Ninja 400

Motorcycle
Service Manual

Kawasaki

LIST OF ABBREVIATIONS

A	ampere(s)	in.	inch(es)
ABDC	after bottom dead center	km/h	kilometers per hour
ABS	anti-lock brake system	L	liter(s)
AC	alternating current	LCD	liquid crystal display
Ah	ampere hour	LED	light emitting diode
ATDC	after top dead center	lb	pound(s)
BBDC	before bottom dead center	m	meter(s)
BDC	bottom dead center	min	minute(s)
BTDC	before top dead center	mmHg	millimeters of mercury
°C	degree(s) Celsius	mph	miles per hour
cmHg	centimeters of mercury	N	newton(s)
cu in.	cubic inch(es)	oz	ounce(s)
DC	direct current	Pa	pascal(s)
DFI	digital fuel injection	PS	horsepower
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	MY	Malaysia
AU	Australia	PH	Philippines
CA	Canada	SEA-B1	Southeast Asia B1
CAL	California	SEA-B3	Southeast Asia B3
CH	Switzerland	TH	Thailand
DE	Germany	US	United States
EUR	Europe	WVTA (FULL)	WVTA Model (Full Power)

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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.

EMISSION CONTROL INFORMATION

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

1. Crankcase Emission Control System

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

2. Exhaust Emission Control System

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

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

3. Evaporative Emission Control System

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

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

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

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

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

NOTE

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

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

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

TAMPERING WITH NOISE CONTROL SYSTEM PROHIBITED

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

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

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

Foreword

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

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

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

To get the longest life out of your vehicle.

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

How to Use This Manual

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

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

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

⚠ DANGER

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

⚠ WARNING

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

NOTICE

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

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

NOTE

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

- Indicates a procedural step or work to be done.

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

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

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

General Information

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1

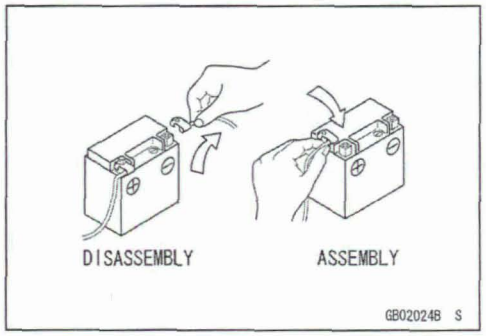
Before Servicing

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.

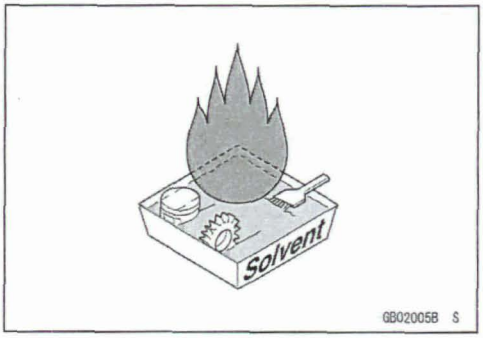


Edges of Parts

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

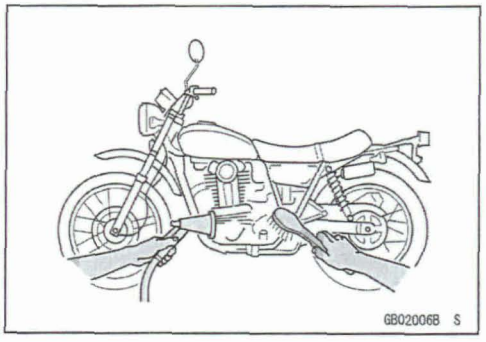
Solvent

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

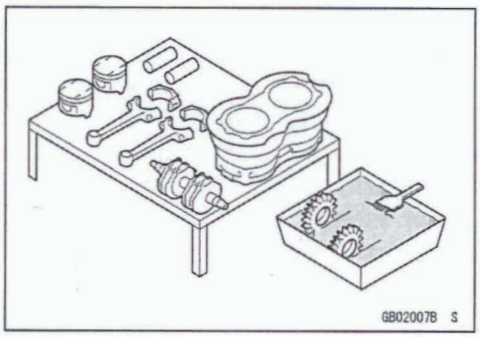
Clean the vehicle thoroughly before disassembly. Dirt or other foreign materials entering into sealed areas during vehicle disassembly can cause excessive wear and decrease performance of the vehicle.



Before Servicing

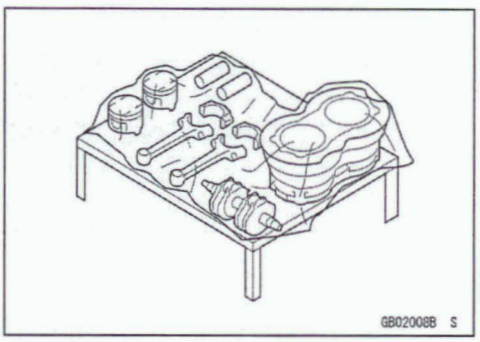
Arrangement and Cleaning of Removed Parts

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.



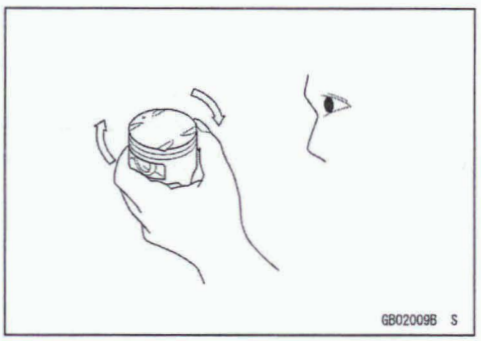
Storage of Removed Parts

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.



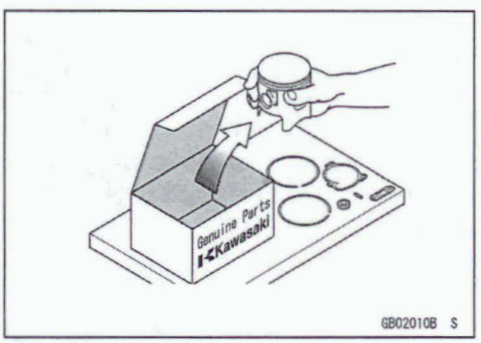
Inspection

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.



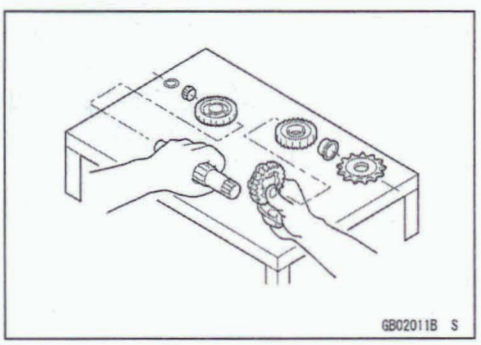
Replacement Parts

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

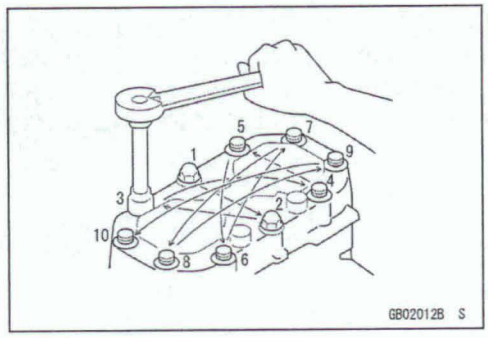
In most cases assembly order is the reverse of disassembly, however, if assembly order is provided in this Service Manual, follow the procedures given.



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.

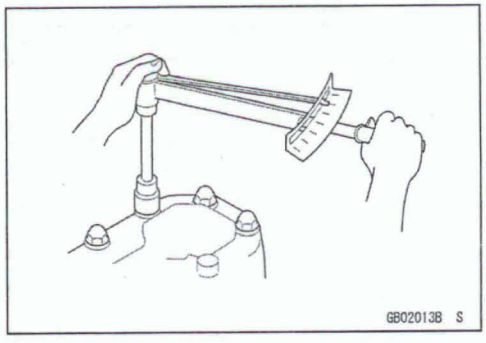


GB02012B S

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.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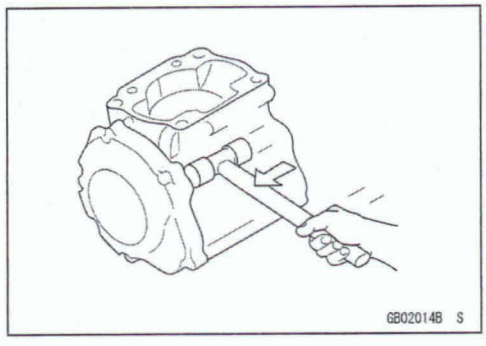
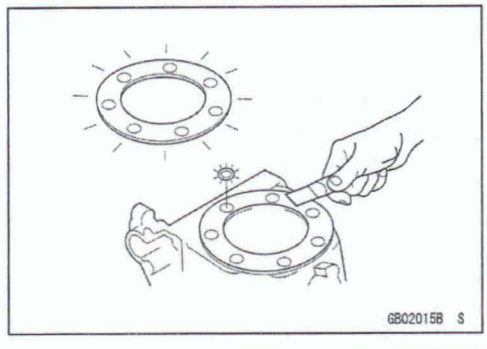
Force

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.


GB02014B S

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.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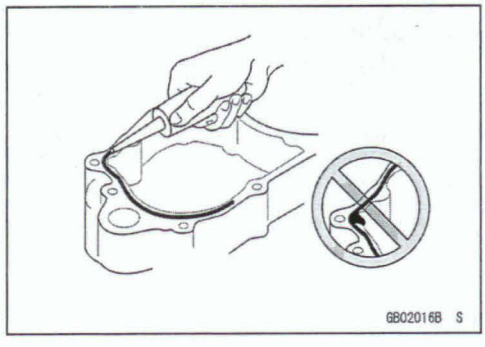
Liquid Gasket, Non-permanent Locking Agent

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.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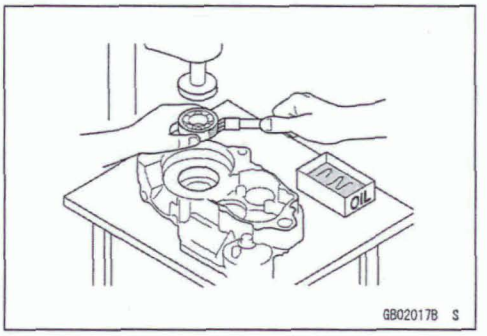
Before Servicing

Press

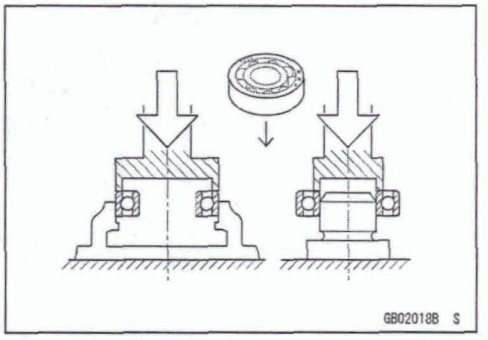
For items such as bearings or oil seals that must be pressed into place, apply small amount of oil to the contact area. Be sure to maintain proper alignment and use smooth movements when installing.



Ball Bearing and Needle Bearing

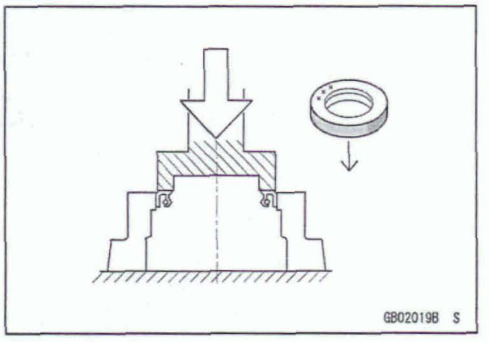
Do not remove pressed ball or needle unless removal is absolutely necessary. Replace with new ones whenever removed. Press bearings with the manufacturer and size marks facing out. Press the bearing into place by putting pressure on the correct bearing race as shown.

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

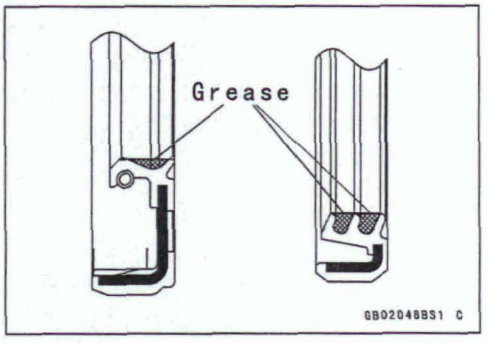


Oil Seal, Grease Seal

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.

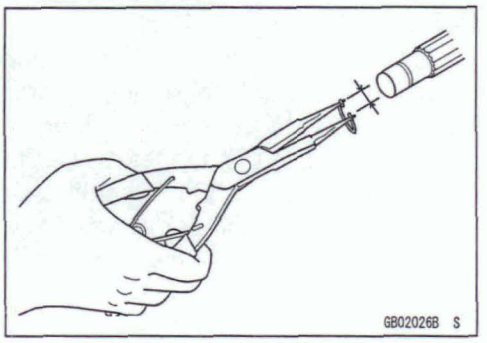


Apply specified grease to the lip of seal before installing the seal.



Circlips, Cotter Pins

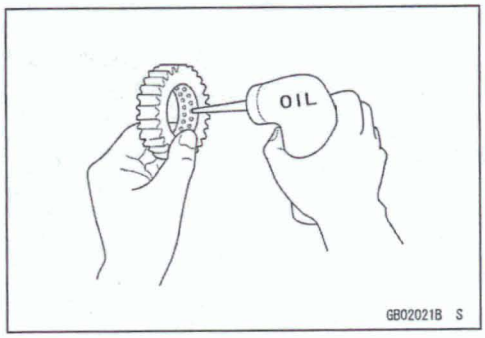
Replace the circlips or cotter pins that were removed with new ones. Take care not to open the clip excessively when installing to prevent deformation.



Before Servicing

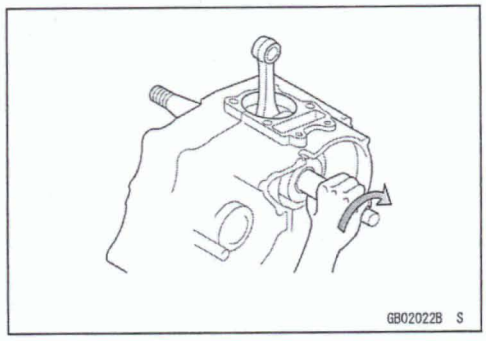
Lubrication

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.



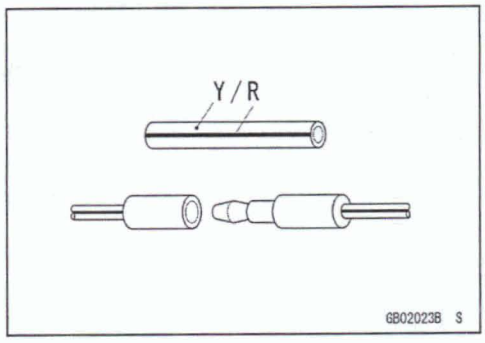
Direction of Engine Rotation

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).



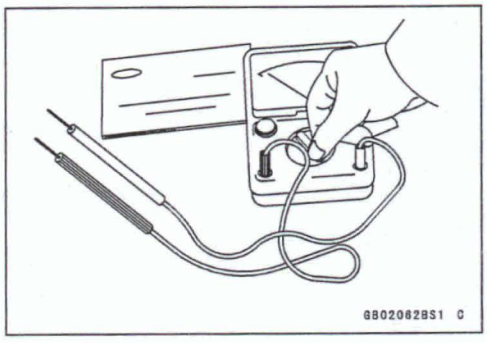
Electrical Wires

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

EX400GJ/HJ Left Side View

GB03B981 P

EX400GJ/HJ Right Side View

GB03B982 P

Model Identification

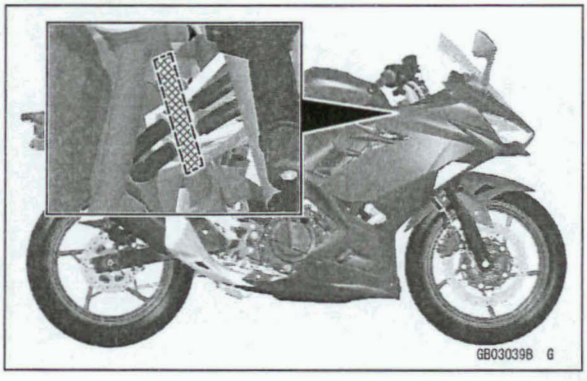
EX400JJ Left Side View

GB03B983 P

EX400JJ Right Side View

GB03B984 P

Frame Number



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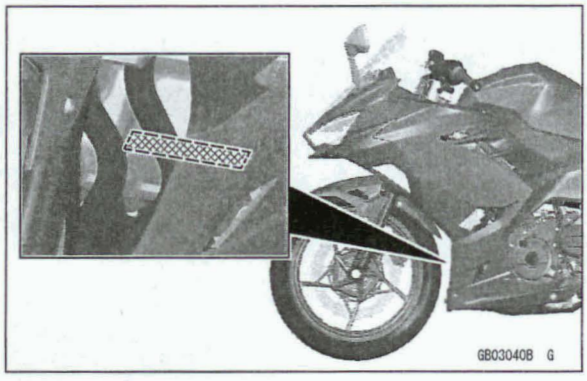
Engine Number



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General Specifications

Items	EX400GJ/HJ/JJ
Dimensions	
Overall Length	1 990 mm (78.35 in.)
Overall Width	710 mm (28.0 in.)
Overall Height:	
EX400G/H	1 120 mm (44.09 in.)
EX400J	1 150 mm (45.28 in.)
Wheelbase	1 370 mm (53.94 in.)
Road Clearance	140 mm (5.51 in.)
Seat Height	785 mm (30.9 in.)
Curb Mass:	
EX400G:	168 kg (370 lb) (US, CA) 166 kg (366 lb) (CAL, PH) 167 kg (368 lb)
Front	86 kg (190 lb) (US, CA, CAL, PH) 85 kg (187 lb)
Rear	82 kg (181 lb) (US, CA) 81 kg (179 lb)
EX400H:	164 kg (362 lb) (CAL) 165 kg (364 lb)
Front	84 kg (185 lb)
Rear	80 kg (176 lb) (CAL) 81 kg (179 lb)
EX400J:	(MY) 168 kg (370 lb) (TH) 169 kg (373 lb)
Front	86 kg (190 lb)
Rear	(MY) 82 kg (181 lb) (TH) 83 kg (183 lb)
Fuel Tank Capacity	14 L (3.7 US gal)
Performance	
Minimum Turning Radius	2.5 m (8.2 ft)
Engine	
Type	4-stroke, DOHC, 2-cylinder
Cooling System	Liquid-cooled
Bore and Stroke	70.0 × 51.8 mm (2.76 × 2.04 in.)
Displacement	399 cm^3 (24.3 cu in.)
Compression Ratio	11.5:1
Maximum Horsepower	33.4 kW (45 PS) @10 000 r/min (rpm) (MY, PH) 36.0 kW (49 PS) @10 000 r/min (rpm) (US, CA, CAL) – – –
Maximum Torque	38.0 N·m (3.9 kgf·m, 28 ft·lb) @8 000 r/min (rpm) (US, CA, CAL) – – –
Fuel System	FI (Fuel injection), MIKUNI 32EIDW × 2
Fuel Type:	
Minimum Octane Rating:	
Research Octane Number (RON)	91
Antiknock Index (RON + MON) / 2	87

General Specifications

Items	EX400GJ/HJ/JJ
Starting System	Electric starter
Ignition System	Battery and coil (transistorized)
Timing Advance	Electronically advanced (IC igniter in ECU)
Ignition Timing	10.0° BTDC @1 300 r/min (rpm) ~ 42.0° BTDC @8 400 r/min (rpm) (US, CA, CAL) 10° BTDC @1 300 r/min (rpm) ~ 40° BTDC @10 000 r/min (rpm) (MY, PH) 10.0° BTDC @1 300 r/min (rpm) ~ 40.9° BTDC @10 000 r/min (rpm) (SEA-B1/B3, TH) 10.0° BTDC @1 300 r/min (rpm) ~ 41.9° BTDC @8 400 r/min (rpm)
Spark Plug	NGK LMAR9G
Cylinder Numbering Method	Left to right, 1-2
Firing Order	1-2
Valve Timing:	
Intake:	
Open	26° (BTDC)
Close	62° (ABDC)
Duration	268°
Exhaust:	
Open	53° (BBDC)
Close	19° (ATDC)
Duration	252°
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	2.3 L (2.4 US qt)
Drive Train	
Primary Reduction System:	
Type	Gear
Reduction Ratio	2.219 (71/32)
Clutch Type	Wet multi disc
Transmission:	
Type	6-speed, constant mesh, return shift
Gear Ratios:	
1st	2.929 (41/14)
2nd	2.056 (37/18)
3rd	1.619 (34/21)
4th	1.333 (32/24)
5th	1.154 (30/26)
6th	1.037 (28/27)
Final Drive System:	
Type	Chain drive
Reduction Ratio	2.929 (41/14)

General Specifications

Items	EX400GJ/HJ/JJ
Overall Drive Ratio	6.738 @Top gear
Frame	
Type	Trellis, high-tensile steel
Caster (Rake Angle)	24.7°
Trail	92 mm (3.6 in.)
Front Tire:	
Type	Tubeless
Size	110/70R17 M/C 54H
Rim Size	17M/C × MT3.00
Rear Tire:	
Type	Tubeless
Size	150/60R17 M/C 66H
Rim Size	17M/C × MT4.00
Front Suspension:	
Type	Telescopic fork
Wheel Travel	120 mm (4.72 in.)
Rear Suspension:	
Type	Swingarm
Wheel Travel	130 mm (5.12 in.)
Brake Type:	
Front	Single disc
Rear	Single disc
Electrical Equipment	
Battery	12 V 8 Ah (10 HR)
Headlight:	
High Beam	LED
Low Beam	LED
City Light	LED
Brake/Tail Light	LED
Turn Signal Light:	
Front	12 V 10 W (RY10W)
Rear	12 V 10 W (WY10W)
License Plate Light	12 V 5 W (W5W)
Alternator:	
Type	Three-phase AC
Maximum Output	14.0 V - 21.0 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:

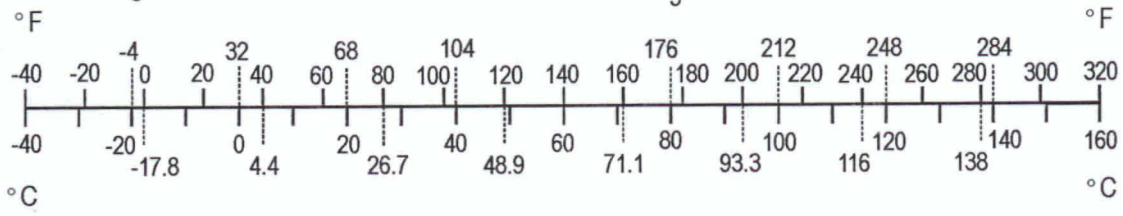
km/h	×	0.6214	=	mph

Units of Power:

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

Units of Temperature:

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



Periodic Maintenance

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Periodic Maintenance Chart

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

Periodic Inspection

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

Q: Inspection
↻: Change or Replace
🔧: Lubrication

	Items	year (*A)	Odometer Reading (*B) × 1 000 km (× 1 000 mile) 1 (0.6)	6 (3.8)	12 (7.6)	18 (11.4)	24 (15.2)	See Page
Fuel System								
○	Air cleaner element (*C)					↻		2-14
○	Idle speed		Q		Q		Q	2-15
○	Throttle control system (play, smooth return, no drag)	Q:1	Q		Q		Q	2-15
○	Engine vacuum synchronization				Q		Q	2-16
	Fuel system	Q:1	Q		Q		Q	2-19
	Fuel filter						↻	2-19
	Fuel hose	↻:5						2-22
○	Evaporative emission control system (Equipped Models)		Q	Q	Q	Q	Q	2-24
Cooling System								
	Coolant level		Q		Q		Q	2-25
	Cooling system	Q:1	Q		Q		Q	2-25
	Coolant, water hose and O-ring	↻:3	↻: every 36 000 km (22 500 mile)					2-25, 2-27
Engine Top End								
○	Valve clearance (US and CA Models)						Q	2-27
	Valve clearance (Other than US and CA Models)		Q: every 42 000 km (26 250 mile)					2-27
○	Air suction system				Q		Q	2-30
Clutch								
	Clutch operation (play, engagement, disengagement)		Q		Q		Q	2-30
Engine Lubrication System								
	Engine oil (*C) and oil filter	↻:1	↻		↻		↻	2-31, 2-32
Wheels and Tires								
	Tire air pressure	Q:1			Q		Q	2-33

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	2-33
	Wheel bearing damage	Q:1			Q		Q	2-34
Final Drive								
	Drive chain lubrication condition (*C)		Q: every 600 km (400 mile)					2-35
	Drive chain slack (*C)		Q: every 1 000 km (600 mile)					2-35
	Drive chain wear (*C)				Q		Q	2-37
	Drive chain guide wear				Q		Q	2-38
Brakes								
	Brake system	Q:1	Q		Q		Q	2-38
	Brake operation (effectiveness, play, no drag)	Q:1	Q		Q		Q	2-39
	Brake fluid level	Q:1	Q		Q		Q	2-39
	Brake fluid (front and rear)	↻:2					↻	2-40
	Brake hose	↻:4						2-42
	Rubber parts of brake master cylinder and caliper	↻:4	↻: every 48 000 km (30 000 mile)					2-44, 2-46
	Brake pad wear (*C)			Q	Q	Q	Q	2-48
	Brake light switch operation		Q	Q	Q	Q	Q	2-48
Suspension								
	Suspension system	Q:1			Q		Q	2-49
	Lubrication of rear suspension						◣	2-50
Steering								
	Steering play	Q:1	Q		Q		Q	2-51
	Steering stem bearing	◣:2					◣	2-52
Electrical System								
	Electrical system	Q:1			Q		Q	2-53
○	Spark plug				↻		↻	2-58
Others								
	Chassis parts	◣:1			◣		◣	2-58
	Condition of bolts, nuts and fasteners		Q		Q		Q	2-60

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.
Lh: Left-hand Threads
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
S: Follow the specified tightening sequence.
Si: Apply silicone grease.

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Fuel System (DFI)				
Spark Plugs	13	1.3	115 in·lb	
Air Cleaner Housing Assembly Screws	1.2	0.12	11 in·lb	
Oxygen Sensor	25	2.5	18	
Air Cleaner Housing Mounting Bolt	9.8	1.0	87 in·lb	
Air Cleaner Element Mounting Screw	1.2	0.12	11 in·lb	
Intake Air Temperature Sensor Screw	1.2	0.12	11 in·lb	
Switch Housing Screws	3.5	0.36	31 in·lb	
Air Cleaner Housing Clamp Bolts	2.0	0.20	18 in·lb	
Idle Speed Control Valve Actuator Screw	5.0	0.51	44 in·lb	R
Delivery Pipe Mounting Screws	3.5	0.36	31 in·lb	
Water Temperature Sensor	12	1.2	106 in·lb	
Fuel Tank Bolts	8.8	0.90	78 in·lb	
Oil Pressure Switch	15	1.5	11	LG
Gear Position Sensor Bolt	9.8	1.0	87 in·lb	
Fuel Pump Assembly Screws	0.98	0.10	8.7 in·lb	R
Fuel Pump Bolts	9.8	1.0	87 in·lb	L, S
Side Stand Switch Bolt	8.8	0.90	78 in·lb	L
Purge Valve Nut (Equipped Models)	6.9	0.70	61 in·lb	
Canister Bracket Bolt (L = 10 mm) (Equipped Models)	9.8	1.0	87 in·lb	
Canister Bracket Bolt (L = 20 mm) (Equipped Models)	9.8	1.0	87 in·lb	
Cooling System				
Water Temperature Sensor	12	1.2	106 in·lb	
Reserve Tank Bolts	6.9	0.70	61 in·lb	
Radiator Bolts	9.8	1.0	87 in·lb	
Radiator Fan Assy Mounting Bolts	8.4	0.86	74 in·lb	
Lower Fairing Bracket Bolts	9.8	1.0	87 in·lb	
Water Pump Impeller	9.8	1.0	87 in·lb	
Coolant Drain Bolt	7.0	0.71	62 in·lb	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Water Pump Cover Bolts	9.8	1.0	87 in·lb	
Thermostat Cover Bolts	9.8	1.0	87 in·lb	
Engine Top End				
Air Suction Valve Cover Bolts	9.8	1.0	87 in·lb	
Cylinder Head Cover Bolts	9.8	1.0	87 in·lb	
Cylinder Head Bolts (M9)	see the text	–	–	MO, S
Cylinder Head Bolts (M6)	12	1.2	106 in·lb	S
Camshaft Cap Bolts	12	1.2	106 in·lb	S
Spark Plugs	13	1.3	115 in·lb	
Cylinder Head Jacket Plugs	22	2.2	16	L
Throttle Body Assy Holder Bolts	12	1.2	106 in·lb	
Throttle Body Assy Holder Clamp Bolts	2.0	0.20	18 in·lb	
Camshaft Sprocket Bolts	20	2.0	15	L
Camshaft Chain Tensioner Cap Bolt	20	2.0	15	
Camshaft Chain Tensioner Mounting Bolts	9.8	1.0	87 in·lb	
Rear Camshaft Chain Guide Bolt	17	1.7	13	
Lower Camshaft Chain Guide Bolt	9.8	1.0	87 in·lb	
Muffler Body Mounting Bolt	25	2.5	18	
Muffler End Cover Bolts	4.4	0.45	39 in·lb	
Muffler Cover Bolt	4.4	0.45	39 in·lb	
Exhaust Pipe Holder Nuts	12	1.2	106 in·lb	S
Oxygen Sensor	25	2.5	18	
Muffler Cover Clamp Bolt	6.9	0.70	61 in·lb	
Muffler Body Clamp Bolt	10	1.0	89 in·lb	
Clutch				
Clutch Lever Pivot Bolt	5.5	0.56	49 in·lb	Si
Clutch Lever Holder Clamp Bolt	6.8	0.69	60 in·lb	
Clutch Hub Nut	132	13.5	97.4	
Clutch Stopper Bolts	10	1.0	89 in·lb	
Clutch Cover Bracket Bolts	9.8	1.0	87 in·lb	
Clutch Cover Bolts (L = 25 mm)	9.8	1.0	87 in·lb	L (1), S
Clutch Cover Bolt (L = 35 mm)	9.8	1.0	87 in·lb	S
Engine Lubrication System				
Oil Nozzles	3.0	0.31	27 in·lb	
Oil Pipe Bolt	9.8	1.0	87 in·lb	
Oil Passage Nozzle (M5)	3.0	0.31	27 in·lb	
Oil Filter	17.5	1.78	12.9	G, R
Oil Filter Pipe	35	3.6	26	L
Oil Passage Nozzle (M8)	5.0	0.51	44 in·lb	
Oil Pressure Switch	15	1.5	11	LG
Breather Plate Bolts	9.8	1.0	87 in·lb	L
Oil Passage Plugs	20	2.0	15	L
Oil Pump Cover Bolts	7.0	0.71	62 in·lb	L

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Oil Pump Driven Gear Bolt	9.8	1.0	87 in·lb	L
Oil Pressure Relief Valve	15	1.5	11	L
Engine Oil Drain Bolt	30	3.1	22	
Oil Pan Bolts	9.8	1.0	87 in·lb	S
Engine Removal/Installation				
Front Engine Mounting Bolts	44	4.5	32	S
Middle Engine Mounting Bolts	44	4.5	32	S
Frame Bracket Bolts	34	3.5	25	S
Swingarm Mounting Plate Nut	44	4.5	32	R, S
Rear Engine Mounting Bolts	44	4.5	32	S
Crankshaft/Transmission				
Connecting Rod Nuts	see the text	–	–	MO, R
Starter Motor Clutch Bolts	12	1.2	106 in·lb	L
Breather Plate Bolts	9.8	1.0	87 in·lb	L
Crankcase Bolts (M6, L = 52 mm)	11	1.1	97 in·lb	S
Crankcase Bolts (M6, L = 72 mm)	11	1.1	97 in·lb	S
Crankcase Bolts (M8, L = 80 mm)	27.5	2.80	20.3	S
Crankcase Bolts (M6, L = 30 mm)	11	1.1	97 in·lb	S
Crankcase Bolts (M6, L = 76 mm)	11	1.1	97 in·lb	S
Crankcase Bolts (M8, L = 70 mm)	see the text	–	–	MO, S
Crankcase Bolts (M9)	see the text	–	–	MO, S
Crankcase Bolts (M8, L = 40 mm)	27.5	2.80	20.3	S
Gear Positioning Lever Bolt	9.8	1.0	87 in·lb	L
Shift Drum Bearing Holder Bolts	9.8	1.0	87 in·lb	L
Shift Shaft Return Spring Pin	29	3.0	21	L
Shift Drum Cam Bolt	12	1.2	106 in·lb	L
Shift Lever Clamp Bolt	12	1.2	106 in·lb	
Tie-Rod Locknut (Front)	7.0	0.71	62 in·lb	Lh
Tie-Rod Locknut (Rear)	7.0	0.71	62 in·lb	
Shift Pedal Mounting Bolt	25	2.5	18	G
Wheels/Tires				
Front Axle Nut	98	10	72	
Rear Axle Nut	98	10	72	
Final Drive				
Engine Sprocket Cover Bolts	9.8	1.0	87 in·lb	
Engine Sprocket Nut	127	13.0	93.7	MO
Rear Sprocket Nuts	59	6.0	44	R, S
Brakes				
Brake Hose Banjo Bolts	25	2.5	18	
Front Brake Reservoir Cap Screws	1.5	0.15	13 in·lb	
Brake Lever Pivot Bolt	5.9	0.60	52 in·lb	Si
Brake Lever Pivot Bolt Locknut	5.9	0.60	52 in·lb	
Front Master Cylinder Clamp Bolts	8.8	0.90	78 in·lb	S

Torque and Locking Agent

The table below, relating tightening torque to thread diameter, lists the basic torque for the bolts and nuts. Use this table for only the bolts and nuts which do not require a specific torque value. All of the values are for use with dry solvent-cleaned threads.

Basic Torque for General Fasteners

Threads Diameter (mm)	Torque		
	N·m	kgf·m	ft·lb
5	3.4 ~ 4.9	0.35 ~ 0.50	30 ~ 43 in·lb
6	5.9 ~ 7.8	0.60 ~ 0.80	52 ~ 69 in·lb
8	14 ~ 19	1.4 ~ 1.9	10.0 ~ 13.5
10	25 ~ 34	2.6 ~ 3.5	19.0 ~ 25
12	44 ~ 61	4.5 ~ 6.2	33 ~ 45
14	73 ~ 98	7.4 ~ 10.0	54 ~ 72
16	115 ~ 155	11.5 ~ 16.0	83 ~ 115
18	165 ~ 225	17.0 ~ 23.0	125 ~ 165
20	225 ~ 325	23.0 ~ 33.0	165 ~ 240

Specifications

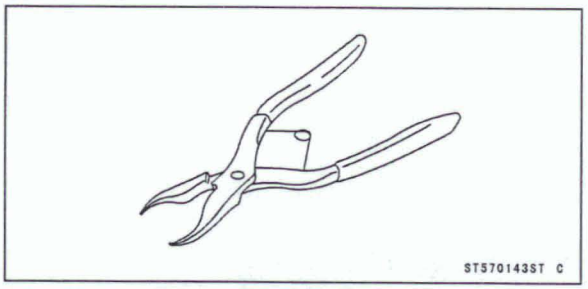
Item	Standard	Service Limit
Fuel System (DFI)		
Throttle Grip Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	– – –
Idle Speed	1 300 ±50 r/min (rpm)	– – –
Throttle Body Vacuum	36.0 ±1.33 kPa (270 ±10 mmHg) at idle speed	– – –
Bypass Screws (Turn Out)	– – –	– – –
Air Cleaner Element	Viscous paper element	– – –
Cooling 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	1.3 L (1.4 US qt)	– – –
Engine Top End		
Valve Clearance:		
Exhaust	0.25 ~ 0.31 mm (0.0098 ~ 0.0122 in.)	– – –
Intake	0.13 ~ 0.19 mm (0.0051 ~ 0.0075 in.)	– – –
Clutch		
Clutch Lever Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	– – –
Engine Lubrication System		
Engine Oil:		
Type	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2	– – –
Viscosity	SAE 10W-40	– – –
Capacity	1.6 L (1.7 US qt) (When filter is not removed.)	– – –
	2.0 L (2.1 US qt) (When filter is removed.)	– – –
	2.3 L (2.4 US qt) (When engine is completely dry.)	– – –
Level	Between upper and lower level lines (Wait several minutes after idling or running)	– – –
Wheels/Tires		
Tire Tread Depth:		
Front	4.0 mm (0.16 in.)	1 mm (0.04 in.) (AT, CH, DE) 1.6 mm (0.06 in.)
Rear	6.0 mm (0.24 in.)	Up to 130 km/h (80 mph): 2 mm (0.08 in.) Over 130 km/h (80 mph): 3 mm (0.12 in.)
Air Pressure (when cold):		
Front	Up to 180 kg (397 lb) load: 200 kPa (2.00 kgf/cm², 28 psi)	– – –
Rear	Up to 180 kg (397 lb) load: 225 kPa (2.25 kgf/cm², 32 psi)	– – –

Specifications

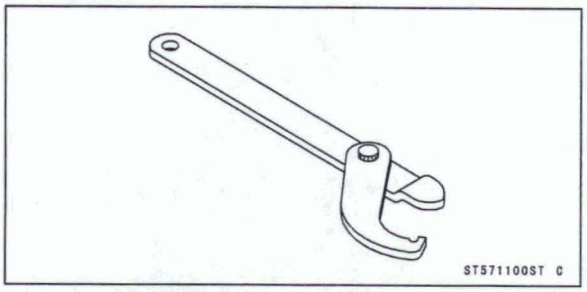
Item	Standard	Service Limit
Final Drive		
Drive Chain Slack	20 ~ 30 mm (0.8 ~ 1.2 in.)	– – –
Drive Chain 20-link Length	317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)	319 mm (12.6 in.)
Standard Chain:		
Make	ENUMA	– – –
Type	EK520SRO2	– – –
	EK520LVO3(when shipping)	– – –
Link	106 links	– – –
Brakes		
Brake Fluid:		
Grade:		
Front	DOT3 or DOT4	– – –
Rear	DOT4	– – –
Brake Pad Lining Thickness:		
Front	4.5 mm (0.18 in.)	1.0 mm (0.04 in.)
Rear	4.5 mm (0.18 in.)	1.5 mm (0.06 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 LMAR9G	– – –
Gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)	– – –

Special Tools

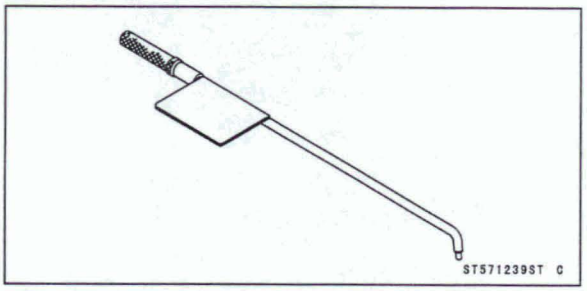
Inside Circlip Pliers:
57001-143



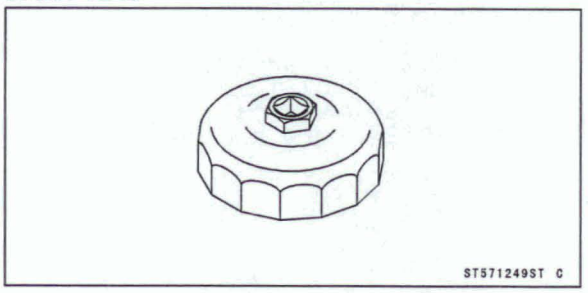
Steering Stem Nut Wrench:
57001-1100



Pilot Screw Adjuster, A:
57001-1239



Oil Filter Wrench:
57001-1249



Vacuum Gauge:
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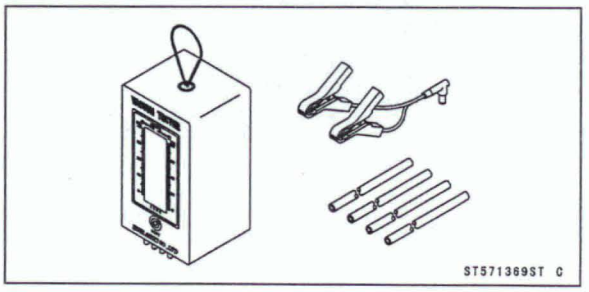

Filler Cap Driver:
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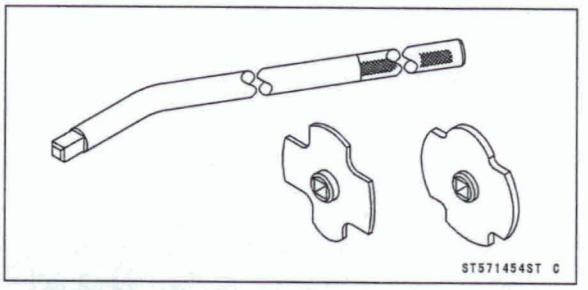
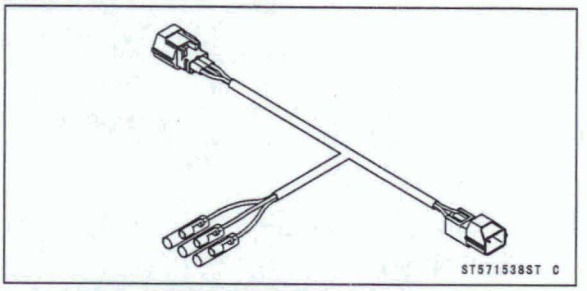
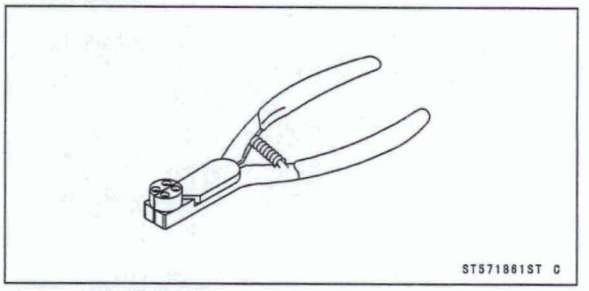


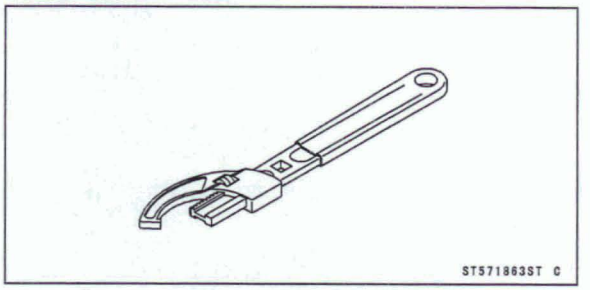
Throttle Sensor Setting Adapter:
57001-1538



Brake Caliper Piston Pliers (ϕ16 ~ ϕ26):
57001-1861



Adjustable Hook Wrench:
57001-1863



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.*

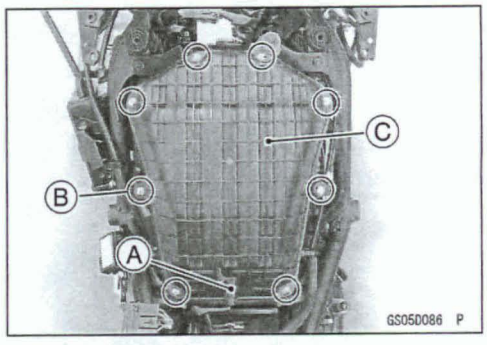
⚠ WARNING

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.

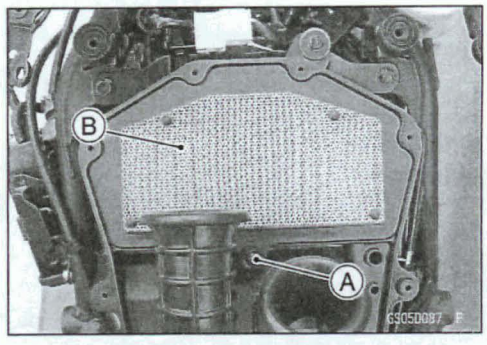
NOTICE

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)
- Disconnect the intake air temperature sensor connector [A].
- Remove:
  Air Cleaner Housing Assembly Screws [B]
  Upper Air Cleaner Housing [C]



- Remove the air cleaner element mounting screw [A].
- Discard the air cleaner element [B].



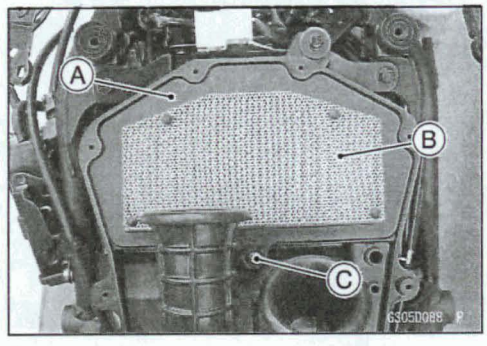
- Install a new element [A] so that the screen side [B] faces upward.
- Tighten:

  Torque - Air Cleaner Element Mounting Screw [C]: 1.2 N·m (0.12 kgf·m, 11 in·lb)

- Install:
  Upper Air Cleaner Housing
- Tighten:

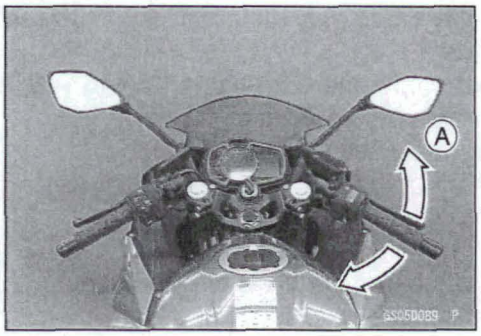
  Torque - Air Cleaner Housing Assembly Screws: 1.2 N·m (0.12 kgf·m, 11 in·lb)

- Connect the intake air temperature sensor connector.
- 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.

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

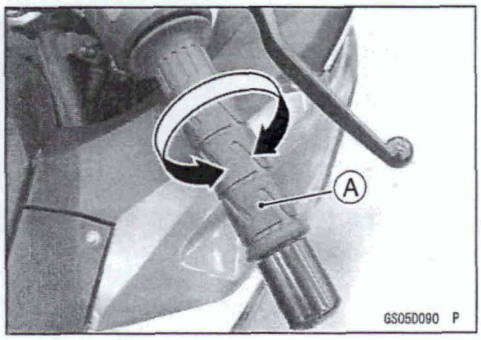
★If the idle speed is out of specified range, check the idle speed control valve actuator (see Idle Speed Control Valve Actuator Resistance Inspection in the Fuel System (DFI) chapter).

Idle Speed Adjustment

NOTE

○*This motorcycle is equipped with the idle speed control valve actuator. The idle speed is adjusted automatically at the specified value (1 300 ±50 r/min (rpm)) by the idle speed control valve system. Therefore, it is not necessary to adjust the idle speed normally.*

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.

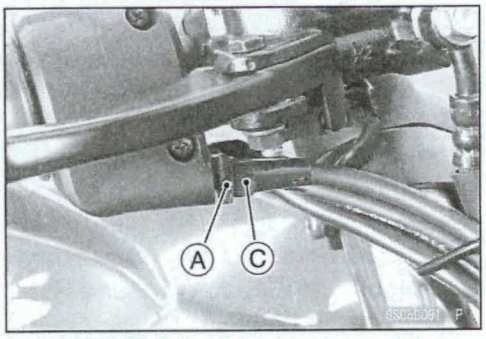
- Check the throttle grip free play.

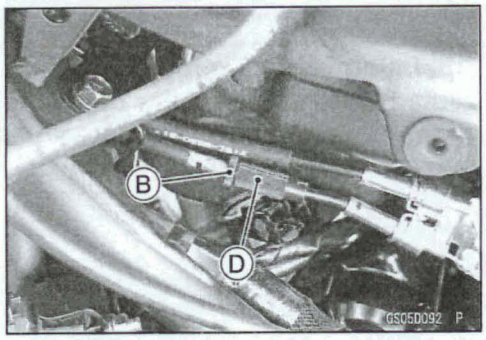
Throttle Grip Free Play
Standard: 2 ~ 3 mm (0.08 ~ 0.12 in.)

Periodic Maintenance Procedures

★If the free play incorrect, adjust the throttle cable as follows.
- Remove the left middle fairing (see Middle Fairing Removal in the Frame chapter).
- 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 [D] until it has no play when the throttle grip is completely closed.
- Tighten the locknut [B].
- Turn the accelerator cable adjuster [C] until 2 ~ 3 mm (0.08 ~ 0.12 in.) of throttle grip play is obtained.
- Tighten the locknut [A].

★If the free play can not be adjusted with the adjusters, replace the cable.
- Install the removed parts (see appropriate chapters).





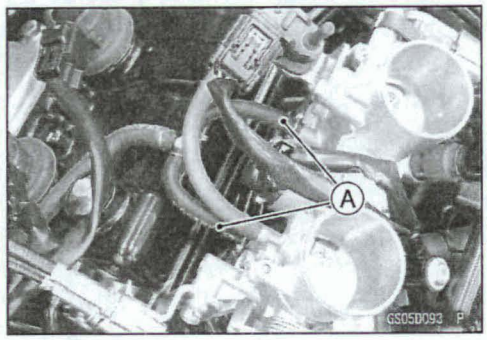
Engine Vacuum Synchronization Inspection

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:
  Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter)
- Pull off the rubber caps or vacuum hoses [A] from the fittings of each throttle body.

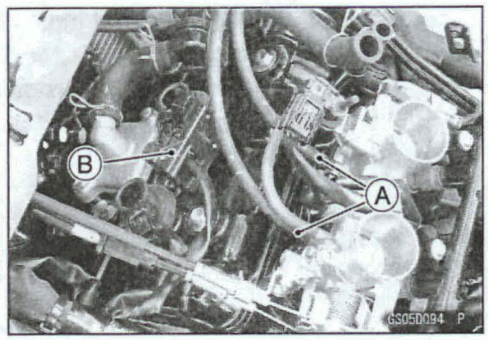
○The evaporative emission control system equipped models are equipped the vacuum hoses.



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

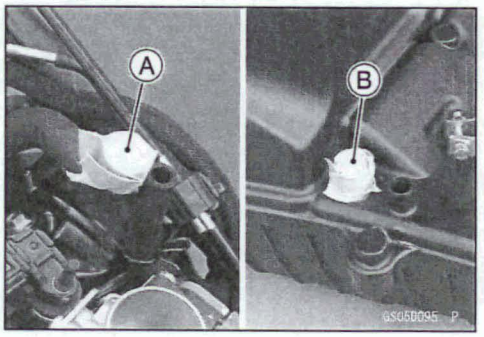
Special Tool - Vacuum Gauge: 57001-1369

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



Periodic Maintenance Procedures

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



- Install:
  Air Cleaner Housing (see Air Cleaner Housing Installation in the Fuel System (DFI) chapter)
  Fuel Tank (see Fuel Tank Installation in the Fuel System (DFI) chapter)
- Start the engine and warm it up thoroughly.
- Check the idle speed, using a highly accurate tachometer.

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

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.

Throttle Body Vacuum
Standard: 36.0 ±1.33 kPa (270 ±10 mmHg) at idle speed

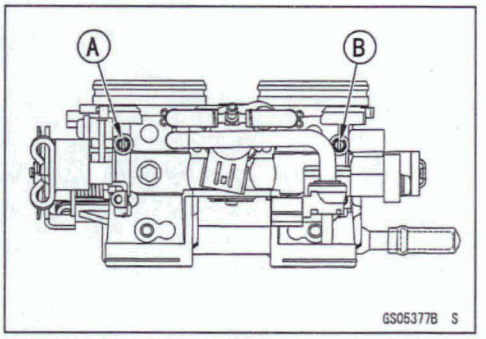
★If any vacuum is not within specifications, adjust the bypass screws #1 [A] and #2 [B].

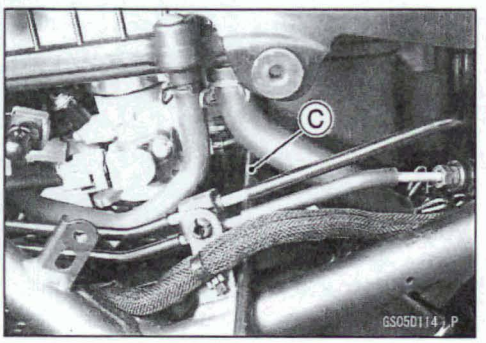
Special Tool - Pilot Screw Adjuster, A [C]: 57001-1239

- Adjust the each vacuum (#1, #2) to the standard value.
- Open and close the throttle valves after each measurement.
- Check the vacuums as before.

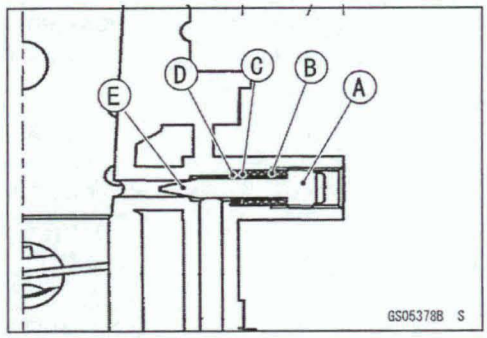
★If all vacuums are within the specification range, finish the engine vacuum synchronization.

★If any vacuum can not be adjusted within the specification, replace the bypass screws #1 and #2 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 screw.
- Repeat the synchronization.

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

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538

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

Standard: DC 1.00 ~ 1.02 V at idle throttle opening

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

- Remove the vacuum gauge hoses and install the rubber caps or vacuum hoses to the original position.

○The evaporative emission control system equipped models are equipped the vacuum hoses.

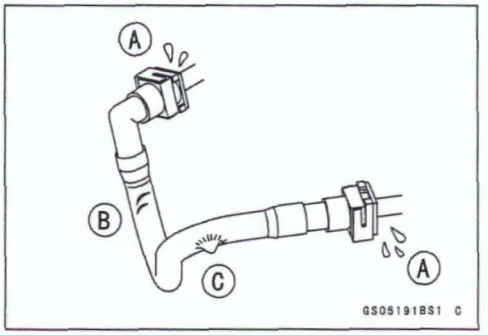
○Run the vacuum hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.

- Install the removed parts (see appropriate chapters).

Periodic Maintenance Procedures

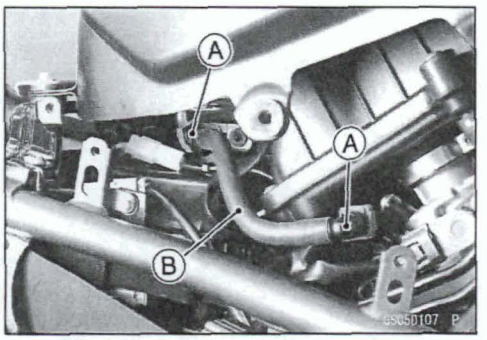
Fuel System Inspection

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 right middle fairing (see Middle Fairing Removal in the Frame chapter) and check the fuel hose.

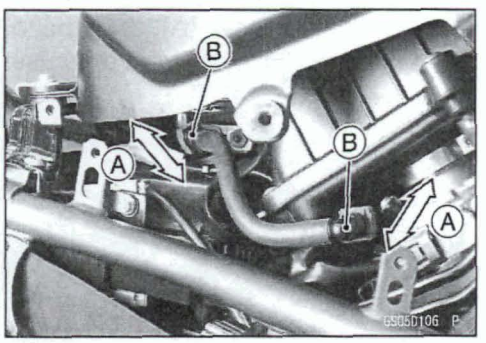
★Replace the fuel hose if any fraying, cracks [B] or bulges [C] are noticed.



• Check that the 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 and does not come off.

⚠ WARNING

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

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

Fuel Filter Replacement

⚠ WARNING

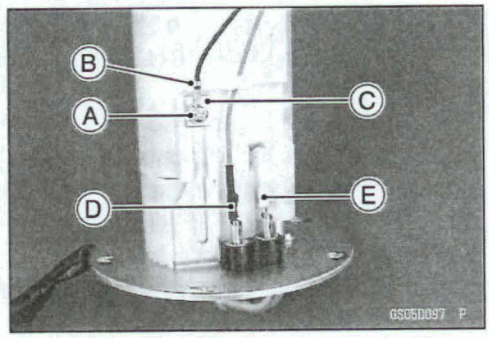
Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Disconnect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

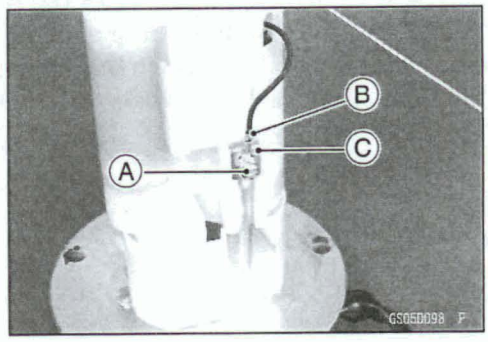
Never drop the fuel pump especially on a hard surface. Such a shock to the pump can damage it.

Periodic Maintenance Procedures

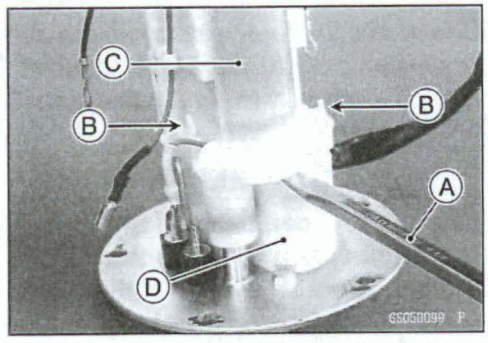
- Remove:
  Fuel Pump (see Fuel Pump Removal in the Fuel System (DFI) chapter)
  Fuel Pump Assy Screw [A]
  Lead Terminal [B]
  Plate Nut [C]
- Disconnect:
  Lead Terminal (Red) [D]
  Lead Terminal (Light Blue) [E]



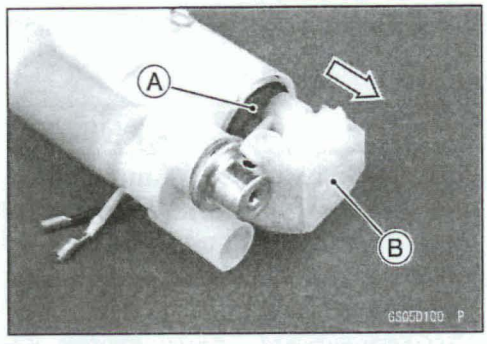
- Remove:
  Fuel Pump Assy Screw [A]
  Lead Terminal [B]
  Plate Nut [C]



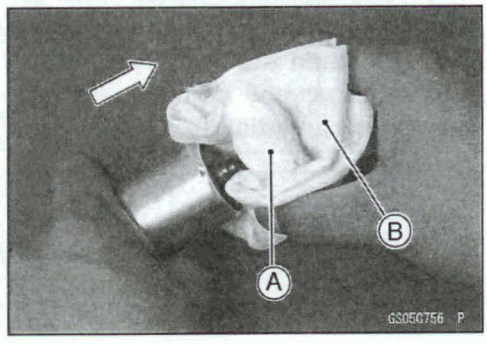
- Using the flat tip driver [A], clear the tabs [B], and remove the fuel pump fitting [C] from the case [D].



- Remove the fuel pump body [A] with fuel filter [B] from the fitting.

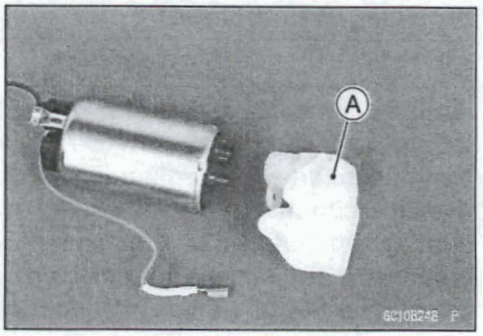


- Wrap the fuel filter [A] with the clean cloth [B], and remove the fuel filter.



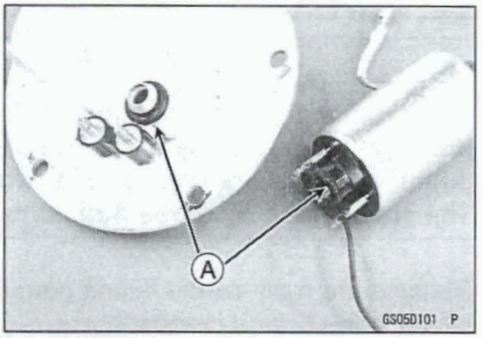
Periodic Maintenance Procedures

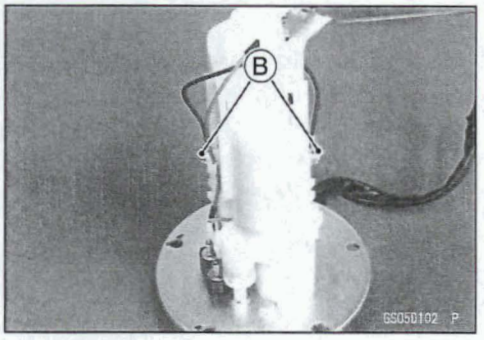
- Replace the fuel filter [A] with a new one.



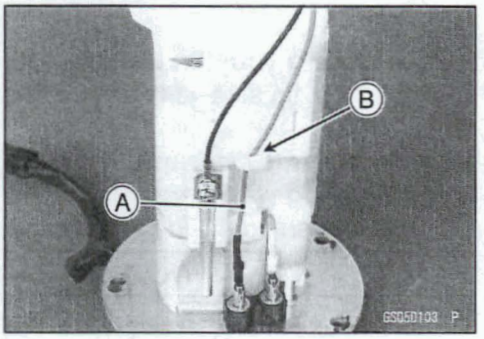
- Replace the following parts with new ones and install the removed parts in the reverse procedure.
  O-rings [A]
  Fuel Pump Assy Screws [B]
- Tighten:

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





- Run the lead [A] into the guide [B].



Periodic Maintenance Procedures

Fuel Hose Replacement

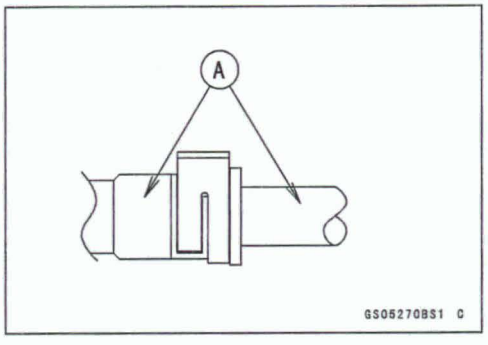
⚠ WARNING

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.

NOTICE

When removing and installing the fuel hose joint, do not apply strong force to the outlet pipe on the fuel pump and delivery pipe on the throttle body assy. The pipes made from resin could be damaged.

- Remove the right middle fairing (see Middle Fairing Removal in the Frame chapter).
- Be sure to place a piece of cloth around the fuel hose joint.
- Wipe off the dirt of the surface [A] around the connection using a cloth or a soft brush.

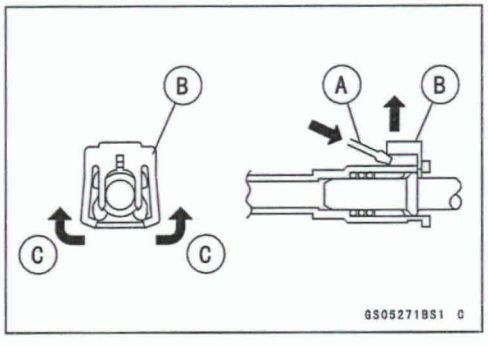


When removing with flat tip screwdriver

- 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.

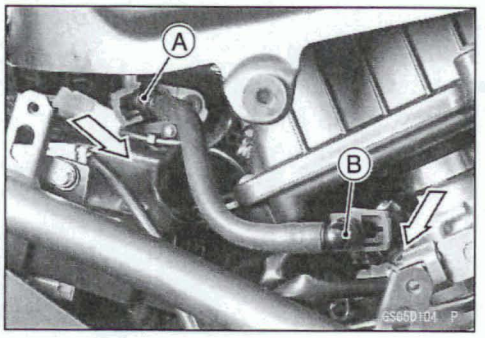


NOTICE

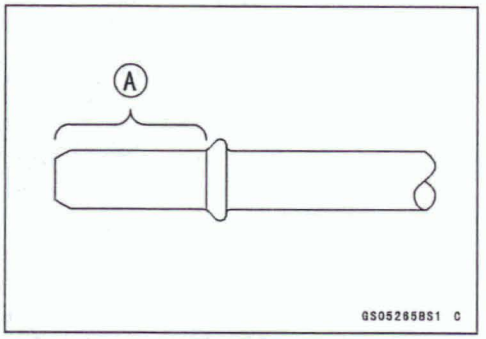
Prying or excessively widening the joint lock ends for fuel hose removal will permanently deform the joint lock, resulting in a loose or incomplete lock that may allow fuel to leak and create the potential for a fire explosion. To prevent fire or explosion from a damaged joint lock, do not pry or excessively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

Periodic Maintenance Procedures

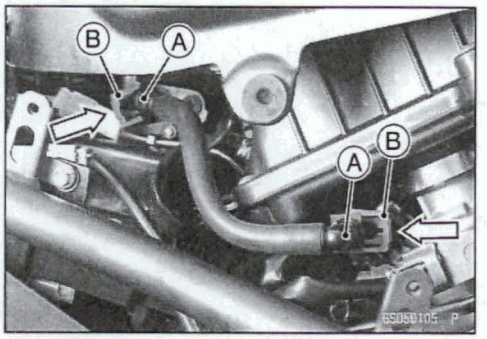
- Pull the fuel hose joint [A] out of the outlet pipe.
- Pull the fuel hose joint [B] out of the delivery pipe.



- Clean the outlet pipe and delivery pipe.
- Cover the outlet pipe and delivery pipe with the vinyl bags to keep them clean.
- Remove the vinyl bags on the pipe.
- Check that there are no flaws, burrs, and adhesion of foreign materials on the pipe [A].
- Replace the fuel hose with a new one.



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



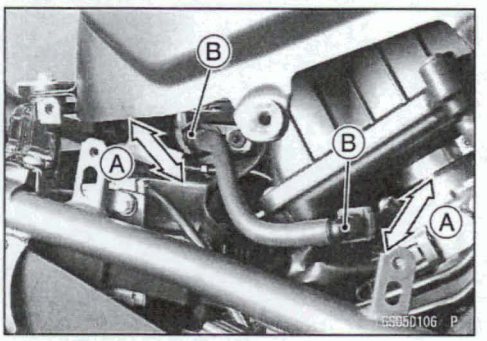
- Push and pull [A] the fuel hose joint [B] back and forth more than two times, and make sure it is locked and does not come off.

⚠ WARNING

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

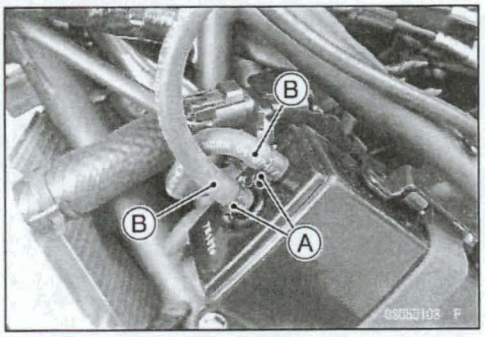
★If it comes off, reinstall the hose joint.

- Start the engine and check the fuel hose for leaks.



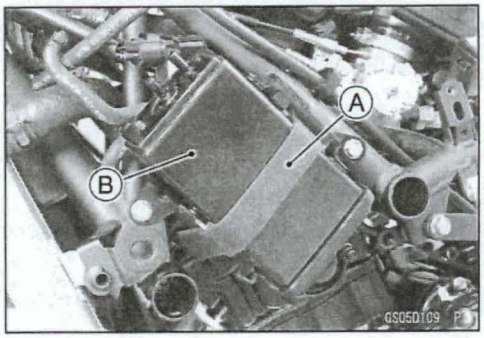
Periodic Maintenance Procedures

Evaporative Emission Control System Inspection (Equipped Models)



- Inspect the canister as follows.

○Remove the left middle fairing (see Middle Fairing Removal in the Frame chapter).
○Slide the clamps [A].
○Disconnect the hoses [B].



○Remove:
Band [A]
Canister [B]
○Visually inspect the canister for cracks or other damage.
★If the canister has any cracks or bad damage, replace it with a new one.

NOTE

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

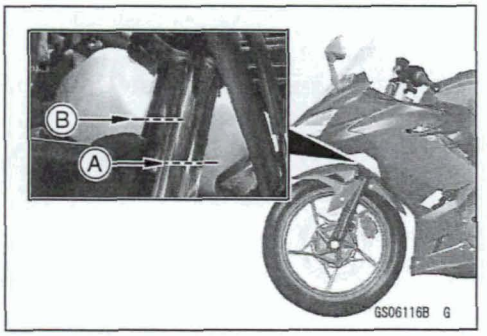
- Inspect the purge valve (see Purge Valve Inspection in the Fuel System (DFI) chapter).

○Check that the hoses are securely connected and clamps are in position.
○Replace any kinked, deteriorated or damaged hoses.
○Run the hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.
○When installing the hoses, avoid sharp bending, kinking, flattening or twisting, and run the hoses with a minimum of bending so that the emission flow will not be obstructed.

Periodic Maintenance Procedures

Cooling System

Coolant Level Inspection



NOTE

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

- Check the coolant level in the reserve tank with the motorcycle held perpendicular (Do not use the sidestand.).

★If the coolant level is lower than the "L" level line [A], unscrew the reserve tank cap and add coolant to the "F" level line [B].

"L": low

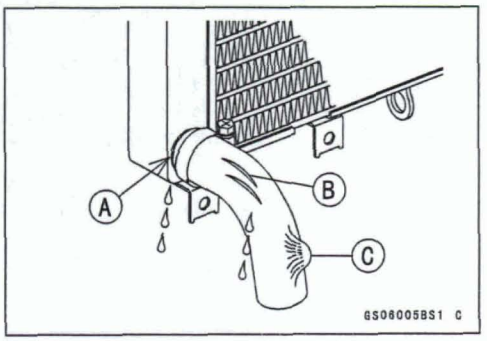
"F": full

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 reserve tank has run completely dry, there is probably leakage in the cooling system. Check the system for leaks.
Coolant ruins painted surfaces. Immediately wash away any coolant that spills on the frame, engine, wheels or other painted parts.

Cooling System Inspection

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



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

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

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

- Check that the hoses are securely connected.

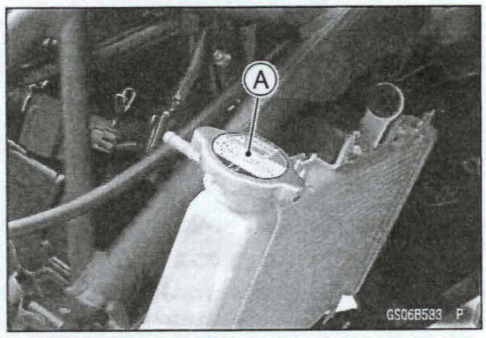
Coolant Change

⚠ WARNING

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

Periodic Maintenance Procedures

- Remove:
  Right Middle Fairing (see Middle Fairing Removal in the Frame chapter)
  Coolant Reserve Tank (see Coolant Reserve Tank Removal in the Cooling System chapter)
  Radiator Cap [A]

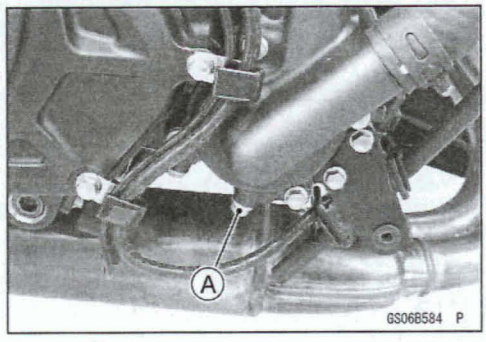


- Place a container under the coolant drain bolt [A], then remove the drain bolt.

○The coolant will drain from the radiator and engine.

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

Torque - Coolant Drain Bolt: 7.0 N·m (0.71 kgf·m, 62 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)

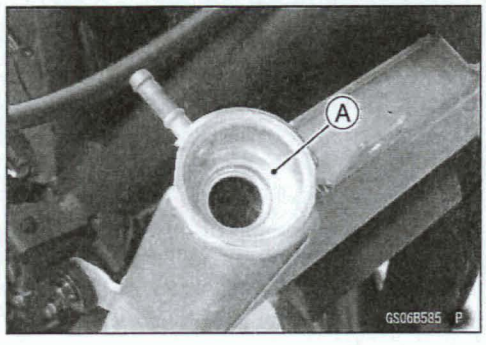
Soft Water:	**50%**
Coolant:	**50%**
Freezing Point:	**–35°C (–31°F)**
Total Amount:	**1.3 L (1.4 US qt)**

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

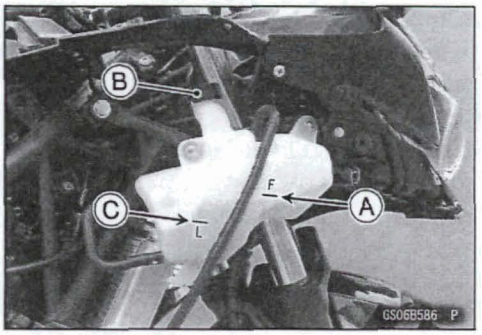
NOTE

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

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



Periodic Maintenance Procedures



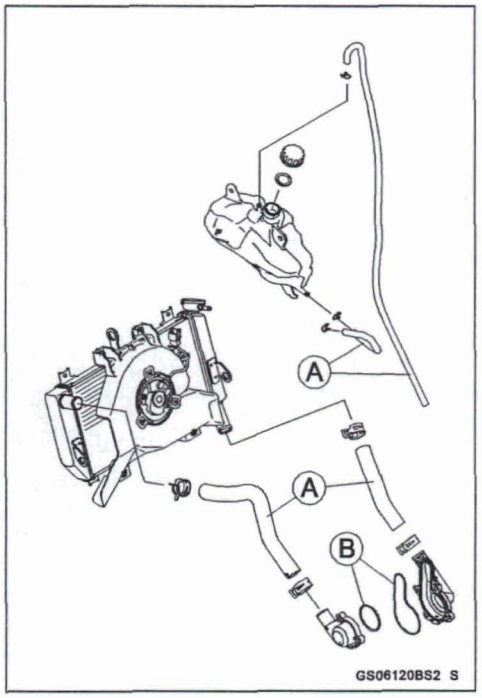
- Install the coolant reserve tank (see Coolant Reserve Tank Installation in the Cooling System chapter).
- Fill the reserve tank up to the "F" (full) level line [A] with coolant and install the cap [B].
- Install the radiator cap.
- Start the engine, warm it up thoroughly until the radiator fan turns 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.

Water Hose and O-ring Replacement

- Drain the coolant (see Coolant Change).
- Remove:
  Thermostat Housing (see Thermostat Housing Removal in the Cooling System chapter)
  Water Pump Cover (see Water Pump Cover Removal in the Cooling System chapter)
  Water Hoses [A]
- Apply grease to the new O-rings [B] and install them.
- Run the new hoses according to the Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).
- Fill the coolant (see Coolant Change).
- Check the cooling system for leaks.



Engine Top End

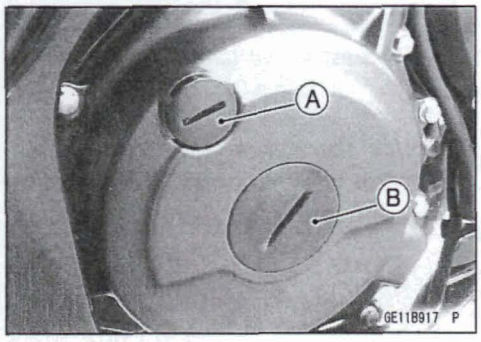
Valve Clearance Inspection

NOTE

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

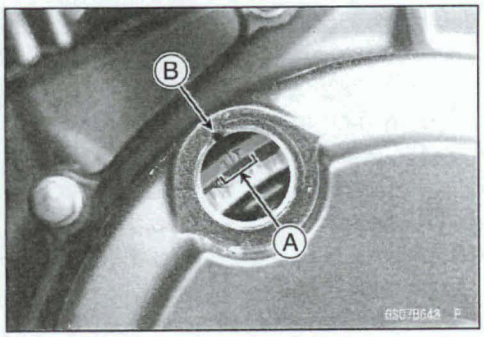
- Remove:
  Cylinder Head Cover (see Cylinder Head Cover Removal in the Engine Top End chapter)
  Plugs [A] [B]

Special Tool - Filler Cap Driver: 57001-1454

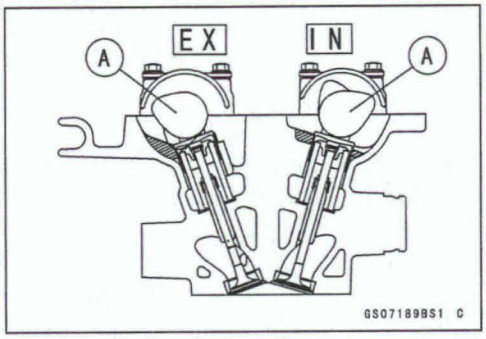


Periodic Maintenance Procedures

• Check the valve clearance when the pistons are at TDC.
○The pistons are numbered beginning with the engine left side.
• Using a wrench on the alternator rotor bolt, turn the crankshaft counterclockwise until the "1T" mark [A] on the alternator rotor is aligned with the groove [B] in the inspection window on the alternator cover.

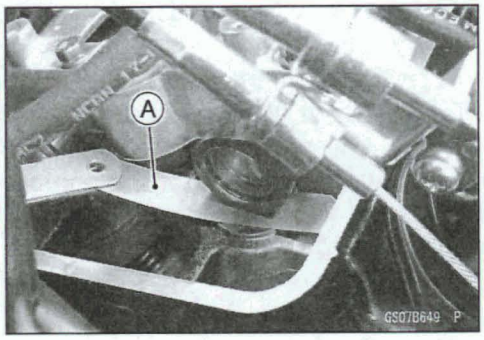


○Measure the valve clearance of the valves for which the cam [A] are turned away from each other.



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

Valve Clearance
Standard:
Exhaust 0.25 ~ 0.31 mm (0.0098 ~ 0.0122 in.)
Intake 0.13 ~ 0.19 mm (0.0051 ~ 0.0075 in.)



○Each piston has two intake and two exhaust valves. Measure these two intake or exhaust valves at the same crankshaft position.

Valve Clearance Measuring Position
#1 Piston TDC at End of Compression Stroke:
Intake Valve Clearances of #1 Piston
Exhaust Valve Clearances of #1 Piston

NOTE

○*Check the valve clearance using this method only. Checking the clearance at any other cam position may result in improper valve clearance.*

Valve Clearance Measuring Position
#2 Piston TDC at End of Compression Stroke:
Intake Valve Clearances of #2 Piston
Exhaust Valve Clearances of #2 Piston

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

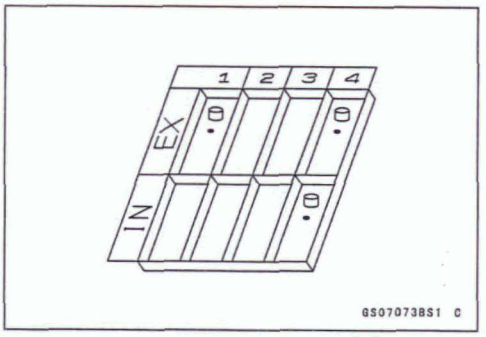
Periodic Maintenance Procedures

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.*



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

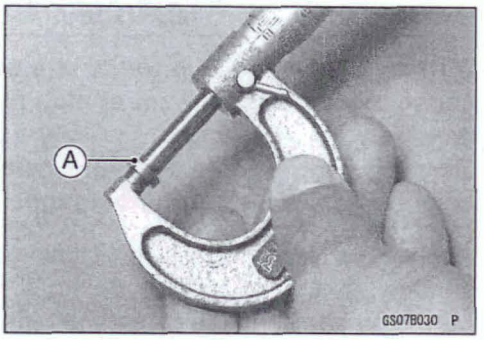
  a + b – c = d

  [a] Present Shim Thickness

  [b] Measured Valve Clearance

  [c] Specified Valve Clearance (Mean Value = 0.28 mm (Exhaust), 0.16 mm (Intake))

  [d] Replace Shim Thickness



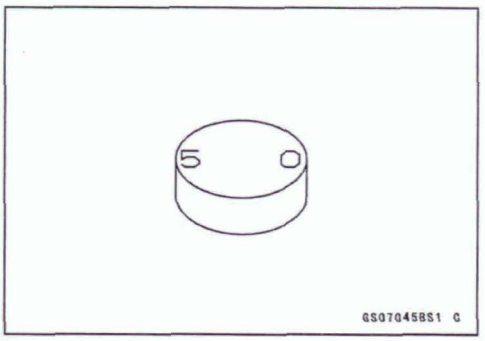
Example (Intake):

2.90 + 0.41 – 0.16 = 3.15 mm

○Exchange the shim for the 3.15 size shim.

Adjustment Shims

Thickness	Part Number	Mark
2.50	92180-1014	50
2.55	92180-1016	55
2.60	92180-1018	60
2.65	92180-1020	65
2.70	92180-1022	70
2.75	92180-1024	75
2.80	92180-1026	80
2.85	92180-1028	85
2.90	92180-1030	90
2.95	92180-1032	95
3.00	92180-1034	00
3.05	92180-1036	05
3.10	92180-1038	10
3.15	92180-1040	15
3.20	92180-1042	20
3.25	92180-1044	25
3.30	92180-1046	30
3.35	92180-1048	35
3.40	92180-1050	40
3.45	92180-1052	45
3.50	92180-1054	50



Periodic Maintenance Procedures

NOTICE

Be sure to remeasure the clearance after selecting a shim. 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 to keep the shim in place during camshaft installation.

NOTICE

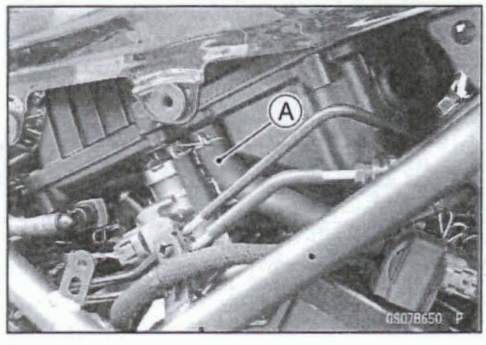
Do not put shim stock under the shim. This may cause the shim to pop out at high rpm, causing extensive engine damage.
Do not grind the shim. This may cause it to fracture, causing extensive engine damage.

- Apply molybdenum disulfide oil solution to the valve lifter surface and install the lifter.
- Install the camshaft (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 Middle Fairing (see Middle Fairing Removal in the Frame chapter)
- Disconnect the air switching valve hose [A] from the air cleaner housing.
- Start the engine and run it at idle speed.
- Plug the air switching valve hose end with your finger and feel vacuum pulsing in the hose.

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



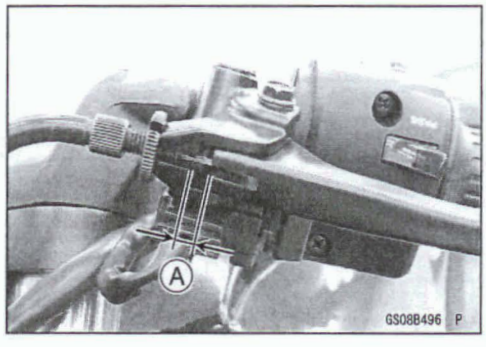
Clutch

Clutch Operation Inspection

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

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

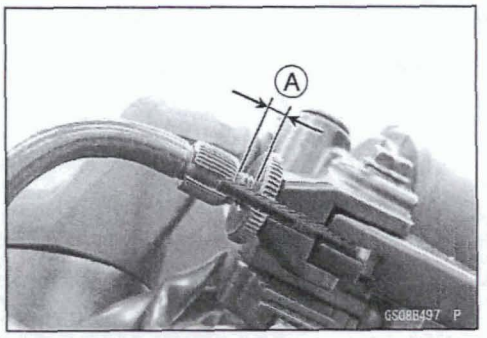
Clutch Lever Free Play
Standard: 2 ~ 3 mm (0.08 ~ 0.12 in.)



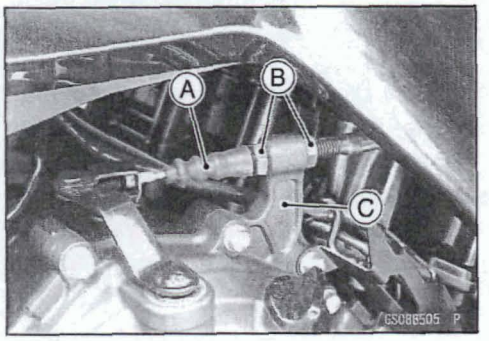
Periodic Maintenance Procedures

⚠ WARNING

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



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



- 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 tight and tighten the adjusting nuts against the clutch cover [C].
- Slip the dust cover back onto place.
- Turn the adjuster at the clutch lever until the free play is correct.

⚠ WARNING

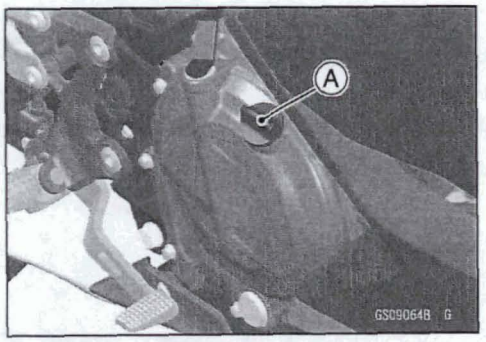
Too much cable play can prevent clutch disengagement and cause an accident resulting in serious injury or death. When adjusting the clutch or replacing the cable, be sure the upper end of the clutch outer cable is fully seated in its fitting, or it could slip into place later, creating enough cable play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

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

Engine Lubrication System

Engine Oil Change

- Situate the motorcycle so that it is vertical after warming up the engine.
- Unscrew the oil filler plug [A].

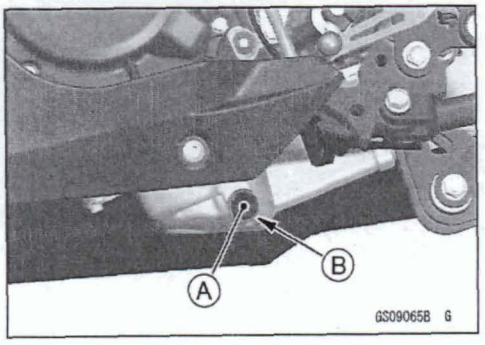


- Place the oil pan beneath the engine.
- Remove the engine oil drain bolt [A] to drain the oil.

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

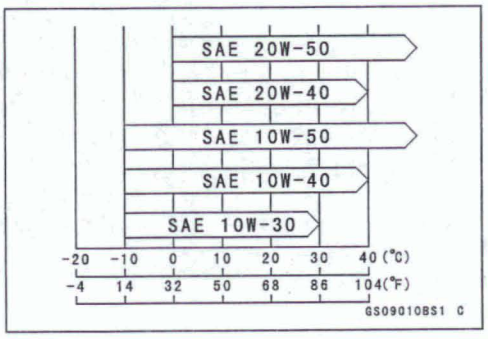
- Replace the drain bolt gasket [B] with a new one.
- Tighten:

Torque - Engine Oil Drain Bolt: 30 N·m (3.1 kgf·m, 22 ft·lb)



Periodic Maintenance Procedures

- Pour in the specified type and amount of oil.



Recommended Engine Oil

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

Viscosity: **SAE 10W-40**

Capacity: **1.6 L (1.7 US qt) (When filter is not removed.)**

2.0 L (2.1 US qt) (When filter is removed.)

2.3 L (2.4 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.*

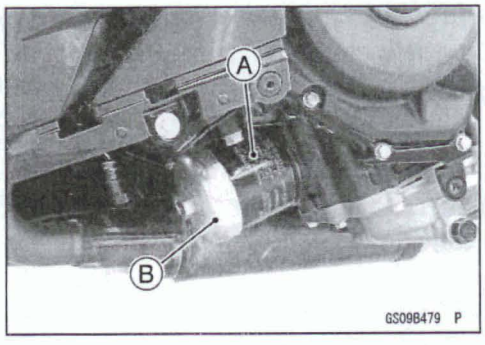
○*Although 10W-40 engine oil is the recommended oil for most conditions, the oil viscosity may need to be changed to accommodate atmospheric conditions in your riding area.*

- Check the oil level (see Oil Level Inspection in the Engine Lubrication System chapter).
- Install the removed parts (see appropriate chapters).

Oil Filter Replacement

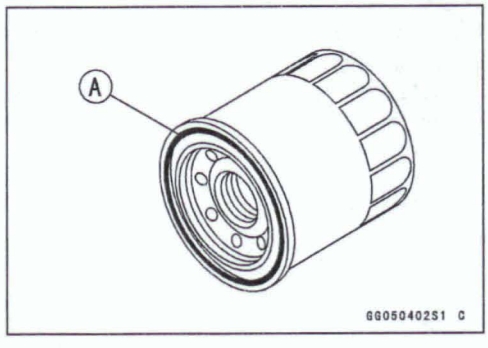
- Drain the engine oil (see Engine Oil Change).
- Remove:
  Left Lower Fairing (see Lower Fairing Removal in the Frame chapter)
- Remove the oil filter [A] with the oil filter wrench [B].

Special Tool - Oil Filter Wrench: 57001-1249



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

Torque - Oil Filter: 17.5 N·m (1.78 kgf·m, 12.9 ft·lb)



NOTE

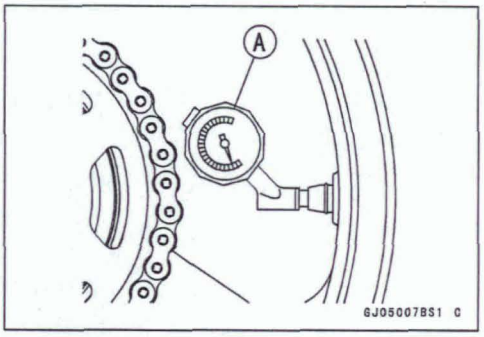
○*Hand tightening of the oil filter can not be allowed since it does not reach to this tightening torque.*

- Pour in the specified type and amount of oil (see Engine Oil Change).
- Install the removed parts (see appropriate chapters).

