collation Error Pattern (5)
4. ECU confirms the following.
   - Ignition Key or Not
   - Match the Unique Code
5. ECU confirms the following.
   - Immobilizer Amplifier Failure Pattern (1)
   - Second Ignition Key Collation Error Pattern (5)
   - Registered Ignition Key is Inserted Pattern (2)
6. ECU confirms the following.
   - Ignition Key or Not.
   - Match the Unique Code
   - Not Registered Ignition Key
7. When the ECU-registered key is turned to "OFF", ECU keeps the power on for two seconds.
   And then, in two seconds after the key is turned to "OFF", ECU turns the power off.

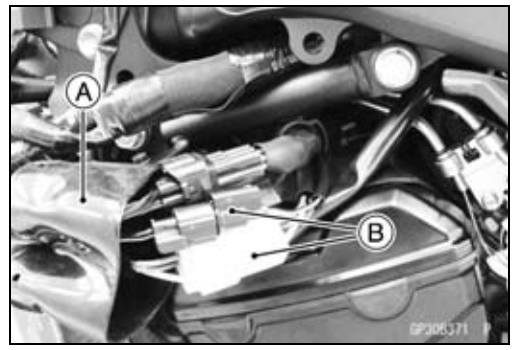
GP30343C F

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)
- Slide the dust cover [A].
- Disconnect the lead connectors [B].

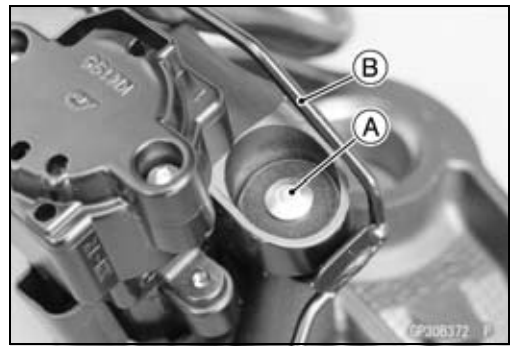


- Using a punch mark the punch mark at the center of broken Torx bolt head [A].

NOTE

○*Make the punch mark at center of the bolt head surely.*

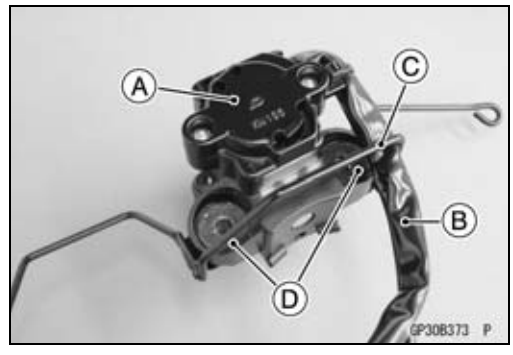
- Extend the punch mark with the ϕ2 mm drill.
- In addition, extend the punch mark with the ϕ3.5 mm drill.
- Lastly, shave off the Torx bolt head with the ϕ6.5 mm drill.



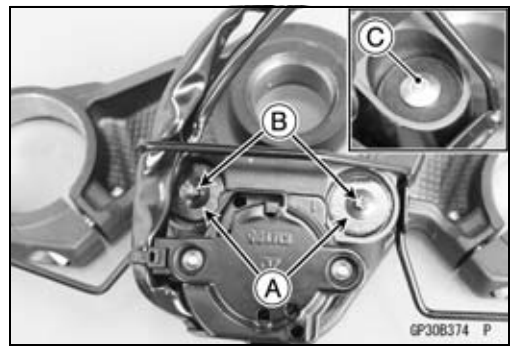
NOTE

○*Be sure to do not damage the lead wires and component parts with a drill.*

- Remove the guide [B] and ignition switch.
- Replace the ignition switch [A] with a new one.
- Hold the ignition switch lead [B] with the guide [C] as shown. Install the dampers and washers [D].

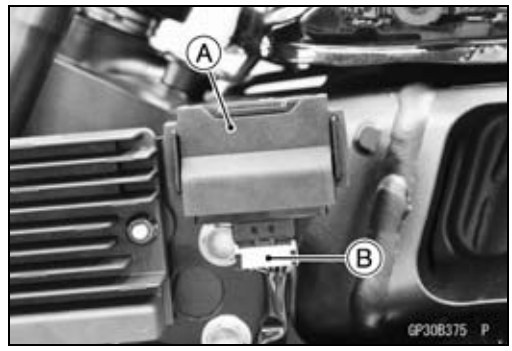


- Tighten a new Torx bolt [A] until the bolt head [B] is broken [C].
- Run the leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Register the more than two ignition keys (see Key Registration).



Immobilizer System (Equipped Models)

Immobilizer Amplifier Replacement



- Remove the left lower fairing (see Lower Fairing Removal in the Frame chapter).
- Remove the immobilizer amplifier [A] from the bracket.
- Disconnect the connector [B].
- Installation is the reverse of removal.

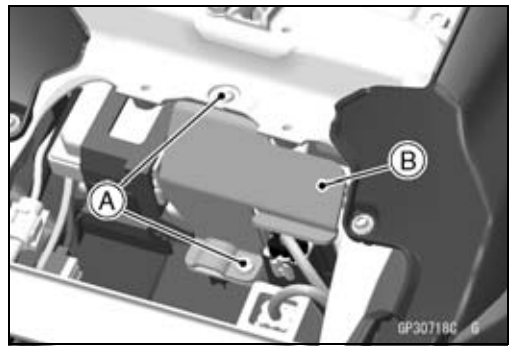
ECU Replacement (EUR Model)

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

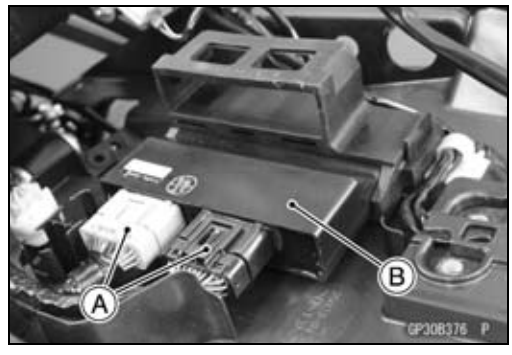
NOTE

○*Replace the ECU according to the following procedure for the models with the ECU guard.*

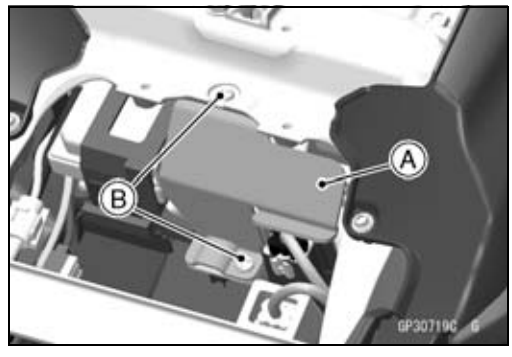
○*Refer to the ECU Removal/Installation in the Fuel System (DFI) chapter for the models without the ECU guard.*



- Remove:
  Front Seat (see Front Seat Removal in the Frame chapter)
- Using a small chisel or other suitable tool, remove the ECU guard bolts [A] and ECU guard [B].



- Remove:
  Relay Box (see Relay Box Removal)
- Disconnect ECU connectors [A].
- Remove the ECU [B].



- Connect the connectors to the ECU.
- Install the ECU guard [A].

NOTICE
Do not pinch the leads.

- Tighten the new ECU guard bolts [B] using the Kawasaki genuine screws of which threads are coated with locking agent.

Immobilizer System (Equipped Models)

Registered Immobilizer Relational Parts Replacement Chart

		Failed or Lost Part			
		Ignition Keys	Ignition Switch	Amplifier	ECU
*	Ignition Key	●	○		
	Ignition Switch		●		
	Amplifier			●	
	ECU	○			●

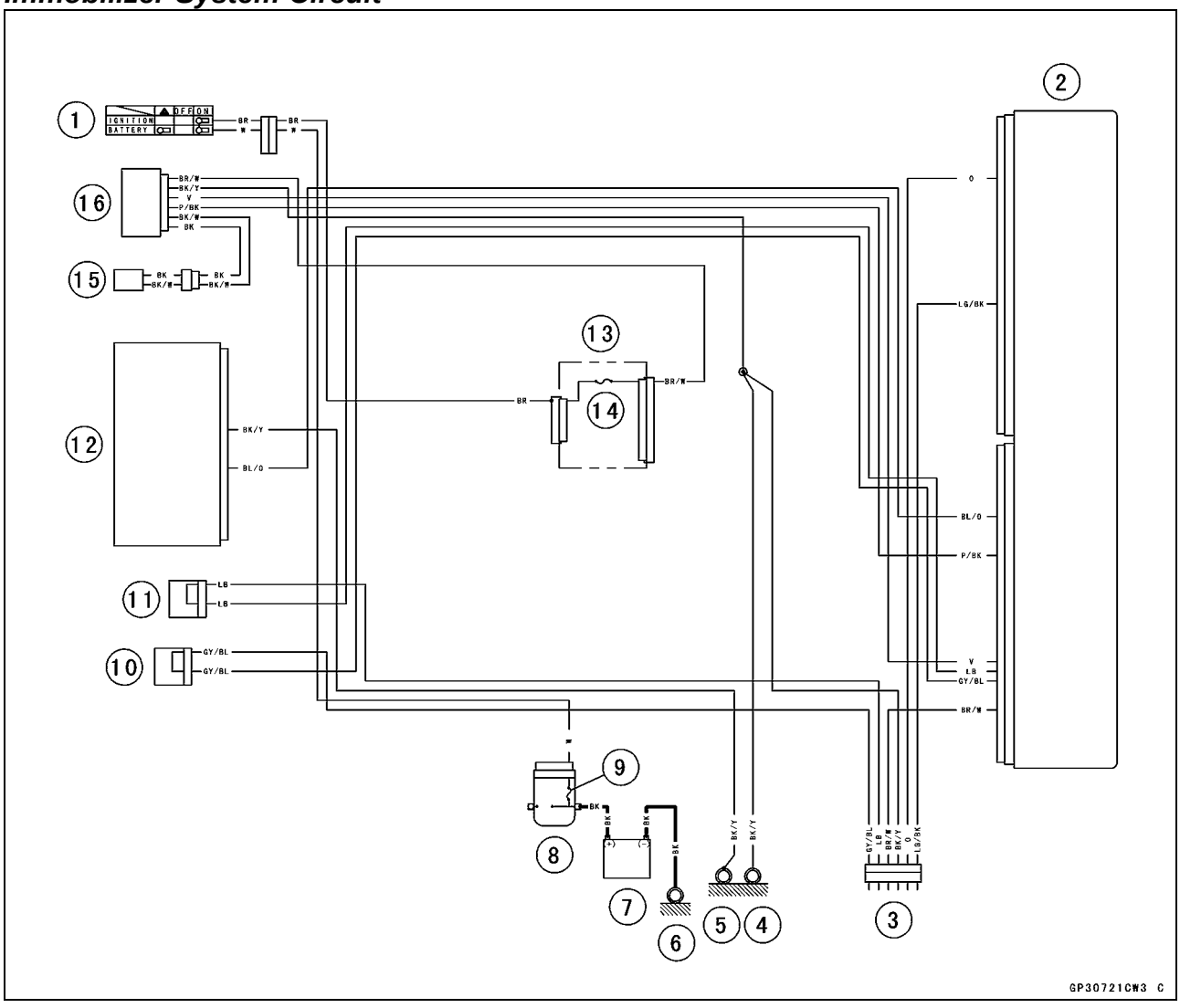
*	Replacement Part
●	Main Replacement Part
○	Additional Replacement Part

Immobilizer System Inspection

- Refer to the Immobilizer Amplifier and Blank Key Detection section in the Fuel System (DFI) chapter.

Immobilizer System (Equipped Models)

Immobilizer System Circuit



1. Ignition Switch
2. ECU
3. Immobilizer/Kawasaki Diagnostic System Connector
4. Frame Ground (5)
5. Frame Ground (4)
6. Engine Ground
7. Battery 12 V 8 Ah
8. Starter Relay
9. Main Fuse 30 A
10. Joint Connector (1)
11. Joint Connector (2)
12. Meter Unit
13. Fuse Box (1)
14. Ignition Fuse 15 A
15. Immobilizer Antenna
16. Immobilizer Amplifier

Switches and Sensors

Brake Light Timing Inspection

● Refer to the Brake Light Switch Operation Inspection in the Periodic Maintenance chapter.

Brake Light Timing Adjustment

● Refer to the Brake Light Switch Operation Inspection in the Periodic Maintenance chapter.

Switch Inspection

● Using a tester, check to see that only the connections shown in the table have continuity (about zero ohms).

○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		

Side Stand Switch Connections

Side Stand Switch Connections		
Color	BK	G
When side stand is down		
When side stand is up	○——○	

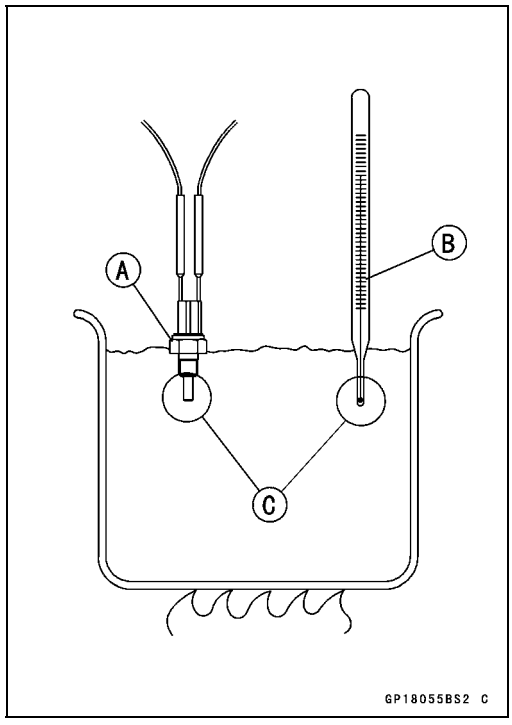
Oil Pressure Switch Connections*

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 threaded portion is submerged.
- Suspend an accurate thermometer [B] with temperature sensing portions [C] located in almost the same depth.

NOTE

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

- Place the container over a source of heat and gradually raise the temperature of the coolant while stirring the coolant gently.
- Using a digital meter, measure the internal resistance of the sensor.

★If the digital meter does not show the specified values, replace the sensor.

Water Temperature Sensor Resistance

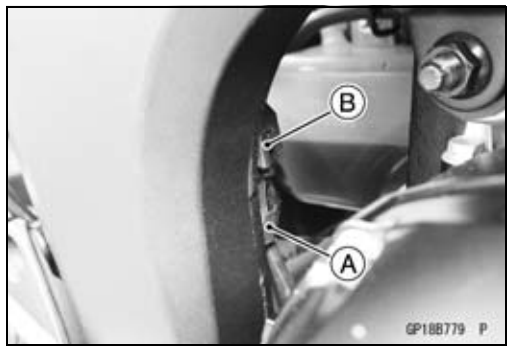
Temperature	Resistance (kΩ)
–20°C (–4°F)	*18.80 ±2.37
0°C (32°F)	*(about 6.544)
40°C (104°F)	1.136 ±0.095
100°C (212°F)	0.1553 ±0.0070

*: Reference Information

Oxygen Sensor Removal

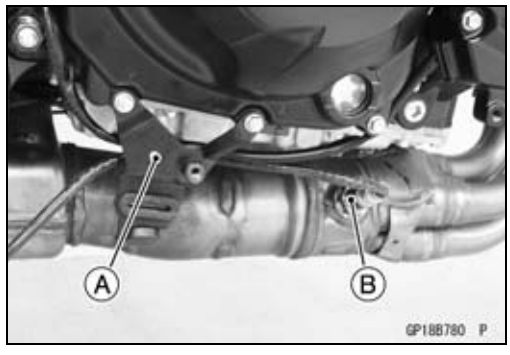
NOTICE
Never drop the sensor especially on a hard surface. Such a shock to the sensor can damage it.

NOTICE
Do not pull strongly, twist, or bend the oxygen sensor lead. This may cause the wiring open.



- Clear the oxygen sensor lead from the clamp [A].
- Disconnect the oxygen sensor lead connector [B].

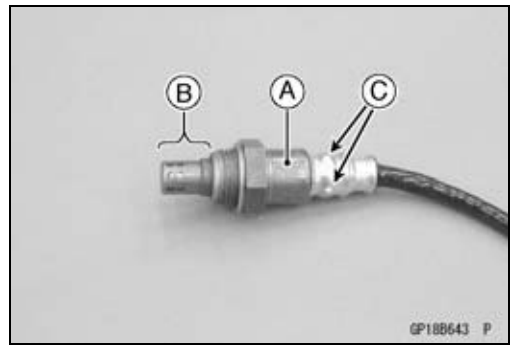
- Remove:
  Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Exhaust Pipe Cover (see Muffler Body Removal in the Engine Top chapter)
- Clear the oxygen sensor lead from the clamp [A].
- Remove the oxygen sensor [B].



Switches and Sensors

Oxygen Sensor Installation

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] and filter holes [C] of the sensor to prevent oil contact. Oil contamination from hands can reduce sensor performance.



- Tighten:

  Torque - Oxygen Sensor: 45 N·m (4.6 kgf·m, 33 ft·lb)

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

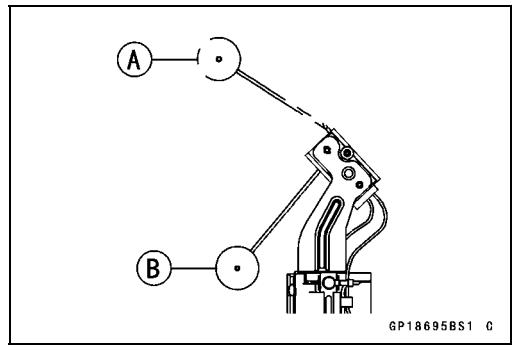
Oxygen Sensor Inspection

- Refer to the Oxygen Sensor Inspection in the Fuel System (DFI) chapter.

Fuel Level Sensor Inspection

- Remove:
  Fuel Pump (see Fuel Pump Removal in the Fuel System (DFI) chapter)
- Check that the float moves up and down smoothly without binding. It should go down under its own weight.

★If the float does not move smoothly, replace the fuel pump.
Float in Full Position [A]
Float in Empty Position [B]

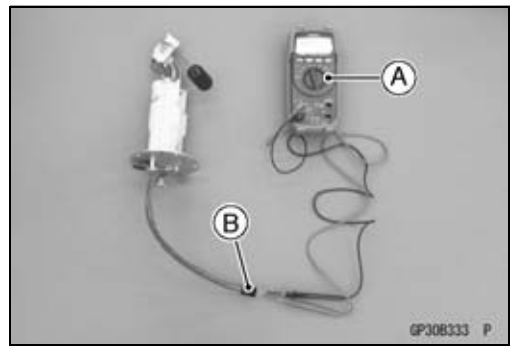


- Using a tester [A], measure the resistance across the terminals in the fuel level sensor lead connector [B].

  Special Tool - Needle Adapter Set: 57001-1457

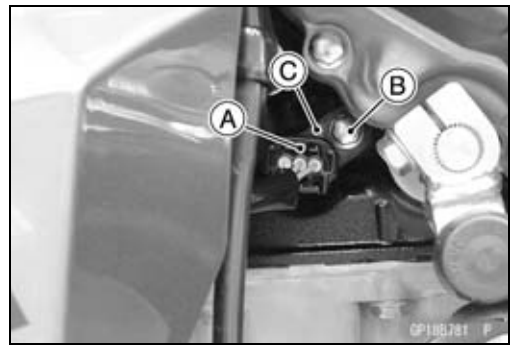
★If the tester readings are not as specified, or do not change smoothly according as the float moves up and down, replace the fuel pump.

Fuel Level Sensor Resistance
Standard: Full position: 9.6 ~ 12.4 Ω
Empty position: 222 ~ 228 Ω



Gear Position Sensor Removal

- Drain:
  Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
- Disconnect the connector [A] to remove the gear position sensor.
- Remove the gear position sensor bolt [B] and pull out the gear position sensor [C].

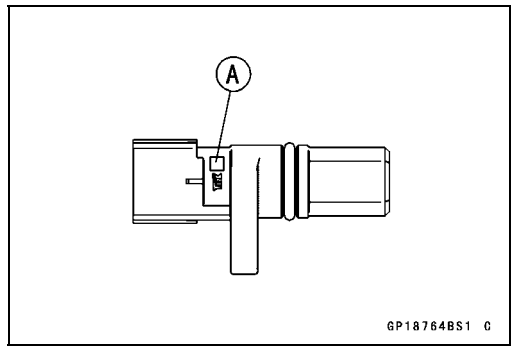


Switches and Sensors

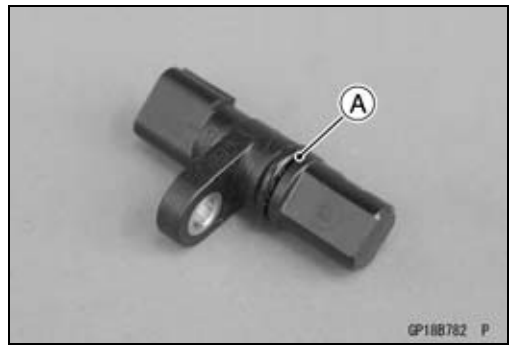
Gear Position Sensor Installation

★If replace the gear position sensor, select new sensor which has same mark with the current one.