Periodic Maintenance Procedures

Wheels/Tires

Air Pressure Inspection



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

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

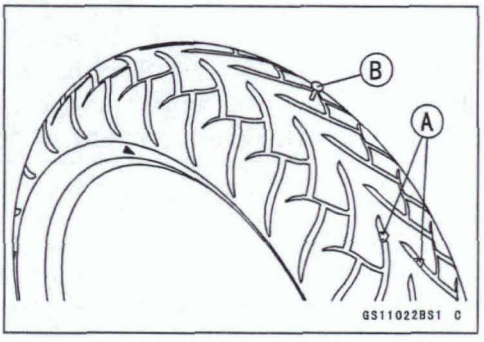
Air Pressure (when Cold)

Front:	**200 kPa (2.00 kgf/cm², 28 psi)**
Rear:	**225 kPa (2.25 kgf/cm², 32 psi)**

- Install the air valve cap.

Wheels and Tires Inspection

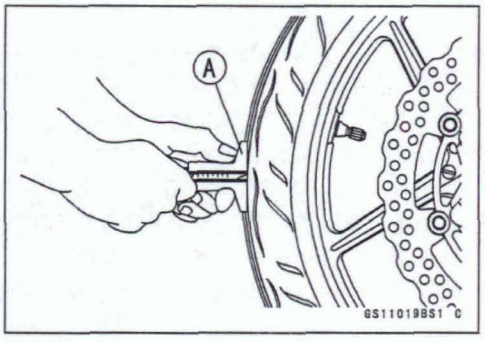
Wheel/Tire Damage Inspection



- 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.

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).

Periodic Maintenance Procedures

Tread Depth	
Standard:	
Front	**4.0 mm (0.16 in.)**
Rear	**6.0 mm (0.24 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

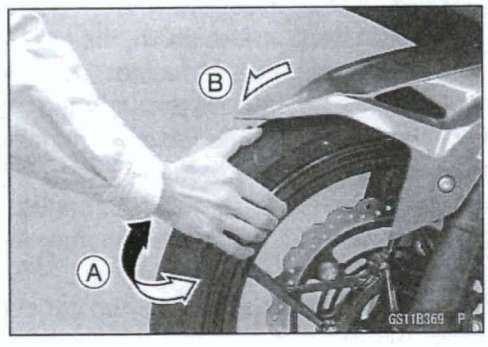
○*Most countries may have their own regulations a minimum tire tread depth: be sure to follow them.*

○*Check and balance the wheel when a tire is replaced with a new one.*

Wheel Bearing Damage Inspection

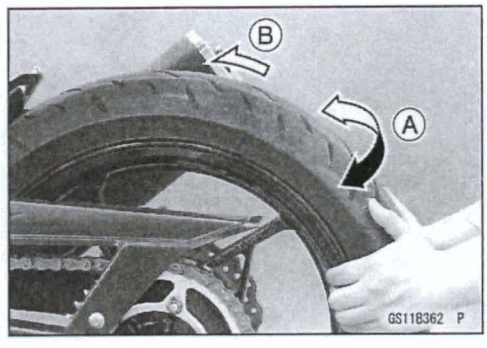
- Raise the front wheel off the ground with a suitable stand.
- Turn the handlebar all the way to the right or left.
- Inspect the roughness of the front wheel bearing by pushing and pulling [A] the wheel.
- Spin [B] the front wheel lightly, and check for smoothly turn, roughness, binding or noise.

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



- Raise the rear wheel off the ground with a suitable stand.
- 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).



Periodic Maintenance Procedures

Final Drive

Drive Chain Lubrication Condition Inspection

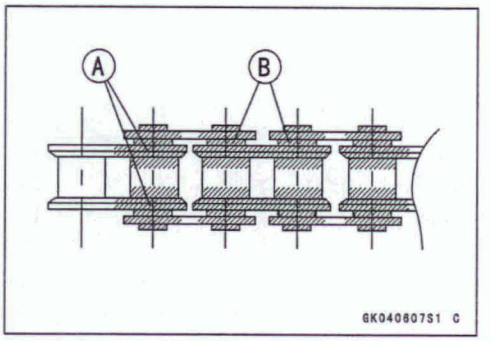
Lubrication is necessary after riding through rain or on wet roads, or any time that the chain appears dry.

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 kerosene or diesel oil for cleaning of the O-ring of the drive chain. Any other cleaning solution such as gasoline will cause deterioration and swelling of the O-ring. Immediately blow the chain dry with compressed air after cleaning. Complete cleaning and drying the chain within 10 minutes.

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



Drive Chain Slack Inspection

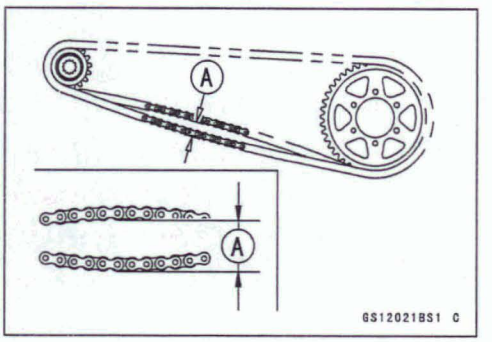
NOTE

○*Check the slack with the motorcycle setting on its sidestand.*
○*Clean the chain if it is dirty, and lubricate it if it appears dry.*

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

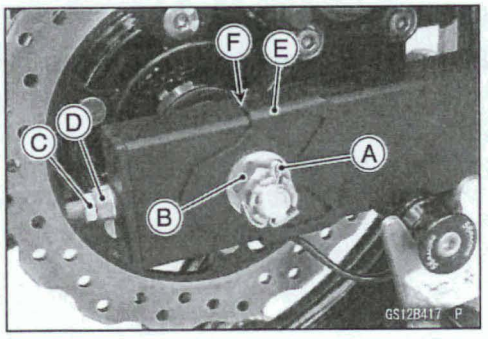
★If the chain slack exceeds the standard, adjust it.

Chain Slack
Standard: 20 ~ 30 mm (0.8 ~ 1.2 in.)



Periodic Maintenance Procedures

Drive Chain Slack Adjustment



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

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

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

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

⚠ WARNING

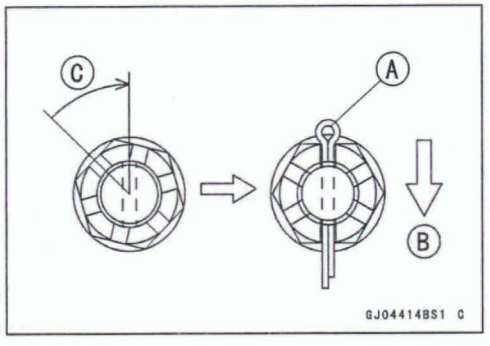
Misalignment of the wheel will result in abnormal wear and may result in an unsafe riding condition. Be sure the wheel is properly aligned.

- Tighten both chain adjuster locknuts securely.
- Tighten:

Torque - Rear Axle Nut: 98 N·m (10 kgf·m, 72 ft·lb)

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

- Insert a new cotter pin [A] downward [B].



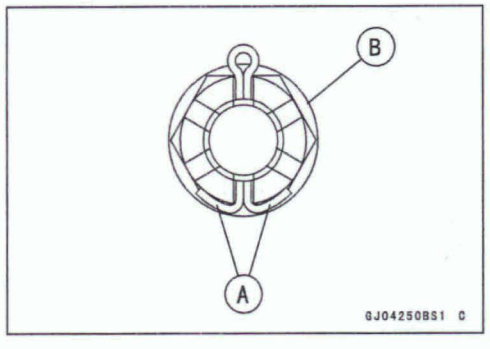
NOTE

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

○It should be within 30 degrees.

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

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

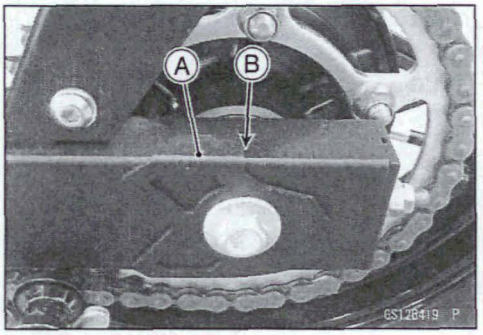


⚠ WARNING

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

Periodic Maintenance Procedures

Wheel Alignment Inspection



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

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

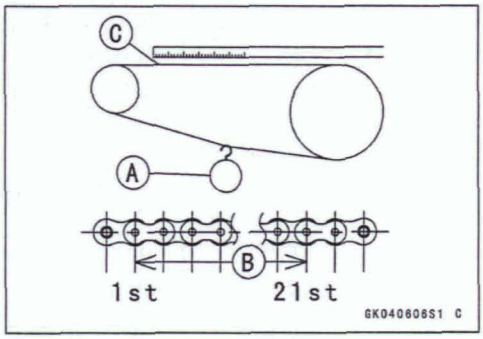
NOTE

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

⚠ WARNING

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

Drive Chain Wear Inspection



- Remove the mud guard (see Mud Guard Removal in the Frame chapter).
- Rotate the rear wheel to inspect the drive chain for damaged rollers, and loose pins and links.

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

★Lubricate the drive chain if it appears dry.

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

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

Drive Chain 20-link Length

Standard:	**317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)**
Service Limit:	**319 mm (12.6 in.)**

⚠ WARNING

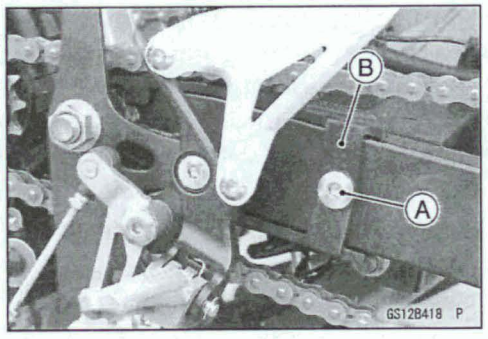
A chain that breaks or jumps off the sprockets could snag on the engine sprocket or lock the rear wheel, severely damaging the motorcycle and causing it to go out of control. Inspect the chain for damage and proper adjustment before each ride. If chain wear exceeds the service limit, replace it with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

Standard Chain

Make:	**ENUMA**
Type:	**EK520SRO2**
	EK520LVO3 (when shipping)
Link:	**106 links**

Periodic Maintenance Procedures

Chain Guide Wear Inspection



- Remove:
  Mud Guard (see Mud Guard Removal in the Frame chapter)
  Engine Sprocket Cover (see Engine Sprocket Removal in the Final Drive chapter)
  Bolt [A]
  Chain Guide [B]
- Visually inspect the chain guide.

★If it shows any signs of abnormal wear or damage, replace the chain guide.

- Install the chain guide, and tighten its bolt.

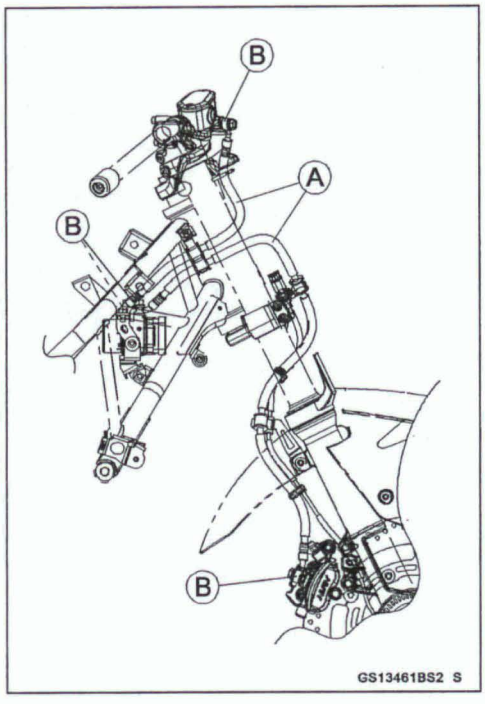
Brakes

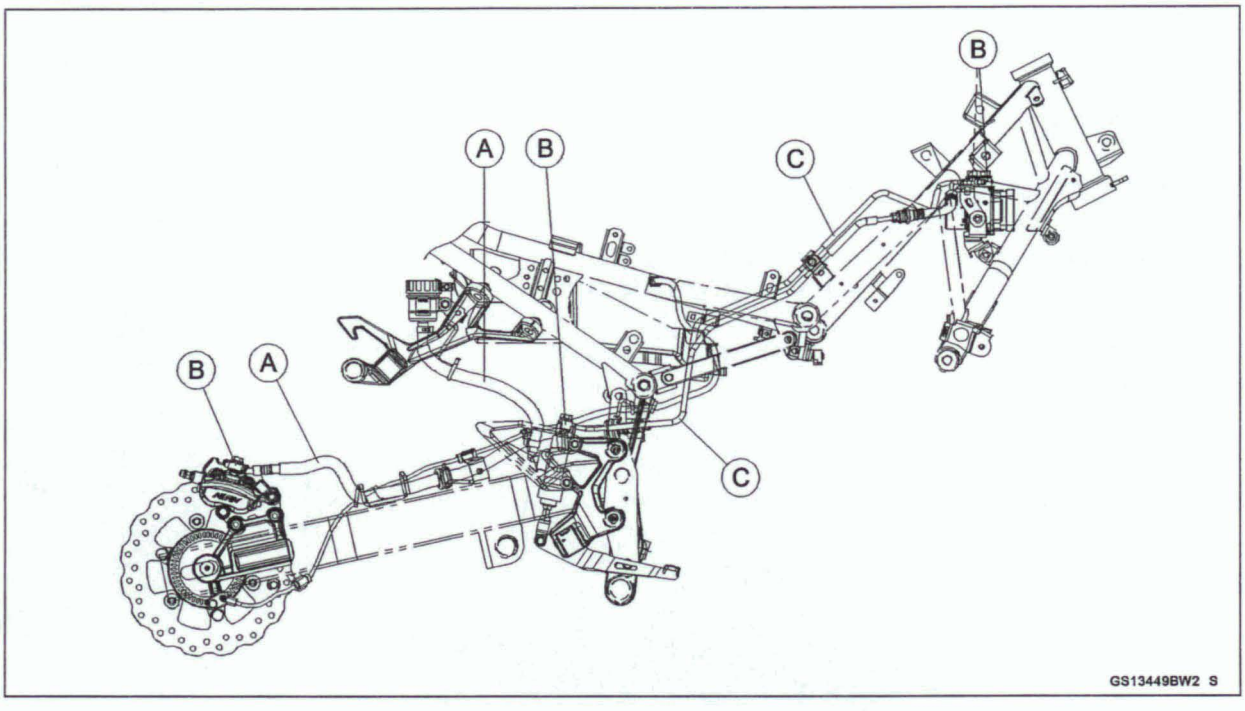
Brake System Inspection

Brake Fluid Leak (Brake Hose and Pipe) Inspection

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

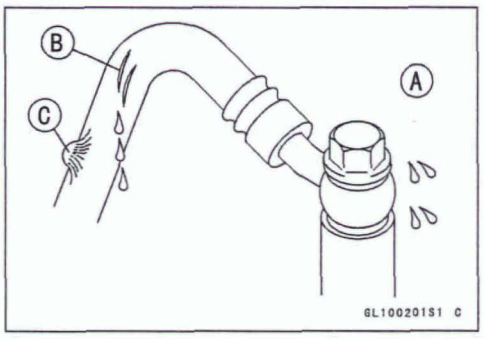
★If the brake fluid leaked from any position, inspect or replace the problem part.





Periodic Maintenance Procedures

Brake Hose and Pipe Damage and Installation Condition Inspection



- For ABS equipped models, remove the air cleaner housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter).
- Inspect the brake hoses, pipes (ABS equipped models) and fittings for deterioration, cracks and signs of leakage.

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

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

★Tighten any brake hose banjo bolts.

Torque - Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)
Brake Hose Banjo Bolts (ABS Hydraulic Unit): 33 N·m (3.4 kgf·m, 24 ft·lb)

- Inspect the brake hose and pipe routing.

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

Brake Operation Inspection

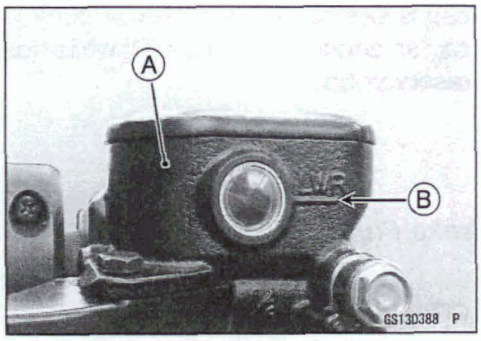
- Inspect the operation of the front and rear brake by running the vehicle on the dry road.

★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 fluid reservoir [A] is above the lower level line [B].

NOTE

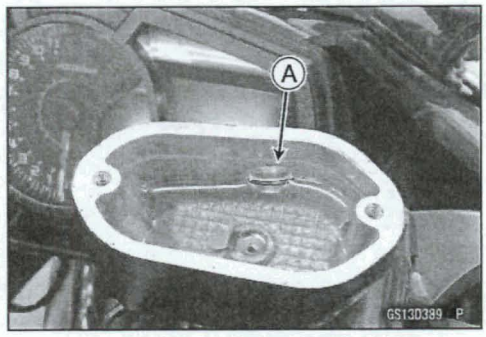
○*Hold the reservoir horizontal by turning the handlebar when checking brake fluid level.*

Periodic Maintenance Procedures

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

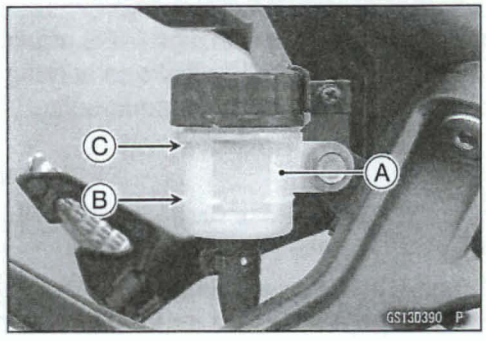
• Tighten:

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



• Check that the brake fluid level in the rear brake fluid 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].



⚠ 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.

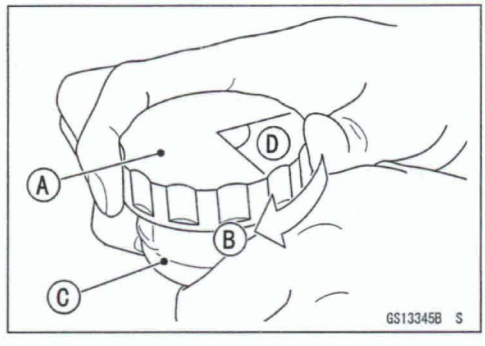
Recommended Disc Brake Fluid

Grade:

Front	**DOT3 or DOT4**
Rear	**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.

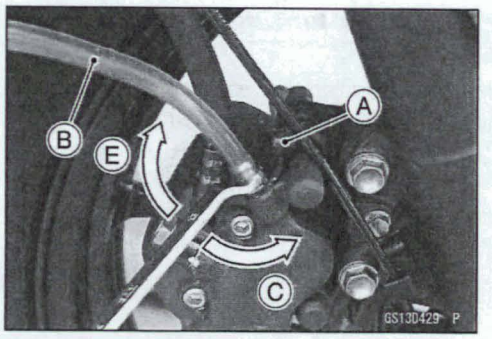


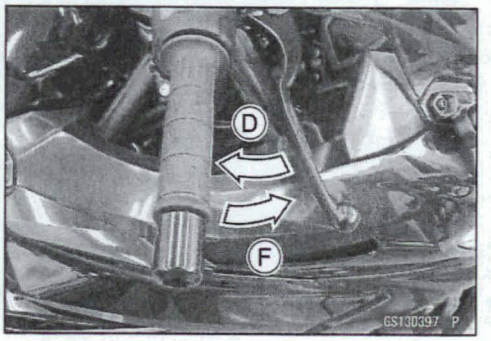
Brake Fluid Change

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.*

Periodic Maintenance Procedures





- Level the brake fluid reservoir.
- Remove the reservoir cap 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.
- Change the brake fluid.

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

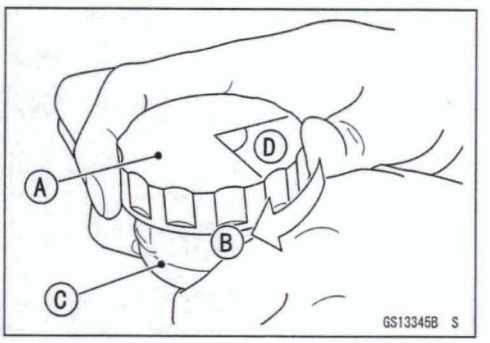
1. Open the bleed valve [C].
2. Apply the brake and hold it [D].
3. Close the bleed valve [E].
4. Release the brake [F].

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.*

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

Torque - Front Brake Reservoir Cap Screws: 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 Valve: 5.4 N·m (0.55 kgf·m, 48 in·lb)

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

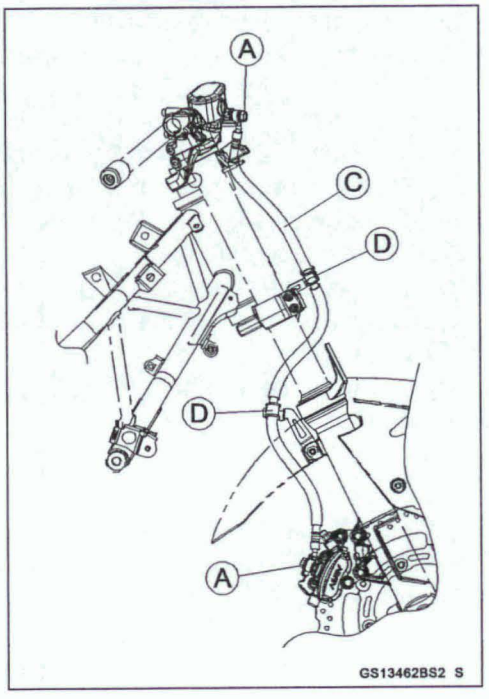
★If necessary, bleed the air from the lines.

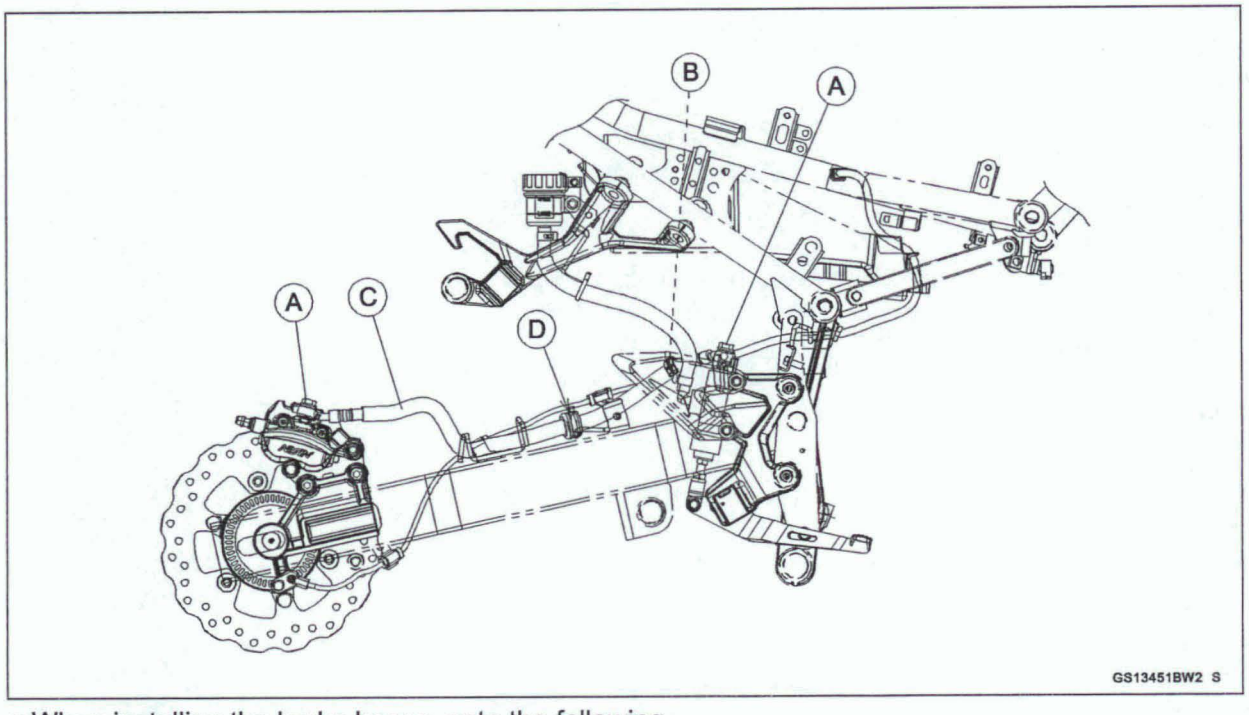
Periodic Maintenance Procedures

Brake Hose and Pipe Replacement

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

- Remove:
  Mud Guard (see Mud Guard Removal in the Frame chapter)
  Brake Hose Banjo Bolts [A]
  Clamp [B]
- Clear the brake hoses [C] from the brackets [D], and remove the brake hoses.





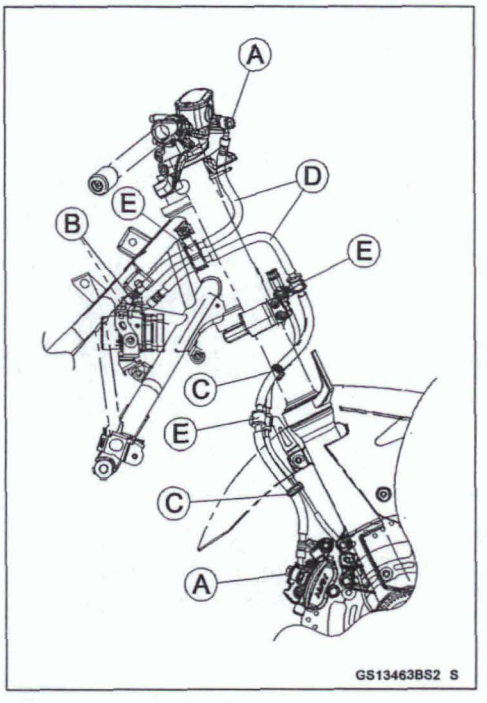
- When installing the brake hoses, note the following.
  ○Avoid sharp bending, kinking, flatting or twisting, and run the hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.
  ○There are washers on each side of the brake hose fitting. Replace them with new ones.
  ○Tighten:

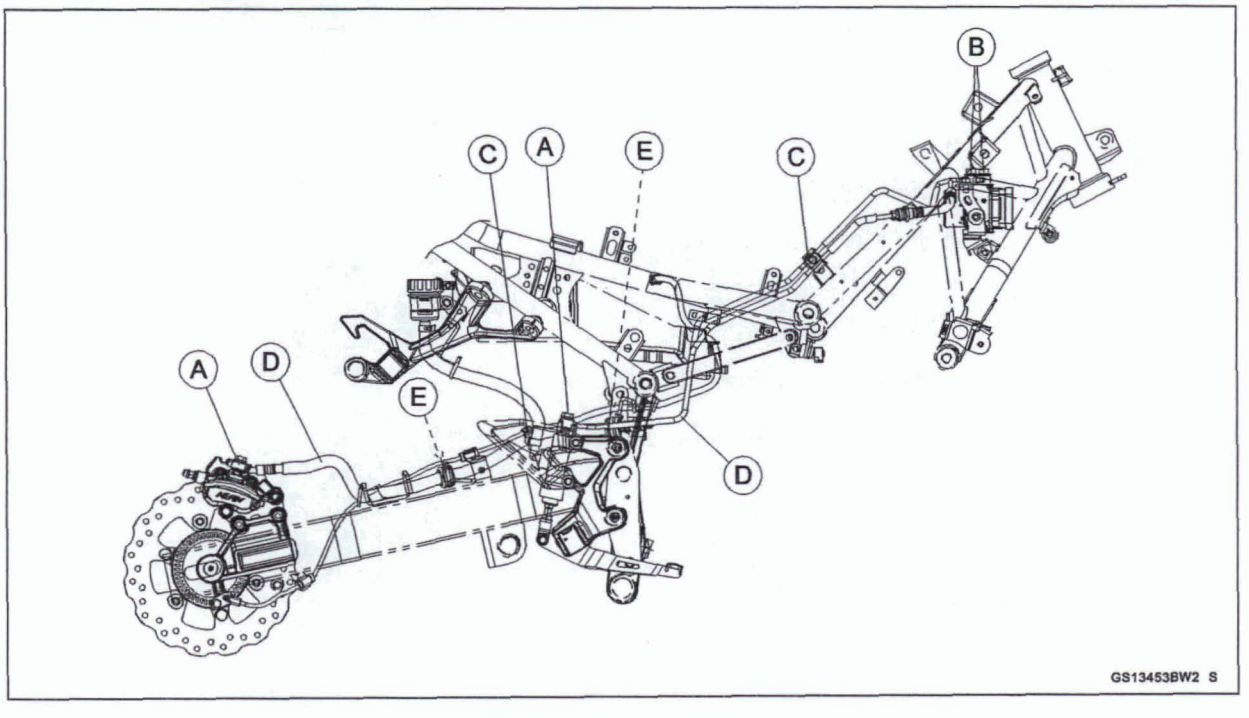
  Torque - Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

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

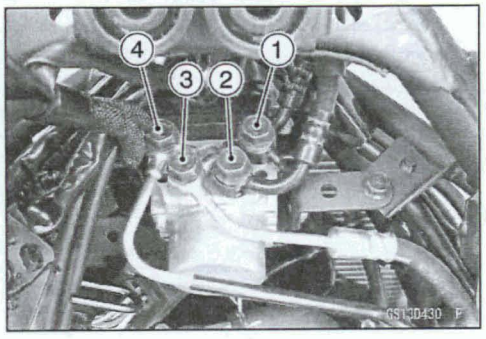
Periodic Maintenance Procedures

- For ABS equipped models; note the following.
- Remove:
  Air Cleaner Housing Bracket
  Frame Cover (see Frame Cover Removal in the Frame chapter)
  Mud Guard (see Mud Guard Removal in the Frame chapter)
  Brake Hose Banjo Bolts [A]
  Brake Hose Banjo Bolts (ABS Hydraulic Unit) [B]
  Clamps [C]
- Clear the brake hoses [D] from the brackets [E], and remove the brake hoses.





Periodic Maintenance Procedures



- There are washers on each side of the brake hose and pipe fitting. Replace them with new ones when installing.
- 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 hose banjo bolts (ABS hydraulic unit) following the specified tightening sequence [1 ~ 4].

Torque - Brake Hose Banjo Bolts (ABS Hydraulic Unit): 33 N·m (3.4 kgf·m, 24 ft·lb)

- Tighten:

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

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

Master Cylinder Rubber Parts Replacement

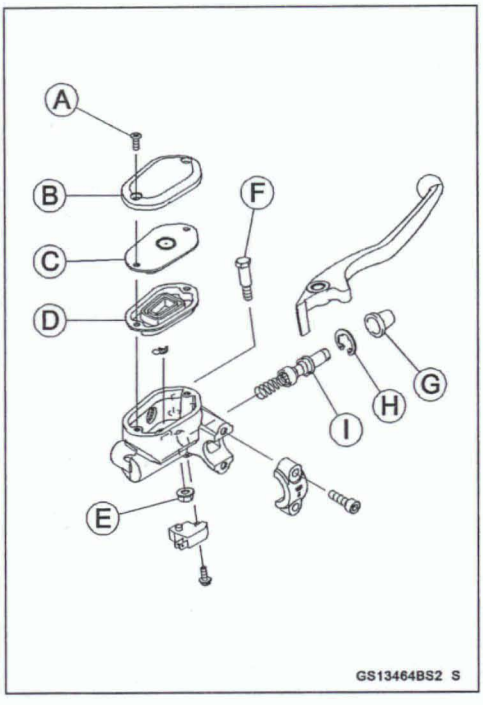
Front Master Cylinder Disassembly

- Remove the front master cylinder (see Front Master Cylinder Removal in the Brakes chapter).
- Remove:
  Front Brake Reservoir Cap Screws [A]
  Reservoir Cap [B]
  Diaphragm Plate [C]
  Diaphragm [D]
- Unscrew the locknut [E] and pivot bolt [F], and remove the brake lever.
- Remove the dust cover [G] and circlip [H].

Special Tool - Inside Circlip Pliers: 57001-143

- Pull out the piston assembly [I].

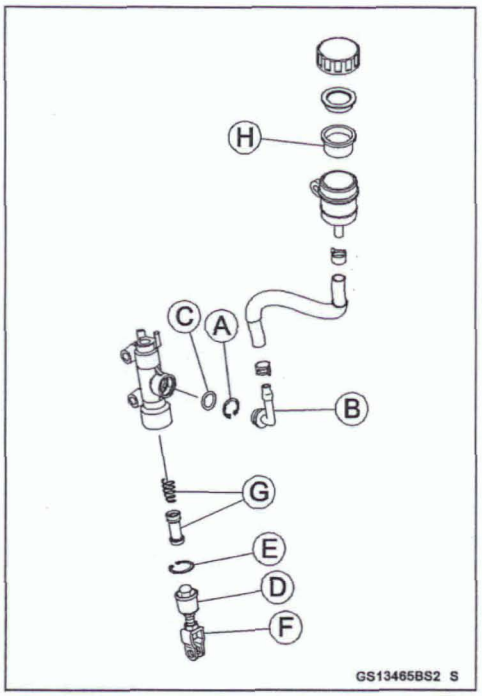
NOTICE
Do not remove the secondary cup from the piston since removal will damage it.



- Replace:
  Diaphragm [D]
  Dust Cover [G]
  Circlip [H]
  Piston Assembly [I]

Periodic Maintenance Procedures

Rear Master Cylinder Disassembly



- Remove:
  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].

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

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

Master Cylinder Assembly

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

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

- Apply brake fluid to 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: 5.9 N·m (0.60 kgf·m, 52 in·lb)
Brake Lever Pivot Bolt Locknut: 5.9 N·m (0.60 kgf·m, 52 in·lb)

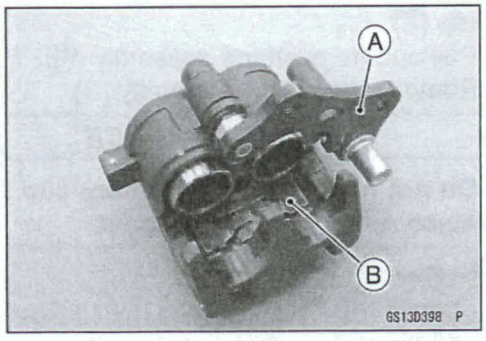
Periodic Maintenance Procedures

Caliper Rubber Parts Replacement

Caliper Disassembly

- Remove:
  Caliper (see Front/Rear Caliper Removal in the Brakes chapter)
  Brake Pad (see Brake Pad Removal in the Brakes chapter)

- Remove:
  Caliper Holder [A]
  Pad Spring [B]



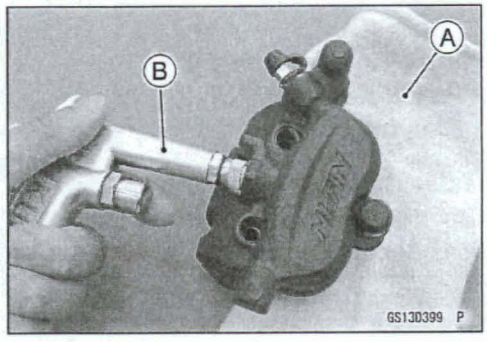
- Using compressed air, remove the pistons.

○Cover the piston area with a clean, thick cloth [A].

○Blow compressed air [B] into the hole for the banjo bolt to remove the piston.

⚠ WARNING

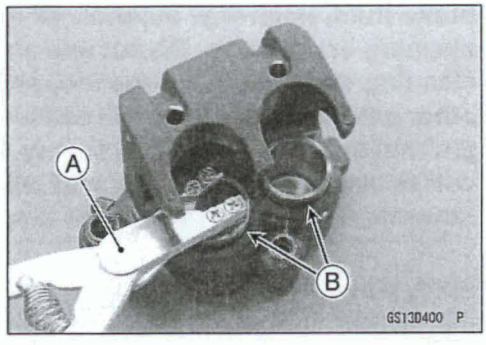
The piston in the brake caliper can crush hands and fingers. Never place your hand or fingers in front of the piston.



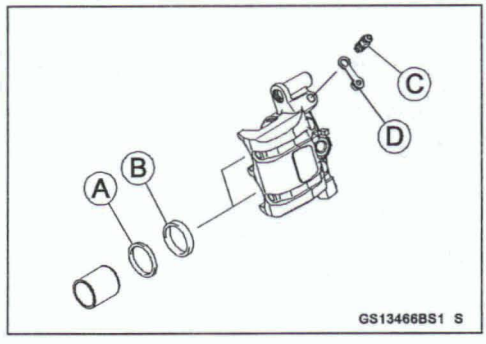
○Pull out the piston by hand.

- When compressed air is not used, using the brake caliper piston pliers [A] remove the pistons [B].

Special Tool - Brake Caliper Piston Pliers (φ16 ~ φ26): 57001-1861



- Remove the dust seals [A] and fluid seals [B].
- Remove the bleed valve [C] and rubber cap [D].



Periodic Maintenance Procedures

Caliper Assembly

- Clean the caliper parts except for the pads.

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

- Install the bleed valve and rubber cap.

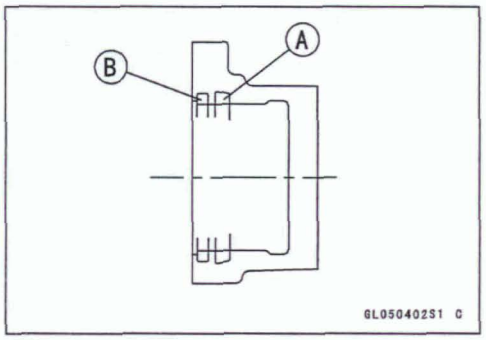
Torque - Bleed Valve: 5.4 N·m (0.55 kgf·m, 48 in·lb)

- Replace the fluid seals [A] with new ones.

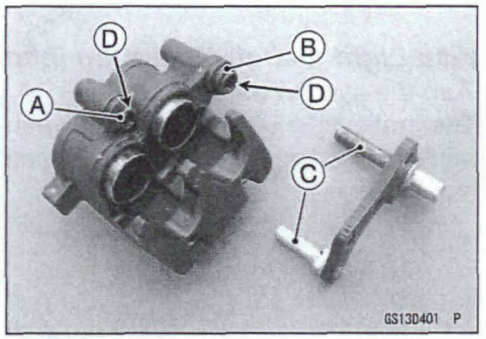
○Apply silicone grease to the fluid seals, and install them into the cylinders by hand.

- Replace the dust seals [B] with new ones if they are damaged.

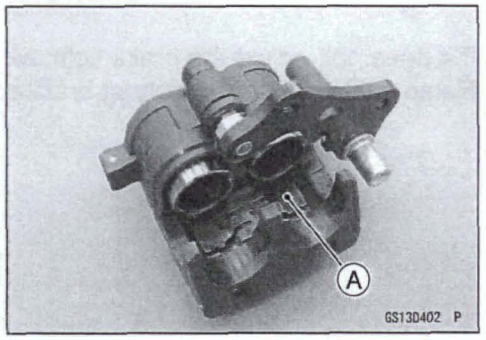
○Apply silicone grease to the dust seals, and install them into the cylinders by hand.



- Apply brake fluid to the outside of the pistons, and push them into each cylinder by hand.
- Check the shaft rubber friction boot [A] and the dust cover [B] replace them with new ones if they are damaged.
- Apply a silicone grease to the caliper holder shafts [C] and holes [D].



- Install the pad spring [A] in the caliper as shown.
- Install the removed parts (see appropriate chapters).
- Wipe up any spilled brake fluid on the caliper with wet cloth.



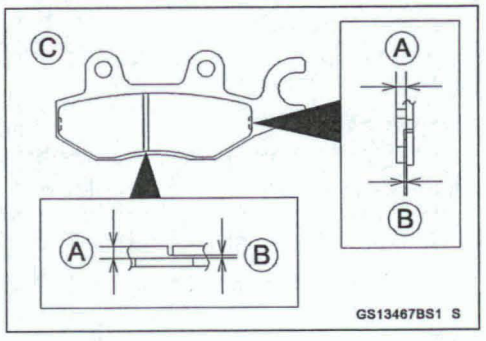
Periodic Maintenance Procedures

Brake Pad Wear Inspection

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

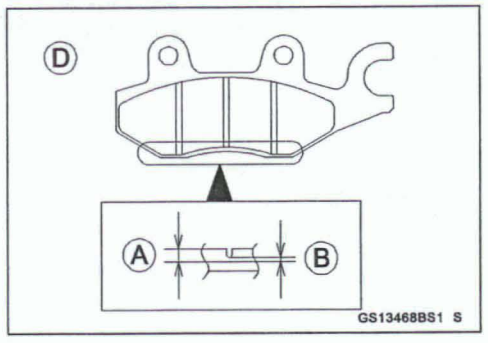
★If the lining thickness of either pad is less than the service limit [B], replace both pads in the caliper as a set.

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



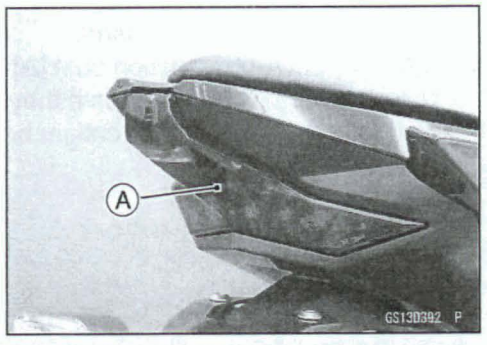
Pad Lining Thickness

Standard:	
Front	**4.5 mm (0.18 in.)**
Rear	**4.5 mm (0.18 in.)**
Service Limit:	
Front	**1.0 mm (0.04 in.)**
Rear	**1.5 mm (0.06 in.)**



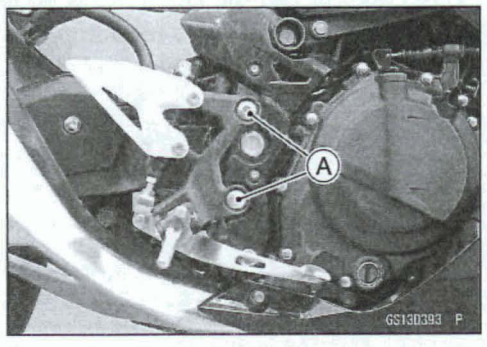
Brake Light Switch Operation Inspection

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



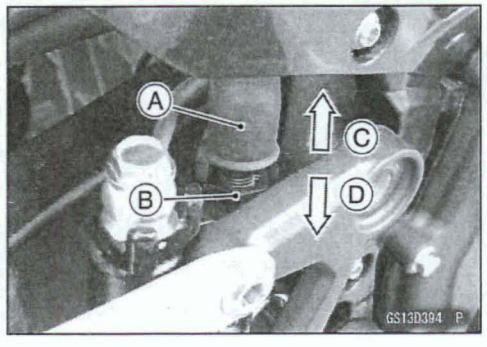
★If it does not, adjust the brake light switch.

- Remove the right front footpeg bracket bolts [A].



- 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)

Periodic Maintenance Procedures

★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 Brake/Tail Light Removal/Installation in the Electrical System chapter)
Turn Signal Relay Fuse 10 A (see Fuse Inspection in the Electrical System chapter)
Front Brake Light Switch [A] (see Switch Inspection in the Electrical System chapter)
Rear Brake Light Switch (see Switch Inspection in the Electrical System chapter)
Harness (see Wiring Inspection in the Electrical System chapter)

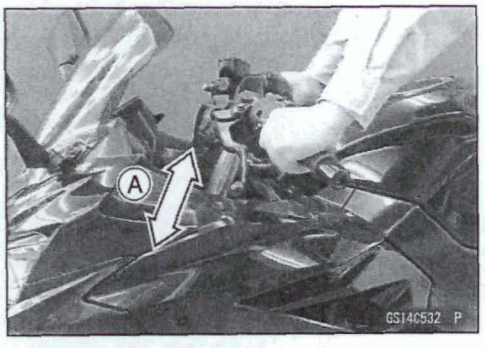
Suspension

Suspension System Inspection

Front Forks/Rear Shock Absorber Operation Inspection

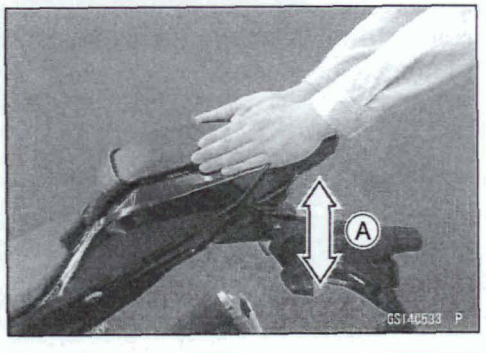
- Pump the forks down and up [A] 4 or 5 times, and inspect the smooth stroke.

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

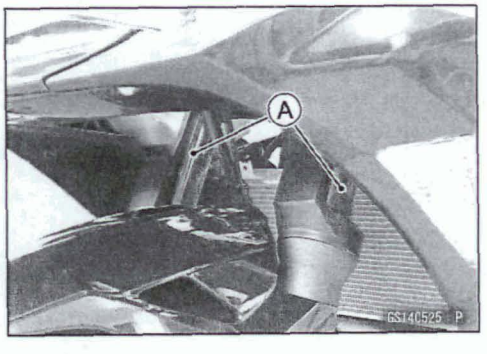
★If the shock absorber does not smoothly stroke or noise is found, inspect the oil leak (see Rear Shock Absorber Oil Leak Inspection).



Front Fork Oil Leak Inspection

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

★Replace any defective parts, if necessary.



Periodic Maintenance Procedures

Rear Shock Absorber Oil Leak Inspection

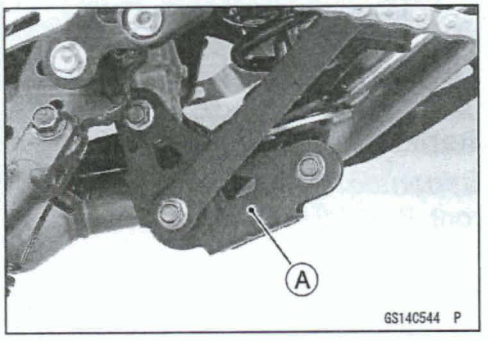
- Visually inspect the shock absorber [A] for oil leakage.

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

Rocker Arm Operation Inspection

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

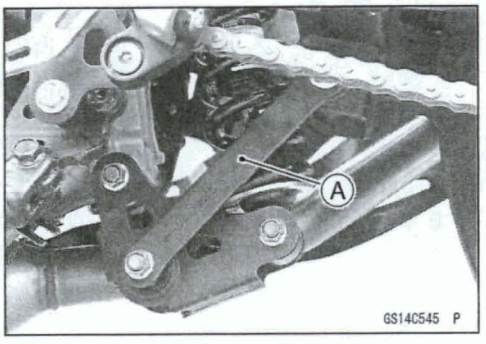
★If the rocker arm [A] does not smoothly stroke or noise is found, inspect the fasteners and bearings (see Rocker Arm/Tie-Rod Bearing, Sleeve Inspection in the Suspension chapter).



Tie-Rod Operation Inspection

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

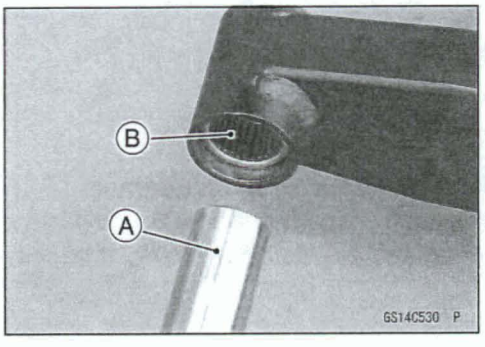
★If the tie-rods [A] do not smoothly stroke or noise is found, inspect the fasteners and tie-rod bushing (see Tie-Rod, Rocker Arm Bushing, Sleeve Inspection in the Suspension chapter).



Lubrication of Rear Suspension

Swingarm Pivot Lubrication

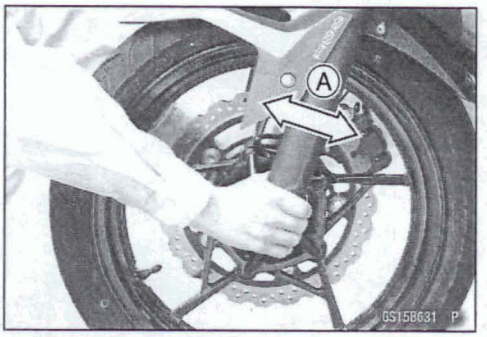
- Remove:
  Swingarm (see Swingarm Removal in the Suspension chapter)
  Grease Seals (Both Sides)
  Sleeves [A]
- Using a high flash-point solvent, clean the old grease out of the needle bearings [B].
- Apply plenty of grease to the inner surface of the needle bearings.
- Apply thin coat of grease to the lips of the oil seals.
- Install the swingarm (see Swingarm Installation in the Suspension chapter).



Periodic Maintenance Procedures

Steering

Steering Play Inspection



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

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

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

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

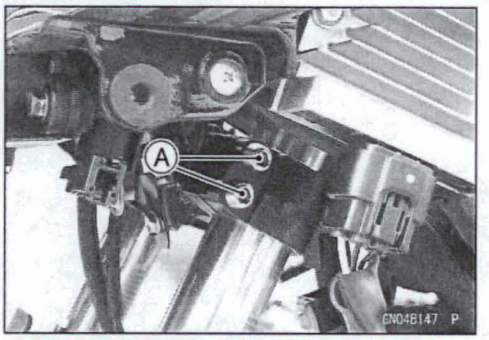
NOTE

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

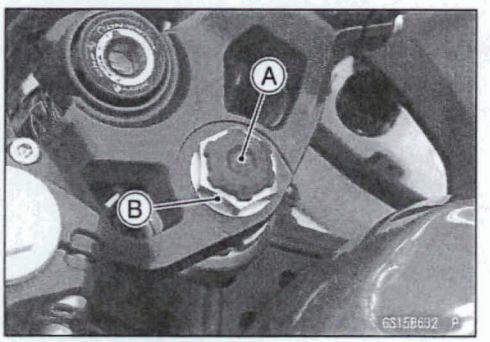
○*Be sure the leads and cables are properly routed.*

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

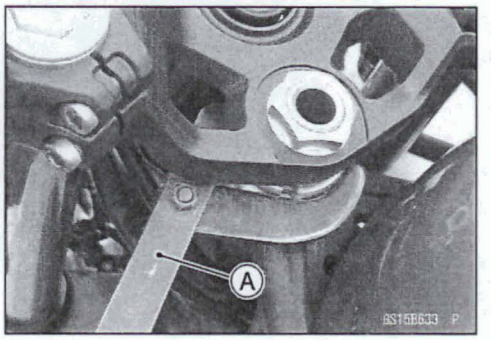
Steering Play Adjustment



- Remove:
  Middle Fairings (see Middle Fairing Removal in the Frame chapter)
- Loosen:
  Lower Front Fork Clamp Bolts [A] (Both Sides)



- Remove:
  Steering Stem Head Nut Plug [A]
- Loosen:
  Steering Stem Head Nut [B]



- Raise the front wheel off the ground with a suitable stand.
- Adjust the steering.

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

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

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

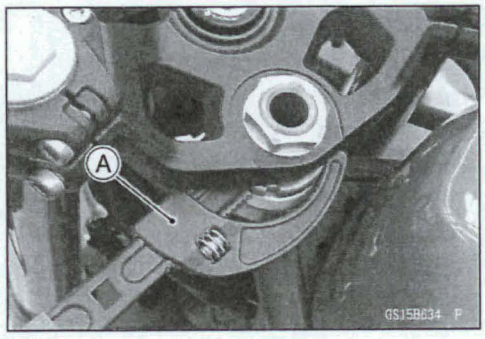
NOTE

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

Periodic Maintenance Procedures

○You may adjust the steering using the adjustable hook wrench [A].

Special Tool - Adjustable Hook Wrench: 57001-1863



- Tighten:

Torque - Steering Stem Head Nut: 49 N·m (5.0 kgf·m, 36 ft·lb)
Lower Front Fork Clamp Bolts: 23 N·m (2.3 kgf·m, 17 ft·lb)

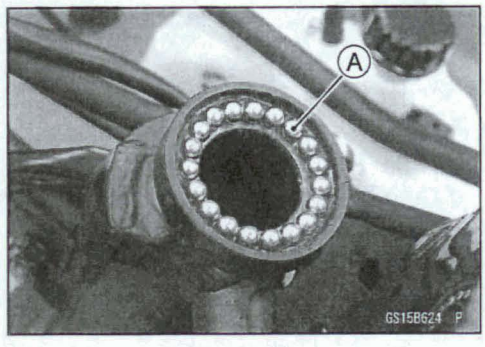
NOTE

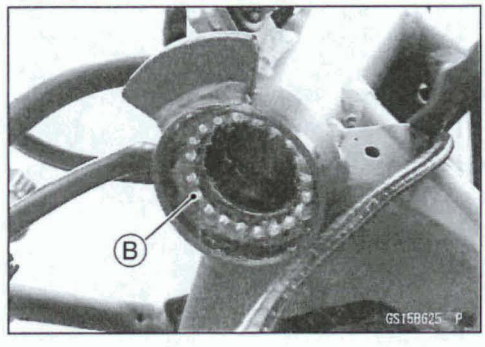
○*Tighten the two lower front fork clamp bolts alternately two times to ensure even tightening torque.*

- 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 [A] and lower [B] ball bearings, 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 them if they show wear or damage.
- Apply a light coat of grease to the upper and lower ball bearings and outer races.
- Install the steering stem (see Stem, Stem Bearing Installation in the Steering chapter).
- Adjust the steering (see Steering Play Adjustment).





Periodic Maintenance Procedures

Electrical System

Lights and Switches Operation Inspection

First Step

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

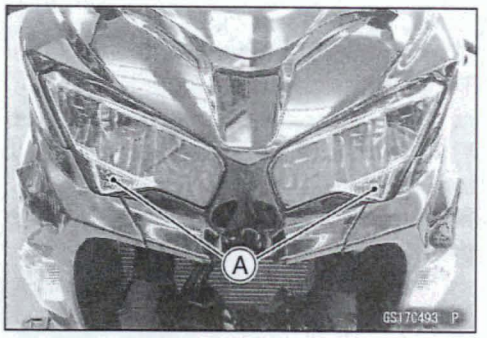
City Lights (LED) [A]	Goes on
Taillight (LED) [B]	Goes on
License Plate Light [C]	Goes on
Meter Panel Illumination (LED) [D]	Goes on
Meter Panel LCD [E]	Goes on
Green Neutral Indicator Light (LED) [F]	Goes on
Oil Pressure Warning Indicator [G] and Red Warning Indicator (LED) [H]	Goes on
Yellow Engine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

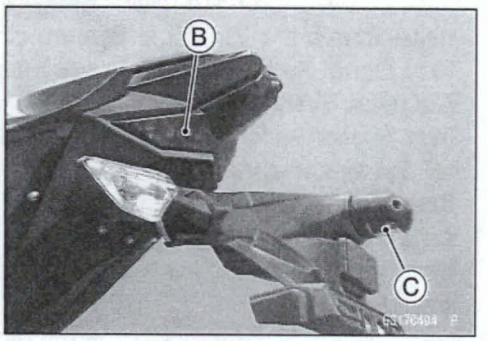
★If the light does not go on, inspect or replace the following parts.

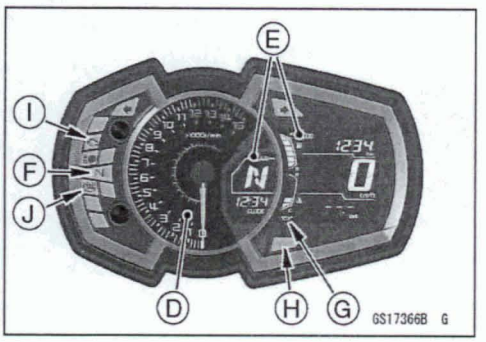
Battery (see Charging Condition Inspection in the Electrical System chapter)
Headlight (LED) Assembly (see Headlight (LED) Assembly Removal/Installation in the Electrical System chapter)
License Plate Light Bulb (see License Plate Light Bulb Replacement in the Electrical System chapter)
Meter Panel LCD (see Meter Unit Inspection in the Electrical System chapter)
Indicator Lights (LED) (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 10 A and Turn Signal Relay Fuse 10 A (see Fuse Inspection in the Electrical System chapter)
Ignition Switch (see Switch Inspection in the Electrical System chapter)
Oil Pressure Switch (see Switch Inspection in the Electrical System chapter)
Gear Position Sensor (see Gear Position Sensor Input Voltage Inspection in the Fuel System (DFI) chapter)
Harness (see Wiring Inspection in the Electrical System chapter)

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

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







Periodic Maintenance Procedures

Second Step

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

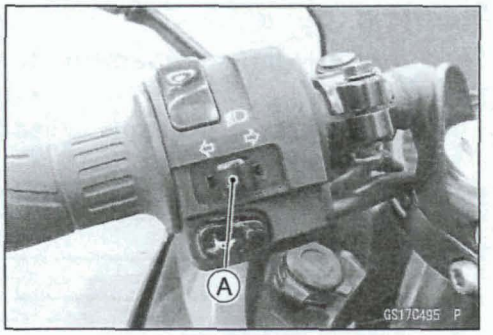
★If each light does not blink, inspect or replace the following parts.

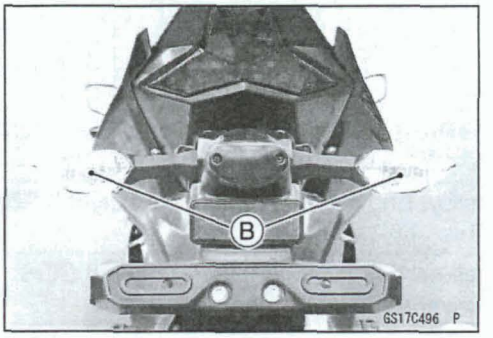
Turn Signal Light Bulb (see Turn Signal Light Bulb Replacement in the Electrical System chapter)
Green Turn Signal Indicator Light (LED) (see Meter Unit Inspection in the Electrical System chapter)
Turn Signal Relay Fuse 10 A (see Fuse Inspection in the Electrical System chapter)
Turn Signal Switch (see Switch Inspection in the Electrical System chapter)
Turn Signal Relay (see Turn Signal Relay Inspection in the Electrical System chapter)
Harness (see Wiring Inspection in the Electrical System chapter)

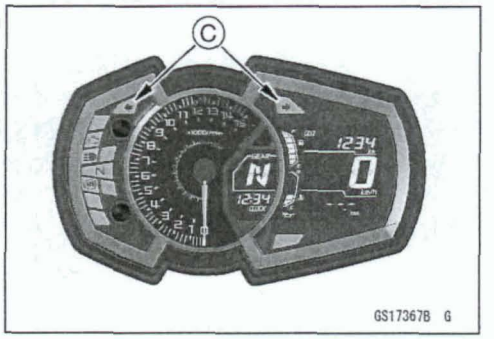
- Push the turn signal switch.
- The turn signal lights and green turn signal indicator light (LED) should go off.

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

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





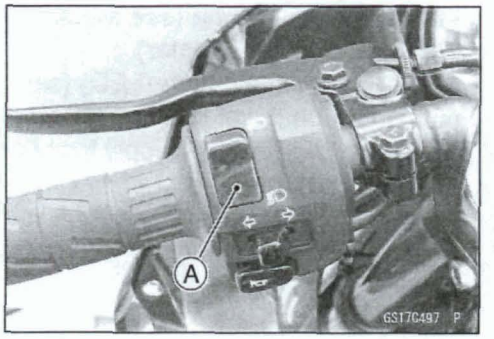


Third Step

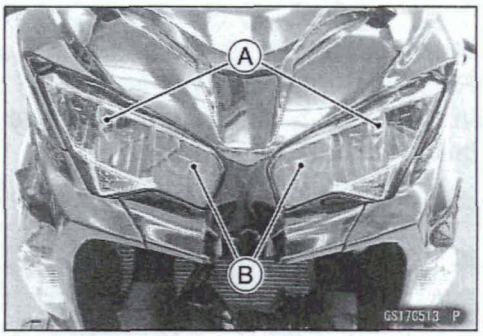
- Set the dimmer switch [A] to low beam position.
- Start the engine.
- The low beam headlights should go on.

★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 10 A (see Fuse Inspection in the Electrical System chapter)
Dimmer Switch (see Switch Inspection in the Electrical System chapter)
Headlight Circuit Relay in Relay Box (see Relay Circuit Inspection in the Electrical System chapter)
Harness (see Wiring Inspection in the Electrical System chapter)



Periodic Maintenance Procedures



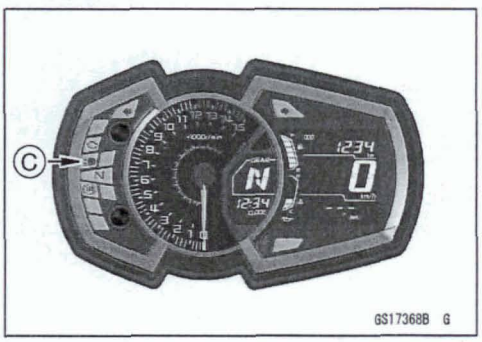
- Set the dimmer switch to high beam position.
- The low beam [A] and high beam [B] headlights should go on.
- The blue high beam indicator light (LED) [C] should goes on.

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

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

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

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



Headlight Aiming Inspection

- Inspect the headlight beam for aiming.

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

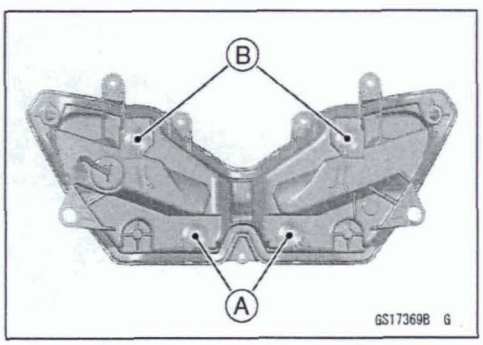
Headlight Beam Horizontal Adjustment

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

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

Headlight Beam Vertical Adjustment

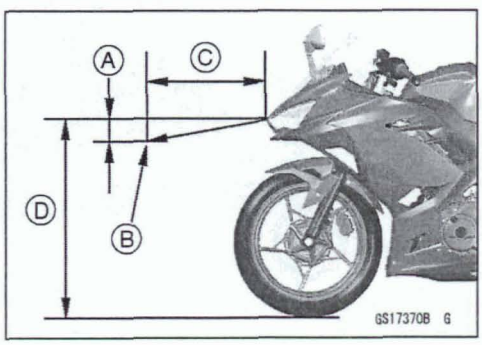
- Turn the vertical adjuster [B] in both headlights in or out to adjust the headlight vertically.



NOTE

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

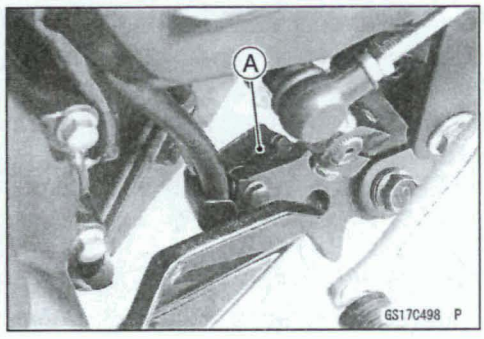
○*For US model, the proper angle is 0.4 degrees below horizontal. This is 50 mm (2.0 in.) drop at 7.6 m (25 ft) measured from the center of the headlight with the motorcycle on its wheels and the rider seated.*



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

Periodic Maintenance Procedures

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

Periodic Maintenance Procedures

★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 10 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)

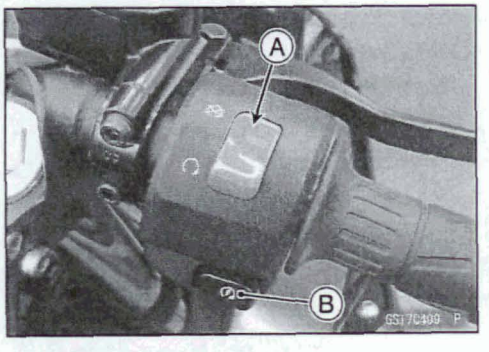
★If the all parts are good condition, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

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 [B].
- The engine does not start.

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

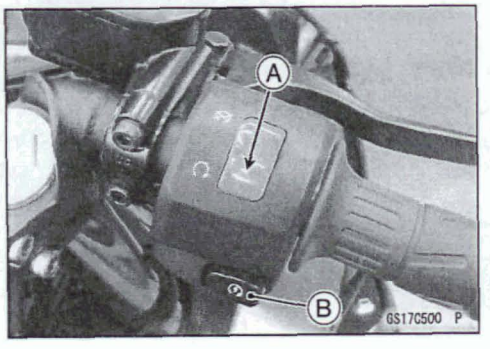


Second Step

- 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 [B] 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).

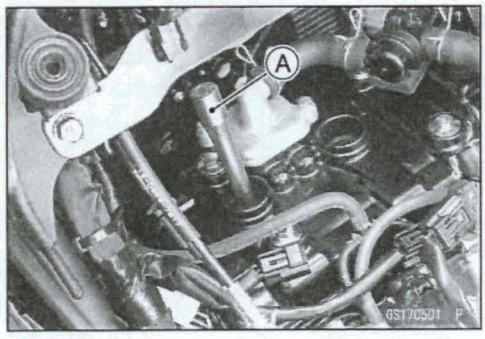


Periodic Maintenance Procedures

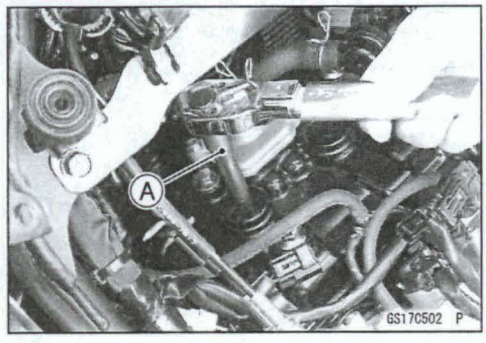
Spark Plug Replacement

- Remove the stick coils (see Stick Coil Removal in the Electrical System chapter).
- Remove the spark plugs using the 14 mm (0.55 in.) plug wrench [A] vertically.
- Replace the spark plugs with new ones.

Standard Spark Plug
Type: NGK LMAR9G



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



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

- Tighten:

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

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

Others

Chassis Parts Lubrication

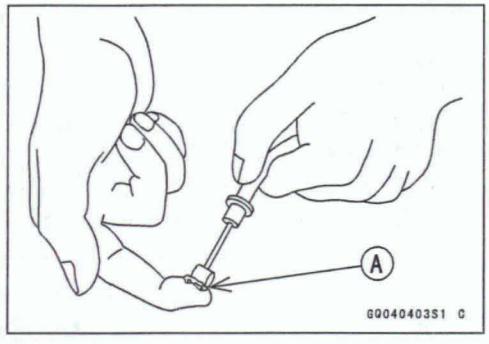
- Before lubricating each part, clean off any rusty spots with rust remover and wipe off any grease, oil, dirt, or grime.
- Lubricate the points listed below with indicated lubricant.

NOTE

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

Pivots: Lubricate with Grease.
Brake Lever
Brake Pedal
Clutch Lever
Rear Brake Joint Pin
Sidestand

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

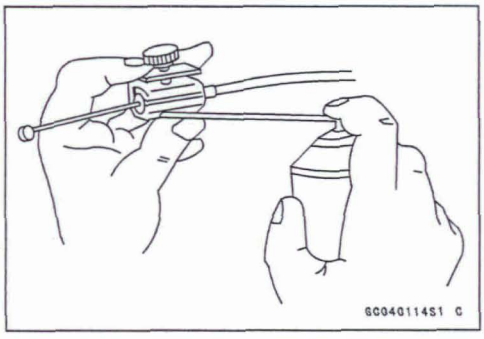


Periodic Maintenance Procedures

Cables: Lubricate with Rust Inhibitor.
Clutch Cable
Throttle Cables

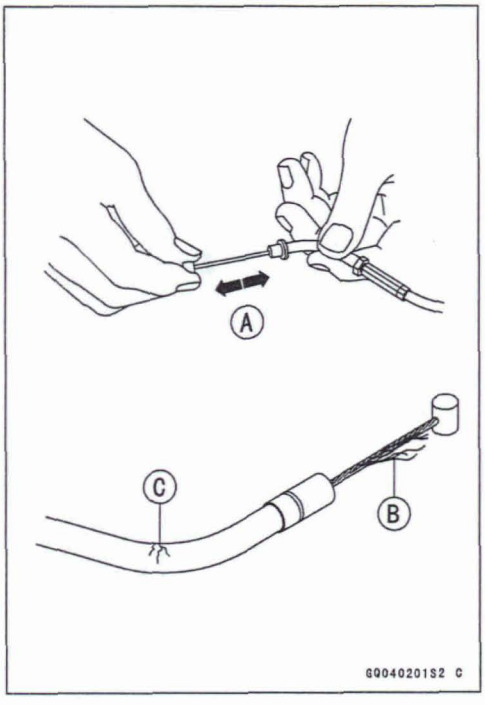
- Lubricate the cables by seeping the oil between the cable and housing.

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



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

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



Periodic Maintenance Procedures

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.

Bolt, Nut and Fastener to be checked

Engine:
- Clutch Lever Pivot Bolt
- Frame Bracket Bolts
- Swingarm Mounting Plate Nut
- Engine Mounting Bolts
- Exhaust Pipe Holder Nuts
- Muffler Body Clamp Bolt
- Muffler Body Mounting Bolt
- Radiator Bolts

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

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

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

Steering:
- Handlebar Clamp Bolts
- Steering Stem Head Nut

Others:
- Footpeg Bracket Bolts
- Side Stand Bolt
- Side Stand Bracket Bolts

Fuel System (DFI)

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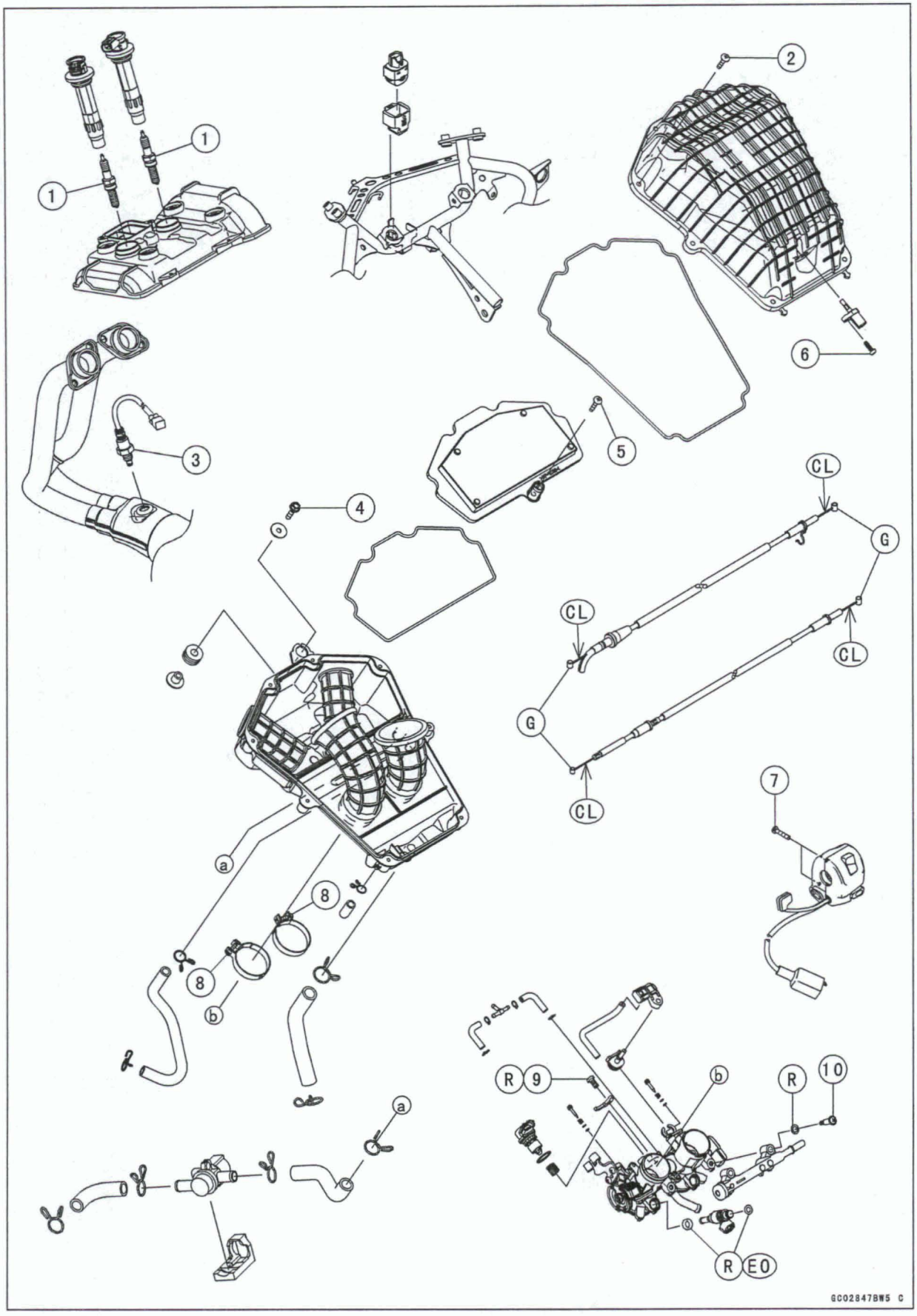
Exploded View

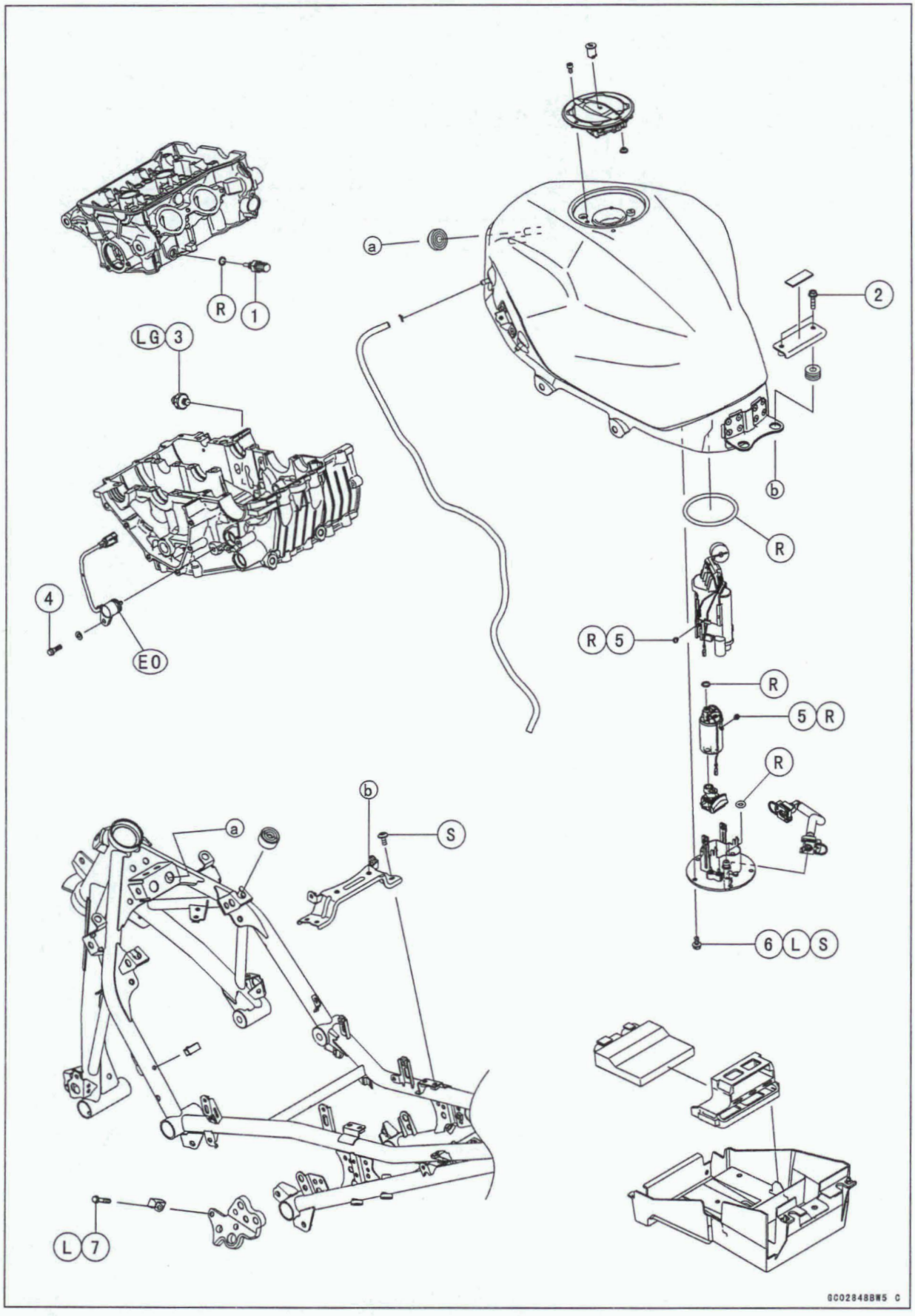


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Spark Plugs	13	1.3	115 in·lb	
2	Air Cleaner Housing Assembly Screws	1.2	0.12	11 in·lb	
3	Oxygen Sensor	25	2.5	18	
4	Air Cleaner Housing Mounting Bolt	9.8	1.0	87 in·lb	
5	Air Cleaner Element Mounting Screw	1.2	0.12	11 in·lb	
6	Intake Air Temperature Sensor Screw	1.2	0.12	11 in·lb	
7	Switch Housing Screws	3.5	0.36	31 in·lb	
8	Air Cleaner Housing Clamp Bolts	2.0	0.20	18 in·lb	
9	Idle Speed Control Valve Actuator Screw	5.0	0.51	44 in·lb	R
10	Delivery Pipe Mounting Screws	3.5	0.36	31 in·lb	

CL: Apply cable lubricant.
EO: Apply engine oil.
G: Apply grease.
R: Replacement Parts

Exploded View



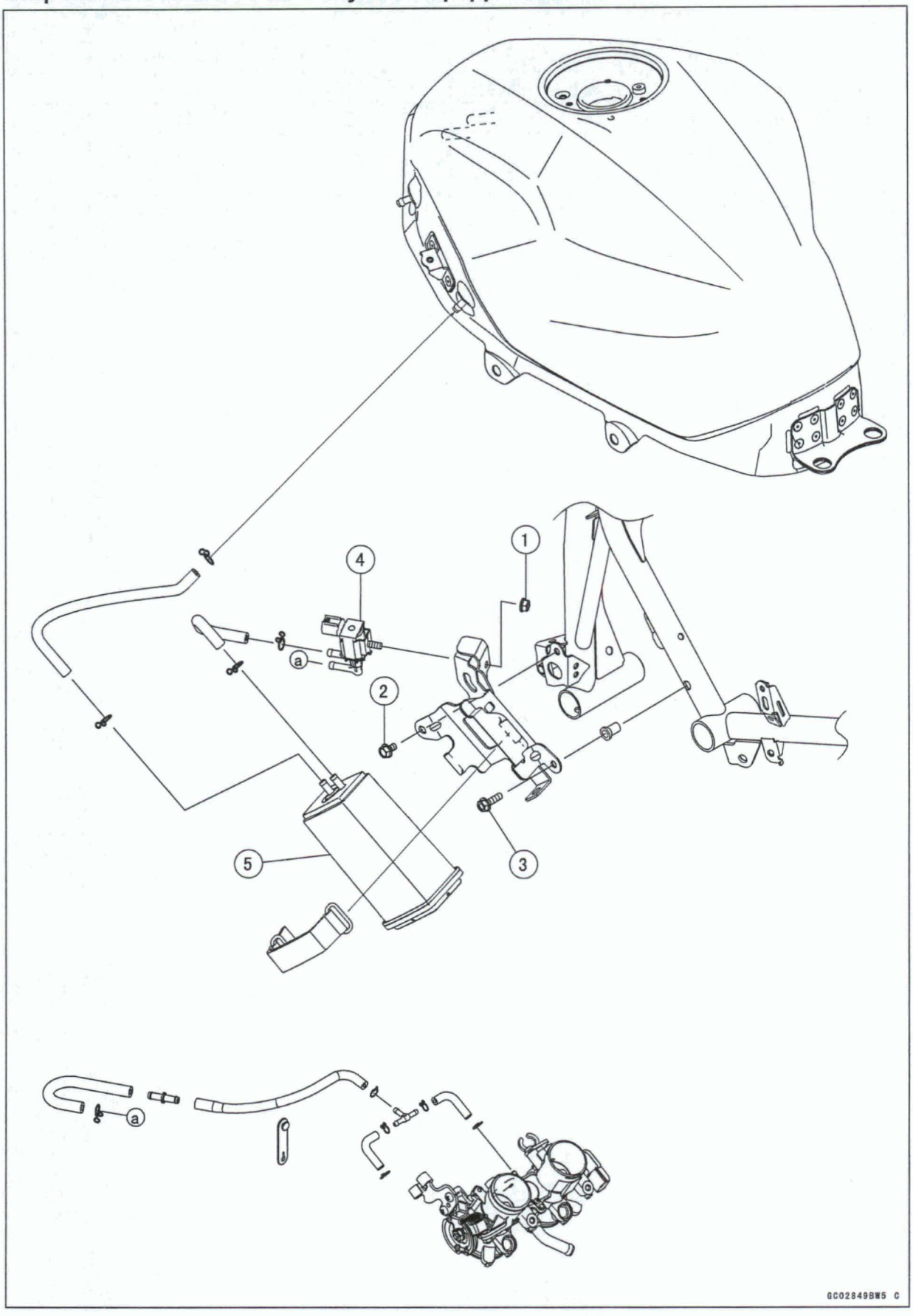
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Water Temperature Sensor	12	1.2	106 in·lb	
2	Fuel Tank Bolts	8.8	0.90	78 in·lb	
3	Oil Pressure Switch	15	1.5	11	LG
4	Gear Position Sensor Bolt	9.8	1.0	87 in·lb	
5	Fuel Pump Assembly Screws	0.98	0.10	8.7 in·lb	R
6	Fuel Pump Bolts	9.8	1.0	87 in·lb	L, S
7	Side Stand Switch Bolt	8.8	0.90	78 in·lb	L

EO: Apply engine oil.
L: Apply a non-permanent locking agent.
LG: Apply liquid gasket.
R: Replacement Parts
S: Follow the specified tightening sequence.

Exploded View

Evaporative Emission Control System Equipped Models



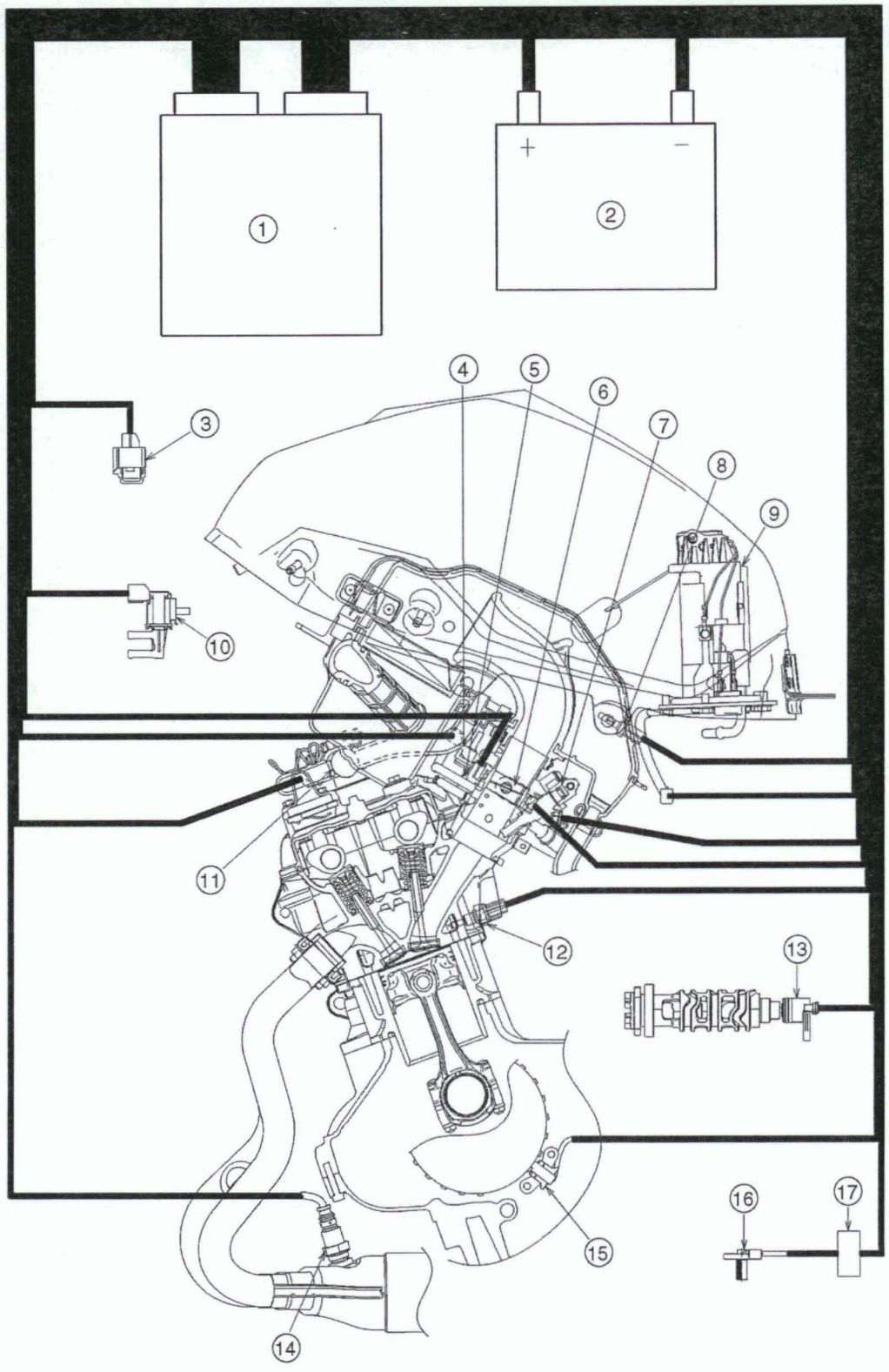
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Purge Valve Nut	6.9	0.70	61 in·lb	
2	Canister Bracket Bolt (L = 10 mm)	9.8	1.0	87 in·lb	
3	Canister Bracket Bolt (L = 20 mm)	9.8	1.0	87 in·lb	

4. Purge Valve
5. Canister

DFI System

DFI System



DFI System

1. ECU
2. Battery
3. Vehicle-down Sensor
4. Intake Air Pressure Sensor
5. Idle Speed Control Valve Actuator
6. Throttle Sensor
7. Fuel Injectors
8. Intake Air Temperature Sensor
9. Fuel Pump
10. Purge Valve (Equipped Models)
11. Air Switching Valve
12. Water Temperature Sensor
13. Gear Position Sensor
14. Oxygen Sensor
15. Crankshaft Sensor
16. Rear Wheel Rotation Sensor
17. ABS Hydraulic Unit (ABS Equipped Models)

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
Crankshaft position sensor (Crankshaft position sensor "A")	Crankshaft sensor
Engine coolant temperature sensor (Engine coolant temperature sensor 1)	Water temperature 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
O_2 sensor (binary/linear) signals (O_2 sensor)	Oxygen sensor
Throttle position sensor (Throttle/Pedal position sensor/switch "A")	Throttle 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
Fuel injector (Injector - cylinder 1 ~ 2)	Fuel injector
Idle air control system (Idle Air Control Circuit)	Idle speed control valve actuator
Ignition coil primary control circuits (Ignition coil "A ~ B" 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

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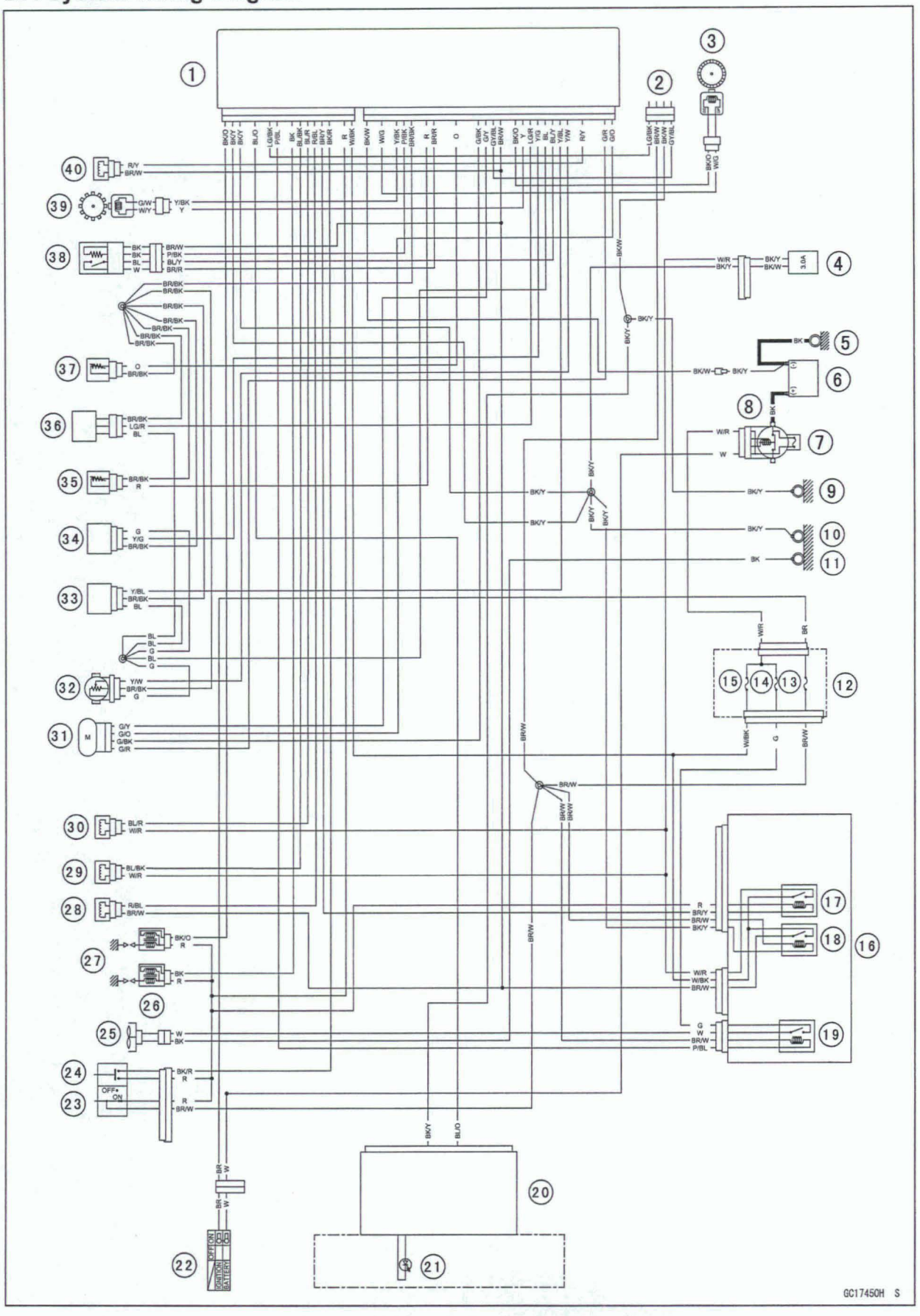
DFI System

DFI System Wiring Diagram



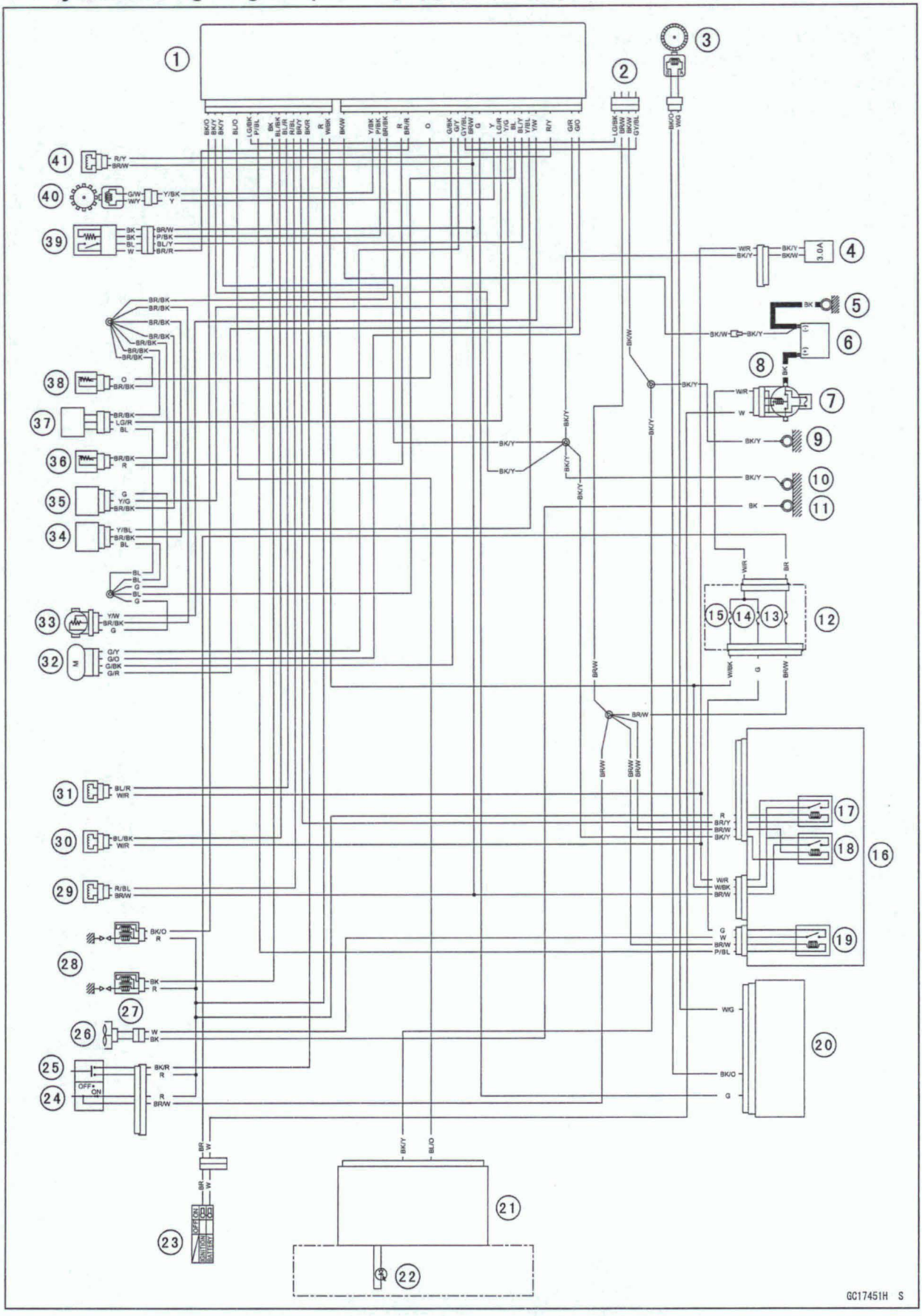
DFI System

Part Names

1. ECU
2. Kawasaki Diagnostic System Connector
3. Rear Wheel Rotation Sensor
4. Fuel Pump
5. Engine Ground
6. Battery
7. Main Fuse 30 A
8. Starter Relay
9. Frame Ground (4)
10. Frame Ground (2)
11. Frame Ground (1)
12. Fuse Box (1)
13. Ignition Fuse 10 A
14. Fan Fuse 15 A
15. ECU Fuse 15 A
16. Relay Box
17. Fuel Pump Relay
18. ECU Main Relay
19. Radiator Fan Relay
20. Meter Unit
21. Yellow Engine Warning Indicator Light (LED)
22. Ignition Switch
23. Engine Stop Switch
24. Starter Button
25. Fan Motor
26. Stick Coils
27. Spark Plugs
28. Air Switching Valve
29. Fuel Injector #1
30. Fuel Injector #2
31. Idle Speed Control Valve Actuator
32. Throttle Sensor
33. Intake Air Pressure Sensor
34. Vehicle-down Sensor
35. Intake Air Temperature Sensor
36. Gear Position Sensor
37. Water Temperature Sensor
38. Oxygen Sensor
39. Crankshaft Sensor
40. Purge Valve (Equipped Models)

DFI System

DFI System Wiring Diagram (ABS Equipped Models)



DFI System

Part Names

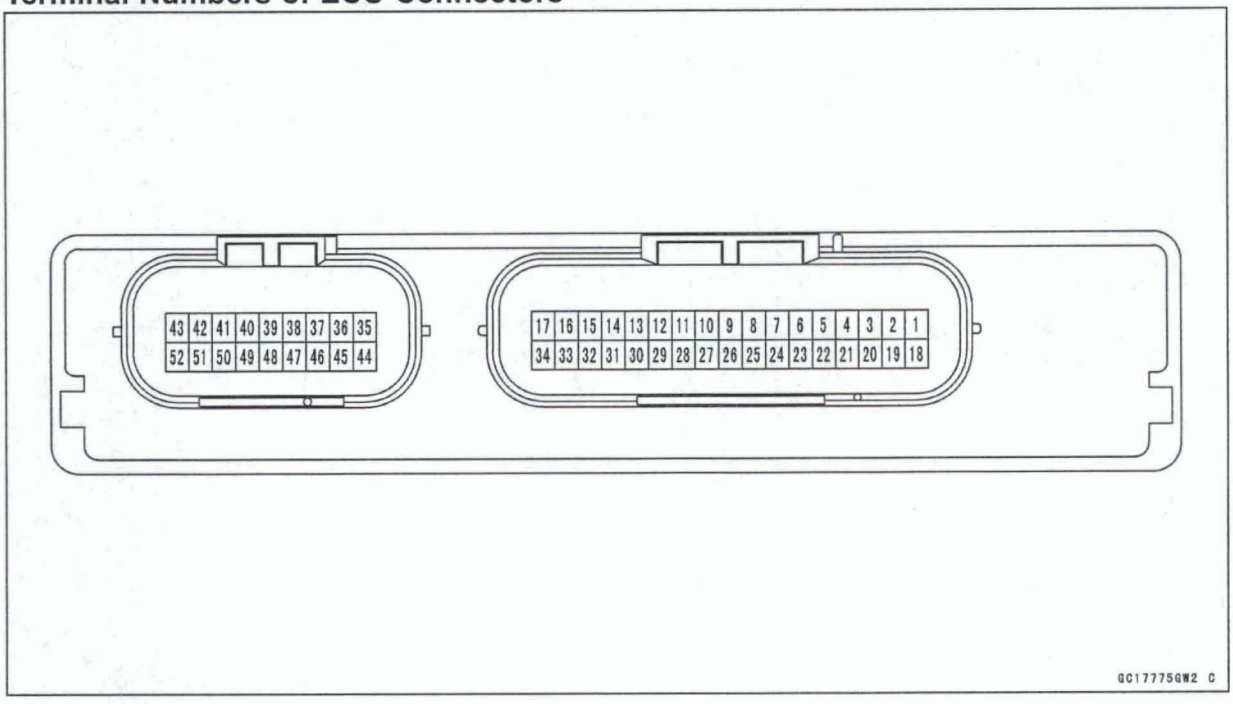
1. ECU
2. Kawasaki Diagnostic System Connector
3. Rear Wheel Rotation Sensor
4. Fuel Pump
5. Engine Ground
6. Battery
7. Main Fuse 30 A
8. Starter Relay
9. Frame Ground (4)
10. Frame Ground (2)
11. Frame Ground (1)
12. Fuse Box (1)
13. Ignition Fuse 10 A
14. Fan Fuse 15 A
15. ECU Fuse 15 A
16. Relay Box
17. Fuel Pump Relay
18. ECU Main Relay
19. Radiator Fan Relay
20. ABS Hydraulic Unit
21. Meter Unit
22. Yellow Engine Warning Indicator Light (LED)
23. Ignition Switch
24. Engine Stop Switch
25. Starter Button
26. Fan Motor
27. Stick Coils
28. Spark Plugs
29. Air Switching Valve
30. Fuel Injector #1
31. Fuel Injector #2
32. Idle Speed Control Valve Actuator
33. Throttle Sensor
34. Intake Air Pressure Sensor
35. Vehicle-down Sensor
36. Intake Air Temperature Sensor
37. Gear Position Sensor
38. Water Temperature Sensor
39. Oxygen Sensor
40. Crankshaft Sensor
41. Purge Valve (Equipped Models)

○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

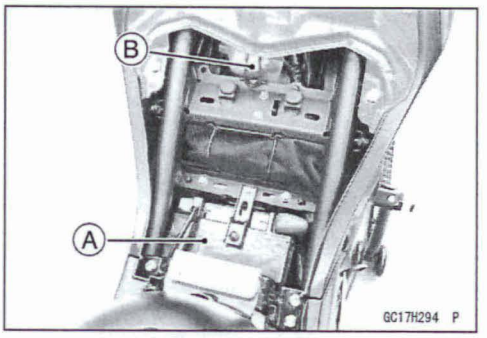


Terminal Names

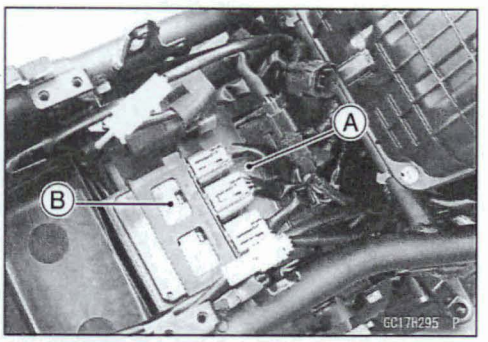
1. Idle Speed Control Valve Actuator: G/O
2. Idle Speed Control Valve Actuator: G/R
3. Unused
4. Green Neutral Indicator Light (LED): LG
5. Purge Valve (Equipped Models): R/Y
6. Unused
7. Throttle Sensor: Y/W
8. Intake Air Pressure Sensor: Y/BL
9. Oxygen Sensor: BL/Y
10. Power Supply to Sensors: BL
11. Vehicle-down Sensor: Y/G
12. Gear Position Sensor: LG/R
13. Crankshaft Sensor (+): Y
14. Power Supply to Rear Wheel Rotation Sensor (EX400H): BK/O
15. Rear Wheel Rotation Sensor Signal (from ABS Hydraulic Unit, EX400G/J): G
16. Power Supply to ECU (from ECU Main Relay): BR/W
17. External Communication Line (Kawasaki Diagnostic System): GY/BL
18. Idle Speed Control Valve Actuator: G/Y
19. Idle Speed Control Valve Actuator: G/BK
20. Unused
21. Unused
22. Water Temperature Sensor: O
23. Unused
24. Unused
25. Oxygen Sensor: BR/R
26. Intake Air Temperature Sensor: R
27. Unused
28. Ground for Sensors: BR/BK
29. Oxygen Sensor Heater: P/BK
30. Crankshaft Sensor (–): Y/BK
31. Rear Wheel Rotation Sensor Output: LG/W
32. Rear Wheel Rotation Sensor (EX400H): W/G
33. Unused
34. Ground for Control System: BK/W
35. Power Supply to ECU (from Battery): W/BK
36. Engine Stop Switch: R
37. Starter Lockout Switch: R/G
38. Starter Button: BK/R
39. Fuel Pump Relay: BR/Y
40. Air Switching Valve: R/BL
41. Fuel Injector #2: BL/R
42. Fuel Injector #1: BL/BK
43. Stick Coil #1: BK
44. Side Stand Switch: G/BK
45. Radiator Fan Relay: P/BL
46. External Communication Line (Kawasaki Diagnostic System): LG/BK
47. Meter Unit (Tachometer): LB
48. Meter Communication Line: BL/O
49. Unused
50. Ground for Fuel System: BK/Y
51. Ground for Ignition System: BK/Y
52. Stick Coil #2: BK/O

DFI Parts Location

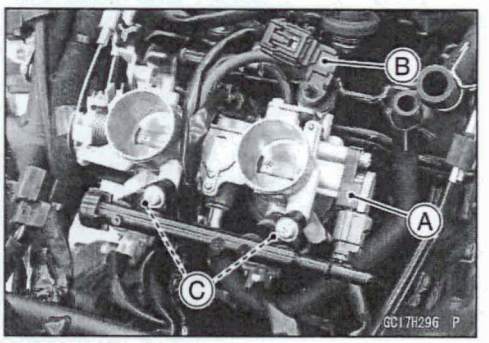
Battery [A]
Kawasaki Diagnostic System Connector [B]



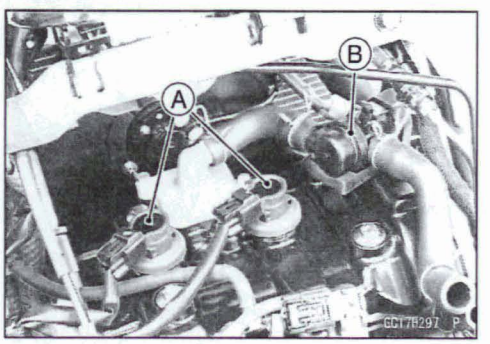
ECU [A]
Relay Box [B]



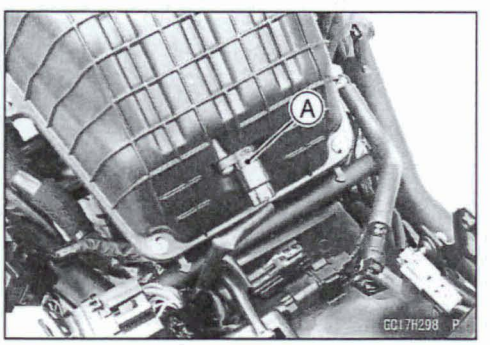
Throttle Sensor [A]
Intake Air Pressure Sensor [B]
Fuel Injectors #1, #2 [C]



Stick Coils #1, #2 [A]
Air Switching Valve [B]

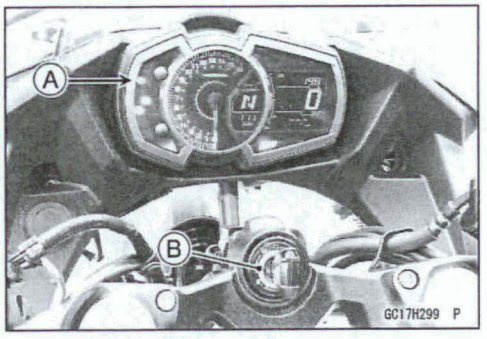


Intake Air Temperature Sensor [A]

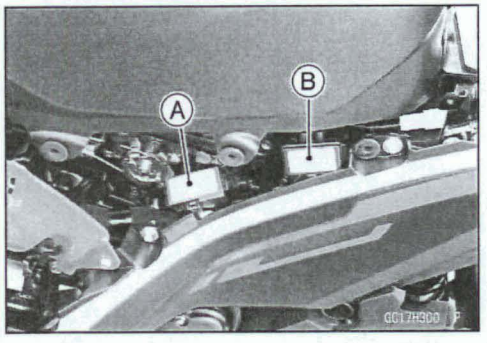


DFI Parts Location

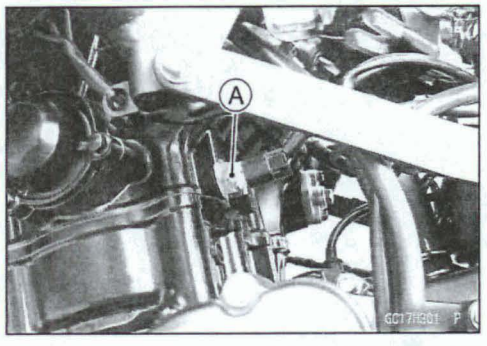
Yellow Engine Warning Indicator Light (LED) [A]
Ignition Switch [B]



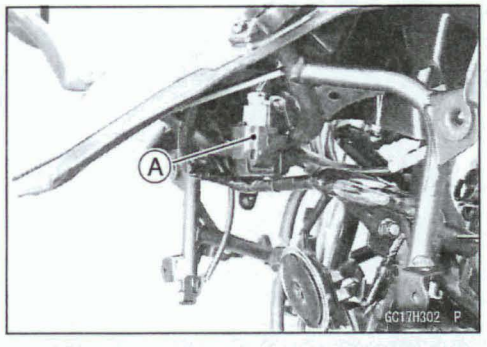
Fuse Box 1 [A]
Fuse Box 2 [B]



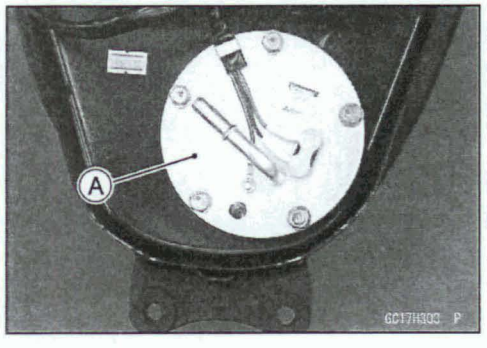
Water Temperature Sensor [A]



Vehicle-down Sensor [A]

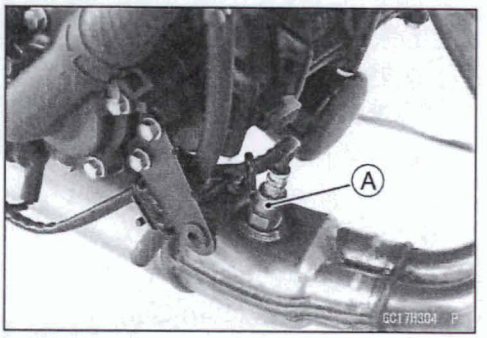


Fuel Pump [A]

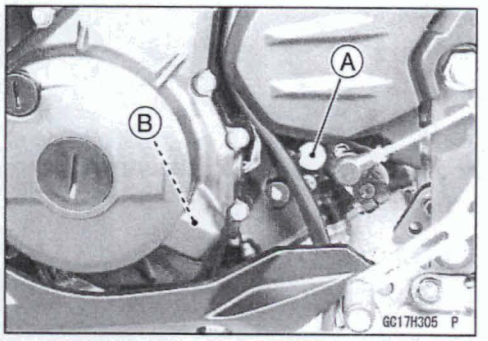


DFI Parts Location

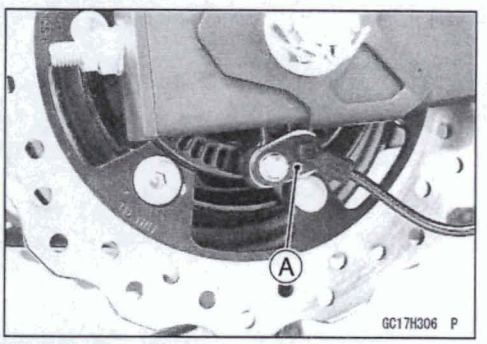
Oxygen Sensor [A]



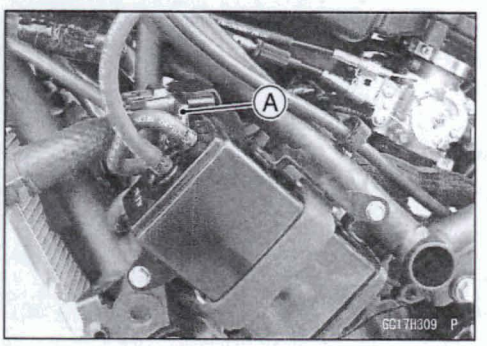
Gear Position Sensor [A]
Crankshaft Sensor [B]



Rear Wheel Rotation Sensor [A]



Purge Valve [A] (Equipped Model)



Specifications

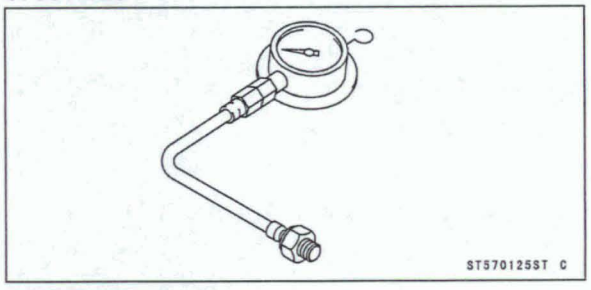
Item	Standard
Digital Fuel Injection System	
Idle Speed	1 300 ±50 r/min (rpm)
Throttle Body Assy:	
Throttle Valve	Single throttle valve
Bore	ϕ32 mm (1.3 in.)
Throttle Body Vacuum	36.0 ±1.33 kPa (270 ±10 mmHg) at idle speed
Bypass Screws (Turn Out)	– – –
ECU:	
Make	DENSO
Type	Digital memory type, with 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 tank)
Discharge	50 mL (1.7 US oz.) or more for 3 seconds
Fuel Injectors:	
Type	QL7285
Nozzle Type	Fine atomizing type with 12 holes
Resistance	About 12.0 Ω @20°C (68°F)
Throttle Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	DC 1.00 ~ 1.02 V at idle throttle opening DC 4.07 ~ 4.55 V at full throttle opening (for reference)
Resistance	4 ~ 6 kΩ
Intake Air Pressure Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	DC 3.80 ~ 4.20 V at standard atmospheric pressure (101.32 kPa, 76 cmHg)
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

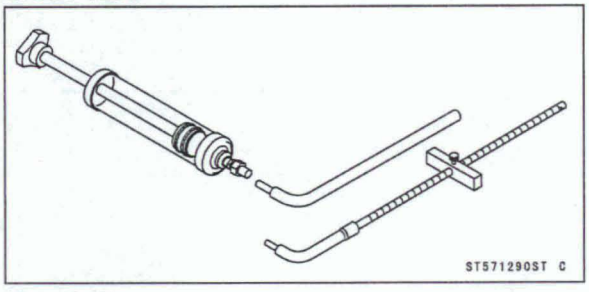
Item	Standard
Oxygen Sensor:	
Output Voltage (Rich)	DC 0.5 V or more
Output Voltage (Lean)	DC 0.2 V or less
Heater Resistance	5.49 ~ 6.91 Ω @20°C (68°F)
Idle Speed Control Valve Actuator:	
Input Voltage	About DC 11 ~ 13 V and then 0.5 V or About DC 11 ~ 13 V
Resistance	About 20 Ω
Purge Valve (Equipped Models):	
Resistance	30 ~ 34 Ω @20°C (68°F)
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

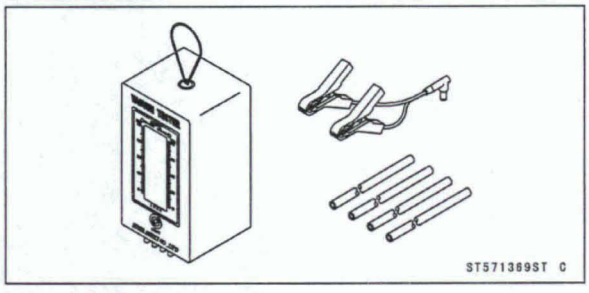
Oil Pressure Gauge, 5 kgf/cm²:
57001-125



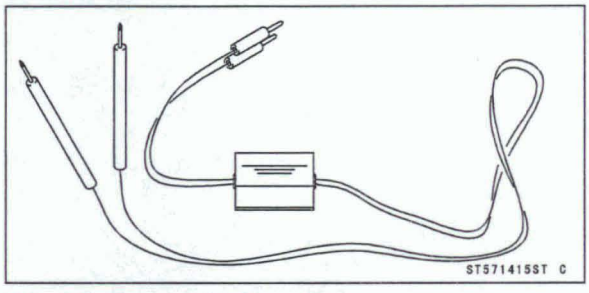
Fork Oil Level Gauge:
57001-1290



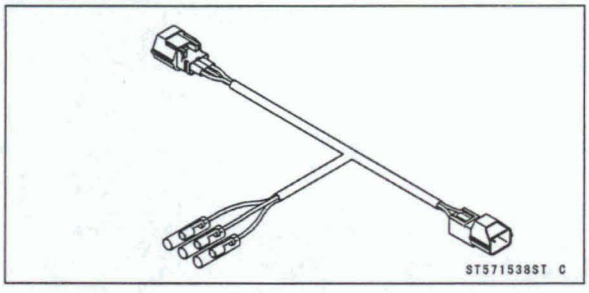
Vacuum Gauge:
57001-1369



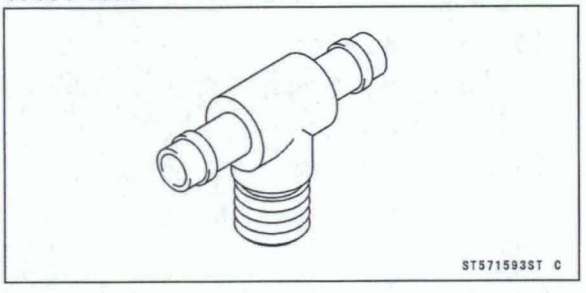
Peak Voltage Adapter:
57001-1415



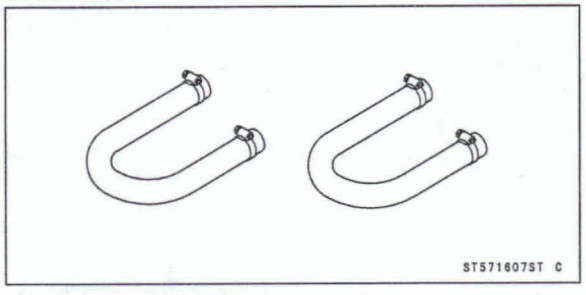
Throttle Sensor Setting Adapter:
57001-1538



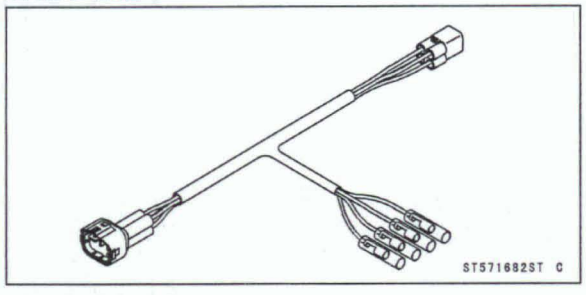
Fuel Pressure Gauge Adapter:
57001-1593



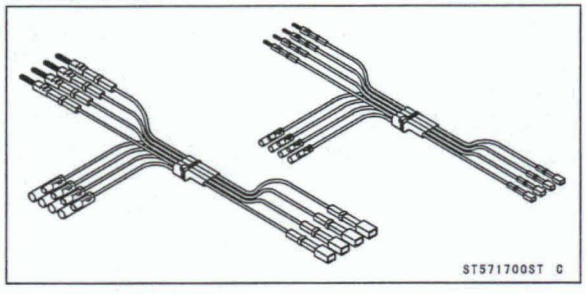
Fuel Hose:
57001-1607



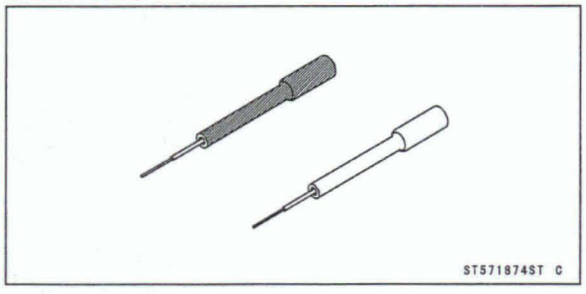
Oxygen Sensor Measuring Adapter:
57001-1682



Measuring Adapter:
57001-1700

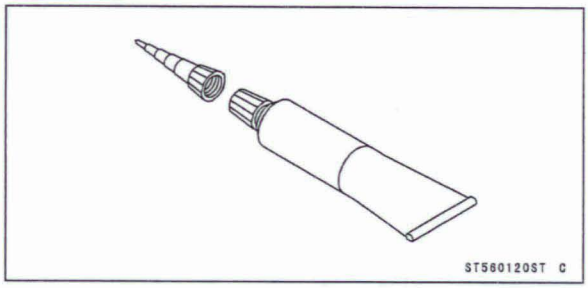


Needle Adapter Set:
57001-1874



Special Tools and Sealant

Liquid Gasket, TB1211:
56019-120

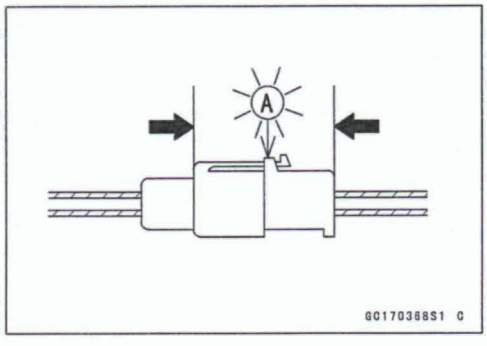


DFI Servicing Precautions

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].

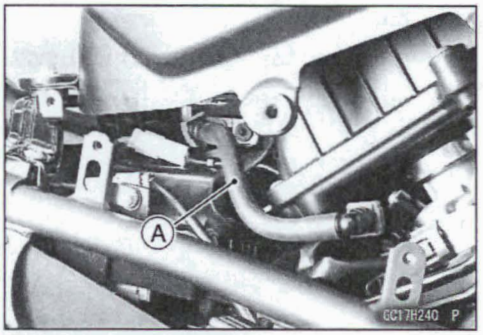


- Do not turn the ignition switch on while any of the DFI electrical connectors are disconnected. The ECU memorizes service codes.
- Do not spray water on the electrical parts, DFI parts, connectors, leads and wiring.
- If a transceiver is installed on the motorcycle, make sure that the operation of 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.

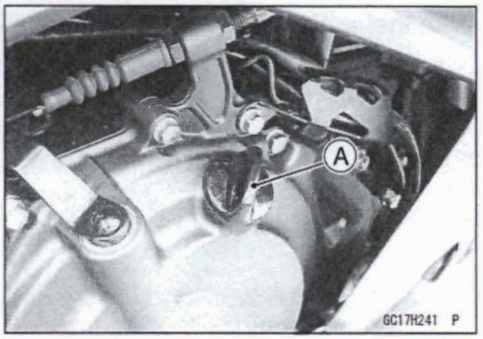
DFI Servicing Precautions

○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 right middle fairing (see Middle Fairing Removal in the Frame chapter) and check the fuel hose [A].

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



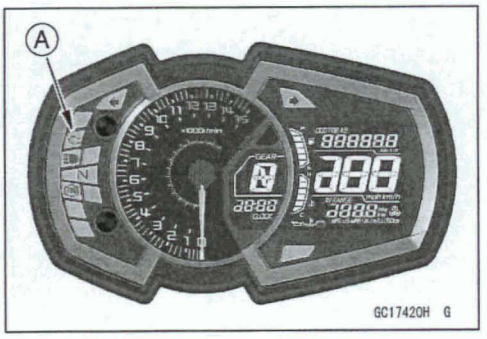
○To maintain the correct fuel/air mixture (F/A), there must be no intake air leaks in the DFI system. Be sure to install the oil filler plug [A] after filling the engine oil.



Troubleshooting the DFI System

Outline

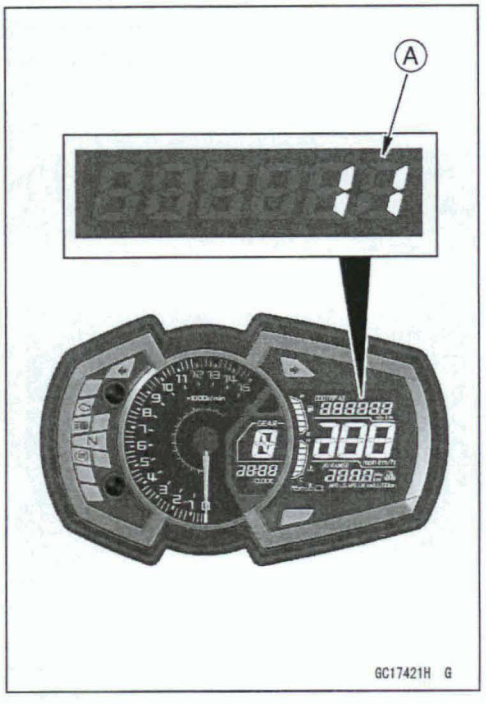
When a problem occurs with DFI system, the yellow engine warning indicator light (LED) [A] stays on after starting the engine to alert the rider.



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.

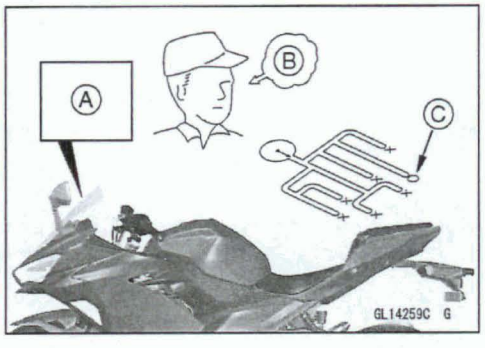
Fuel Pump
Fuel Pump Relay
ECU Main Relay



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.



Troubleshooting the DFI System

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.

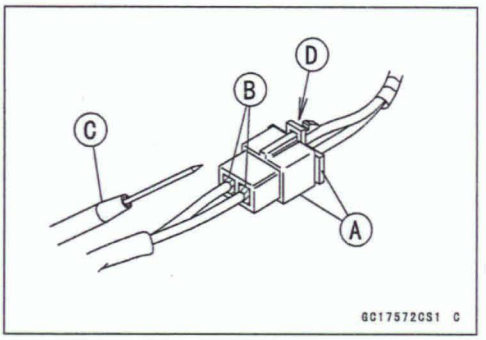
When the motorcycle is down, the vehicle-down sensor operates and the ECU shuts off the fuel pump relay, fuel injectors and ignition system. The ignition switch is left on. If the starter button is pushed, the electric starter turns but the engine does not start. To start the engine again, raise the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

- 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: 57001-1874



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

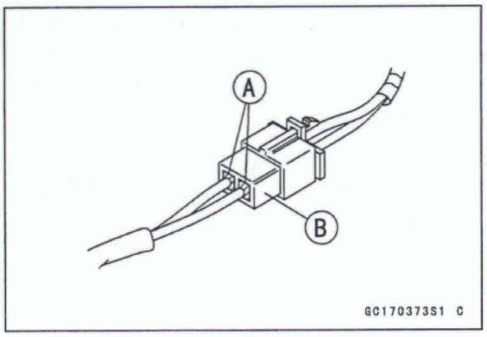
- Make sure that measuring points are correct in the connector, noting the position of the lock [D] and the lead color before measurement. Do not reverse connections of a digital meter.
- Be careful not to short-circuit the leads of the DFI or electrical system parts by contact between adapters.
- Turn 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.

Troubleshooting the DFI System

○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.

- Pull each connector [A] apart and inspect it for corrosion, dirt, and damage.

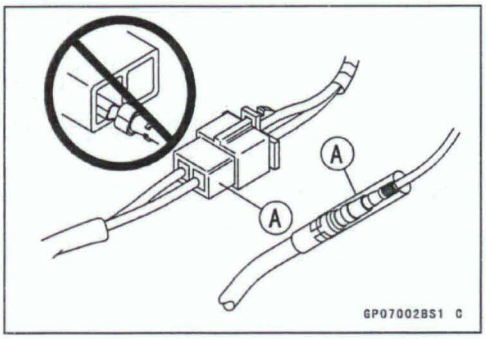
★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it. Connect the connectors securely.

- Check the wiring for continuity.

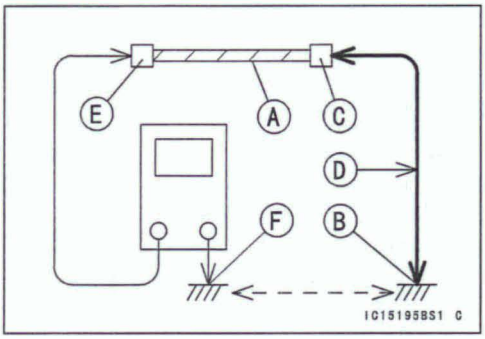
○Use the wiring diagram to find the ends of the lead which is suspected of being a problem.

○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.

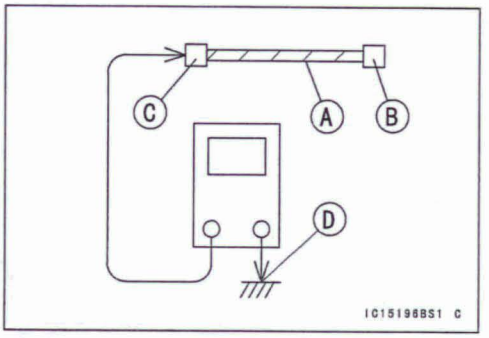


○If both ends of a harness [A] are far apart, ground [B] the one end [C], using a jumper lead [D] and check the continuity between the end [E] and the ground [F]. This enables to check a long harness for continuity. If the harness is open, repair or replace the harness.



Troubleshooting the DFI System

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



- Narrow down suspicious locations by repeating the continuity tests from the ECU connectors.

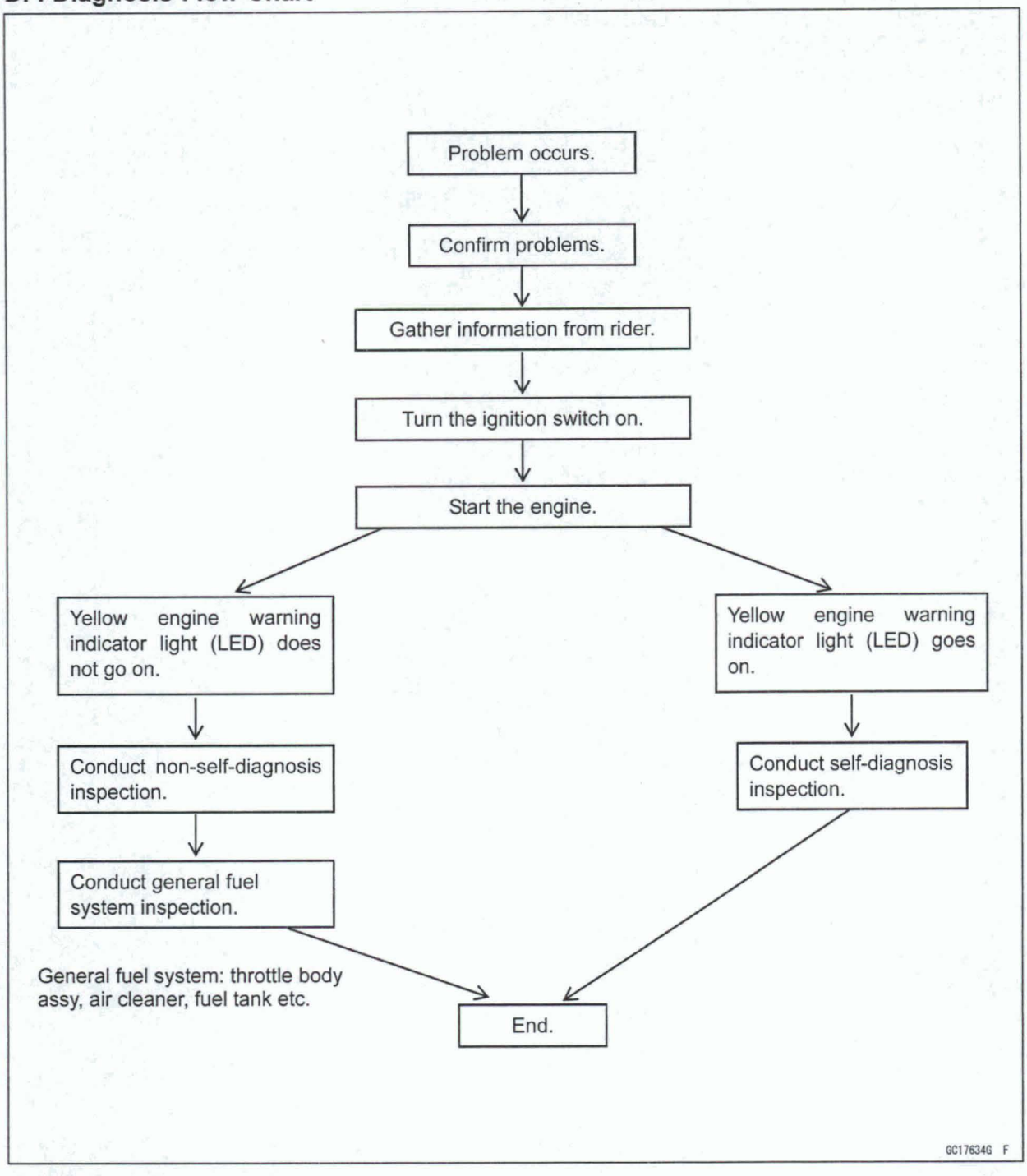
★If no abnormality is found in the wiring or connectors, the DFI parts are the next likely suspects. Check the part, starting with input and output voltages. However, there is no way to check the ECU itself.

★If an abnormality is found, replace the affected DFI part.

★If no abnormality is found in the wiring, connectors, and DFI parts, replace the ECU.

Troubleshooting the DFI System

DFI Diagnosis Flow Chart



Inquiries to Rider

- ○Each rider reacts to problems in different ways, so it is important to confirm what kind of symptoms the rider has encountered.
- ○Try to find out exactly what problem occurred under exactly what conditions by asking the rider; knowing this information may help you reproduce the problem.
- ○The following sample diagnosis sheet will help prevent you from overlooking any areas, and will help you decide if it is a DFI system problem, or a general engine problem.

Troubleshooting the DFI System

Sample Diagnosis Sheet

Rider name:	**Registration No. (license plate No.):**	**Year of initial registration:**
Model:	**Engine No.:**	**Frame No.:**
Date problem occurred:		**Mileage:**
Environment when problem occurred.		
Weather	☐ fine, ☐ cloudy, ☐ rain, ☐ snow, ☐ always, ☐ other:	
Temperature	☐ hot, ☐ warm, ☐ cold, ☐ very cold, ☐ always, ☐ other:	
Problem frequency	☐ chronic, ☐ often, ☐once	
Road	☐ street, ☐ highway, ☐ mountain road (☐ uphill, ☐ downhill), ☐ bumpy, ☐ pebble	
Altitude	☐ normal, ☐ high (about 1 000 m or more)	
Motorcycle conditions when problem occurred.		
Yellow engine warning indicator light (LED)	☐ goes on immediately after turning the ignition switch on, and goes off after starting the engine (normal)	
	☐ goes on immediately after turning the ignition switch on, goes off after about 3 seconds, and goes on again after about 10 seconds (ECU communication error)	
	☐ goes on immediately after turning the ignition switch on, and stays on after starting the engine (DFI problem)	
	☐ does not go on after turning the ignition switch on (indicator light (LED), meter unit fault)	
Red warning indicator light (LED)	☐ Does not go on about 1 second after ignition switch on (ECU or meter unit fault).	
	☐ light up (battery, oil pressure, water temperature 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.
	☐ 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.
	☐ spark plug incorrect.
	☐ knocking (fuel poor quality or incorrect).
	☐ 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 3 or 16).
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 16).
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).
Idle speed control valve actuator trouble	Inspect (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 5).
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 trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Intake air temperature sensor trouble	Inspect (see chapter 3).
Throttle sensor 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).
Throttle sensor trouble	Inspect (see chapter 3).
Idle speed control valve actuator trouble	Inspect (see chapter 3).
Engine vacuum not synchronizing	Inspect and adjust (see chapter 2).
Intake air pressure sensor 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).
Throttle sensor trouble	Inspect (see chapter 3).
Idle speed control valve actuator trouble	Inspect (see chapter 3).
Intake air pressure sensor 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).
Throttle sensor trouble	Inspect (see chapter 3).
Intake air pressure sensor 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).

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions (chapter)
Fuel injector trouble	Inspect (see chapter 3).
Throttle sensor trouble	Inspect (see chapter 3).
Intake air pressure sensor 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 line) (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).
Throttle sensor trouble	Inspect (see chapter 3).
Intake air pressure sensor 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 trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Intake air temperature sensor trouble	Inspect (see chapter 3).
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).

DFI System Troubleshooting Guide

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 5).
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 trouble	Inspect (see chapter 3).
Cracked or obstructed intake air pressure sensor vacuum hose	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).
Throttle sensor 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 trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Intake air temperature sensor trouble	Inspect (see chapter 3).
Miscellaneous:	
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).

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions (chapter)
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

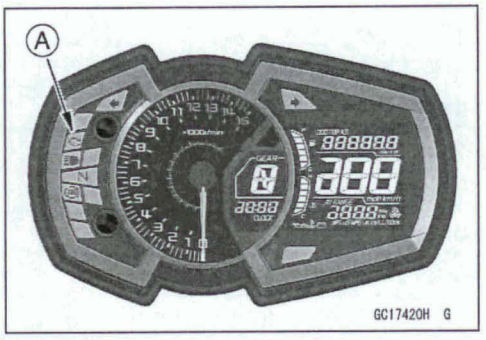
The self-diagnosis system is monitoring the following mechanisms.

DFI System and Ignition System

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

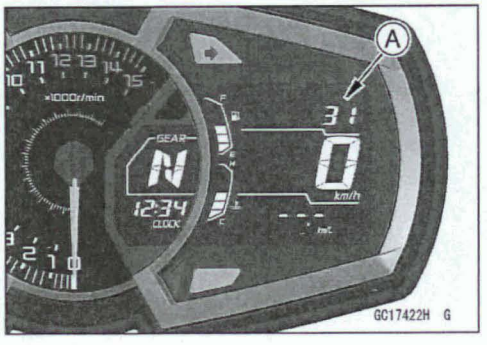
User Mode

The ECU notifies the rider of troubles in DFI system and ignition system by lighting the yellow engine warning indicator light (LED) [A] when DFI and ignition system parts are faulty, and initiates fail-safe function. In case of serious troubles, ECU stops the injection and ignition operations.



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 Procedures

NOTE

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

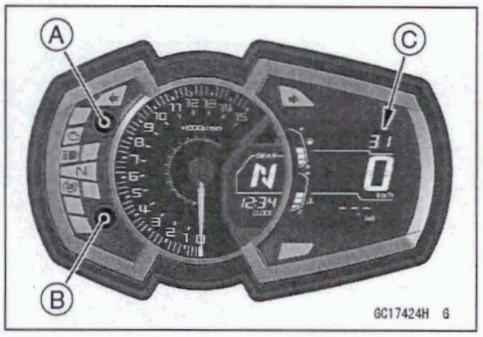
- Turn the ignition switch on and start the engine.

○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.

- Push the upper meter button [A] to display the odometer.

Self-Diagnosis

- Push the upper meter button [A] and lower meter button [B] for more than two seconds.
- The service code [C] is displayed on the LCD by the number of two digits.



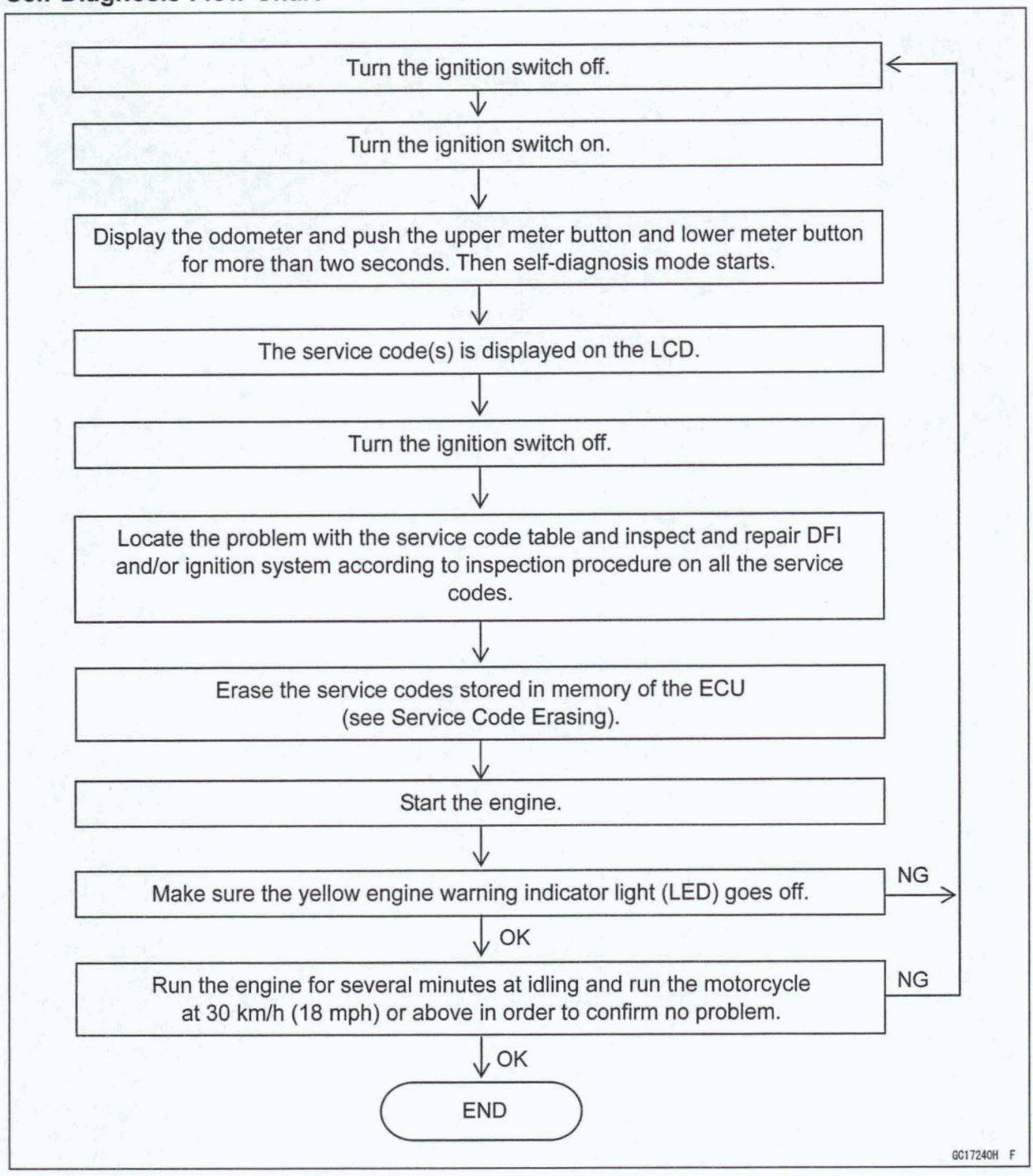
- Any of the following procedures ends self-diagnosis.

○When the service code is displayed on the LCD, push the upper meter button and lower meter button 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



Self-Diagnosis

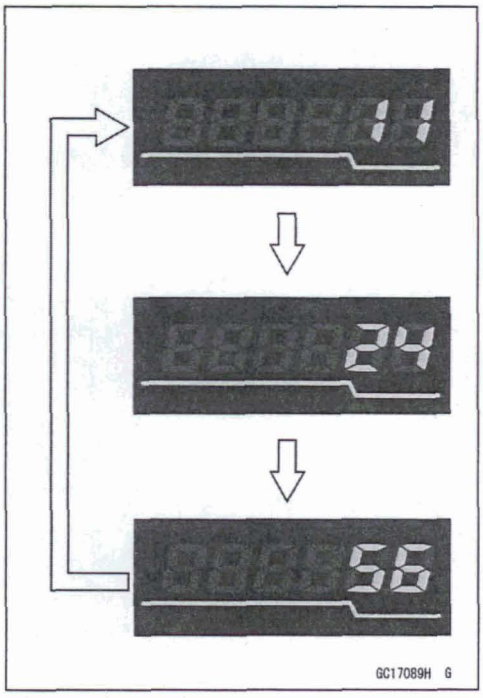
Service Code Reading

○The service code(s) is displayed on the LCD by the number of two digits.

○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 meter button and lower meter button are pushed for more than two seconds.

○For example, if three problems occurred in the order of 56, 11, 24, the service codes are displayed (each two seconds) from the lowest number in the order listed as shown. (11→24→56)→(11→24→56)→· · ·(repeated)



Service Code Erasing

● The service codes stored in memory of the ECU can be erased using Kawasaki Diagnostic System.

★If the Kawasaki Diagnostic System 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

Service Codes	DTC (Diagnostic Trouble Code)	Problems
11	P0120	Throttle sensor malfunction, wiring open or short
	P0123	
12	P0105	Intake air pressure sensor malfunction, wiring open or short
	P0106	
	P0107	
13	P0110	Intake air temperature sensor malfunction, wiring open or short
	P0112	
14	P0115	Water temperature sensor malfunction, wiring open or short
	P0117	
21	P0335	Crankshaft sensor malfunction, wiring open or short
24	P2158	Rear wheel rotation sensor malfunction, wiring open or short
25	P0914	Gear position sensor malfunction, wiring open or short
	P0915	
	P0916	
	P0917	
31	C0064	Vehicle-down sensor malfunction, wiring open or short

Self-Diagnosis

Service Codes	DTC (Diagnostic Trouble Code)	Problems
33	P0130	Oxygen sensor malfunction or inactivate, wiring open or short
	P0132	
39	–	ECU communication error
41	P0201	Fuel injector #1 malfunction, wiring open or short
42	P0202	Fuel injector #2 malfunction, wiring open or short
51	P0351	Stick coil #1 malfunction, wiring open or short
52	P0352	Stick coil #2 malfunction, wiring open or short
56	P0480	Radiator fan relay malfunction, wiring open or short
64	P0410	Air switching valve malfunction, wiring open or short
67	P0030	Oxygen sensor heater malfunction, wiring open or short
94	P0170	Fuel supply system malfunction
1C	P0508	Idle speed control valve actuator malfunction, wiring open or short
	P0509	
	P0518	
3A	P0443	Purge valve malfunction, wiring open or short (Equipped Models)

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 and the Generic Scan Tool (GST).

Backups

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

Service Codes	Parts or Function	Output Signal Usable Range or Criteria	Backups by ECU
11	Throttle Sensor	Output Voltage 0.2 ~ 4.8 V	If the 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). The ECU stops the oxygen sensor feedback mode.
12	Intake Air Pressure Sensor	Intake Air Pressure (Absolute) Pv = 150 ~ 800 mmHg	If the intake air pressure sensor 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 oxygen sensor feedback mode.
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. The ECU stops the oxygen sensor feedback mode.

Self-Diagnosis

Service Codes	Parts or Function	Output Signal Usable Range or Criteria	Backups by ECU
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. The ECU stops the oxygen sensor feedback mode.
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 50 signals to the ECU at the 1 rotation of the wheel.	–
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.
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.
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 oxygen sensor feedback mode.
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 oxygen sensor feedback mode.
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 oxygen sensor feedback mode.
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 oxygen sensor feedback mode.
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 oxygen sensor feedback mode.
56	Radiator Fan Relay	When the radiator fan relay is OFF, the relay is opened.	–

Self-Diagnosis

Service Codes	Parts or Function	Output Signal Usable Range or Criteria	Backups by ECU
64	Air Switching Valve	The air switching valve controls the flow of the secondary air by opening and shutting the solenoid valve.	–
67	Oxygen Sensor Heater	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.	–
1C	Idle Speed Control Valve Actuator	The actuator operates open and close of the bypass passage by the pulse signal from the ECU.	If the idle speed control valve actuator fails (the signal is out to the usable range, wiring open or short), the ECU stops the current to the actuator.
3A	Purge Valve (Equipped 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.

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.

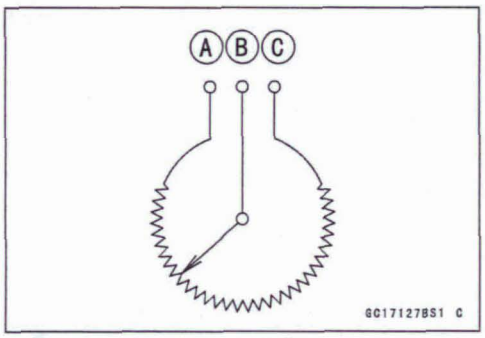
(2): α-N Method: As the engine speed increases, and the engine load turns middle to heavy, the ECU determines the injection quantity by calculating from the throttle opening (throttle sensor output voltage) and the engine speed. This method is called α-N method.

(*): This depends on the number of stopped cylinders.

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

The 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.

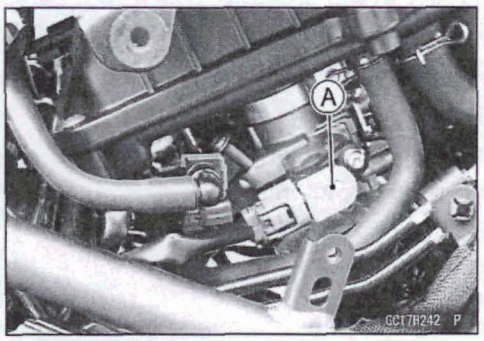
Input Terminal [A]: G
Output Terminal [B]: Y/W
Ground Terminal [C]: BR/BK



Throttle Sensor Removal/Adjustment

NOTICE

Do not remove or adjust the 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 throttle sensor can damage it.



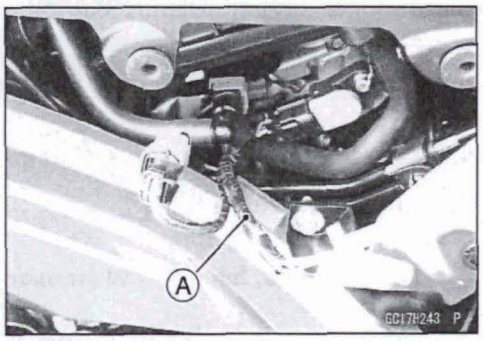
Throttle Sensor Input Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove:
  Right Side Cover (see Side Cover Removal in the Frame chapter)
- Disconnect the 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.

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

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

Input Voltage
Standard: DC 4.75 ~ 5.25 V

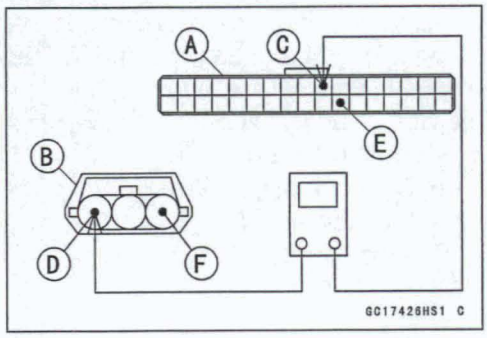
- Turn the ignition switch off.

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

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.



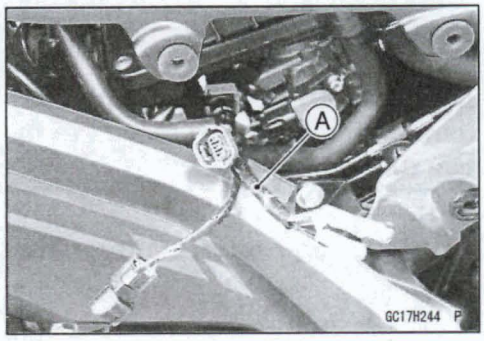
Wiring Continuity Inspection
ECU Connector [A] ←→
Throttle Sensor Connector [B]
ECU Terminal 10 [C] ←→ Sensor Terminal [D]
ECU Terminal 28 [E] ←→ Sensor Terminal [F]

★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).

Throttle Sensor Resistance Inspection

- Turn the ignition switch off.
- Remove:
  Right Side Cover (see Side Cover Removal in the Frame chapter)
- Disconnect the throttle sensor connector.
- Connect the setting adapter [A] to the sensor connector only.



Special Tool - Throttle Sensor Setting Adapter: 57001 -1538

- Measure the throttle sensor resistance.

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

Standard: 4 ~ 6 kΩ

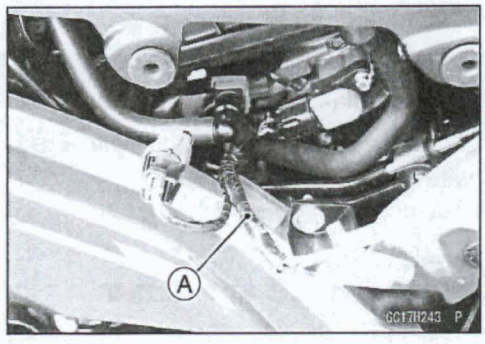
★If the reading is out of the standard, replace the throttle body assy (see Throttle Body Assy Removal/Installation).

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

Throttle Sensor Output Voltage Inspection

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

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



Special Tool - Throttle Sensor Setting Adapter: 57001 -1538

Throttle Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → R (sensor Y/W) lead
Digital Meter (–) → W (sensor BR/BK) 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: 1 300 ±50 r/min (rpm)

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 1.00 ~ 1.02 V at idle throttle opening

DC 4.07 ~ 4.55 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.

1.00 × 4.75 ÷ 5.00 = 0.950 V

1.02 × 4.75 ÷ 5.00 = 0.969 V

Thus, the valid range is 0.950 ~ 0.969 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, 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] ←→

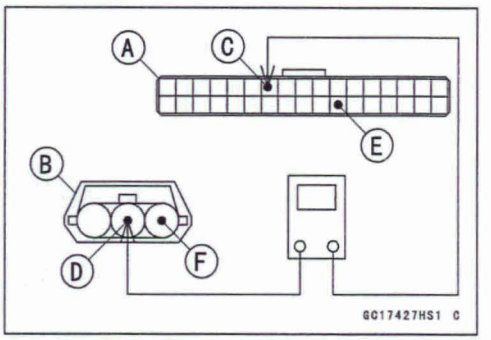
Throttle Sensor Connector [B]

ECU Terminal 7 [C] ←→ Sensor Terminal [D]

ECU Terminal 28 [E] ←→ Sensor Terminal [F]

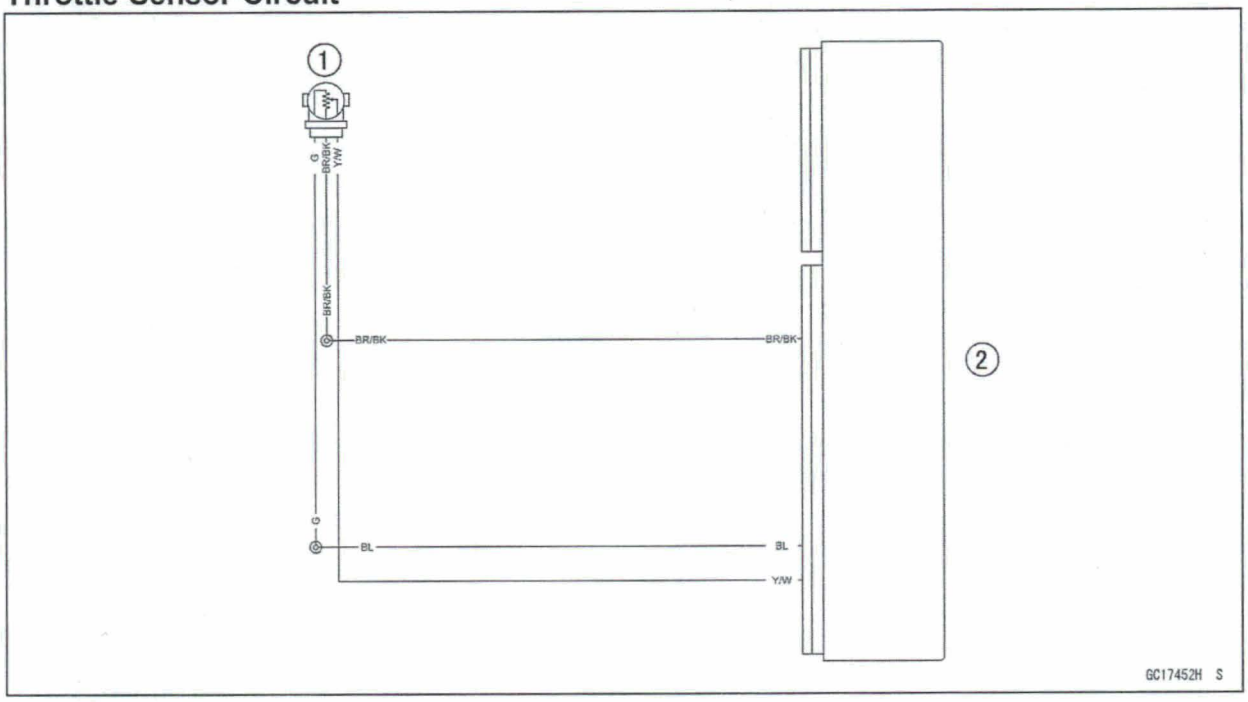
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

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



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

Throttle Sensor Circuit

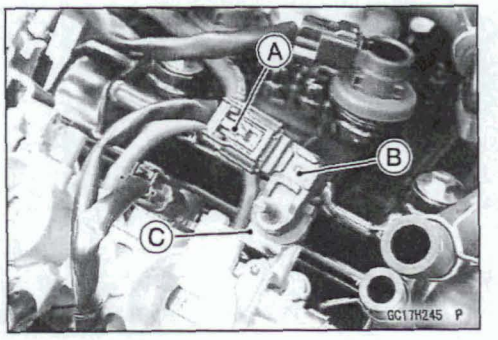


1. Throttle Sensor
2. ECU

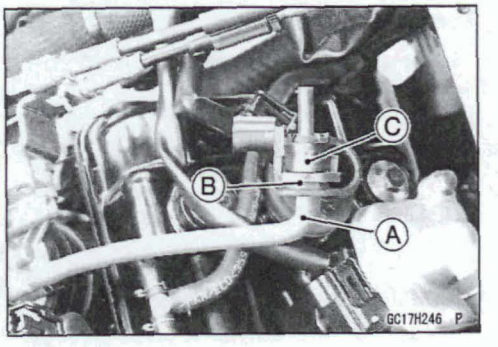
Intake Air Pressure Sensor (Service Code 12) (DTC P0105, P0106, P0107)

Intake Air Pressure Sensor Removal

NOTICE
Never drop the intake air pressure sensor especially on a hard surface. Such a shock to the sensor can damage it.



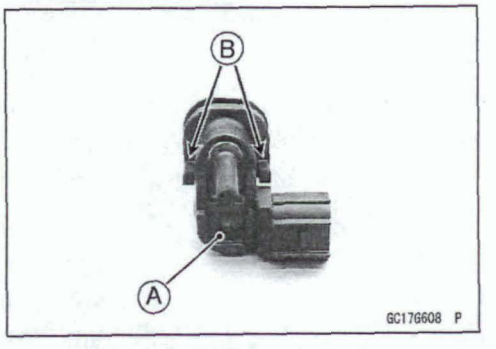
- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal)
- Disconnect:
  Intake Air Pressure Sensor Connector [A]
- Remove the intake air pressure sensor [B] from the bracket [C].



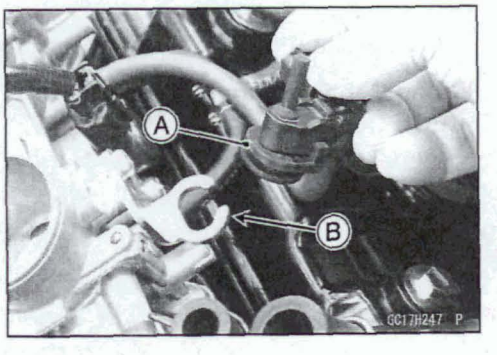
- Disconnect the vacuum hose [A].
- Remove the rubber damper [B] from the intake air pressure sensor [C].

Intake Air Pressure Sensor Installation

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

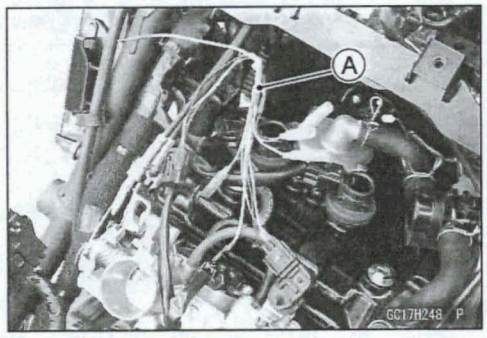


- Install the rubber damper [A] on the bracket [B].



Intake Air Pressure Sensor (Service Code 12) (DTC P0105, P0106, P0107)

Intake Air Pressure Sensor Input Voltage Inspection



NOTE

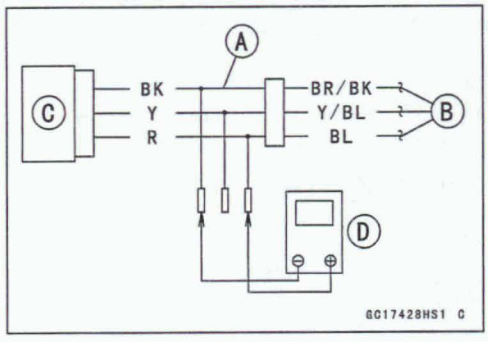
○*Be sure the battery is fully charged.*

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

Special Tool - Measuring Adapter: 57001-1700

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

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



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

Input Voltage
Standard: DC 4.75 ~ 5.25 V

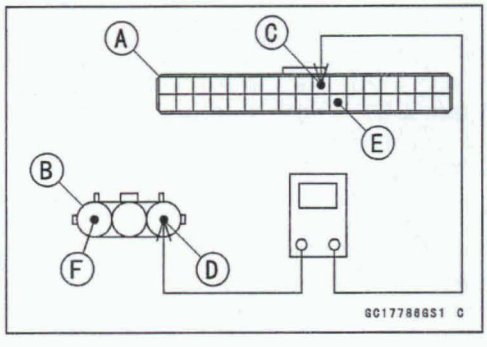
- Turn the ignition switch off.

★If the reading is within the standard, check the output voltage (see Intake Air Pressure Sensor 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 Connector [B]
ECU Terminal 10 [C] ←→ Sensor Terminal [D]
ECU Terminal 28 [E] ←→ Sensor Terminal [F]

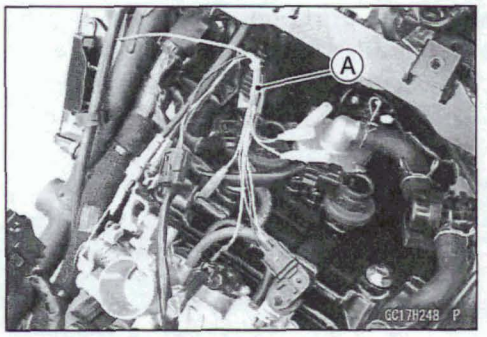


★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

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

Intake Air Pressure Sensor (Service Code 12) (DTC P0105, P0106, P0107)

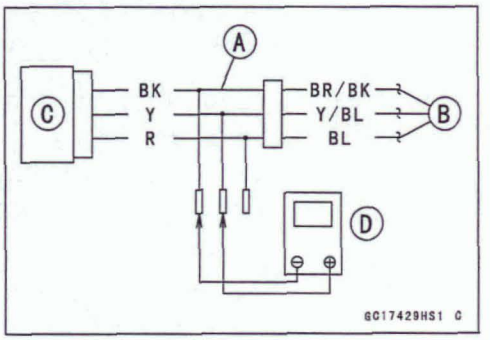
Intake Air Pressure Sensor Output Voltage Inspection



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

○Disconnect the intake air pressure sensor connector and connect the measuring adapter [A] between these connectors.
Main Harness [B]
Intake Air Pressure Sensor [C]
Digital Meter [D]

Special Tool - Measuring Adapter: 57001-1700



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

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

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

NOTE

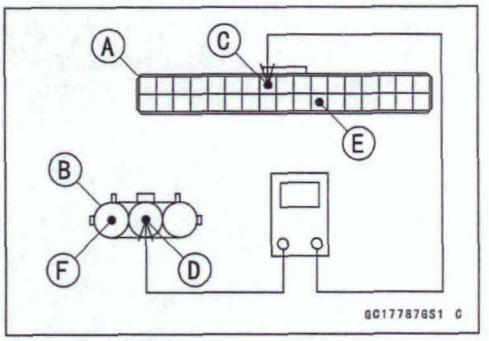
○*The output voltage changes according to the local atmospheric pressure.*

- Turn the ignition switch off.

★If the reading is out of the usable range, replace the sensor (see Intake Air Pressure Sensor Removal/Installation).

★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 Connector [B]
ECU Terminal 8 [C] ←→ Sensor Terminal [D]
ECU Terminal 28 [E] ←→ Sensor Terminal [F]

Intake Air Pressure Sensor (Service Code 12) (DTC P0105, P0106, P0107)

★If the wiring is good, check the sensor for various vacuum.
- Remove the intake air pressure sensor [A] and disconnect the vacuum hose from the sensor.
- Connect an auxiliary hose [B] to the intake air pressure sensor.
- Temporarily install the intake air pressure sensor.

○Connect a digital meter [C], vacuum gauge [D], the fork oil level gauge [E] and the measuring adapter to the intake air pressure sensor.

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

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

○Turn the ignition switch on.
○Measure the intake air pressure sensor output voltage from various vacuum readings, while pulling the handle of the fork oil level gauge.
○Check the intake air pressure sensor 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)

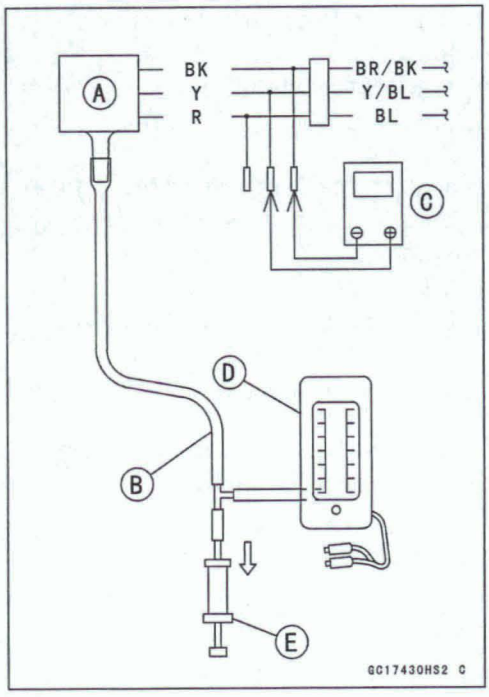
then
Pv = Pl + Pg

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)

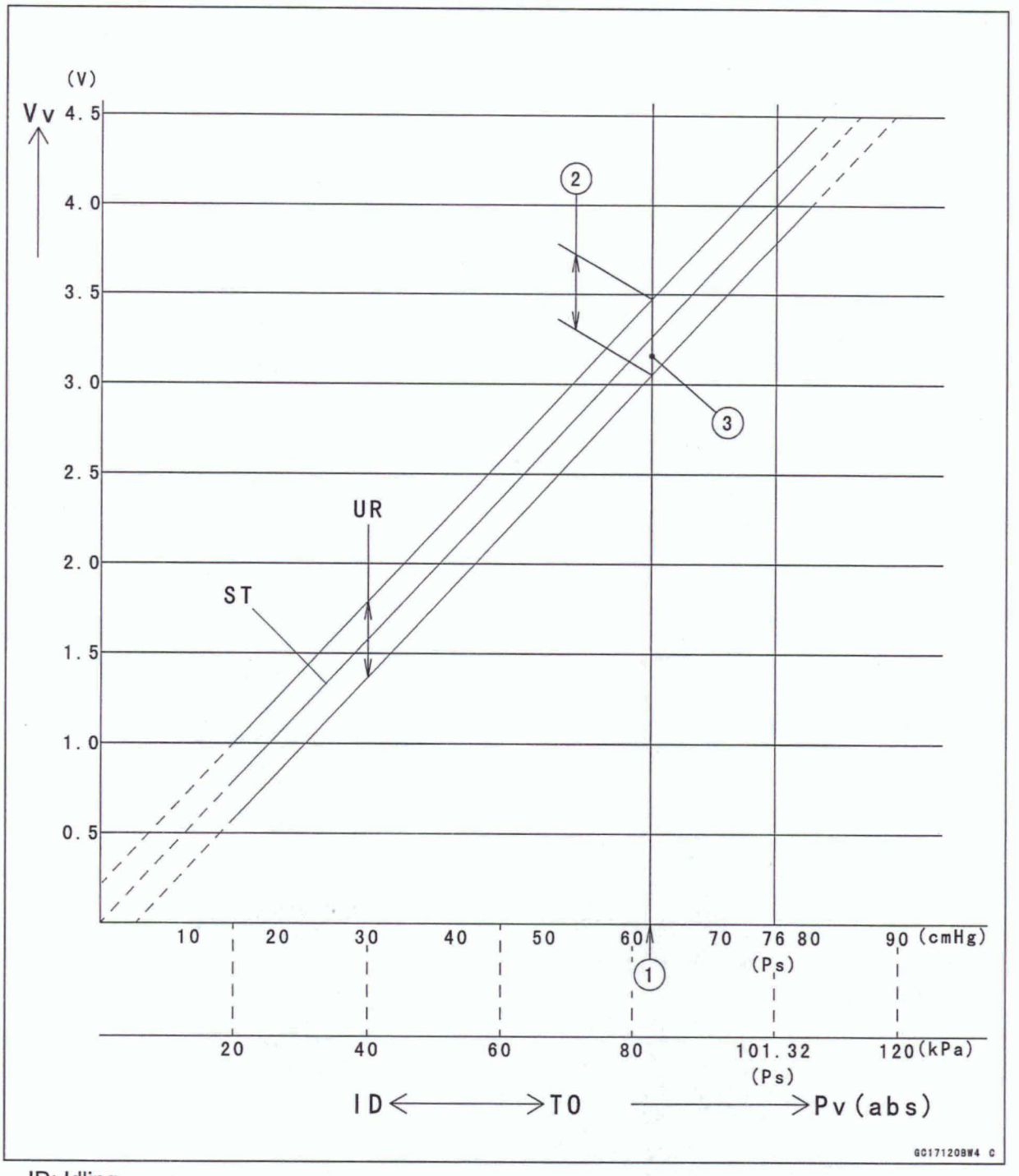
then
Pv = 70 + (–8) = 62 cmHg (Absolute)

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 (see Intake Air Pressure Sensor Removal/Installation).
★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).



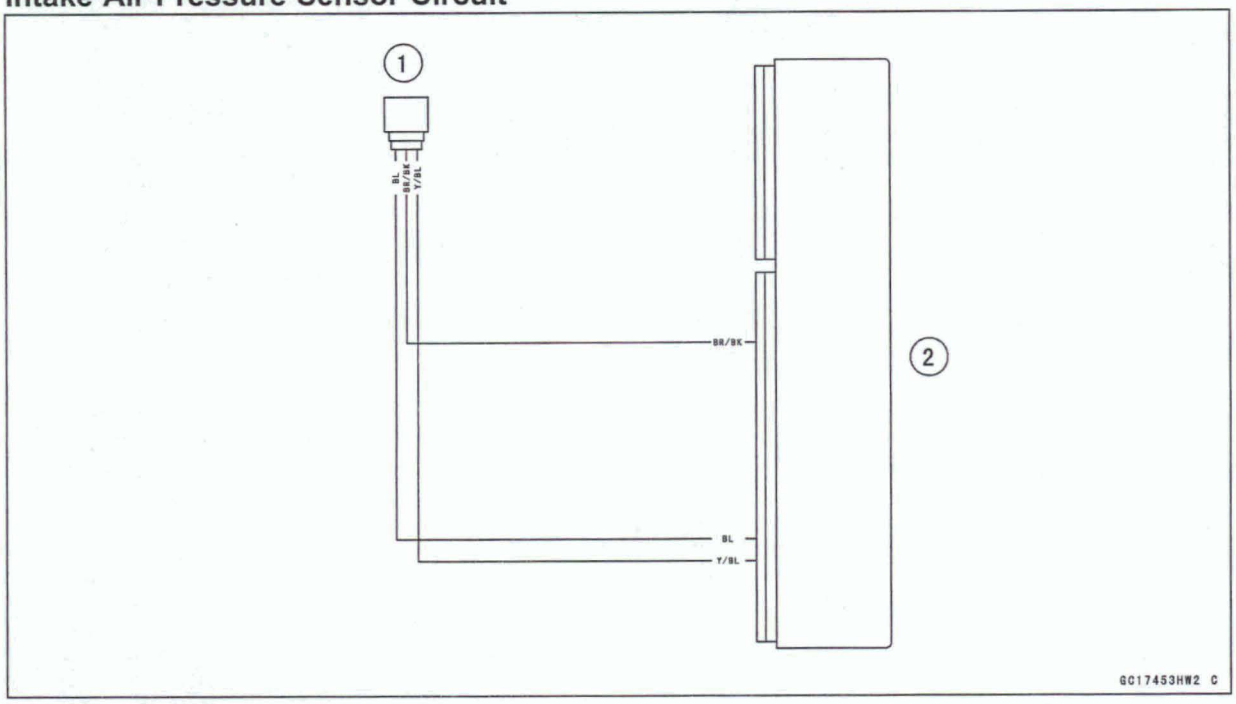
Intake Air Pressure Sensor (Service Code 12) (DTC P0105, P0106, P0107)



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 Output Voltage (V) (Digital Meter Reading)

Intake Air Pressure Sensor (Service Code 12) (DTC P0105, P0106, P0107)

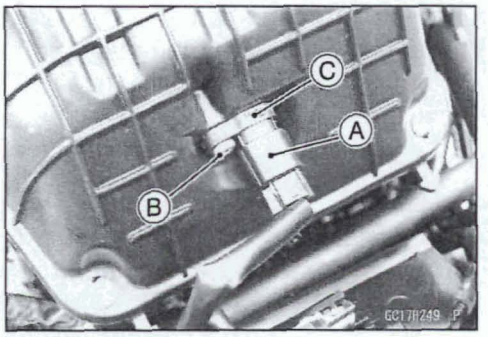
Intake Air Pressure Sensor Circuit



1. Intake Air Pressure Sensor
2. ECU

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

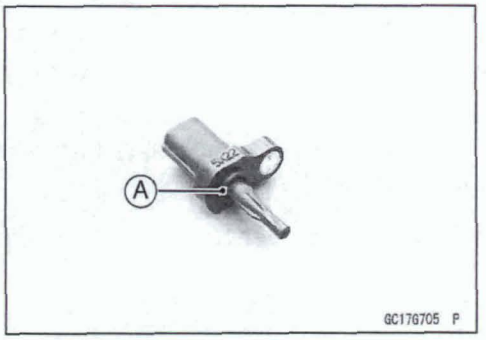
Intake Air Temperature Sensor Removal/Installation



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]

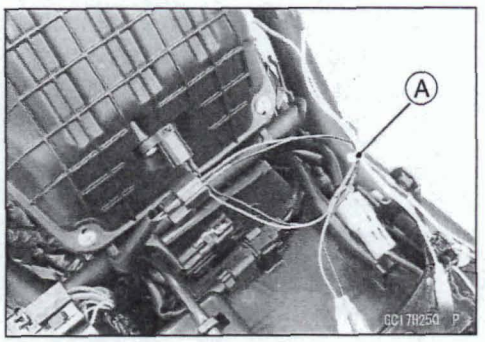


- Be sure to install the O-ring [A].
- Install the intake air temperature sensor.
- Tighten:

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 removed parts (see appropriate chapters).

Intake Air Temperature Sensor Output Voltage Inspection

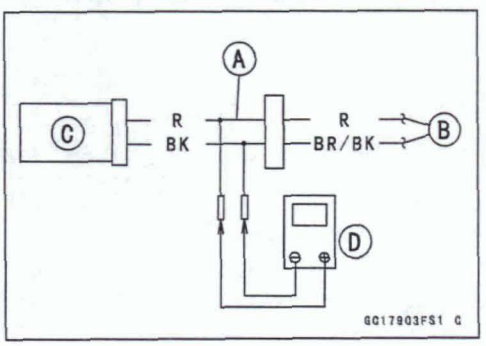


NOTE

○*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 (see Water Temperature Sensor Removal/Inspection).
- 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 Output Voltage
Connections to Adapter:

Digital Meter (+) → R (sensor R) lead

Digital Meter (–) → BK (sensor BR/BK) lead

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

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

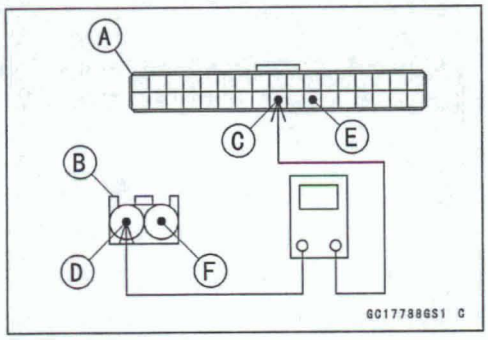
- Turn the ignition switch off.

★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]

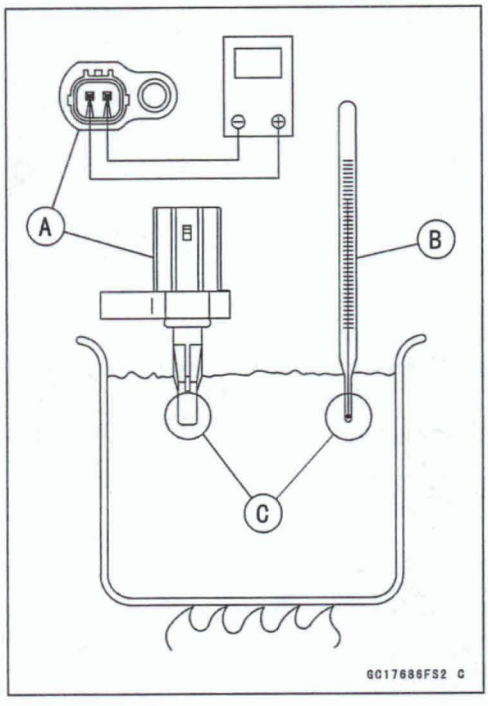
ECU Terminal 26 [C] ←→ Sensor Terminal [D]

ECU Terminal 28 [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 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)

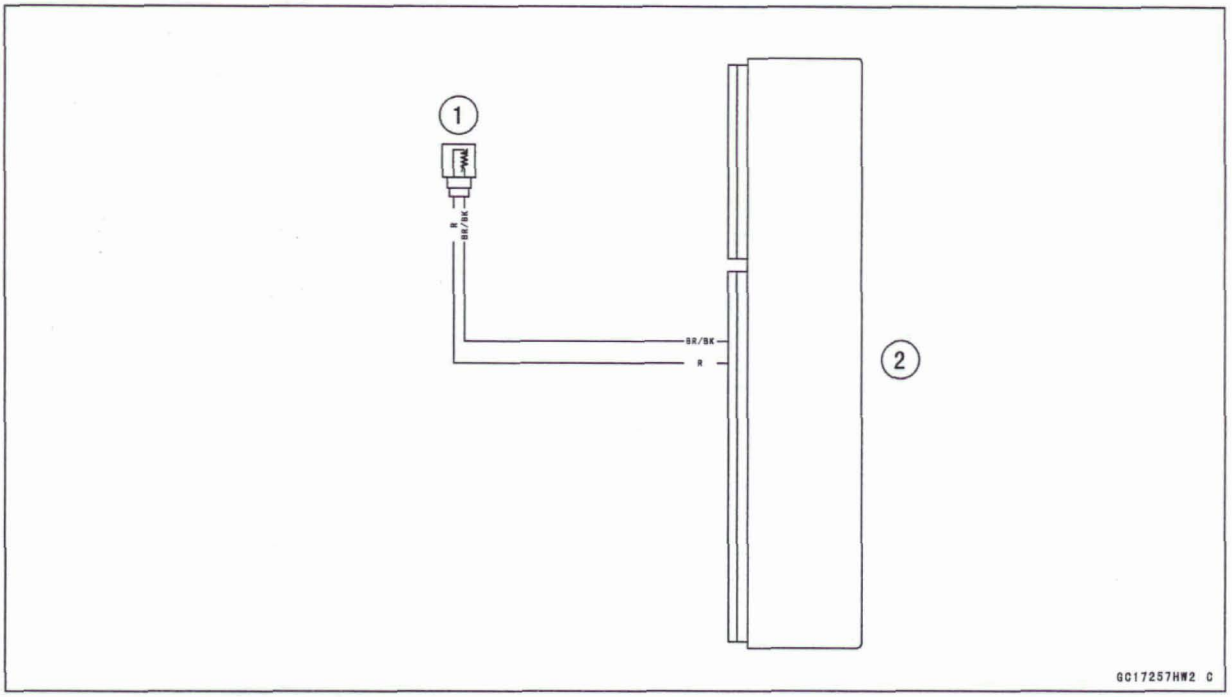
0.29 ~ 0.39 kΩ @80°C (176°F)

★If the reading is out of the standard, replace the sensor (see Intake Air Temperature Sensor Removal/Installation).

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

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

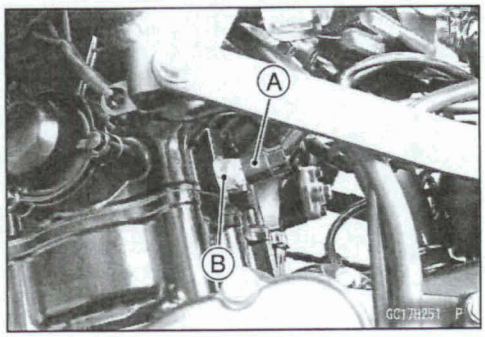
Intake Air Temperature Sensor Circuit



1. Intake Air Temperature Sensor
2. ECU

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.