Mark [A]	Parts Number
H	21176-0845
M	21176-0825
L	21176-0846



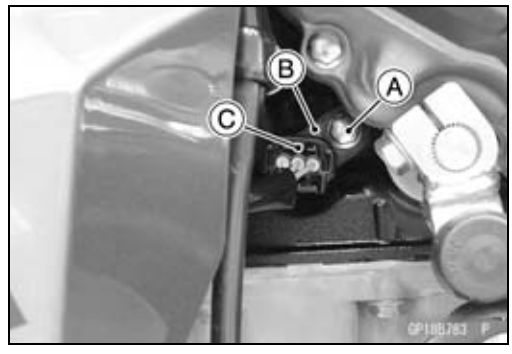
- Replace the O-ring [A] with a new one.
- Apply grease to the O-ring.



- Apply a non-permanent locking agent to the threads of the gear position sensor bolt [A].
- Install the gear position sensor [B] to the crankcase.

○When installing the sensor which is fastened by bolt, tighten the bolt after placing the sensor on the bottom surface completely.

Torque - Gear Position Sensor Bolt: 10 N·m (1.0 kgf·m, 89 in·lb)



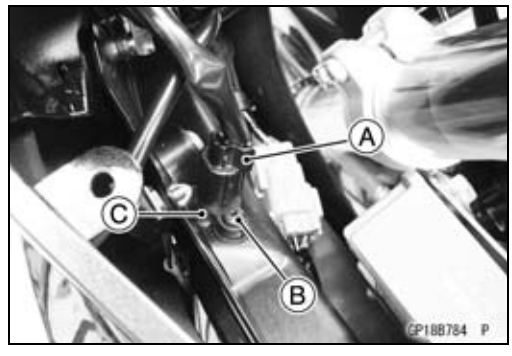
- Connect the connector [C] to the gear position sensor.
- Fill the engine with recommended engine oil (see Engine Oil Change in the Periodic Maintenance chapter).

Gear Position Sensor Inspection

- Refer to the Gear Position Sensor Input Voltage Inspection in the Fuel System (DFI) chapter.

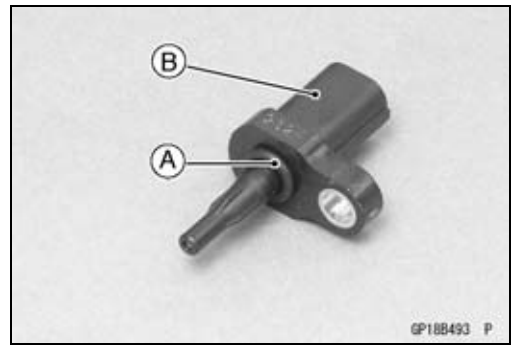
Outside Temperature Sensor Removal

- Remove the meter cover (see Upper Fairing Removal in the Frame chapter).
- Disconnect the connector [A].
- Remove:
  Outside Temperature Sensor Screw [B]
  Outside Temperature Sensor [C]



Switches and Sensors

Outside Temperature Sensor Installation



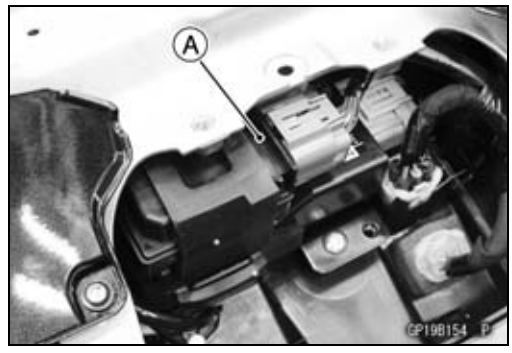
- Check that the O-ring [A] is in place on the outside temperature sensor [B].
- Install the outside temperature sensor.
- Tighten:

Torque - Outside Temperature Sensor Screw: 0.50 N·m (0.05 kgf·m, 4.4 in·lb)

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

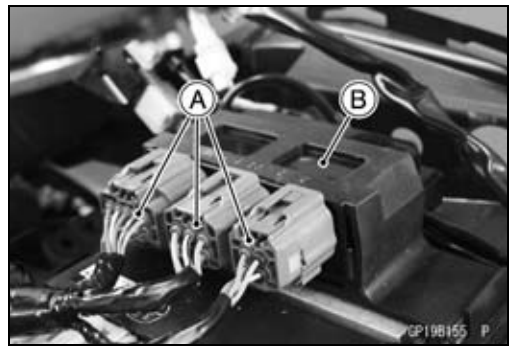
Relay Box

The relay box [A] has relays and diodes. The relays and diodes can not be removed.



Relay Box Removal/Installation

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



- Remove the rear fender from the battery case and rear frame (see Flap and Rear Fender Removal in the Frame chapter).
- Disconnect:
  Connectors [A]
- Remove:
  Relay Box [B]
- Installation is the reverse of removal.

Relay Circuit Inspection

- Remove the relay box (see Relay Box Removal).
- Check conductivity of the following numbered terminals by connecting a tester and one 12 V battery to the relay box as shown (see Relay Box Internal Circuit in this section).

★If the tester does not read as specified, replace the relay box.

Relay Circuit Inspection (with the battery disconnected)

	Tester Connection	Tester Reading (Ω)
Headlight Circuit Relay	1-3	∞
ECU Main Relay	7-6	∞
	4-5	Not ∞*
Fuel Pump Relay	7-8	∞
	9-10	Not ∞*
Starter Circuit Relay	11-16	∞
	11-12	∞
Fan Relay	17-20	∞
	18-19	Not ∞*

*: The actual reading varies with the tester used.

Relay Box

Relay Circuit Inspection (with the battery connected)

	Battery Connection (+) (–)	Tester Connection	Tester Reading (Ω)
Headlight Relay	2-11	1-3	0
ECU Main Relay	4-5	7-6	0
Fuel Pump Relay	9-10	7-8	0
Fan Relay	18-19	17-20	0

	Battery Connection (+) (–)	Tester Connection (+) (–)	Tester Reading (V)
Starter Circuit Relay	16-12	11-12	Battery Voltage

(+): Apply positive lead.
(–): Apply negative lead.

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

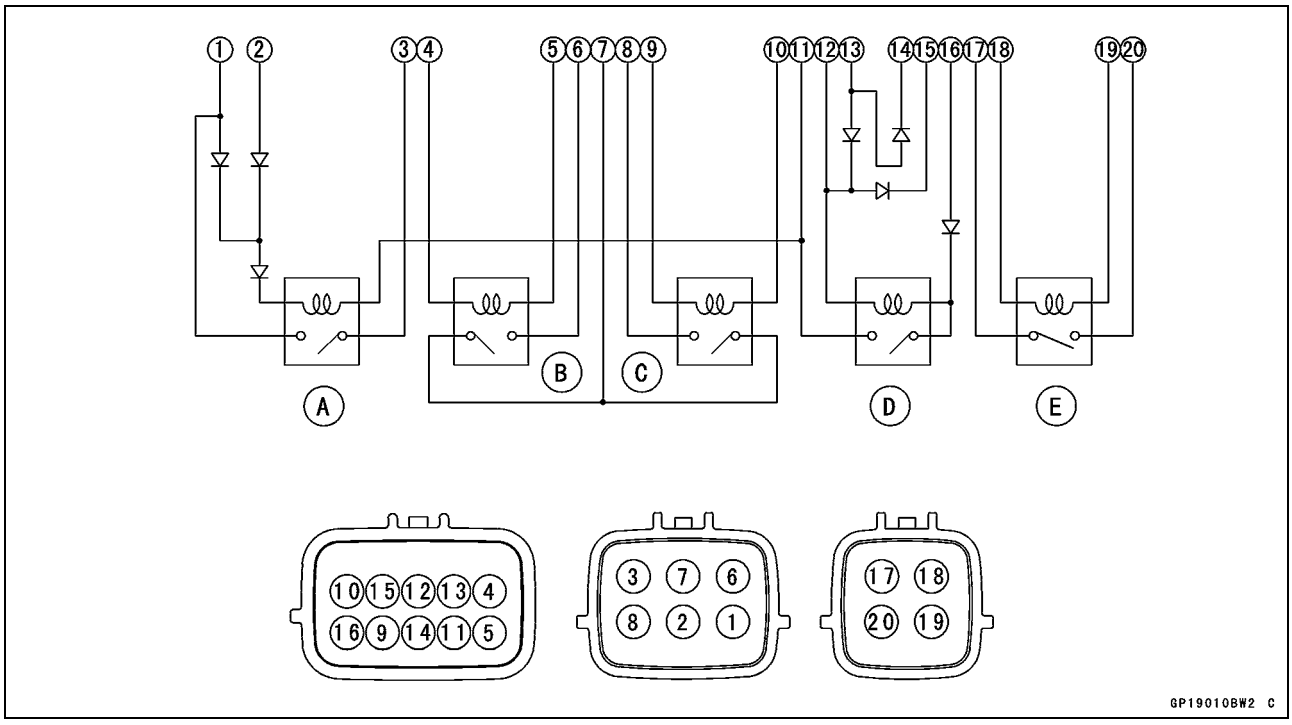
★The resistance should be low in one direction and more than 10 times as much in the other direction. If any diode shows low or high in both directions, the diode is defective and the relay box must be replaced.

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

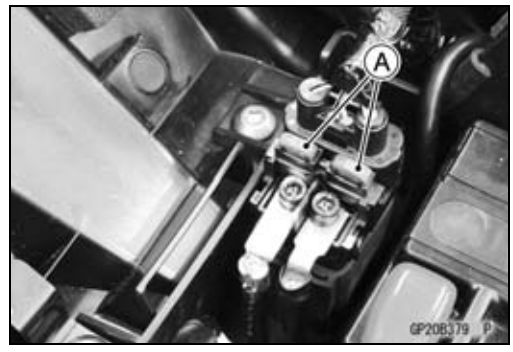
Relay Box Internal Circuit



A. Headlight Circuit Relay
B. ECU Main Relay
C. Fuel Pump Relay
D. Starter Circuit Relay
E. Fan Relay

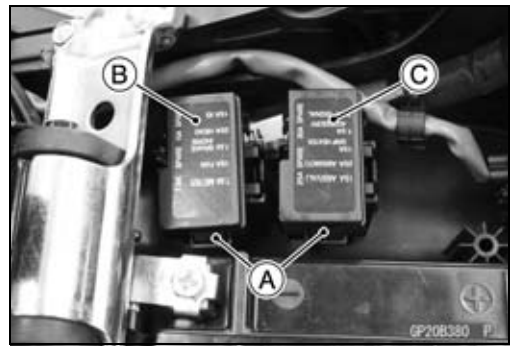
Fuse

30 A Main/15 A ECU Fuse Removal

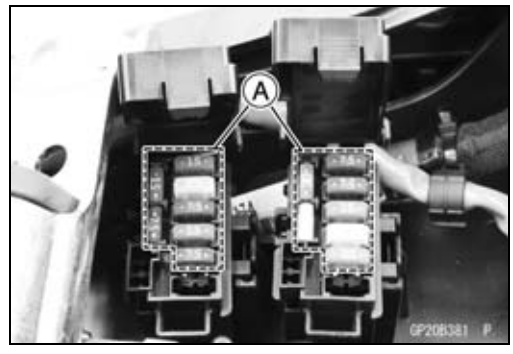


- Remove:
  Starter Relay Cover (see Starter Relay Inspection)
- Pull out the fuses [A] from the starter relay with needle nose pliers.

Fuse Box Fuse Removal



- Remove:
  Front Seat (see Front Seat Removal in the Frame chapter)
- Unlock the hook [A] to lift up the lid.
  Fuse Box (1) [B]
  Fuse Box (2) [C]



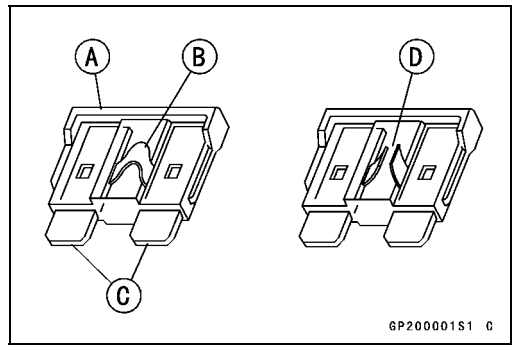
- Pull the fuses [A] straight out of the fuse box with needle nose pliers.

Fuse Installation

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

- Install the fuse box fuses on the original position as specified on the lid.

Fuse Inspection



- Remove the fuse (see 30 A Main/15 A ECU/Fuse Box Fuse Removal).
- Inspect the fuse element.

★If it is blown out, replace the fuse. Before replacing a blown fuse, always check the amperage in the affected circuit. If the amperage is equal to or greater than the fuse rating, check the wiring and related components for a short circuit.
  Housing [A]
  Fuse Element [B]
  Terminals [C]
  Blown Element [D]

NOTICE

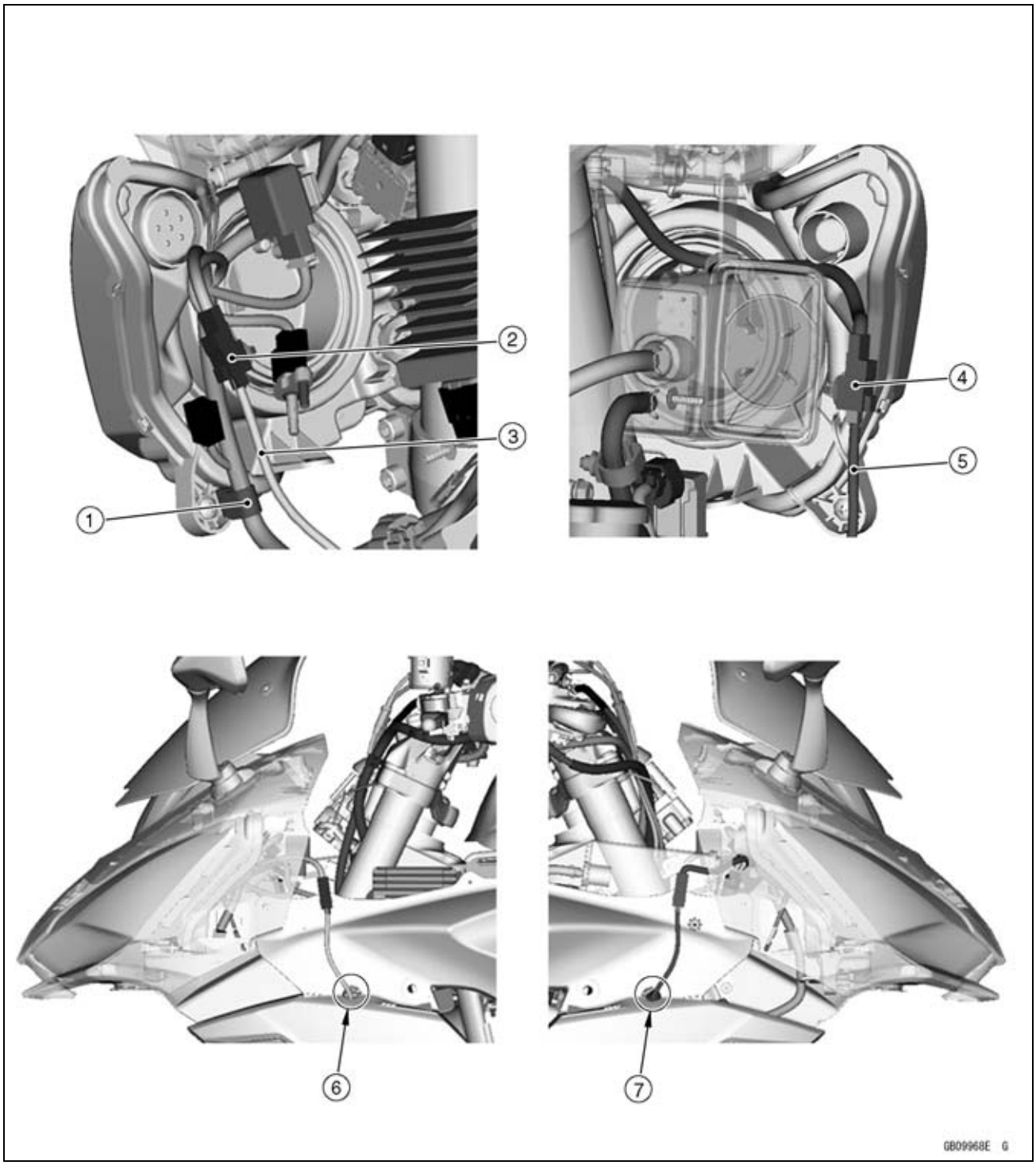
When replacing a fuse, be sure the new fuse matches the specified fuse rating for that circuit. Installation of a fuse with a higher rating may cause damage to wiring and components.

Appendix

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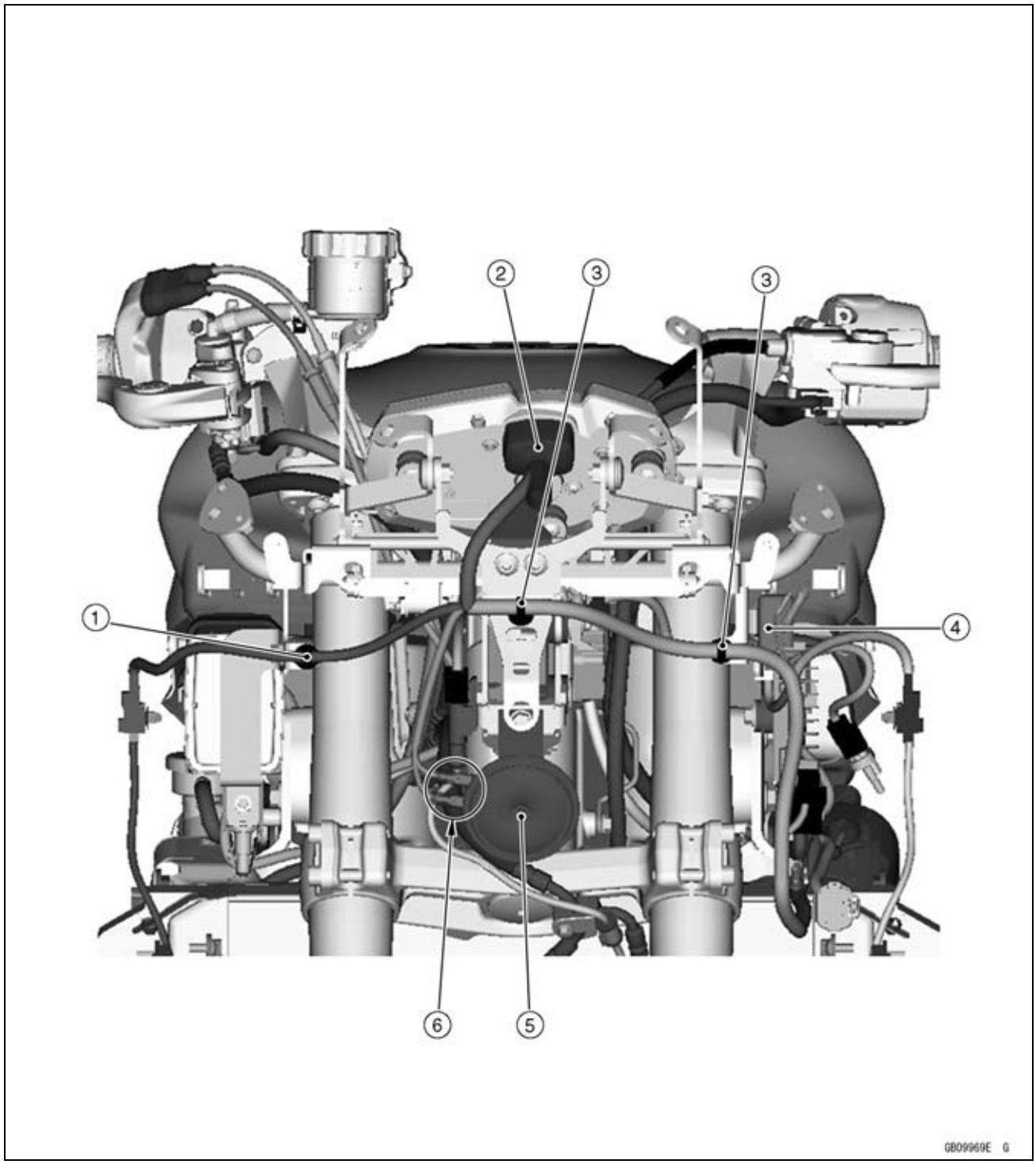
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Troubleshooting Guide 17-44

Cable, Wire, and Hose Routing



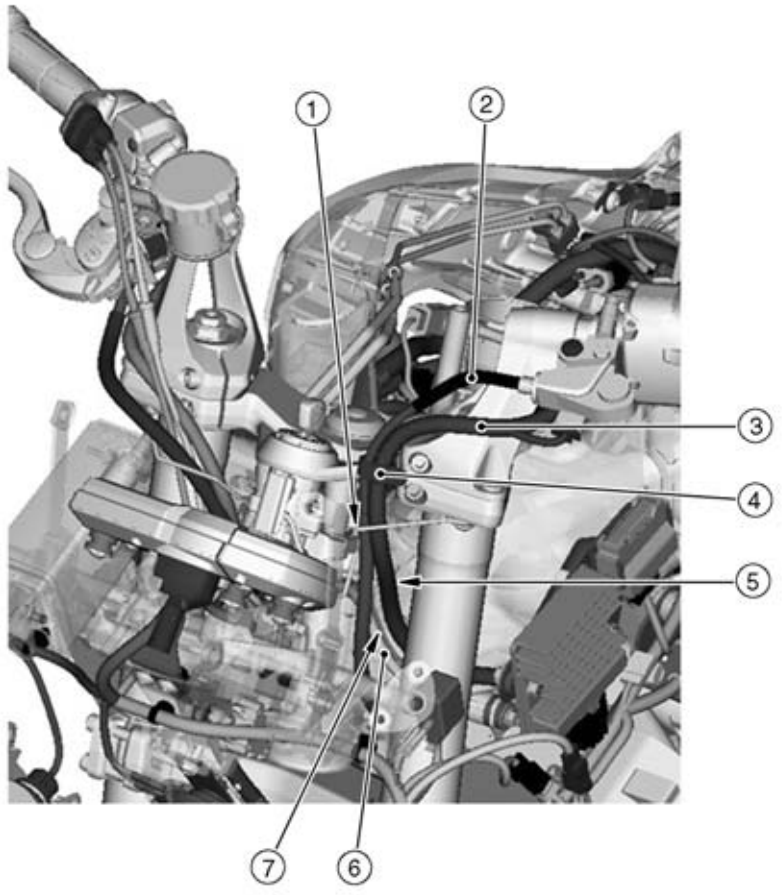
1. Clamp (Hold the main harness.)
2. Clamp (Hold the left front turn signal light lead to the left upper fairing.)
3. Left Front Turn Signal Light Lead
4. Clamp (Hold the right front turn signal light lead to the right upper fairing.)
5. Right Front Turn Signal Light Lead
6. Run the left front turn signal light lead into the hole of the left upper fairing.
7. Run the right front turn signal light lead into the hole of the right upper fairing.

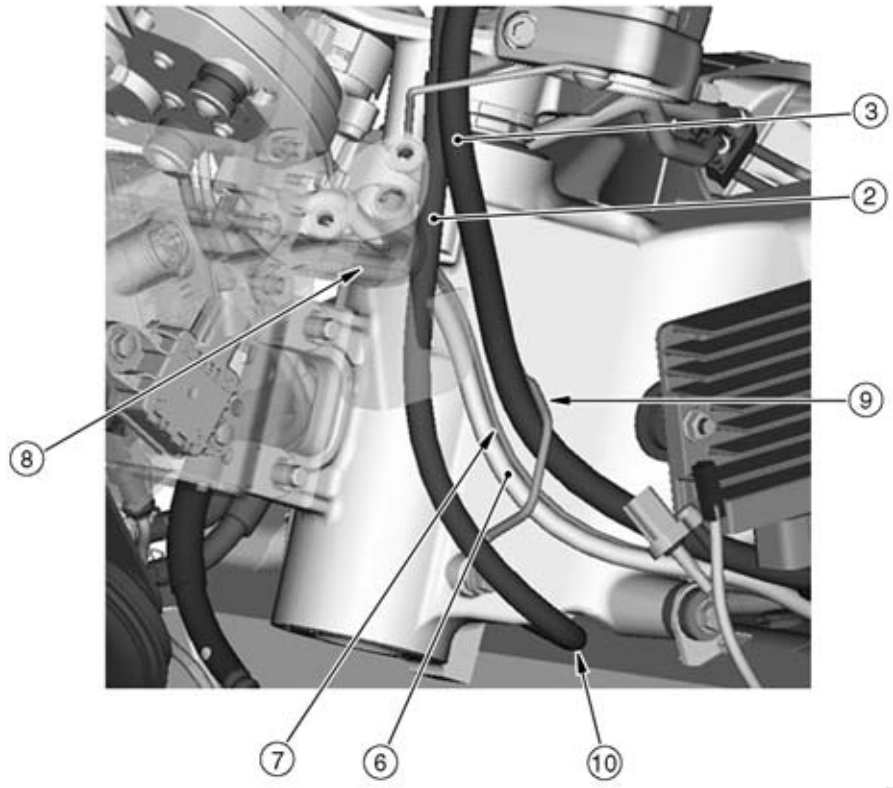
Cable, Wire, and Hose Routing



1. Clamp (Hold the right front turn signal light lead to the meter bracket.)
2. Meter Lead
3. Clamp (Hold the main harness to the meter bracket.)
4. Turn Signal Relay
5. Horn
6. Install the horn connectors to the horn as shown.

Cable, Wire, and Hose Routing



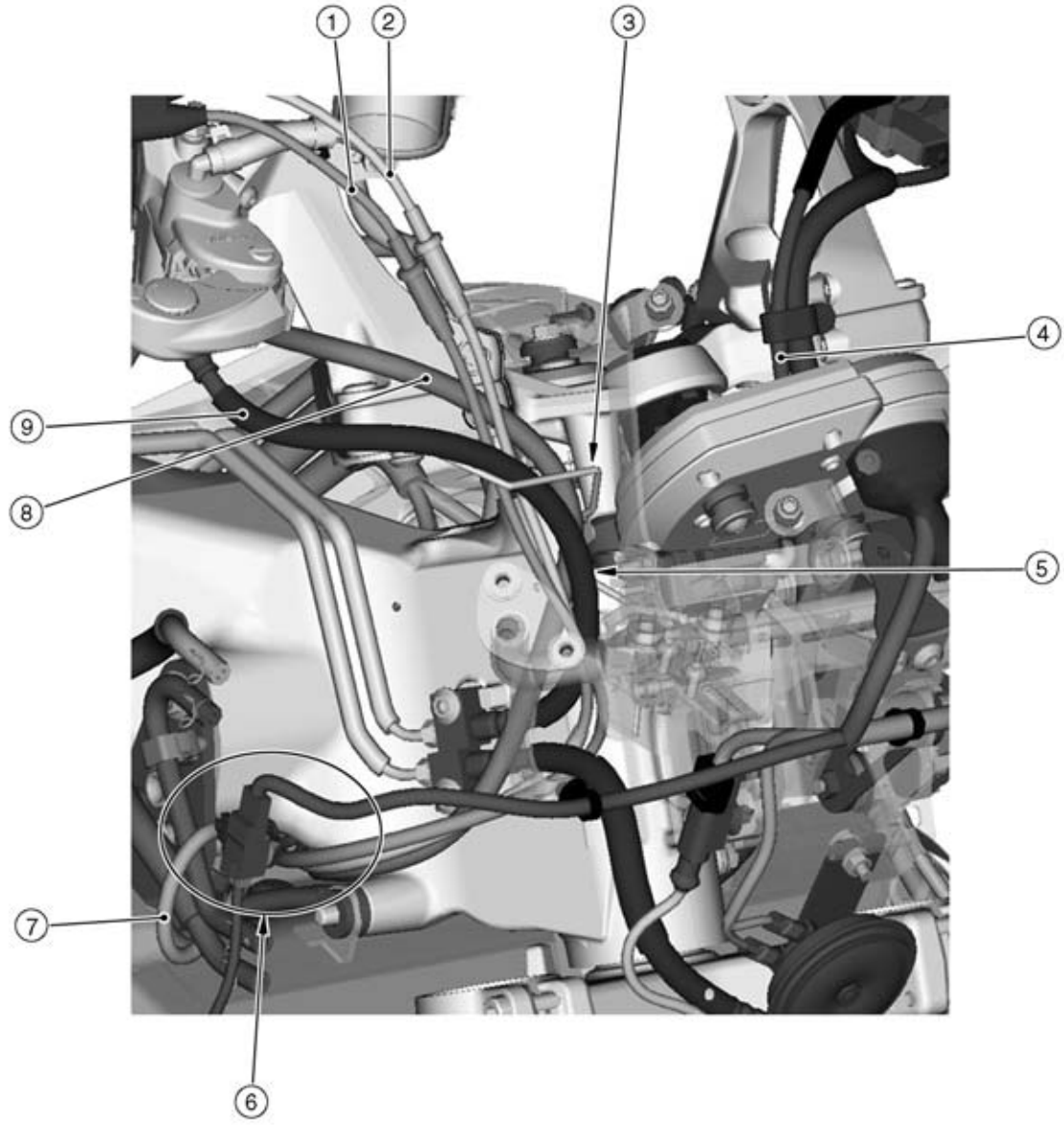


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Cable, Wire, and Hose Routing

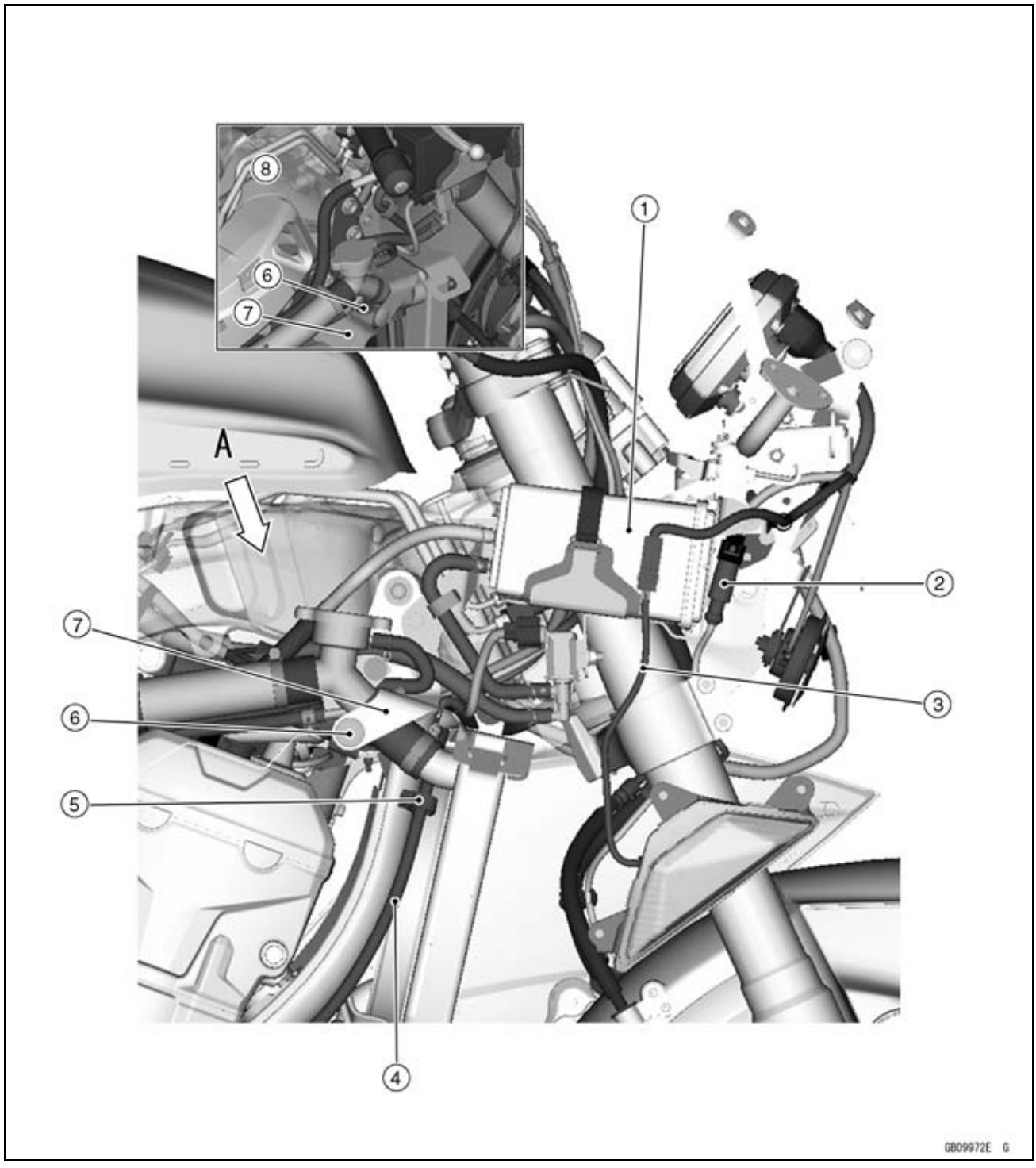
1. Clamp (Run the clutch cable and left switch housing lead in order from the inside of the motorcycle.)
2. Clutch Cable
3. Left Switch Housing Lead
4. Clamp (Hold the clutch cable and left switch housing lead.)
5. Run the ignition switch lead, immobilizer antenna lead (equipped models), left switch housing lead and clutch cable to the inside of the front fork.
6. Ignition Switch Lead
7. Immobilizer Antenna Lead (Equipped Models)
8. Run the ignition switch lead and immobilizer antenna lead (equipped models) through the clamp.
9. Run the ignition switch lead, immobilizer antenna lead (equipped models) and left switch housing lead to the inside of the clamp.
10. Run the clutch cable to the inside of the radiator mounting position. Run the clutch cable under the other leads.

Cable, Wire, and Hose Routing



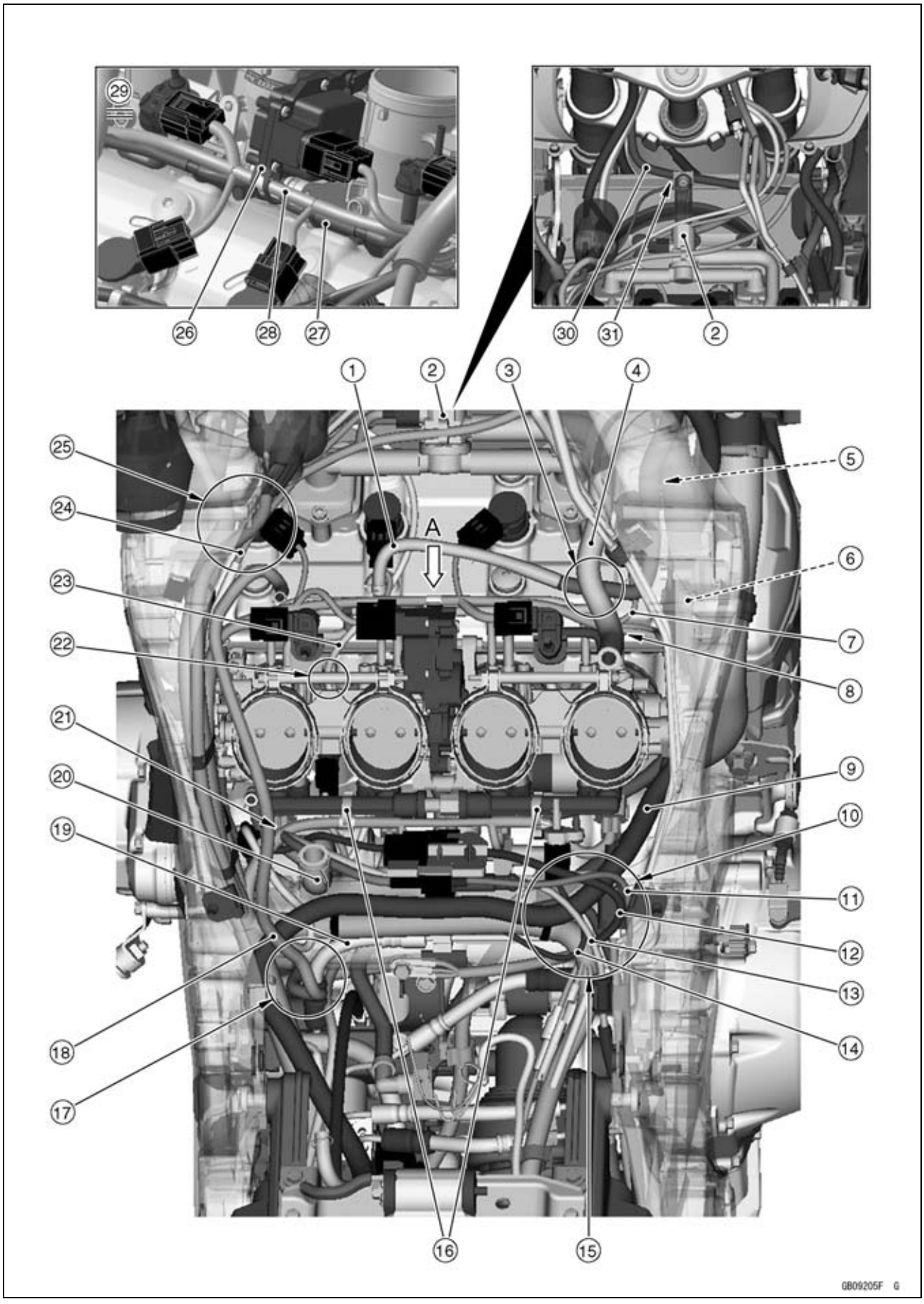
1. Throttle Cable (Decelerator)
2. Throttle Cable (Accelerator)
3. Clamp (Run the brake hose, throttle cable (decelerator), throttle cable (accelerator) and right switch housing lead in order from the outside of the motorcycle.)
4. Clutch Cable
5. Run the brake hose to the front side of the right switch housing lead and throttle cables. Run the right switch housing lead to the rear side of the brake hose and throttle cables.
6. Run the throttle cables, clutch cable, right switch housing lead and purge valve lead (equipped models) through this point to the inside of the frame.
7. Purge Valve Lead (Equipped Models)
8. Right Switch Housing Lead
9. Brake Hose

Cable, Wire, and Hose Routing



1. Canister (Equipped Models)
2. Install the front wheel rotation sensor to the windshield bracket assembly.
3. Right Front Turn Signal Light Lead
4. Clutch Cable
5. Clamp (Hold the clutch cable.)
6. Quick Rivet (Hold the front heat insulation rubber plate to the bracket.)
7. Front Heat Insulation Rubber Plate
8. Viewed from A

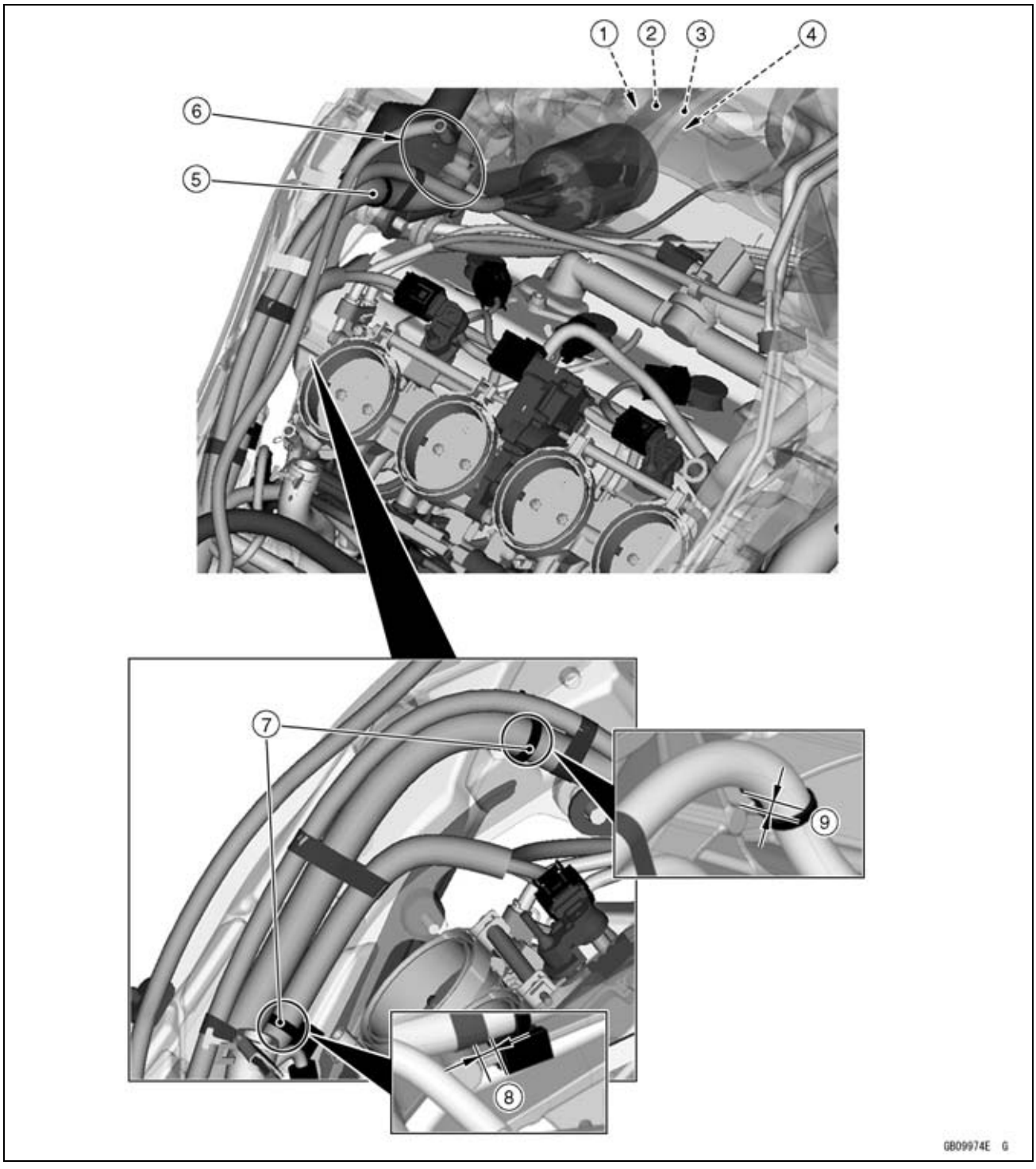
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