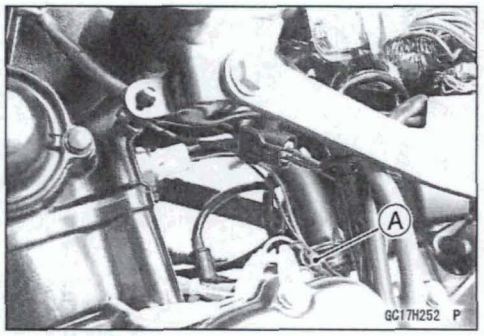
- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove:
  Left Middle Fairing (see Middle Fairing Removal in the Frame chapter)
- Disconnect:
  Water Temperature Sensor Connector [A]
- Remove:
  Water Temperature Sensor [B] with O-ring
- Replace the O-ring with a new one.
- 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 (Service Code 14) (DTC P0115, P0117)

Water Temperature Sensor Output Voltage Inspection

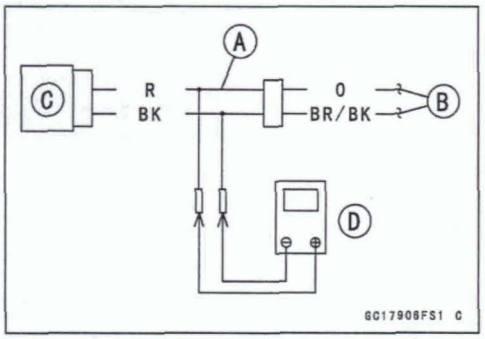


NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Disconnect the water temperature sensor connector (see Water Temperature Sensor Removal/Installation).
- Connect the measuring adapter [A] between these connectors as shown.
  Main Harness [B]
  Water Temperature Sensor [C]

Special Tool - Measuring Adapter: 57001-1700



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

Water Temperature Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → R (sensor O) lead
Digital Meter (–) → BK (sensor BR/BK) lead

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

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

NOTE

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

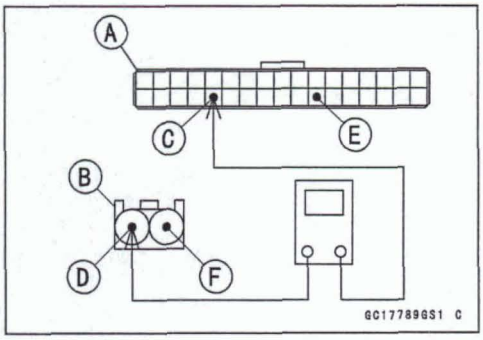
- Turn the ignition switch off.

★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] ←→
Water Temperature Sensor Connector [B]
ECU Terminal 22 [C] ←→ Sensor Terminal [D]
ECU Terminal 28 [E] ←→ Sensor Terminal [F]

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

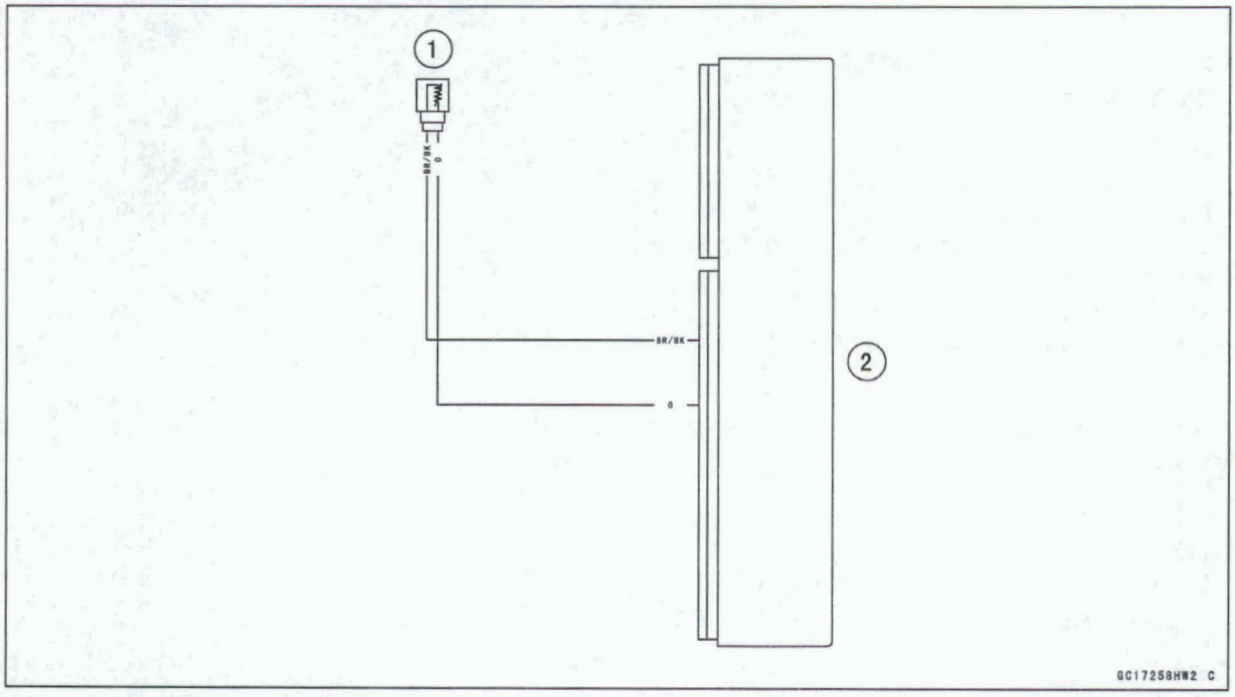
Water Temperature Sensor Resistance Inspection

- 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. Water Temperature Sensor
2. ECU

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] ←→

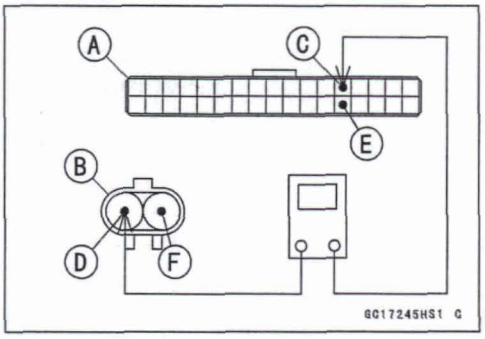
Crankshaft Sensor Connector [B]

ECU Terminal 13 [C] ←→ Sensor Terminal [D]

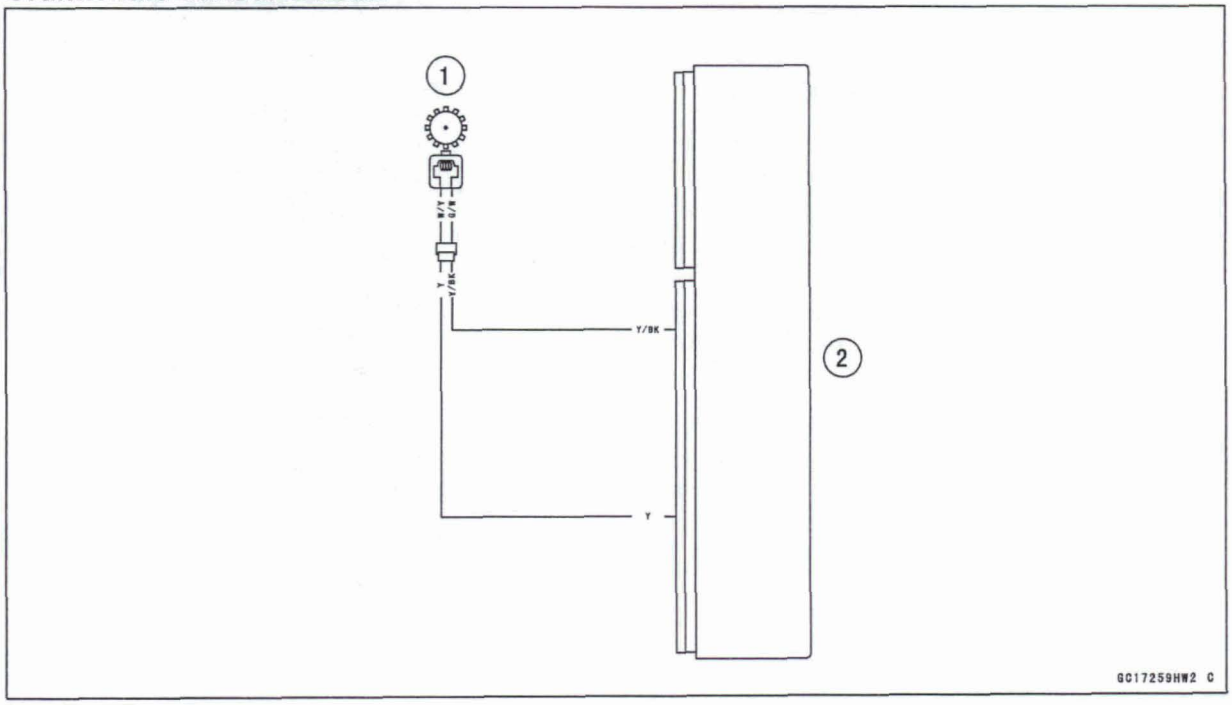
ECU Terminal 30 [E] ←→ Sensor Terminal [F]

★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. Crankshaft Sensor
2. ECU

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 (ABS equipped models). For other than ABS equipped models, the signal is sent directly to the ECU.

○The ECU uses the rear wheel rotation sensor signal for motorcycle speed.

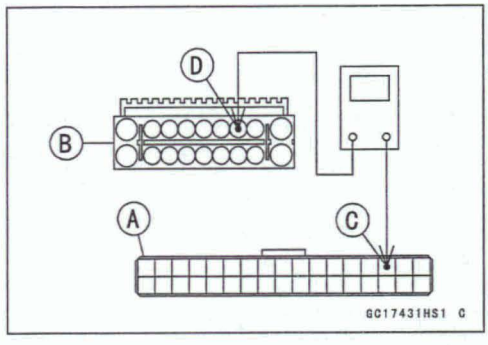
○The service code 24/DTC P2158 is detected with the ECU.

- 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).

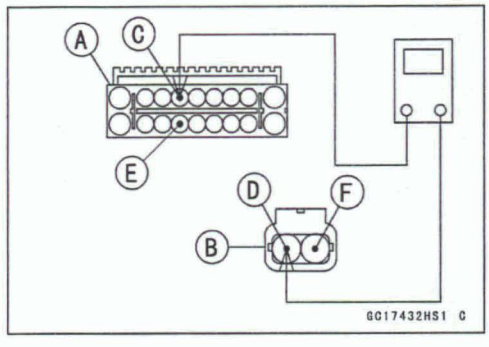
- When service code 24/DTC P2158 is displayed, do the following inspection procedures.
- Disconnect:
  ECU Connectors (see ECU Removal)
  Rear Wheel Rotation Sensor Lead Connector (see Rear Wheel Rotation Sensor Removal in the Brakes chapter)
  ABS Hydraulic Unit Connector (see ABS Hydraulic Unit Removal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

- For ABS equipped models, check the wiring for continuity between main harness connectors.

Wiring Continuity Inspection
ECU Connector [A] ← →
ABS Hydraulic Unit Connector [B]
ECU Terminal 15 [C] ← → ABS Hydraulic Unit Terminal 3 [D]



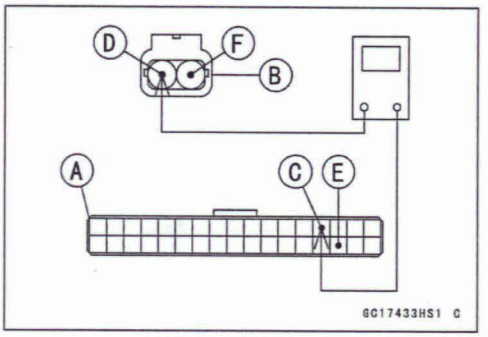
Wiring Continuity Inspection
ABS Hydraulic Unit Connector [A] ← →
Rear Wheel Rotation Sensor Connector [B]
ABS Hydraulic Unit Connector Terminal 6 [C] ←→ Sensor Terminal [D]
ABS Hydraulic Unit Connector Terminal 15 [E] ←→ Sensor Terminal [F]



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

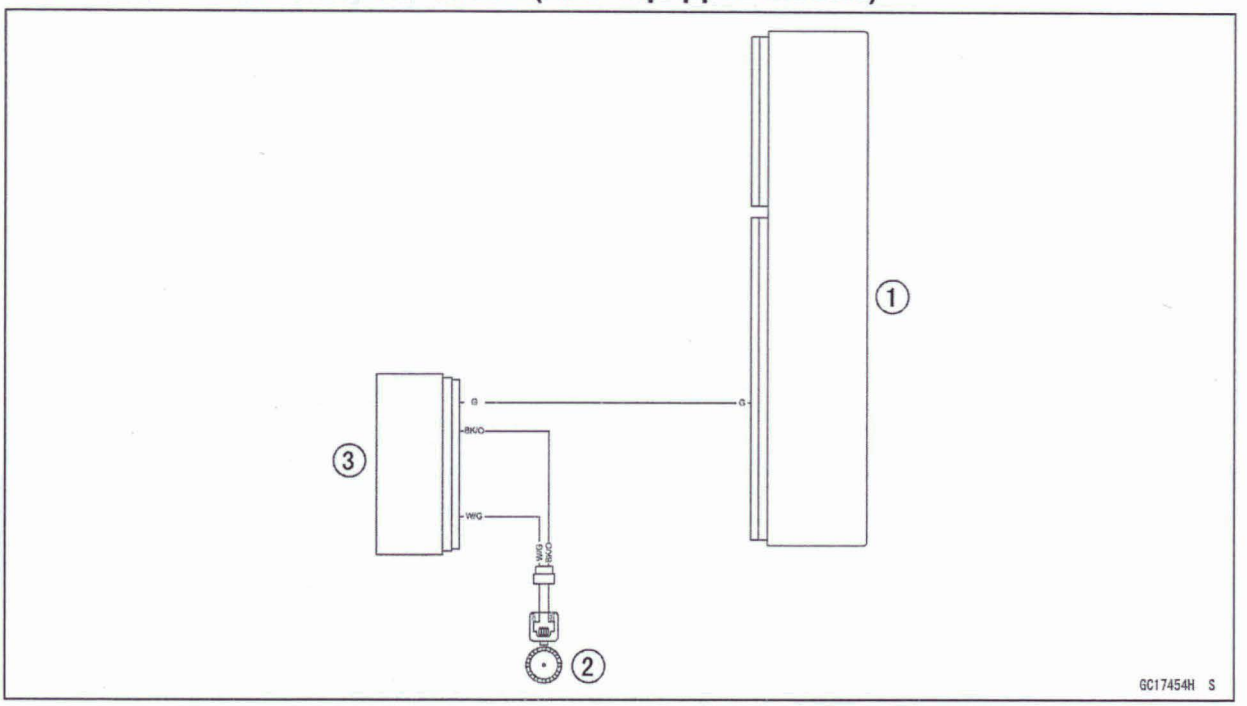
- For other than ABS equipped models, check the wiring for continuity between main harness connectors.

Wiring Continuity Inspection
ECU Connector [A] ← →
Rear Wheel Rotation Sensor Connector [B]
ECU Terminal 14 [C] ←→ Sensor Terminal [D]
ECU Terminal 32 [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).

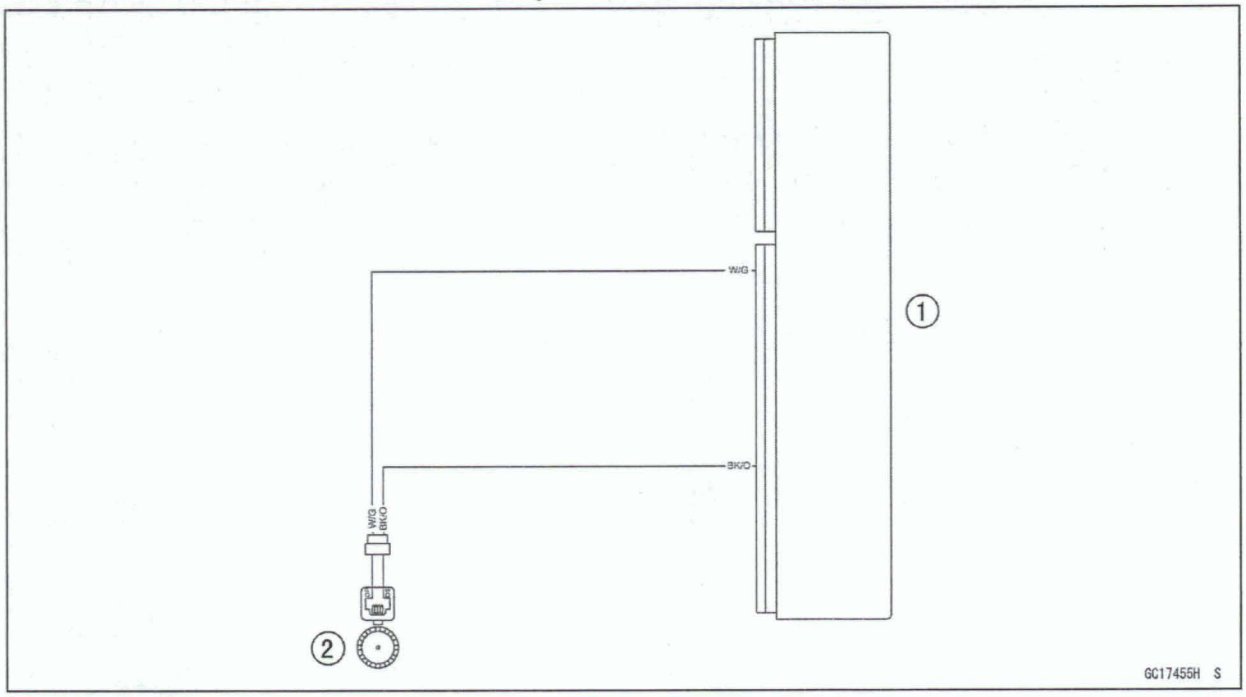
Rear Wheel Rotation Sensor Circuit (ABS Equipped Models)



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

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

Rear Wheel Rotation Sensor Circuit (other than ABS Equipped Models)



1. ECU
2. Rear Wheel Rotation Sensor

Gear Position Sensor (Service Code 25) (DTC P0914, P0915, P0916, P0917)

Gear Position Sensor Removal/Installation

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

Gear Position Sensor Input Voltage Inspection

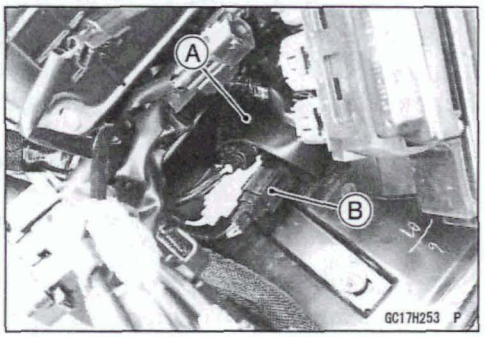
NOTE

○*Be sure the battery is fully charged.*

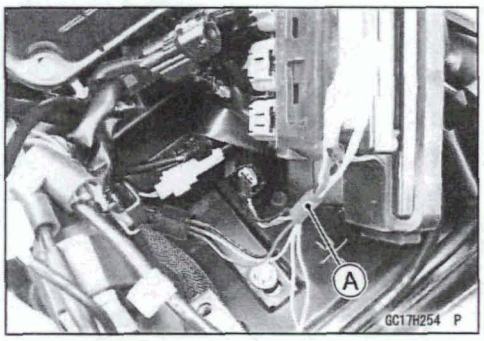
- Turn the ignition switch off.
- Remove:
  Battery Case Cover (see Battery Case Cover Removal in the Frame chapter)
  ECU (see ECU Removal)

○Do not disconnect the ECU connector.

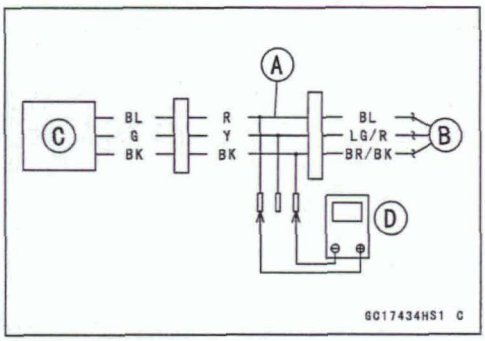
- Slide the rubber boot [A].
- Disconnect:
  Gear Position Sensor Connector [B]



- Connect the suitable measuring lead [A] between the main harness connector and gear position sensor connector.
  Main Harness [B]
  Gear Position Sensor [C]
- Temporarily install the battery (see Battery Installation in the Electrical System chapter)
- Connect a digital meter [D] to the measuring leads.



Gear Position Sensor Input Voltage
Connections to Adapter:
Digital Meter (+) → R (sensor BL) lead
Digital Meter (–) → BK (sensor BR/BK) lead



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

Input Voltage
Standard: DC 4.75 ~ 5.25 V

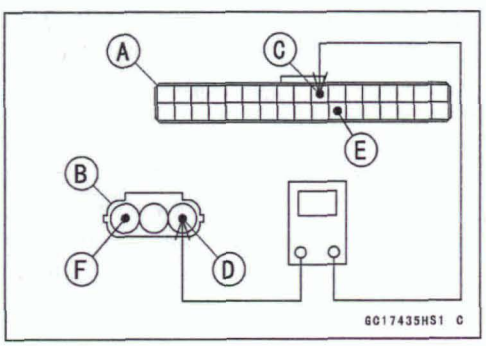
- Turn the ignition switch off.

★If the reading is within the standard, check the output voltage (see 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 harness connectors.

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ← →
Gear Position Sensor Connector [B]
ECU Terminal 10 [C] ←→ Sensor Terminal [D]
ECU Terminal 28 [E] ←→ Sensor Terminal [F]

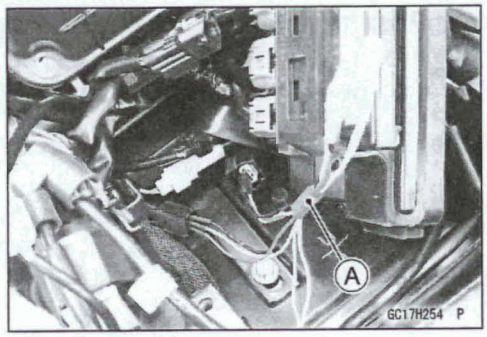


★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

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

Gear Position Sensor (Service Code 25) (DTC P0914, P0915, P0916, P0917)

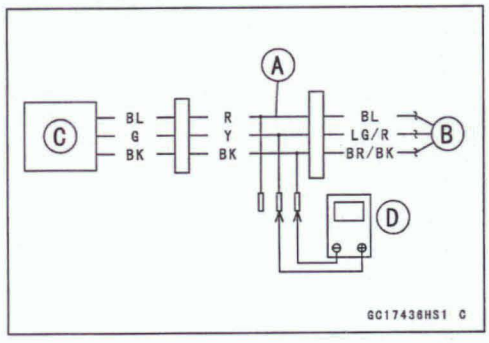
Gear Position Sensor Output Voltage Inspection



- Remove the gear position sensor (see Gear Position Sensor Removal in the Electrical System chapter).
- Measure the output voltage at the gear position sensor in the same way as input voltage inspection, note the following.

○Connect the suitable measuring lead [A] between these connectors.
Main Harness [B]
Gear Position Sensor [C]
Digital Meter [D]

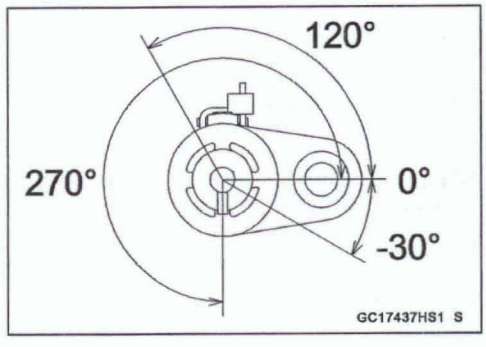
Gear Position Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → Y (sensor G) lead
Digital Meter (–) → BK (sensor BK) lead



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

Output Voltage

Angle	Output Voltage (V)
–30°	0.4 ~ 0.6
120°	2.4 ~ 2.6
270°	4.4 ~ 4.6



NOTE

○*This figure shows 270°.*
○*Rotate the gear position sensor, confirm the output voltage will be raise or lower.*

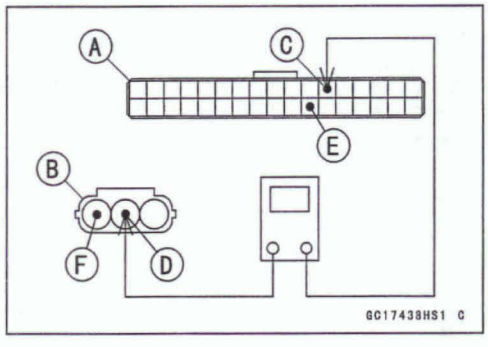
- Turn the ignition switch off.

★If the reading is out of the standard, replace the gear position sensor (see Gear Position Sensor Removal/Installation 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] ← →
Gear Position Sensor Connector [B]
ECU Terminal 12 [C] ←→ Sensor Terminal [D]
ECU Terminal 28 [E] ←→ Sensor Terminal [F]

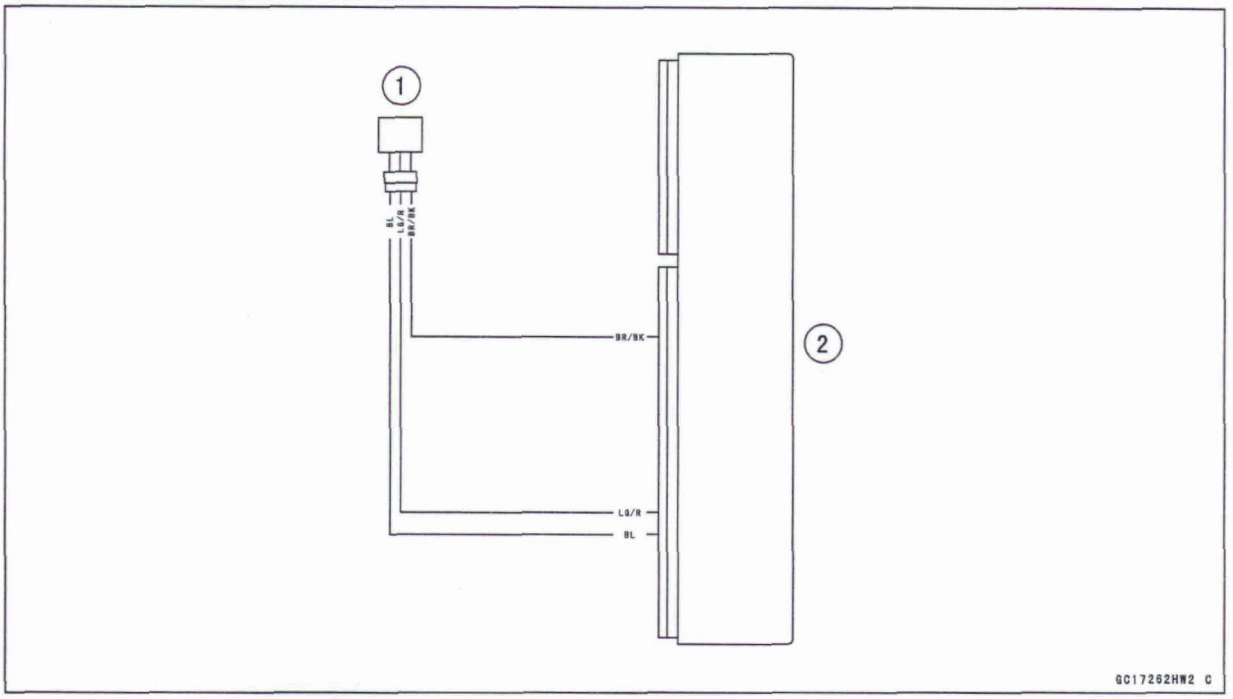


★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

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

Gear Position Sensor (Service Code 25) (DTC P0914, P0915, P0916, P0917)

Gear Position Sensor Circuit



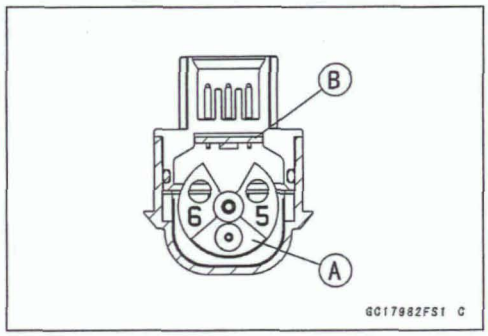
1. Gear Position Sensor
2. ECU

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

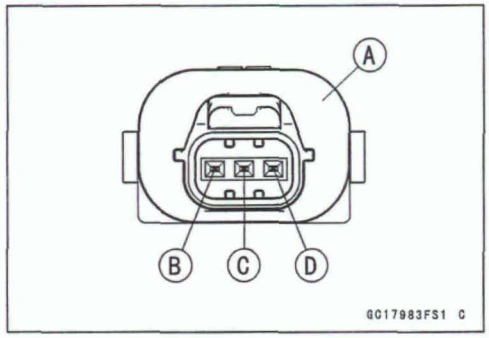
This sensor has a weight [A] with two magnets inside, and sends a signal to the ECU. But when the motorcycle banks 60 ~ 70° or more to either side (in fact falls down), the weight turns and the signal changes. The ECU senses this change, and stops the fuel pump relay, the fuel injectors and the ignition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



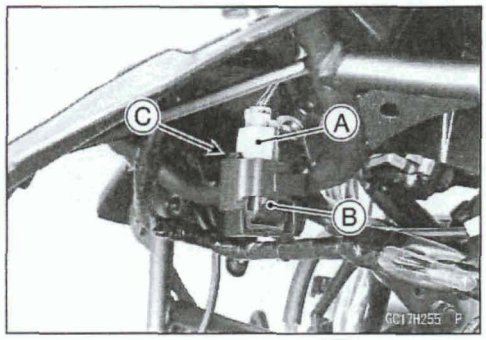
Vehicle-down Sensor [A]
Ground Terminal [B]: BR/BK
Output Terminal [C]: Y/G
Power Source Terminal [D]: G



Vehicle-down Sensor Removal

NOTICE

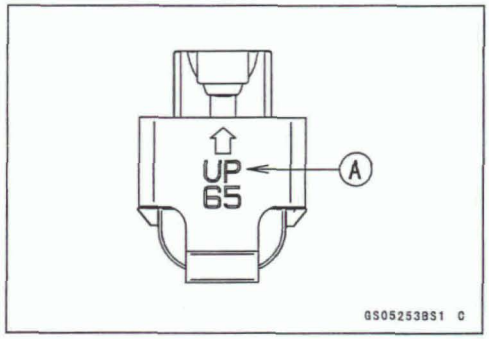
Never drop the vehicle-down sensor especially on a hard surface. Such a shock to the sensor can damage it.



- *Remove:*
  Upper Fairing (see Upper Fairing Removal in the Frame chapter)
- Disconnect the vehicle-down sensor connector [A].
- Pull up the vehicle-down sensor [B] with rubber protector to clear the projection [C].

Vehicle-down Sensor Installation

- Installation is the reverse of removal.
- The UP mark [A] of the sensor should face upward.



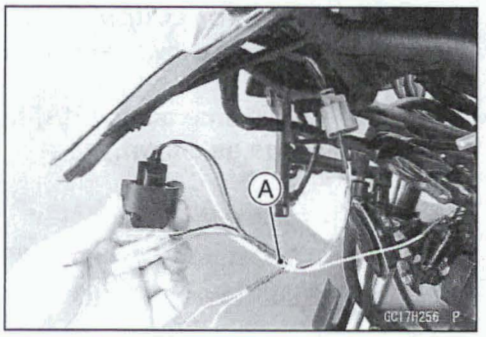
⚠ WARNING

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

- Install the removed parts (see appropriate chapters).

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

Vehicle-down Sensor Input Voltage Inspection



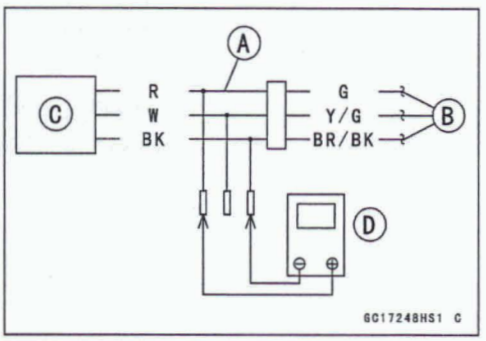
NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove:
  Upper Fairing (see Upper Fairing Removal in the Frame chapter)
- 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 G) lead
Digital Meter (–) → BK (sensor BR/BK) lead

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

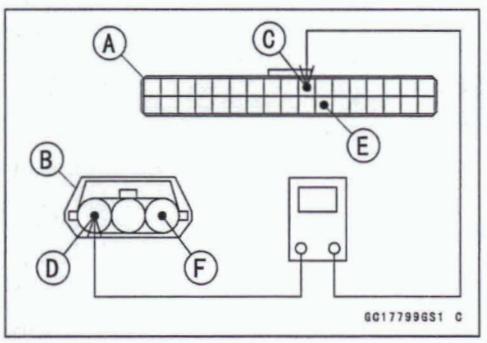
Input Voltage
Standard: DC 4.75 ~ 5.25 V

- Turn the ignition switch off.

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

★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 10 [C] ←→ Sensor Terminal [D]
ECU Terminal 28 [E] ←→ Sensor Terminal [F]

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

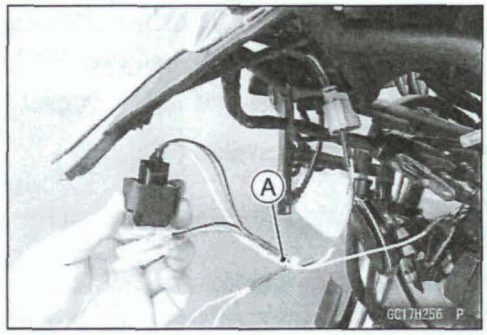
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

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

Vehicle-down Sensor Output Voltage Inspection

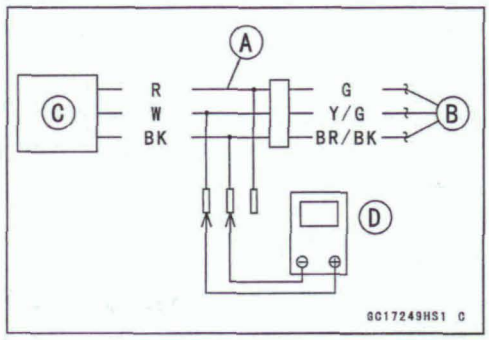
- Remove the vehicle-down sensor (see Vehicle-down Sensor Removal).
- Connect the measuring adapter [A] to the vehicle-down sensor connectors as shown.
  Main Harness [B]
  Vehicle-down Sensor [C]

Special Tool - Measuring Adapter: 57001-1700



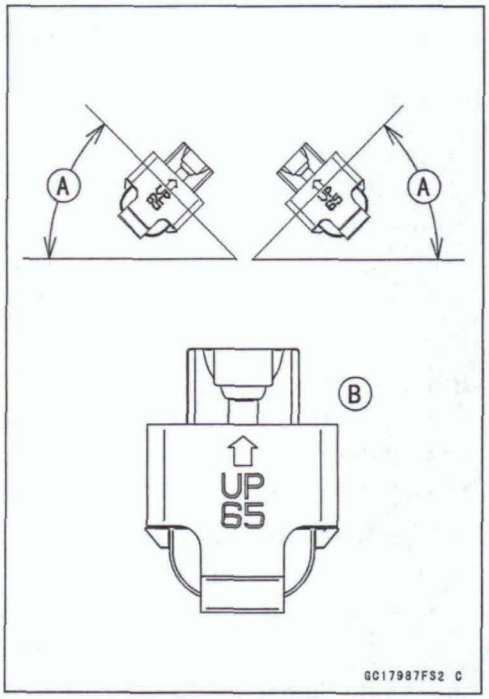
- Connect a digital meter [D] to the measuring adapter leads.

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



- 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 (see Vehicle-down Sensor Removal/Installation).

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

★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.

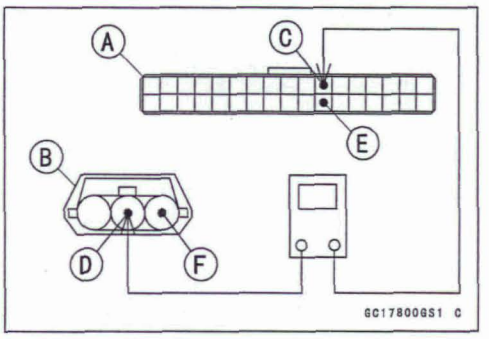
Wiring Continuity Inspection

ECU Connector [A] ←→

Vehicle-down Sensor Connector [B]

ECU Terminal 11 [C] ←→ Sensor Terminal [D]

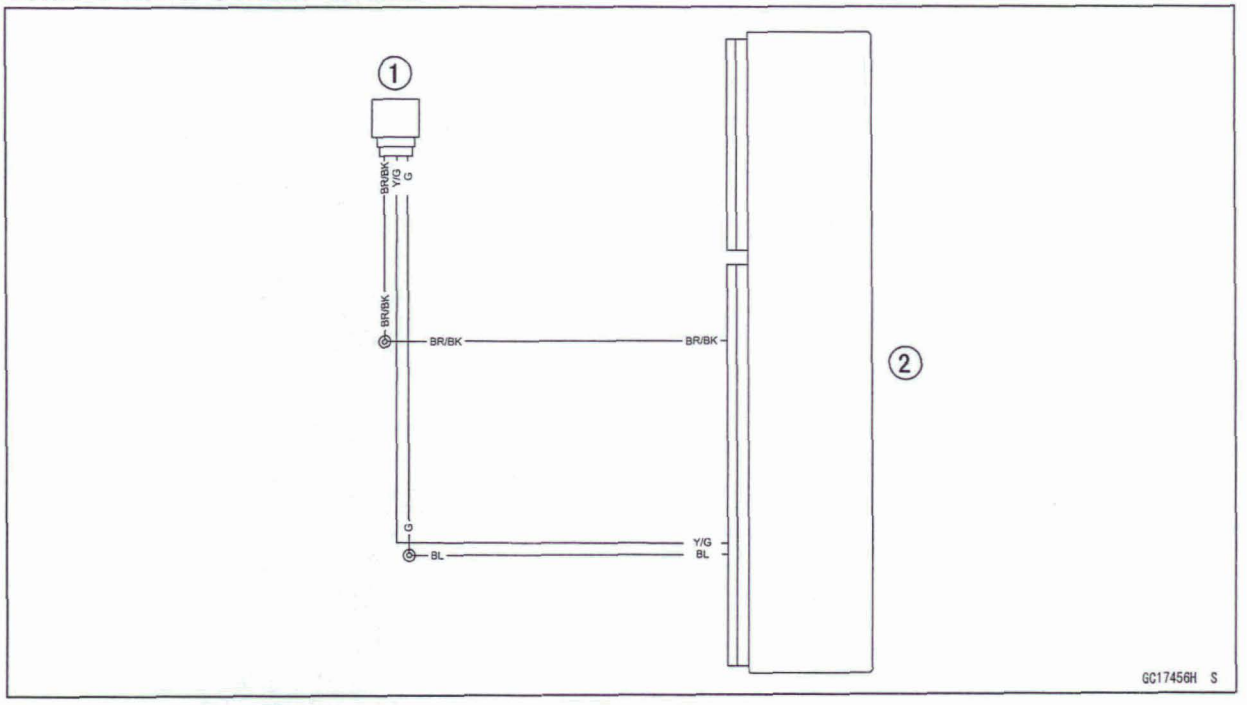
ECU Terminal 28 [E] ←→ Sensor Terminal [F]



★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 Circuit



1. Vehicle-down Sensor
2. ECU

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

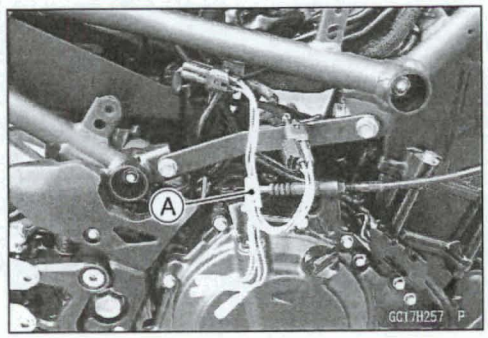
Oxygen Sensor Removal/Installation

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

Oxygen Sensor Inspection

- Turn the ignition switch off.
- Remove the right middle fairing (see Middle Fairing Removal in the Frame chapter).
- Disconnect the oxygen sensor lead connector and connect the oxygen sensor measuring adapter [A] between these connectors.

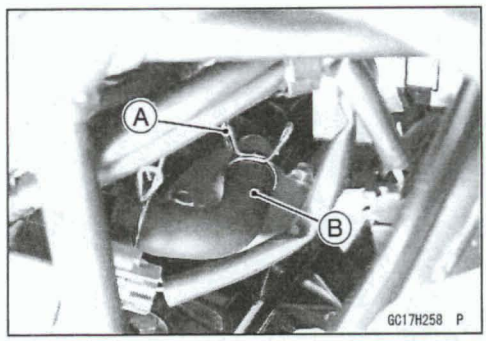
Special Tool - Oxygen Sensor Measuring Adapter: 57001 -1682



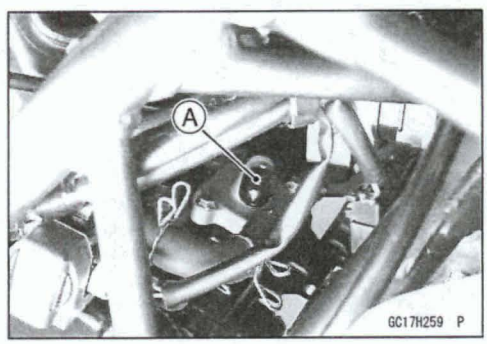
- Connect a digital meter to the measuring adapter leads.

Oxygen Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → BL (sensor BL) lead
Digital Meter (−) → BR (sensor W) lead

- Slide the clamp [A].
- Disconnect the air switching valve hose [B].



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

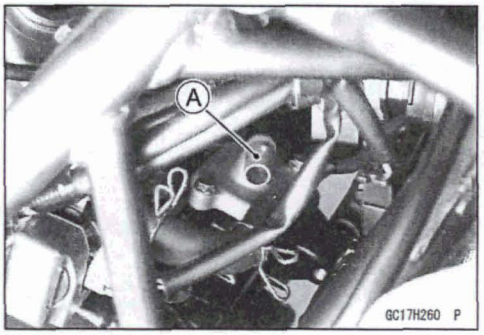


- Warm up the engine thoroughly until the radiator fan starts.
- Measure the output voltage with the connector joined.

Output Voltage (with Plug, Rich)
Standard: DC 0.5 V or more

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

- Turn the ignition switch off.
- Remove the plug from the fitting [A].



⚠ WARNING

The engine gets extremely hot during normal operation and can cause serious burns. Never touch a hot engine.

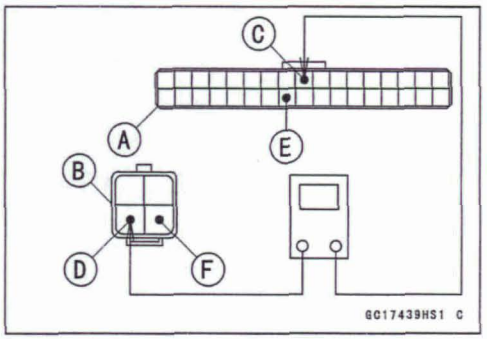
- Start the engine, and let it idle.
- Measure the output voltage with the connector joined.

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

- Turn the ignition switch off.

★If the reading is out of the standard (with plug: DC 0.5 V or more, without plug: 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 Connector [A] ←→
Oxygen Sensor Connector [B]
ECU Terminal 9 [C] ←→ Sensor Terminal [D]
ECU Terminal 25 [E] ←→ Sensor Terminal [F]

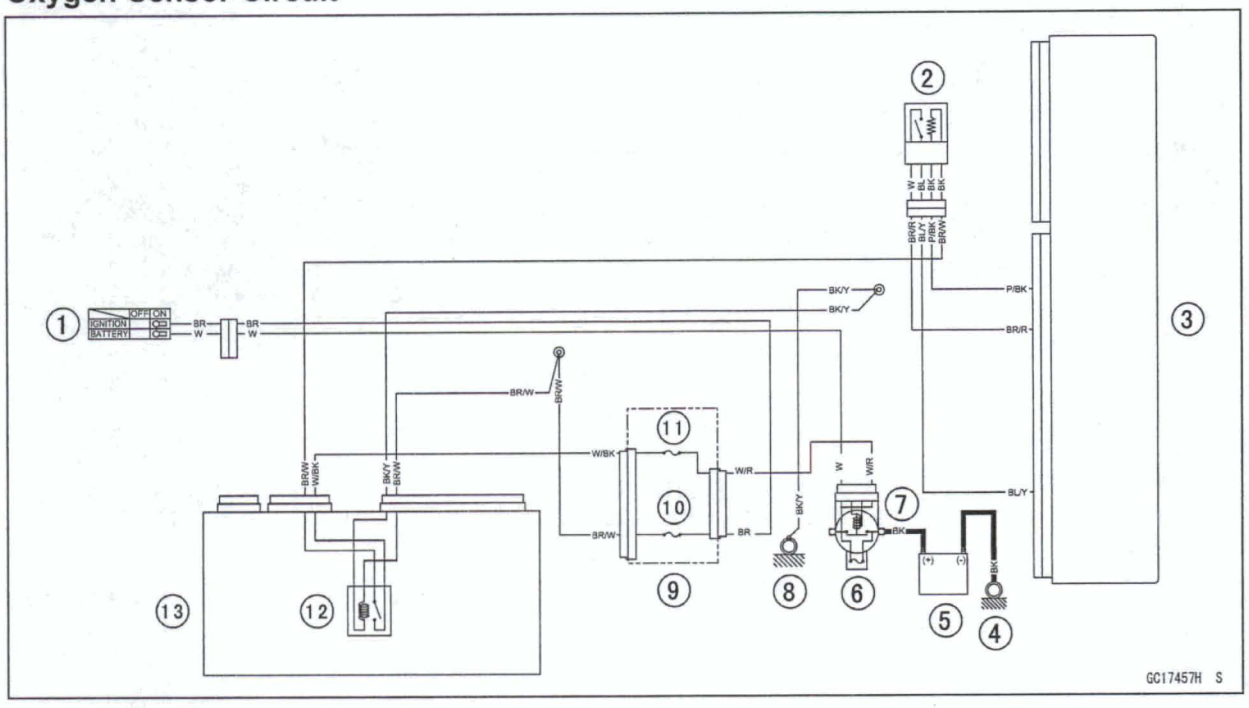
★If the wiring is good, replace the sensor (see Oxygen Sensor Removal/Installation in the Electrical System chapter).

★If the reading is within the standard (with plug: DC 0.5 V or more, without plug: 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 - not activated (Service Code 33) (DTC P0130, P0132)

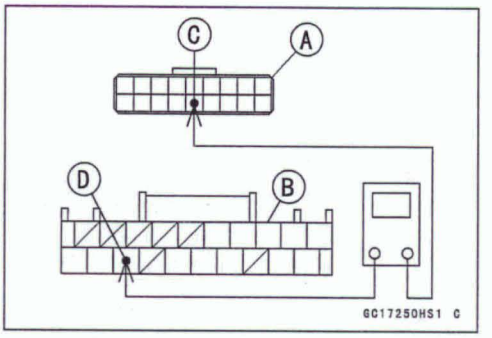
Oxygen Sensor Circuit



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

ECU Communication Error (Service Code 39)

ECU Communication Line Inspection



○When the data is not sent from the ECU to the meter unit for more than about 10 seconds, the service code 39 is displayed.

○The 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

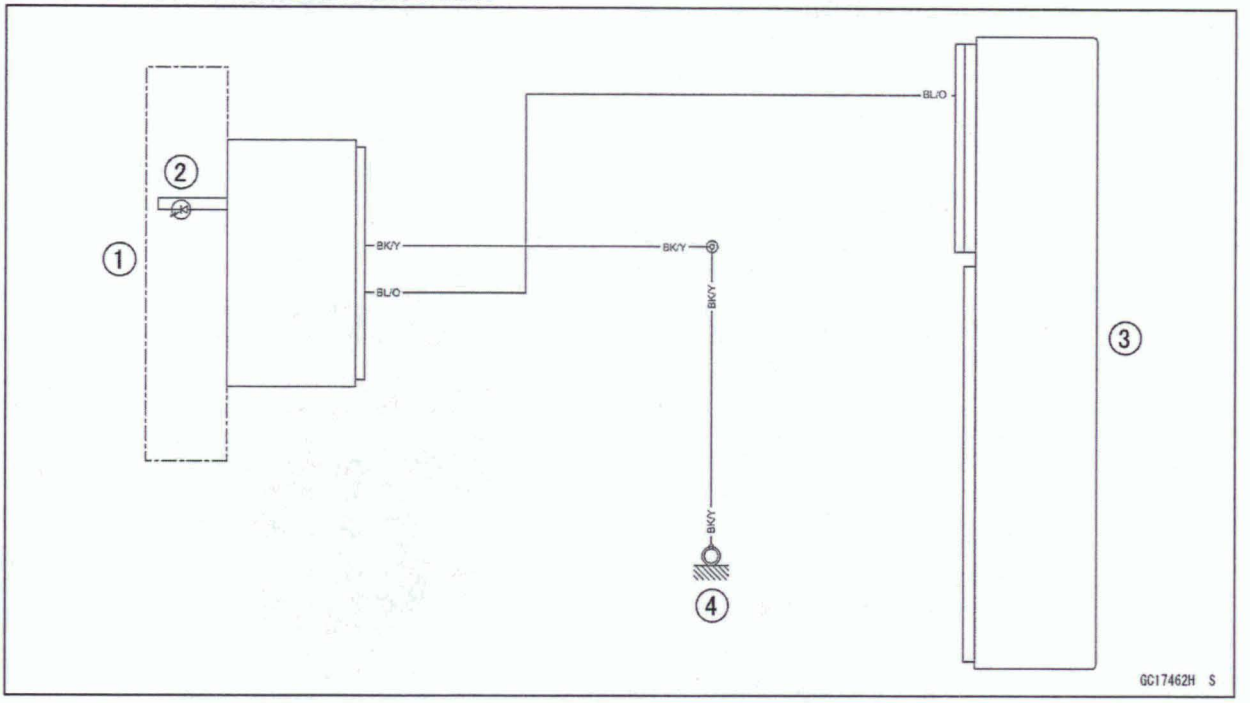
ECU Connector [A] ⟷ Meter Unit Connector [B]

ECU Terminal 48 [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. Yellow Engine Warning Indicator Light (LED)
3. ECU
4. Frame Ground (4)

Fuel Injectors (Service Code 41, 42) (DTC P0201, P0202)

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

Fuel Injector Removal/Installation

- Refer to the Throttle Body Assy Disassembly/Assembly.

Fuel Injector Audible Inspection

NOTE

○*Be sure the battery is fully charged.*

- Remove the right side cover (see Side Cover Removal in the Frame chapter).
- Start the engine, and let it idle.
- Apply the 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.

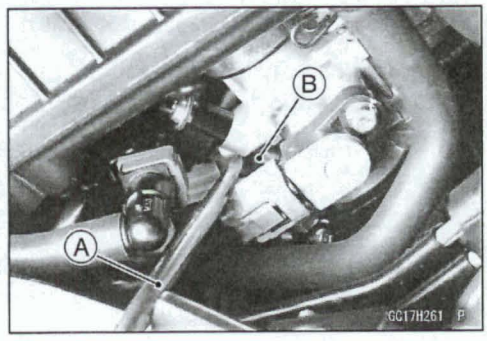
○The click interval becomes shorter as the engine speed rises.

- 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).



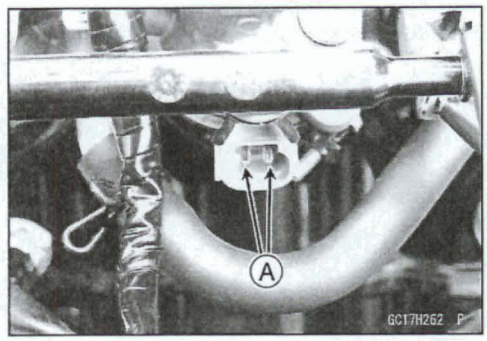
Fuel Injector Resistance Inspection

- Remove the air cleaner housing (see Air Cleaner Housing 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 12.0 Ω @20°C (68°F)

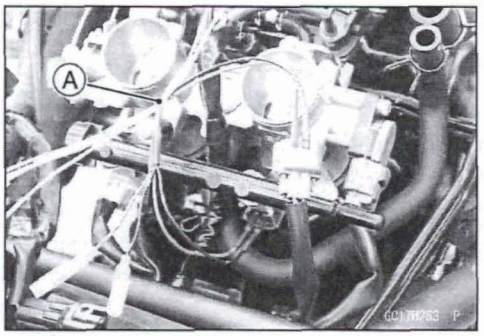
★If the reading is out of the standard, replace the fuel injector (see Throttle Body Assy Disassembly/Assembly).

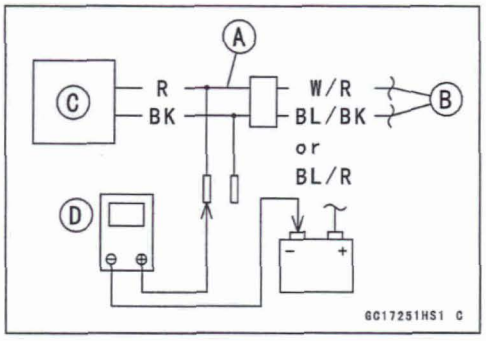
★If the reading is within the standard, check the power source voltage (see Fuel Injector Power Source Voltage Inspection).



Fuel Injectors (Service Code 41, 42) (DTC P0201, P0202)

Fuel Injector Power Source Voltage Inspection





NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the air cleaner housing (see Air Cleaning Housing Removal).
- Disconnect the fuel injector connector and connect the measuring adapter [A] between these connectors as shown.

  Main Harness [B]
  Fuel Injector [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
Digital Meter (+) → R (injector W/R) lead
Digital Meter (–) → Battery (–) Terminal

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

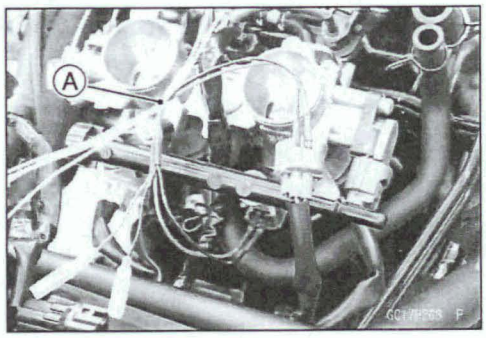
Power Source Voltage
Standard: Battery Voltage for 3 seconds, and then 0 V

- 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) (DTC P0201, P0202)

Fuel Injector Output Voltage Inspection



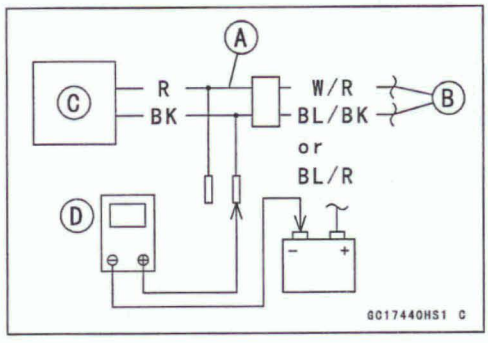
NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal)
- Disconnect the fuel 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 leads.



Fuel Injector Output Voltage
Connections to Adapter:
For Fuel Injector #1
Digital Meter (+) → BK (injector BL/BK)
Digital Meter (–) → Battery (–) Terminal
For Fuel Injector #2
Digital Meter (+) → BK (injector BL/R)
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

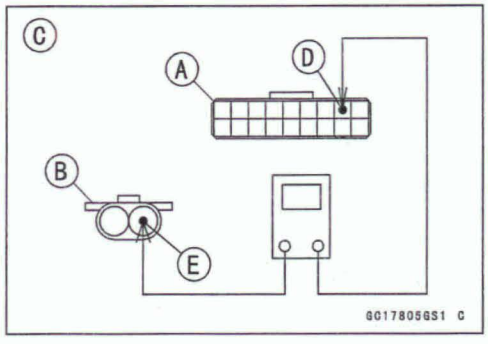
- Turn the ignition switch off.

★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).

★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 [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

★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 Injectors (Service Code 41, 42) (DTC P0201, P0202)

Fuel Injector Fuel Line Inspection

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

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

⚠ WARNING

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

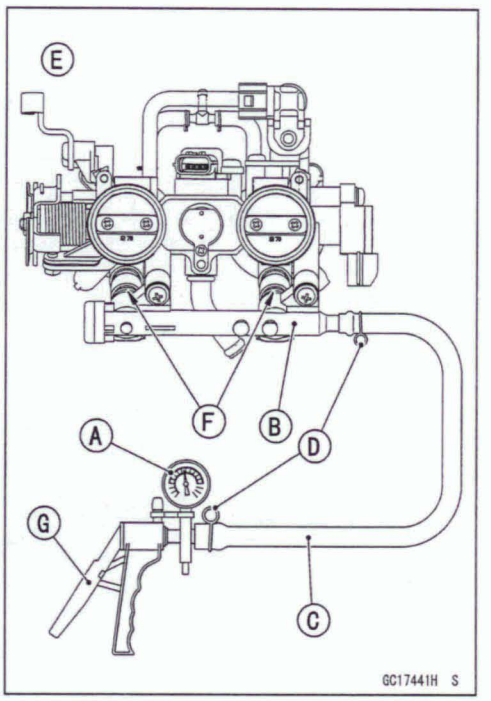
- Check the fuel injector fuel line for leakage as follows.

○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.
Up 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.

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.

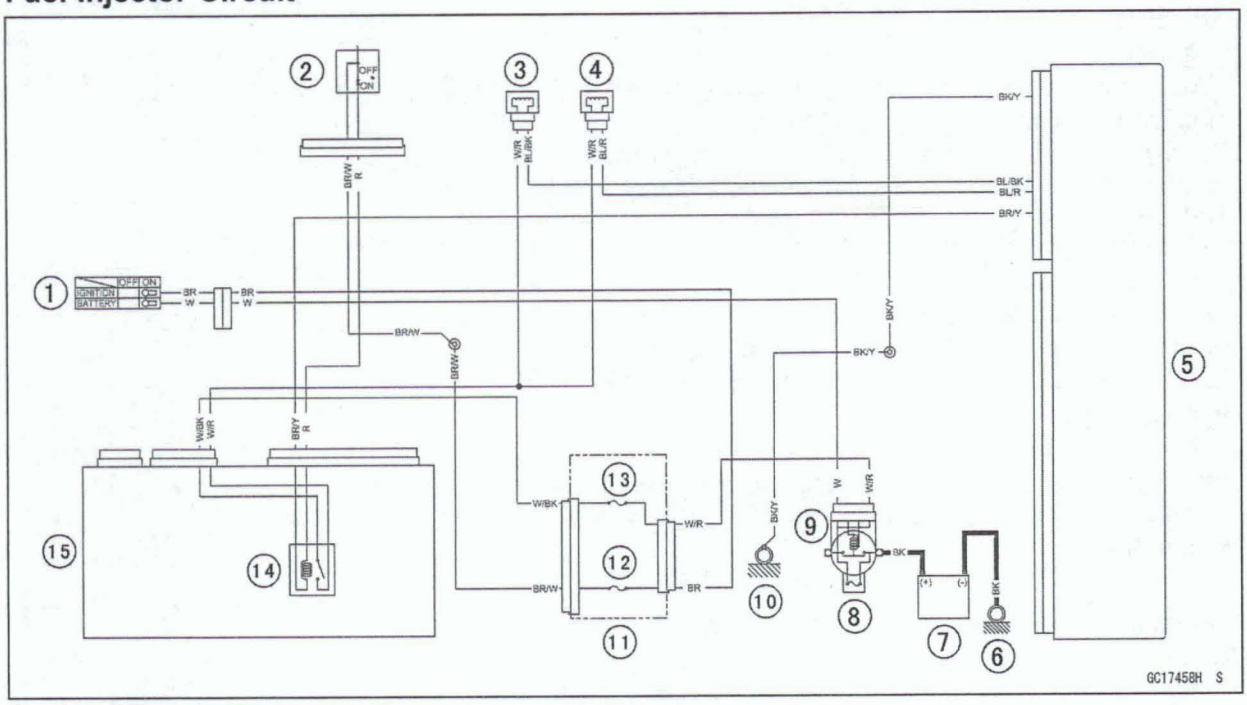
★If the pressure drops at once or if bubbles are found in the area, the fuel line is leaking. Replace the delivery pipe, fuel injectors and related parts (see Throttle Body Assy Disassembly/Assembly).

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

- Install:
  Fuel Hose (see Fuel Hose Replacement in the Periodic Maintenance chapter)
  Air Cleaner Housing (see Air Cleaner Housing Installation)
- Start the engine and check for fuel leakage.

Fuel Injectors (Service Code 41, 42) (DTC P0201, P0202)

Fuel Injector Circuit



1. Ignition Switch
2. Engine Stop Switch
3. Fuel Injector #1
4. Fuel Injector #2
5. ECU
6. Engine Ground
7. Battery
8. Main Fuse 30 A
9. Starter Relay
10. Frame Ground (2)
11. Fuse Box (1)
12. Ignition Fuse 10 A
13. ECU Fuse 15 A
14. Fuel Pump Relay
15. Relay Box

Stick Coils #1, #2 (Service Code 51, 52) (DTC P0351, P0352)

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

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

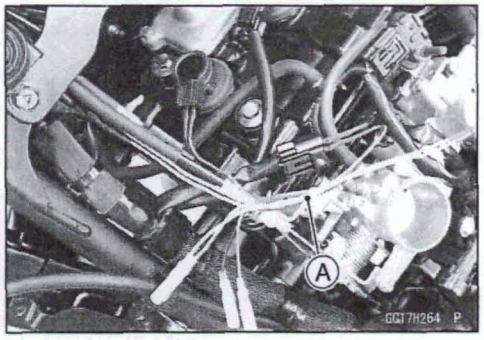
○*Be sure the battery is fully charged.*

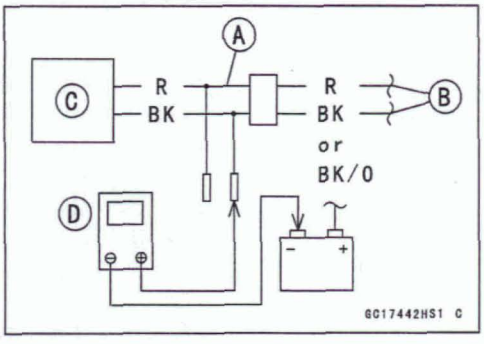
- Turn the ignition switch off.
- Remove:

  Air Cleaner Housing (see Air Cleaner Housing Removal)
- Disconnect the stick coil connector and connect the measuring adapter [A] between these connectors as shown.

  Main Harness [B]
  Stick Coil [C]

Special Tool - Measuring Adapter: 57001-1700





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

Stick Coil Input Voltage
Connections to Adapter:
For Stick Coil #1
Digital Meter (+) → BK (stick coil BK)
Digital Meter (–) → Battery (–) Terminal
For Stick Coil #2
Digital Meter (+) → BK (stick coil BK/O)
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 (Service Code 51, 52) (DTC P0351, P0352)

- Turn the ignition switch off.

★If the input voltage is out of the standard, check the wiring for continuity (see Stick Coil Circuit).

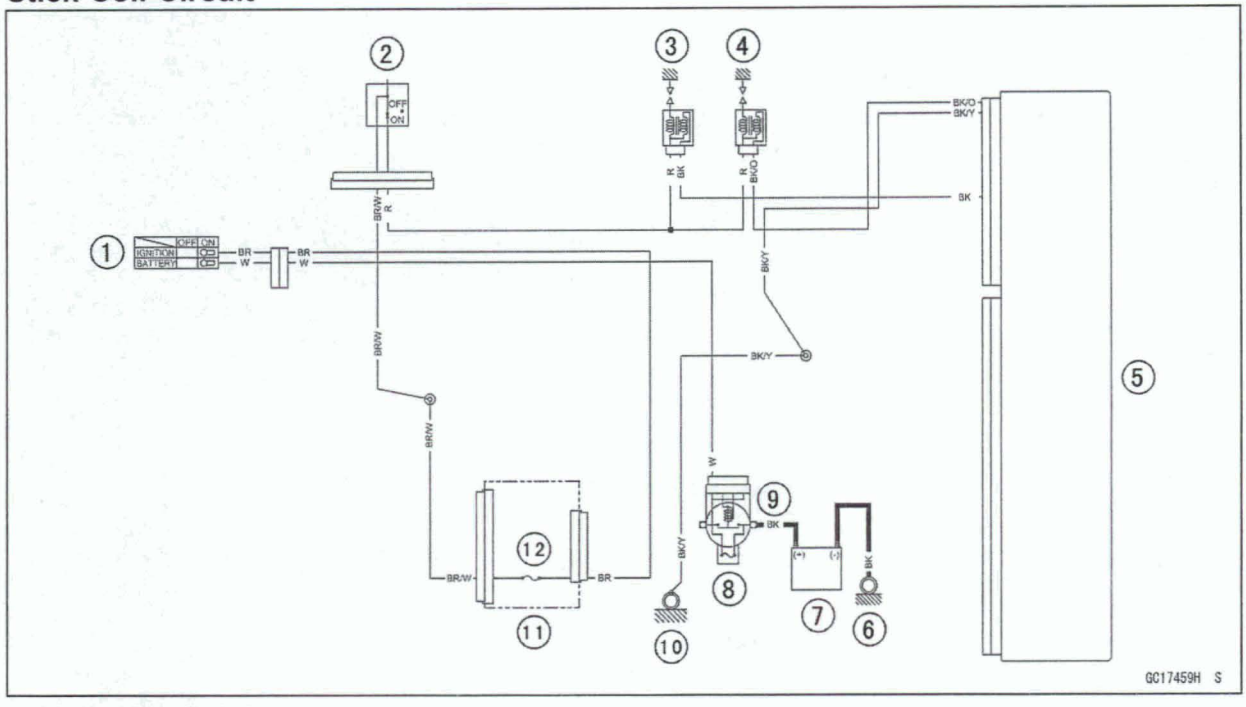
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

★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).

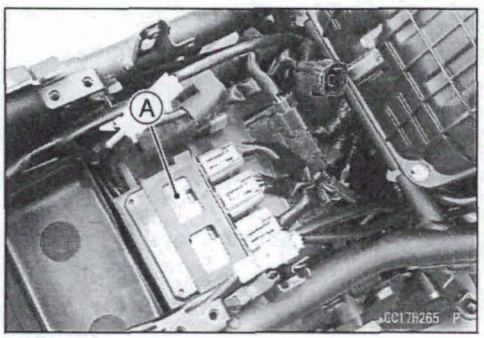
Stick Coil Circuit



1. Ignition Switch
2. Engine Stop Switch
3. Stick Coil #1
4. Stick Coil #2
5. ECU
6. Engine Ground
7. Battery
8. Main Fuse 30 A
9. Starter Relay
10. Frame Ground (2)
11. Fuse Box (1)
12. Ignition Fuse 10 A

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

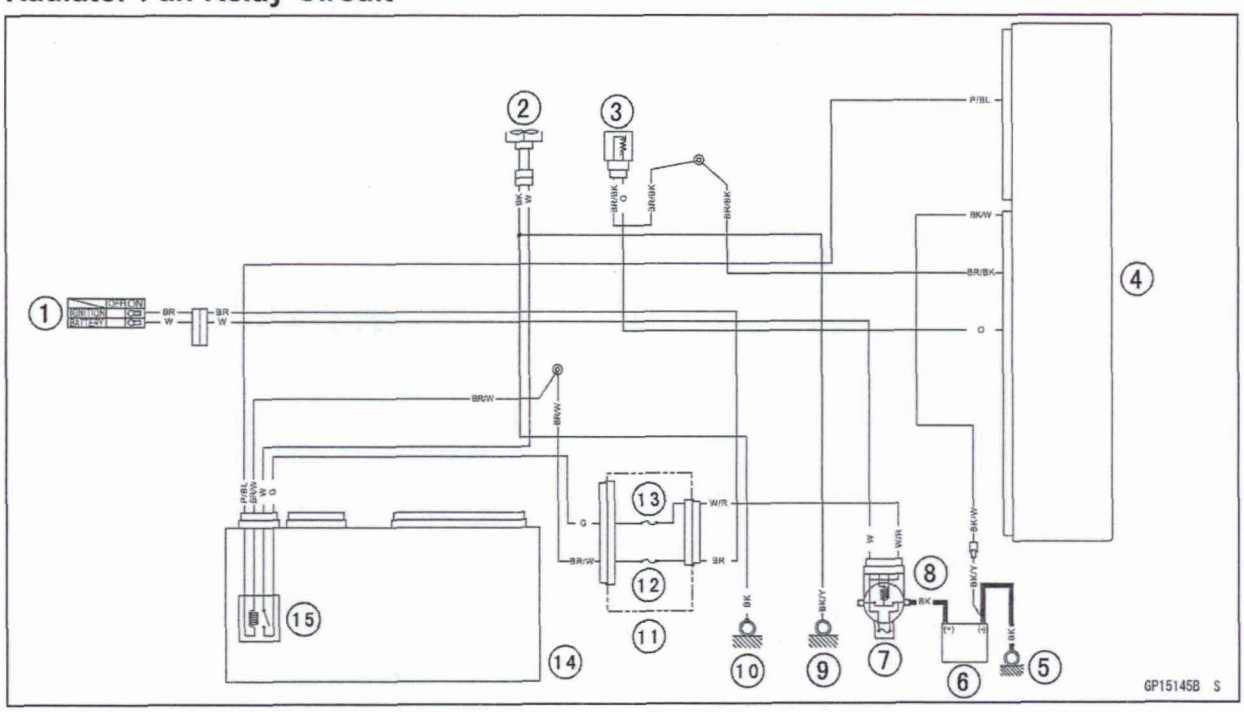
- Refer to the Relay Circuit Inspection in the Electrical System chapter.

★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. Water Temperature Sensor
4. ECU
5. Engine Ground
6. Battery
7. Main Fuse 30 A
8. Starter Relay
9. Frame Ground (6)
10. Frame Ground (1)
11. Fuse Box (1)
12. Ignition Fuse 10 A
13. Fan Fuse 15 A
14. Relay Box
15. Fan Relay

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

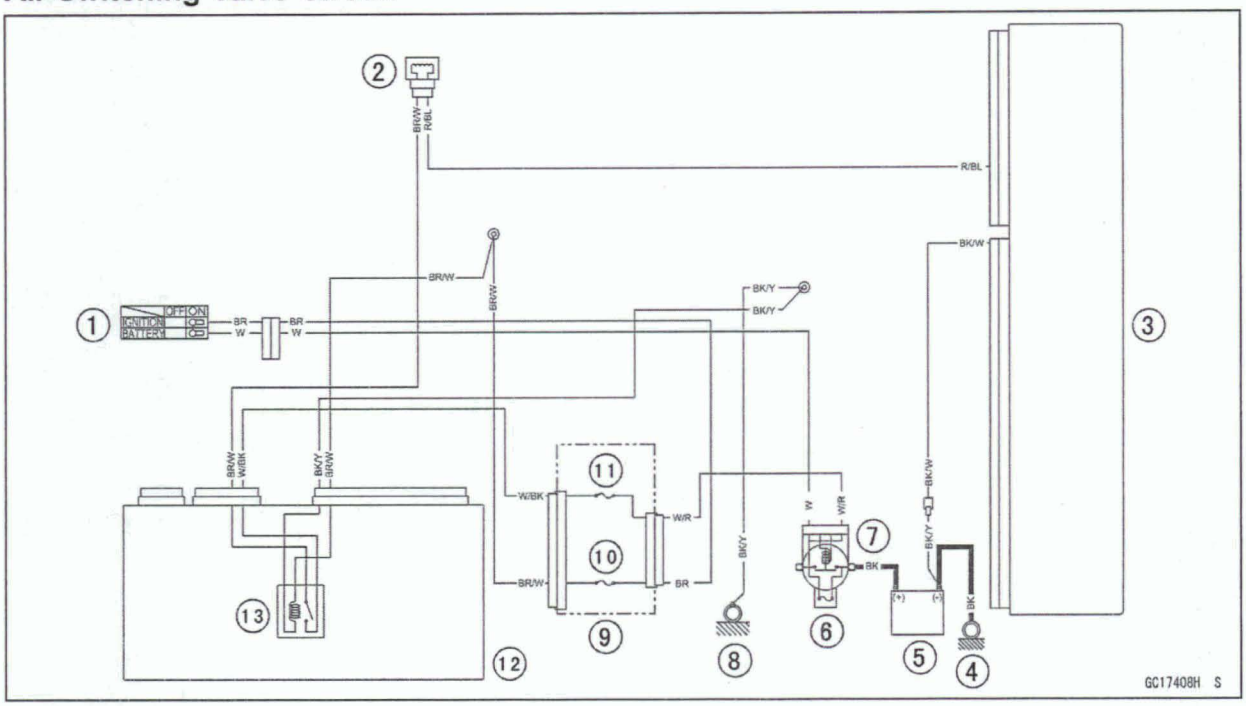
- Refer to the Air Switching Valve Unit Test in the Electrical System chapter.

★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. Ignition Switch
2. Air Switching Valve
3. ECU
4. Engine Ground
5. Battery
6. Main Fuse 30 A
7. Starter Relay
8. Frame Ground (2)
9. Fuse Box (1)
10. Ignition Fuse 10 A
11. ECU Fuse 15 A
12. Relay Box
13. ECU Main Relay

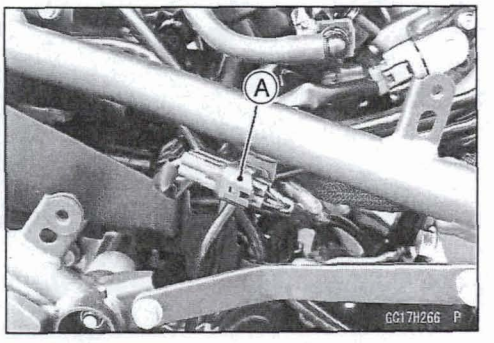
Oxygen Sensor Heater (Service Code 67) (DTC P0030)

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.
- Remove the right middle fairing (see Middle Fairing Removal in the Frame chapter).
- Disconnect the oxygen sensor lead connector [A].

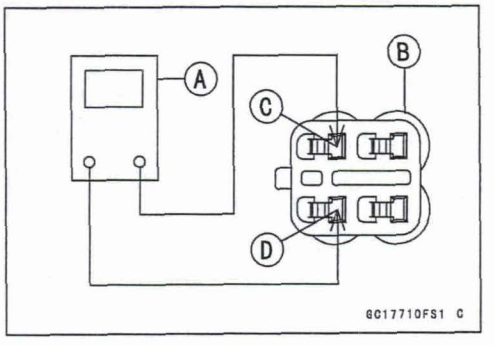


- Connect a digital meter [A] to the oxygen sensor lead connector [B].
- Measure the oxygen sensor heater resistance.

Oxygen Sensor Heaters Resistance
Connections: BK lead [C] ⟷ BK lead [D]
Standard: 5.49 ~ 6.91 Ω @20° C (68°F)

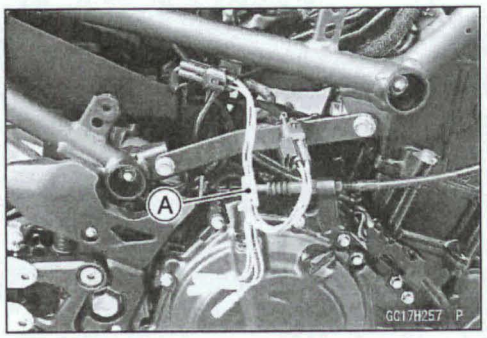
★If the reading is out of the standard, replace the sensor (see Oxygen Sensor Removal/Installation in the Electrical System chapter).

★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.
- Remove the right middle fairing (see Middle Fairing Removal in the Frame chapter).
- Disconnect the oxygen sensor lead connector and connect the measuring adapter [A] between these connectors.

Special Tool - Oxygen Sensor Measuring Adapter: 57001 -1682

- Connect a digital meter to the measuring adapter lead.

Oxygen Sensor Power Source Voltage
Connections to Adapter:
Digital Meter (+) → W (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

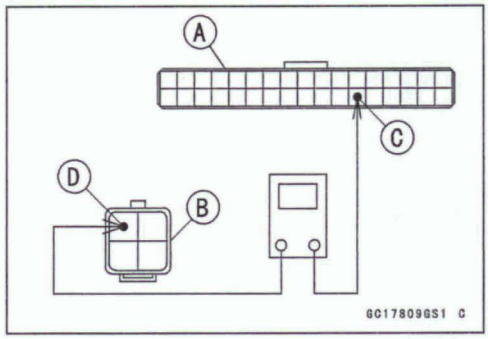
- Turn the ignition switch off.

★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.



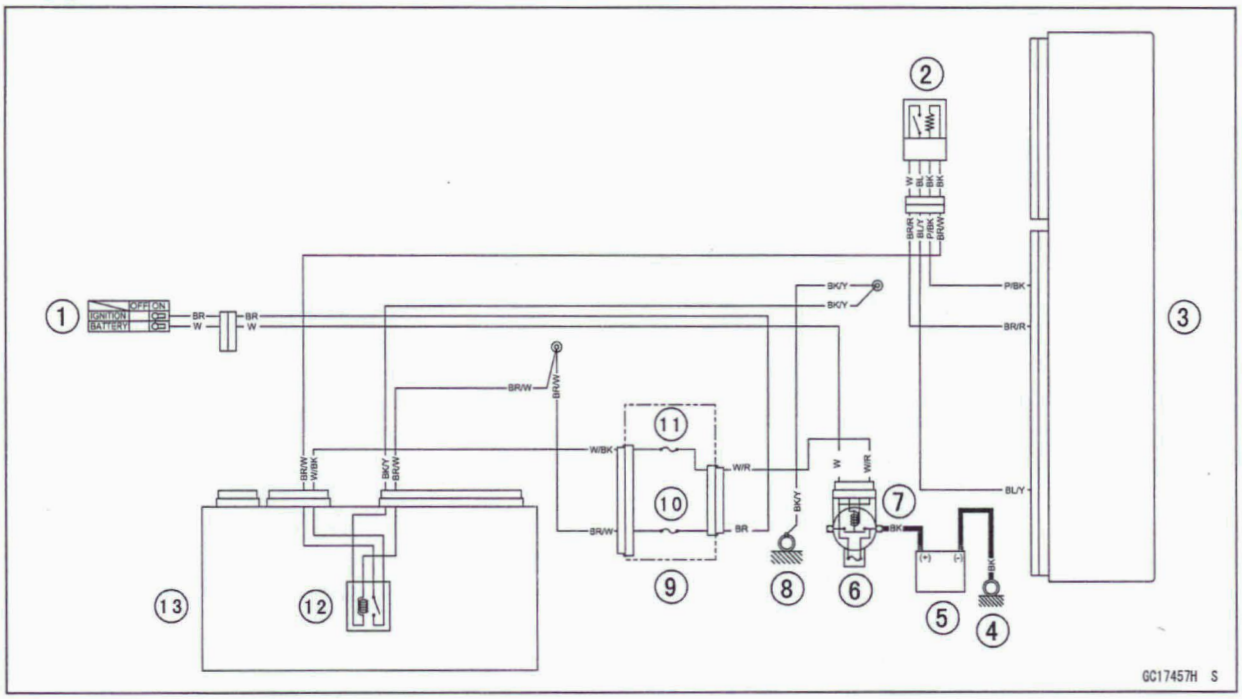
Wiring Continuity Inspection
ECU Connector [A] ←→
Oxygen Sensor Connector [B]
ECU Terminal 29 [C] ←→ Sensor Terminal [D]

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

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).

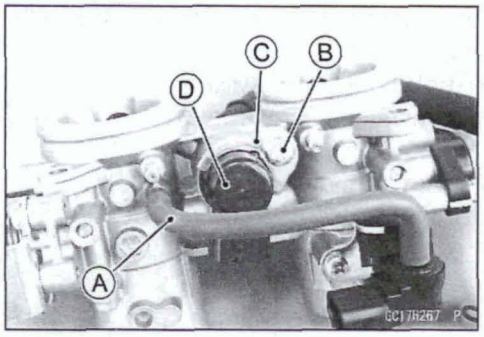
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Idle Speed Control Valve Actuator (Service Code 1C) (DTC P0508, P0509, P0518)

Idle Speed Control Valve Actuator Removal

NOTICE

Never drop the idle speed control valve actuator especially on a hard surface. Such a shock to the actuator can damage it.



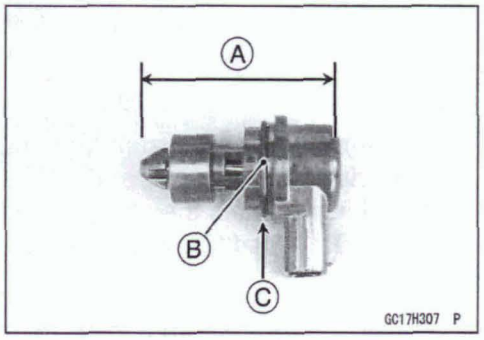
- Remove:
  Throttle Body Assy (see Throttle Body Assy Removal)
- Disconnect the intake air pressure hose [A].
- Remove:
  Idle Speed Control Valve Actuator Screw [B]
  Plate [C]
  Idle Speed Control Valve Actuator [D]
  Spring

Idle Speed Control Valve Actuator Installation

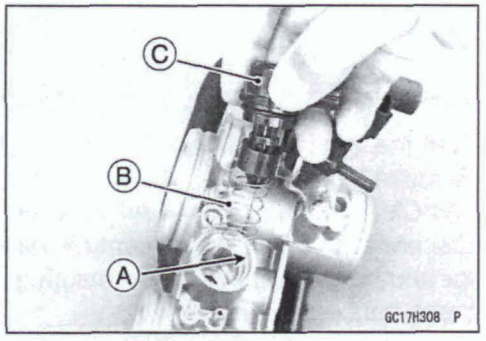
- Measure the plunger position.

Plunger Position
44 ~ 50 mm (1.7 ~ 2.0 in.) [A]

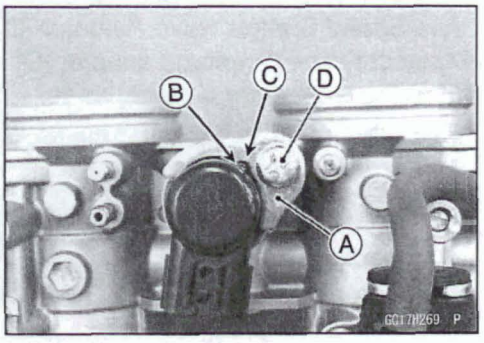
★If the plunger position is not within the specified range, replace the idle speed control valve actuator.



- Replace the O-ring [B] with a new one.
- Fit the O-ring into contact with the step [C].



- Apply a small amount of engine oil to the throttle body [A].
- Install the spring [B] to the idle speed control valve actuator [C] as shown.
- Install the idle speed control valve actuator straight to the throttle body.



- Install the plate [A] and fit the projection [B] of the idle speed control valve actuator to notch [C] of the plate.
- Tighten:

Torque - Idle Speed Control Valve Actuator Screw [D]: 5.0 N·m (0.51 kgf·m, 44 in·lb)

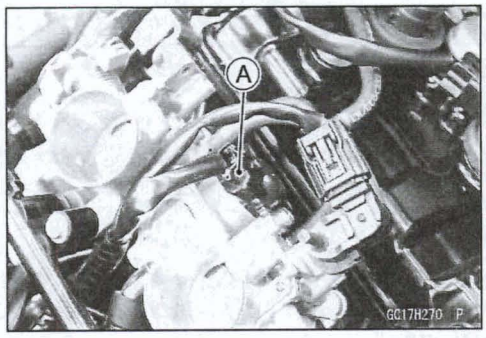
- Connect the intake air pressure hose.
- Install the removed parts (see appropriate chapters).

★If the idle speed control valve actuator is replaced, be sure to do the following procedures.

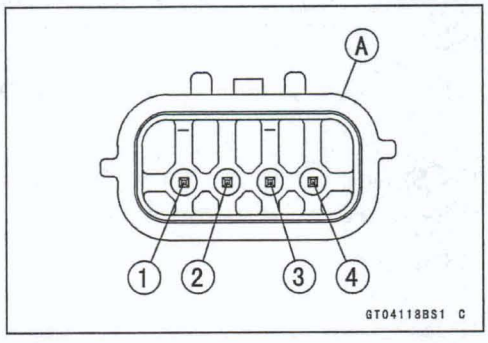
○Turn the ignition switch on.
○Turn the ignition switch off, and wait for 2 or 3 seconds.
○Inspect the idle speed (see Idle Speed Inspection in the Periodic Maintenance chapter).

Idle Speed Control Valve Actuator (Service Code 1C) (DTC P0508, P0509, P0518)

Idle Speed Control Valve Actuator Resistance Inspection



- Turn the ignition switch off.
- Remove the air cleaner housing (see Air Cleaner Housing Removal).
- Disconnect the idle speed control valve actuator connector [A].

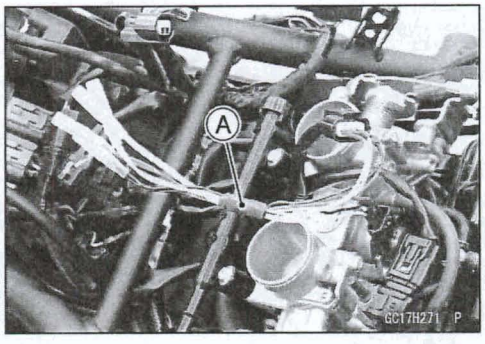


- Connect a digital meter to the idle speed control valve actuator connector [A].
- Measure the idle speed control valve actuator resistance.

Idle Speed Control Valve Actuator Resistance
Connections: G/R lead [1] ⟷ G/BK lead [2]
G/O lead [3] ⟷ G/Y lead [4]
Standard: About 20 Ω

★If the reading is out of the standard, replace the idle speed control valve actuator.
★If the reading is within the standard, check the input voltage (see Idle Speed Control Valve Actuator Input Voltage Inspection).

Idle Speed Control Valve Actuator Input Voltage Inspection

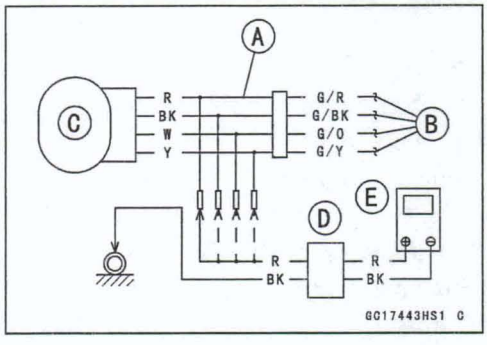


NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal)
- Disconnect the idle speed control valve actuator connector and connect a suitable measuring leads [A] between these connectors as shown.
  Main Harness [B]
  Idle Speed Control Valve Actuator [C]
- Connect the peak voltage adapter [D] and a digital meter [E] to the measuring adapter leads.

Special Tool - Peak Voltage Adapter: 57001-1415
Type: KEK-54-9-B



Idle Speed Control Valve Actuator Input Voltage
Connections to Adapter:
(I) Digital Meter (+) → R (actuator G/R) lead
Digital Meter (–) → BK (actuator G/BK) lead
(II) Digital Meter (+) → W (actuator G/O) lead
Digital Meter (–) → Y (actuator G/Y) lead

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

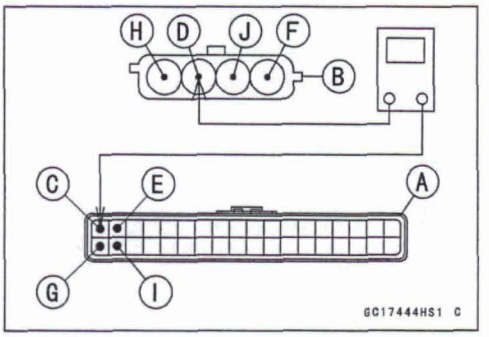
Input Voltage
Standard: About DC 11 ~ 13 V and then 0.5 V or About DC 11 ~ 13 V

- Turn the ignition switch off.

Idle Speed Control Valve Actuator (Service Code 1C) (DTC P0508, P0509, P0518)

★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] ←→

Idle Speed Control Valve Actuator Connector [B]

ECU terminal 1 [C] ←→ Actuator Terminal [D]

ECU terminal 2 [E] ←→ Actuator Terminal [F]

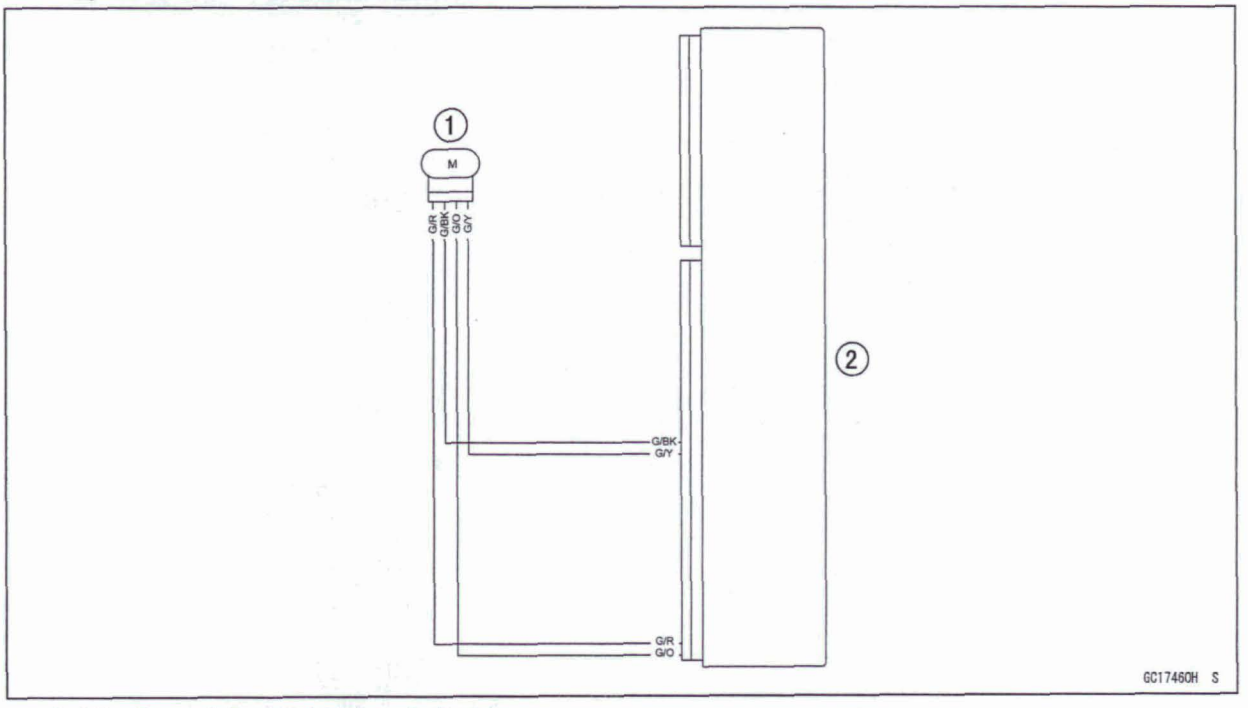
ECU terminal 18 [G] ←→ Actuator Terminal [H]

ECU terminal 19 [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).