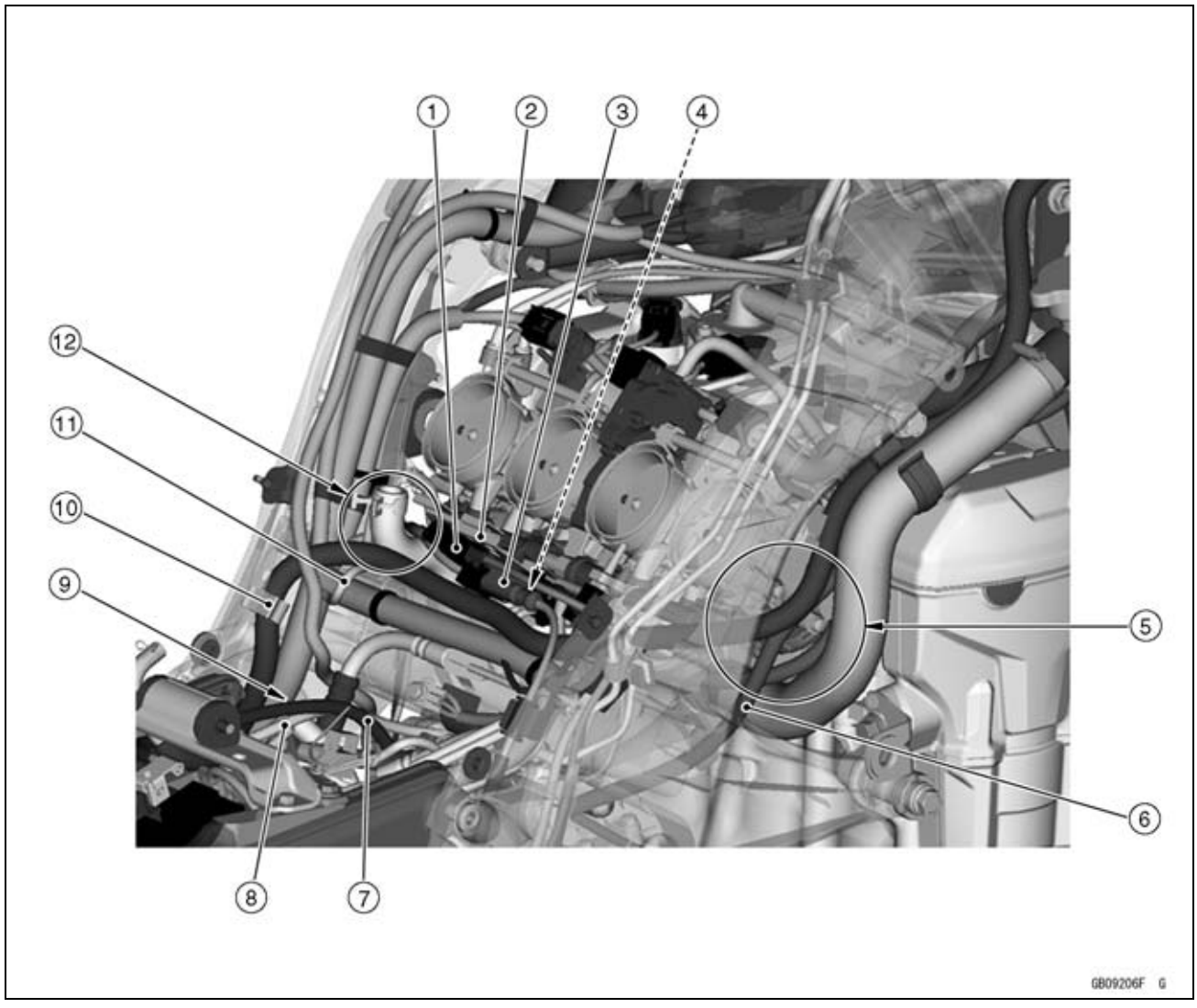
1. Run the purge hose (equipped models) to left side of the stick coil #2 lead.
2. Air Switching Valve
3. Run the purge hose (equipped models) under the air switching valve hose.
4. Air Switching Valve Hose
5. Run the purge hose (equipped models) above the bracket.
6. Hold the breather hose (equipped models) and the water hose with the clamp. Run the breather hose (equipped models) inside of the water hose.
7. Stick Coil Lead
8. Run the air switching valve hose to the upside of the stick coil lead.
9. Breather Hose (Equipped Models)
10. Run the breather hose (equipped models) under the crankshaft sensor lead, wheel rotation sensor lead and alternator lead.
11. Crankshaft Sensor Lead
12. Alternator Lead
13. Rear Wheel Rotation Sensor Lead
14. Intake Air Temperature Sensor Lead
15. Run the intake air temperature sensor lead under the crankshaft senor lead, rear wheel rotation sensor lead and alternator lead.
16. Clamps (Hold the fuel injector lead.)
17. Run the fuel tank drain hose to the outside of the brake pipe.
18. Fuel Tank Drain Hose
19. Brake Pipe
20. Fuel Tank Breather Hose
21. Run the fuel injector lead in front of the fuel tank breather hose.
22. Run the subharness between the throttle body assy holder #1 and #2. Do not pinch the subharness with the throttle body assy.
23. Subharness
24. Right Switch Housing Lead
25. Run the right switch housing lead under the other leads and cables.
26. Clamp (Hold the vacuum hose and main harness at the white tape position of the main harness.)
27. Vacuum Hose
28. Main Harness
29. Viewed from A
30. Clutch Cable
31. Run the clutch cable in front of the radiator bracket.

Cable, Wire, and Hose Routing



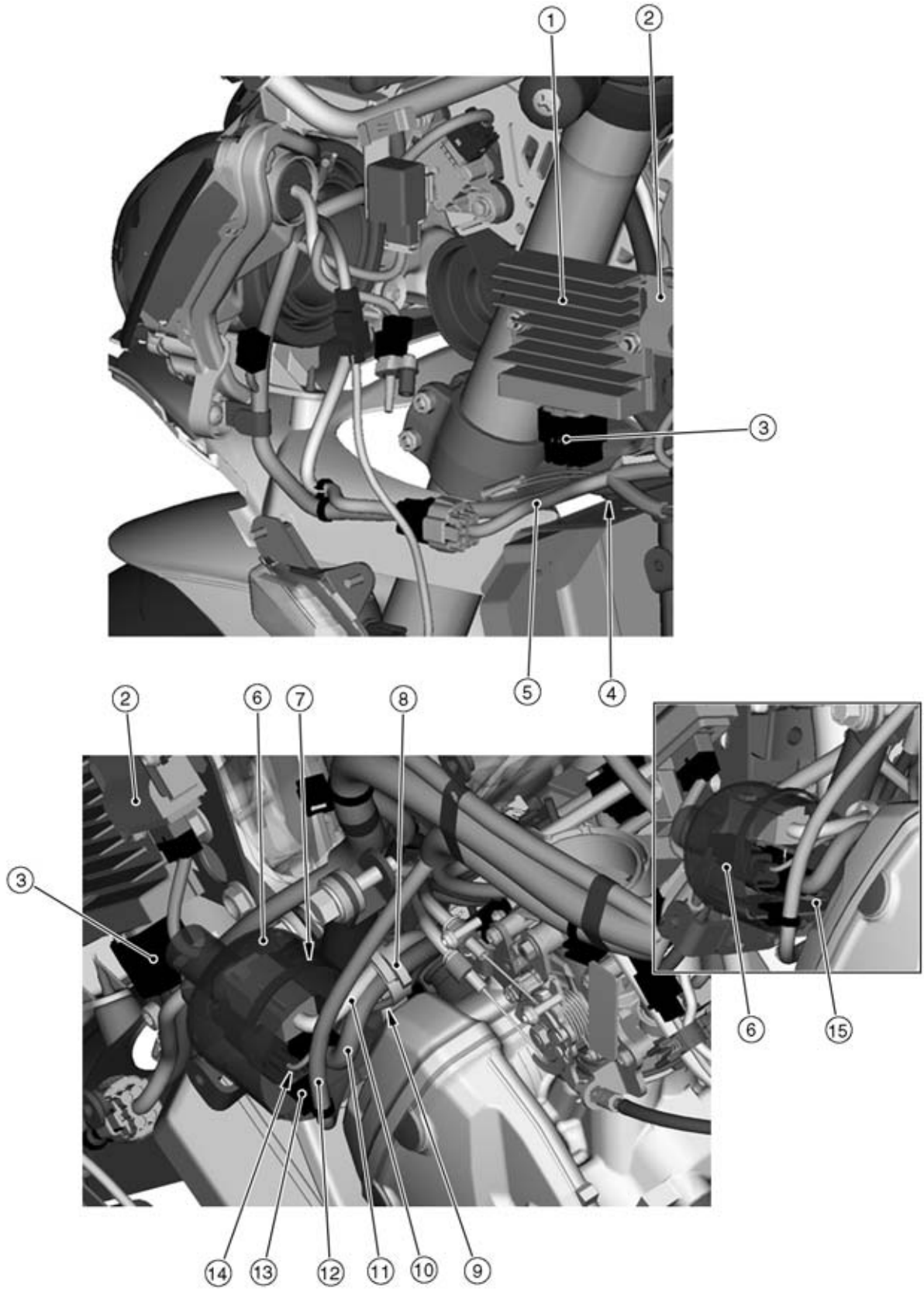
1. Run the ignition switch lead and immobilizer antenna lead (equipped models) under the left switch housing lead.
2. Left Switch Housing Lead
3. Ignition Switch Lead
4. Immobilizer Antenna Lead (Equipped Models)
5. Main Harness
6. Run the main harness between the bracket and frame.
7. Install the clamps to the frame as shown.
8. 5 mm (0.20 in.)
9. 3 mm (0.12 in.)

Cable, Wire, and Hose Routing



1. Crankshaft Sensor Lead Connector (Install it to the connector bracket.)
2. Connector Bracket (Install it to the air cleaner housing.)
3. Rear Wheel Rotation Sensor Lead Connector (Install it to the connector bracket.)
4. Alternator Lead Connector (Install it to the connector bracket.)
5. Run the radiator overflow hose between the main throttle sensor and subthrottle sensor.
6. Radiator Overflow Hose
7. Battery Negative (–) Cable
8. Starter Motor Cable
9. Run the starter motor cable to the outside of the battery negative (–) cable.
10. Clamp (Face the open side of the clamp upward and install it to the frame. Then hold the breather hose (equipped models) at the blue paint position of the breather hose (equipped models).)
11. Side Stand Switch Lead
12. Run the side stand switch lead to the rear side of the fuel tank breather hose. Run the alternator lead and crankshaft sensor lead to the front side of the fuel tank breather hose.

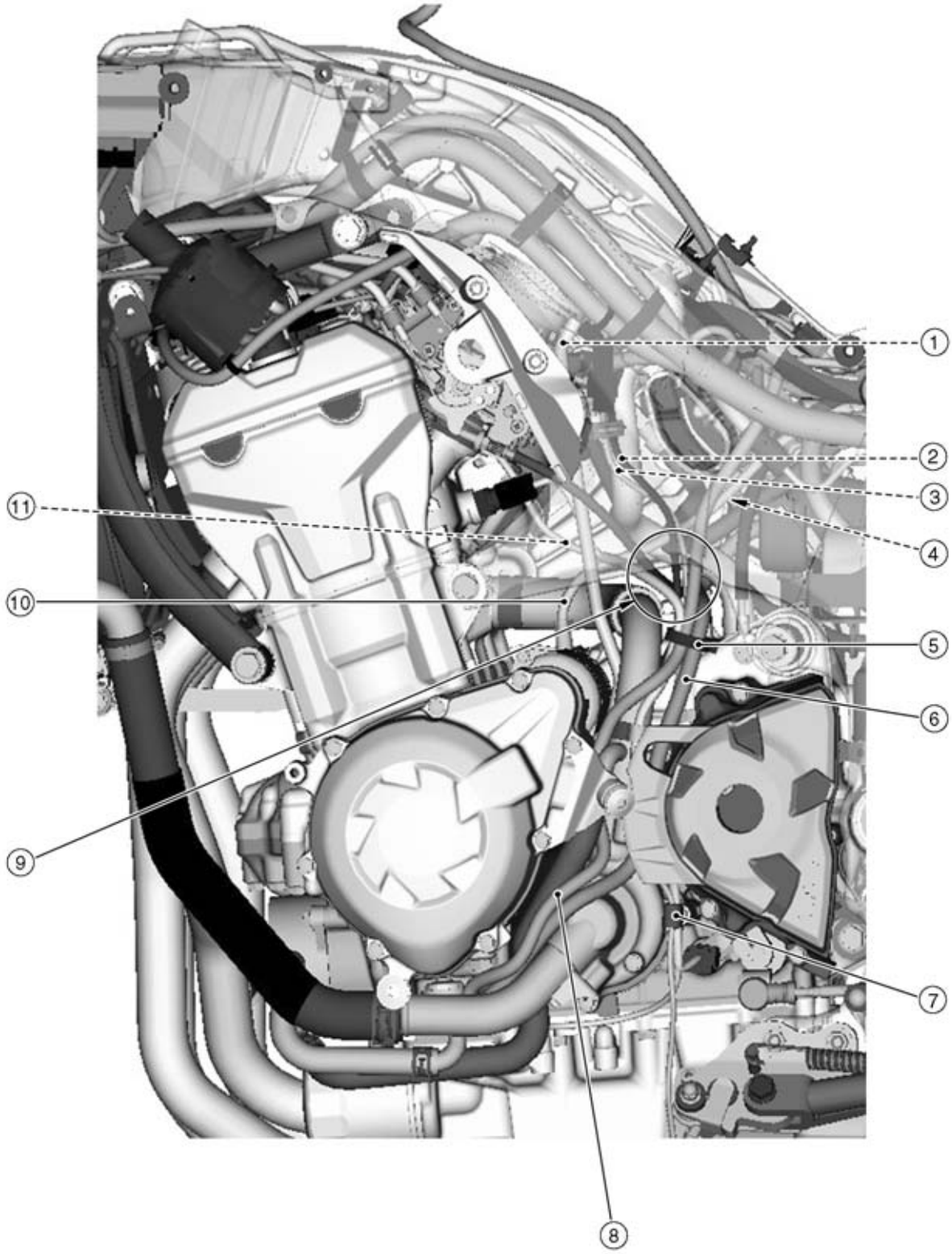
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Regulator/Rectifier
2. Immobilizer Amplifier (Equipped Models)
3. Regulator/Rectifier Lead Connector
4. Run the regulator/rectifier lead to the inside of the main harness.
5. Main Harness
6. Cover the right switch housing lead connector, ignition switch lead connector, radiator fan motor lead connector and immobilizer antenna lead connector (equipped models) with the dust cover.
7. Band (Hold the dust cover. Cut the band excess length after holding the dust cover.)
8. Clamp (Hold the right switch housing lead, ignition switch lead, radiator fan motor lead and immobilizer antenna lead (equipped models).)
9. Radiator Fan Motor Lead
10. Ignition Switch Lead
11. Right Switch Housing Lead
12. Run the subharness under the bracket, cables and other leads.
13. Install the clamp to the bracket as shown.
14. Immobilizer Antenna Lead (Equipped Models)
15. Rivet (Hold the heat insulation rubber plate to the bracket.)

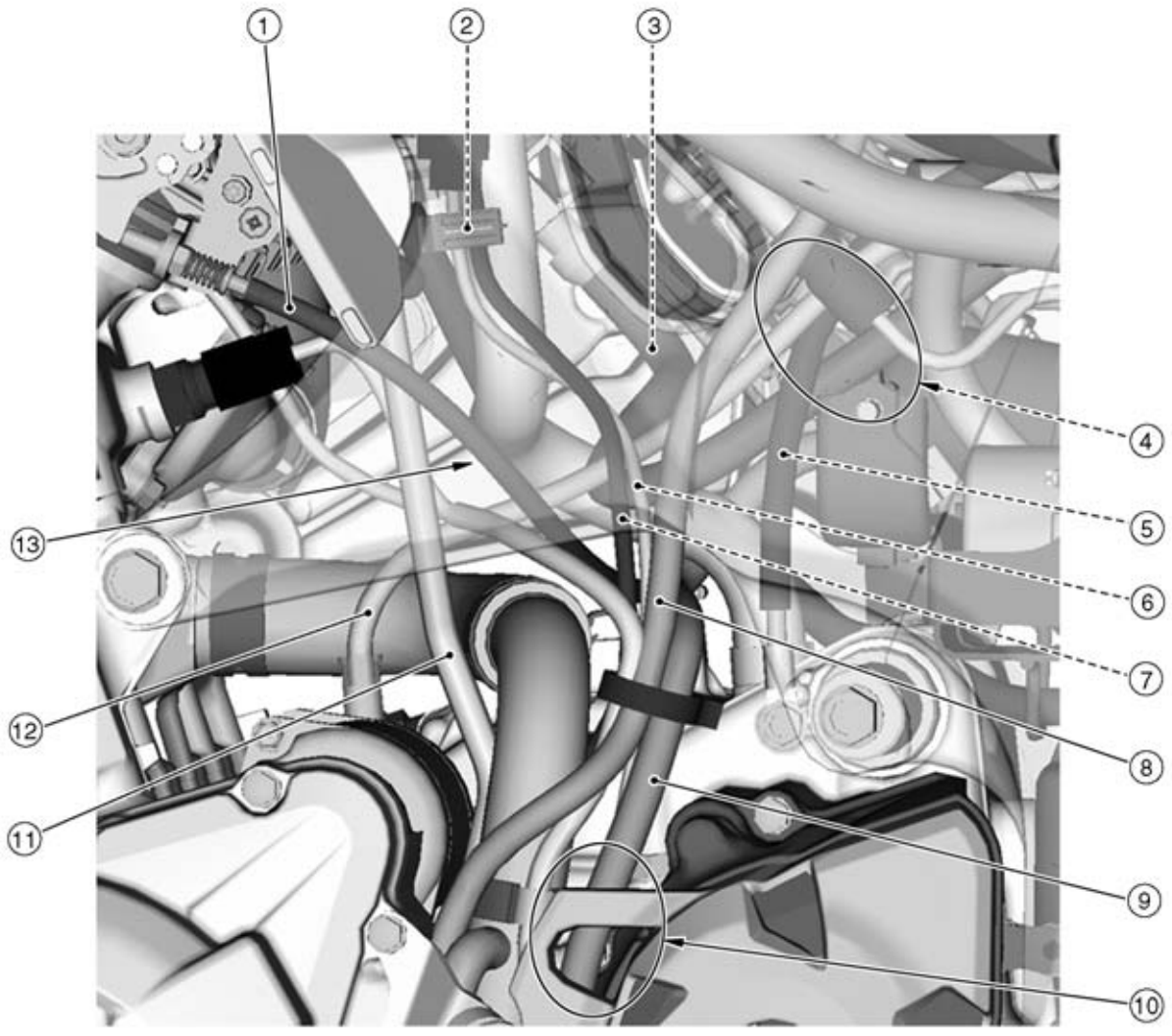
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Air Cleaner Drain Hose
2. Alternator Lead
3. Side Stand Switch Lead
4. Run the starter motor cable to the inside of the other hoses, alternator lead and side stand switch lead.
5. Clamp (Hold the reserve tank overflow hose, side stand switch lead, alternator lead, fuel tank drain hose and subharness.)
6. Reserve Tank Overflow Hose
7. Clamp (Hold the side stand switch lead and subharness.)
8. Fuel Tank Drain Hose
9. Run the alternator lead to the inside of the subharness.
10. Starter Motor Cable
11. Subharness