Idle Speed Control Valve Actuator Circuit

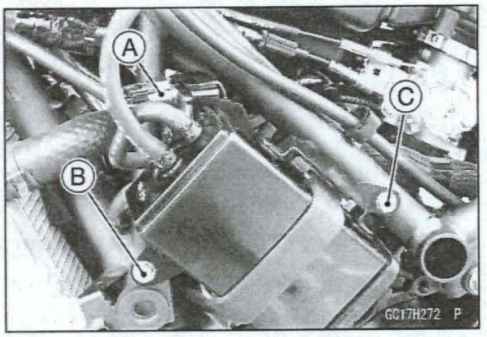


1. Idle Speed Control Valve Actuator
2. ECU

Purge Valve (Service Code 3A) (DTC P0443) (Equipped Models)

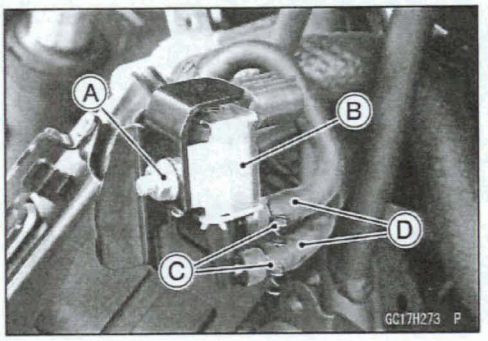
Purge Valve Removal/Installation

- Remove:
  Left Middle Fairing (see Middle Fairing Removal in the Frame chapter)
- Disconnect the purge valve connector [A].
- Remove:
  Canister Bracket Bolt (L = 10 mm) [B]
  Canister Bracket Bolt (L = 20 mm) [C]



- Remove the purge valve nut [A].
- Remove the purge valve [B] from the bracket.
- Slide the clamps [C].
- Disconnect the hoses [D].
- Installation is the reverse of removal.
- Run the hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Tighten:

Torque - Purge Valve Nut: 6.9 N·m (0.70 kgf·m, 61 in·lb)
Canister Bracket Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

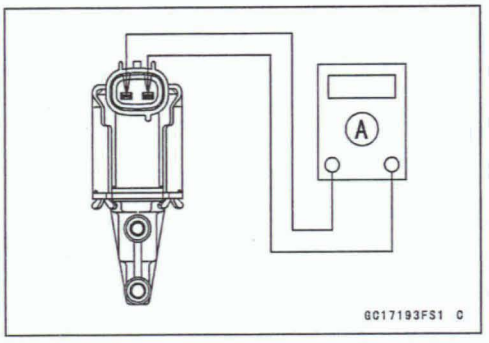


Purge Valve Inspection

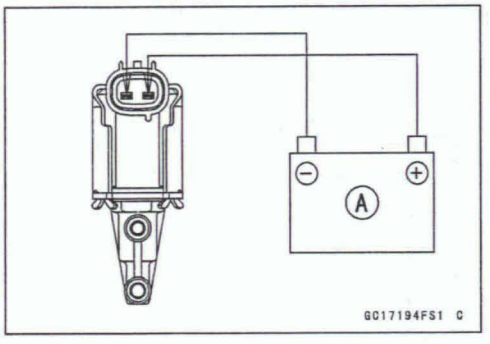
- Remove the purge valve (see Purge Valve Removal/Installation).
- Connect a digital meter [A] to the purge valve terminals as shown.

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.

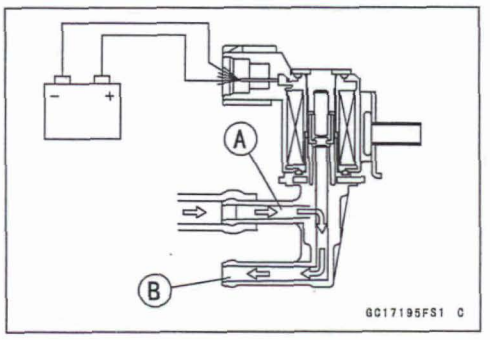


- Connect the 12 V battery [A] to the purge valve terminals as shown.



Purge Valve (Service Code 3A) (DTC P0443) (Equipped Models)

- Blow the air to the intake air duct [A], and make sure that the air flows from the outlet air duct [B].



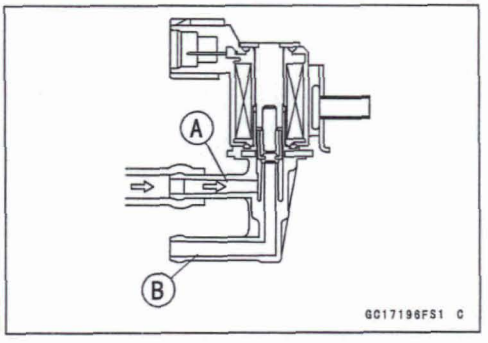
- Disconnect the 12 V battery.
- Blow the air to the intake air duct [A] again, and make sure that the air does not flow from the outlet air duct [B].

★If the purge valve dose not operate as described, replace it with a new one.

★If the purge valve is normal, check the wiring for continuity (see Purge Valve Circuit).

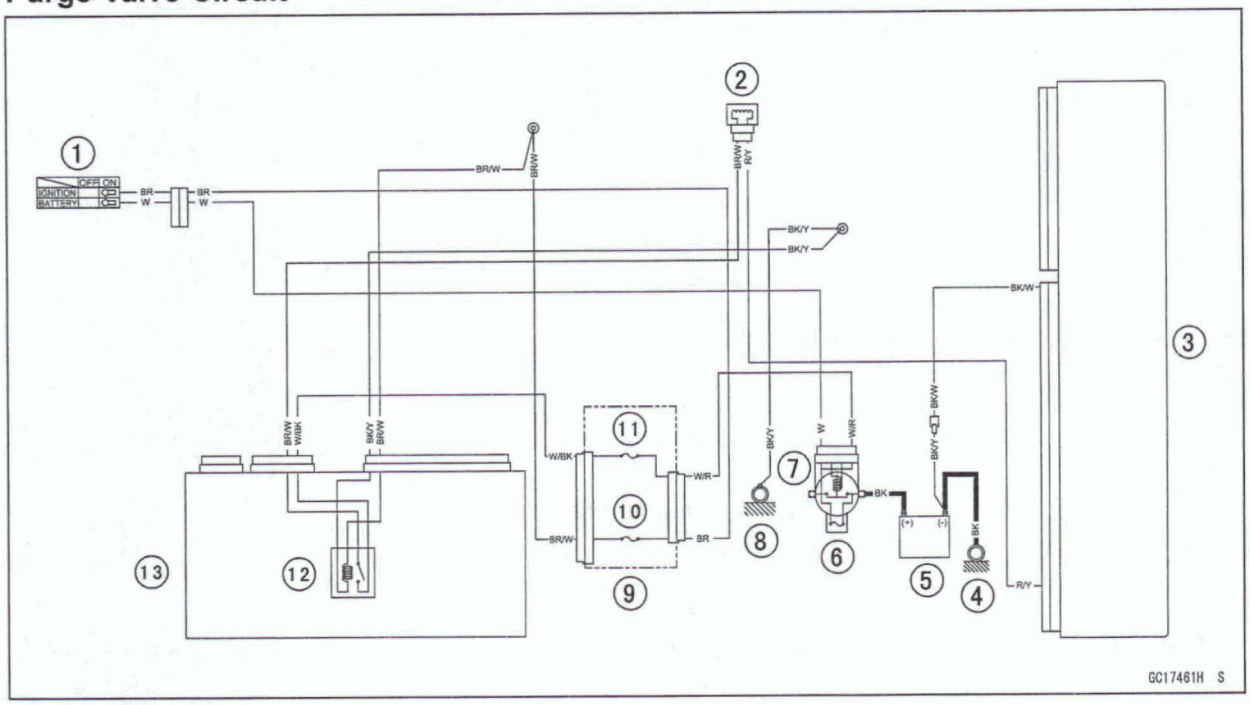
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

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



Purge Valve (Service Code 3A) (DTC P0443) (Equipped Models)

Purge Valve Circuit



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

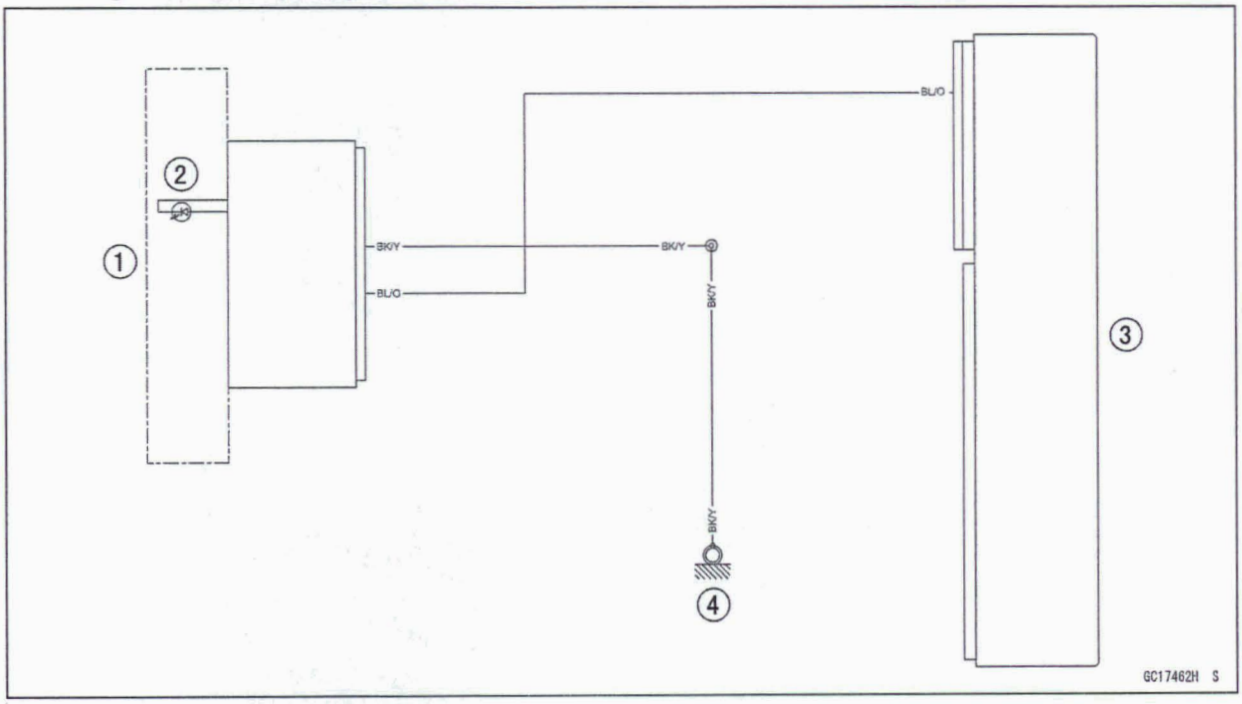
Warning Indicator Light (LED)

Yellow Engine Warning Indicator Light (LED) Inspection

OIn this model, the yellow engine warning indicator light (LED) [A] goes on or blinks by the data sent from the ECU.

- Refer to the Meter Unit Inspection in the Electrical System chapter.

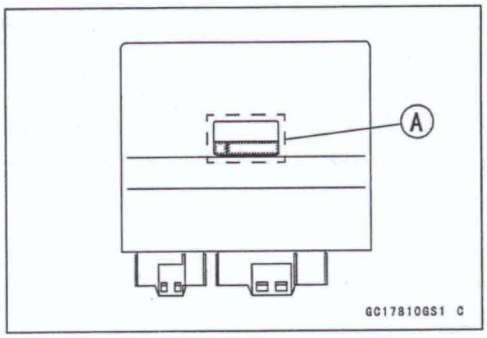
Warning Indicator (LED) Circuit



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

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.

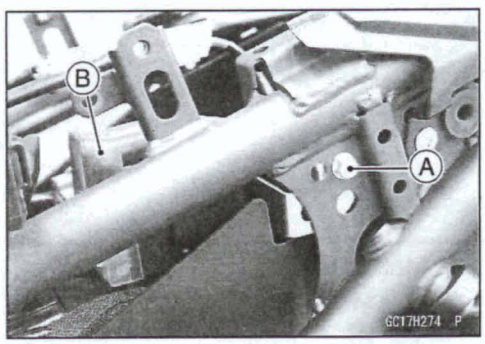
ECU Identification

Part Number [A]	Specification
21175-1314	AU
	WVTA FULL AB-2
	TH
	SEA-B3
21175-1424	MY
21175-1332	US
	CA
21175-1371	CAL
21175-1373	PH

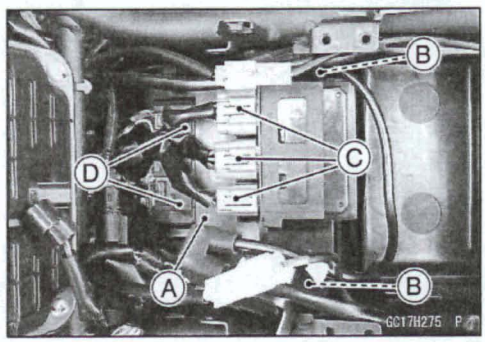
ECU Removal

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

- Remove:
  Battery Case Cover (see Battery Case Cover Removal in the Frame chapter)
- Remove the bolt [A] and free the starter relay [B] from the frame.



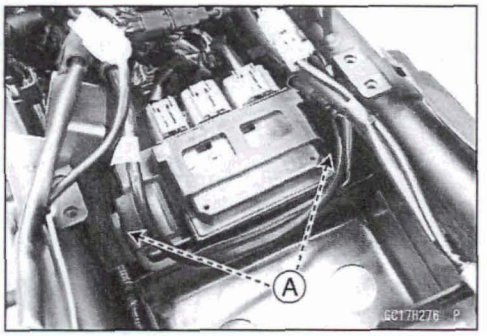
- Lift up the ECU [A] with rubber protector to clear the projections [B].
- Disconnect:
  Relay Box Connectors [C]
  ECU Connectors [D]
- Remove the ECU from the rubber protector.



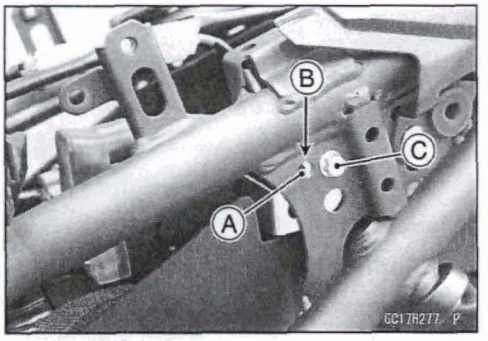
ECU

ECU Installation

- Connect:
  ECU Connectors
  Relay Box Connectors
- Insert the slits of the rubber protector to the projections [A] of the battery case.



- Insert the projection [A] of the starter relay bracket to the hole [B] of the frame.
- Tighten the bolt [C].
- Install the removed parts (see appropriate chapters).



ECU Power Supply Inspection

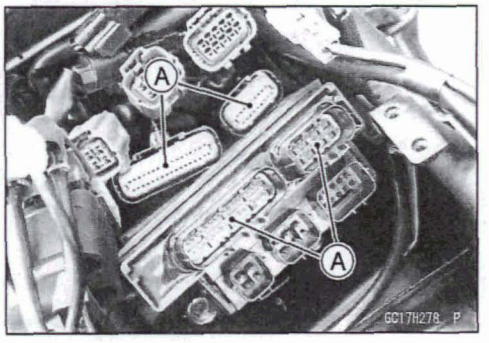
- Remove the battery case cover (see Battery Case Cover Removal in the Frame chapter).
- Visually inspect the ECU connectors.

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

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

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

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



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

ECU Grounding Inspection

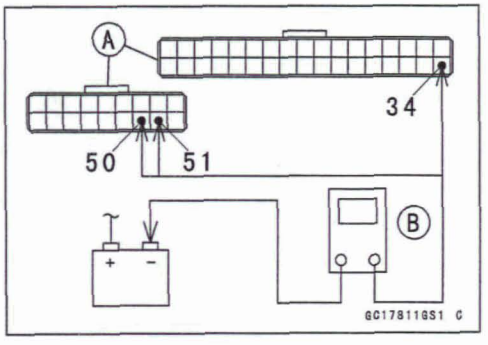
Connections:

(I) ECU Terminal 50 or 51 ⟷ Battery (–) Terminal
ECU Terminal 34

(II) Engine Ground ⟷ Battery (–) Terminal

Criteria:

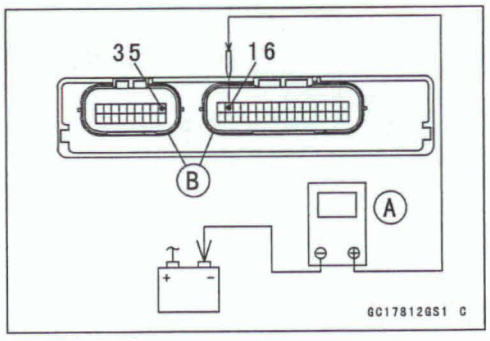
Both: 0 Ω



★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 connectors [B] with the needle adapter set.

Special Tool - Needle Adapter Set: 57001-1874

ECU Power Supply Inspection

Connections:

(I) Digital Meter (+) → Terminal 16 (BR/W)

Digital Meter (–) → Battery (–) Terminal

(II) Digital Meter (+) → Terminal 35 (W/BK)

Digital Meter (–) → Battery (–) Terminal

Ignition Switch off:

Terminal 16 (BR/W): 0 V

Terminal 35 (W/BK): 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)

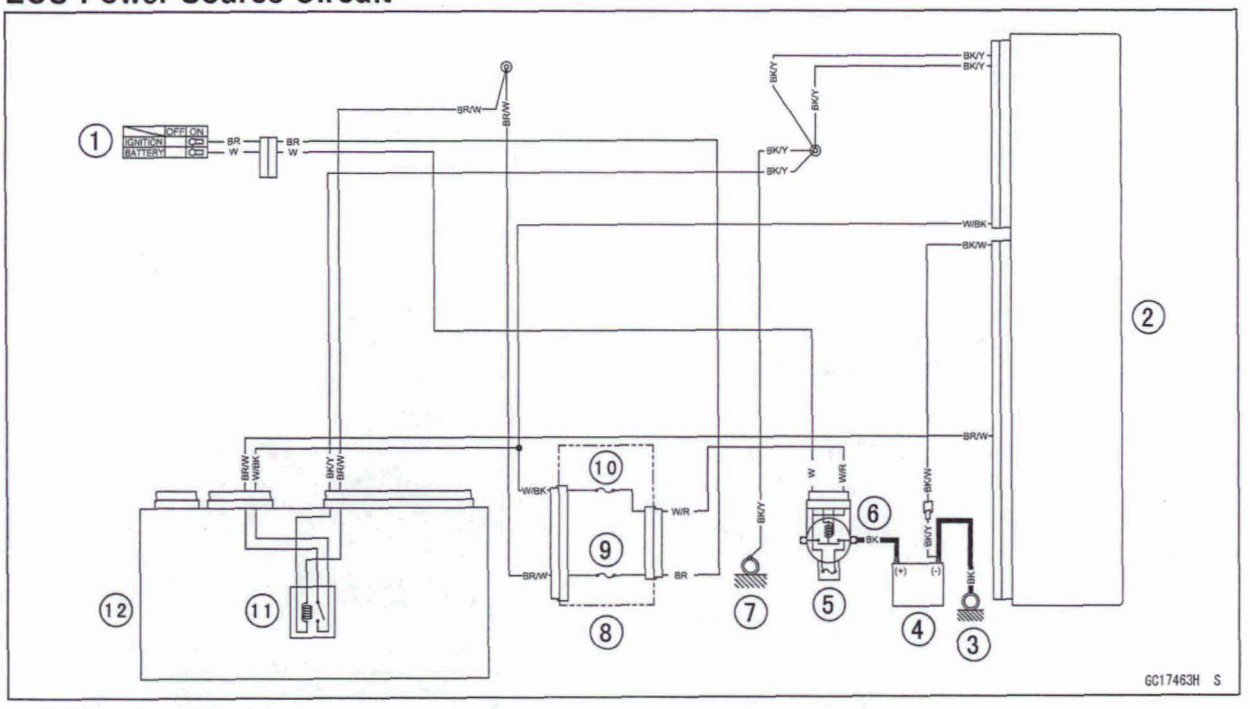
ECU Main Relay (see Relay Circuit Inspection in the Electrical System chapter)

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

DFI Power Source

ECU Fuse Removal

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

ECU Fuse Installation

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

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

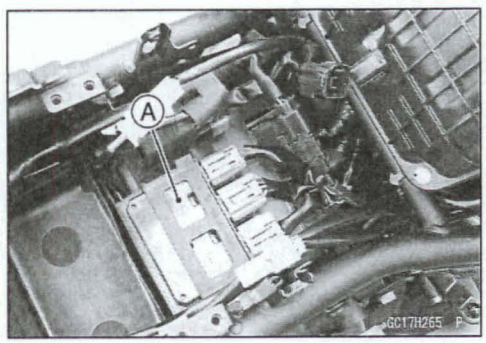
ECU Fuse Inspection

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

ECU Main Relay Removal/Installation

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

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



ECU Main Relay Inspection

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

Fuel Line

Fuel Pressure Inspection

NOTE

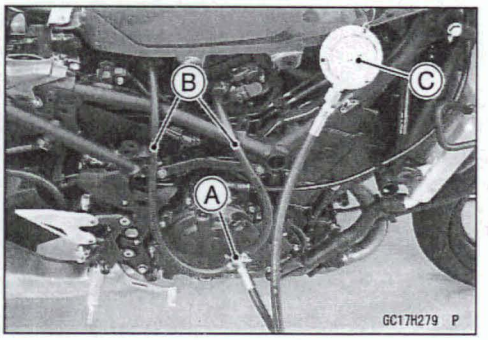
○*Be sure the battery is fully charged.*

- Remove:
  Fuel 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.

- Connect the fuel pump lead connector.
- 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)
- 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.

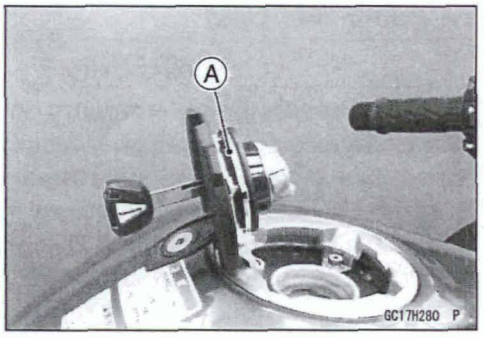
NOTE

○*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

Fuel Line

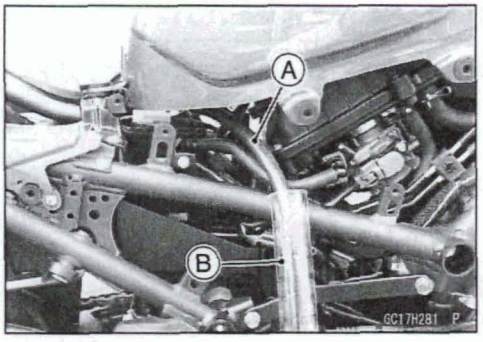


- Open the fuel tank cap [A] to lower the pressure in the tank.
- Disconnect the fuel hose from the fuel pump (see Fuel Tank Removal).

○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 hose (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.

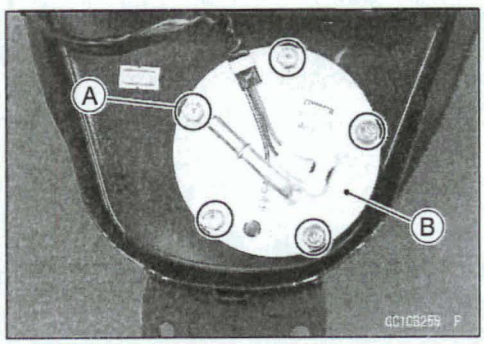
NOTICE

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.

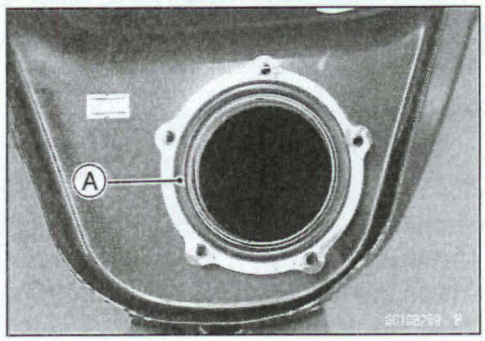
- Turn the fuel tank upside down.
- Remove the fuel pump bolts [A], and take out the fuel pump [B].



NOTICE

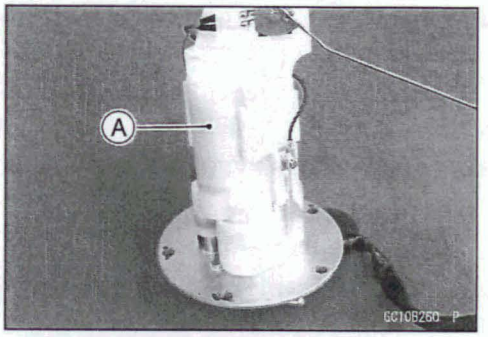
Do not pull the leads of the fuel pump. If they are pulled, the lead terminals may be damaged.

- Discard the fuel pump gasket [A].



Fuel Pump

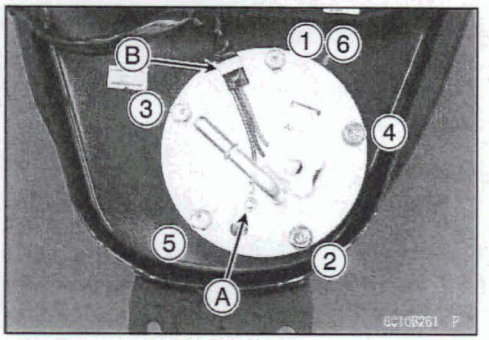
Fuel Pump Installation



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

NOTE

○*Be careful not to bend the fuel level sensor arm.*



- Check that the fuel pump terminal [A] and clamp [B] are in place.
- Apply a non-permanent locking agent to the threads of the fuel pump bolts.
- Tighten the fuel pump bolts following the specified tightening sequence [1 ~ 6] temporarily.
- Tighten the fuel pump bolts with the specified torque by the same sequence.

Torque - Fuel Pump Bolts: 9.8 N·m (1.0 kgf·m, 87 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.

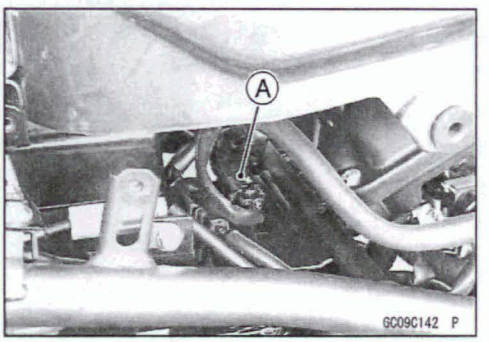
★If the pump does not operate as described above, check the operating voltage (see Fuel Pump Operating Voltage Inspection).

Fuel Pump Operating Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.

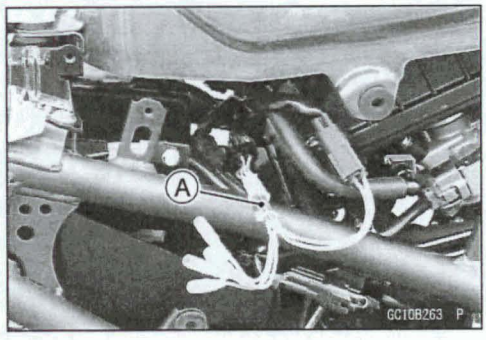


- Remove the right middle fairing (see Middle Fairing Removal in the Frame chapter).
- Disconnect the fuel pump lead connector [A].

Fuel Pump

- Connect the measuring adapter [A] between fuel pump lead connectors.

Special Tool - Oxygen Sensor Measuring Adapter: 57001 -1682



- Connect a digital meter to the measuring adapter leads.

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

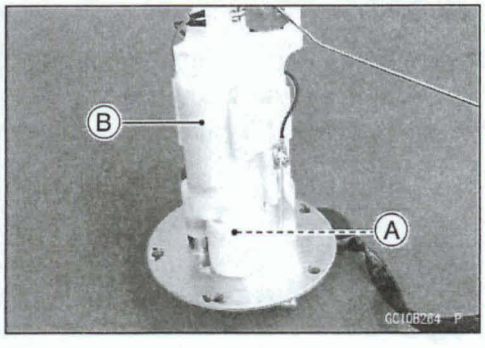
Operating Voltage
Standard: Battery Voltage for 3 seconds, and then 0 V

- 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).

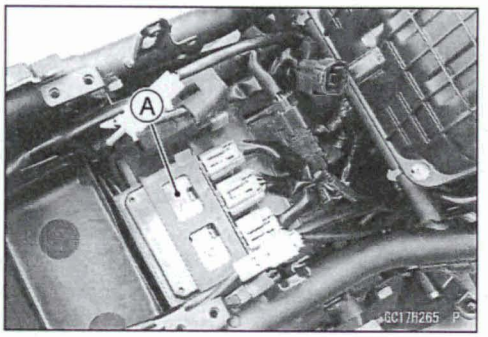
Pressure Regulator Removal

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



Fuel Pump

Fuel Pump Relay Removal/Installation



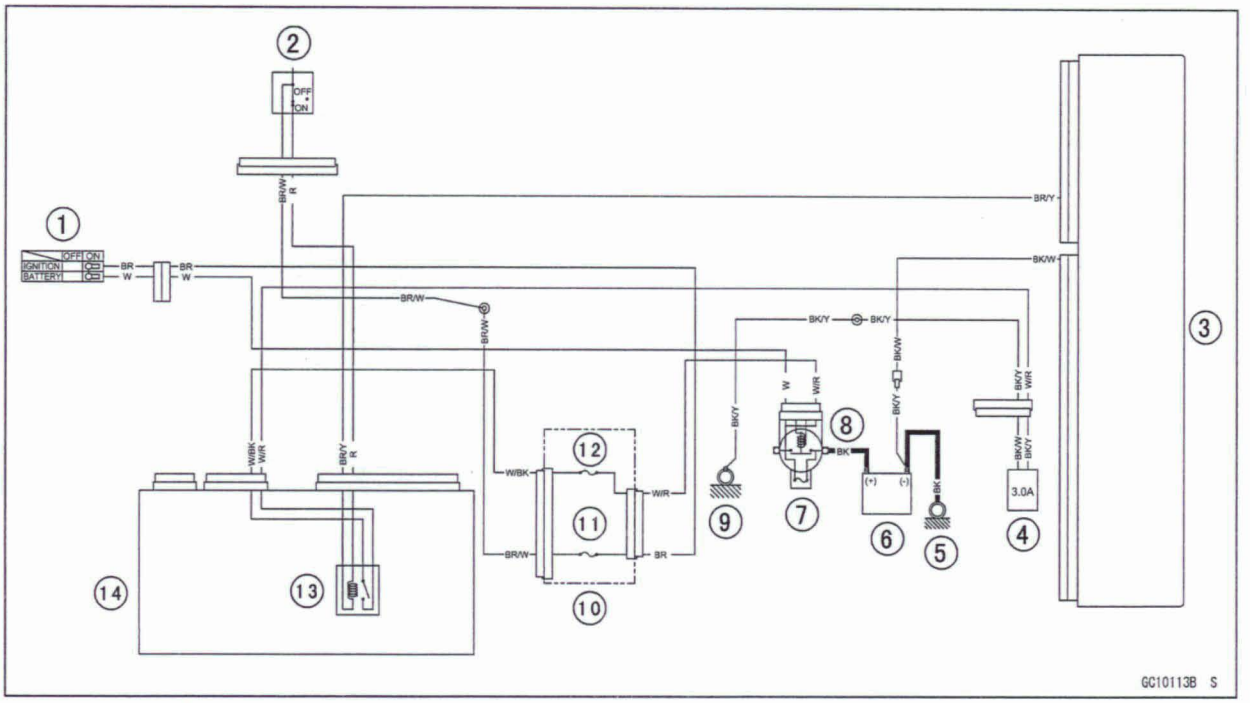
○The fuel pump relay is built in the relay box [A].

- 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 Circuit



1. Ignition Switch
2. Engine Stop Switch
3. ECU
4. Fuel Pump
5. Engine Ground
6. Battery
7. Main Fuse 30 A
8. Starter Relay
9. Frame Ground (2)
10. Fuse Box (1)
11. Ignition Fuse 10 A
12. ECU Fuse 15 A
13. Fuel Pump Relay
14. Relay Box

Throttle Grip and Cables

Throttle Grip Free Play Inspection

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

Throttle Grip Free Play Adjustment

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

Throttle 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.

Throttle 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.

Throttle Bore Cleaning

- Check the throttle bore for cleanliness as follows.

○Remove the throttle body assy (see Throttle Body Assy Removal).

○Check the throttle valves and throttle bores for carbon deposits by opening the throttle valves.

★If any carbon accumulates, wipe the carbon off the throttle bores around the throttle bores and the throttle valves, using a cotton pad penetrated with a high flash-point solvent.

Synchronization Inspection/Adjustment

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

Throttle Body Assy Removal

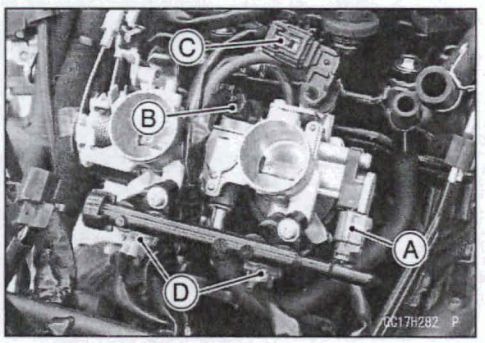
⚠ WARNING

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

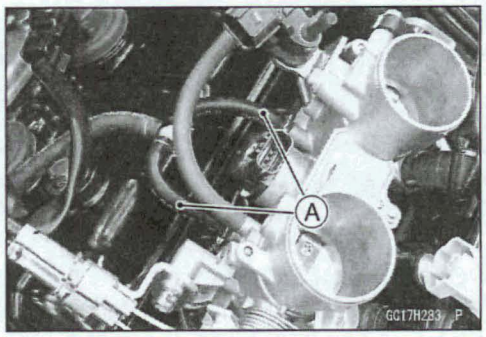
Never drop the throttle body assy especially on a hard surface. Such a shock to the body assy can damage it.

- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal)
  Fuel Hose (see Fuel Hose Replacement in the Periodic Maintenance chapter)
- Disconnect:
  Throttle Sensor Connector [A]
  Idle Speed Control Valve Actuator Connector [B]
  Intake Air Pressure Sensor Connector [C]
  Fuel Injector Connectors Connector [D]

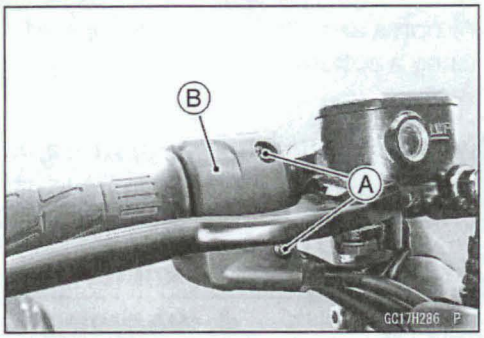


Throttle Body Assy

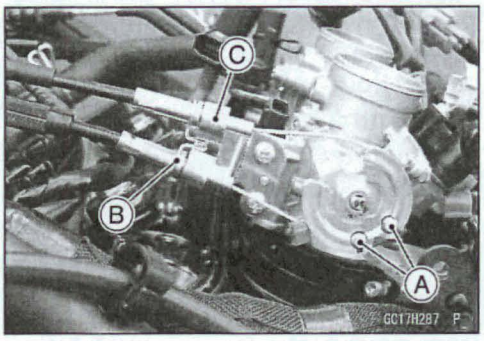
- For evaporative emission control system equipped models, disconnect the vacuum hose [A].



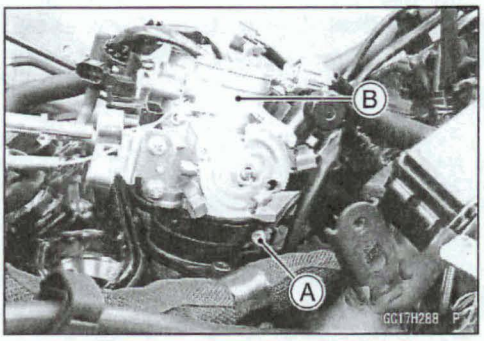
- Remove:
  Switch Housing Screws [A]
- Separate the right switch housing [B].
- Disconnect the throttle cable upper ends.



- Disconnect the throttle cable lower ends [A].
- Remove the clamp [B].
- Remove the throttle cables from the throttle cable holder [C].



- Loosen:
  Throttle Body Assy Holder Clamp Screw [A] (Both Sides)
- Remove the throttle body assy [B].
- After removing the throttle body assy, stuff pieces of lint-free, clean cloth into the throttle body assy holders



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

Throttle Body Assy Installation

- 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).
- Install the throttle body assy to the throttle body assy holders.
- Tighten:

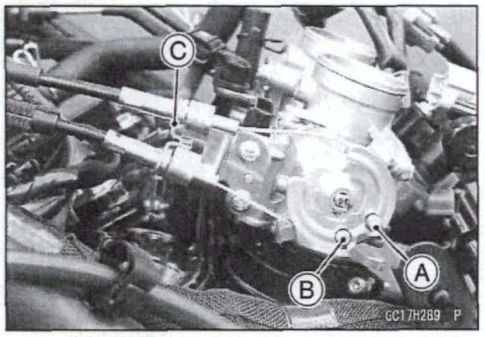
Torque - Throttle Body Assy Holder Clamp Bolts: 2.0 N·m (0.20 kgf·m, 18 in·lb)

Throttle Body Assy

- 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.



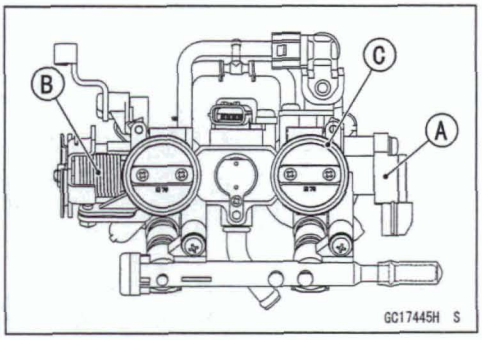
- Install the right switch housing (see Handlebar Installation in the steering chapter).
- Turn the throttle grip and make sure that the throttle pulley moves smoothly and return by spring force.
- Run the leads and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).
- Adjust:

  Throttle Grip Free Play (see Throttle Control System Inspection in the Periodic Maintenance chapter)

Throttle Body Assy Disassembly

NOTICE

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



NOTICE

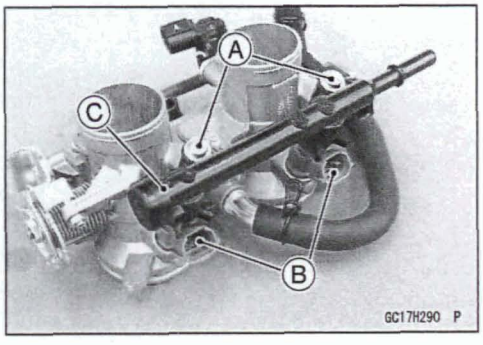
Never drop the throttle body assy especially on a hard surface. Such a shock to the body assy can damage it.

- Remove:

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

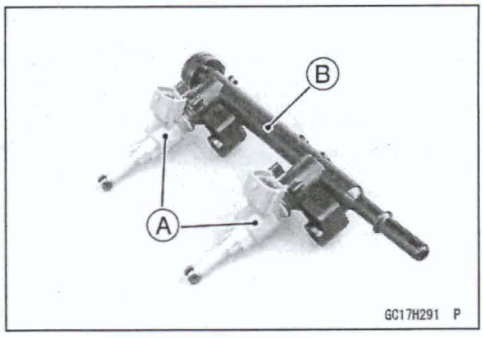
NOTE

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



Throttle Body Assy

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



NOTE

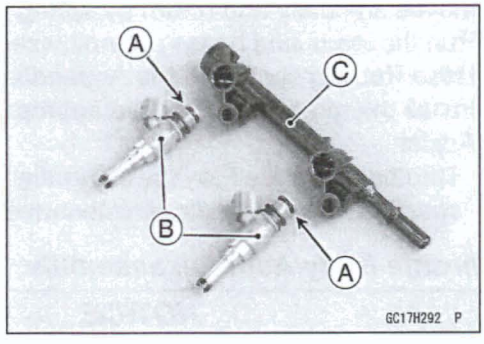
○Do not damage the insertion portions of the fuel injectors when they are pulled out from the delivery pipe.

NOTICE

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

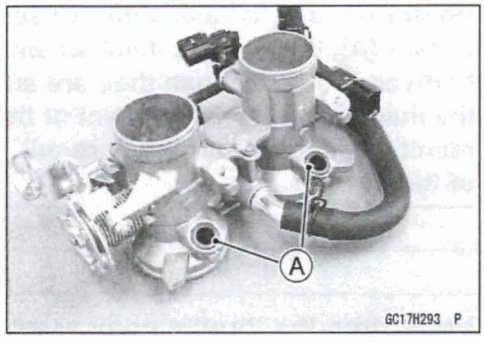
Throttle Body Assy Assembly

- Before assembling, blow away dirt or dust from the throttle body and delivery pipe by applying compressed air.
- 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 [C] and confirm whether the fuel 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 to the throttle body.
- Tighten:

Torque - Delivery Pipe Mounting Screws: 3.5 N·m (0.36 kgf·m, 31 in·lb)



- Install:

Throttle Body Assy (see Throttle Body Assy Installation)

Air Cleaner

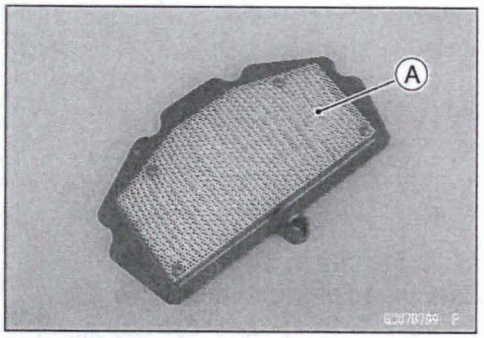
Air Cleaner Element Removal/Installation

- 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.

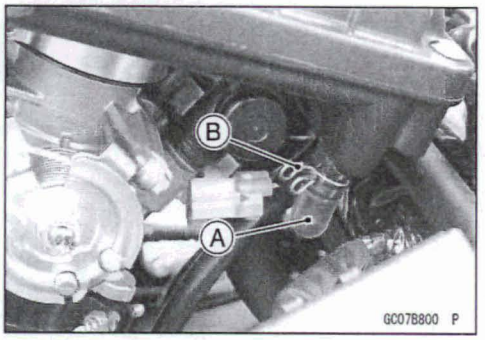


Air Cleaner Oil Draining

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

- Visually check the drain cap [A], if the water or oil accumulates in the cap.

★If any water or oil accumulates in the drain cap, slide the clamp [B] and remove the cap from the air cleaner housing and drain it.

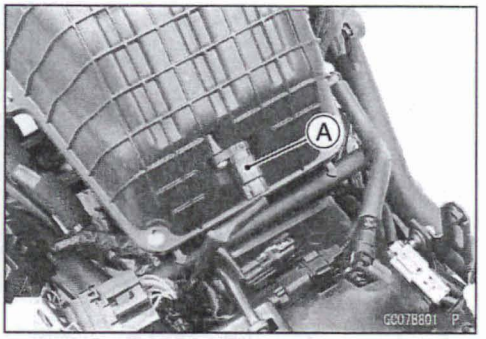


⚠ WARNING

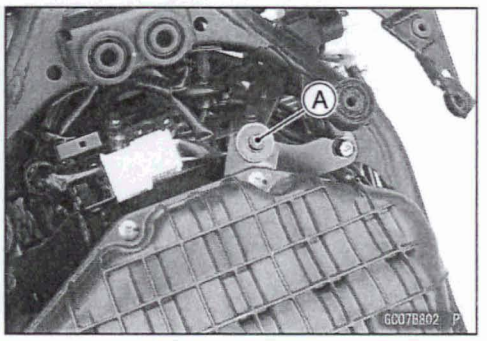
Oil on tires will make them slippery and can cause an accident and injury. Be sure to reinstall the cap in the air cleaner housing after draining.

Air Cleaner Housing Removal

- Remove:
  Fuel Tank (see Fuel Tank Removal)
- Disconnect the intake air temperature sensor connector [A].

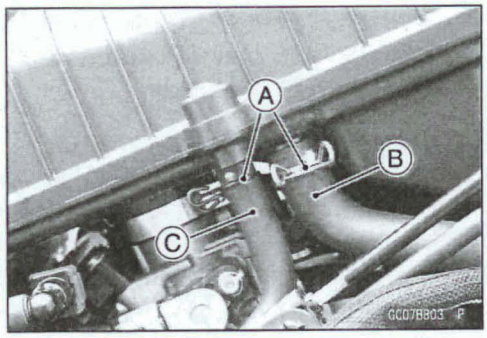


- Remove:
  Air Cleaner Housing Mounting Bolt [A]

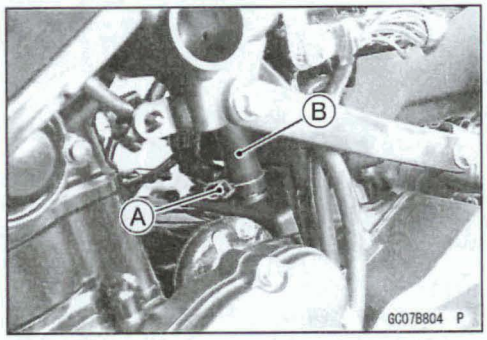


Air Cleaner

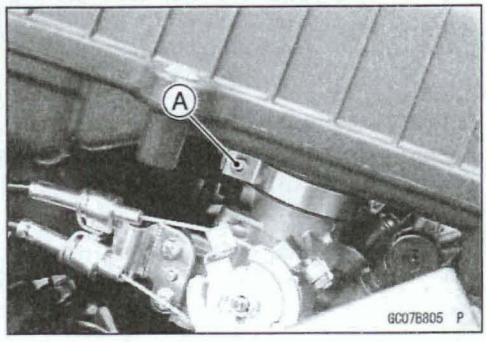
- Slide the clamps [A].
- Disconnect:
  Air Switching Valve Hose [B]
  Intake Air Hose [C]



- Slide the clamp [A].
- Disconnect the breather hose [B].



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



Air Cleaner Housing Installation

- Installation is the reverse of removal.
- Run the hose, cable and leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Tighten:

Torque - Air Cleaner Housing Clamp Bolts: 2.0 N·m (0.20 kgf·m, 18 in·lb)
Air Cleaner Housing Mounting Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Install the removed parts (see appropriate chapters).

Fuel Tank

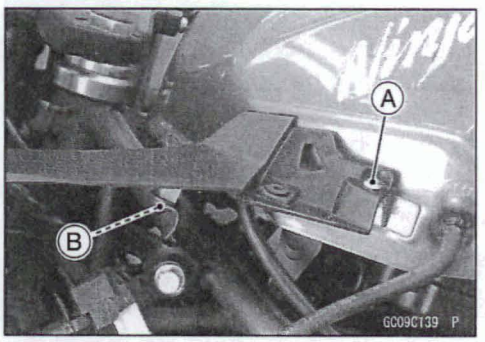
Fuel Tank Removal

⚠ WARNING

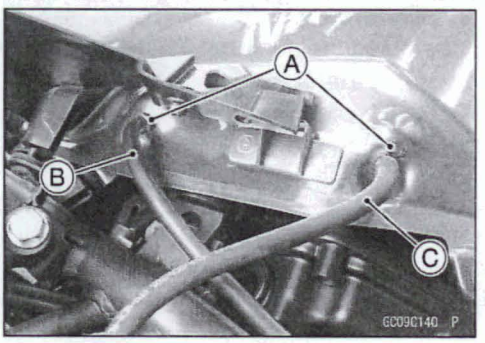
Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Disconnect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

- Turn the ignition switch off.
- Wait until the engine cools down.
- Disconnect the battery (–) terminal (see Battery Removal in the Electrical System chapter).
- Remove:
  Seats (Rear/Front Seat Removal in the Frame chapter)
  Middle Fairings (see Middle Fairing Removal in the Frame chapter)

- Remove the bolt [A] on both sides.
- Clear the projection [B] of the upper inner fairing to the grommet on both sides.

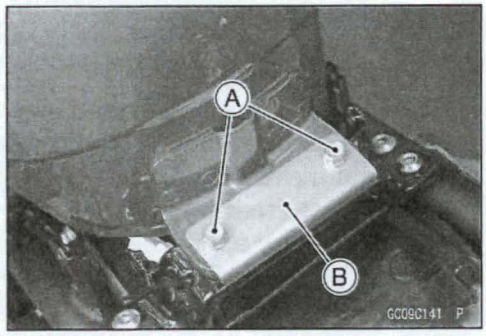


- Slide the clamps [A].
- Disconnect:
  Drain Hose [B]
  Breather Hose [C]

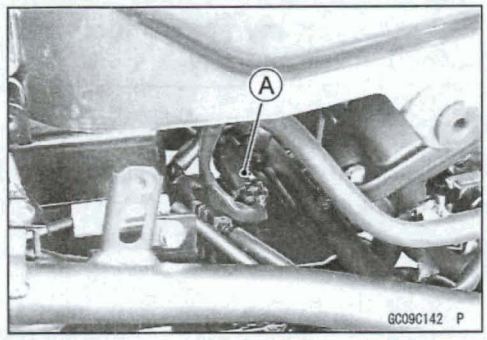


Fuel Tank

- Remove:
  Fuel Tank Bolts [A]
  Bracket [B]

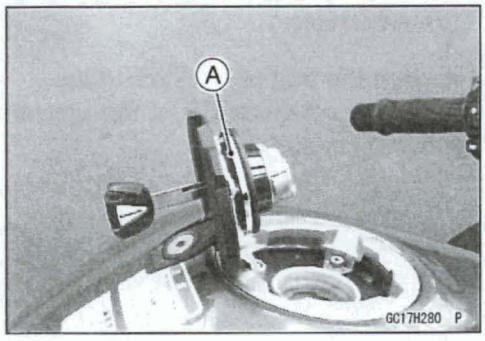


- Disconnect the fuel pump lead connector [A].



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

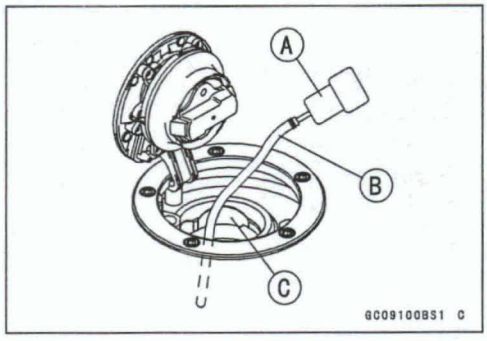
○During tank removal, keep the tank cap open to release pressure in the tank. This makes fuel spillage less.



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

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

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



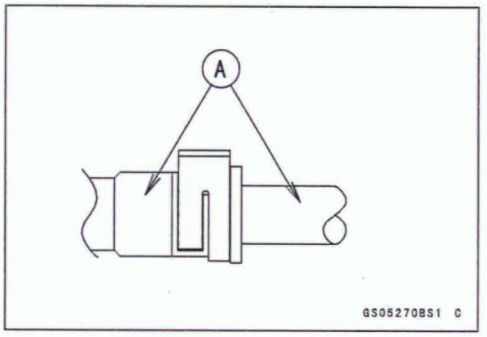
⚠ WARNING

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.

- Close the fuel tank cap.

Fuel Tank

- Pull up the rear of the fuel tank.
- 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.

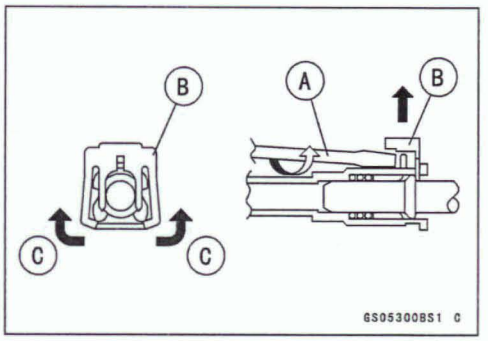


When removing with flat tip screwdriver

- 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

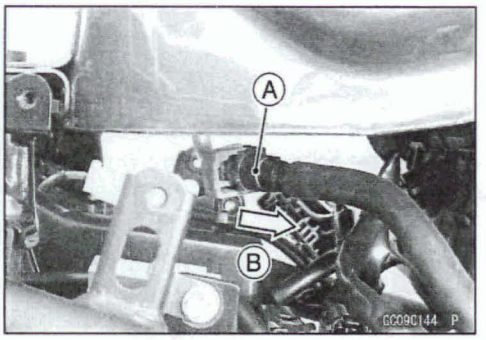
- Open and push up [C] the joint lock with your fingers.



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

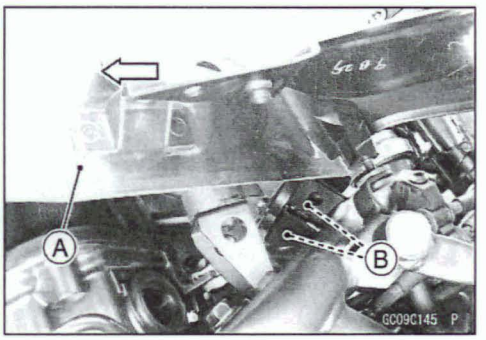


⚠ WARNING

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.

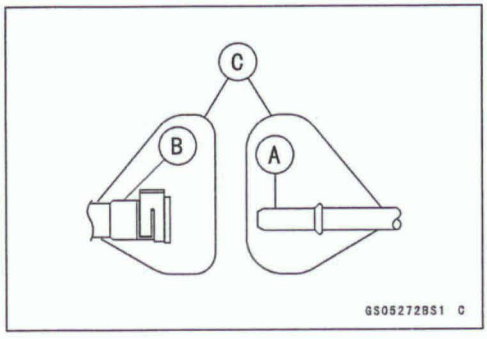
- Remove the fuel tank [A] rearward to clear the projection [B] from the damper, and place it on a flat surface.

○Do not apply the load to the fuel pipe of the fuel pump.



Fuel Tank

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

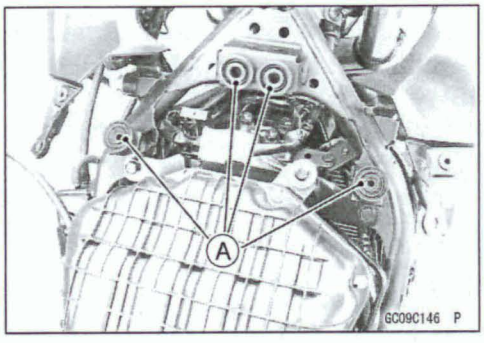


Fuel Tank Installation

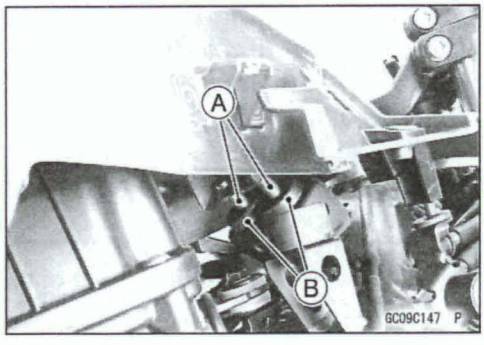
- Note the above WARNING (see Fuel Tank Removal).
- Check that the dampers [A] are in place on the frame.

★If the dampers are damaged or deteriorated, replace them.

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



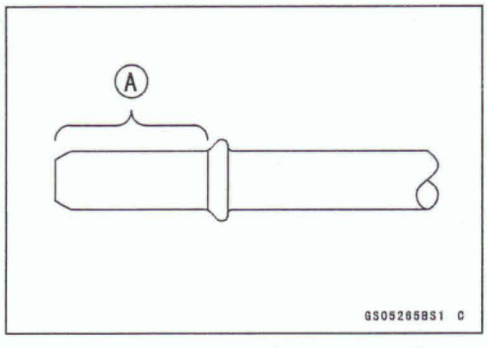
- Insert the projections [A] of the fuel tank to the dampers [B].



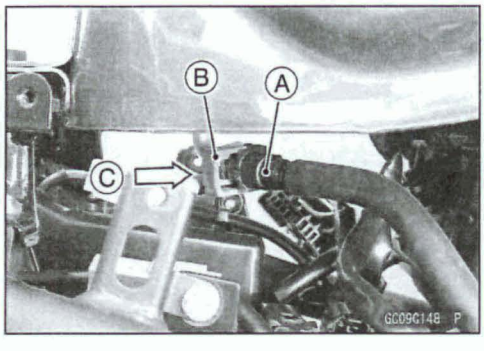
- Remove the vinyl bag on the pipe and fuel hose joint.
- Check the joint lock for deformation and wear.

★If the joint lock is deformed, replace the fuel hose with a new one.

- Check that there are no flaws, burrs, and adhesion of foreign materials on the pipe [A].
- Apply engine oil to the pipe.

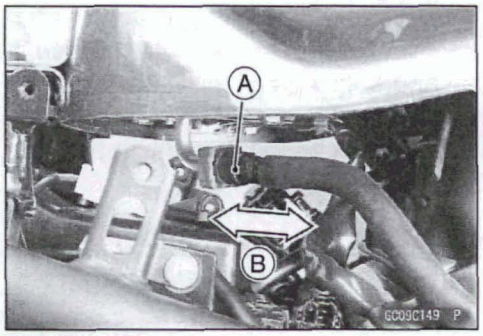


- Insert the fuel hose joint [A] straight onto the fuel outlet pipe until the hose joint clicks.
- Push [B] the joint lock [C] until the hose joint clicks.



Fuel Tank

- 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.



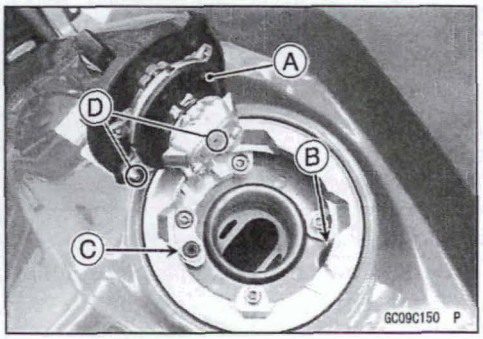
⚠ WARNING

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 fuel pump lead connector and the battery (–) terminal (see Battery Installation in the Electrical System chapter).
- Install the removed parts (see appropriate chapters).
- Tighten:

Torque - Fuel Tank Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

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 [B] and fuel breather pipe [C] in the tank are not clogged. Check the tank cap breather also.

★If they are clogged, remove the tank and drain it, and then blow the breather free with compressed air.

NOTICE

Do not apply compressed air to the air vent holes [D] in the tank cap. This could cause damage and clogging of the labyrinth in the cap.

Fuel Tank Cleaning

⚠ WARNING

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

- Remove:
  Fuel Tank (see Fuel Tank Removal)
  Fuel Pump (see Fuel Pump Removal)
- Pour some high flash-point solvent into the fuel tank and shake the tank to remove dirt and fuel deposits.
- Draw the solvent out of the fuel tank.
- Dry the tank with compressed air.
- Install:
  Fuel Pump (see Fuel Pump Installation)
  Fuel Tank (see Fuel Tank Installation)

Evaporative Emission Control System (Equipped 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.

- Run the hoses correctly (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 (Equipped 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 (Equipped Models) in the Periodic Maintenance chapter.

Cooling System

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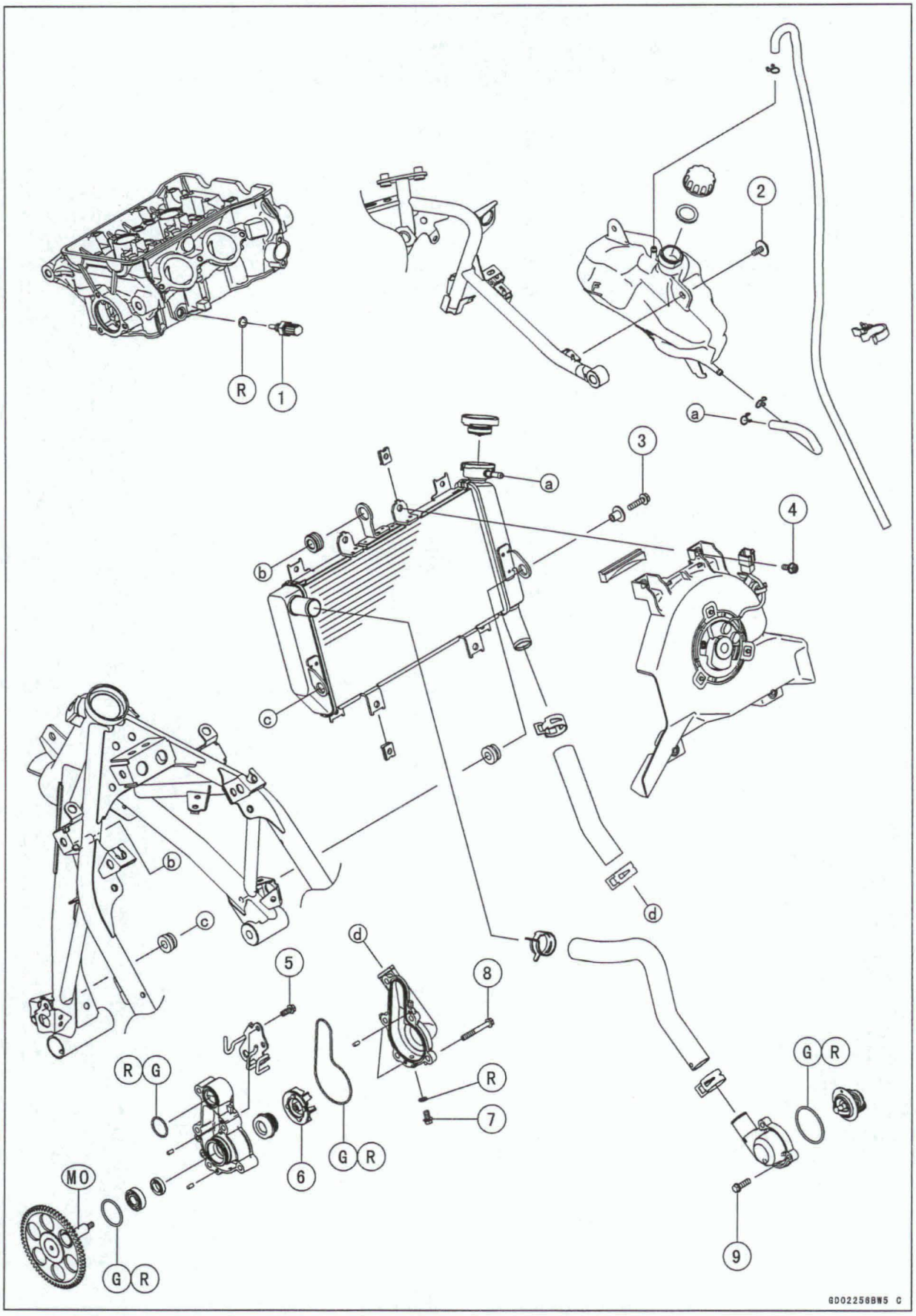
Exploded View

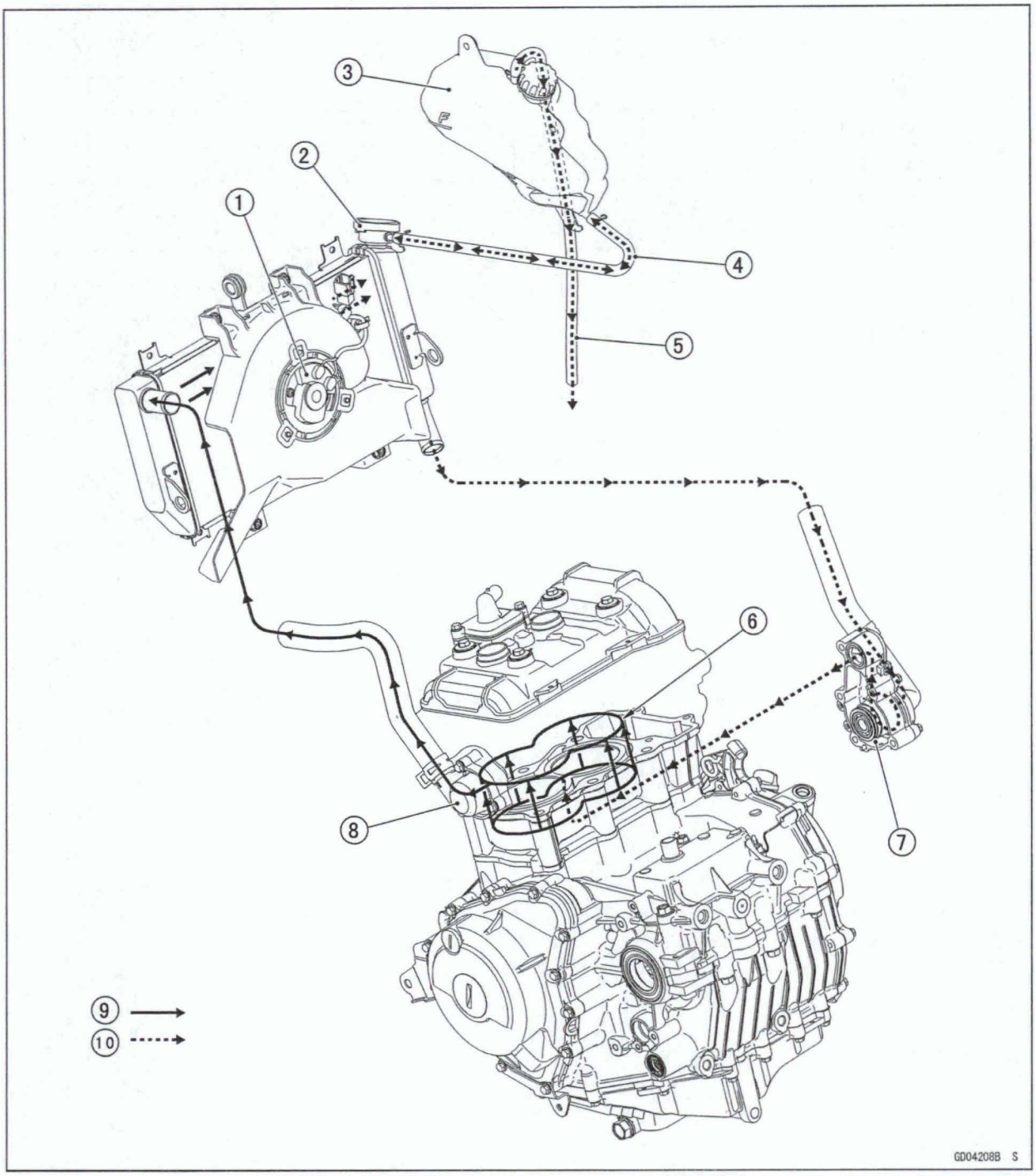


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Water Temperature Sensor	12	1.2	106 in·lb	
2	Reserve Tank Bolts	6.9	0.70	61 in·lb	
3	Radiator Bolts	9.8	1.0	87 in·lb	
4	Radiator Fan Assy Mounting Bolts	8.4	0.86	74 in·lb	
5	Lower Fairing Bracket Bolts	9.8	1.0	87 in·lb	
6	Water Pump Impeller	9.8	1.0	87 in·lb	
7	Coolant Drain Bolt	7.0	0.71	62 in·lb	
8	Water Pump Cover Bolts	9.8	1.0	87 in·lb	
9	Thermostat Cover Bolts	9.8	1.0	87 in·lb	

G: Apply 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

Coolant Flow Chart



Coolant Flow Chart

1. Radiator Fan
2. Radiator Cap
3. Reserve Tank
4. Radiator Overflow Hose
5. Reserve Tank Overflow Hose
6. Cylinder Head Water Jacket
7. Water Pump
8. Thermostat Housing
9. Hot Coolant
10. 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 80.5 ~ 83.5°C (177 ~ 182°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 80.5 ~ 83.5°C (177 ~ 182°F), the thermostat opens and the coolant flows.

When the coolant temperature goes up beyond 104°C (219°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 99°C (210°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.

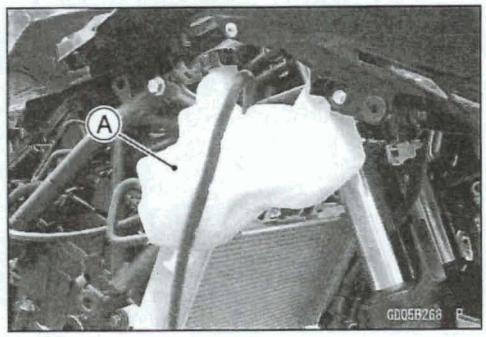
The radiator cap has two valves. One is a pressure valve which holds the pressure in the system when the engine is running. When the pressure exceeds 107.9 ~ 137.3 kPa (1.10 ~ 1.40 kgf/cm², 15.6 ~ 19.9 psi), the pressure valve opens and releases the pressure to the reserve tank. As soon as pressure escapes, the valve closes, and keeps the pressure at 107.9 ~ 137.3 kPa (1.10 ~ 1.40 kgf/cm², 15.6 ~ 19.9 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.

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	1.3 L (1.4 US qt) (Reserve tank full level, including radiator and engine)
Radiator Cap	
Relief Pressure	107.9 ~ 137.3 kPa (1.10 ~ 1.40 kgf/cm², 15.6 ~ 19.9 psi)
Thermostat	
Valve Opening Temperature	80.5 ~ 83.5°C (177 ~ 182°F)
Valve Full Opening Lift	8 mm (0.31 in.) or more @95°C (203°F)

Coolant

Coolant Deterioration Inspection



- Remove the right middle fairing (see Middle Fairing Removal in the Frame chapter).
- Visually inspect the coolant in the reserve tank [A].

★If whitish cotton-like wafts are observed, aluminum parts in the cooling system are corroded. If the coolant is brown, iron or steel parts are rusting. In either case, flush the cooling system.

★If the coolant gives off an abnormal smell, check for a cooling system leak. It may be caused by exhaust gas leaking into the cooling system.

Coolant Level Inspection

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

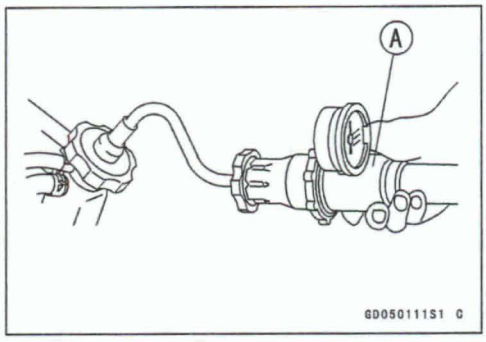
Coolant Draining

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

Coolant Filling

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

Pressure Testing



- Remove the coolant reserve tank (see Coolant Reserve Tank Removal).
- 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 137.3 kPa (1.40 kgf/cm², 19.9 psi).

NOTICE

During pressure testing, do not exceed the pressure for which the system is designed. The maximum pressure is 137.3 kPa (1.40 kgf/cm², 19.9 psi).

- Watch the gauge for at least 6 seconds.

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

★If the pressure drops and no external source is found, check for internal leaks. Droplets in the engine oil indicate internal leakage. Check the cylinder head gasket and the water pump.

- Remove the pressure tester, replenish the coolant, and install the radiator cap.

Coolant

Cooling System Flushing

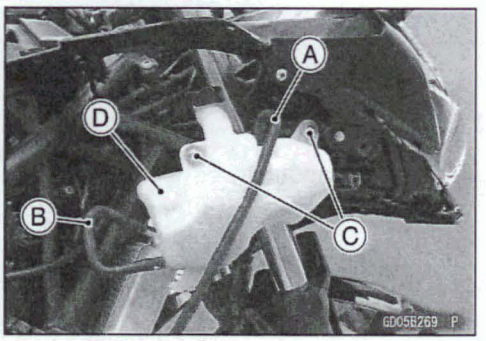
Over a period of time, the cooling system accumulates rust, scale, and lime in the water jacket and radiator. When this accumulation is suspected or observed, flush the cooling system. If this accumulation is not removed, it will clog up the water passage and considerable reduce the efficiency of the cooling system.

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

NOTICE
Do not use a flushing compound which is harmful to the aluminum engine and radiator. Carefully follow the instructions supplied by the manufacturer of the cleaning product.

- Warm up the engine, and run it at normal operating temperature for about ten minutes.
- Stop the engine, and drain the cooling system.
- Fill the system with fresh water.
- Warm up the engine and drain the system.
- Repeat the previous two steps once more.
- Fill the system with a permanent type coolant and bleed the air from the system (see Coolant Change in the Periodic Maintenance chapter).

Coolant Reserve Tank Removal



- Remove the right middle fairing (see Middle Fairing Removal in the Frame chapter).
- Slide the clamp and disconnect the hose [A].
- Slide the clamp and disconnect the hose [B] from the radiator.
- Remove:
  Coolant Reserve Tank Bolts [C]
  Coolant Reserve Tank [D]
- Pour the coolant into a container.

Coolant Reserve Tank Installation

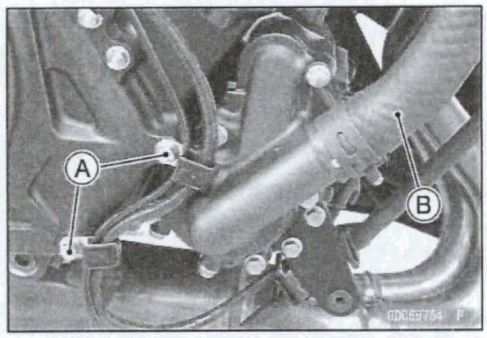
- Installation is the reverse of removal.
- Run the cable and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Tighten:

Torque - Reserve Tank Bolts: 6.9 N·m (0.70 kgf·m, 61 in·lb)

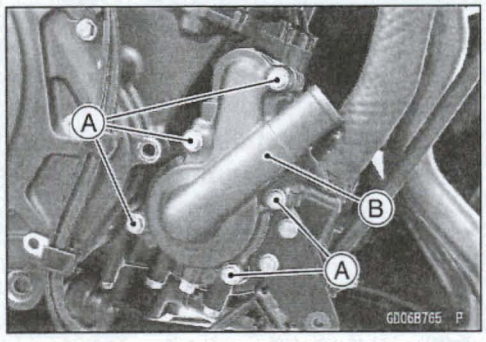
Water Pump

Water Pump Cover Removal

- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove:
  Right Middle Fairing (see Middle Fairing Removal in the Frame chapter)
  Clutch Cover Bolts [A]
- Disconnect the water hose [B].

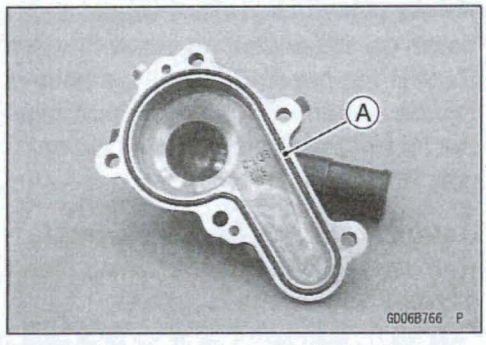


- Remove:
  Water Pump Cover Bolts [A]
  Water Pump Cover [B]

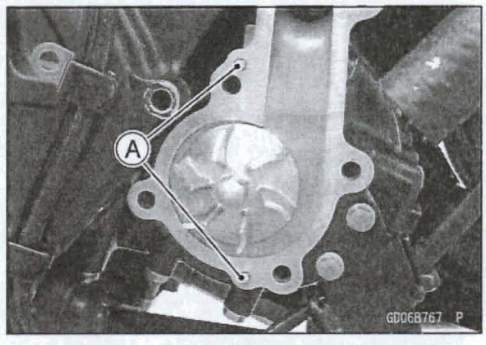


Water Pump Cover Installation

- Replace the O-ring [A] with a new one.
- Apply grease to the O-ring.



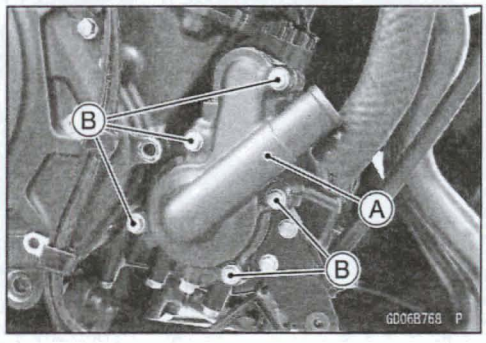
- Be sure to install the dowel pins [A] in position.



- Install the water pump cover [A].
- Tighten:

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

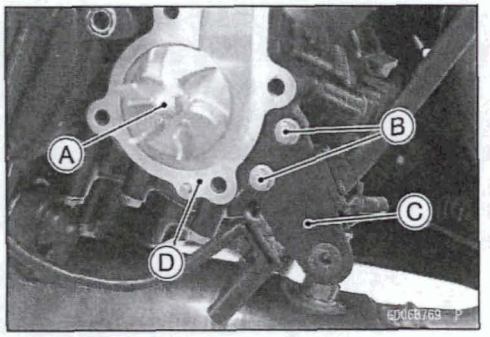
- Install the removed parts (see appropriate chapters).



Water Pump

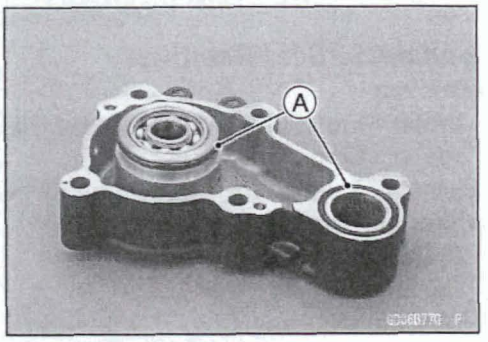
Water Pump Removal

- Shift the transmission into 1st gear.
- Remove the water pump cover (see Water Pump Cover Removal).
- While applying the rear brake, remove the water pump impeller [A].
- Remove:
  Lower Fairing Bracket Bolts [B]
  Bracket [C]
  Water Pump Housing [D]

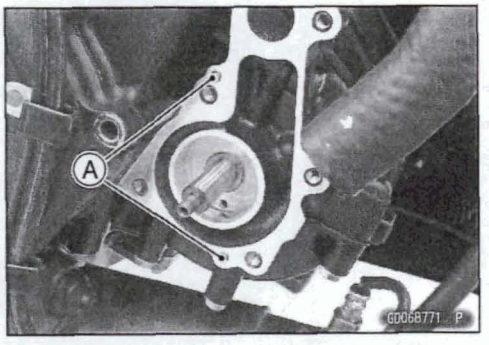


Water Pump Installation

- Replace the O-rings [A] with new ones.
- Apply grease to the O-rings.



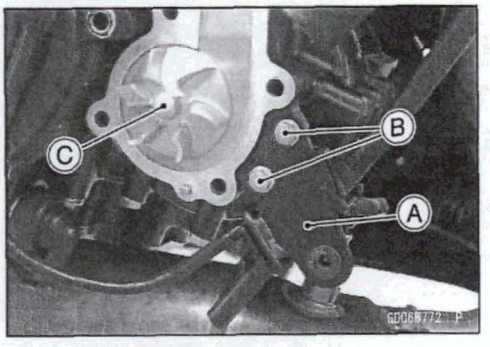
- Be sure to install the dowel pins [A] in position.
- Install:
  Water Pump Housing



- Install the bracket [A].
- Tighten:

Torque - Lower Fairing Bracket Bolts [B]: 9.8 N·m (1.0 kgf·m, 87 in·lb)
Water Pump Impeller [C]: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Install the removal parts (see appropriate chapters).



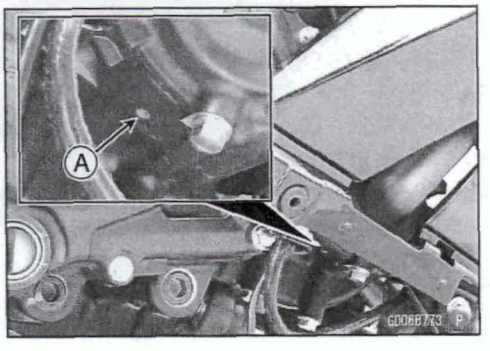
Water Pump Inspection

- Remove the right lower fairing (see Lower Fairing Removal in the Frame chapter).
- 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.

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



Water Pump

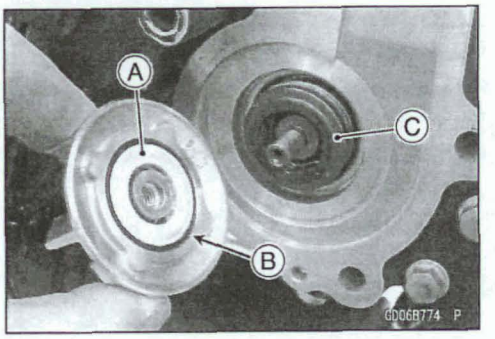
Mechanical Seal Inspection

- Remove the impeller (see Water Pump Removal).
- Visually inspect the mechanical seal.

★If any of the parts is damaged, replace the mechanical seal with a new one (see Mechanical Seal Removal/Installation).

○The sealing seat and rubber seal may be removed easily by hand.

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



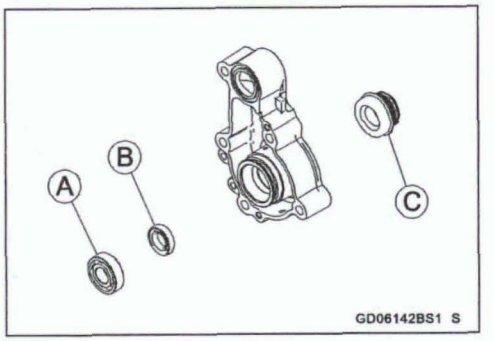
Mechanical Seal Removal

- Remove:

Water Pump Housing (see Water Pump Removal)
Water Pump Shaft

- Using a suitable tool, remove the following parts from the water pump housing.

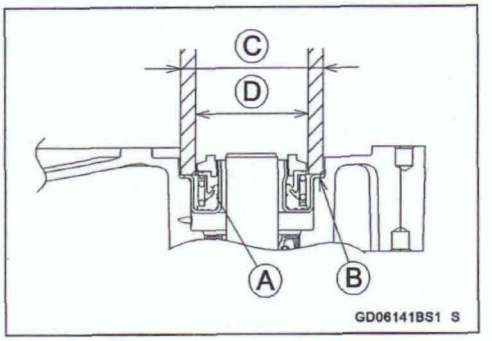
Ball Bearing [A]
Oil Seal [B]
Mechanical Seal [C]



Mechanical Seal Installation

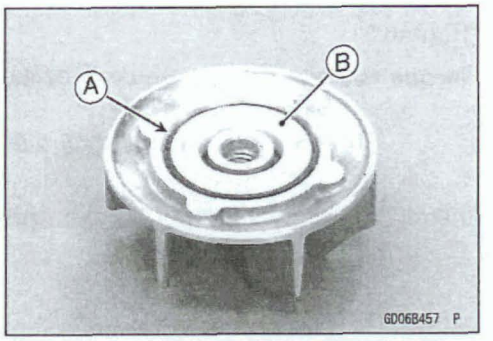
- Using a suitable tool or pipe with the dimension as shown, install the mechanical seal [A] until the flange [B] on the mechanical seal is bottomed.

30 ~ 33 mm (1.2 ~ 1.3 in.) [C]
26 ~ 29 mm (1.0 ~ 1.1 in.) [D]



Impeller Assembly

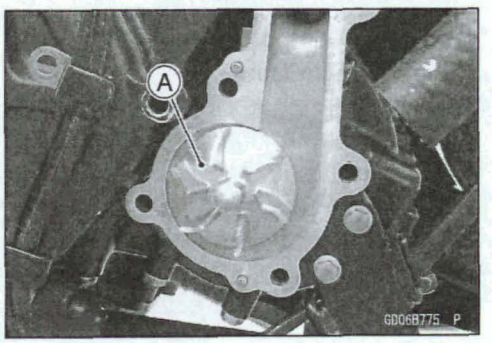
- Clean the sliding surface of the mechanical seal with a high flash-point solvent, and apply a little coolant to the sliding surface to give the mechanical seal initial lubrication.
- Apply coolant to the surfaces of the rubber seal [A] and sealing seat [B], and install the rubber seal and sealing seat into the impeller by pressing them by hand until the seat stops at the bottom of the hole.



Water Pump Impeller Inspection

- Remove the water pump cover (see Water Pump Removal).
- Visually inspect the impeller [A].

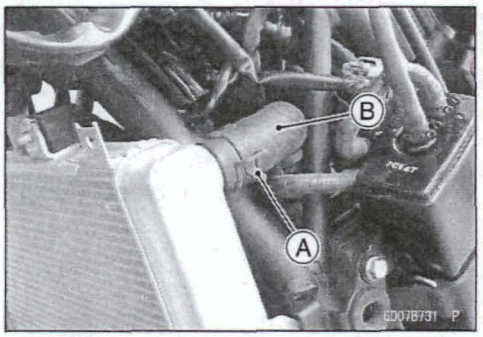
★If the surface is corroded, or if the blades are damaged, replace the impeller with a new one (see Water Pump Removal/Installation).



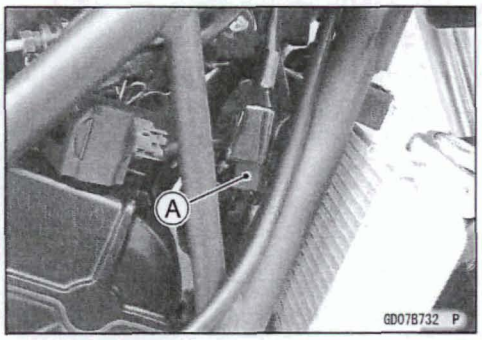
Radiator

Radiator and Radiator Fan Removal

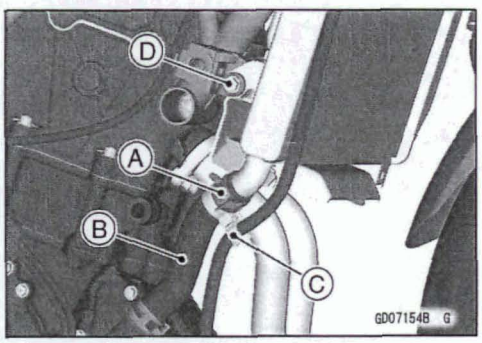
- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove the middle fairings (see Middle Fairing Removal in the Frame chapter).
- Slide the clamp [A] and disconnect the water hose [B].



- Disconnect the radiator fan motor lead connector [A].



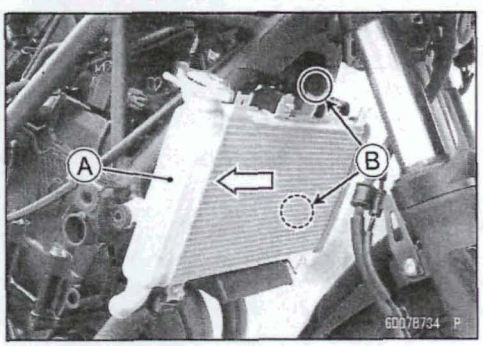
- Slide the clamp [A] and disconnect the water hose [B].
- Free the hose from the clamp [C].
- Remove the radiator bolt [D].



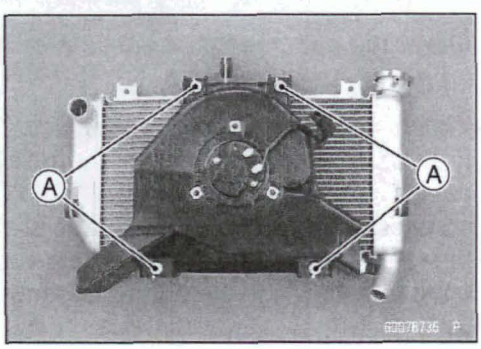
- Remove:
  Radiator [A]

○Slide the radiator rightward to clear it from the projections [B] on the frame.

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



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



Radiator and Radiator Fan Installation

- Installation is the reverse of removal.

Radiator

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

Torque - Radiator Fan Assy Mounting Bolts: 8.4 N·m (0.86 kgf·m, 74 in·lb)
Radiator Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

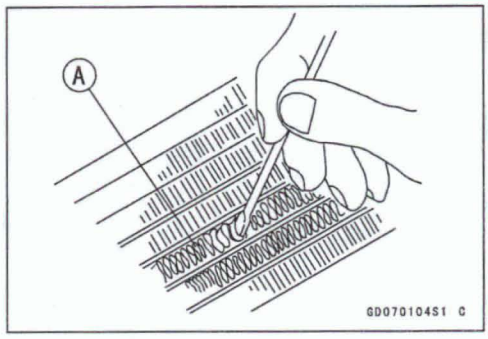
Radiator Inspection

- Check the radiator core.

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

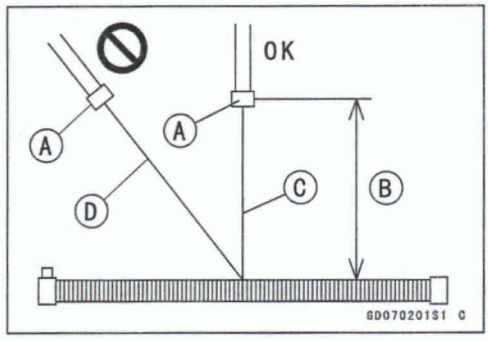
★If the corrugated fins [A] are deformed, carefully straighten them.

★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

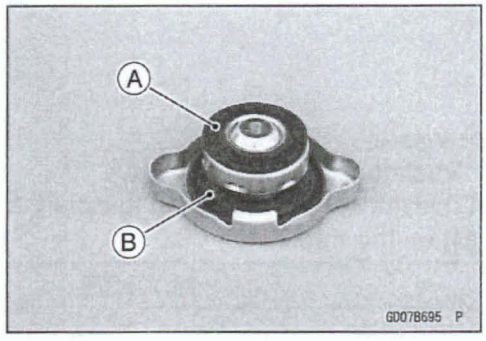
When cleaning the radiator with steam cleaner, be careful of the following to prevent radiator damage:
Keep the steam gun [A] away more than 0.5 m (1.6 ft) [B] from the radiator core.
Hold the steam gun perpendicular [C] (not oblique [D]) to the core surface.
Run the steam gun, following the core fin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



Radiator Cap Inspection

- Remove:
  Right Middle Fairing (see Middle Fairing Removal in the Frame chapter)
  Coolant Reserve Tank (see Coolant Reserve Tank Removal)
  Radiator Cap
- Check the condition of the bottom [A] and top [B] valve seals.