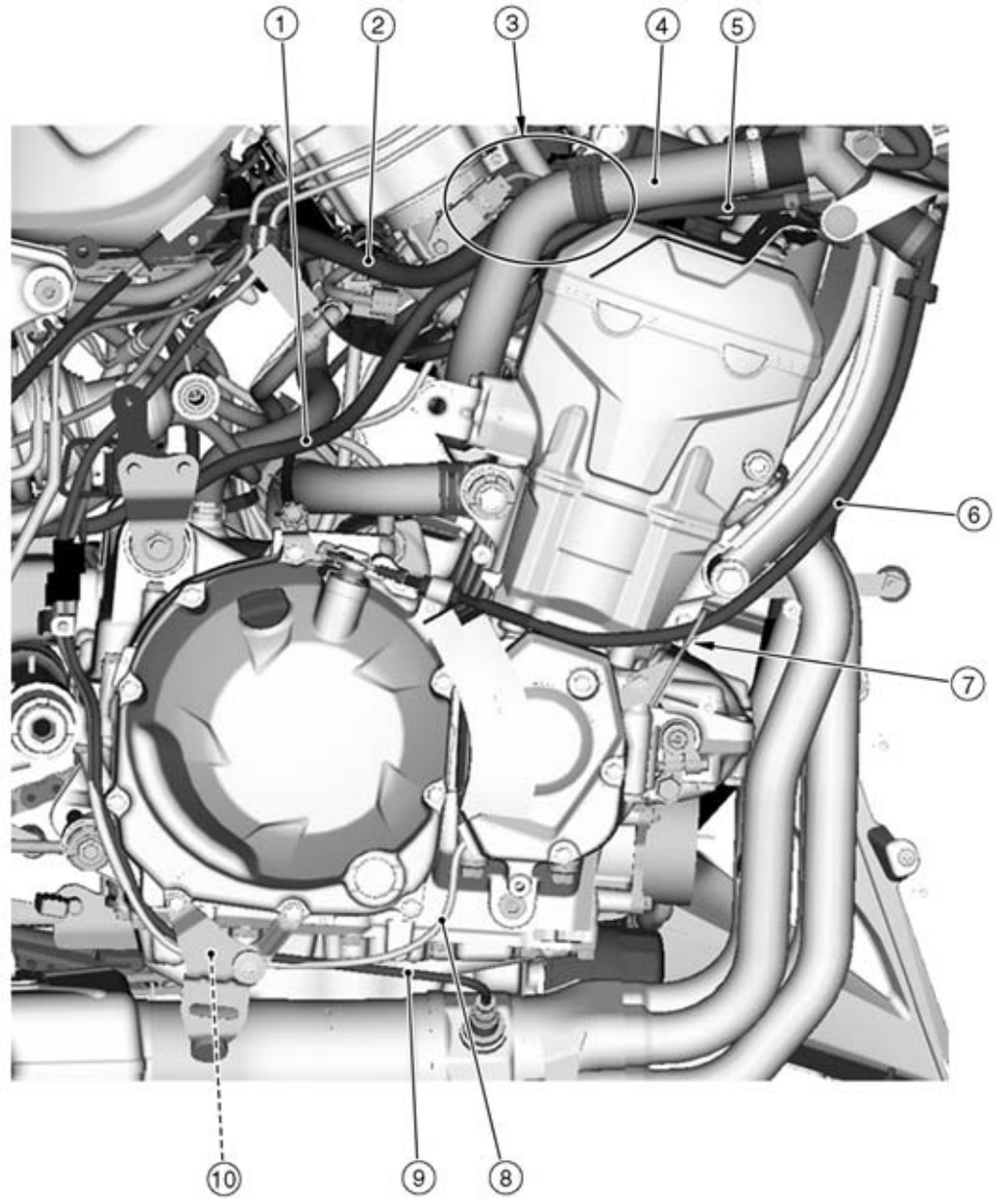
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Idle Adjusting Cable
2. Clamp (Hold the alternator lead and side stand switch lead, and face the open side of the clamp forward.)
3. Fuel Hose
4. Run the fuel hose, battery negative (–) cable, starter motor cable and fuel tank drain hose in order from the inside of the frame.
5. Battery Negative (–) Cable
6. Side Stand Switch Lead
7. Alternator Lead
8. Fuel Tank Drain Hose
9. Reserve Tank Overflow Hose
10. Run the reserve tank overflow hose and side stand switch lead to the inside of the engine sprocket cover.
11. Air Cleaner Drain Hose
12. Starter Motor Cable
13. Run the idle adjusting cable to the under of the starter motor cable. Run the idle adjusting cable to the front side of the side stand switch lead and alternator lead. Run the idle adjusting cable to the outside of the air cleaner drain hose.

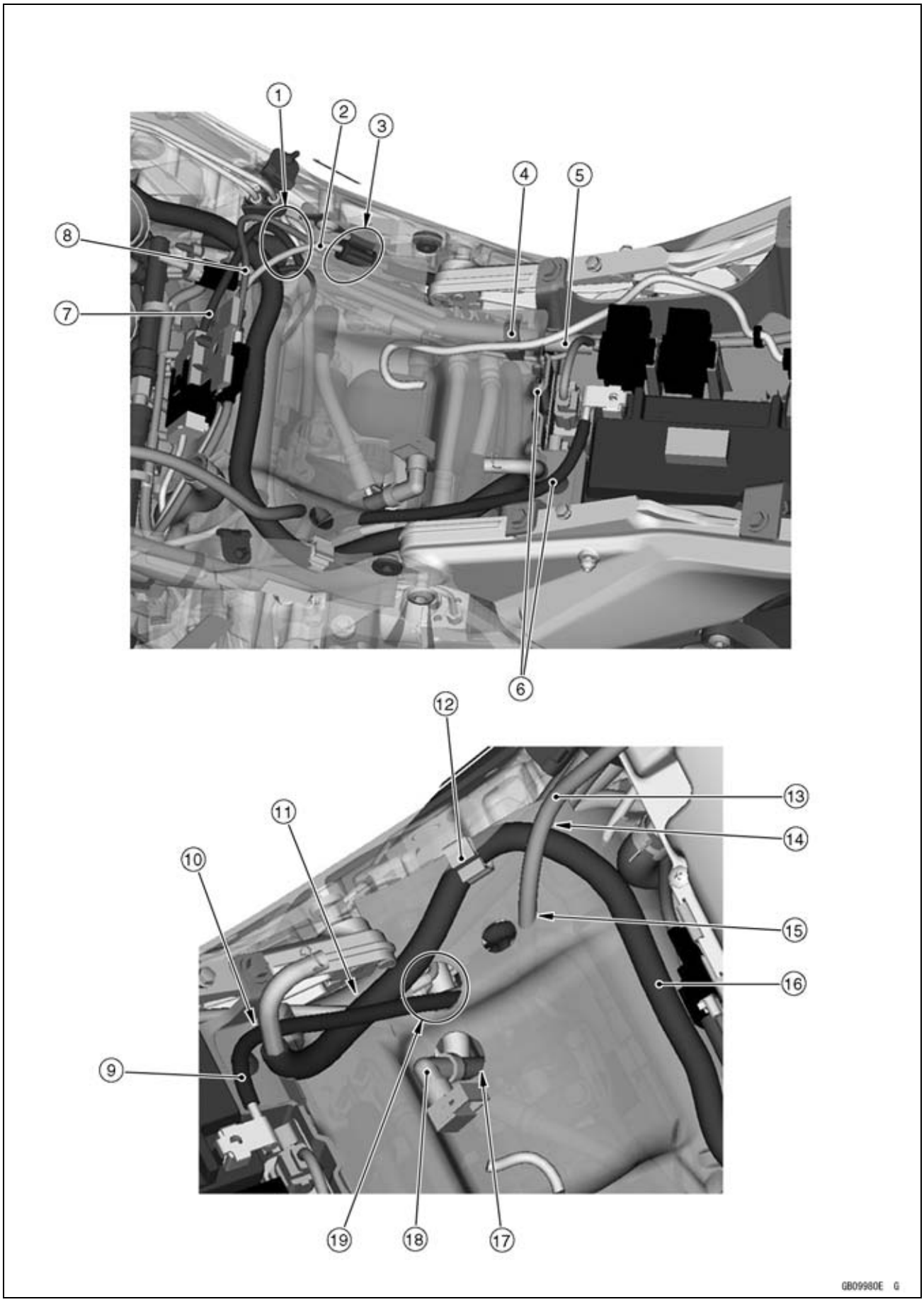
Cable, Wire, and Hose Routing



1. Radiator Overflow Hose
2. Breather Hose (Equipped Models)
3. Run the water hose, breather hose (equipped models), radiator overflow hose and air bleeder hose in order from the outside of the frame.
4. Water Hose
5. Air Bleeder Hose
6. Clutch Cable
7. Run the clutch cable through the clamp of the crankshaft sensor cover.
8. Crankshaft Sensor Lead
9. Oxygen Sensor Lead
10. Clamp (Hold the oxygen sensor lead and crankshaft sensor lead.)

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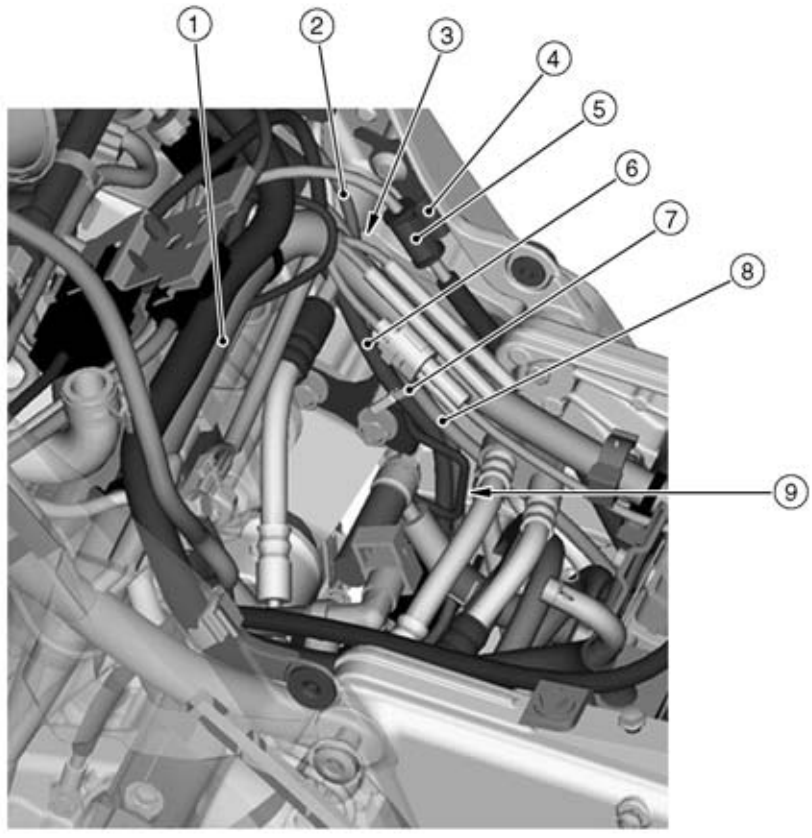
Cable, Wire, and Hose Routing

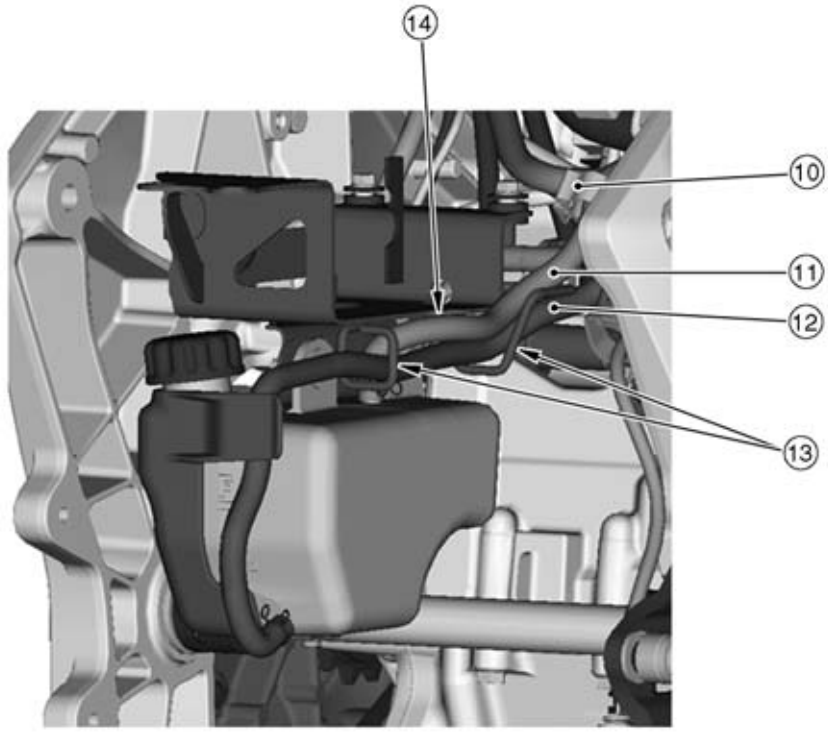


Cable, Wire, and Hose Routing

1. Run the alternator lead and crankshaft sensor lead through this point.
2. Rear Wheel Rotation Sensor Lead
3. Run the rear wheel rotation sensor lead through this point.
4. Clamp (Hold the main harness and heat insulation rubber plate, and face the open side of the clamp to the right side.)
5. Main Harness
6. Rivets (Hold the heat insulation rubber plate to the battery case.)
7. Crankshaft Sensor Lead
8. Alternator Lead
9. Battery Negative (–) Cable
10. Run the breather hose (equipped models) to right side of the battery negative (–) cable.
11. Run the breather hose (equipped models) under the battery negative (–) cable.
12. Clamp (Face the open side of the clamp upward and install it to the frame. Then hold the breather hose (equipped models) at the blue paint position of the breather hose.)
13. Fuel Tank Drain Hose
14. Run the breather hose (equipped models) under the fuel tank drain hose.
15. Run the fuel tank drain hose into the hole of the heat insulation rubber plate.
16. Breather Hose (Equipped Models) (Run it above the heat insulation rubber plate.)
17. Run the fuel hose into the hole of the heat insulation rubber plate.
18. Fuel Hose
19. Run the fuel tank breather hose (US and CA models) and battery negative (–) cable into the hole of the heat insulation rubber plate.

Cable, Wire, and Hose Routing



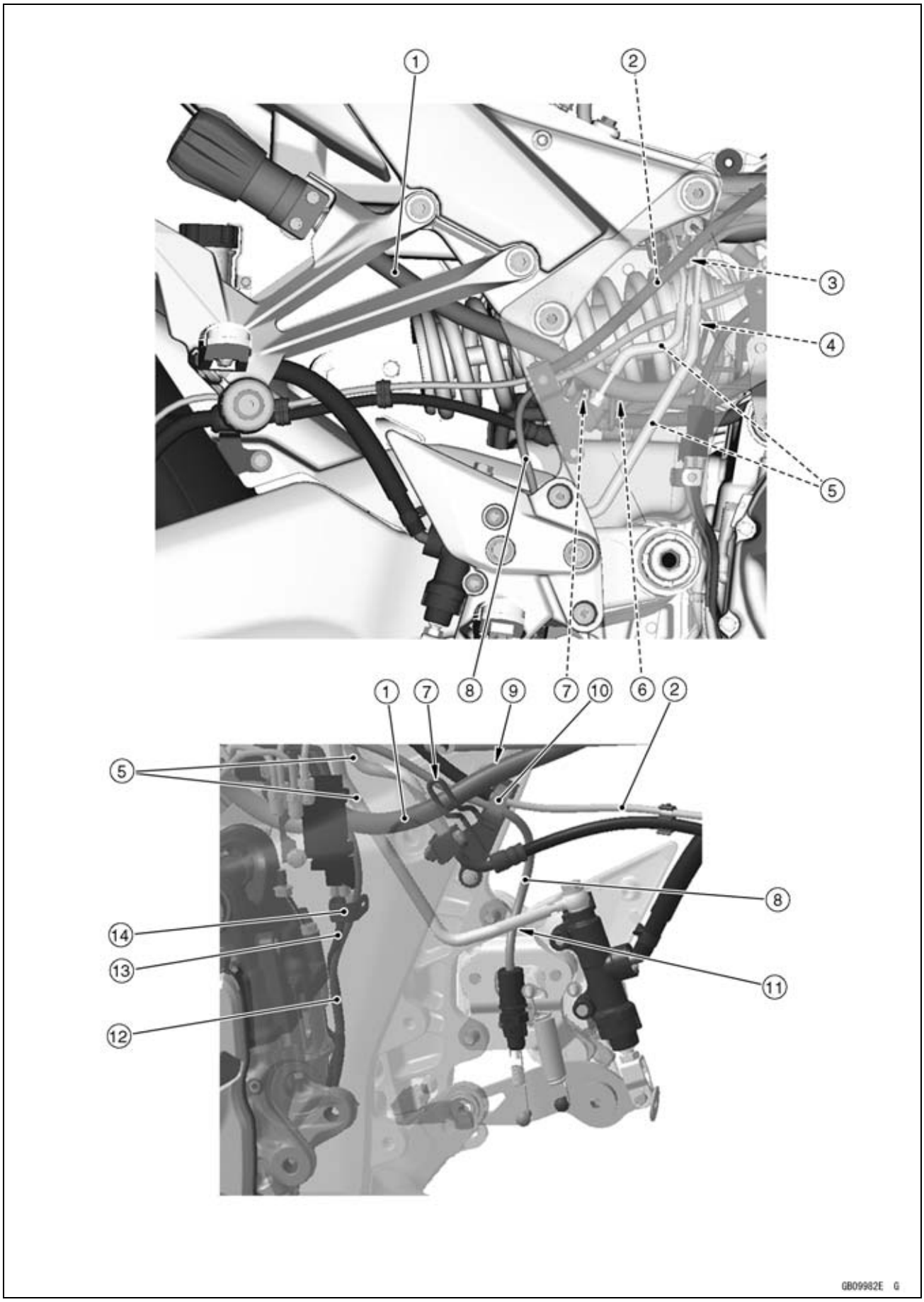


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Cable, Wire, and Hose Routing

1. Main Harness
2. Crankshaft Sensor Lead
3. Run the oxygen sensor lead, crankshaft sensor lead and rear brake light switch lead to the outside of the main harness.
4. Clamp (Hold the rear wheel rotation sensor lead.)
5. Rear Wheel Rotation Sensor Lead
6. Oxygen Sensor Lead
7. Clamp (Hold the oxygen sensor lead, crankshaft sensor lead and rear brake light switch lead.)
8. Rear Brake Light Switch Lead
9. Run the oxygen sensor lead and crankshaft sensor lead between the clamp and frame.
10. Clamp (Hold the reserve tank overflow hose.)
11. Reserve Tank Overflow Hose
12. Radiator Overflow Hose
13. Run the radiator overflow hose through the clamps.
14. Run the radiator overflow hose to the inside of the reserve tank overflow hose.