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



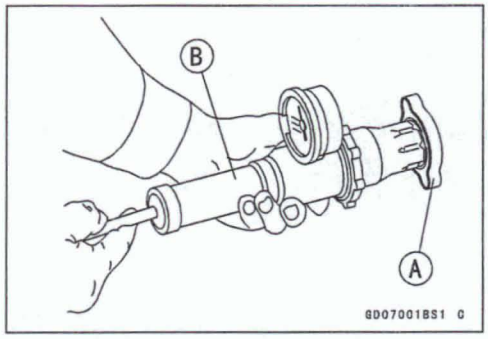
- Install the cap [A] on a cooling system pressure tester [B].

NOTE

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

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

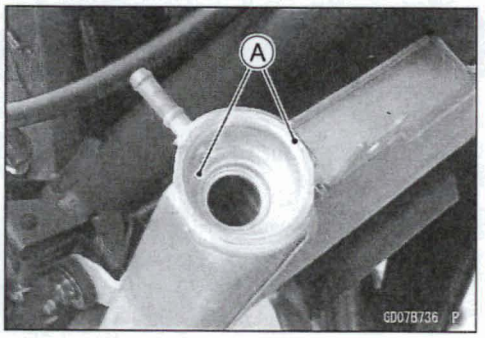
Radiator Cap Relief Pressure
Standard: 107.9 ~ 137.3 kPa (1.10 ~ 1.40 kgf/cm², 15.6 ~ 19.9 psi)



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

Radiator

Radiator Filler Neck Inspection

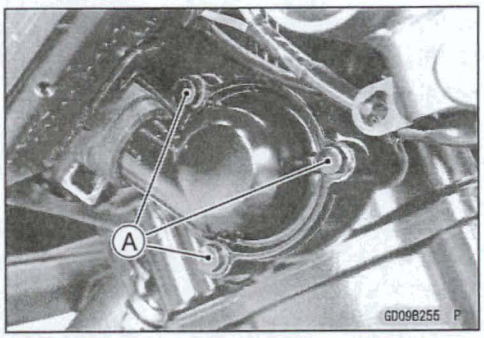


- Remove:
  Right Middle Fairing (see Middle Fairing Removal in the Frame chapter)
  Coolant Reserve Tank (see Coolant Reserve Tank Removal)
  Radiator Cap
- Check the radiator filler neck for signs of damage.
- Check the condition of the top and bottom sealing seats [A] in the filler neck. They must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

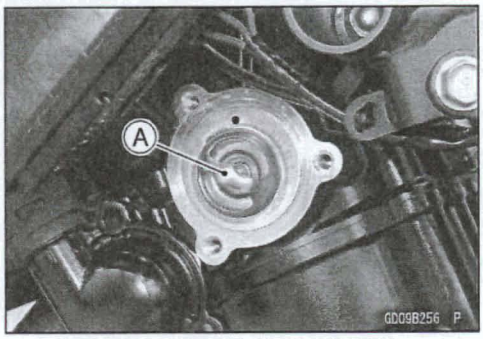
Thermostat

Thermostat Removal

- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove:
  Left Middle Fairing (see Middle Fairing Removal in the Frame chapter)
  Thermostat Cover Bolts [A]



- Move the thermostat cover and remove the thermostat [A].

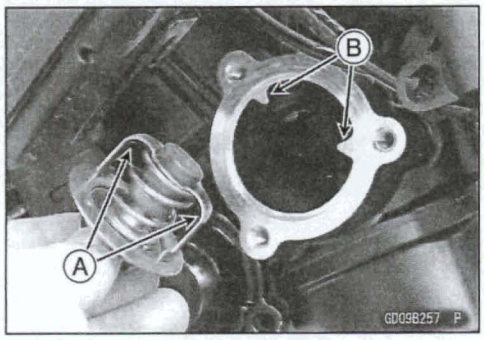


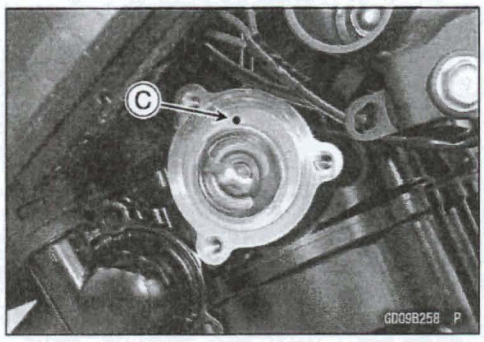
Thermostat Installation

- Install the thermostat.

○Place the frame [A] of the thermostat under the ribs [B] on the cylinder head.

○Place the air bleeder hole [C] to the top as shown.

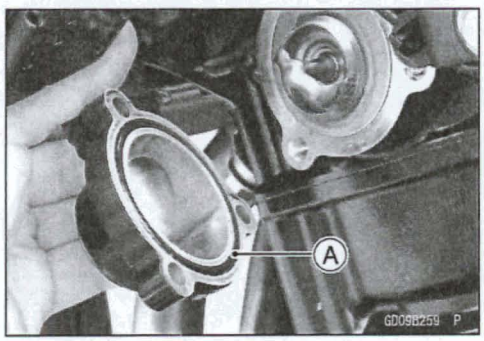




- Replace the O-ring [A] with a new one.
- Apply grease to the O-ring.
- Tighten:

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

- Install the removed parts (see appropriate chapters).

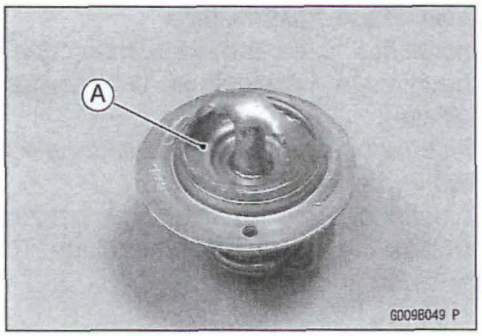


Thermostat

Thermostat Inspection

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

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

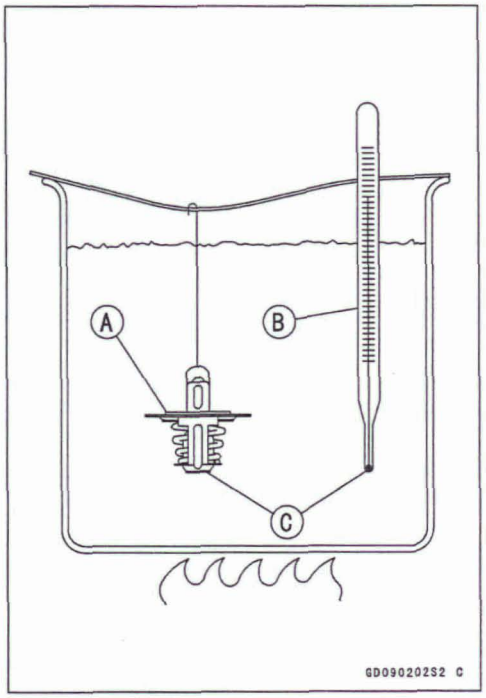


- To check valve opening temperature, suspend the thermostat [A] in a container of water and raise the temperature of the water.

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

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

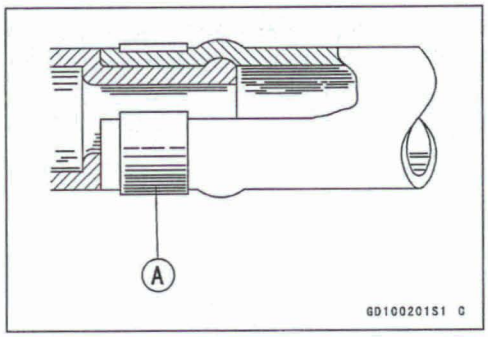
Thermostat Valve Opening Temperature
80.5 ~ 83.5°C (177 ~ 182°F)



Water Hoses and Pipes

Water 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.



Water Hose Inspection

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

Water Hose and O-ring Replacement

- Refer to the Water Hose and O-ring Replacement 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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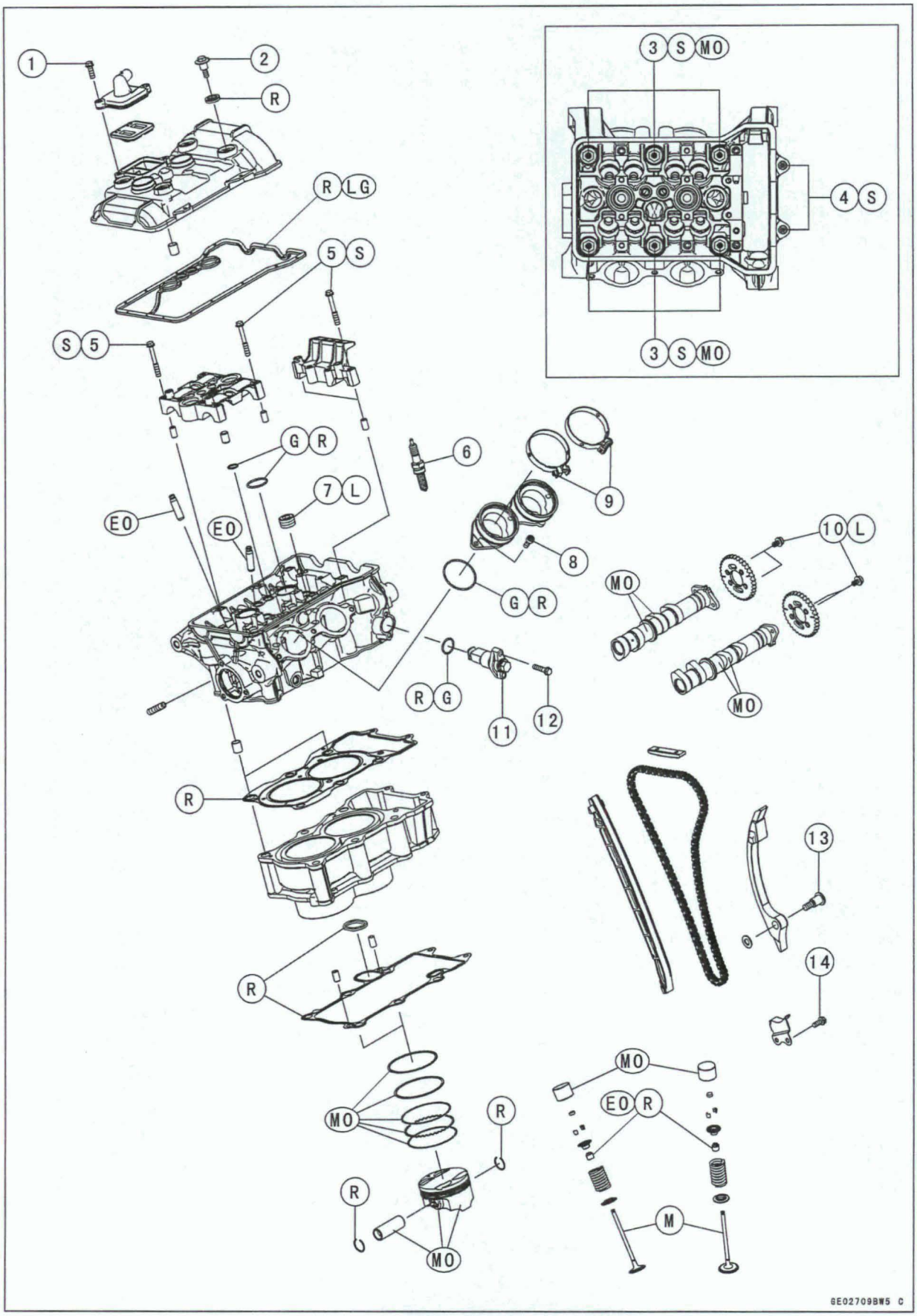
Exploded View

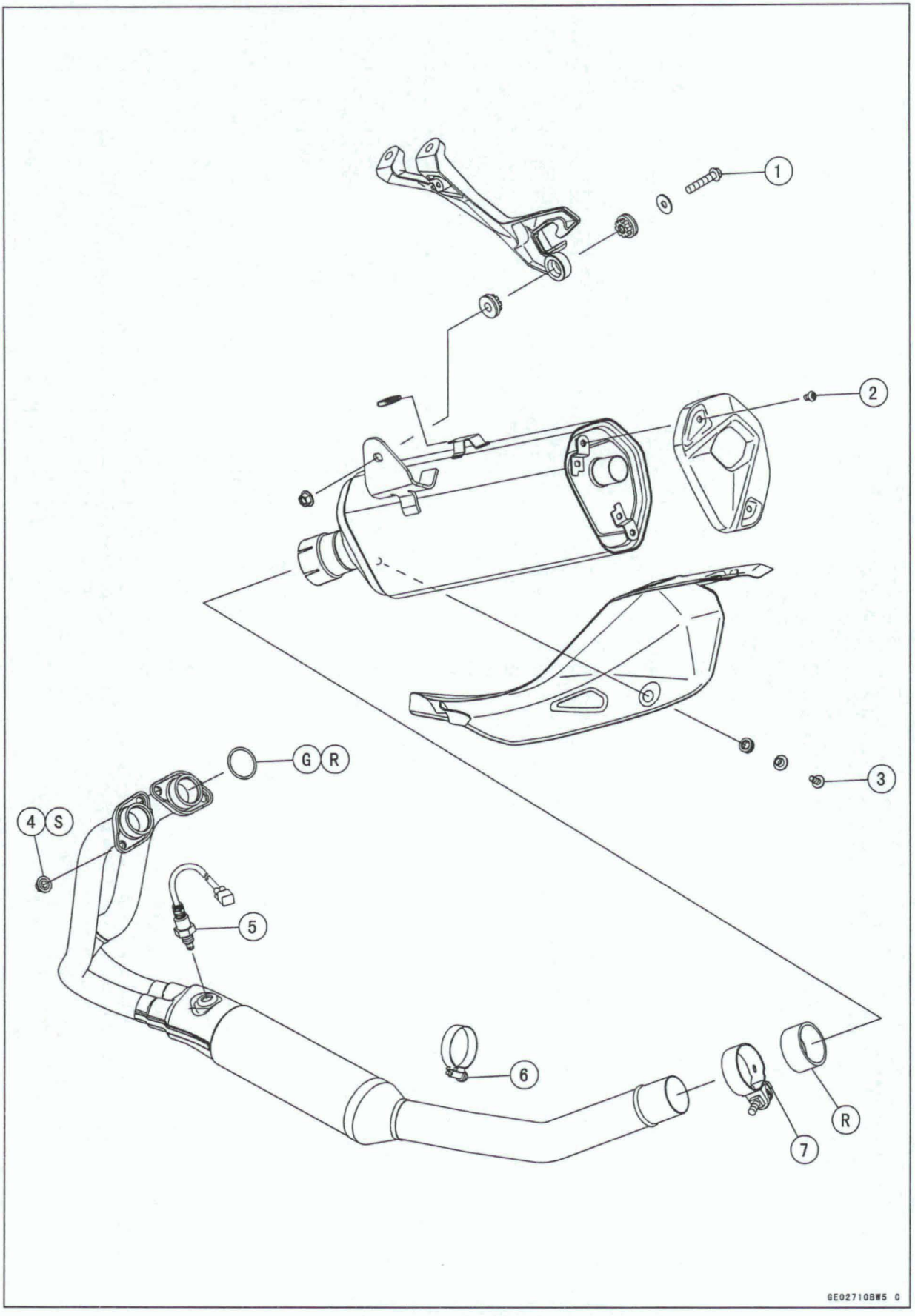


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Air Suction Valve Cover Bolts	9.8	1.0	87 in·lb	
2	Cylinder Head Cover Bolts	9.8	1.0	87 in·lb	
3	Cylinder Head Bolts (M9)	see the text	–	–	MO, S
4	Cylinder Head Bolts (M6)	12	1.2	106 in·lb	S
5	Camshaft Cap Bolts	12	1.2	106 in·lb	S
6	Spark Plugs	13	1.3	115 in·lb	
7	Cylinder Head Jacket Plugs	22	2.2	16	L
8	Throttle Body Assy Holder Bolts	12	1.2	106 in·lb	
9	Throttle Body Assy Holder Clamp Bolts	2.0	0.20	18 in·lb	
10	Camshaft Sprocket Bolts	20	2.0	15	L
11	Camshaft Chain Tensioner Cap Bolt	20	2.0	15	
12	Camshaft Chain Tensioner Mounting Bolts	9.8	1.0	87 in·lb	
13	Rear Camshaft Chain Guide Bolt	17	1.7	13	
14	Lower Camshaft Chain Guide Bolt	9.8	1.0	87 in·lb	

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 Bolt	25	2.5	18	
2	Muffler End Cover Bolts	4.4	0.45	39 in·lb	
3	Muffler Cover Bolt	4.4	0.45	39 in·lb	
4	Exhaust Pipe Holder Nuts	12	1.2	106 in·lb	S
5	Oxygen Sensor	25	2.5	18	
6	Muffler Cover Clamp Bolt	6.9	0.70	61 in·lb	
7	Muffler Body Clamp Bolt	10	1.0	89 in·lb	

G: Apply grease.
R: Replacement Parts
S: Follow the specified tightening sequence.

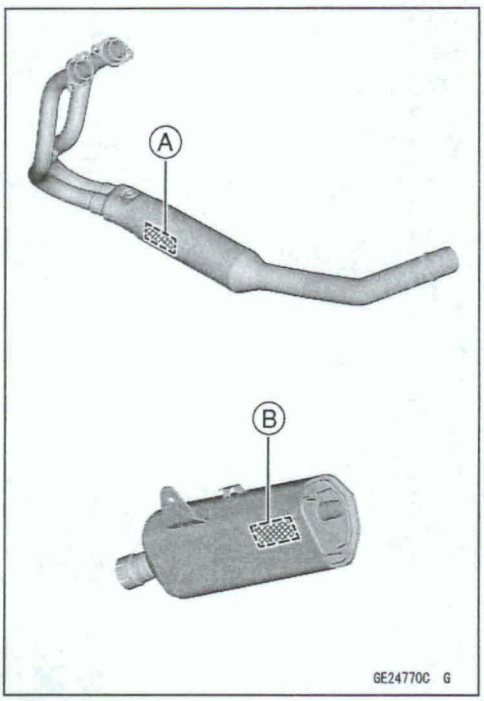
Exhaust System Identification

Exhaust System

MANIFOLD	MUFFLER	SPECIFICATION	MODEL
Honeycomb Type Catalyst with Oxygen Sensor P/No. 39178-0295 Mark: KHI M 191	Non Catalyst P/No. 18091-1133 Mark: KHI K 670 EPA Noise Emission Control Information	WVTA (FULL) AU TH SEA-B1 SEA-B3	EX400GJ EX400GJ EX400GJ EX400JJ EX400GJ EX400GJ
Honeycomb Type Catalyst with Oxygen Sensor P/No. 39178-0315 Mark: KHI M 194	Non Catalyst P/No. 18091-1133 Mark: KHI K 670 EPA Noise Emission Control Information	US CAL CA	EX400GJ EX400HJ EX400GJ EX400HJ EX400GJ EX400HJ
Honeycomb Type Catalyst with Oxygen Sensor P/No. 39178-0317 Mark: KHI M 201	Non Catalyst P/No. 18091-1133 Mark: KHI K 670 EPA Noise Emission Control Information	MY PH	EX400JJ EX400GJ

GE24768C F

Manifold Mark Position [A]
Muffler Mark Position [B]

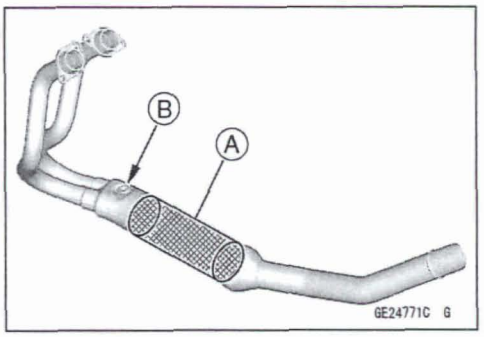


GE24770C G

Exhaust System Identification

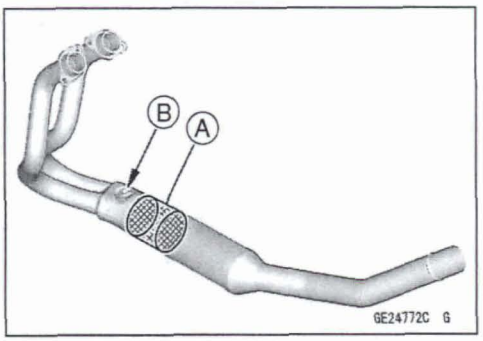
P/No. 39178-0295, 0317

Honeycomb Type Catalyst Position [A]
Oxygen Sensor Mounting Hole [B]



P/No. 39178-0315

Honeycomb Type Catalyst Position [A]
Oxygen Sensor Mounting Hole [B]



Specifications

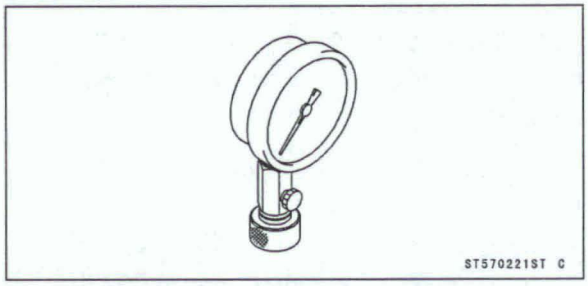
Item	Standard	Service Limit
Camshafts		
Cam Height:		
Exhaust	32.743 ~ 32.857 mm (1.2891 ~ 1.2936 in.)	32.64 mm (1.285 in.)
Intake	33.743 ~ 33.857 mm (1.3285 ~ 1.3330 in.)	33.64 mm (1.324 in.)
Camshaft Journal/Cap Clearance	0.038 ~ 0.081 mm (0.0015 ~ 0.0032 in.)	0.17 mm (0.0067 in.)
Camshaft Journal 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) 1 050 ~ 1 598 kPa (10.71 ~ 16.30 kgf/cm², 152.3 ~ 231.7 psi) @500 r/min (rpm)	– – –
Cylinder Head Warp	– – –	0.05 mm (0.002 in.)
Valves		
Valve Clearance:		
Exhaust	0.25 ~ 0.31 mm (0.0098 ~ 0.0122 in.)	– – –
Intake	0.13 ~ 0.19 mm (0.0051 ~ 0.0075 in.)	– – –
Valve Head Thickness:		
Exhaust	0.8 mm (0.031 in.)	0.7 mm (0.03 in.)
Intake	0.5 mm (0.020 in.)	0.3 mm (0.01 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.)	0.29 mm (0.011 in.)
Valve Seat Cutting Angle	32°, 45°, 60°	– – –
Valve Seating Surface:		
Outside Diameter:		
Exhaust	22.9 ~ 23.1 mm (0.902 ~ 0.909 in.)	– – –
Intake	26.9 ~ 27.1 mm (1.06 ~ 1.07 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	36.9 mm (1.45 in.)	35.5 mm (1.40 in.)
Intake	36.9 mm (1.45 in.)	35.5 mm (1.40 in.)

Specifications

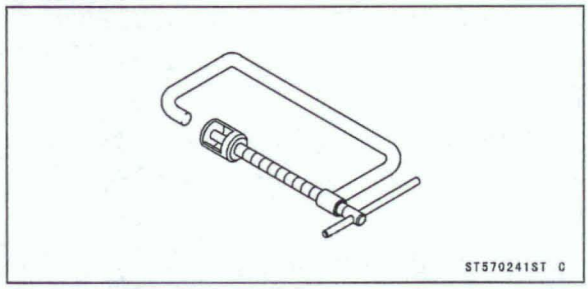
Item	Standard	Service Limit
Cylinders, Pistons		
Cylinder Inside Diameter	69.994 ~ 70.010 mm (2.7557 ~ 2.7563 in.)	70.09 mm (2.759 in.)
Piston Diameter	69.967 ~ 69.982 mm (2.7546 ~ 2.7552 in.)	69.82 mm (2.749 in.)
Piston/Cylinder Clearance	0.012 ~ 0.043 mm (0.0005 ~ 0.0017 in.)	– – –
Piston Ring/Groove Clearance:		
Top	0.030 ~ 0.070 mm (0.0012 ~ 0.0028 in.)	0.17 mm (0.0067 in.)
Second	0.020 ~ 0.060 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 (0.030 ~ 0.031 in.)	0.70 mm (0.028 in.)
Second	0.77 ~ 0.79 mm (0.030 ~ 0.031 in.)	0.70 mm (0.028 in.)
Piston Ring End Gap:		
Top	0.15 ~ 0.30 mm (0.006 ~ 0.012 in.)	0.6 mm (0.02 in.)
Second	0.56 ~ 0.66 mm (0.022 ~ 0.026 in.)	1.0 mm (0.04 in.)

Special Tools and Sealants

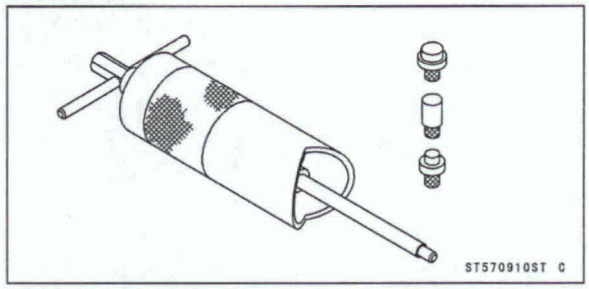
Compression Gauge, 20 kgf/cm²:
57001-221



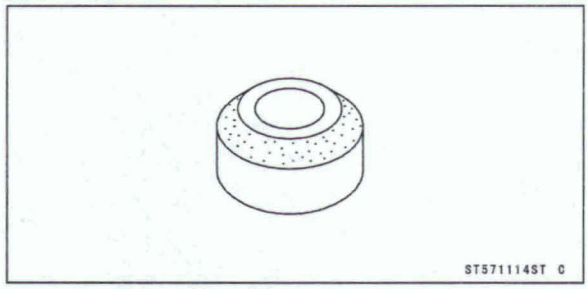
Valve Spring Compressor Assembly:
57001-241



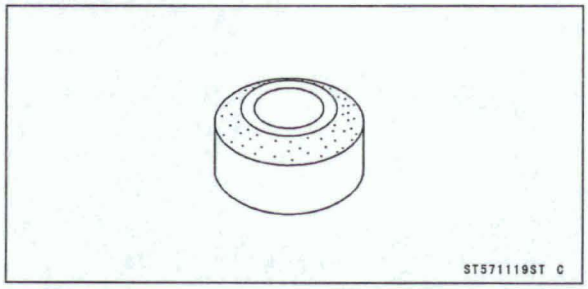
Piston Pin Puller Assembly:
57001-910



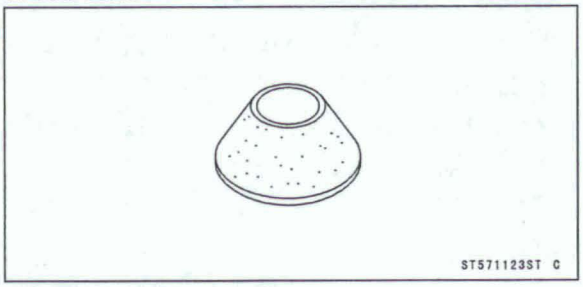
Valve Seat Cutter, 45° - ϕ27.5:
57001-1114



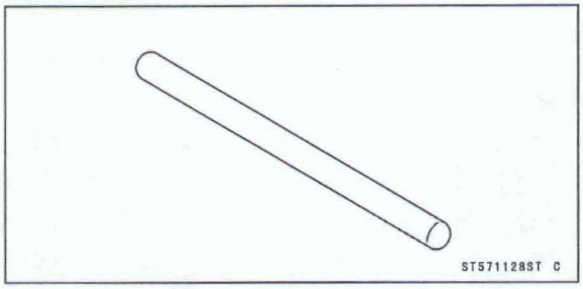
Valve Seat Cutter, 32° - ϕ28:
57001-1119



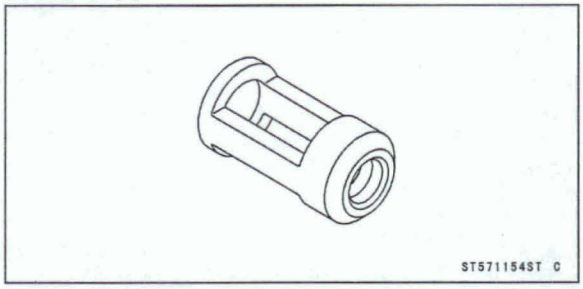
Valve Seat Cutter, 60° - ϕ30:
57001-1123



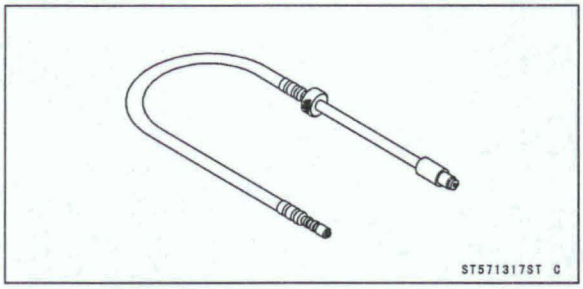
Valve Seat Cutter Holder Bar:
57001-1128



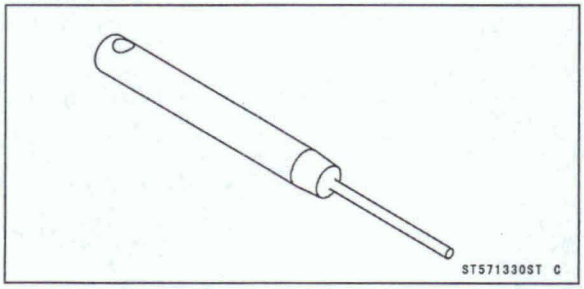
Valve Spring Compressor Adapter, ϕ20:
57001-1154



Compression Gauge Adapter, M10 × 1.0:
57001-1317

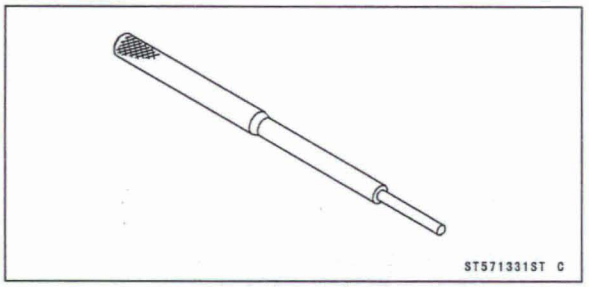


Valve Seat Cutter Holder, ϕ4.5:
57001-1330

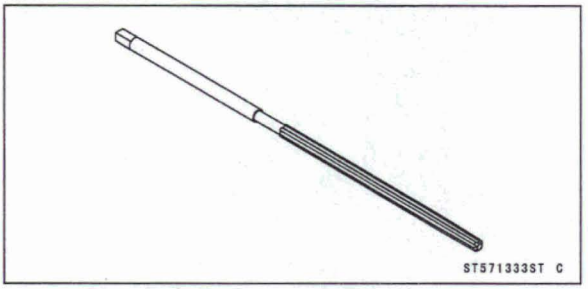


Special Tools and Sealants

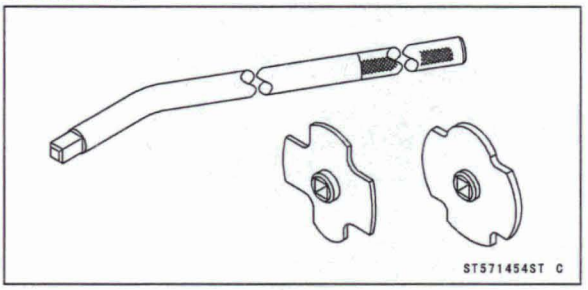
Valve Guide Arbor, ϕ4.5:
57001-1331



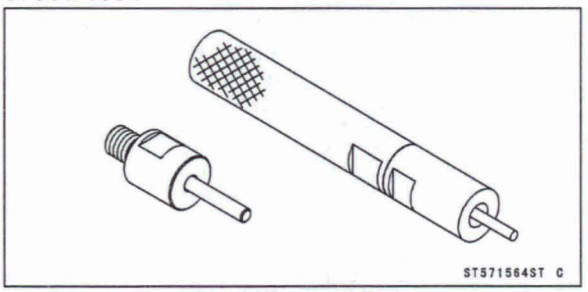
Valve Guide Reamer, ϕ4.5:
57001-1333



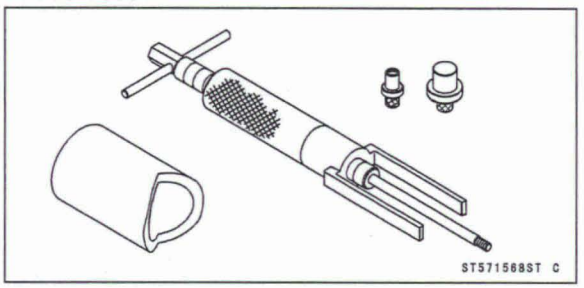
Filler Cap Driver:
57001-1454



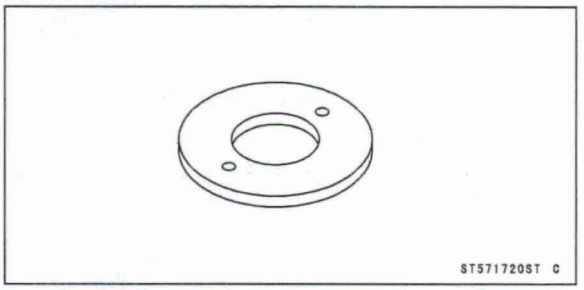
Valve Guide Driver:
57001-1564



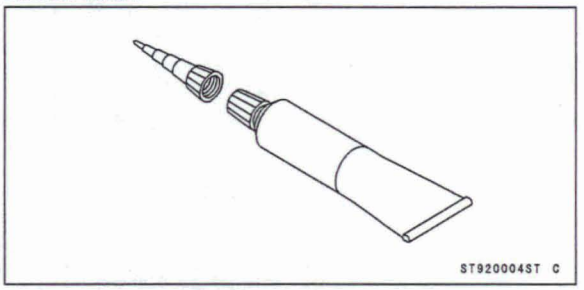
Piston Pin Puller:
57001-1568



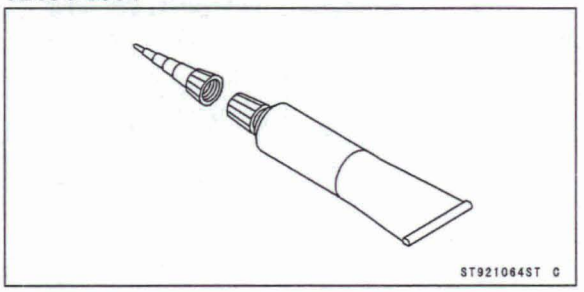
Washer:
57001-1720



Liquid Gasket, TB1211F:
92104-0004



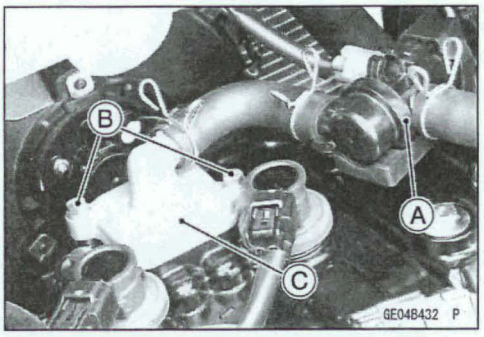
Liquid Gasket, TB1216B:
92104-1064



Clean Air System

Air Suction Valve Removal

- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter)
  Air Switching Valve [A]
  Air Suction Valve Cover Bolts [B]
- Raise the air suction valve cover [C] and remove the air suction valve.



Air Suction Valve Installation

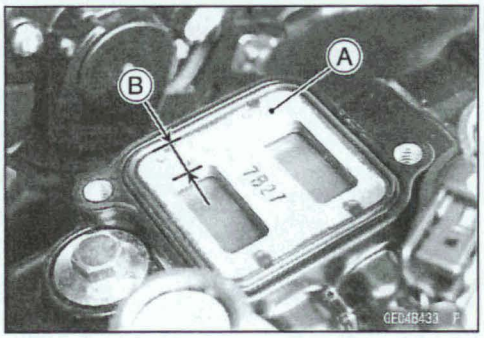
- Install the air suction valve [A].

○Face the wider side [B] of the valve forward.

- Tighten:

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

- Install the removed parts (see appropriate chapters).



Air Suction Valve Inspection

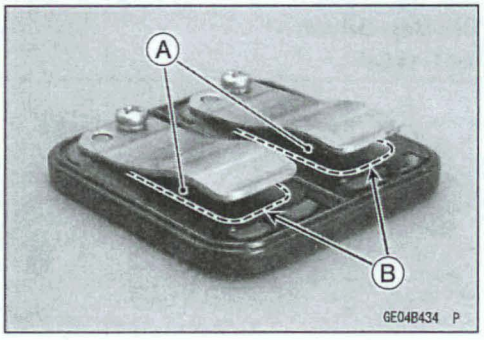
- Remove the air suction valve (see Air Suction Valve Removal).
- Visually inspect the reeds [A] for cracks, folds, warps, heat damage or other damage.

★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.

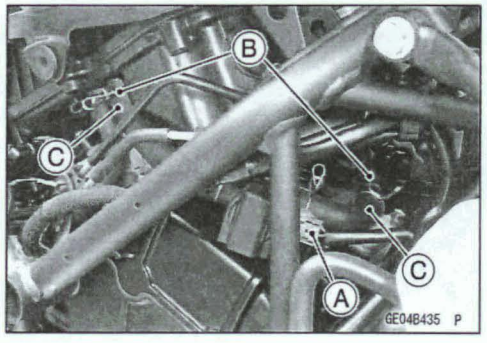


NOTICE

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

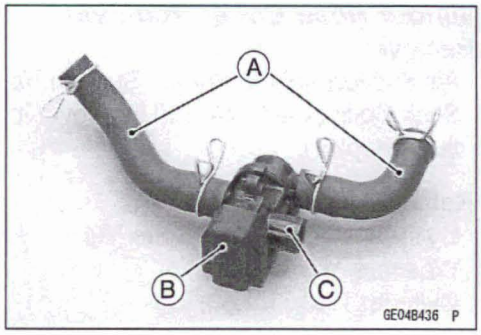
Air Switching Valve Removal

- Remove:
  Right Middle Fairing (see Middle Fairing Removal in the Frame chapter)
- Disconnect the connector [A].
- Slide the clamps [B].
- Disconnect the hoses [C] from the air suction valve cover and air cleaner housing fitting, and remove the air switching valve assembly.



Clean Air System

- Remove:
  Hoses [A]
  Damper [B]
  Air Switching Valve [C]



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

Air Switching Valve Installation

- Installation is the reverse of removal.
- Run the lead and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- 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 cover.

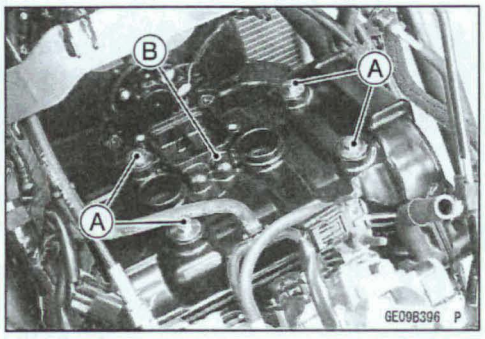
★If they are not, correct them. Replace them if they are damaged.

Cylinder Head Cover

Cylinder Head Cover Removal

- Remove:
  Air Suction Valve (see Air Suction Valve Removal)
  Stick Coils (see Stick Coil Removal in the Electrical System chapter)

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



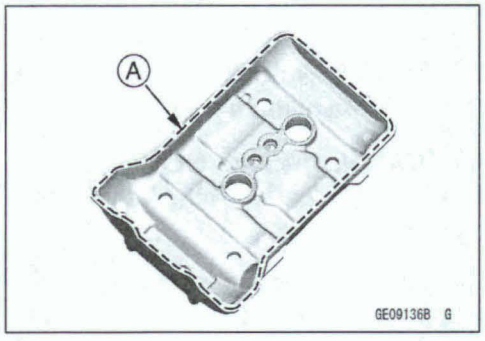
Cylinder Head Cover Installation

- Replace the head cover gasket with a new one.
- Clean off any oil or dirt and apply liquid gasket to the groove [A] of the cylinder head cover.

Sealant - Liquid Gasket, TB1211F: 92104-0004

NOTE

○*Make the tightening the cylinder head cover bolts finish within 60 minutes when the liquid gasket is applied.*



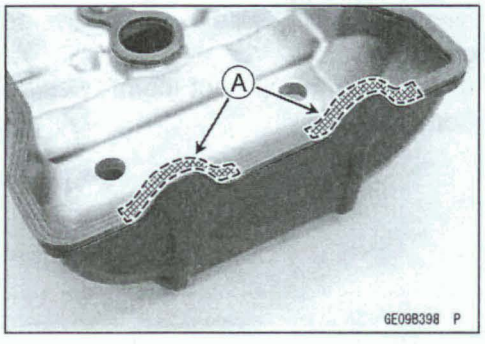
- Install the gasket to the cylinder head cover.

- Apply liquid gasket [A] to the head cover gasket as shown.

Sealant - Liquid Gasket, TB1216B: 92104-1064

NOTE

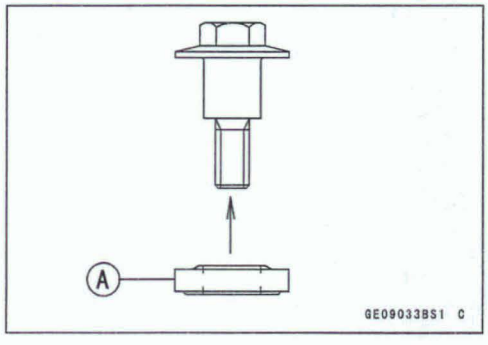
○*Make the tightening the cylinder head cover bolts finish within 20 minutes when the liquid gasket is applied.*



- Replace the washers [A] with new ones.
- Install the washers with metal side faces upward.
- Tighten:

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

- Install the removed parts (see appropriate chapters).



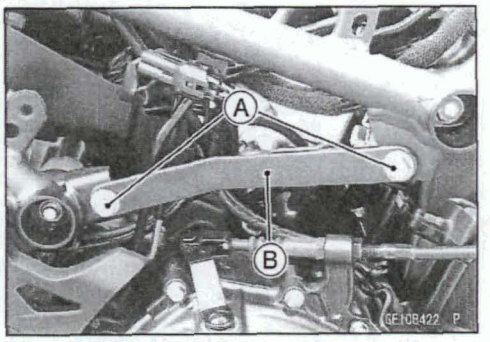
Camshaft Chain Tensioner

Camshaft Chain Tensioner Removal

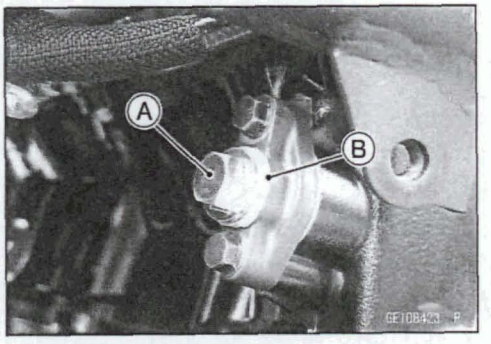
NOTICE

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.

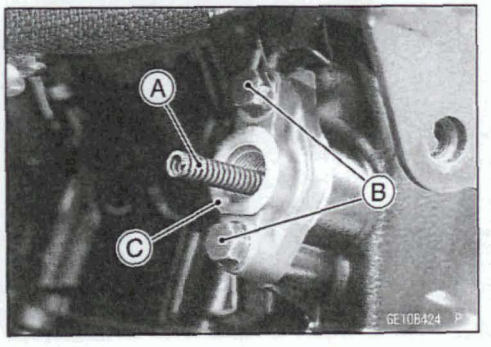
- Remove:
  Right Middle Fairing (see Middle Fairing Removal in the Frame chapter)
  Frame Bracket Bolts [A]
  Right Frame Bracket [B]



- Remove:
  Cap Bolt [A]
  Washer [B]

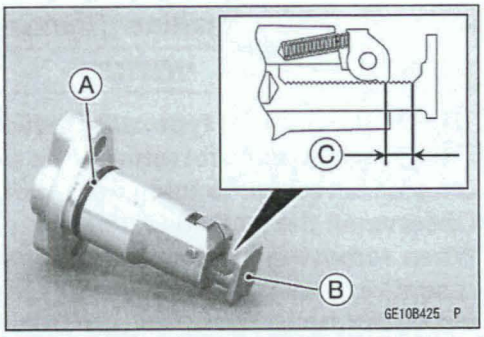


- Remove:
  Spring [A]
  Camshaft Chain Tensioner Mounting Bolts [B]
  Camshaft Chain Tensioner [C]



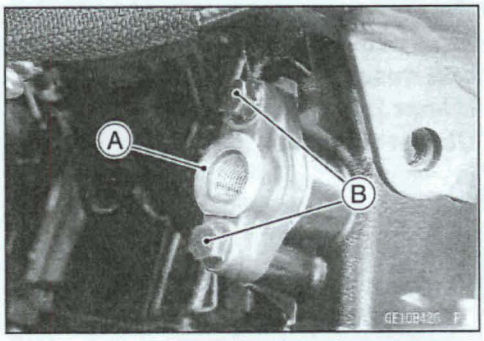
Camshaft Chain Tensioner

Camshaft Chain Tensioner Installation



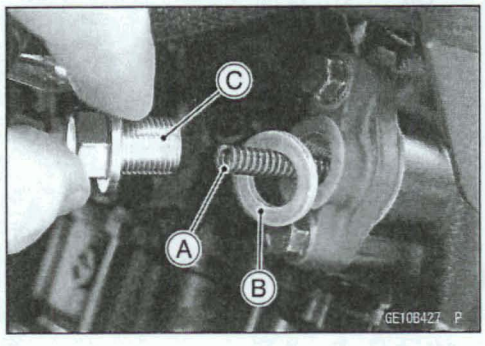
- Replace the O-ring [A] with a new one.
- Apply grease to the new O-ring.
- Adjust the position of push rod [B].

○Insert it fully.
○Pull out it as shown.
6 Notches [C] (5 clicks)



- Install the tensioner body [A] so that the stopper faces upward.
- Tighten the tensioner mounting bolts [B].

Torque - Camshaft Chain Tensioner Mounting Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)



- Install:
  Spring [A]
  Washer [B]
- Tighten:

Torque - Camshaft Chain Tensioner Cap Bolt [C]: 20 N·m (2.0 kgf·m, 15 ft·lb)

- Install:
  Right Frame Bracket
- Tighten:

Torque - Frame Bracket Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)

○Tighten the front side bolt first.

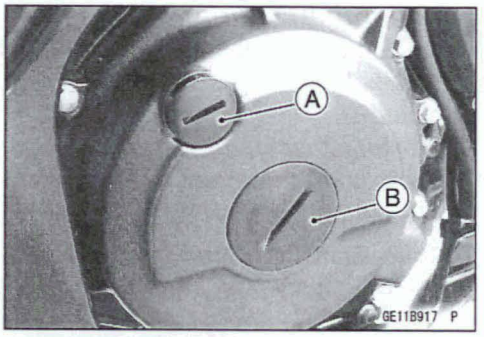
- Install the right middle fairing (see Middle Fairing Installation in the Frame chapter).

Camshaft, Camshaft Chain

Camshaft Removal

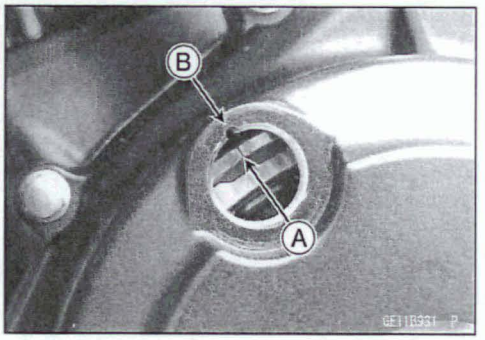
- Remove:
  Cylinder Head Cover (see Cylinder Head Cover Removal)
  Timing Inspection Cap [A]
  Alternator Rotor Bolt Cap [B]

Special Tool - Filler Cap Driver: 57001-1454

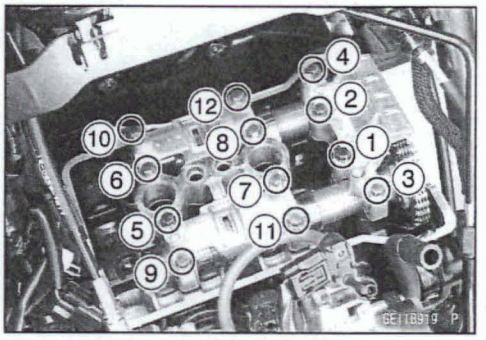


- Position the crankshaft at the specified angle.

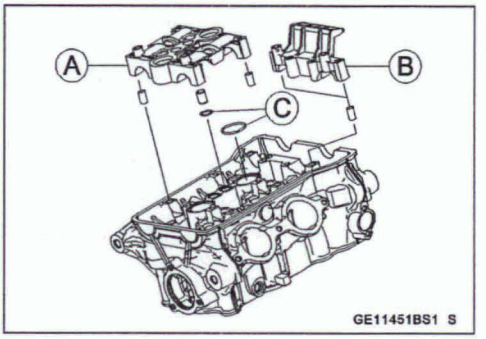
○Using a wrench on the alternator rotor bolt, turn the crankshaft counterclockwise until the line without characters [A] on the alternator rotor is aligned with the groove [B] in the inspection window.



- Remove:
  Camshaft Chain Tensioner (see Camshaft Chain Tensioner Removal)
- Loosen the camshaft cap bolts gradually and evenly as shown sequence [1 ~ 12] and remove them.



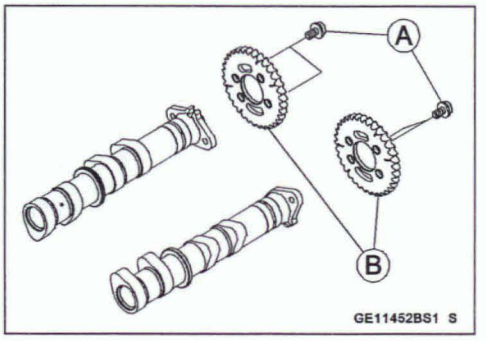
- Remove:
  Camshaft Cap [A]
  Upper Chain Guide [B]
  Dowel Pins
  O-rings [C]
  Camshafts
- Stuff a clean cloth into the chain tunnel to keep any parts from dropping into the crankcase.



- Remove:
  Camshaft Sprocket 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

- Install the camshaft sprockets as shown.
  Exhaust [A]
  Intake [B]

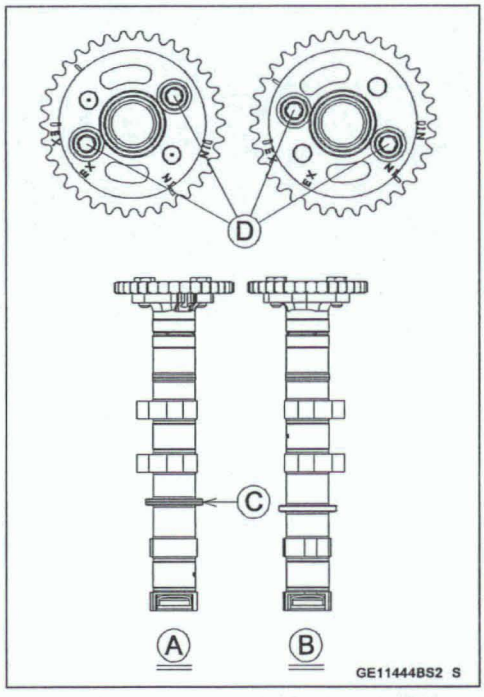
○The exhaust camshaft has the groove [C].

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

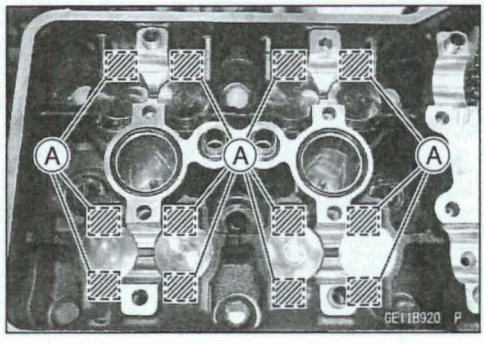
Torque - Camshaft Sprocket Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)

- Apply molybdenum disulfide oil solution to all cam parts and journals.

★If a new camshaft is to be used, apply a thin coat of molybdenum disulfide grease to the cam surfaces.



- Pour the engine oil into the position [A] as shown.



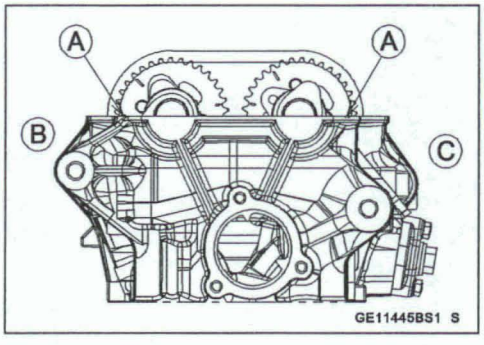
- Position the crankshaft at the specified angle (see Camshaft Removal).

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.

- Engage the camshaft chain with the camshaft sprockets.

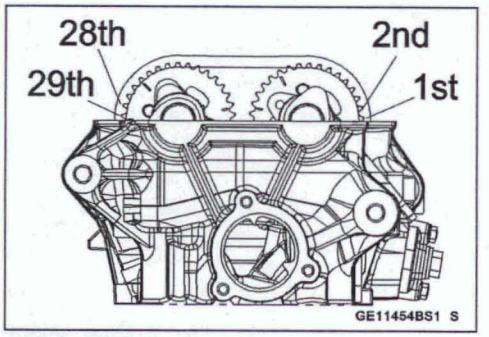
○Pull the tension side (exhaust side) of the chain taut to install the chain on the sprockets.

○The shorter timing marks [A] align with the cylinder head upper surface.
  Exhaust [B]
  Intake [C]

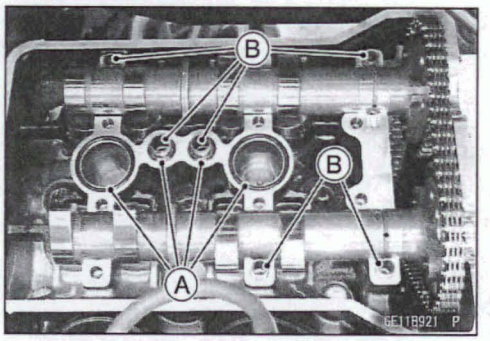


Camshaft, Camshaft Chain

○Count the camshaft chain link pins as shown to verify that the sprocket are positioned correctly.

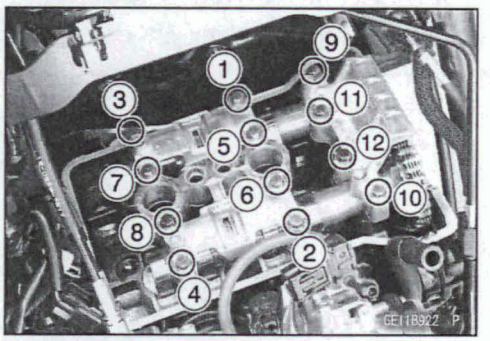


- Replace the O-rings [A] with new ones.
- Apply grease to the O-rings.
- Install:
  Dowel Pins [B]
  Upper Chain Guide
  Camshaft Cap



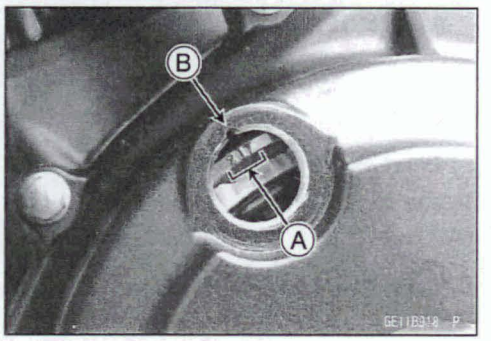
- First tighten the all camshaft cap bolts evenly to seat the camshaft in place, then tighten all bolts following the specified tightening sequence [1 ~ 12].

Torque - Camshaft Cap Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)



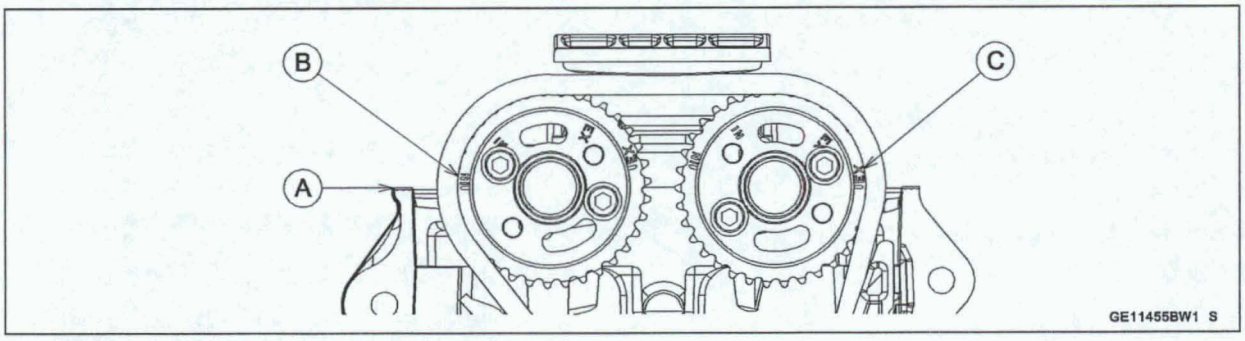
- Install:
  Camshaft Chain Tensioner (see Camshaft Chain Tensioner Installation)
- Position the crankshaft at #2 piston TDC.

○Using a wrench on the alternator rotor bolt, turn the crankshaft counterclockwise until the "2T" mark [A] on the alternator rotor is aligned with the groove [B] in the inspection window.



Camshaft, Camshaft Chain

- Check that the timing marks on the camshaft sprockets are align with the cylinder head upper surface [A].
  Intake Side Timing Mark [B] (IN)
  Exhaust Side Timing Mark [C] (EX)



- Install the removed parts (see appropriate chapters).

Camshaft, Camshaft Cap Wear Inspection

- Remove:
  Upper Chain Guide (see Camshaft Removal)
  Camshaft Cap (see Camshaft Removal)
- Cut the strips of plastigauge (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 (see Camshaft Installation).

NOTE

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

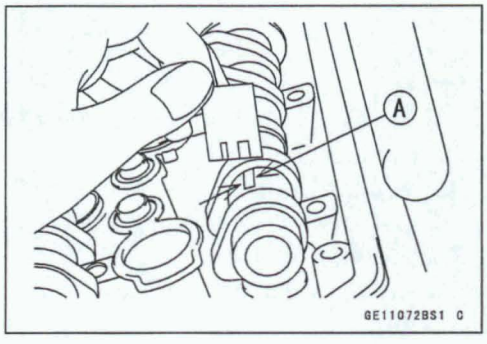
- Remove the camshaft cap again, measure each clearance between the camshaft journal and the camshaft cap using the plastigauge (press gauge) [A].

Camshaft Journal/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.)**

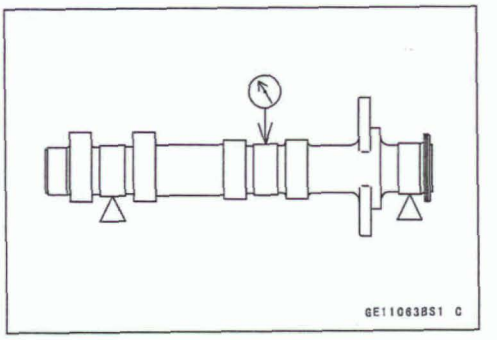
Service Limit: **23.91 mm (0.9413 in.)**

★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, Camshaft Chain

Camshaft Runout Inspection



- Remove the camshafts (see Camshaft Removal).
- Set the camshaft in a camshaft alignment jig or on V blocks.
- Measure the runout with a dial gauge at the specified place as shown.

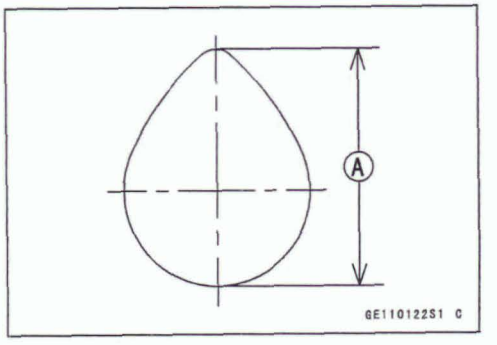
★If the runout exceeds the service limit, replace the camshaft.

Camshaft Runout

Standard: TIR 0.02 mm (0.0008 in.) or less

Service Limit: TIR 0.1 mm (0.004 in.)

Cam Wear Inspection



- Remove the camshafts (see Camshaft Removal).
- Measure the height [A] of each cam with a micrometer.

★If the cams are worn down past the service limit, replace the camshaft.

Cam Height

Standard:

Exhaust 32.743 ~ 32.857 mm (1.2891 ~ 1.2936 in.)

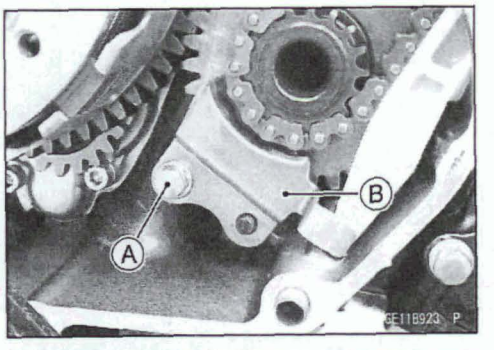
Intake 33.743 ~ 33.857 mm (1.3285 ~ 1.3330 in.)

Service Limit:

Exhaust 32.64 mm (1.285 in.)

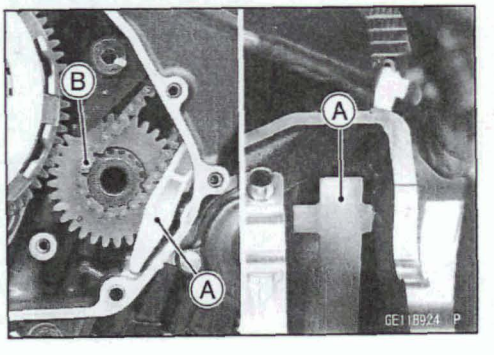
Intake 33.64 mm (1.324 in.)

Camshaft Chain Removal



- Remove:

Clutch Cover (see Clutch Cover Removal in the Clutch chapter)
Camshafts (see Camshaft Removal)
Lower Camshaft Chain Guide Bolt [A]
Lower Camshaft Chain Guide [B]



- Remove:

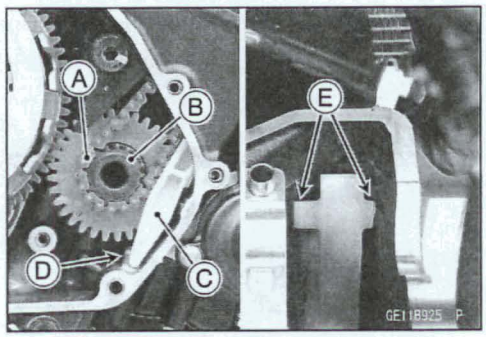
Front Camshaft Chain Guide [A]
Camshaft Chain [B]

Camshaft, Camshaft Chain

Camshaft Chain Installation

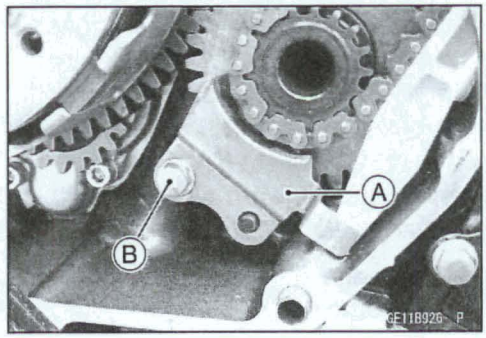
- Engage the camshaft chain [A] to the sprocket on the crankshaft [B].
- Install:
  Front Camshaft Chain Guide [C]

○Fit the chain guide in front of the rib [D] on the crankcase.
○Fit the projections [E] of the chain guide to the inside wall of the cylinder head.



- Install:
  Lower Camshaft Chain Guide [A]
- Tighten:

Torque - Lower Camshaft Chain Guide Bolt [B]: 9.8 N·m (1.0 kgf·m, 87 in·lb)



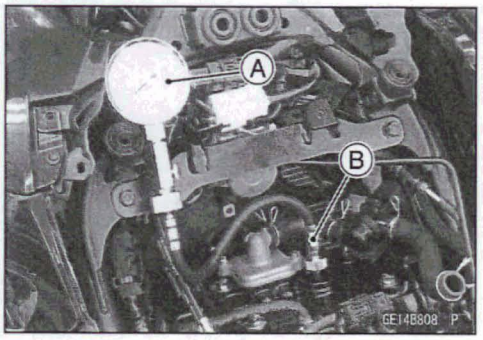
Cylinder Head

Cylinder Compression Measurement

NOTE

○*Use the battery which is fully charged.*

- Warm up the engine thoroughly.
- Stop the engine.
- 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)
  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: 57001-1317

Cylinder Compression
Usable Range: 1 050 ~ 1 598 kPa (10.71 ~ 16.30 kgf/cm², 152.3 ~ 231.7 psi) @500 r/min (rpm)

- Repeat the measurement for the other cylinder.
- Install the spark plugs.

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

○The following table should be consulted if the obtainable compression reading is not within the usable range.

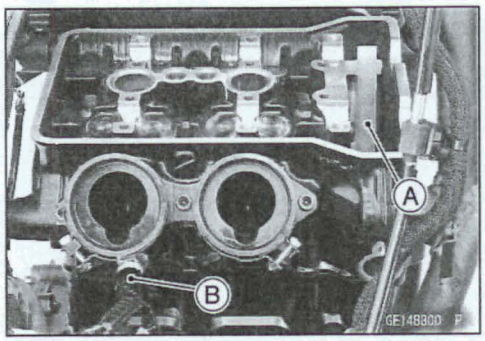
Problem	Diagnosis	Remedy (Action)
Cylinder compression is higher than usable range.	Carbon accumulation on piston and in combustion chamber possibly due to damaged valve stem oil seal and/or damaged piston oil rings (This may be indicated by white exhaust smoke).	Remove the carbon deposits and replace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

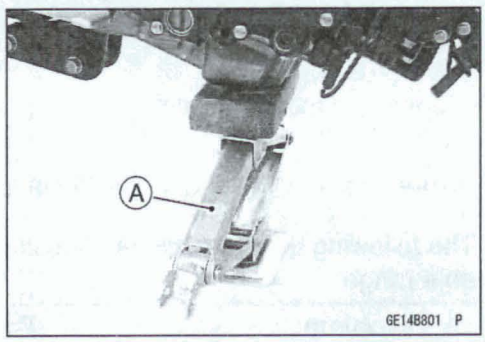
Cylinder Head Removal

- Drain:
  Coolant (see Coolant Change in the Periodic Maintenance chapter)
- Remove:
  Cylinder Head Cover (see Cylinder Head Cover Removal)
  Camshafts (see Camshaft Removal)
  Thermostat Housing (see Thermostat Housing Removal in the Cooling System chapter)
  Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
  Exhaust Pipe (see Exhaust Pipe Removal)

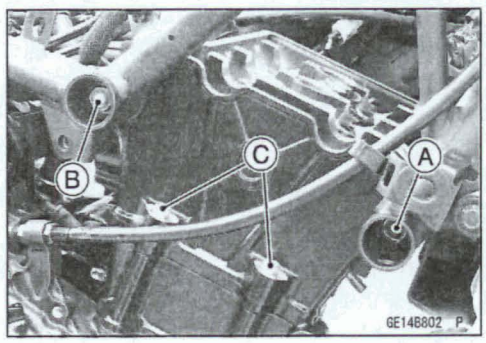
- Remove:
  Front Camshaft Chain Guide [A]
- Disconnect:
  Water Temperature Sensor Connector [B]



- Support the engine with a suitable jack [A].

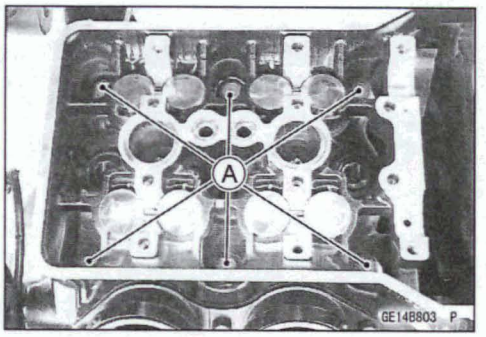


- Remove:
  Front Engine Mounting Bolt [A] (Both Sides)
  Middle Engine Mounting Bolt [B] (Both Sides)
  Collars (Left Side)
  M6 Cylinder Head Bolts [C]



Cylinder Head

- Remove:
  M9 Cylinder Head Bolts [A]
  Cylinder Head

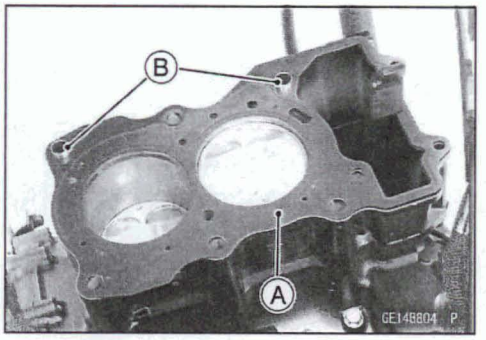


Cylinder Head Installation

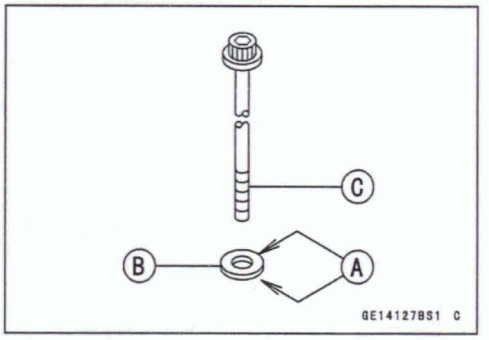
NOTE

○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:
  Dowel Pins [B]

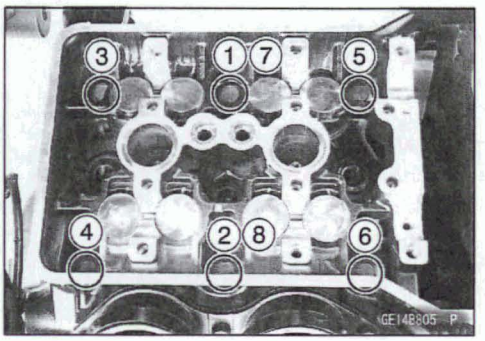


- Replace the cylinder head bolt washers with new ones.
- Apply molybdenum disulfide oil solution to both sides [A] of the cylinder head bolt washers [B] and the threads of the head bolts [C].



- Firstly, tighten the M9 cylinder head bolts temporarily following the specified sequence [1 ~ 6].
- Next, tighten the M9 cylinder head bolts following the specified sequence [1 ~ 8].

Torque - Cylinder Head Bolts (M9): 20 N·m (2.0 kgf·m, 15 ft·lb)

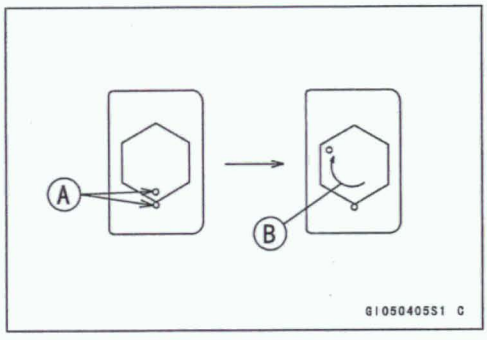


Cylinder Head

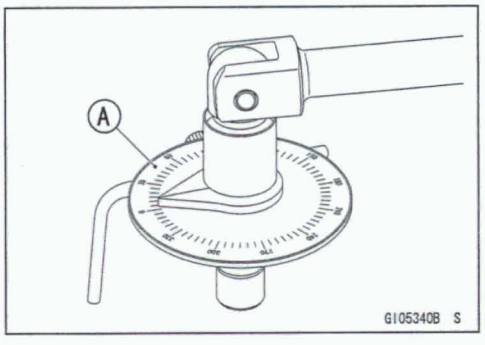
- Finally, tighten the M9 bolts **120° ±2°** following above specified sequence [1 ~ 6].

○Mark [A] the cylinder head and the bolts so that the bolts can be turned 120° [B] properly.

○Tighten the hexagon bolt by 2 corners.



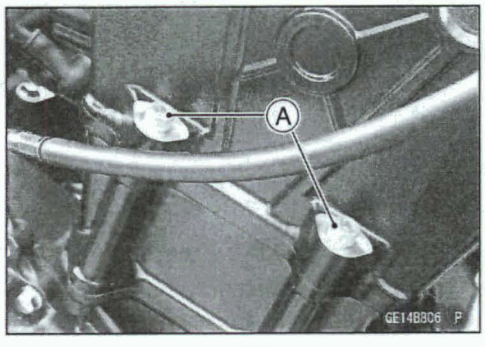
○The bolts can be tightened by using a torque angle gauge [A].



- Tighten:

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

- Install the removed parts (see appropriate chapters).



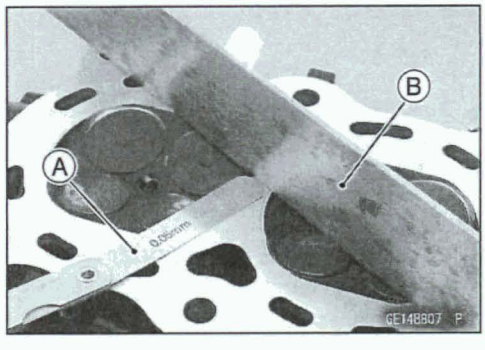
Cylinder Head Warp Inspection

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

Cylinder Head Warp
Standard: – – –
Service Limit: 0.05 mm (0.002 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.

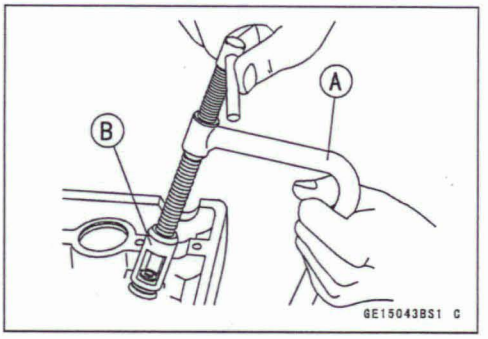
Valve Removal

- Remove:
  Cylinder Head (see Cylinder Head Removal)
  Valve Lifter and Shim

○Mark and record the valve lifter and shim locations so they can be installed in their original positions.

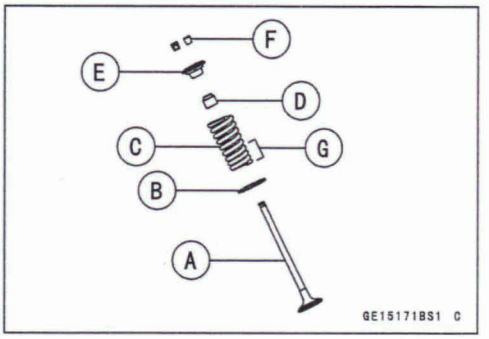
- Using the valve spring compressor assembly, remove the valve.

Special Tools - Valve Spring Compressor Assembly [A]: 57001-241
Valve Spring Compressor Adapter, ϕ20 [B]: 57001-1154



Valve Installation

- Replace the oil seal with a new one.
- Apply engine oil to the lip of the oil seal.
- Apply a thin coat of molybdenum disulfide grease to the valve stem before valve installation.
- Install the spring so that the closed coil end faces downwards.
  Valve Stem [A]
  Spring Seat [B]
  Valve Spring [C]
  Oil Seal [D]
  Retainer [E]
  Split Keepers [F]
  Closed Coil End [G]



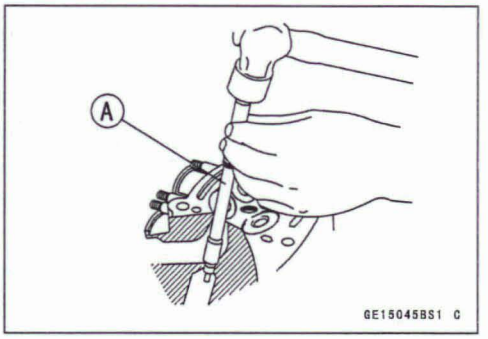
Valve Guide Removal

- 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

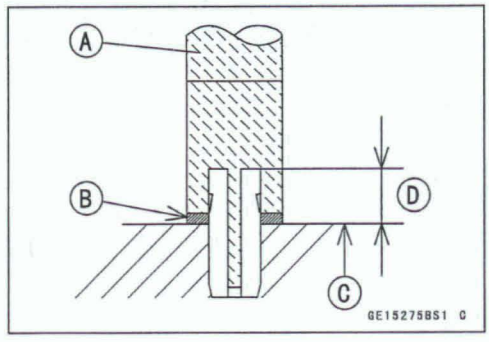
Valve Guide Installation

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

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

- Using the valve guide driver [A] and washer [B], press and insert the valve guide in until the washer surface touches the head surface [C].
  15.3 ~ 15.5 mm (0.602 ~ 0.610 in.) [D]

Special Tools - Valve Guide Driver: 57001-1564
Washer: 57001-1720

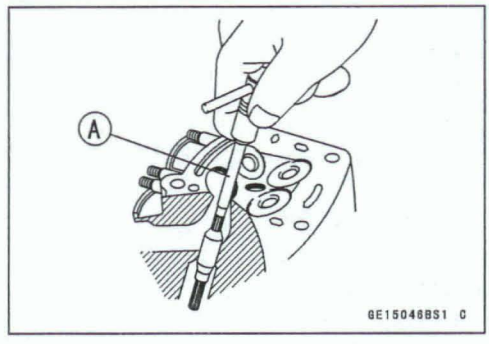


- Wait until the cylinder head cools down and then ream the valve guide with the valve guide reamer [A] even if the old guide is reused.

○Turn the reamer in a clockwise direction until the reamer turns freely in the guide. Never turn the reamer counter-clockwise or it will be dulled.

○Once the guides are reamed they must be cleaned thoroughly.

Special Tool - Valve Guide Reamer, ϕ4.5: 57001-1333

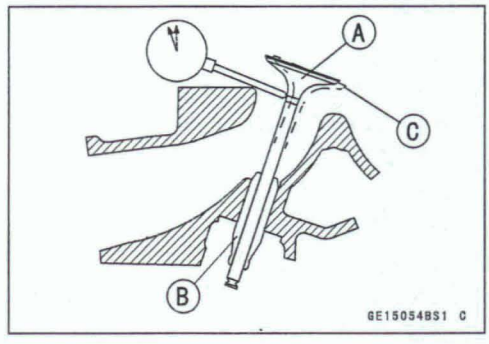


Valve-to-Guide Clearance Measurement (Wobble Method)

If a small bore gauge is not available, inspect the valve guide wear by measuring the valve to valve guide clearance with the wobble method as indicated below.

- Insert a new valve [A] into the guide [B] and set a dial gauge against the stem perpendicular to it as close as possible to the cylinder head mating surface.
- Move the stem back and forth [C] to measure valve/valve guide clearance.
- Repeat the measurement in a direction at a right angle to the first.

★If the reading exceeds the service limit, replace the guide.



Valves

NOTE

○*The reading is not actual valve/valve guide clearance because the measuring point is above the guide.*

Valve/Valve Guide Clearance (Wobble Method)

Standard:

Exhaust	**0.08 ~ 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	**0.29 mm (0.011 in.)**

Valve Seat Inspection

- Remove the valve (see Valve Removal).
- Check the valve seating surface [A] between the valve [B] and valve seat [C].

○Measure the outside diameter [D] of the seating pattern on the valve seat.

★If the outside diameter is too large or too small, repair the seat (see Valve Seat Repair).

Valve Seating Surface Outside Diameter

Standard:

Exhaust	**22.9 ~ 23.1 mm (0.902 ~ 0.909 in.)**
Intake	**26.9 ~ 27.1 mm (1.06 ~ 1.07 in.)**

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

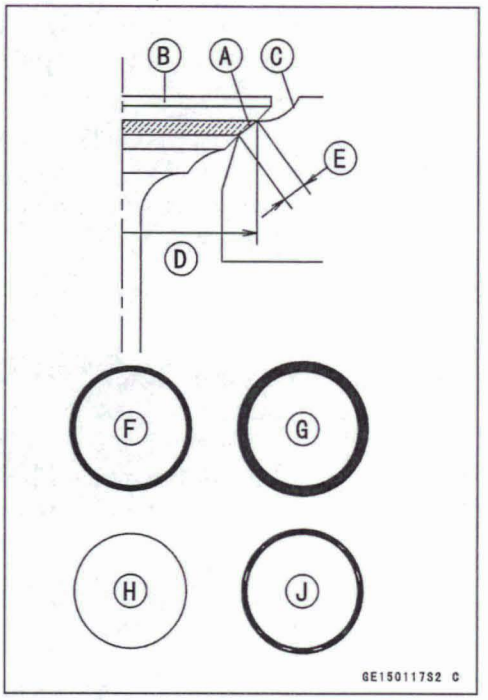
Good [F]

★If the width is too wide [G], too narrow [H] or uneven [J], repair the seat (see Valve Seat Repair).

Valve Seating Surface Width

Standard:

Exhaust	**0.8 ~ 1.2 mm (0.031 ~ 0.047 in.)**
Intake	**0.5 ~ 1.0 mm (0.020 ~ 0.039 in.)**

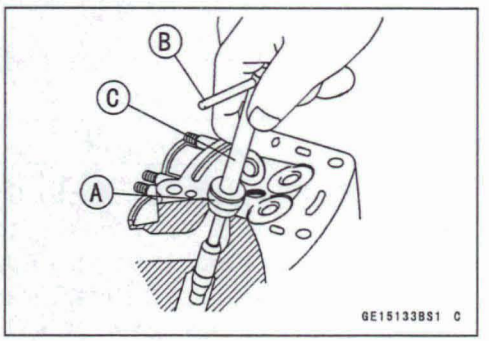


Valve Seat Repair

- Repair the valve seat with the valve seat cutters [A].

Special Tools - Valve Seat Cutter Holder Bar [B]: 57001 -1128
Valve Seat Cutter Holder, ϕ4.5 [C]: 57001 -1330
Valve Seat Cutter, 45° - ϕ27.5: 57001-1114
Valve Seat Cutter, 32° - ϕ28: 57001-1119
Valve Seat Cutter, 60° - ϕ30: 57001-1123

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



Valves

Seat Cutter Operation Care

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

NOTE

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

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

NOTE

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

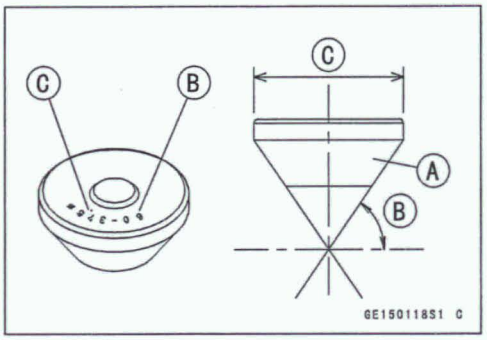
5. After use, wash it with washing oil and apply thin layer of engine oil before storing.

Marks Stamped on the Cutter

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

60° ..... Cutter angle [B]

37.5ϕ ..... Outer diameter of cutter [C]



Operating Procedures

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

NOTICE

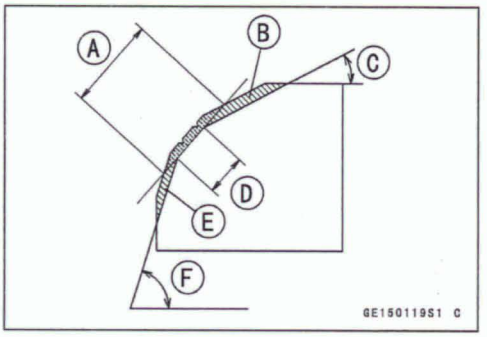
Do not grind the seat too much. Overgrinding will reduce valve clearance by sinking the valve into the head. If the valve sinks too far into the head, it will be impossible to adjust the clearance, and the cylinder head must be replaced.

Valves

• Measure the outside diameter of the seating surface with a vernier caliper.

★If the outside diameter of the seating surface is too small, repeat the 45° grind until the diameter is within the specified range.

Widened Width [A] of engagement by machining with 45° cutter
Ground Volume [B] by 32° cutter
32° [C]
Correct Width [D]
Ground Volume [E] by 60° cutter
60° [F]



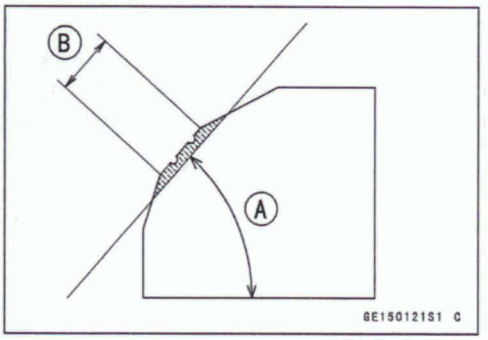
• Measure the outside diameter of the seating surface with a vernier caliper.

★If the outside diameter of the seating surface is too small, repeat the 45° grind [A] until the diameter is within the specified range.

Original Seating Surface [B]

NOTE

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



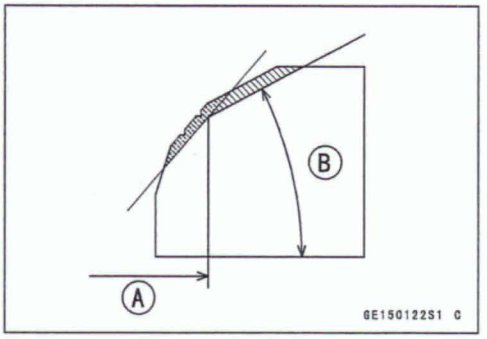
★If the outside diameter [A] of the seating surface is too large, make the 32° grind described below.

★If the outside diameter of the seating surface is within the specified range, measure the seat width as described below.

• Grind the seat at a 32° angle [B] until the seat outside diameter is within the specified range.

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

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



NOTICE

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

○After making the 32° grind, return to the seat outside diameter measurement step above.

• To measure the seat width, use a vernier caliper to measure the width of the 45° angle portion of the seat at several places around the seat.

★If the seat width is too narrow, repeat the 45° grind until the seat is slightly too wide, and then return to the seat outside diameter measurement step above.

Valves

★If the seat width is too wide, make the 60° [A] grind described below.

★If the seat width is within the specified range, lap the valve to the seat as described below.

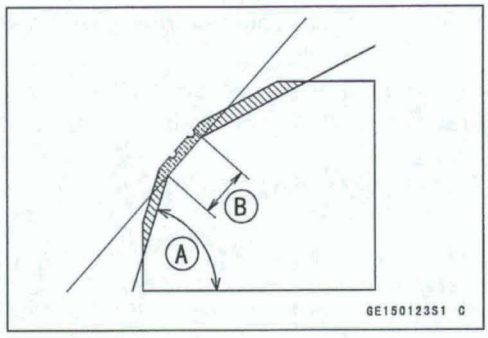
• Grind the seat at a 60° angle until the seat width is within the specified range.

○To make the 60° grind, fit 60° cutter into the holder, and slide it into the valve guide.

○Turn the holder, while pressing down lightly.

○After making the 60° grind, return to the seat width measurement step above.

Correct Width [B]



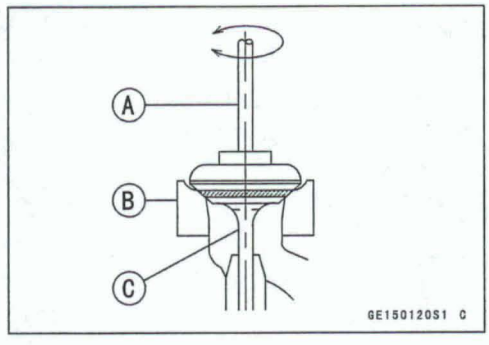
• Lap the valve to the seat, once the seat width and outside diameter are within the ranges specified above.

○Put a little coarse grinding compound on the face of the valve in a number of places around the valve head.

○Spin the valve against the seat until the grinding compound produces a smooth, matched surface on both the seat and the valve.

○Repeat the process with a fine grinding compound.

Lapper [A]
Valve Seat [B]
Valve [C]



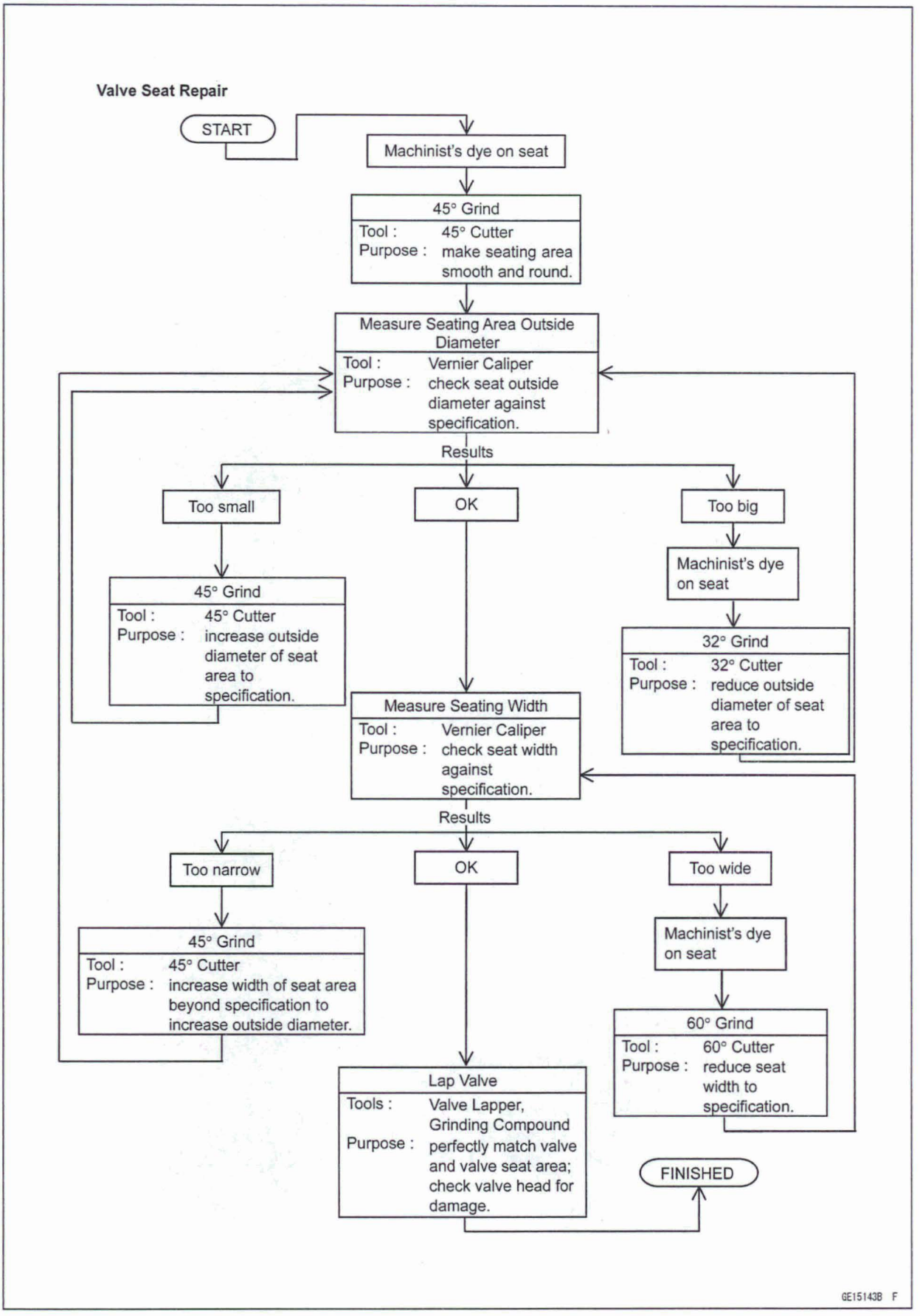
• The seating area should be marked about in the middle of the valve face.