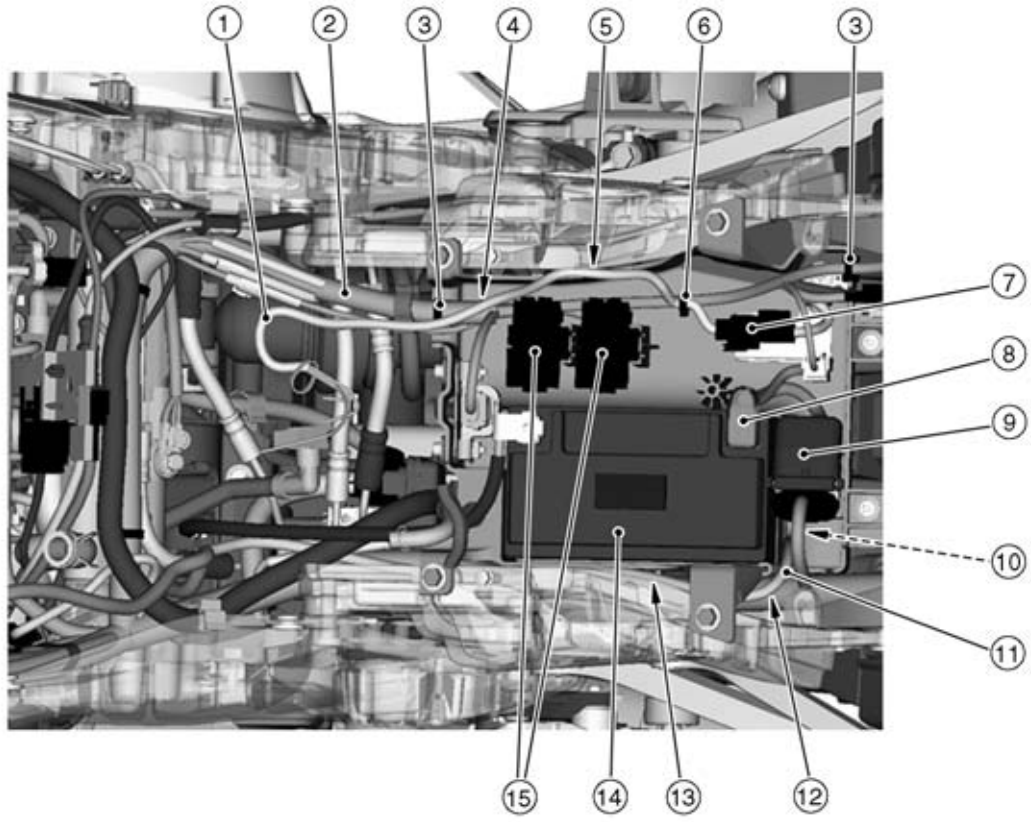
Cable, Wire, and Hose Routing

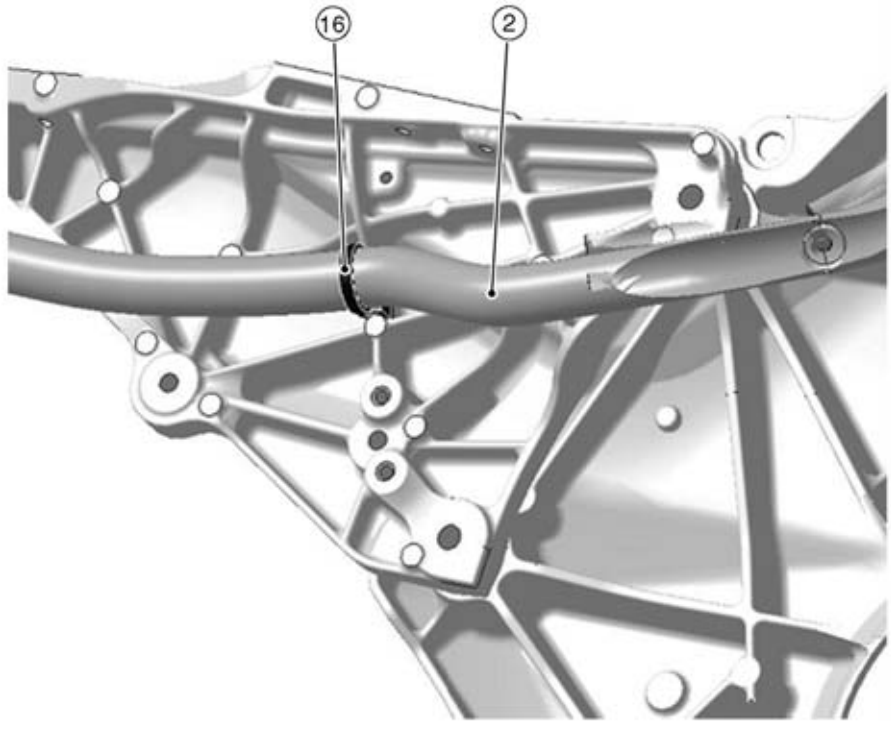


Cable, Wire, and Hose Routing

1. Spring Preload Adjuster Hose
2. Rear Wheel Rotation Sensor Lead
3. Run the rear wheel rotation sensor lead to the outside of the brake pipes.
4. Run the rear brake light switch lead to the inside of the brake pipes.
5. Brake Pipes
6. Run the spring preload adjuster hose to the inside of the brake pipes.
7. Run the spring preload adjuster hose between the frame and clamp.
8. Rear Brake Light Switch Lead
9. Run the rear brake light switch lead and rear wheel rotation sensor lead to the outside of the spring preload adjuster hose.
10. Clamp (Hold the rear brake light switch lead and rear wheel rotation sensor lead.)
11. Run the brake pipe to the inside of the rear brake light switch lead.
12. Crankshaft Sensor Lead
13. Oxygen Sensor Lead
14. Bend the clamp rearward to hold the crankshaft sensor and oxygen sensor lead.

Cable, Wire, and Hose Routing



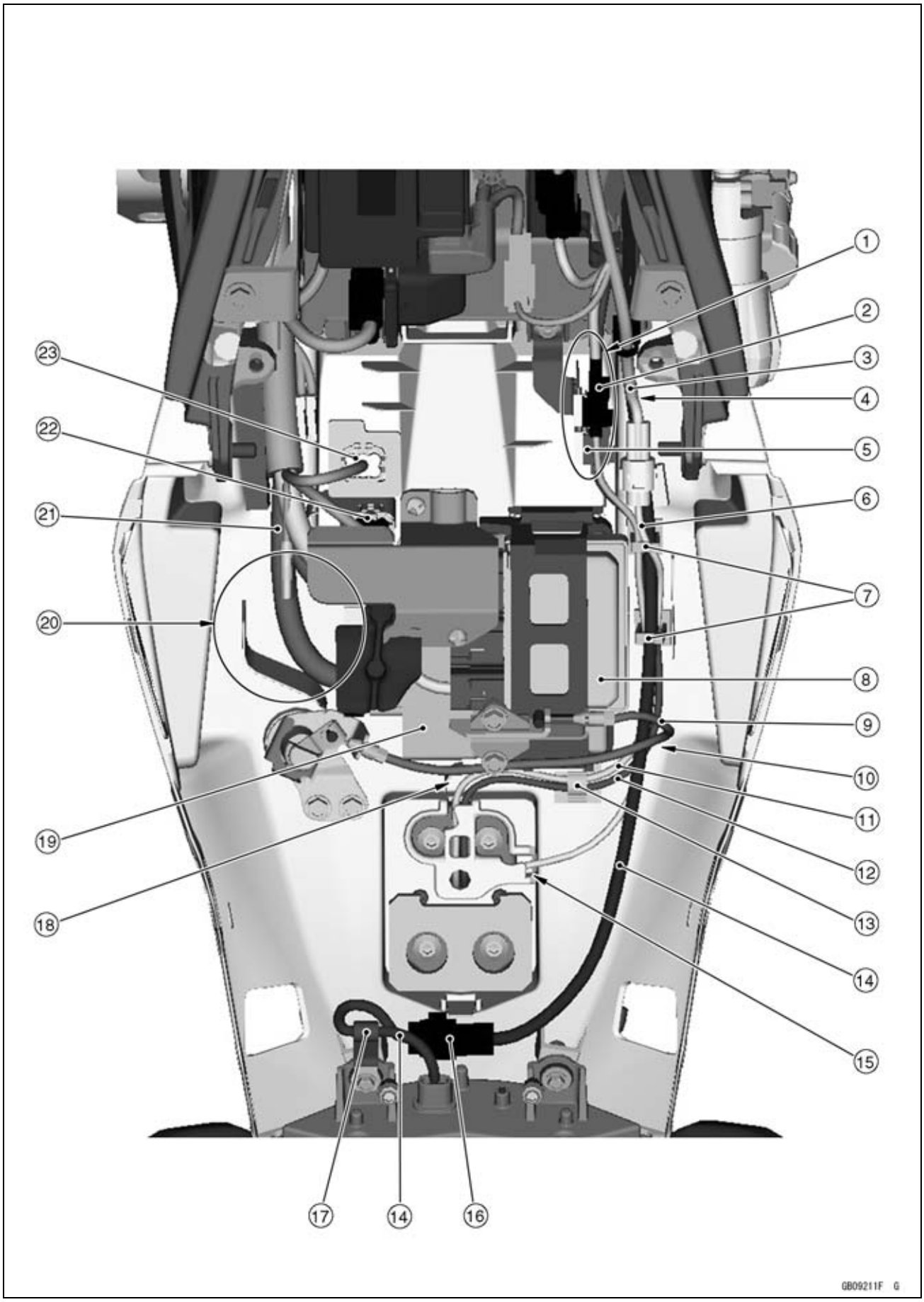


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Cable, Wire, and Hose Routing

1. Fuel Pump Lead
2. Main Harness
3. Install the clamp to the battery case as shown.
4. Run the fuel pump lead to the upside of the main harness.
5. Run the fuel pump lead and main harness to the outside of the fuse boxes.
6. Clamp (Hold the fuel pump lead and main harness.)
7. Install the fuel pump lead connector to the bracket.
8. Battery Positive (+) Cable
9. Starter Relay
10. Run the starter motor cable to the inside of the battery positive (+) cable.
11. Starter Motor Cable
12. Run the starter motor cable between the starter relay and battery.
13. Run the starter motor cable to the upside of the main harness.
14. Battery
15. Fuse Boxes
16. Install the clamp to the frame as shown.

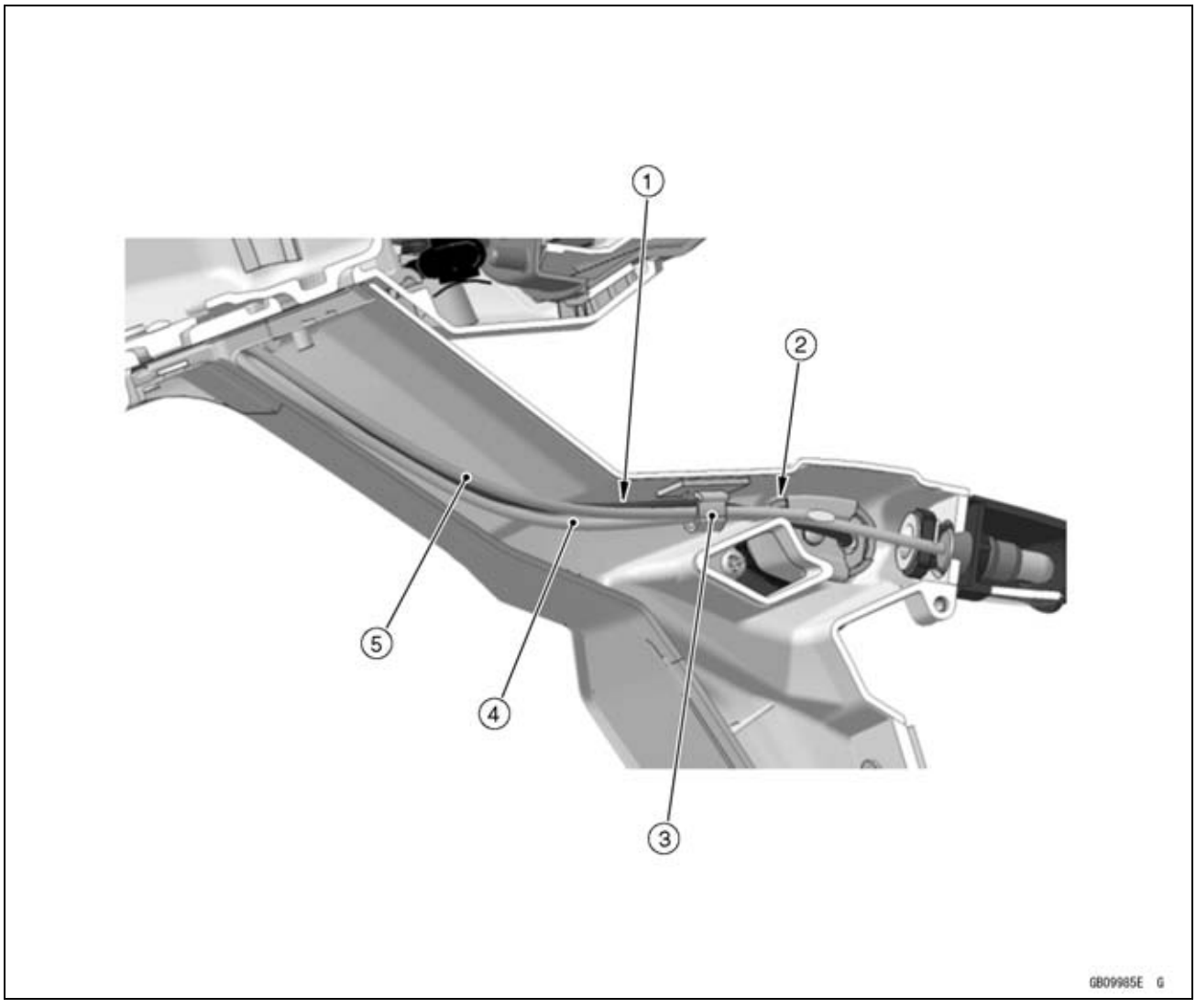
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

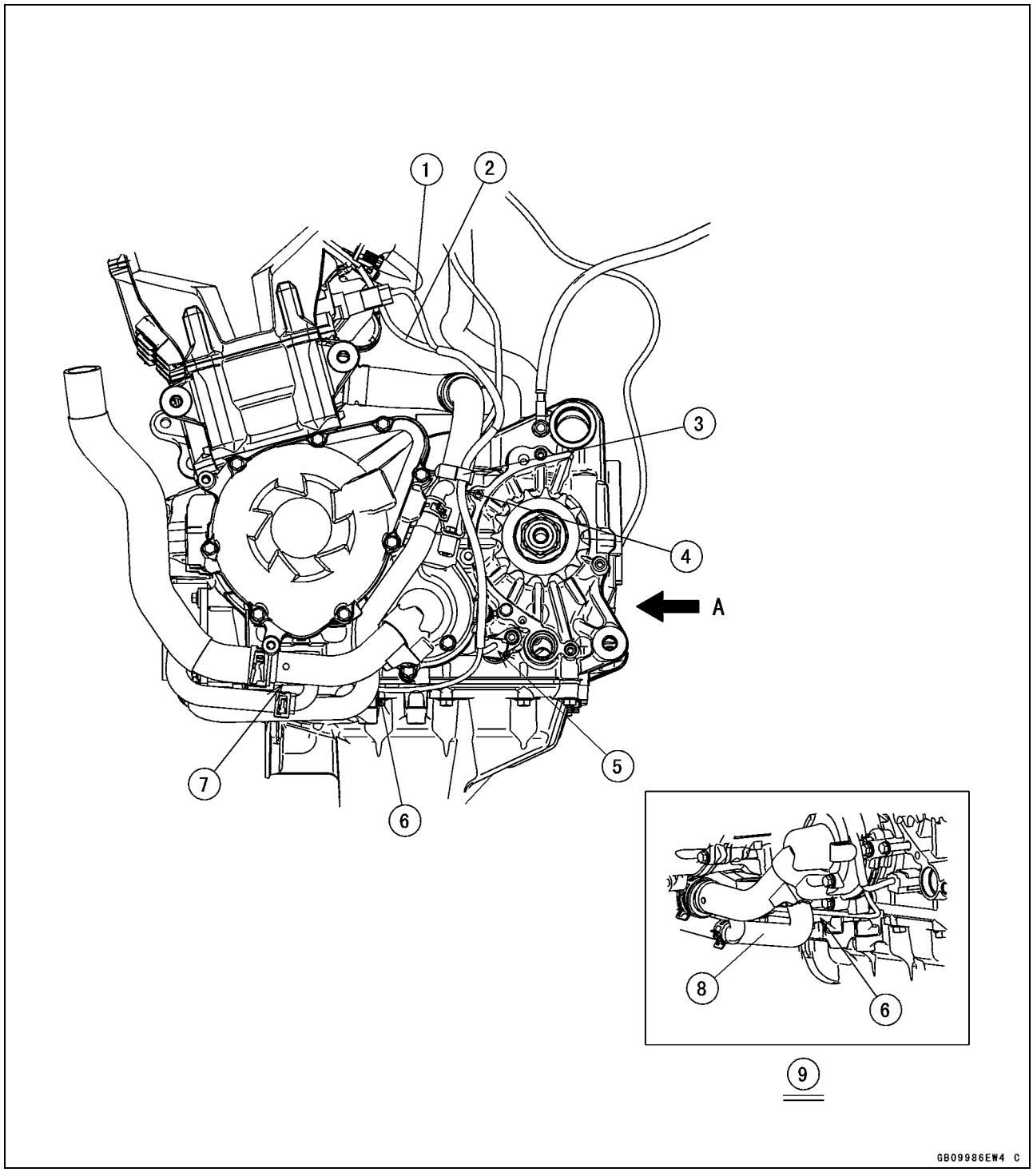
1. Hold the right rear turn signal light lead connector and left rear turn signal light lead connector to the bracket.
2. Left Rear Turn Signal Light Lead Connector
3. Main Harness
4. Run the main harness to the right side of the rear turn signal light lead connectors.
5. Right Rear Turn Signal Light Lead Connector
6. License Plate Light Lead
7. Clamp (Hold the license plate light lead, tail/brake light lead and rear turn signal light leads. When installing the clamp, bended portion of the clamp faces to inside.)
8. Relay Box
9. Seat Lock Cable
10. Run the seat lock cable to the front side of the rib. Run the seat lock cable to the upside of the license plate light lead, tail/brake light lead and rear turn signal light leads.
11. Left Rear Turn Signal Light Lead
12. Right Rear Turn Signal Light Lead
13. Clamp (Hold the rear turn signal light leads, and face the open side of the clamp rearward.)
14. Tail/Brake Light Lead
15. Run the license plate light lead through this point.
16. Put the tail/brake light lead connector in this position. Do not pinch the tail/brake light lead with the rear fender.
17. Bend the clamp upward to hold the tail/brake light lead.
18. Run the rear turn signal light leads through this point.
19. ECU
20. Run the ECU leads to the front side of the rib.
21. ECU Leads
22. ABS Kawasaki Diagnosis System Connector
23. Kawasaki Diagnostic System Connector

Cable, Wire, and Hose Routing



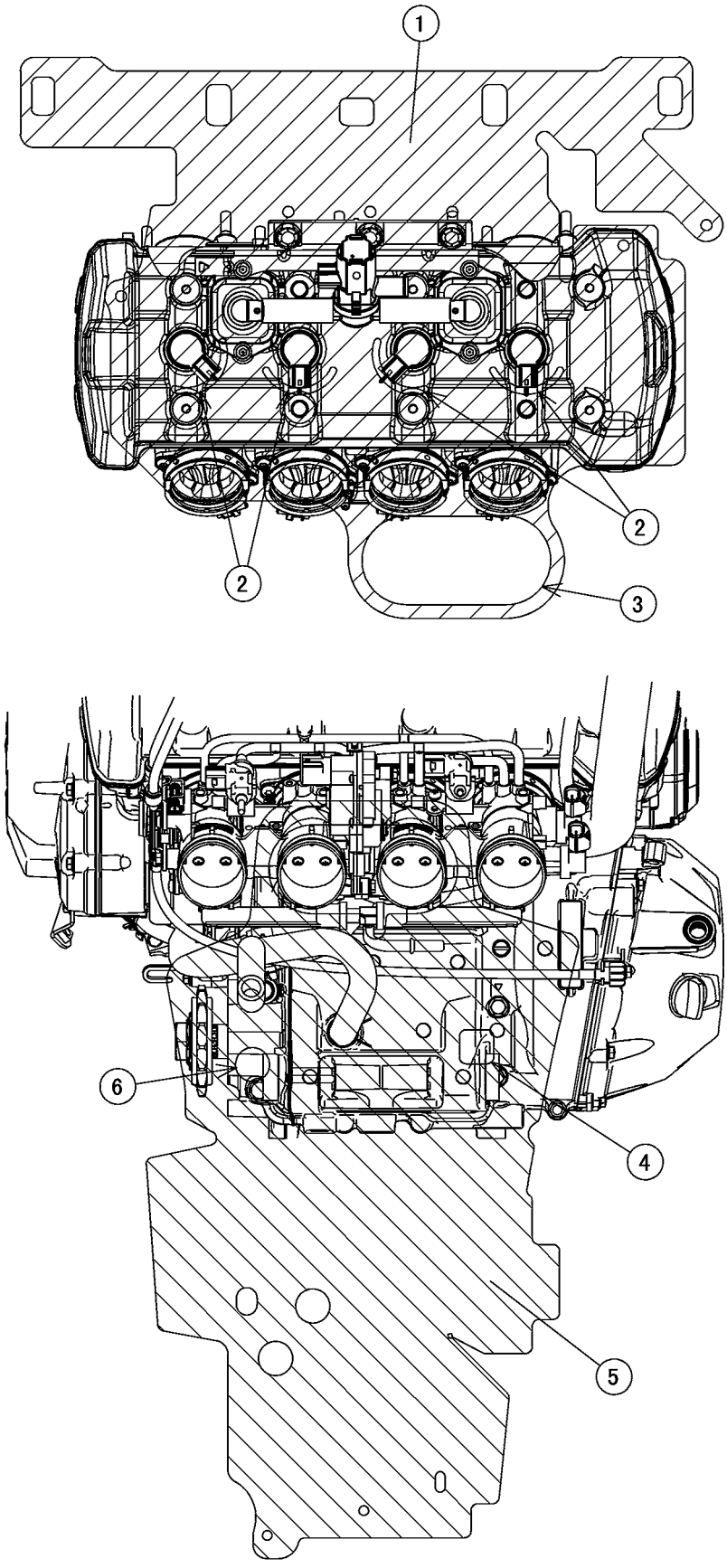
1. Right Rear Turn Signal Light Lead
2. Run the license plate light lead, left rear turn signal light lead and right rear turn signal light lead to the upside of the flap.
3. Clamp (Hold the license plate light lead, left rear turn signal light lead and right rear turn signal light lead.)
4. License Plate Light Lead
5. Left Rear Turn Signal Light Lead

Cable, Wire, and Hose Routing



1. Water Temperature Sensor Lead
2. Subharness
3. Clamp (Hold the gear position sensor/oil pressure switch lead. Attach the clamp to the upside of the water pipe branch.)
4. Run the gear position sensor/oil pressure switch lead to the rear side of the water pipe branch.
5. Connect the gear position sensor lead to the gear position sensor. Do not stretch the lead after connected.
6. Run the oil pressure switch lead to the inside of the water hose.
7. Cover the oil pressure switch with the switch cover.
8. Water Pipe
9. Viewed from A

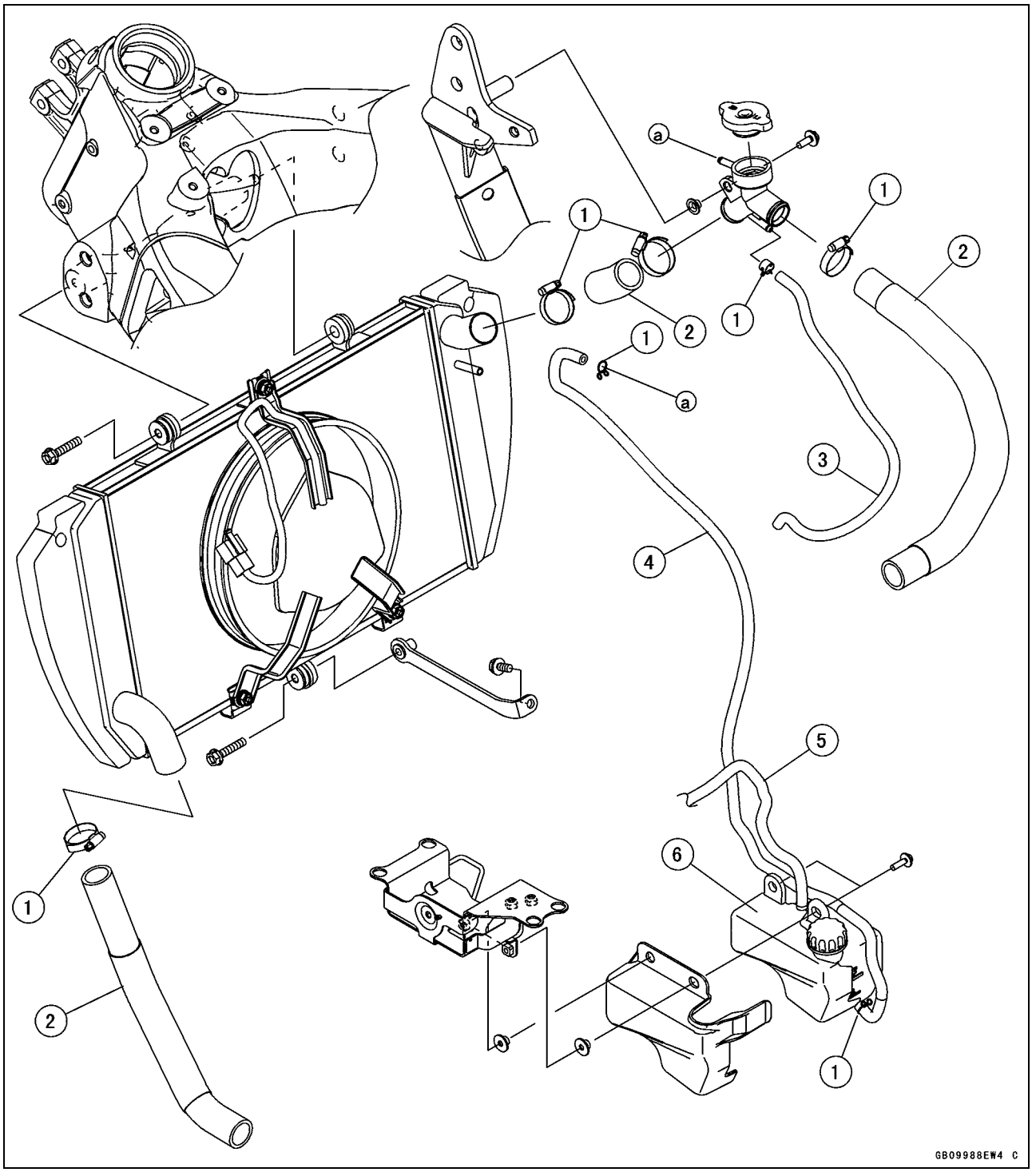
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Front Heat Insulation Rubber Plate
2. Stick Coil Connectors
3. Throttle Body Assy Holder #3 and #4
4. Fuel Hose
5. Rear Heat Insulation Rubber Plate (Install the rear heat insulation rubber plate to the throttle body assy holder #2 and #3.)
6. Breather Hose

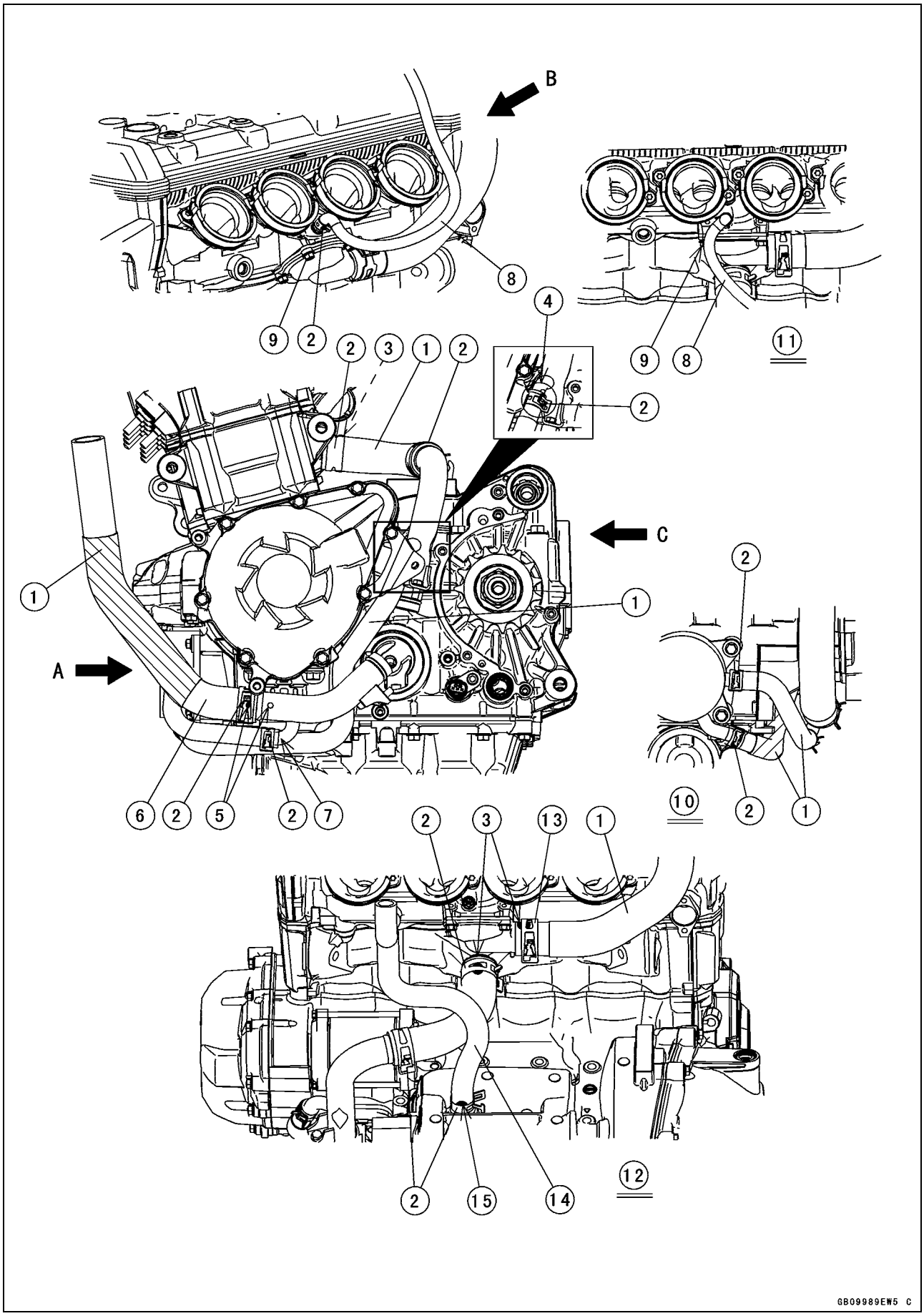
Cable, Wire, and Hose Routing



1. Install the clamps as shown.
2. Water Hoses
3. Air Bleeder Hose
4. Radiator Overflow Hose
5. Reserve Tank Overflow Hose
6. Coolant Reserve Tank

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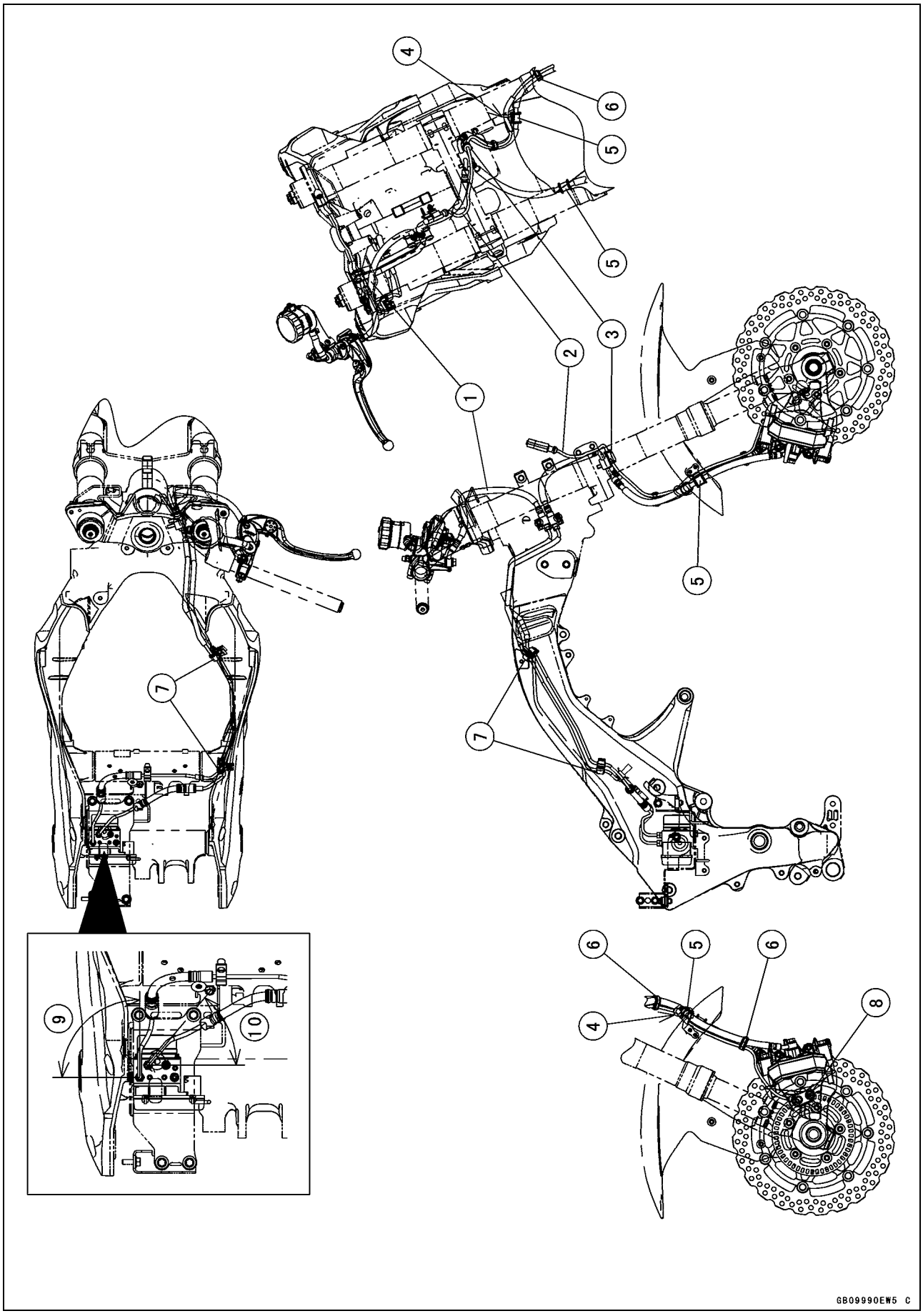
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Water Hoses
2. Install the clamps as shown.
3. Install the water hose so that the white paint mark faces upward.
4. Install the water hose so that the white paint mark faces outward.
5. Align the yellow paint mark of the water hose with the projection on the water pipe.
6. Install the water hose until the raised portion of the water pipe.
7. Install the water hose until the half of the punch mark is hidden.
8. Air Bleeder Hose
9. Install the air bleeder hose above the thermostat cover bolt.
10. Viewed from A
11. Viewed from B
12. Viewed from C
13. Install the clamp so that the tab of the clamp faces rearward.
14. Breather Hose
15. Install the breather hose so that the white paint mark faces rearward.

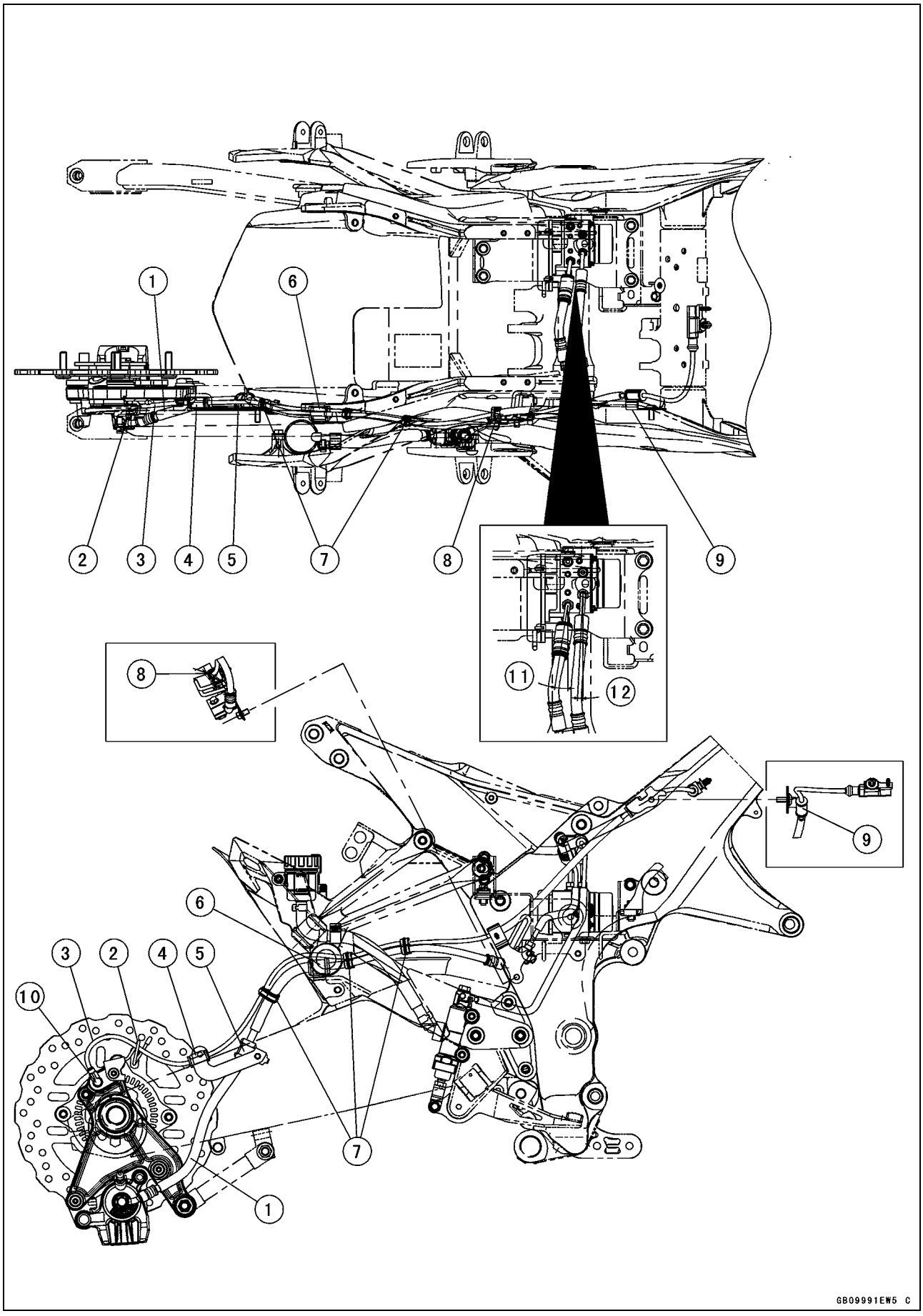
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Front Brake Hose
2. Front Wheel Rotation Sensor Lead
3. Clamp (Hold the front wheel rotation sensor lead.)
4. Clamp (Hold the front wheel rotation sensor lead.)
5. Clamps (Hold the front brake hose.)
6. Clamps (Hold the front brake hose and front wheel rotation sensor lead.)
7. Clamps (Hold the brake pipes.)
8. Front Wheel Rotation Sensor
9. About 90°
10. About 50°

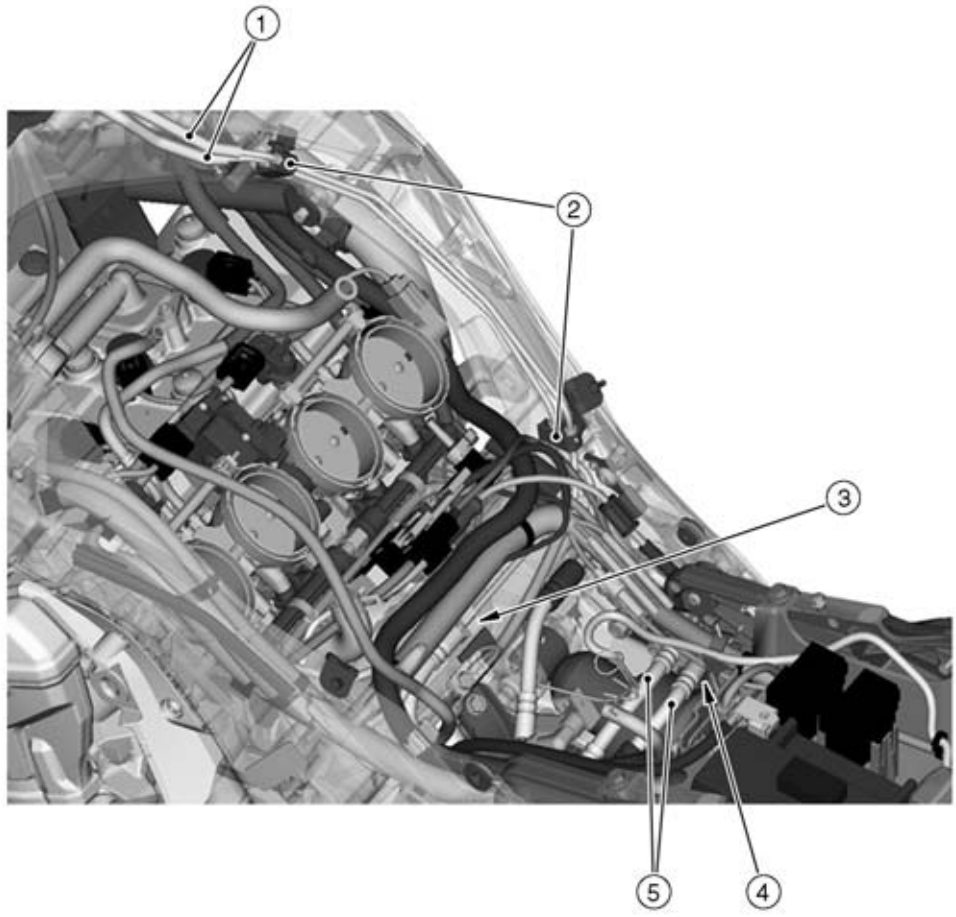
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Rear Brake Hose
2. Run the rear wheel rotation sensor lead through the clamp.
3. Rear Wheel Rotation Sensor Lead
4. Clamp (Hold the rear wheel rotation sensor lead.)
5. Clamp (Hold the rear brake hose.)
6. Clamp (Hold the rear brake hose.)
7. Clamps (Hold the rear brake hose and rear wheel rotation sensor lead.)
8. Clamp (Hold the rear wheel rotation sensor lead.)
9. Clamp (Hold the rear wheel rotation sensor lead.)
10. Rear Wheel Rotation Sensor
11. About 9°
12. About 3°