★If the seat area is not in the right place on the valve, check to be sure the valve is the correct part. If it is, it may have been refaced too much; replace it.

• Be sure to remove all grinding compound before assembly.

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

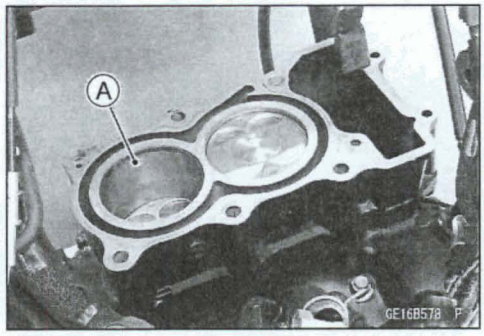
Valves


Valve Seat Repair
START
Machinist's dye on seat
45° Grind
Tool : 45° Cutter
Purpose : make seating area smooth and round.
Measure Seating Area Outside Diameter
Tool : Vernier Caliper
Purpose : check seat outside diameter against specification.
Results
Too small
OK
Too big
45° Grind
Tool : 45° Cutter
Purpose : increase outside diameter of seat area to specification.
Machinist's dye on seat
32° Grind
Tool : 32° Cutter
Purpose : reduce outside diameter of seat area to specification.
Measure Seating Width
Tool : Vernier Caliper
Purpose : check seat width against specification.
Results
Too narrow
OK
Too wide
45° Grind
Tool : 45° Cutter
Purpose : increase width of seat area beyond specification to increase outside diameter.
Machinist's dye on seat
60° Grind
Tool : 60° Cutter
Purpose : reduce seat width to specification.
Lap Valve
Tools : Valve Lapper, Grinding Compound
Purpose : perfectly match valve and valve seat area; check valve head for damage.
FINISHED
GE15143B F

Cylinder, Pistons

Cylinder Removal

- Remove:
  Cylinder Head (see Cylinder Head Removal)
  Cylinder [A]

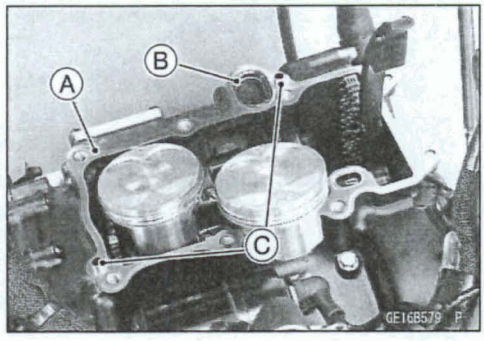


Cylinder Installation

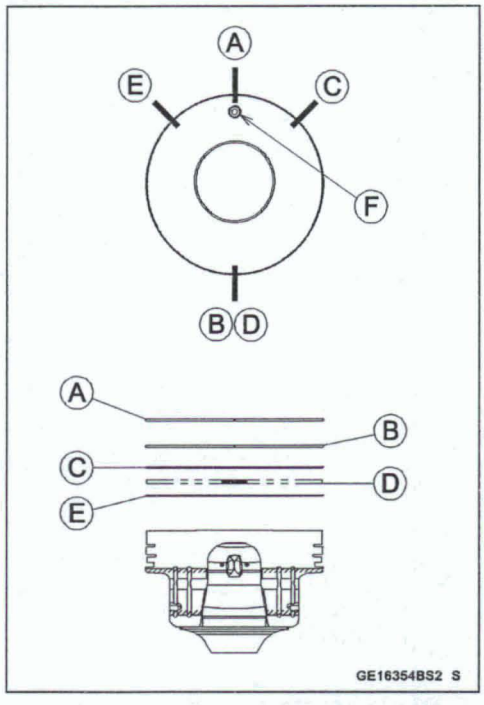
NOTE

○*If a new cylinder is used, use a new piston ring.*

- Replace the cylinder gasket [A] and the O-ring [B] with new ones.
- Install:
  Dowel Pins [C]



- The piston ring openings must be positioned as shown.
  Top Ring [A]
  Second Ring [B]
  Upper Oil Ring Steel Rail [C]
  Oil Ring Expander [D]
  Lower Oil Ring Steel Rail [E]
  Dent [F] (Exhaust Side)



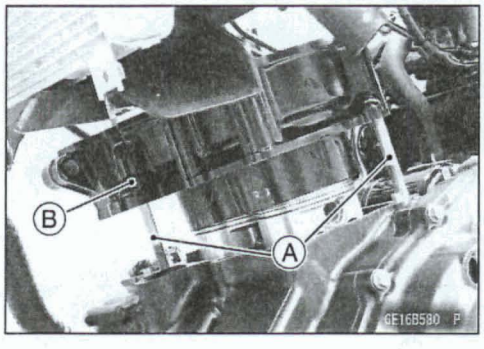
- Apply molybdenum disulfide oil solution to the cylinder bore, piston rings and piston skirt.
- Prepare two auxiliary head bolts [A] with their head cut.

○Install the two bolts diagonally in the crankcase.

- Position the crankshaft so that the piston heads are almost level.
- Install the cylinder [B].

○Insert the piston rings with your thumbs.

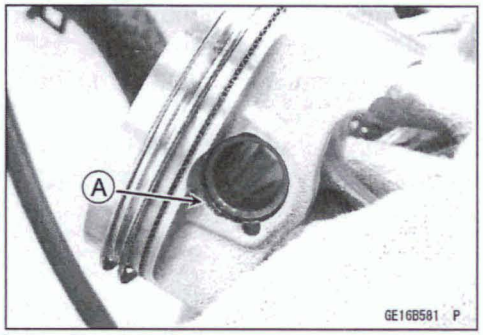
- Install the removed parts (see appropriate chapters).



Cylinder, Pistons

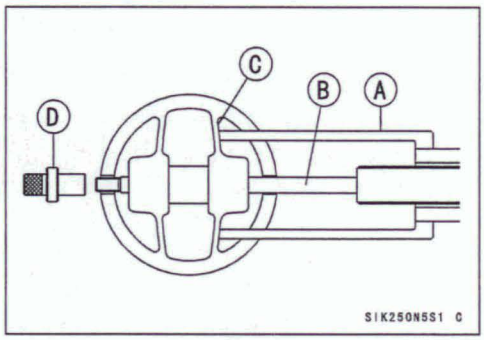
Piston Removal

- 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.

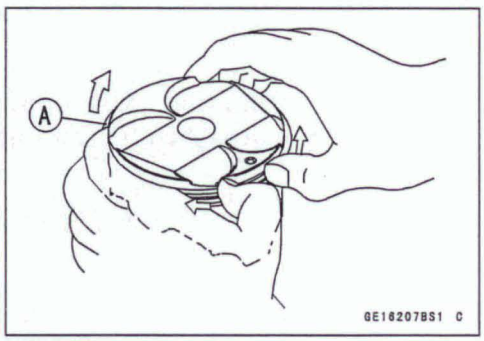


- Remove the piston pins with the piston pin puller [A].
  Center Bolt [B]
  Shell of Piston [C]

  Special Tools - Piston Pin Puller Assembly [D]: 57001-910
  Piston Pin Puller: 57001-1568
- Remove the pistons.



- Carefully spread the ring opening with your thumbs and then push up on the opposite side of the ring [A] to remove it.
- Remove the 3-piece oil ring with your thumbs in the same manner.



Piston Installation

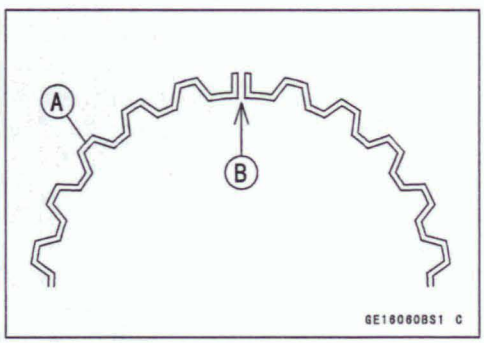
- Apply molybdenum disulfide oil solution to the oil ring expander, and install the oil ring expander [A] in the bottom piston ring groove so the ends [B] not butt together.
- Apply molybdenum disulfide oil solution to the oil ring steel rails, and install the oil ring steel rails, one above the expander 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

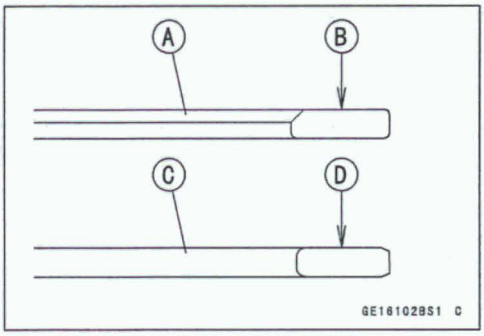
○*The oil ring rails have no "top" or "bottom."*



Cylinder, Pistons

- Do not mix up the top and second ring.
- Install the top ring [A] so that the "1R" mark [B] faces up.
- Install the second ring [C] so that the "2R" mark [D] faces up.

○Apply molybdenum disulfide oil solution to the piston rings.



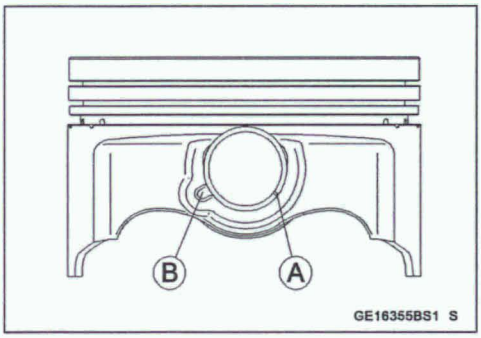
NOTE

○*If a new piston is used, use new piston ring.*

- Install the piston with its dent mark facing forward.
- Fit a new piston pin snap ring into the side of the piston so that the ring opening [A] does not coincide with the slit [B] of the piston pin hole.

○Apply molybdenum disulfide oil solution to the piston pins and piston journals.

○When installing the piston pin snap ring, compress it only enough to install it and no more.



NOTICE

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

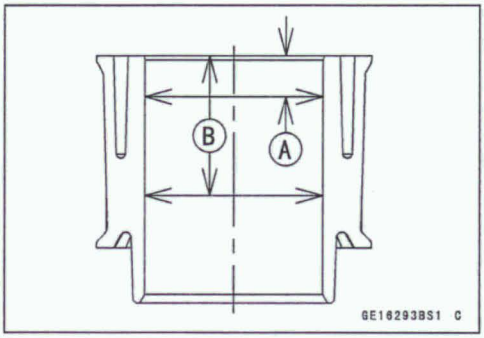
- Install the cylinder (see Cylinder Installation).

Cylinder 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) 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

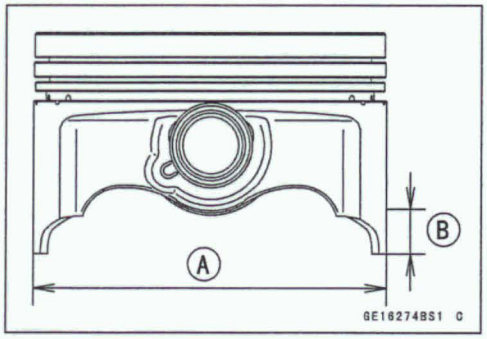
Standard: 69.994 ~ 70.010 mm (2.7557 ~ 2.7563 in.)

Service Limit: 70.09 mm (2.759 in.)

Piston Wear Inspection

- Measure the outside diameter [A] of each piston 5 mm (0.20 in.) [B] up from the bottom of the piston at a right angle to the direction of the piston pin.

★If the measurement is under service limit, replace the piston.



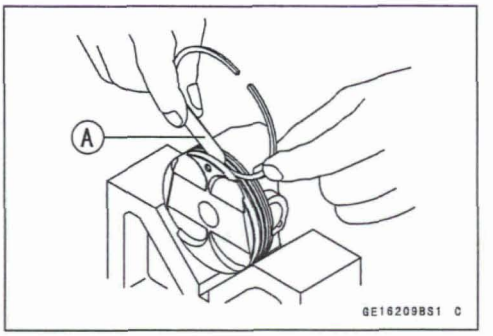
Piston Diameter

Standard: 69.967 ~ 69.982 mm (2.7546 ~ 2.7552 in.)

Service Limit: 69.82 mm (2.749 in.)

Cylinder, Pistons

Piston Ring, Piston Ring Groove Wear Inspection



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

★The rings should fit perfectly parallel to groove surfaces. If not, replace the piston and all the piston rings.

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

Piston Ring/Groove Clearance

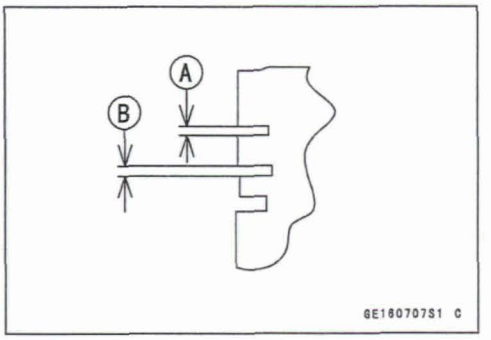
Standard:

Top	**0.030 ~ 0.070 mm (0.0012 ~ 0.0028 in.)**
Second	**0.020 ~ 0.060 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:

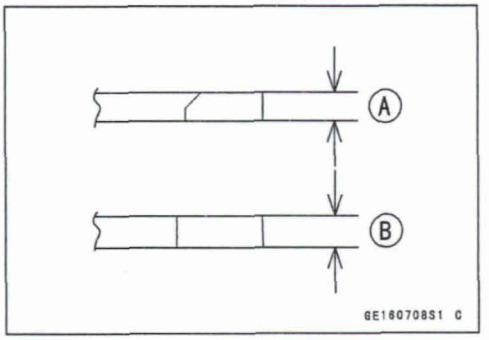
Top [A]	**0.82 ~ 0.84 mm (0.0323 ~ 0.0331 in.)**
Second [B]	**0.81 ~ 0.83 mm (0.0319 ~ 0.0327 in.)**

Service Limit:

Top	**0.92 mm (0.0362 in.)**
Second	**0.91 mm (0.0358 in.)**

★If the width of any of the two grooves is wider than the service limit at any point, replace the piston.

Piston Ring Thickness Inspection



- Measure the piston ring thickness.

○Use the micrometer to measure at several points around the ring.

Piston Ring Thickness

Standard:

Top [A]	**0.77 ~ 0.79 mm (0.030 ~ 0.031 in.)**
Second [B]	**0.77 ~ 0.79 mm (0.030 ~ 0.031 in.)**

Service Limit:

Top	**0.70 mm (0.028 in.)**
Second	**0.70 mm (0.028 in.)**

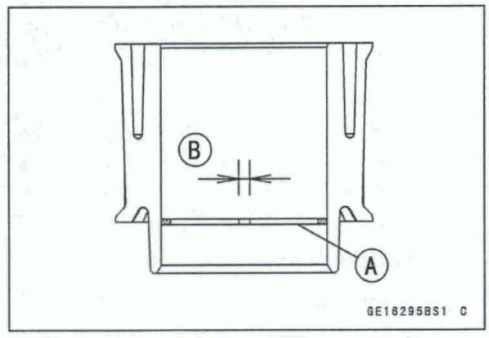
★If any of the measurements is less than the service limit on either of the rings, replace all the rings.

NOTE

○*When using new rings in a used piston, check for uneven groove wear. The rings should fit perfectly parallel to the groove sides. If not, replace the piston.*

Cylinder, Pistons

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	**0.15 ~ 0.30 mm (0.006 ~ 0.012 in.)**
Second	**0.56 ~ 0.66 mm (0.022 ~ 0.026 in.)**

Service Limit:

Top	**0.6 mm (0.02 in.)**
Second	**1.0 mm (0.04 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 Installation

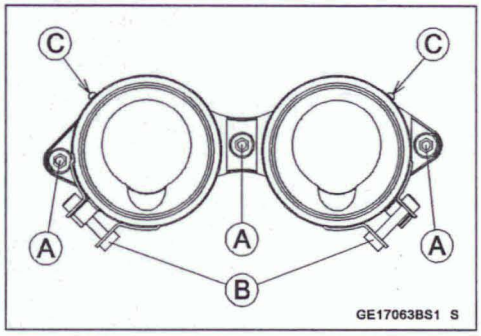
- Replace the O-rings with new ones.
- Tighten:

Torque - Throttle Body Assy Holder Bolts [A]: 12 N·m (1.2 kgf·m, 106 in·lb)

- Install:

Air Cleaner Housing Clamps [B]

○Fit the hole on the clamp to the projections [C] on the throttle body assy holder.



Muffler

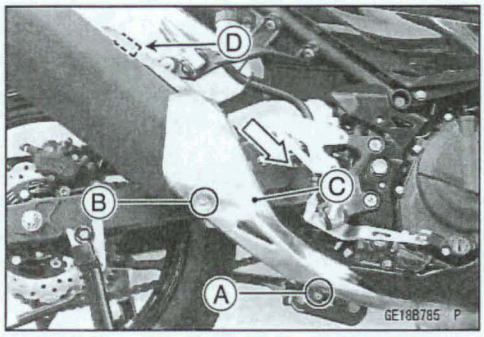
⚠ WARNING

The muffler can become extremely hot during normal operation and cause severe burns. Do not remove the muffler while it is hot.

Muffler Body Removal

- Loosen the muffler cover clamp bolt [A].
- Remove the muffler cover bolt [B] and collar.
- Remove the muffler cover [C] forward.

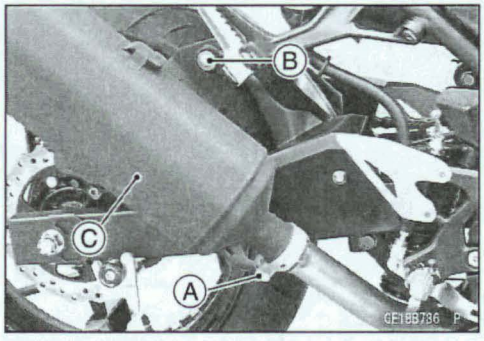
○Clear the hook [D].



- Loosen the muffler body clamp bolt [A].
- Remove:

  Muffler Body Mounting Nut and Bolt [B] and Washer

  Muffler Body [C]

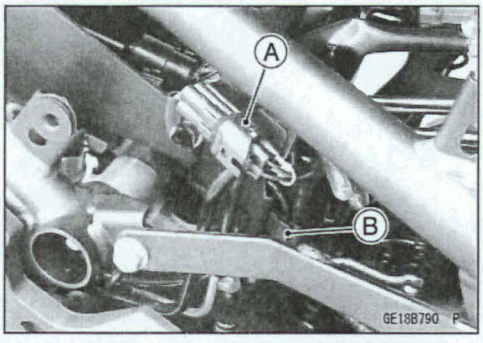


Exhaust Pipe Removal

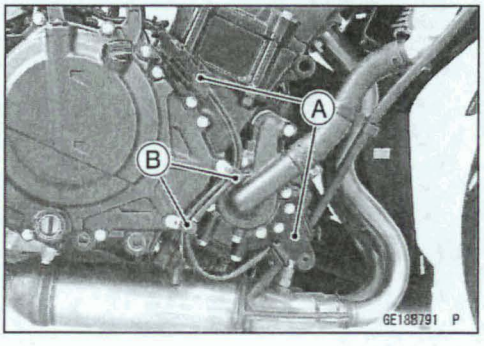
- Remove:

  Right Middle Fairing (see Middle Fairing Removal in the Frame chapter)

  Muffler Body (see Muffler Body Removal)
- Disconnect the oxygen sensor connector [A].
- Open the clamp [B].

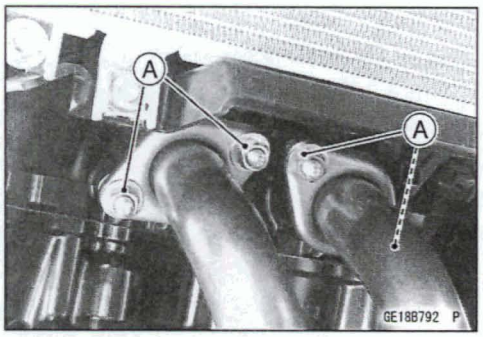


- Free the oxygen sensor lead from the brackets [A].
- Open the clamps [B].



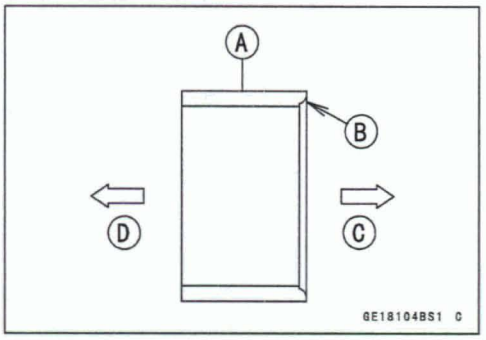
Muffler

- Remove:
  Exhaust Pipe Holder Nuts [A]
  Exhaust Pipe



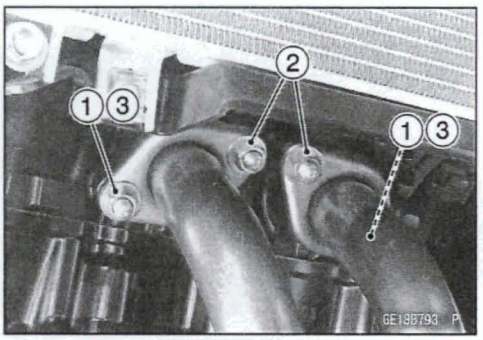
Muffler Body and Exhaust Pipe Installation

- Replace the exhaust pipe gaskets and muffler body gasket with new ones.
- Install the muffler body gasket [A] so that its chamfered side [B] faces front [C].
  Rear [D]
- Apply grease to the exhaust pipe gaskets.

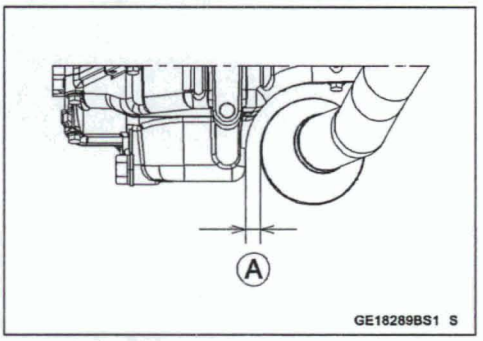


- Install the following parts and tighten them temporarily.
  Exhaust Pipe
  Exhaust Pipe Holder Nuts

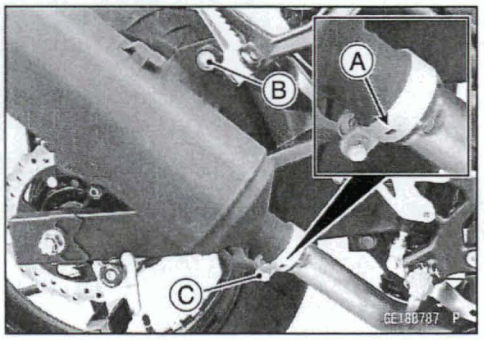
○When tightening the exhaust pipe holder nuts, be sure to follow the specified sequence [1 ~ 3].



- Make sure the clearance between the exhaust pipe and oil pan is 10 mm (0.39 in.) [A].



- Fit the muffler body tooth and the muffler body clamp hole [A].
- Install the following parts and tighten them temporarily.
  Muffler Body
  Muffler Body Mounting Bolt [B], Washer and Nut
  Muffler Body Clamp Bolt [C]



Muffler

- Tighten:

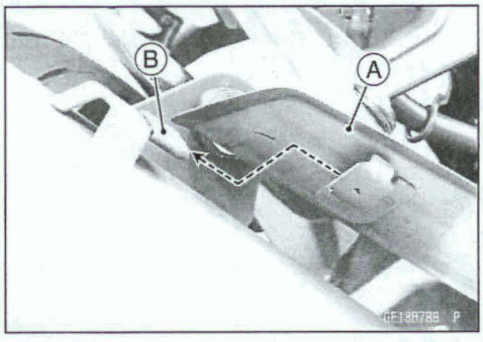
Torque - Exhaust Pipe Holder Nuts: 12 N·m (1.2 kgf·m, 106 in·lb)

○When tightening the exhaust pipe holder nuts, be sure to follow the above sequence.

- Tighten:

Torque - Muffler Body Mounting Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)
Muffler Body Clamp Bolt: 10 N·m (1.0 kgf·m, 89 in·lb)

- Insert the muffler cover [A] into the muffler body claw (grommet) [B].

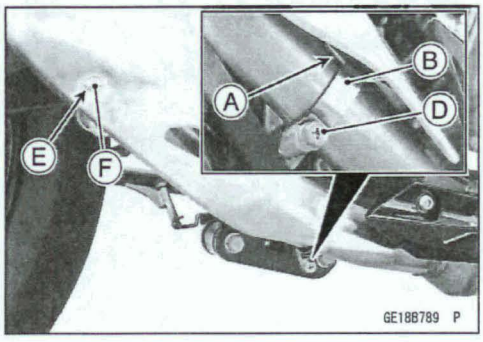


- Insert the claw [A] into the cover clamp [B] as shown. 45 ~ 55° [C]
- Tighten:

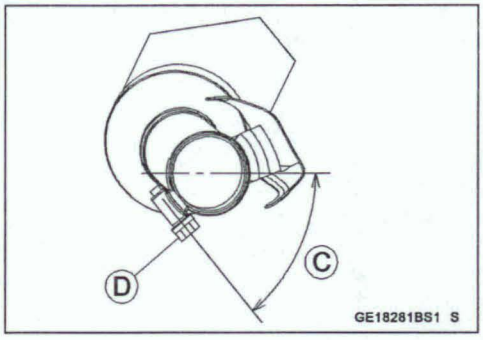
Torque - Muffler Cover Clamp Bolt [D]: 6.9 N·m (0.70 kgf·m, 61 in·lb)

- Be sure to install the damper and collar [E].
- Tighten:

Torque - Muffler Cover Bolt [F]: 4.4 N·m (0.45 kgf·m, 39 in·lb)



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



Clutch

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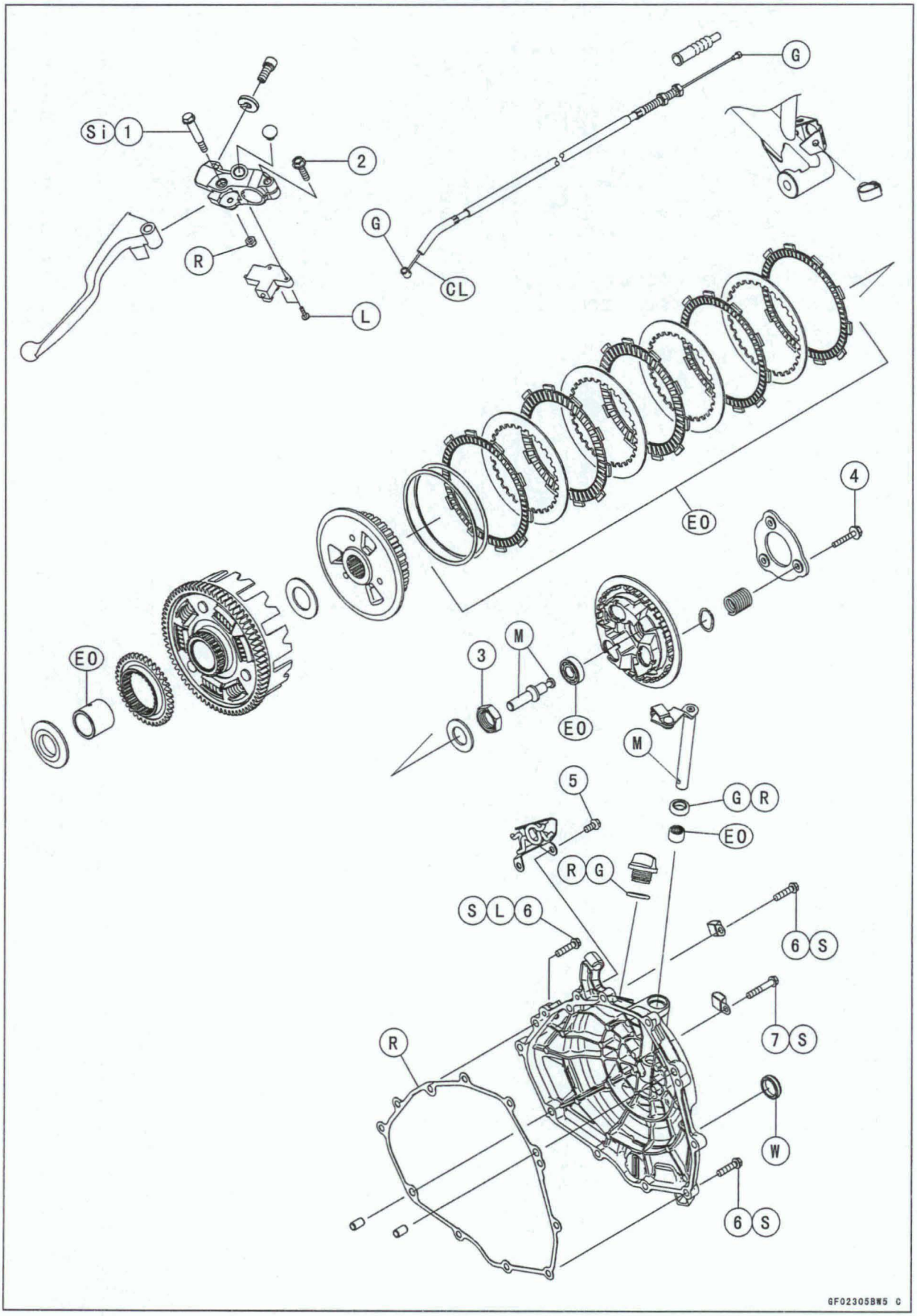
Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Clutch Lever Pivot Bolt	5.5	0.56	49 in·lb	Si
2	Clutch Lever Holder Clamp Bolt	6.8	0.69	60 in·lb	
3	Clutch Hub Nut	132	13.5	97.4	
4	Clutch Stopper Bolts	10	1.0	89 in·lb	
5	Clutch Cover Bracket Bolts	9.8	1.0	87 in·lb	
6	Clutch Cover Bolts (L = 25 mm)	9.8	1.0	87 in·lb	L (1), S
7	Clutch Cover Bolt (L = 35 mm)	9.8	1.0	87 in·lb	S

CL: Apply cable lubricant.
EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
M: Apply molybdenum disulfide grease.
R: Replacement Parts
S: Follow the specified tightening sequence.
Si: Apply silicone grease.
W: Apply water.

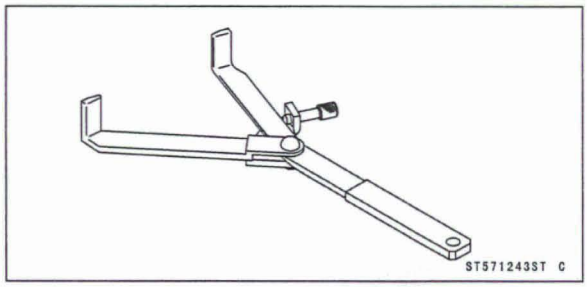
6-4 CLUTCH

Specifications

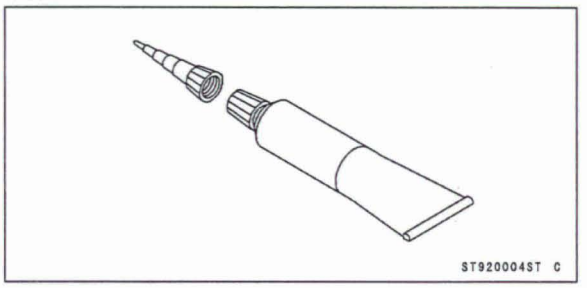
Item	Standard	Service Limit
Clutch Lever and Cable		
Clutch Lever Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	– – –
Clutch		
Clutch Plate Assembly Length	(Reference)	
	22.42 ~ 23.42 mm (0.88 ~ 0.92 in.)	– – –
Friction Plate Thickness	2.92 ~ 3.08 mm (0.115 ~ 0.121 in.)	2.6 mm (0.10 in.)
Friction and Steel Plate 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

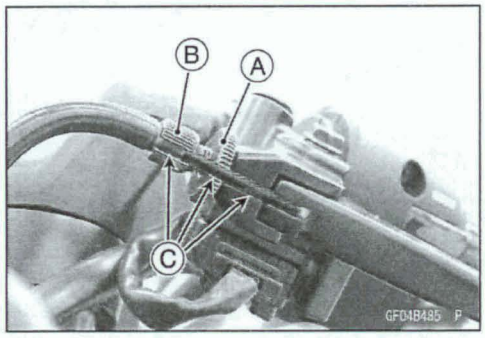
- Refer to the Clutch Operation Inspection in the Periodic Maintenance chapter.

Clutch Lever Free Play Adjustment

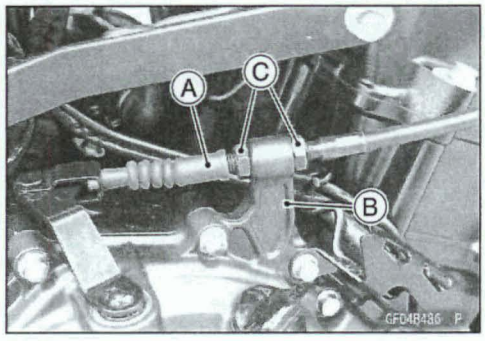
- Refer to the Clutch Operation Inspection in the Periodic Maintenance chapter.

Clutch Cable Removal

- Remove:
  Right Middle Fairing (see Middle Fairing Removal in the Frame chapter)
- Loosen the locknut [A] at the clutch lever, 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.



- Slide the dust cover [A] at the clutch cable lower end out of place.
- Remove the clutch cable lower from the clutch cover [B] loosening the locknuts [C].
- Free the clutch inner cable tip from the clutch release lever.
- Pull 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).

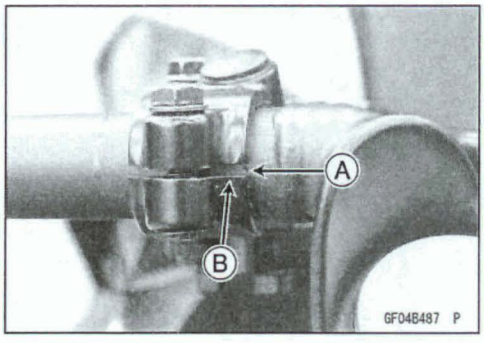
Clutch Cable Lubrication

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

Clutch Lever Holder Installation

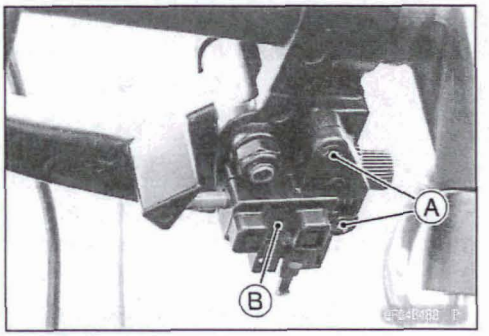
- Install the clutch lever holder so that the punch mark [A] to the center to the slit [B] of the clutch lever holder.
- Tighten:

Torque - Clutch Lever Holder Clamp Bolt: 6.8 N·m (0.69 kgf·m, 60 in·lb)

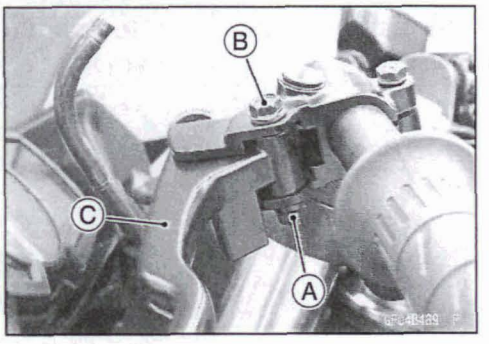


Clutch Lever and Cable

Clutch Lever Removal



- Remove:
  Clutch Cable Upper End (see Clutch Cable Removal)
  Left Switch Housing (see Handlebar Removal in the Steering chapter)
  Starter Lockout Switch Screws [A]
  Starter Lockout Switch [B]

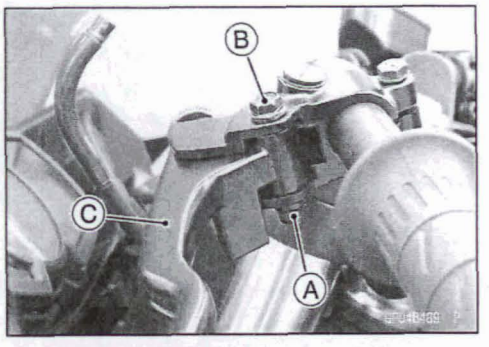


- Remove:
  Clutch Lever Pivot Locknut [A]
  Clutch Lever Pivot Bolt [B]
  Clutch Lever [C]

Clutch Lever Installation

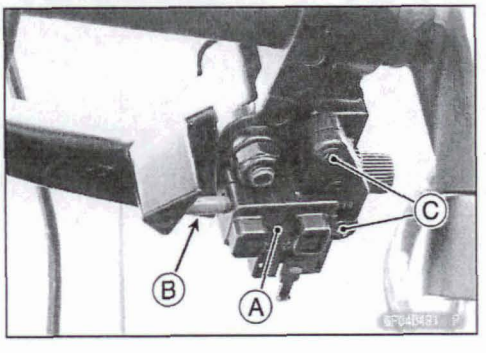
⚠ WARNING

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 clutch lever pivot locknut [A] with a new one.
- Apply silicone grease to the clutch lever pivot bolt [B].
- Install the clutch lever [C] and clutch lever pivot bolt and locknut.
- Tighten:

Torque - Clutch Lever Pivot Bolt: 5.5 N·m (0.56 kgf·m, 49 in·lb)



- Install the starter lockout switch [A].

○Take care not to damage a pin [B] when installing the starter lockout switch.

- Apply a non-permanent locking agent to the starter lockout switch screws [C].
- Tighten the starter lockout switch screws.
- Install:
  Left Switch Housing (see Handlebar Installation in the Steering chapter)
  Clutch Cable Upper End (see Clutch Cable Installation)

Clutch Lever and Cable

- Adjust the clutch cable (see Clutch Operation Inspection in the Periodic Maintenance chapter).
- Check that the pin of the starter lockout switch moves smoothly.

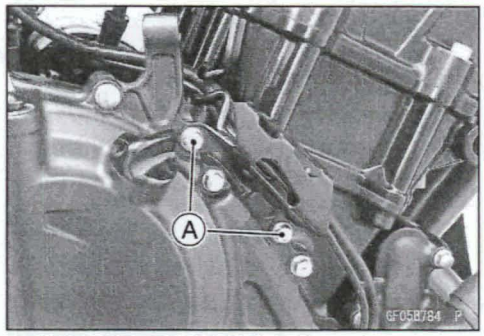
⚠ WARNING

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

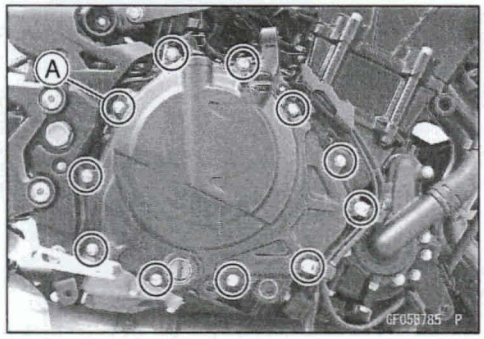
Clutch Cover

Clutch Cover Removal

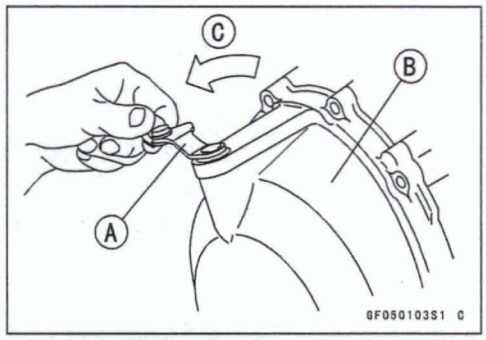
- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Disconnect the clutch cable lower end.
- Remove:
  Right Middle Fairing (see Middle Fairing Removal in the Frame chapter)
  Clutch Cover Bracket Bolts [A]



- Remove:
  Clutch Cover Bolts [A]



- Turn the release lever [A] outward, and remove the clutch cover [B].
  About 90° [C]

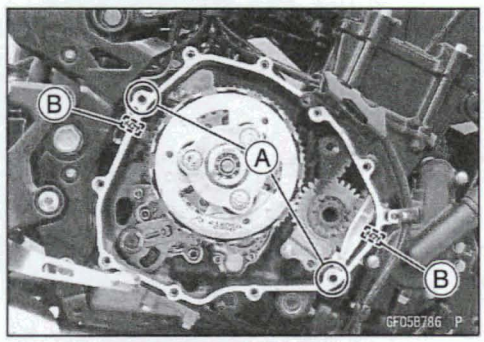


Clutch Cover Installation

- Be sure to dowel pins [A].
- Clean off any oil or dirt and apply liquid gasket to the area [B] where the mating surface of the crankcase touches the clutch cover gasket.

  Sealant - Liquid Gasket, TB1211F: 92104-0004

- Replace the clutch cover gasket with a new one and install it.

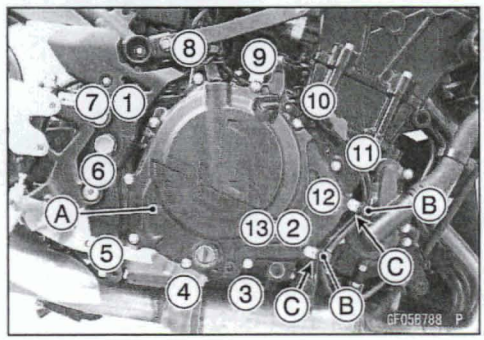


- Install:
  Clutch Cover [A]
  Clamps [B]
- Apply a non-permanent locking agent to the clutch cover bolt [11].
- Tighten the clutch cover bolts following the specified tightening sequence [1 ~ 13].

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

○When tightening the clutch cover bolts, contact the clamps to the stoppers [C].

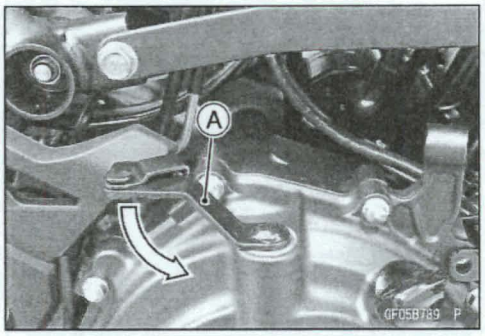
- Install the removed parts (see appropriate chapters).



Clutch Cover

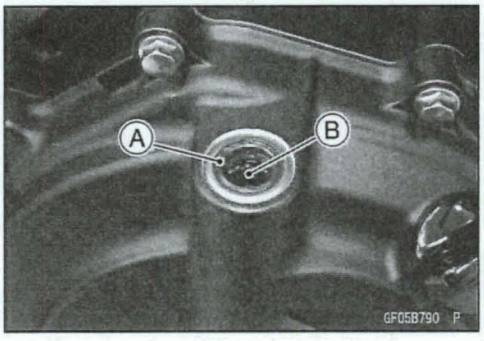
Release Shaft Removal

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.



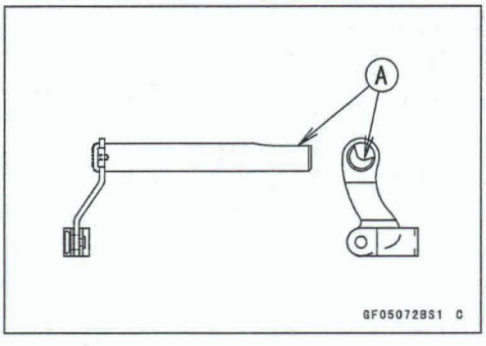
- Disconnect the clutch cable lower end.
- Turn the release shaft [A] outward.
- Pull the release shaft straight out of the clutch cover.

Release Shaft Installation



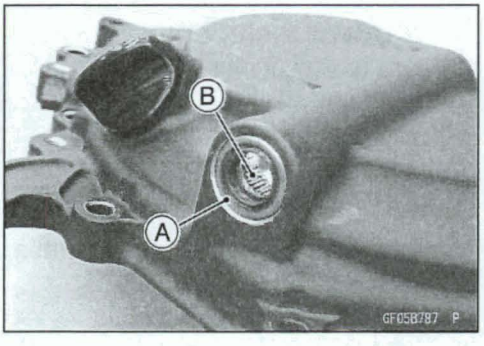
- Replace the oil seal [A] with a new one.
- Apply grease to the oil seal lips on the upper ridge of the clutch cover.
- Apply engine oil to the needle bearing [B] in the hole of the clutch cover.
- Apply molybdenum disulfide grease to the pusher-holding portion [A] on the release shaft.
- Insert the 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.



Clutch Cover Disassembly

- Remove:
  Oil Seal [A]
  Needle Bearing [B]
  Oil Level Inspection Window



Clutch Cover Assembly

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

NOTE

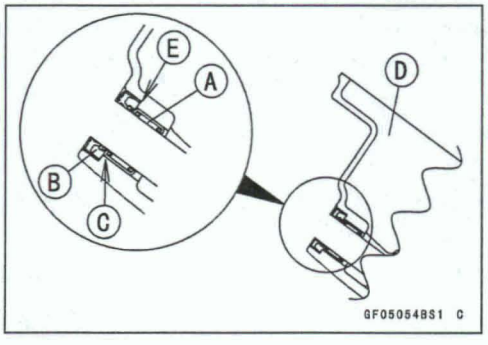
○*Install the needle bearing so that the manufacture's mark face out.*

- Install the needle bearing [A] and oil seal [B] position as shown.

○Press the needle bearing so that the bearing surface [C] is flush with the housing end of clutch cover [D].

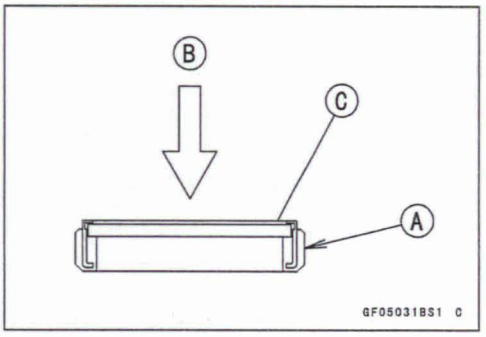
○Press the oil seal until the bottom [E].

- Apply grease to the oil seal lips.



Clutch Cover

- Apply water to the rubber of the oil level inspection window [A] and press [B] it so that the ring [C] faces outside.

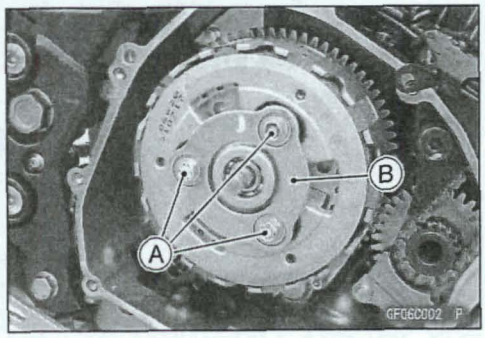


Clutch

Clutch Removal

- Remove:
  Clutch Cover (see Clutch Cover Removal)
  Clutch Stopper Bolts [A]

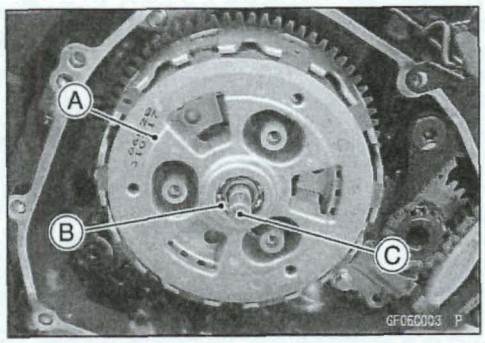
○Loosen the clutch stopper bolts evenly with little by little to prevent tilting the clutch stopper plate.



NOTICE
Do not loosen the one or two clutch stopper plate bolt at once to prevent clutch stopper plate warpage by the spring force.

- Remove:
  Clutch Stopper Plate [B]
  Clutch Springs

- Remove:
  Clutch Pressure Plate [A]
  Ball Bearing [B]
  Pusher [C]
  Friction Plates and Steel Plates
  Judder Spring and Spring Sheet

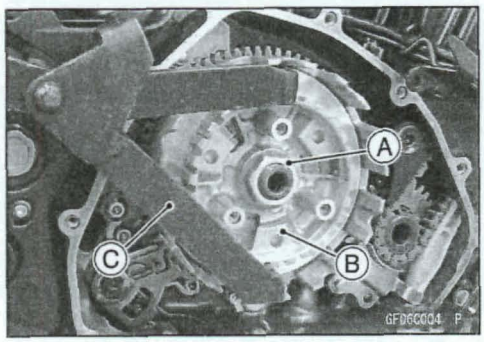


- Remove:
  Clutch Hub Nut [A] and Washer

○Holding the clutch hub [B], remove them.

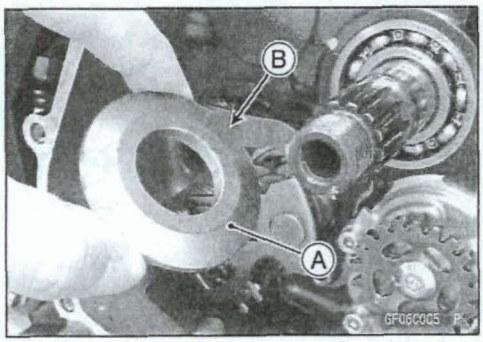
Special Tool - Clutch Holder [C]: 57001-1243

- Remove:
  Clutch Hub
  Spacer
  Bushing
  Clutch Housing
  Thrust Spacer



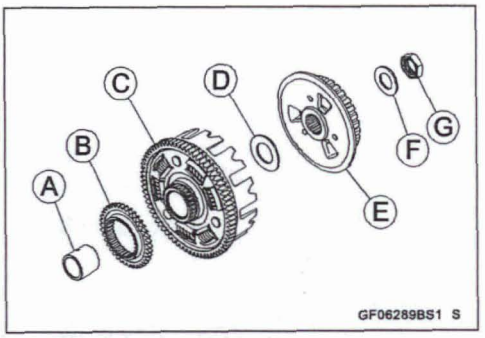
Clutch Installation

- Install the thrust spacer [A] so that the tapered side [B] faces inward.



Clutch

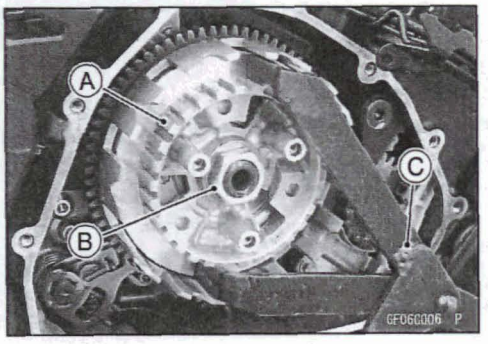
- Apply engine oil to the bushing [A].
- Install:
  Bushing
  Oil Pump Drive Gear [B]
  Clutch Housing [C]
  Spacer [D]
  Clutch Hub [E]
  Washer [F]
  Clutch Hub Nut [G]



- Holding the clutch hub [A], tighten the clutch hub nut [B].

Special Tool - Clutch Holder [C]: 57001-1243

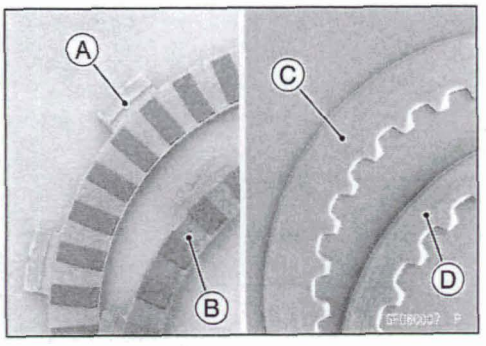
Torque - Clutch Hub Nut: 132 N·m (13.5 kgf·m, 97.4 ft·lb)



NOTE

○*There are several kinds of the friction plates and steel plates.*

○Friction Plates:
  Wide Plate [A]
  Narrow Plate [B]
○Steel Plates:
  Wide Plate [C]
  Narrow Plate [D]

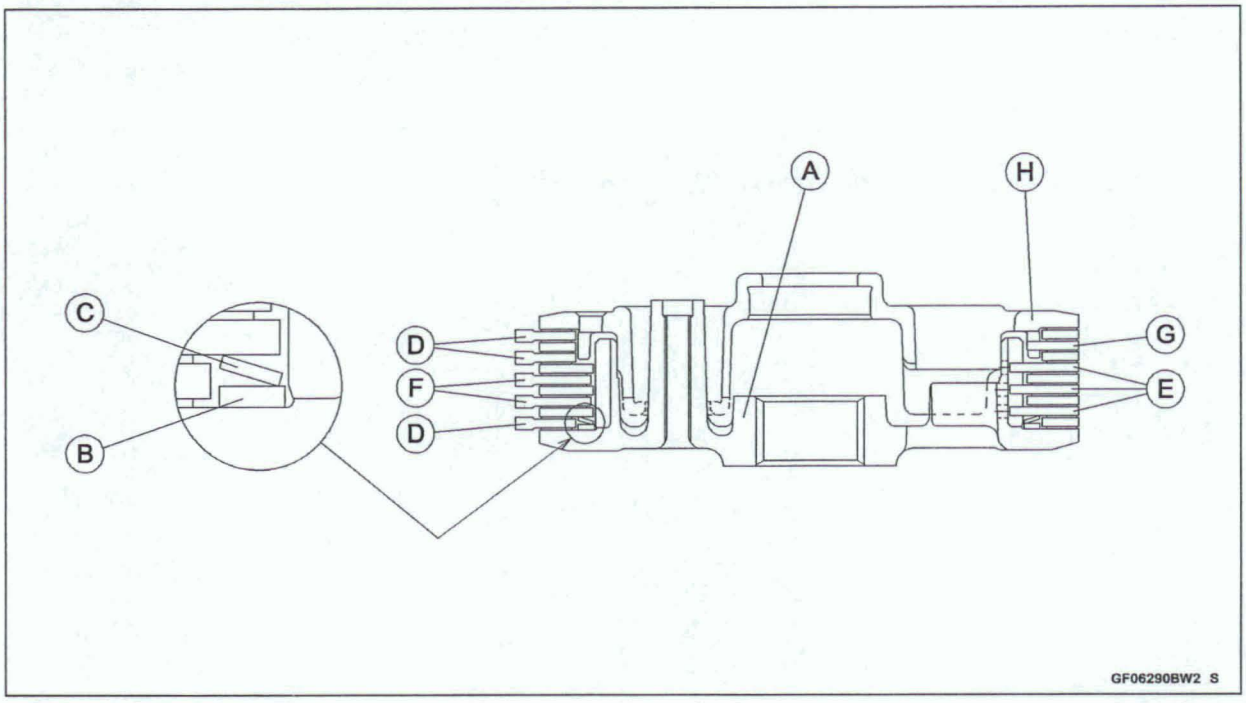


Clutch

- Install the friction plates and steel plate alternately as shown.
  Clutch Hub [A]
  Spring Seat [B]
  Judder Spring [C]
  Narrow Friction Plates [D]
  Wide Steel Plates [E]
  Wide Friction Plates [F]
  Narrow Steel Plate [G]
  Clutch Pressure Plate [H]

○Install the last friction plate and steel plate later with the clutch pressure plate.

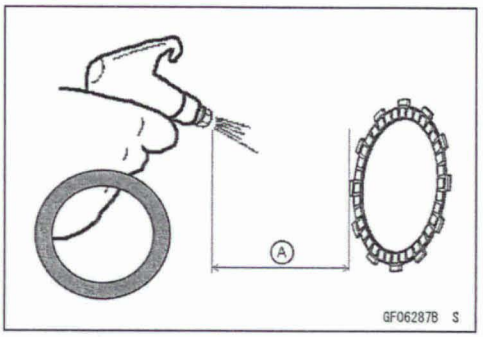
NOTICE
If new dry friction plates and steel plates are installed, apply engine oil to the surfaces of each plate to avoid clutch plate seizure.



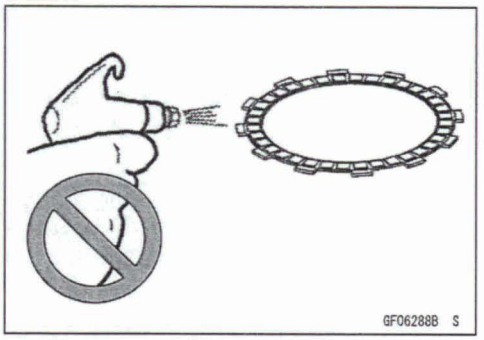
Clutch

NOTICE

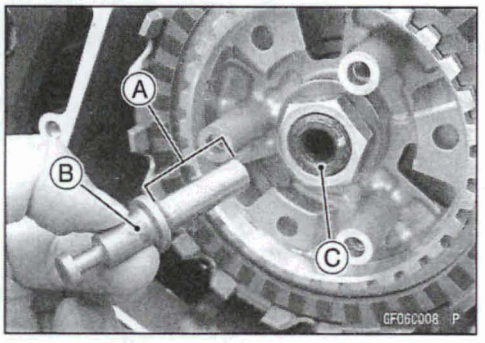
High pressure air blasts may detach clutch friction material from the friction plate. To prevent material detachment, set air pressure lower than 0.5 MPa (5 kgf/cm², 73 psi), do not place air nozzle closer than 30 cm (12 in.) to friction plate and only blow air at a right angle to the plate, facing the friction material. Do not blow air from the side (horizontally) of the plate since it is more likely to detach the friction material.



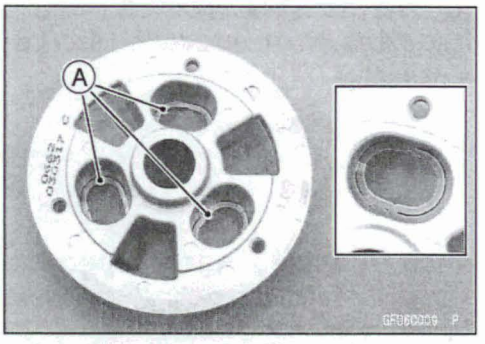
more than 30 cm (12 in.) [A]



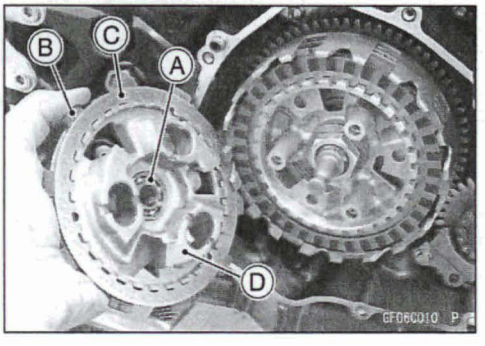
- Apply molybdenum disulfide grease to the pusher end [A].
- Install the pusher [B] into the drive shaft [C].



- Make sure the spring seats [A] are in position.

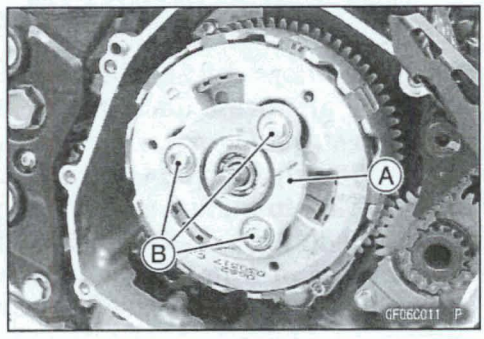


- Apply engine oil to the sliding surfaces of the bearing [A].
- Put the remaining friction plate [B] and steel plate [C] on to the clutch pressure plate [D], and install them.



Clutch

- Install:
  Clutch Springs
  Clutch Stopper Plate [A]
  Clutch Stopper Bolts [B]
- Tighten the clutch stopper bolts evenly with little by little to prevent tilting the clutch stopper plate.



NOTICE

Do not tighten the one or two clutch stopper bolt at once to prevent clutch stopper plate warp age by the spring force.

- Tighten:

Torque - Clutch Stopper Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)

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

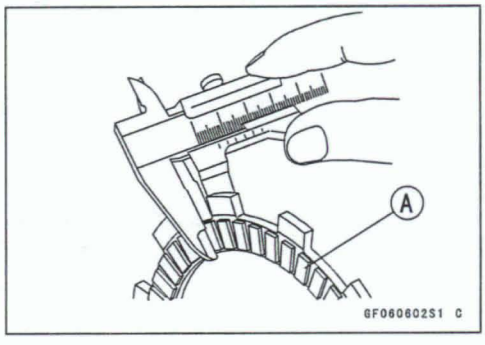
Clutch Plate Wear and Damage Inspection

- 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:	**2.92 ~ 3.08 mm (0.115 ~ 0.121 in.)**
Service Limit:	**2.6 mm (0.10 in.)**



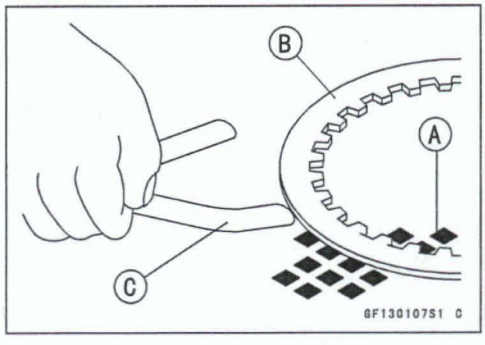
Clutch Plate Warp Inspection

- 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

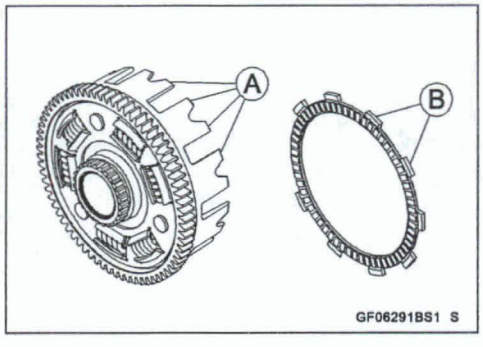
Standard:	**0.15 mm (0.0059 in.) or less**
Service Limit:	**0.3 mm (0.01 in.)**



Clutch Housing Finger Inspection

- Visually inspect the clutch housing fingers [A] where the friction plate tangs [B] hit.

★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.

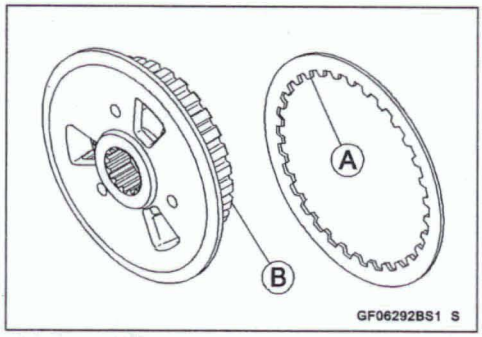


Clutch

Clutch Housing Spline Inspection

- Visually inspect where the teeth [A] on the steel plates wear against the clutch hub splines [B].

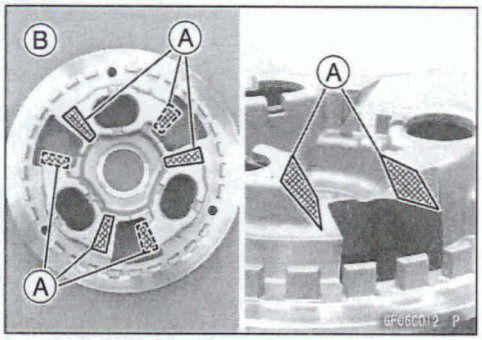
★If there are notches worn into the splines, replace the clutch hub. Also, replace the steel plates if their teeth are damaged.

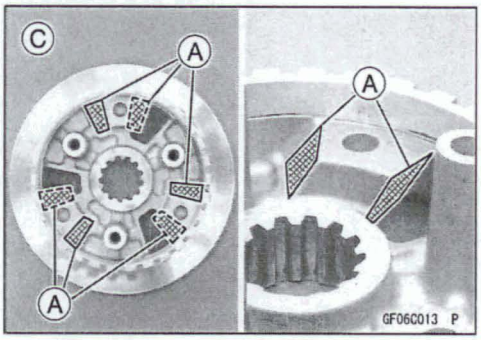


Clutch Pressure Plate and Clutch Hub Inspection

- Visually inspect the contact areas [A] of the clutch pressure plate [B] and clutch hub [C] for damage.

★If the contact areas are damaged replace them with new ones.





Clutch Spring Inspection

★If all the components are good, but the problem still exists, replace the clutch springs (see Clutch Removal/Clutch Installation).

Engine Lubrication System

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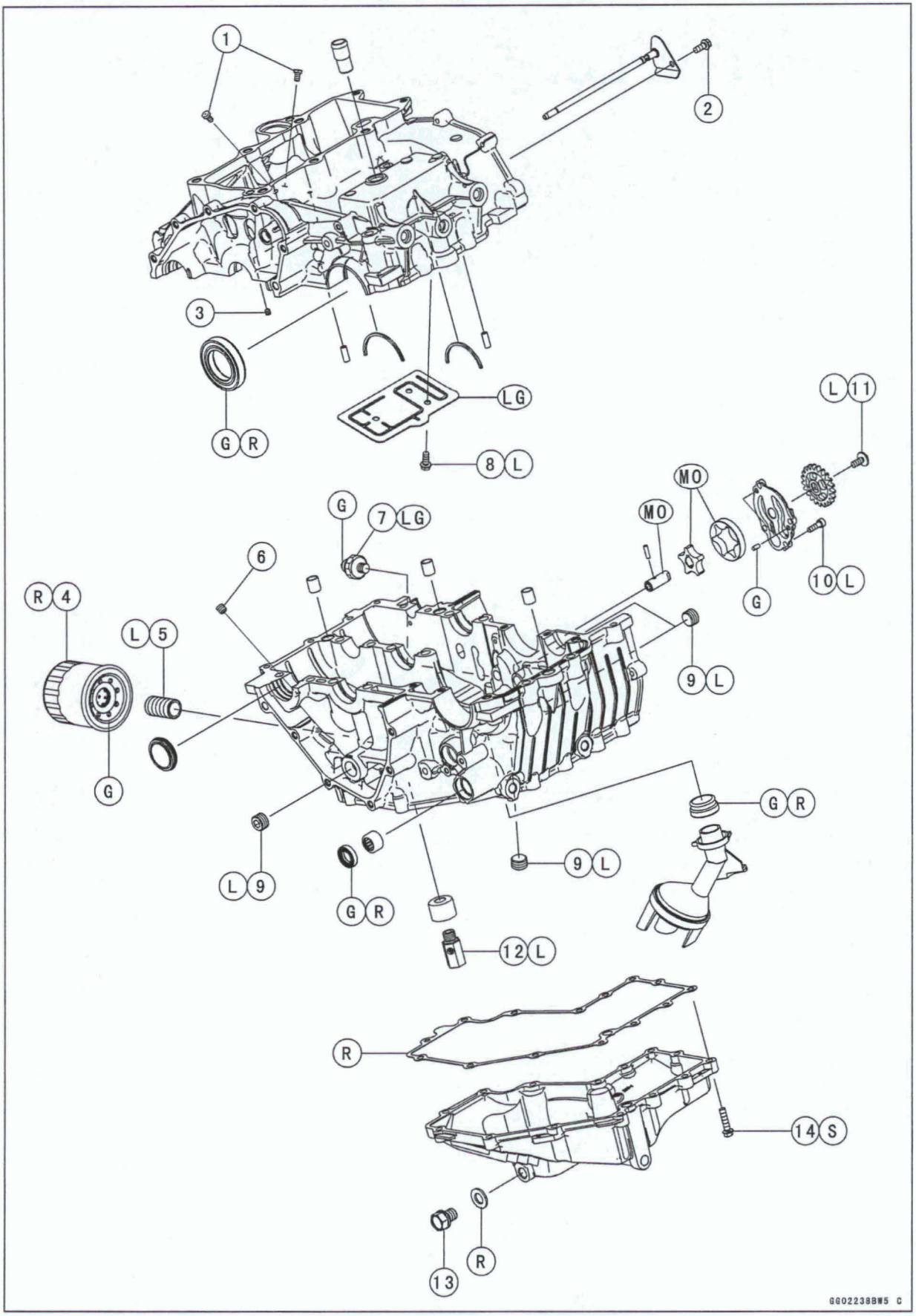
Exploded View

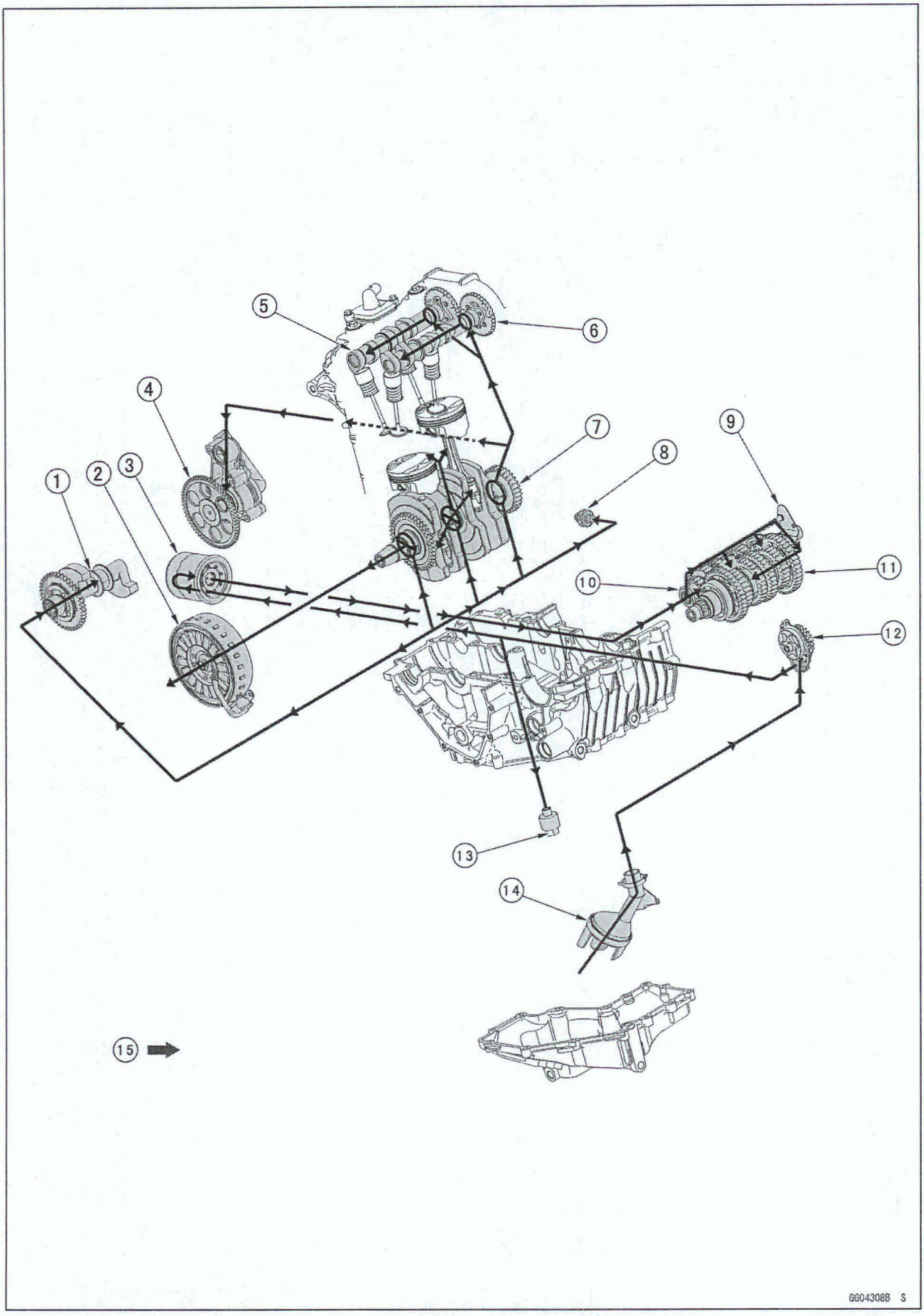


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Oil Nozzles	3.0	0.31	27 in·lb	
2	Oil Pipe Bolt	9.8	1.0	87 in·lb	
3	Oil Passage Nozzle (M5)	3.0	0.31	27 in·lb	
4	Oil Filter	17.5	1.78	12.9	G, R
5	Oil Filter Pipe	35	3.6	26	L
6	Oil Passage Nozzle (M8)	5.0	0.51	44 in·lb	
7	Oil Pressure Switch	15	1.5	11	LG
8	Breather Plate Bolts	9.8	1.0	87 in·lb	L
9	Oil Passage Plugs	20	2.0	15	L
10	Oil Pump Cover Bolts	7.0	0.71	62 in·lb	L
11	Oil Pump Driven Gear Bolt	9.8	1.0	87 in·lb	L
12	Oil Pressure Relief Valve	15	1.5	11	L
13	Engine Oil Drain Bolt	30	3.1	22	
14	Oil Pan Bolts	9.8	1.0	87 in·lb	S

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.

Engine Oil Flow Chart



Engine Oil Flow Chart

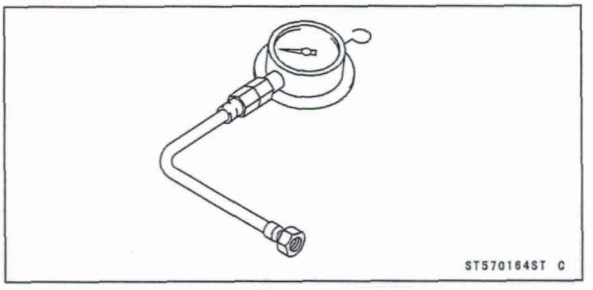
1. Balancer Shaft
2. Alternator
3. Oil Filter
4. Water Pump Drive Gear
5. Exhaust Camshaft
6. Intake Camshaft
7. Crankshaft
8. Oil Pressure Switch
9. Oil Pipe
10. Drive Shaft
11. Output Shaft
12. Oil Pump
13. Oil Pressure Relief Valve
14. Oil Screen
15. Engine Oil

Specifications

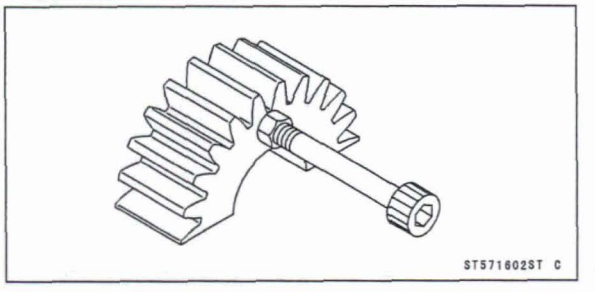
Item	Standard
Engine Oil	
Type	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2
Viscosity	SAE 10W-40
Capacity	1.6 L (1.7 US qt) (When filter is not removed.) 2.0 L (2.1 US qt) (When filter is removed.) 2.3 L (2.4 US qt) (When engine is completely dry.)
Level	Between upper and lower level lines (Wait several minutes after idling or running)
Oil Pressure Measurement	
Oil Pressure	157 ~ 206 kPa (1.60 ~ 2.10 kgf/cm², 22.8 ~ 29.9 psi) @4 000 r/min (rpm), Oil Temperature 90°C (194°F)

Special Tools and Sealant

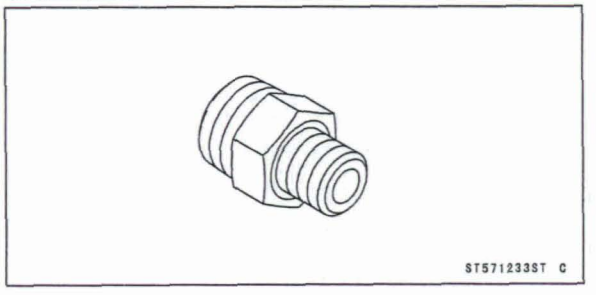
Oil Pressure Gauge, 10 kgf/cm²:
57001-164



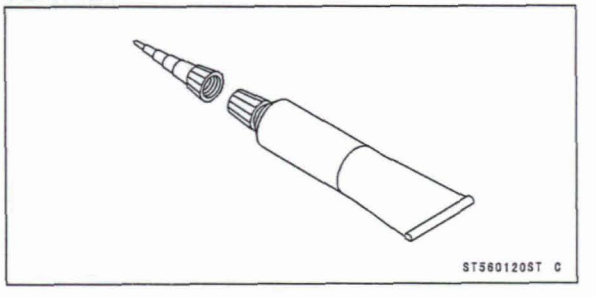
Gear Holder:
57001-1602



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



Liquid Gasket, TB1211:
56019-120



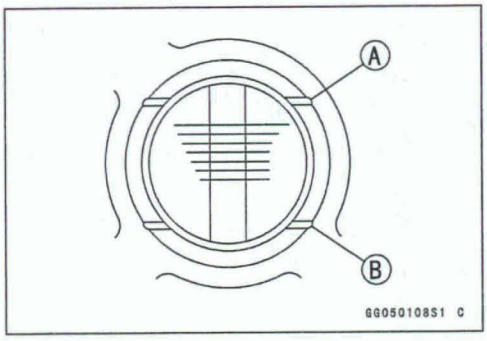
Engine Oil and Oil Filter

⚠ WARNING

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

Oil Level Inspection

- Check that the engine oil level is between the upper [A] and lower [B] levels in the 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 oil pressure warning indicator light will light. If this light stays on when the engine is running above idle speed, stop the engine immediately and find the cause.

★If the oil level is too high, remove the excess oil, using a syringe or some other suitable device.

★If the oil level is too low, add the correct amount of oil through the oil filler opening. Use the same type and make of oil that is already in the engine.

NOTE

○*If the engine oil type and make are unknown, use any brand of the specified oil to top off the level in preference to running the engine with the oil level low. Then at your earliest convenience, change the oil completely.*

Engine Oil Change

- Refer to the Engine Oil Change in the Periodic Maintenance chapter.

Oil Filter Replacement

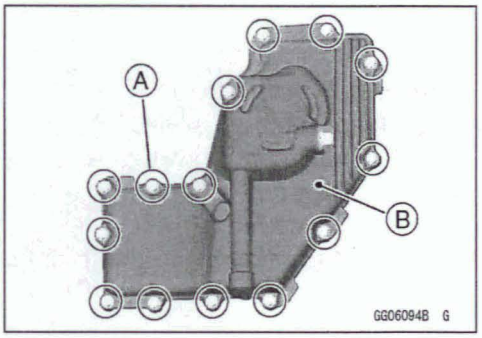
- Refer to the Oil Filter Replacement in the Periodic Maintenance chapter.

Oil Pan

Oil Pan Removal

- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove:
  Exhaust Pipe (see Exhaust Pipe Removal in the Engine Top End chapter)
  Left Lower Fairing (see Lower Fairing Removal in the Frame chapter)

- Remove:
  Oil Pan Bolts [A]
  Oil Pan [B]
  Gasket

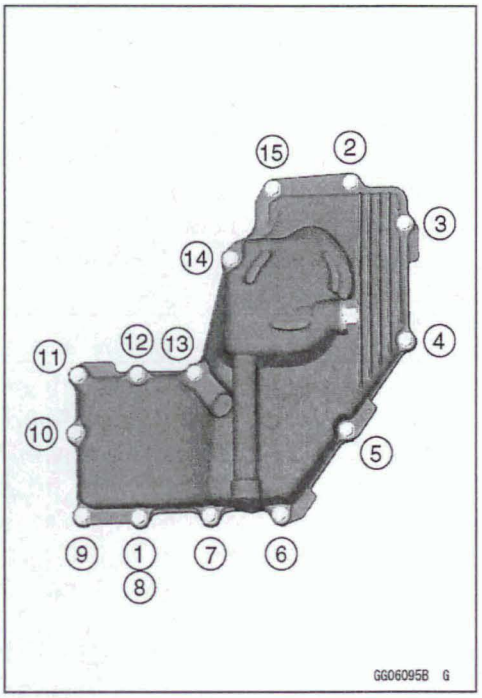


Oil Pan Installation

- Install the following parts if removed.
  Oil Pressure Relief Valve (see Oil Pressure Relief Valve Installation)
  Oil Screen (see Oil Screen Installation)
- Replace the oil pan gasket with a new one.
- Tighten the oil pan bolts following the specified tightening sequence [1 ~ 15].

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

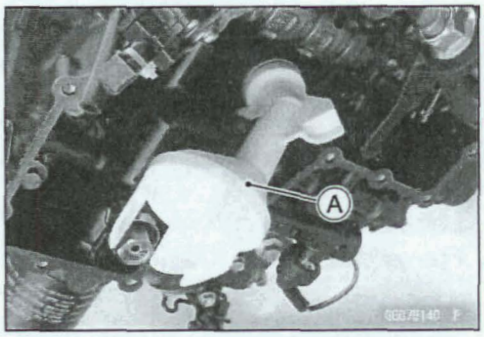
- Install the removed parts (see appropriate chapters).



Oil Screen

Oil Screen Removal

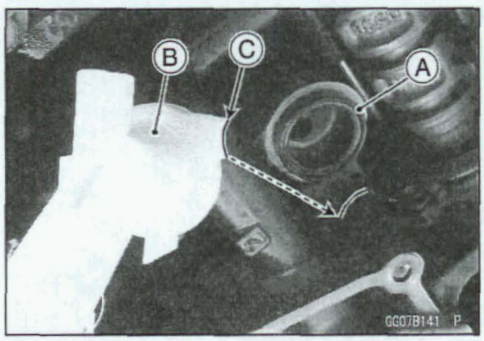
- Remove:
  Oil Pan (see Oil Pan Removal)
  Oil Screen [A]



Oil Screen Installation

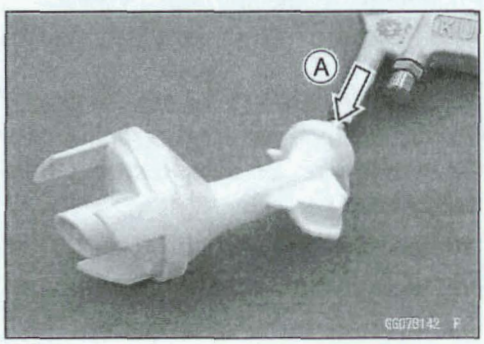
- Clean the oil screen (see Oil Screen Cleaning).
- Replace the O-ring [A] with a new one, and install it.
- Apply grease to the O-ring.
- Install the oil screen [B].

○Fit the guide portion [C] to the crankcase.



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

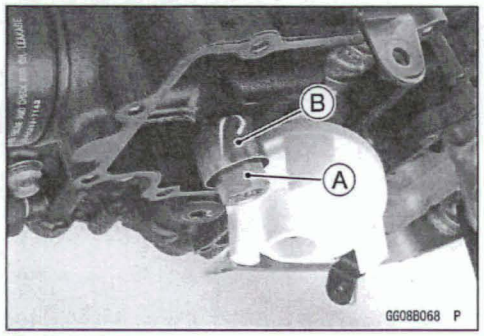
○*While cleaning the screen, check for any metal particles that might indicate internal engine damage.*

- 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 Pan (see Oil Pan Removal)
  Oil Pressure Relief Valve [A]
  Cover [B]

Oil Pressure Relief Valve Installation

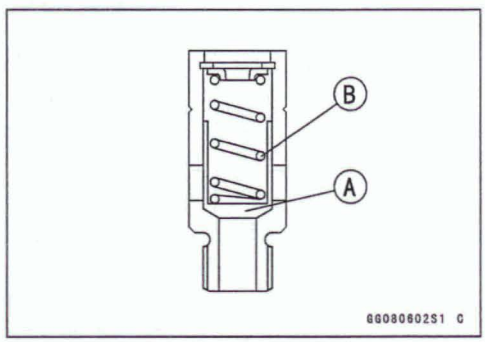
- Apply a non-permanent locking agent to the threads of the oil pressure relief valve, and tighten it.

NOTICE
Do not apply too much non-permanent locking agent to the threads. This may block the oil passage.

Torque - Oil Pressure Relief Valve: 15 N·m (1.5 kgf·m, 11 ft·lb)

- Install the removed parts (see appropriate chapters).

Oil Pressure Relief Valve Inspection



- Remove:
  Oil Pressure Relief Valve (see Oil Pressure Relief Valve Removal)
- Check to see if the valve [A] slides smoothly when pushing it in with a wooden or other soft rod, and see if it comes back to its seat by spring [B] pressure.

NOTE

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

★If any rough spots are found during above inspection, wash the valve clean with a high flash-point solvent and blow out any foreign particles that may be in the valve with compressed air.

⚠ WARNING
Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the oil pressure relief valve in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the oil pressure relief valve.

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

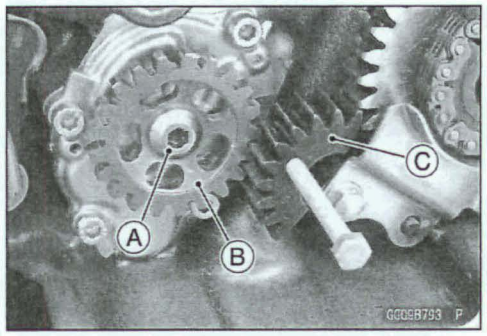
Oil Pump

Oil Pump Removal

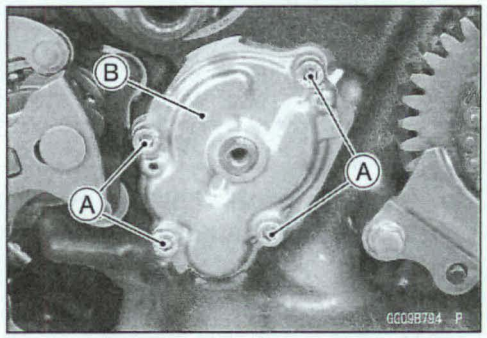
- Remove:
  Clutch (see Clutch Removal in the Clutch chapter)
  Oil Pump Driven Gear Bolt [A]
  Oil Pump Driven Gear [B]

○Hold the gear steady with the gear holder [C].

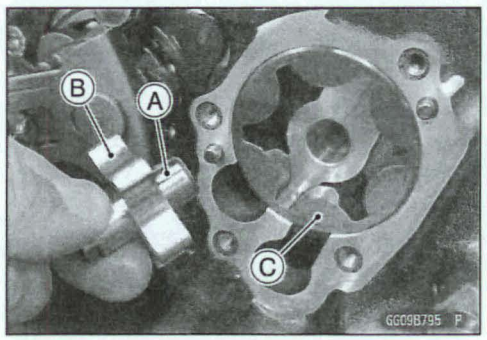
Special Tool - Gear Holder: 57001-1602



- Remove:
  Oil Pump Cover Bolts [A]
  Oil Pump Cover [B]



- Remove:
  Oil Pump Shaft [A]
  Inner Rotor [B]
  Pin
  Outer Rotor [C]

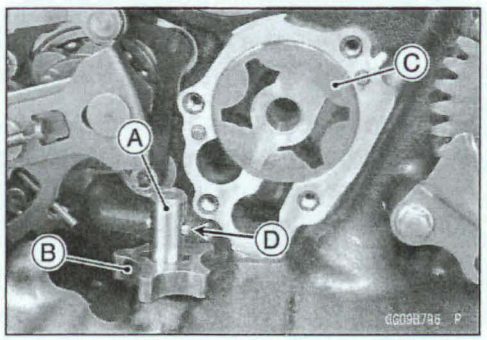


Oil Pump Installation

- Apply molybdenum disulfide oil solution to the followings.
  Oil Pump Shaft [A]
  Inner Rotor [B]
  Outer Rotor [C]
- Assemble:
  Oil Pump Shaft
  Pin [D]
  Inner Rotor

○Fit the groove of rotor and the pin.

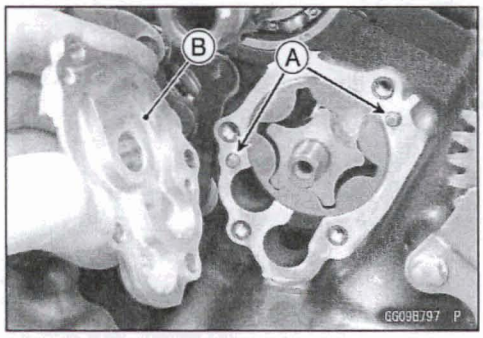
- Install the outer rotor into the crankcase.
- Install the inner rotor and shaft.



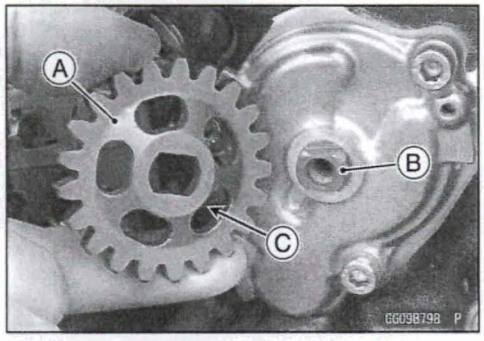
Oil Pump

- Be sure to install the dowel pins [A].
- Install the oil pump cover [B].
- Apply a non-permanent locking agent to the oil pump cover bolts.
- Tighten:

Torque - Oil Pump Cover Bolts: 7.0 N·m (0.71 kgf·m, 62 in·lb)



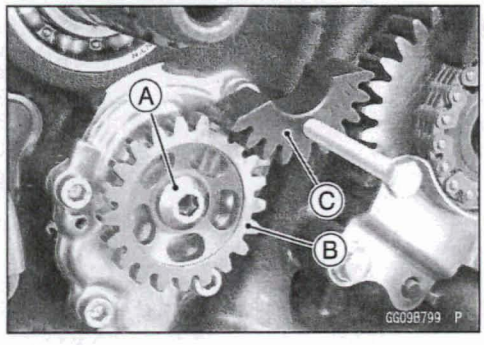
- Install the oil pump driven gear [A] onto the oil pump shaft [B] with its projecting side [C] facing to the oil pump.



- Apply a non-permanent locking agent to the threads of the oil pump driven gear mounting bolt [A].
- Hold the oil pump driven gear [B] steady with the clutch holder [C], and tighten the oil pump driven gear bolt.