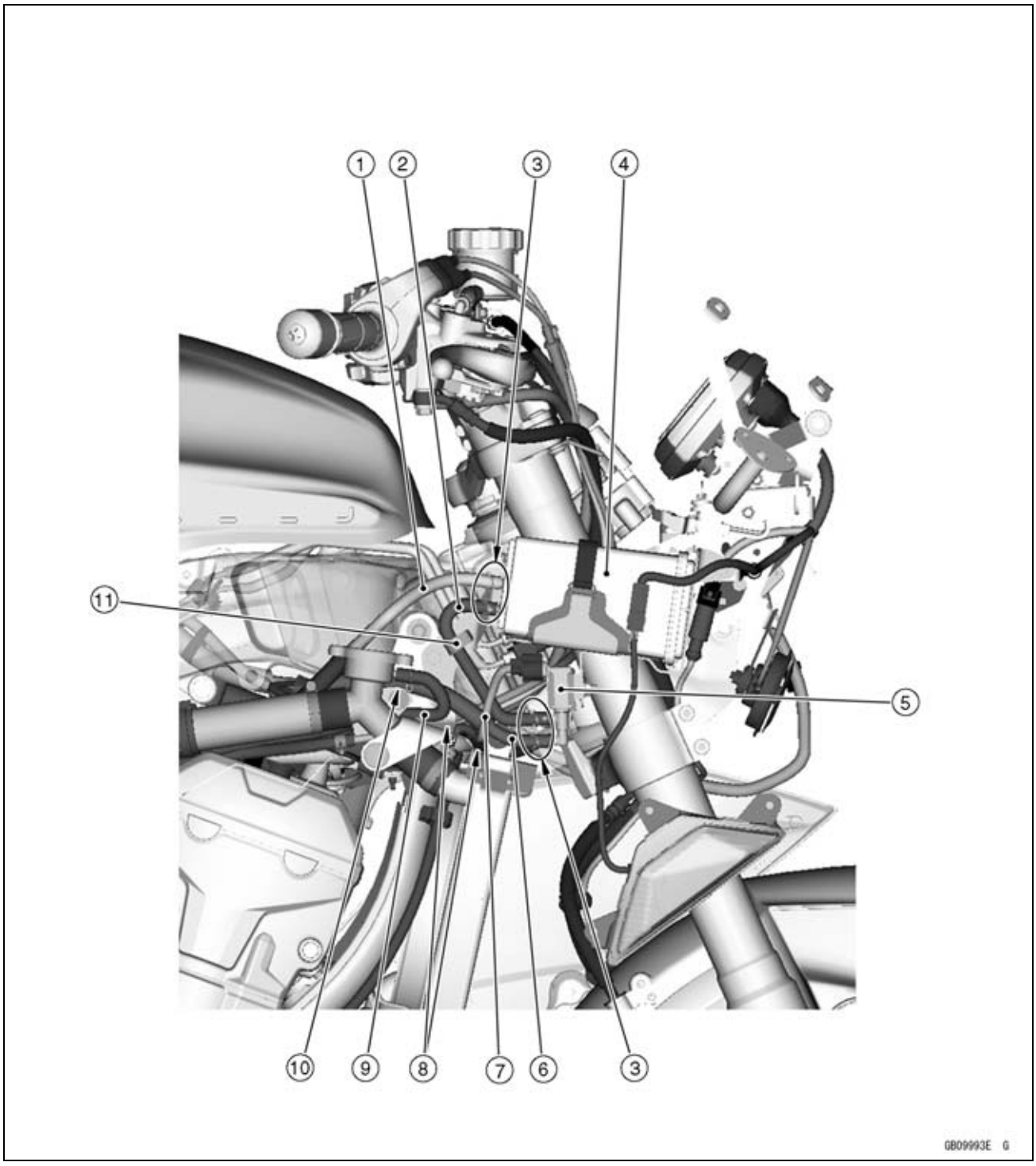
Cable, Wire, and Hose Routing



1. Brake Pipes
2. Clamp (Hold the brake pipes.)
3. Clamp (Hold the brake pipe.)
4. Run the brake hoses under the other leads.
5. Brake Hoses

Cable, Wire, and Hose Routing

Other than US and CA Models



1. Breather Hose
2. Purge Hose (to Canister)
3. Install the clamps so that their tabs face outward of the motorcycle.
4. Canister
5. Purge Valve
6. Purge Hose
7. Purge Valve Lead
8. Run the purge hose to the inside of the purge valve lead and the radiator overflow hose.
9. Radiator Overflow Hose
10. Run the purge hose above the radiator cap housing mounting bolt.
11. Clamp (Hold the purge hose (to canister).)

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 sensor 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 to stop position
- Clutch lever not pulled in or gear not in neutral
- Battery voltage low
- Immobilizer system trouble (Equipped Models)
- Spark plug dirty, broken, or gap maladjusted
- Spark plug incorrect
- Stick coil shorted or not in good contact
- Stick coil trouble
- ECU trouble
- Gear position sensor, starter lockout, or side stand 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 worm

Run-on (dieseling):
Ignition switch trouble
Engine stop switch trouble
Fuel injector trouble
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 trouble
Stick coil trouble
ECU trouble

Fuel/air mixture incorrect:
Air cleaner clogged, poorly sealed, or missing
Air cleaner housing holder loose
Water or foreign matter in fuel
Throttle body assy holder loose
Fuel to 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 worm
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

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:
Clutch slipping
Engine oil level too high
Engine oil viscosity too high
Drive train trouble
Brake dragging

Lubrication inadequate:
Engine oil level too low
Engine oil poor quality or incorrect

Oil cooler incorrect:
Oil cooler clogged

Gauge incorrect:
Water temperature gauge broken
Water temperature sensor broken

Coolant incorrect:
Coolant level too low
Coolant deteriorated
Wrong coolant mixed ratio

Cooling system component incorrect:
Radiator fin damaged
Radiator clogged
Thermostat trouble
Radiator cap trouble
Radiator fan relay trouble
Fan motor broken
Fan blade damaged
Water pump not turning
Water pump impeller damaged

Over Cooling:

Gauge incorrect:
Water temperature gauge broken
Water temperature sensor broken

Cooling system component incorrect:
Thermostat trouble

Clutch Operation Faulty:

Clutch slipping:
Friction plate worn or warped
Steel plate worn or warped
Clutch spring broken or weak
Clutch hub or housing unevenly worn
No clutch lever play
Clutch inner cable trouble
Clutch release mechanism trouble

Clutch not disengaging properly:
Clutch plate warped or too rough
Clutch spring compression uneven
Engine oil deteriorated
Engine oil viscosity too high
Engine oil level too high
Clutch housing frozen on drive shaft
Clutch hub nut loose
Clutch hub spline damaged
Clutch friction plate installed wrong
Clutch lever play excessive
Clutch release mechanism trouble

Gear Shifting Faulty:

Doesn't go into gear; shift pedal doesn't return:
Clutch not disengaging
Shift fork bent or seized
Gear stuck on the shaft
Gear positioning lever binding
Shift return spring weak or broken
Shift return spring pin loose
Shift mechanism arm spring broken
Shift mechanism arm broken
Shift pawl broken

Jumps out of gear:
Shift fork ear worn, bent
Gear groove worn
Gear dogs and/or dog holes worn
Shift drum groove worn
Gear positioning lever spring weak or broken
Shift fork guide pin worn
Drive shaft, output shaft, and/or gear splines worn

Overshifts:
Gear positioning lever spring weak or broken
Shift mechanism arm spring broken

Abnormal Engine Noise:

Knocking:
ECU trouble
Carbon built up in combustion chamber
Fuel poor quality or incorrect
Spark plug incorrect
Overheating

Piston slap:
Cylinder/piston clearance excessive
Cylinder, piston worn
Connecting rod bent
Piston pin, piston pin hole worn

Valve noise:
Valve clearance incorrect
Valve spring broken or weak
Camshaft bearing worn
Valve lifter worn

Other noise:
Connecting rod small end clearance excessive
Connecting rod big end clearance excessive
Piston ring/groove clearance excessive
Piston ring worn, broken, or stuck

Troubleshooting Guide

Piston ring groove worn
Piston seizure, damage
Cylinder head gasket leaking
Exhaust pipe leaking at cylinder head connection
Crankshaft runout excessive
Engine mount 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)
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 (LED) (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:

Handlebars 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

Handlebars shakes or excessively vibrates:
Tire worn
Swingarm pivot bearing worn
Rim warped, or not balanced
Wheel bearing worn
Handlebar holder clamp bolt loose
Steering stem nut loose
Front, rear axle runout excessive
Engine mounting bolt loose

Handlebars pulls to one side:
Frame bent
Wheel misalignment
Swingarm bent or twisted
Swingarm pivot shaft runout excessive
Steering maladjusted
Front fork bent

Troubleshooting Guide

Right and left front fork oil level uneven
Shock absorption unsatisfactory:
(Too hard)
Front fork oil excessive
Front fork oil viscosity too high
Rear shock absorber adjustment too hard
Tire air pressure too high
Front fork bent
(Too soft)
Tire air pressure too low
Front fork oil insufficient and/or leaking
Front fork oil viscosity too low
Rear shock adjustment too soft
Front fork, rear shock absorber spring weak
Rear shock absorber oil leaking

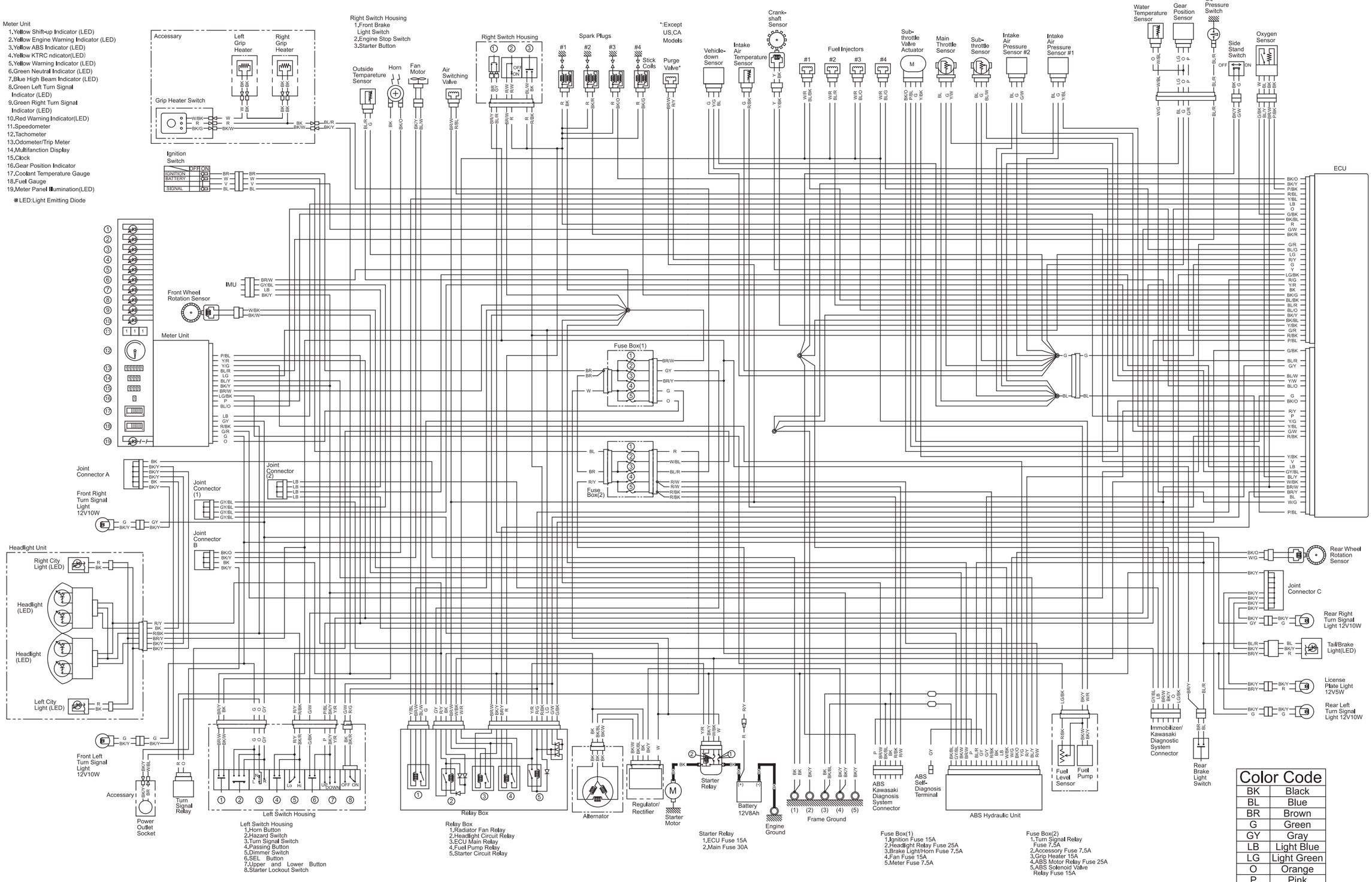
Brake Doesn't Hold:

Air in the brake line
Pad or disc worn
Brake fluid leakage
Disc warped
Contaminated pad
Brake fluid deteriorated
Primary or secondary cup damaged in master cylinder
Master cylinder scratched inside

Battery Trouble:

Battery discharged:
Charge insufficient
Battery faulty (too low terminal voltage)
Battery 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

US,CA and CAL Models



Color Code	
BK	Black
BL	Blue
BR	Brown
G	Green
GY	Gray
LB	Light Blue
LG	Light Green
O	Orange
P	Pink
PU	Purple
R	Red
V	Violet
W	White
Y	Yellow

LEFT SWITCH HOUSING CONNECTIONS

Horn Button			Hazard Switch				Turn Signal Switch				Passing Button			Dimmer Switch			Starter Lockout Switch			Multifunction Button				
Color	BR/W	BK/W	Color	G	O	GY	Color	G	O	GY	Color	R/Y	BK/R	Color	R/Y	BK/R	Color	BK	BK/R	Color	P	BK/Y	G/BK	Y/R
			OFF				L	○	○					HI	○	○	Clutch Lever			Upper	○	○		
Push	○	○	ON	○	○	○	OFF(Push)			○	Push	○	○				Released			SEL		○	○	
Released							R		○					LO			Pulled In	○	○	Lower		○	○	○

IGNITION SWITCH CONNECTIONS

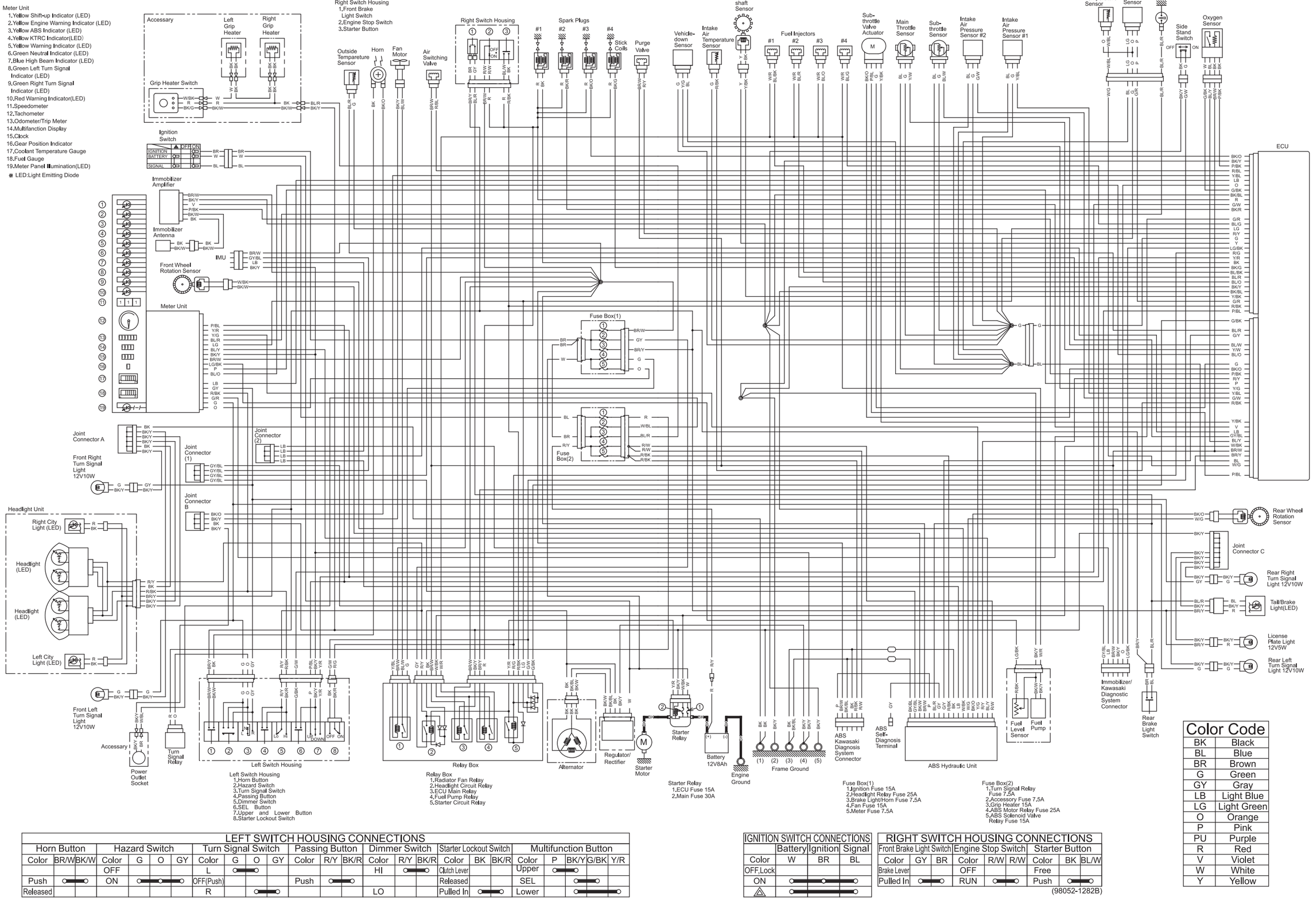
	Battery	Ignition	Signal
Color	W	BR	BL
OFF,Lock			
ON	○	○	○

RIGHT SWITCH HOUSING CONNECTIONS

Front Brake Light Switch			Engine Stop Switch			Starter Button		
Color	GY	BR	Color	R/W	R/W	Color	BK	BL/W
Brake Lever			OFF			Free		
Pulled In	○	○	RUN	○	○	Push	○	○

(98052-1283B,1284B)

Other than US,CA and CAL Models



Color Code	
BK	Black
BL	Blue
BR	Brown
G	Green
GY	Gray
LB	Light Blue
LG	Light Green
O	Orange
P	Pink
PU	Purple
R	Red
V	Violet
W	White
Y	Yellow

LEFT SWITCH HOUSING CONNECTIONS

Horn Button			Hazard Switch				Turn Signal Switch				Passing Button			Dimmer Switch			Starter Lockout Switch			Multifunction Button				
Color	BR/W	BK/W	Color	G	O	GY	Color	G	O	GY	Color	R/Y	BK/R	Color	R/Y	BK/R	Color	BK	BK/R	Color	P	BK/Y	G/BK	Y/R
			OFF				L							HI			Clutch Lever			Upper				
Push			ON				OFF(Push)				Push						Released			SEL				
Released							R							LO			Pulled In			Lower				

IGNITION SWITCH CONNECTIONS

	Battery	Ignition	Signal
Color	W	BR	BL
OFF,Lock			
ON			
△			

RIGHT SWITCH HOUSING CONNECTIONS

Front Brake Light Switch			Engine Stop Switch			Starter Button		
Color	GY	BR	Color	R/W	R/W	Color	BK	BL/W
Brake Lever			OFF			Free		
Pulled In			RUN			Push		

(98052-1282B)

Part No.99924-1519-02

MODEL APPLICATION

Year	Model	Beginning Frame No.
2017	ZX1000WH	JKAZXCW1□HA000001 JKAZXT00WWA000001
2018	ZX1000WJ	JKAZXCW1□JA007001 JKAZXT00WWA007001

□:This digit in the frame number changes from one machine to another.

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