Special Tool - Gear Holder: 57001-1602

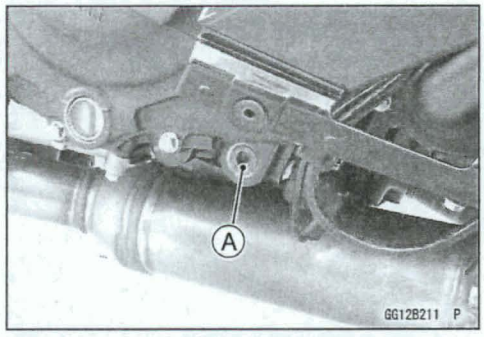
Torque - Oil Pump Driven Gear Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)



Oil Pressure Measurement

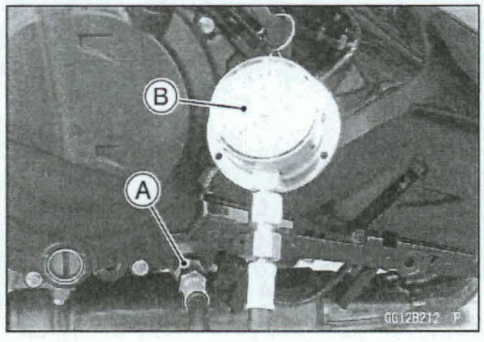
Oil Pressure Measurement

- Remove the right lower fairing (see Lower Fairing Removal in the Frame chapter).
- Remove the 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, PT 3/8: 57001-1233



- Start the engine and warm up the engine.
- Run the engine at the specified speed, and read the oil pressure gauge.

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

★If the reading is much higher than the standard, check the oil passages for clogging.

Oil Pressure
Standard: 157 ~ 206 kPa (1.60 ~ 2.10 kgf/cm², 22.8 ~ 29.9 psi) @4 000 r/min (rpm), Oil Temperature 90°C (194°F)

- Stop the engine.
- Remove the oil pressure gauge and adapter.

⚠ WARNING

Hot oil can cause severe burns. Beware of hot engine oil that will drain through the oil passage when the gauge adapter is removed.

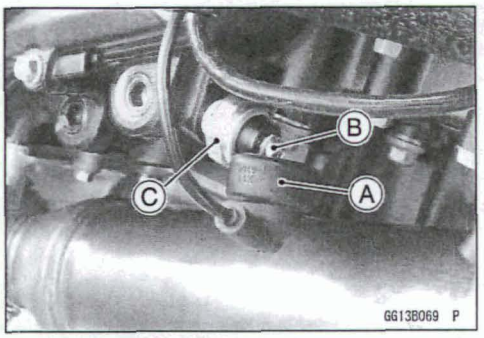
- Apply a non-permanent locking agent to the oil passage plug, and install it.
- Tighten:

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

- Install the right lower fairing (see Lower Fairing Installation in the Frame chapter).

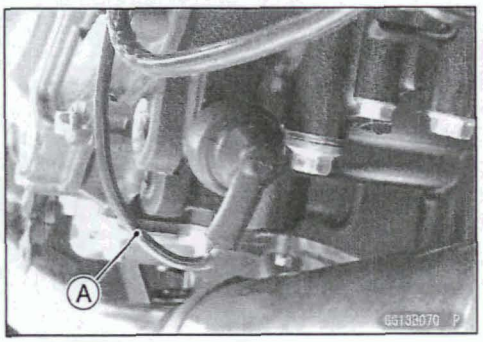
Oil Pressure Switch

Oil Pressure Switch Removal



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

Oil Pressure Switch Installation



- Clean off any oil or dirt and apply silicone sealant to the threads of the oil pressure switch and tighten it.

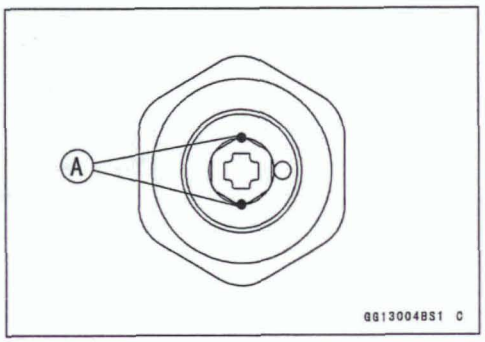
  Sealant - Liquid Gasket, TB1211: 56019-120

  Torque - Oil Pressure Switch: 15 N·m (1.5 kgf·m, 11 ft·lb)

- Apply grease to the both sides of the switch lead terminal.
- Connect the switch lead [A] to the switch terminal as shown.

NOTE

○*Apply a small amount of grease to the terminal so that grease should not close two breather holes [A] for switch diaphragm.*

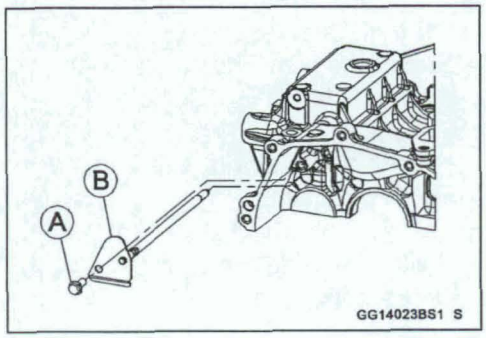


- Install:
  Switch Cover
  Right Lower Fairing (see Lower Fairing Installation in the Frame chapter)
- Fill the engine with engine oil (see Engine Oil Change in the Periodic Maintenance chapter).

Oil Pipe

Oil Pipe Removal

- Remove:
  Clutch (see Clutch Removal in the Clutch chapter)
  Oil Pipe Bolt [A]
  Oil Pipe [B]



Oil Pipe Installation

- Installation is the reverse of removal.
- Tighten:

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

Engine Removal/Installation

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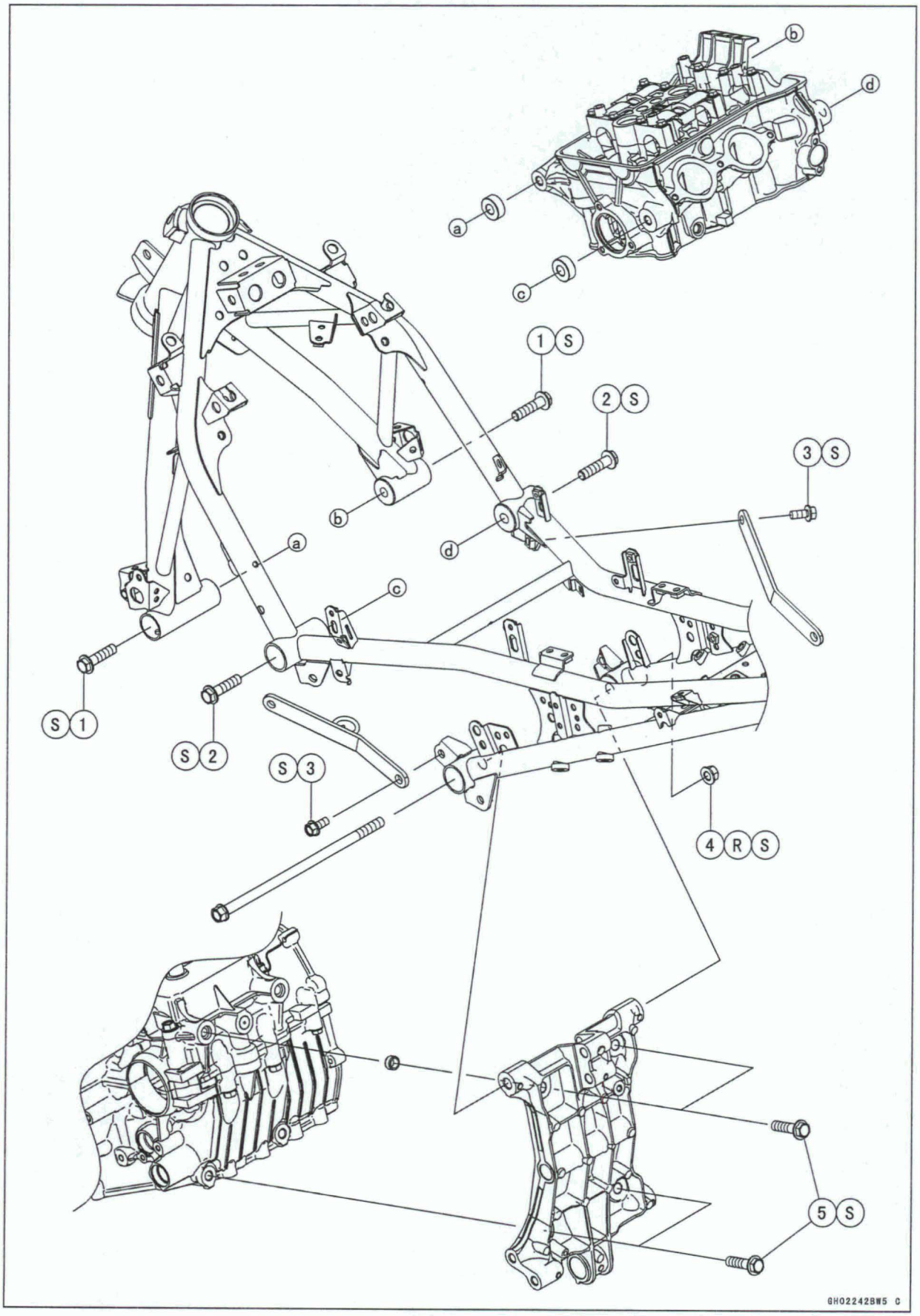
Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Engine Mounting Bolts	44	4.5	32	S
2	Middle Engine Mounting Bolts	44	4.5	32	S
3	Frame Bracket Bolts	34	3.5	25	S
4	Swingarm Mounting Plate Nut	44	4.5	32	R, S
5	Rear Engine Mounting Bolts	44	4.5	32	S

R: Replacement Parts
S: Follow the specified tightening sequence.

Engine Removal/Installation

Engine Removal

- Support the front and rear of the motorcycle with the stands.

⚠ WARNING

Motorcycle may fall over unexpectedly resulting in an accident or injury. Be sure to use the front and rear stands when removing the engine.

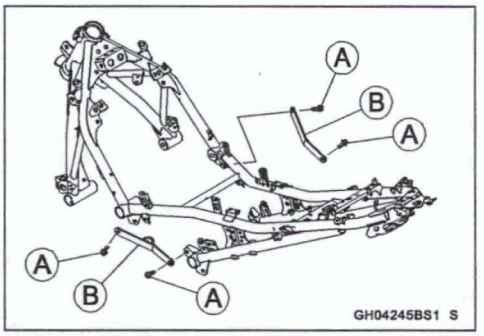
NOTICE

Be sure to use the front and rear stands when removing the engine, or the motorcycle may fall over. The engine or the motorcycle could be damaged.

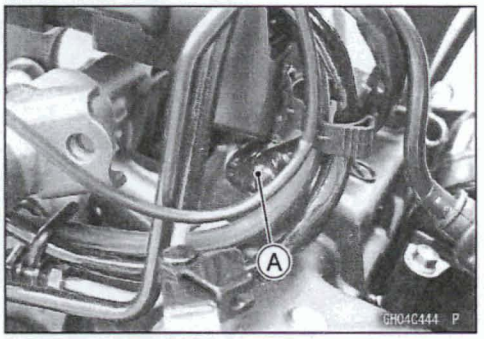
- Drain:
  - Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
  - Coolant (see Coolant Change in the Periodic Maintenance chapter)
- Remove:
  - Middle Fairings (see Middle Fairing Removal in the Frame chapter)
  - Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter)
  - Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
  - Radiator (see Radiator Removal in the Cooling System chapter)
  - Exhaust Pipe (see Exhaust Pipe Removal in the Engine Top End chapter)
  - Right Frame Cover (see Frame Cover Removal in the Frame chapter)
  - Shift Lever (see Shift Pedal Removal in the Crankshaft/Transmission chapter)
  - Engine Sprocket (see Engine Sprocket Removal in the Final Drive chapter)
  - Clutch Cable Ends (see Clutch Cable Removal in the Clutch chapter)
  - Air Switching Valve (see Air Switching Valve Removal in the Engine Top End chapter)
  - Gear Position Sensor (see Gear Position Sensor Removal in the Electrical System chapter)
- Disconnect:
  - Oil Pressure Switch Lead (see Oil Pressure Switch Removal in the Engine Lubrication System chapter)
  - Stick Coil Connectors (Stick Coil Removal in the Electrical System chapter)
  - Alternator Connector (see Alternator Cover Removal in the Electrical System chapter)
  - Crankshaft Sensor Connector (see Crankshaft Sensor 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:
  Fame Bracket Bolts [A] (Both Sides)
  Fame Bracket [B] (Both Sides)

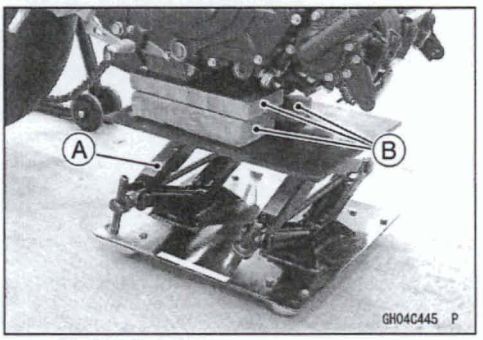


- Slide the cap [A] and disconnect the engine ground lead.

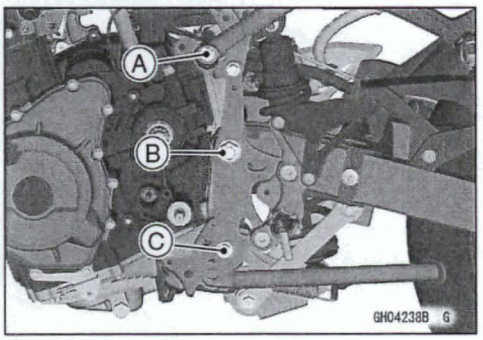


- Support the engine with a suitable stand [A].

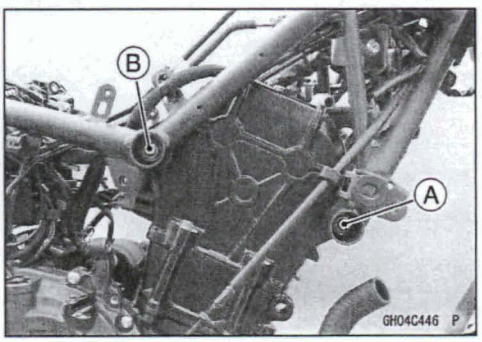
○Put planks [B] onto the stand for engine balance.



- Loosen:
  Swingarm Mounting Plate Bolt [A] and Nut
  Swingarm Pivot Shaft Nut [B]
  Lower Swingarm Side Bracket Bolt [C] (Both Sides)

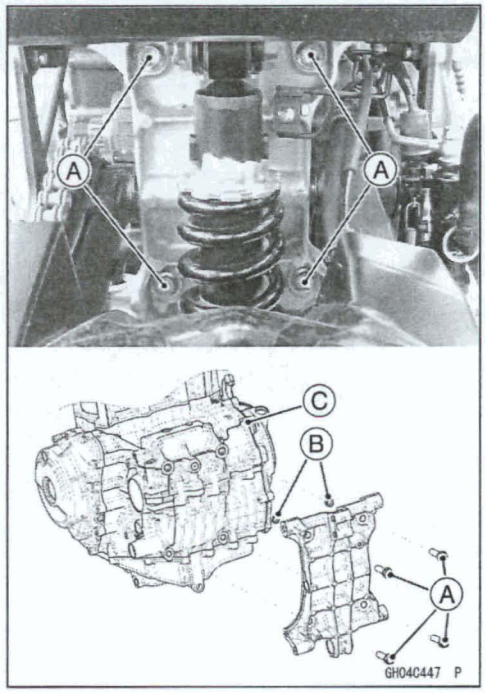


- Remove:
  Front Engine Mounting Bolt [A] (Both Sides)
  Middle Engine Mounting Bolt [B] (Both Sides)
  Collars (Left Side)



Engine Removal/Installation

- Remove:
  Rear Engine Mounting Bolts [A]
  Dowel Pins [B]
  Engine [C]



Engine Removal/Installation

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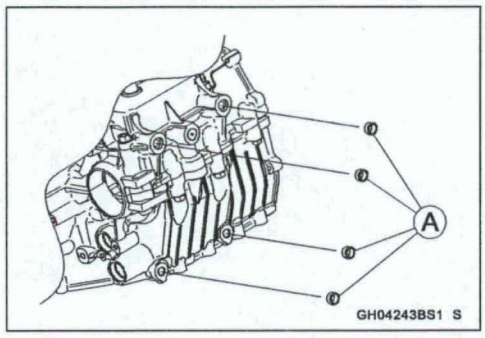
Engine Removal/Installation

Engine Installation

- Replace the swingarm mounting plate nut with a new one.
- Support the front and rear of the motorcycle with the stands.
- Support the engine with a suitable stand.

○Put planks onto the stand for engine balance.

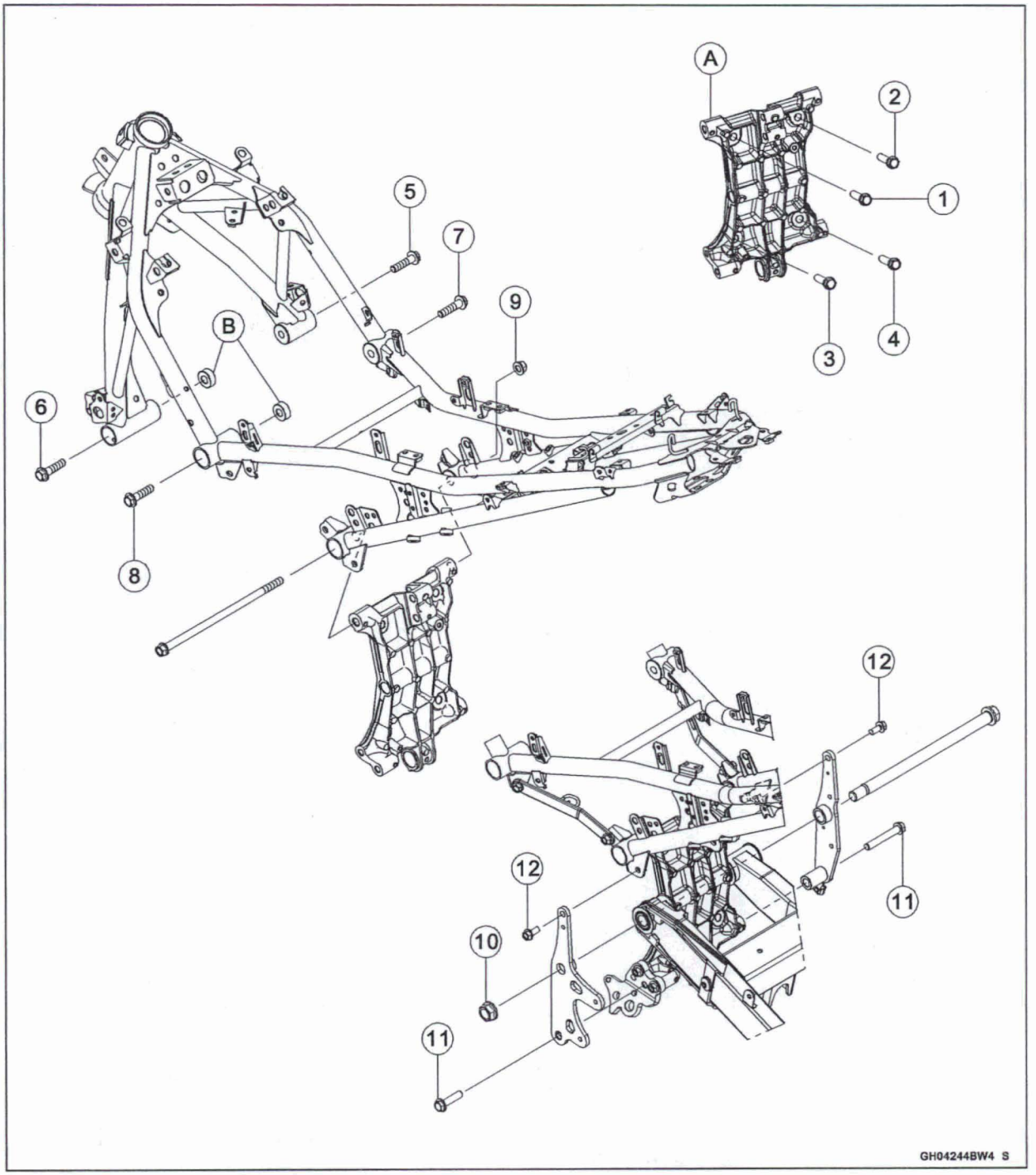
- Install the dowel pins [A].



- Install the engine to the swingarm mounting plate [A].
- Install all bolts and collars [B] and tighten them temporarily in the following order.
  Rear Engine Mounting Bolts
  Right Front Engine Mounting Bolt
  Left Front Engine Mounting Bolt
  Right Middle Engine Mounting Bolt
  Left Middle Engine Mounting Bolt
- Tighten the bolts and nuts to the specified torque in the specified sequence.

Torque - Rear Engine Mounting Bolts [1 ~ 4]: 44 N·m (4.5 kgf·m, 32 ft·lb)
Front Engine Mounting Bolts [5 ~ 6]: 44 N·m (4.5 kgf·m, 32 ft·lb)
Middle Engine Mounting Bolts [7 ~ 8]: 44 N·m (4.5 kgf·m, 32 ft·lb)
Swingarm Mounting Plate Nut [9]: 44 N·m (4.5 kgf·m, 32 ft·lb)
Swingarm Pivot Shaft Nut [10]: 108 N·m (11.0 kgf·m, 79.7 ft·lb)
Lower Swingarm Side Bracket Bolts [11]: 34 N·m (3.5 kgf·m, 25 ft·lb)
Upper Swingarm Side Bracket Bolts [12]: 20 N·m (2.0 kgf·m, 15 ft·lb)

Engine Removal/Installation



- Install the frame brackets and tighten the frame bracket bolts.

○Tighten the front side bolt first.

Torque - Frame Bracket Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)

- Run the leads, cables and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).
- Adjust:

  Throttle Cables (see Throttle Control System Inspection in the Periodic Maintenance chapter)

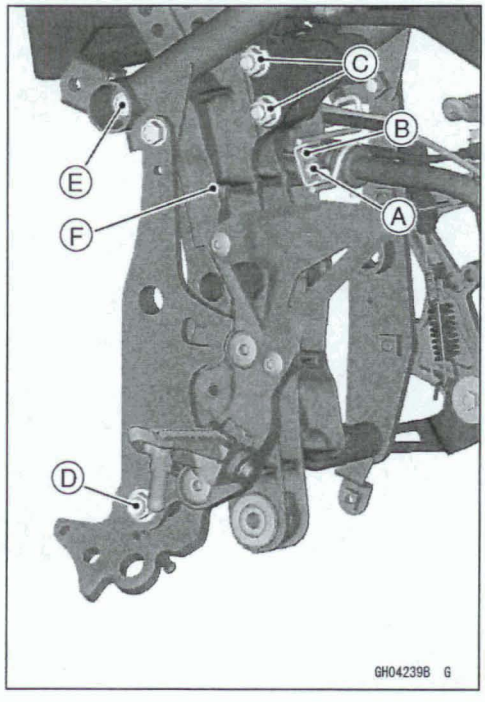
  Drive Chain (see Drive Chain Slack Inspection in the Periodic Maintenance chapter)
- Fill the engine with engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Fill the engine with coolant (see Coolant Change in the Periodic Maintenance chapter).

Engine Removal/Installation

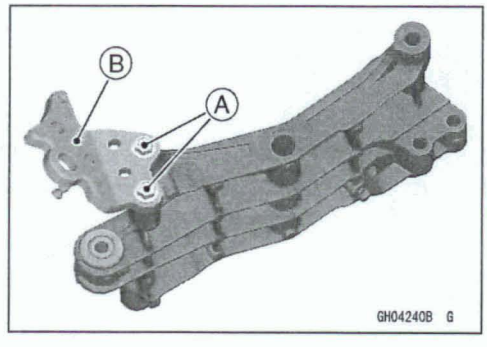
Swingarm Mounting Plate Removal

- Remove:
  Engine (see Engine Removal)
  Side Stand (see Side Stand Removal in the Frame chapter)
  Tie-Rod and Rocker Arm (see Tie-Rod Removal in the Suspension chapter)
  Swingarm (see Swingarm Removal in the Suspension chapter)

- Remove:
  Bolt [A] and Clamp [B]
  Rear Shock Absorber Bracket Bolts and Nuts [C]
  Lower Swingarm Side Bracket Bolt [D] (Both Sides)
  Swingarm Mounting Plate Bolt [E] and Nut
  Swingarm Mounting Plate [F]



- Remove:
  Side Stand Bracket Bolts [A]
  Side Stand Bracket [B]

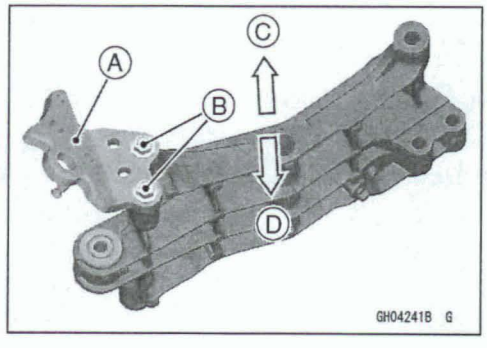


Swingarm Mounting Plate Installation

- Install:
  Side Stand Bracket [A]
- Tighten:

Torque - Side Stand Bracket Bolts [B]: 49 N·m (5.0 kgf·m, 36 ft·lb)

○Tighten the rear bolt first.
  Front [C]
  Rear [D]



- Install the swingarm mounting plate, and tighten its bolts and nuts temporarily.
- Install the swingarm (see Swingarm Installation in the Suspension chapter).

○Tighten the swingarm pivot shaft nut temporarily.

- Install the removed parts (see appropriate chapters).

Crankshaft/Transmission

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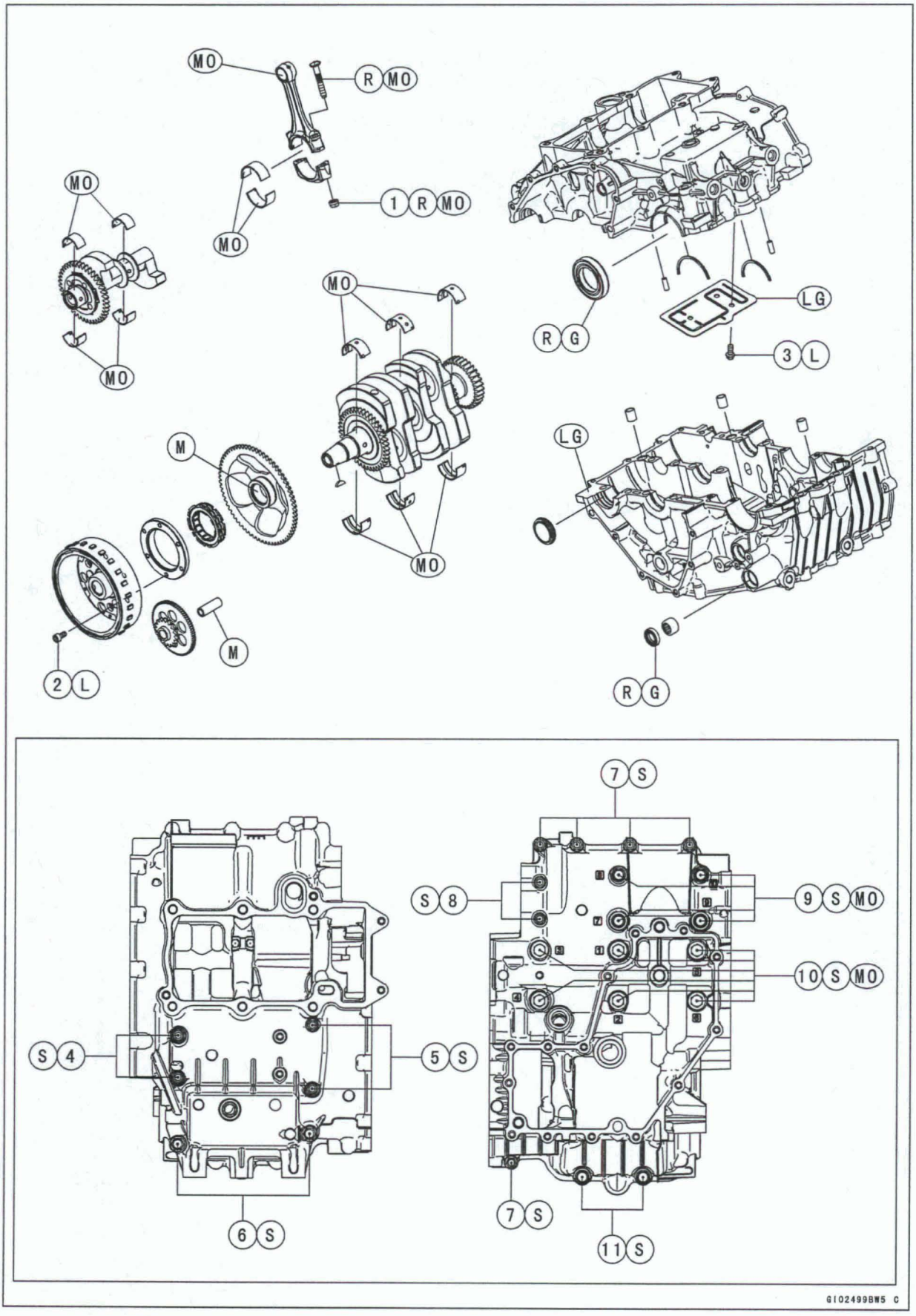
Exploded View

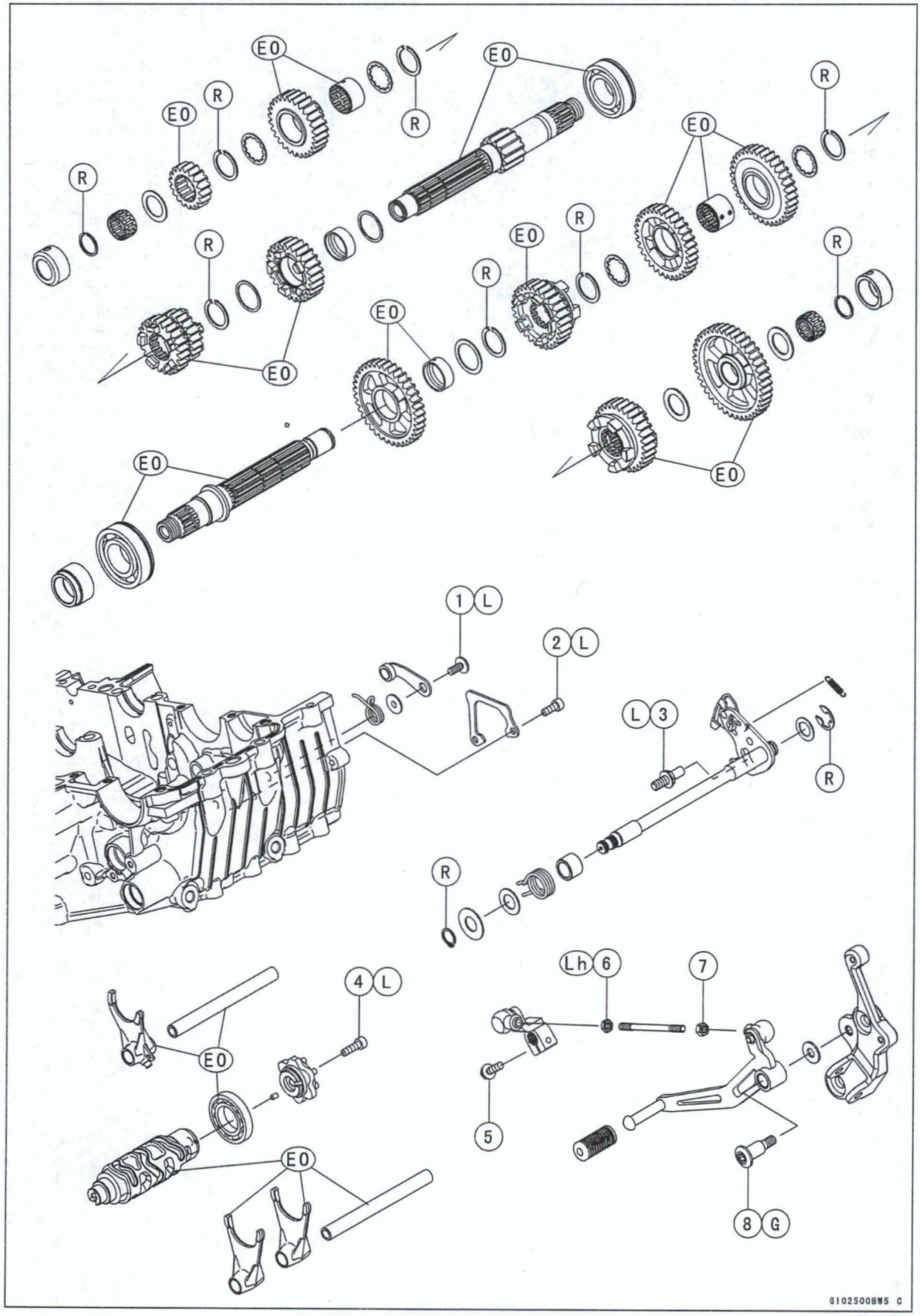


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Connecting Rod Nuts	see the text	–	–	MO, R
2	Starter Motor Clutch Bolts	12	1.2	106 in·lb	L
3	Breather Plate Bolts	9.8	1.0	87 in·lb	L
4	Crankcase Bolts (M6, L = 52 mm)	11	1.1	97 in·lb	S
5	Crankcase Bolts (M6, L = 72 mm)	11	1.1	97 in·lb	S
6	Crankcase Bolts (M8, L = 80 mm)	27.5	2.80	20.3	S
7	Crankcase Bolts (M6, L = 30 mm)	11	1.1	97 in·lb	S
8	Crankcase Bolts (M6, L = 76 mm)	11	1.1	97 in·lb	S
9	Crankcase Bolts (M8, L = 70 mm)	see the text	–	–	MO, S
10	Crankcase Bolts (M9)	see the text	–	–	MO, S
11	Crankcase Bolts (M8, L = 40 mm)	27.5	2.80	20.3	S

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

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Gear Positioning Lever Bolt	9.8	1.0	87 in·lb	L
2	Shift Drum Bearing Holder Bolts	9.8	1.0	87 in·lb	L
3	Shift Shaft Return Spring Pin	29	3.0	21	L
4	Shift Drum Cam Bolt	12	1.2	106 in·lb	L
5	Shift Lever Clamp Bolt	12	1.2	106 in·lb	
6	Tie-Rod Locknut (Front)	7.0	0.71	62 in·lb	Lh
7	Tie-Rod Locknut (Rear)	7.0	0.71	62 in·lb	
8	Shift Pedal Mounting Bolt	25	2.5	18	G

EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
Lh: Left-hand Threads
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 (0.02 in.)
Connecting Rod Big End Bearing Insert/Crankpin Clearance	0.041 ~ 0.074 mm (0.0016 ~ 0.0029 in.)	0.11 mm (0.0043 in.)
Crankpin Diameter:	34.984 ~ 35.000 mm (1.3773 ~ 1.3780 in.)	34.97 mm (1.377 in.)
Marking:		
None	34.984 ~ 34.992 mm (1.3773 ~ 1.3776 in.)	– – –
○	34.993 ~ 35.000 mm (1.3777 ~ 1.3780 in.)	– – –
Connecting Rod Big End Inside Diameter:	38.000 ~ 38.016 mm (1.4961 ~ 1.4967 in.)	– – –
Marking:		
None	38.000 ~ 38.008 mm (1.4961 ~ 1.49637 in.)	– – –
○	38.009 ~ 38.016 mm (1.49641 ~ 1.4967 in.)	– – –
Connecting Rod Big End Bearing Insert Thickness:		
Brown	1.480 ~ 1.485 mm (0.05827 ~ 0.05846 in.)	– – –
Black	1.485 ~ 1.490 mm (0.05846 ~ 0.05866 in.)	– – –
Blue	1.489 ~ 1.494 mm (0.05862 ~ 0.05882 in.)	– – –
Connecting Rod Bolt Stretch	(Usable Range) 0.28 ~ 0.38 mm (0.011 ~ 0.015 in.)	– – –
Crankshaft Side Clearance	0.05 ~ 0.20 mm (0.0020 ~ 0.0079 in.)	0.40 mm (0.016 in.)
Crankshaft Runout	TIR 0.02 mm (0.0008 in.) or less	TIR 0.05 mm (0.0020 in.)
Crankshaft Main Bearing Insert/Journal Clearance	0.028 ~ 0.059 mm (0.0011 ~ 0.0023 in.)	0.09 mm (0.0035 in.)
Crankshaft Main Journal Diameter:	32.984 ~ 33.000 mm (1.2986 ~ 1.2992 in.)	32.96 mm (1.298 in.)
Marking:		
None	32.984 ~ 32.992 mm (1.2986 ~ 1.29890 in.)	– – –
1	32.993 ~ 33.000 mm (1.29893 ~ 1.2992 in.)	– – –

Specifications

Item	Standard	Service Limit
Crankcase Main Bearing Inside Diameter:	36.000 ~ 36.016 mm (1.4173 ~ 1.4179 in.)	– – –
Marking:		
○	36.000 ~ 36.008 mm (1.4173 ~ 1.4176 in.)	– – –
None	36.009 ~ 36.016 mm (1.4177 ~ 1.4179 in.)	– – –
Crankshaft Main Bearing Insert Thickness:		
Brown	1.490 ~ 1.494 mm (0.05866 ~ 0.05882 in.)	– – –
Black	1.494 ~ 1.498 mm (0.05882 ~ 0.05898 in.)	– – –
Blue	1.498 ~ 1.502 mm (0.05898 ~ 0.05913 in.)	– – –
Balancer		
Balancer Shaft Bearing Insert/Journal Clearance	0.024 ~ 0.048 mm (0.0009 ~ 0.0019 in.)	0.08 mm (0.0031 in.)
Balancer Shaft Journal Diameter:	25.984 ~ 26.000 mm (1.0230 ~ 1.0236 in.)	25.96 mm (1.022 in.)
Marking:		
None	25.984 ~ 25.992 mm (1.0230 ~ 1.02331 in.)	– – –
○	25.993 ~ 26.000 mm (1.02334 ~ 1.0236 in.)	– – –
Balancer Shaft Bearing Inside Diameter:	29.000 ~ 29.016 mm (1.1417 ~ 1.1424 in.)	– – –
Marking:		
○	29.000 ~ 29.008 mm (1.1417 ~ 1.1420 in.)	– – –
None	29.009 ~ 29.016 mm (1.1421 ~ 1.1424 in.)	– – –
Balancer Shaft Bearing Insert Thickness:		
Brown	1.495 ~ 1.499 mm (0.05886 ~ 0.05902 in.)	– – –
Black	1.499 ~ 1.503 mm (0.05902 ~ 0.05917 in.)	– – –
Blue	1.503 ~ 1.507 mm (0.05917 ~ 0.05933 in.)	– – –
Transmission		
Shift Fork Ear Thickness	4.9 ~ 5.0 mm (0.19 ~ 0.20 in.)	4.8 mm (0.19 in.)
Gear Groove Width	5.05 ~ 5.15 mm (0.199 ~ 0.203 in.)	5.3 mm (0.21 in.)
Shift Fork Guide Pin Diameter	5.9 ~ 6.0 mm (0.23 ~ 0.24 in.)	5.8 mm (0.23 in.)
Shift Drum Groove Width	6.05 ~ 6.20 mm (0.238 ~ 0.244 in.)	6.3 mm (0.25 in.)

Specifications

Connecting Rod Big End Bearing Insert Selection

Con-rod Big End Inside Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Size Color	Part Number
None	○	Brown	92139-0888
None	None	Black	92139-0887
○	○		
○	None	Blue	92139-0886

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	92139-1868	1, 3
			92139-0882	2
None	1	Black	92139-1867	1, 3
○	None		92139-0881	2
None	None	Blue	92139-1866	1, 3
			92139-0880	2

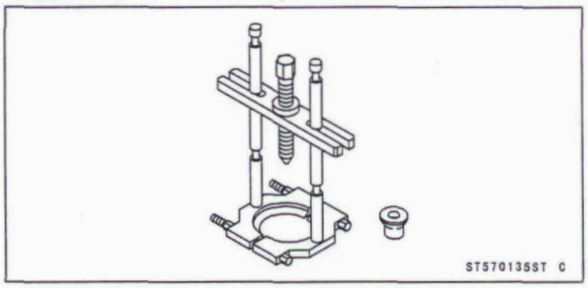
*: The bearing insert for Nos. 2 journal have an oil groove.

Balancer Shaft Bearing Insert Selection

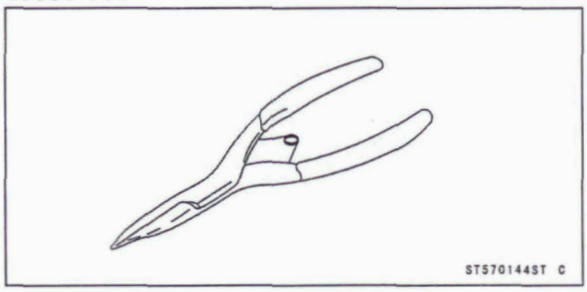
Balancer Shaft Journal Diameter Marking	Balancer Shaft Bearing Inside Diameter Marking	Bearing Insert	
		Size Color	Part Number
○	○	Brown	92028-0885
○	None	Black	92028-0884
None	○		
None	None	Blue	92028-0883

Special Tools and Sealant

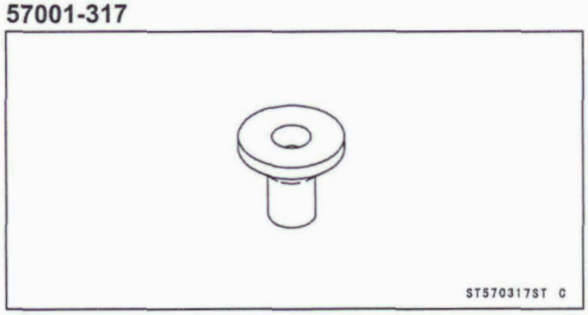
Bearing Puller:
57001-135



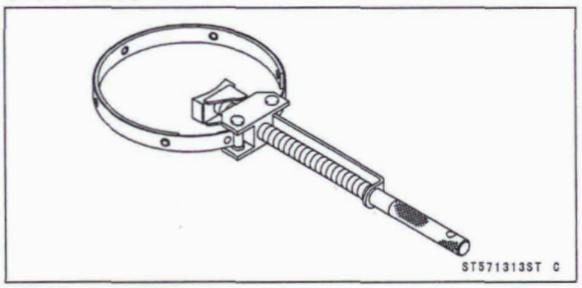
Outside Circlip Pliers:
57001-144



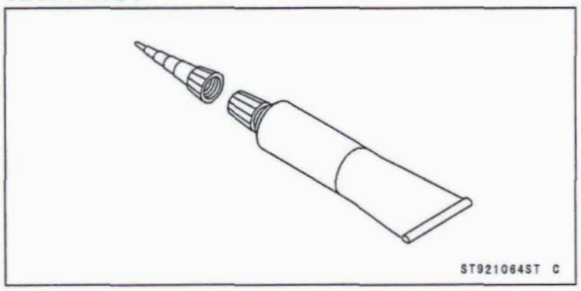
Bearing Puller Adapter:
57001-317



Flywheel Holder:
57001-1313



Liquid Gasket, TB1216B:
92104-1064



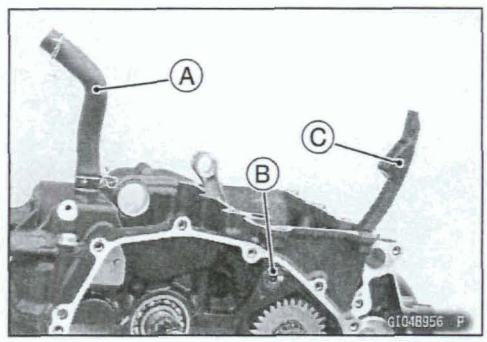
Crankcase

Crankcase Splitting

- Remove the engine (see Engine Removal in the Engine Removal/Installation chapter).
- Set the engine on a clean surface and hold the engine steady while parts are being removed.
- Remove:
  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)
  Oil Pump (see Oil Pump Removal in the Engine Lubrication System chapter)
  Starter Motor (see Starter Motor Removal in the Electrical System chapter)
  Alternator Rotor (see Alternator Rotor Removal in the Electrical System chapter)
  Water Pump (see Water Pump Removal in the Cooling System chapter)
  Oil Filter (see Oil Filter Replacement in the Periodic Maintenance chapter)
  Oil Pressure Switch (see Oil Pressure Switch Removal in the Engine Lubrication System chapter)
  Camshaft Chain (see Camshaft Chain Removal in the Engine Top End chapter)
  Oil Pan (see Oil Pan Removal in the Engine Lubrication System chapter)
  Oil Screen (see Oil Pan Removal in the Engine Lubrication System chapter)
  Oil Pressure Relief Valve (see Oil Pressure Relief Valve Removal in the Engine Lubrication System chapter)

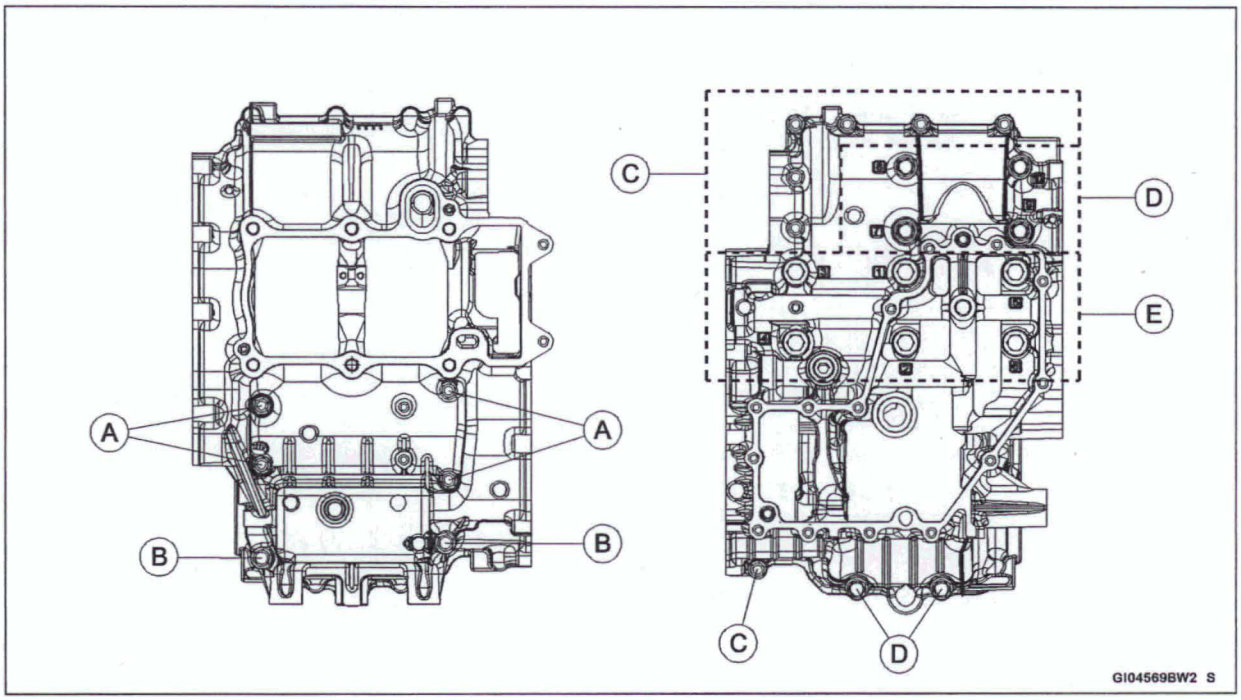
★If the crankshaft is to be removed, remove the pistons (see Piston Removal in the Engine Top End chapter).

- Remove:
  Breather Hose [A]
  Rear Camshaft Chain Guide Bolt [B] and Washer
  Rear Camshaft Chain Guide [C]



Crankcase

- Remove the upper crankcase bolts in order from the small bolts.
  M6 Bolts [A]
  M8 Bolts [B]
- Remove the lower crankcase bolts in order from the small bolts.
  M6 Bolts [C]
  M8 Bolts [D]
  M9 Bolts [E]

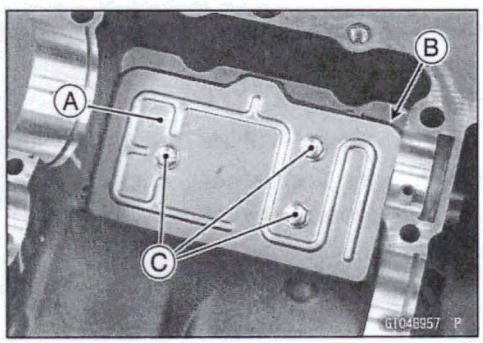


- Tap lightly around the crankcase mating surface with a plastic mallet, and split the crankcase.

○Take care not to damage the crankcase.

★If the breather plate [A] is to be removed, follow the next procedure.

- Remove:
  Transmission Shafts (see Transmission Shaft Removal)
  Oil Pipe (see Oil Pipe Removal in the Engine Lubrication System chapter)
- Cut the gasket [B] around the plate.
- Remove:
  Breather Plate Bolts [C]
  Breather Plate



Crankcase

Crankcase Assembly

NOTICE

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

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

⚠ WARNING

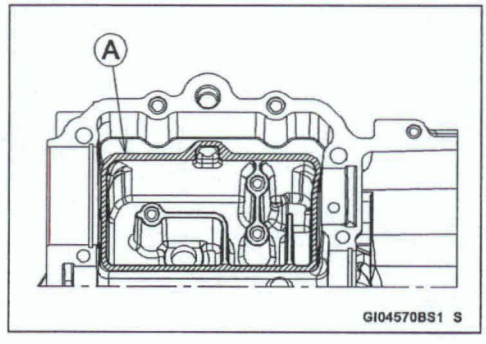
Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the crankcase in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the crankcase.

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

Upper Crankcase Assembly

- Using a high flash-point solvent, clean off any oil or dirt on the mating surface of the breather plate.
- Apply liquid gasket to the mating surface [A] of the breather plate as shown.

Sealant - Liquid Gasket, TB1216B: 92104-1064



NOTE

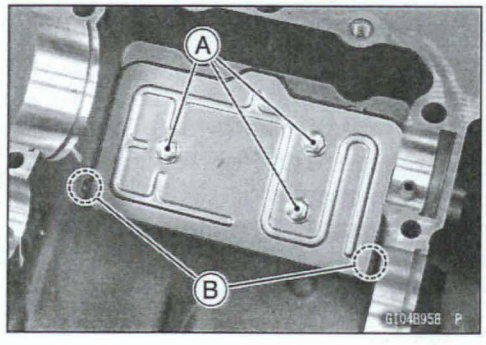
○*Make the application finish within 20 minutes when the liquid gasket (TB1216B) to the mating surface of the breather plate is applied.*

○*Moreover fit the plate and tighten the bolts just after application of the liquid gasket.*

- Apply a non-permanent locking agent to the breather plate bolts [A].
- Tighten:

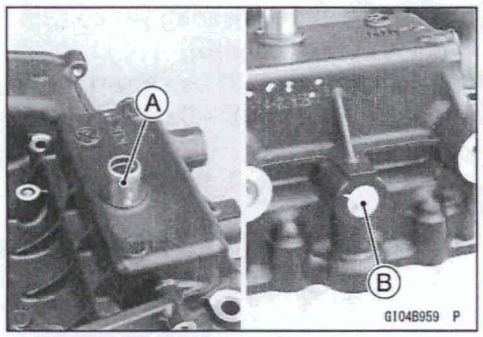
Torque - Breather Plate Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- After tightening the bolts, wipe the excess gasket from the oil pipe mounting holes [B].



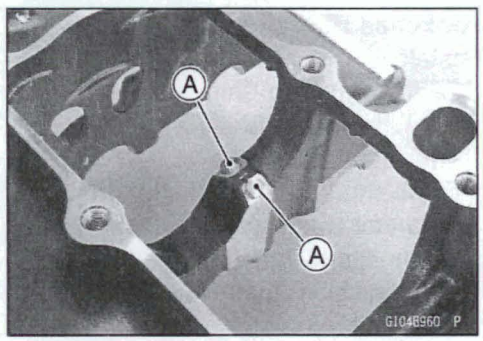
Crankcase

- Install the breather hose fitting [A] until it is bottomed.
- Install the plug [B] so that its surface is flush with the end of the hole.



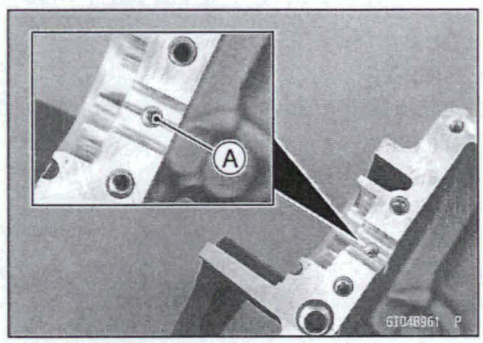
- Tighten:

Torque - Oil Nozzles [A]: 3.0 N·m (0.31 kgf·m, 27 in·lb)



- Tighten:

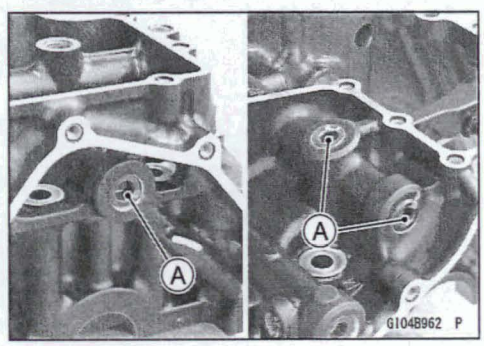
Torque - Oil Passage Nozzle (M5) [A]: 3.0 N·m (0.31 kgf·m, 27 in·lb)



Lower Crankcase Assembly

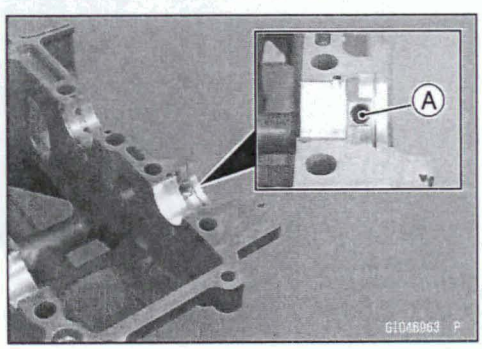
- Apply a non-permanent locking agent to the oil passage plugs [A].
- Tighten:

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



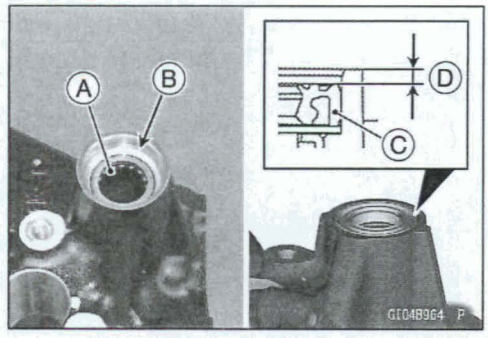
- Tighten:

Torque - Oil Passage Nozzle (M8) [A]: 5.0 N·m (0.51 kgf·m, 44 in·lb)



Crankcase

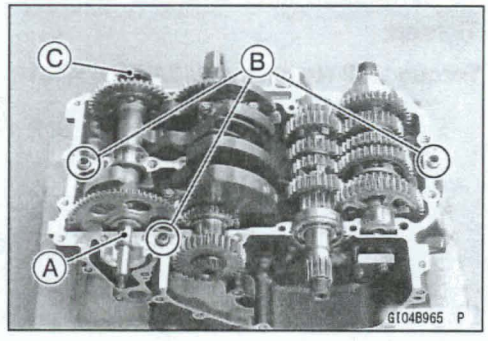
- Install the needle bearing [A] so that its surface is flush with the end of hole [B].
- Install the oil seal [C] as shown.
  0.5 ~ 1.0 mm (0.02 ~ 0.04 in.) [D]



Crankcase Halves Assembly

- Install:
  Shift Drum (see Shift Drum and Fork Installation)
  Shift Forks and Shift Rods (see Shift Drum and Fork Installation)
  Crankshaft (see Crankshaft Installation)
  Balancer Shaft (see Balancer Installation)
  Connecting Rods (see Connecting Rod Installation)
  Transmission Shafts and Gears (see Transmission Shaft Installation)
  Water Pump Drive Shaft [A]
  Dowel Pins [B]
  Cap [C]
- Before fitting the lower case on the upper case, check the following.

○Check to see that the shift drum and transmission gears are in the neutral position.



Crankcase

- Apply liquid gasket [A] to the mating surface of the lower crankcase half as shown.

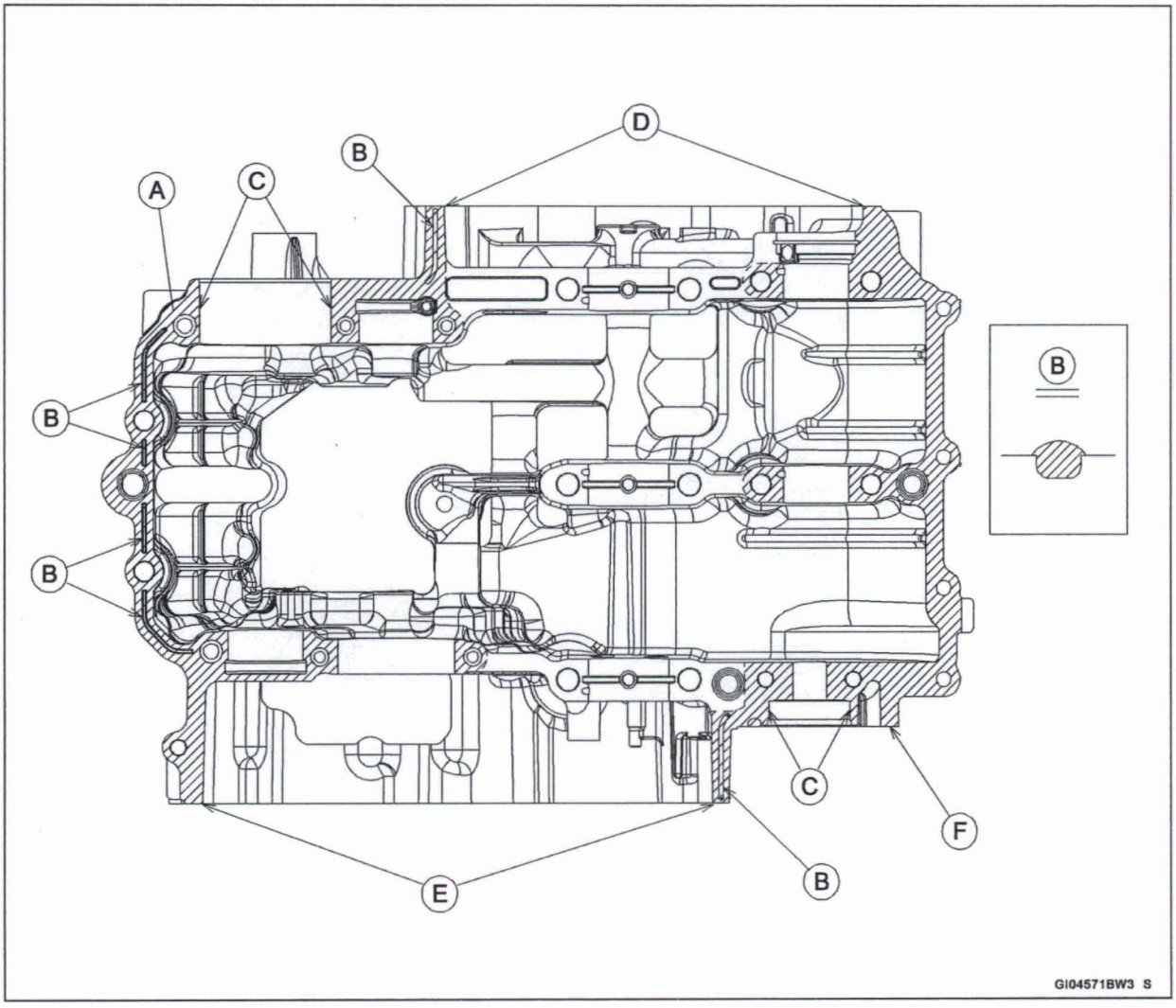
Sealant - Liquid Gasket, TB1216B: 92104-1064

NOTE

○Especially, apply liquid gasket so that it shall be filled up on the grooves [B].
○Make the application finish within 20 minutes when the liquid gasket (TB1216B) 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.

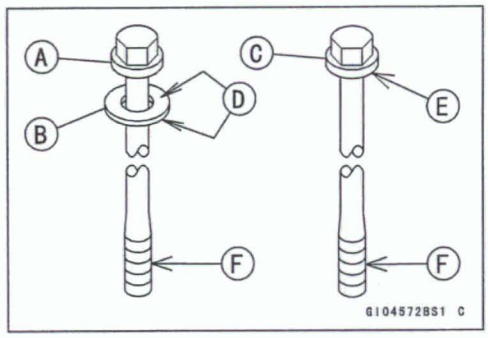
NOTICE
Do not apply liquid gasket around the crankshaft main bearing inserts, and oil passage holes.

- Fit the lower crankcase to the upper crankcase.
- Wipe off excess liquid gasket from the following portions.
  Inside Diameter Surfaces [C]
  Alternator Cover Mating Surface [D]
  Clutch Cover Mating Surface [E]
  Water Pump Housing Mating Surface [F]



Crankcase

- The M9 bolt [A] has a copper plated washer [B], replace them with new ones.
  M6 and M8 Bolts [C]
- Apply molybdenum disulfide oil solution to the following portions of M9 and M8 bolts.
  Both Sides of Washer [D]
  Seating Surface [E]
  Threads [F]



- Firstly, tighten the M9 and M8 bolts temporarily following the specified sequence [1 ~ 10].
- Secondly, tighten the M9 and M8 bolts following the specified sequence [1 ~ 10].

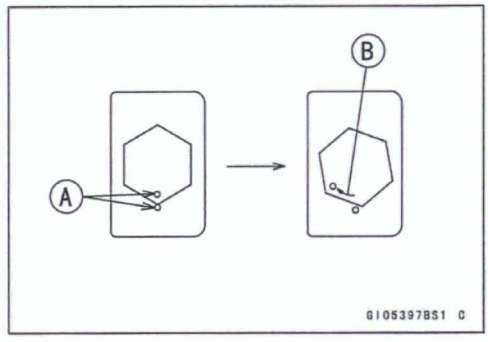
Torque - Crankcase Bolts (M9): 10 N·m (1.0 kgf·m, 89 in·lb)
Crankcase Bolts (M8, L = 70 mm): 10 N·m (1.0 kgf·m, 89 in·lb)

- Thirdly, tighten the M9 bolts following the specified sequence [1 ~ 6].

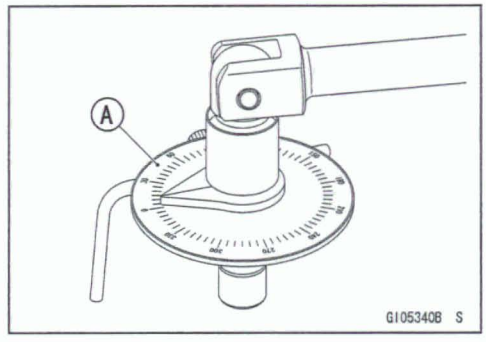
Torque - Crankcase Bolts (M9): 30 N·m (3.1 kgf·m, 22 ft·lb)

- Fourthly, tighten the M9 bolts **50° ±2°** .

○Mark [A] the crankcase and M9 bolts so that bolts can be turned 50° [B] properly.



○The bolts can be tightened by using a torque angle gauge [A].



Crankcase

- Fifthly, tighten the M8 bolts following the specified sequence [7 ~ 10].

Torque - Crankcase Bolts (M8, L = 70 mm): 27 N·m (2.8 kgf·m, 20 ft·lb)

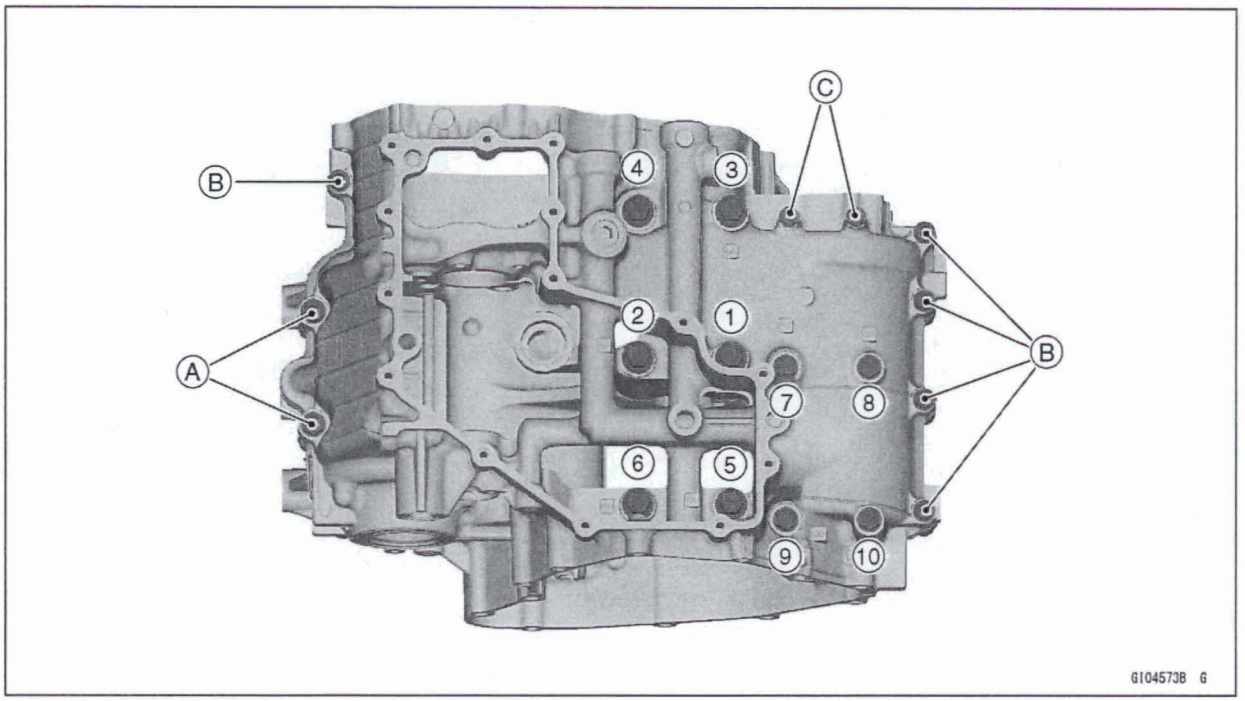
- Sixthly, tighten the M8 bolts [A].

Torque - Crankcase Bolts (M8, L = 40 mm): 27.5 N·m (2.80 kgf·m, 20.3 ft·lb)

- Finally, tighten the M6 bolts.

Torque - Crankcase Bolts (M6): 11 N·m (1.1 kgf·m, 97 in·lb)

L = 30 mm (1.2 in.) [B]
L = 76 mm (3.0 in.) [C]



Crankcase

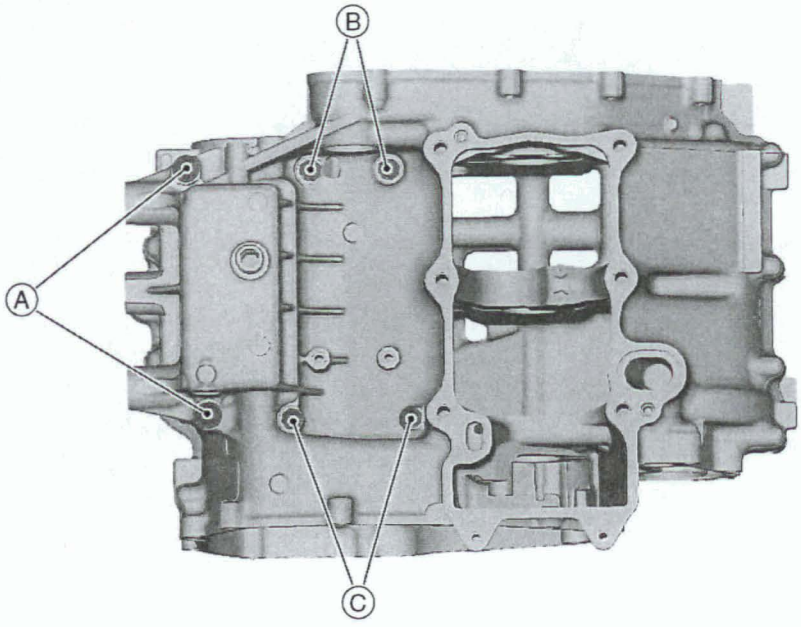
- Tighten:

Torque - Crankcase Bolts (M8, L = 80 mm) [A]: 27.5 N·m (2.80 kgf·m, 20.3 ft·lb)

- Tighten:

Torque - Crankcase Bolts (M6): 11 N·m (1.1 kgf·m, 97 in·lb)

L = 72 mm (2.8 in.) [B]
L = 52 mm (2.0 in.) [C]



G1045748 G

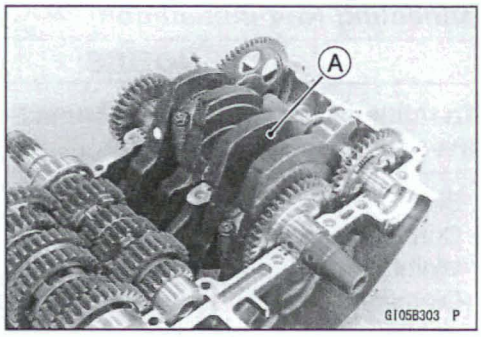
- After tightening all crankcase bolts, check the following.

○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



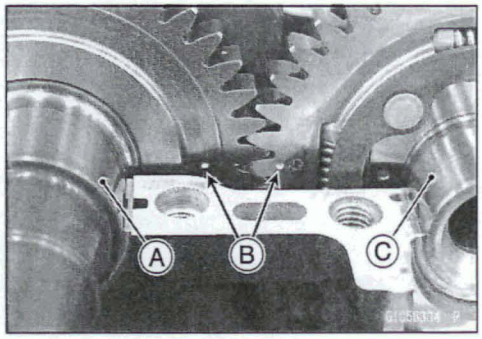
- Split the crankcase (see Crankcase Splitting).
- Remove:
  Crankshaft [A]

Crankshaft Installation

NOTE

○*If the crankshaft is replaced with a new one, refer to the Connecting Rod Big End Bearing Insert Selection in the Specifications.*

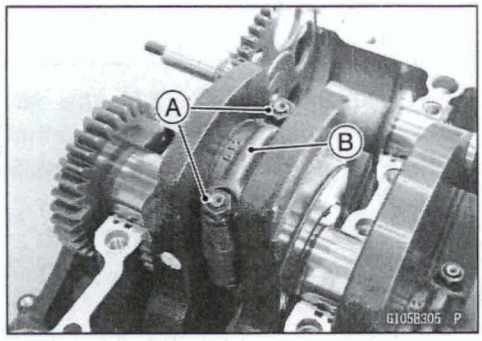
NOTICE
If the crankshaft, bearing inserts, or crankcase halves are replaced with new ones, select the bearing inserts and check clearance with a plastigage (press gauge) before assembling engine to be sure the correct bearing inserts are installed.



- Apply molybdenum disulfide oil solution to the crankshaft main bearing inserts.
- Install the crankshaft [A].

○Align the timing marks [B].
  Balancer [C]

Connecting Rod Removal



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

NOTE

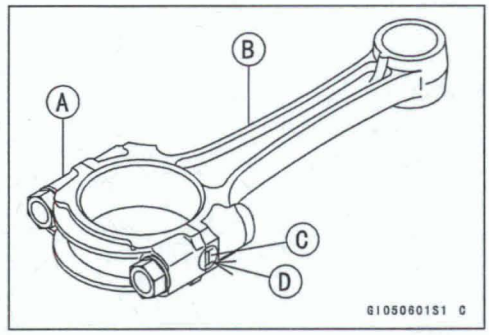
○*Mark and record the locations of the connecting rods and their big end caps [B] so that they can be reassembled in their original positions.*

- 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 (Around Weight Mark) [D]: "○" or no mark

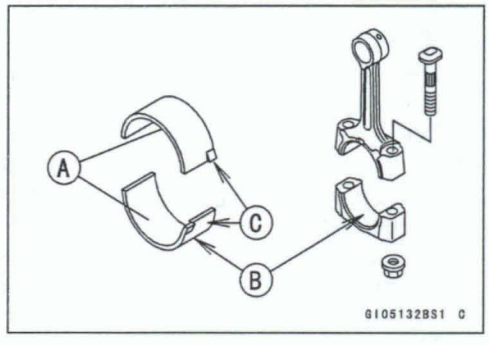
NOTICE

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.

NOTICE

The connecting rod bolts are designed to stretch when tightened. Never reuse them.

- Replace the connecting rod big end bolts and nuts with new ones.



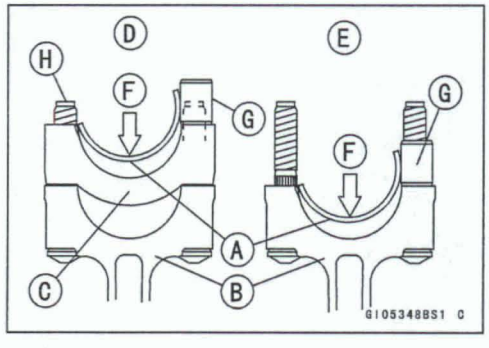
- Apply molybdenum disulfide oil solution to the inner surfaces of upper and lower bearing inserts [A].

○Do not apply any grease or oil to the cap inside and cap insert outside [B].

○Install the inserts so that their nails [C] 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]

- Install the cap on the connecting rod, aligning the weight and diameter marks.
- Remove debris and clean the surface of inserts.

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

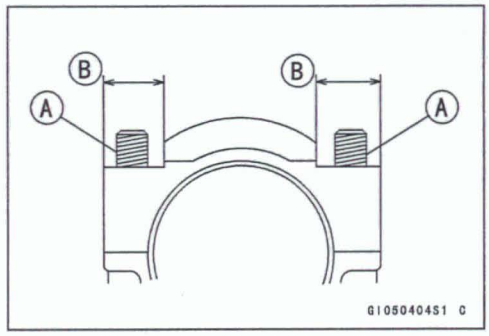
Immediately dry the bolts and nuts with compressed air after cleaning. Clean and dry the bolts and nuts completely.

Crankshaft and Connecting Rods

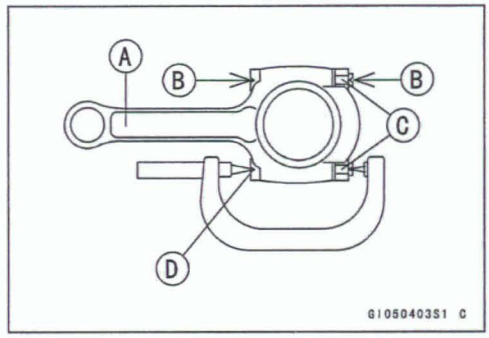
- Install new bolts and nuts in reused connecting rod.

★If the connecting rod assy was replaced, use the new 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 Nuts and Bolts
  Seating Surfaces [B] of Nuts and Connecting Rods



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



Bolt Length after tightening − Bolt Length before tightening = Bolt Stretch

Connecting Rod Bolt Stretch
Usable Range: 0.28 ~ 0.38 mm (0.011 ~ 0.015 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

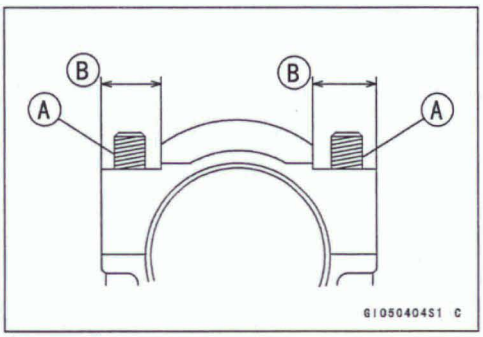
- Install new bolts and nuts in reused connecting rod.

★If the connecting rod assy was replaced, use the new bolts and nuts attached to the new connecting rod assy.

- Apply a small amount of molybdenum disulfide oil solution to the following portions.

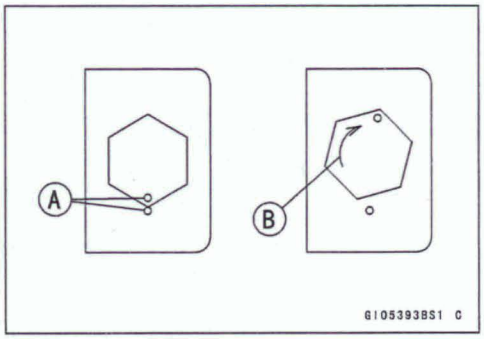
  Threads [A] of Nuts and Bolts

  Seating Surfaces [B] of Nuts and Connecting Rods



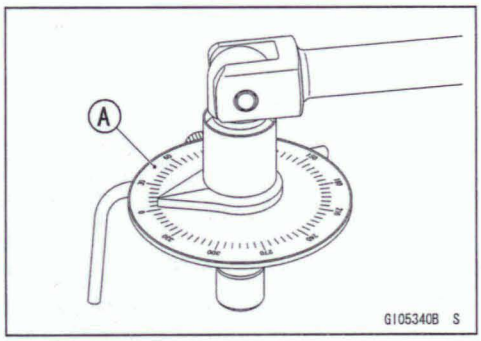
- First, tighten the nuts with **12.0 N·m (1.22 kgf·m, 106 in·lb)** of torque.
- Next, tighten the nuts **195°**.

○Mark [A] the connecting rod big end caps and nuts so that nuts can be turned 195° [B] properly.



Connecting Rod Assy	Bolt	Nut	Torque + Angle N·m (kgf·m, in·lb)
New	Attached to new con-rod	Attached to new con-rod	12.0 (1.22, 106) + 195°
	New	New	
Used	Replace the bolts with new ones	Replace the nuts with new ones	12.0 (1.22, 106) + 195°

○The nuts can be tightened by using a torque angle gauge [A].

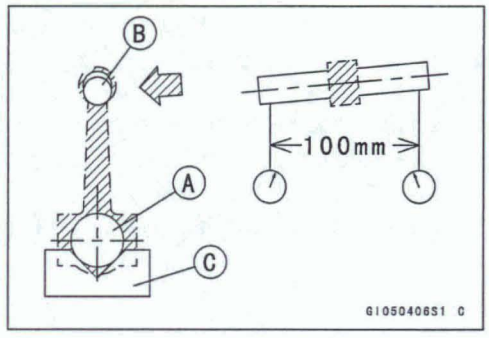


Crankshaft/Connecting Rod Cleaning

- 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

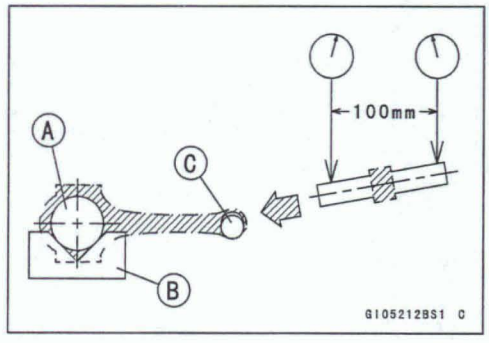


- Remove the connecting rod big end bearing inserts, and reinstall the connecting rod big end cap.
- Select an arbor [A] of the same diameter as the connecting rod big end, and insert the arbor through the connecting rod big end.
- Select an arbor of the same diameter as the piston pin and at least 100 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

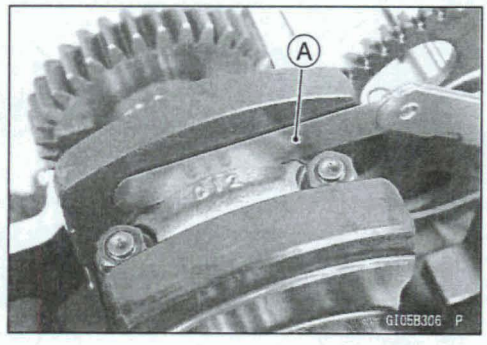


- With the big-end arbor [A] still on V block [B], hold the connecting rod horizontally and measure the amount that the arbor [C] varies from being paralleled with the surface plate over a 100 mm (3.94 in.) length of the arbor to determine the amount of connecting rod twist.

★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 the connecting rod big end side clearance.

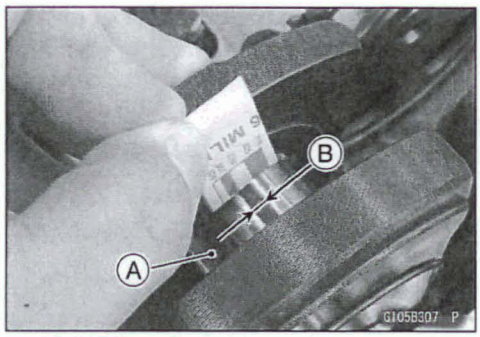
○Insert a thickness gauge [A] between the big end and either crank web to determine clearance.

Connecting Rod Big End Side Clearance
Standard: 0.13 ~ 0.38 mm (0.0051 ~ 0.0150 in.)
Service Limit: 0.6 mm (0.02 in.)

★If the clearance exceeds the service limit, replace the connecting rod with new one and then check the 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



- Measure the bearing insert/crankpin [A] clearance with plastigage [B].
- Tighten the big end nuts to the specified torque (see Connecting Rod Installation).

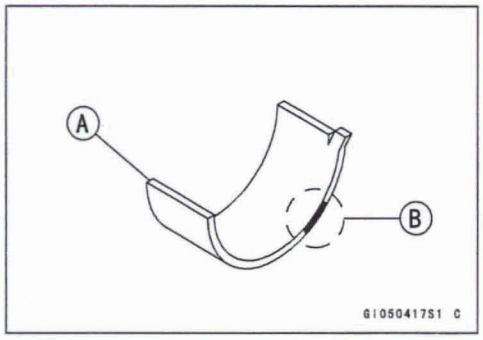
NOTE

○*Do not move the connecting rod and crankshaft during clearance measurement.*

Connecting Rod Big End Bearing Insert/Crankpin Clearance

Standard: 0.041 ~ 0.074 mm (0.0016 ~ 0.0029 in.)

Service Limit: 0.11 mm (0.0043 in.)



★If the clearance is within the standard, no bearing replacement is required.

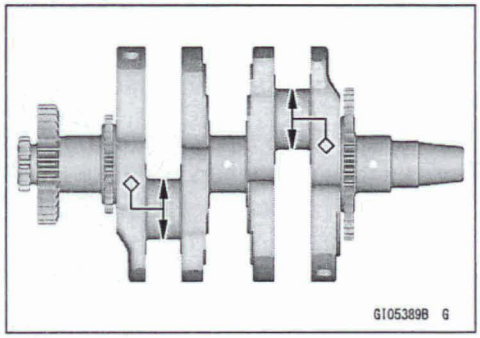
★If the clearance is between 0.059 mm (0.0023 in.) and the service limit 0.10 mm (0.0039 in.), replace the bearing inserts [A] with inserts painted blue [B]. Check the insert/crankpin clearance with the plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.

★If the clearance exceeds the service limit, measure the diameter of the crankpins.

Crankpin Diameter

Standard: 34.984 ~ 35.000 mm (1.3773 ~ 1.3780 in.)

Service Limit: 34.97 mm (1.377 in.)



★If any crankpin has worn past the service limit, replace the crankshaft with a new one.

★If the measured crankpin diameters are not less than the service limit, but do not coincide with the original diameter markings on the crankshaft, make new marks on it.

Crankpin Diameter Marks

None: 34.984 ~ 34.992 mm (1.3773 ~ 1.3776 in.)

○: 34.993 ~ 35.000 mm (1.3777 ~ 1.3780 in.)

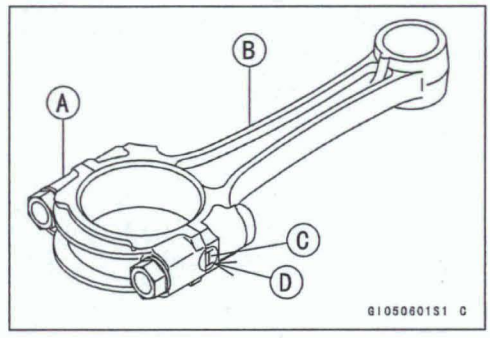
◊: Crankpin Diameter Marks, "○" or no mark.

Crankshaft and Connecting Rods

- Measure the connecting rod big end inside diameter, and mark each connecting rod big end in accordance with the inside diameter.
- Tighten the connecting rod big end nuts to the specified torque (see Connecting Rod Installation).

NOTE

○*The mark already on the big end should almost coincide with the measurement.*



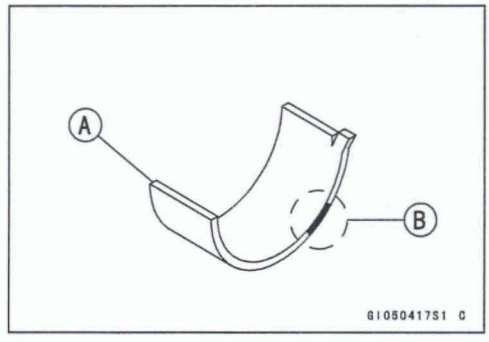
Connecting Rod Big End Inside Diameter Marks

None: 38.000 ~ 38.008 mm (1.4961 ~ 1.49637 in.)

○: 38.009 ~ 38.016 mm (1.49641 ~ 1.4967 in.)

Big End Cap [A]
Connecting Rod [B]
Weight Mark, Alphabet [C]
Diameter Mark (Around Weight Mark) [D]: "○" or no mark

- Select the proper bearing insert [A] in accordance with the combination of the connecting rod and crankshaft coding.
  Size Color [B]



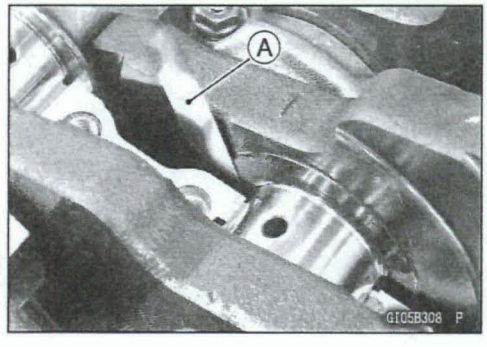
Con-rod Big End Inside Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Size Color	Part Number
None	○	Brown	92139-0888
None	None	Black	92139-0887
○	○		
○	None	Blue	92139-0886

- 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 No. 2 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.*

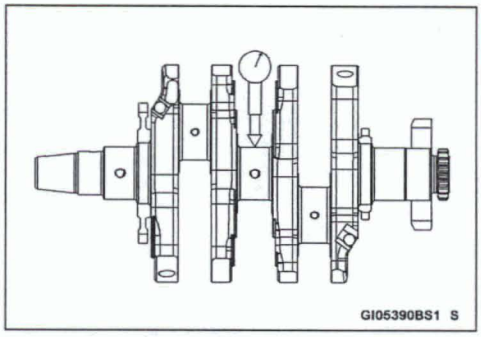
Crankshaft Side Clearance

Standard: 0.05 ~ 0.20 mm (0.0020 ~ 0.0079 in.)

Service Limit: 0.40 mm (0.016 in.)

Crankshaft and Connecting Rods

Crankshaft Runout Inspection



- Measure the crankshaft runout.

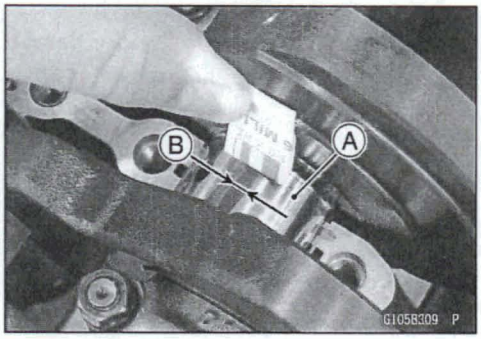
★If the measurement exceeds the service limit, replace the crankshaft.

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



- Using a plastigage (press gauge) [A], measure the bearing insert/journal [B] clearance.

NOTE

○*Tighten the crankcase bolts to the specified torque (see Crankcase Assembly).*

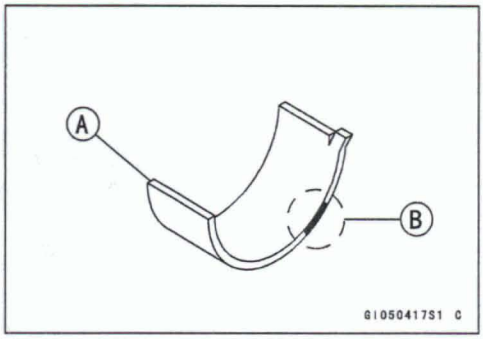
○*Do not turn the crankshaft during clearance measurement.*

○*Journal clearance less than 0.025 mm (0.00098 in.) can not be measured by plastigage, however, using genuine parts maintains the minimum standard clearance.*

Crankshaft Main Bearing Insert/Journal Clearance

Standard: 0.028 ~ 0.059 mm (0.0011 ~ 0.0023 in.)

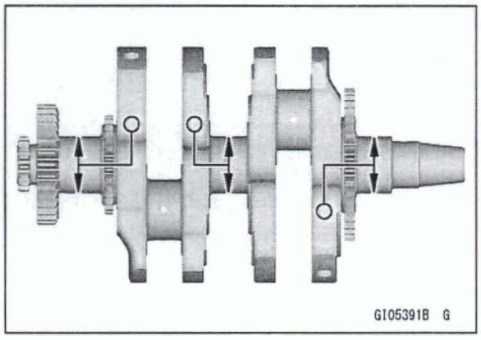
Service Limit: 0.09 mm (0.0035 in.)



★If the clearance is within the standard, no bearing replacement is required.

★If the clearance is between 0.059 mm (0.0023 in.) and the service limit 0.09 mm (0.0035 in.), replace the bearing inserts [A] with inserts painted yellow [B]. Check insert/journal clearance with the plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.

★If the clearance exceeds the service limit, measure the diameter of the crankshaft main journal.



Crankshaft Main Journal Diameter

Standard: 32.984 ~ 33.000 mm (1.2986 ~ 1.2992 in.)

Service Limit: 32.96 mm (1.298 in.)

★If any journal has worn past the service limit, replace the crankshaft with a new one.

★If the measured journal diameters are not less than the service limit, but do not coincide with the original diameter markings on the crankshaft, make new marks on it.

Crankshaft Main Journal Diameter Marks

None: 32.984 ~ 32.992 mm (1.2986 ~ 1.29890 in.)

1: 32.993 ~ 33.000 mm (1.29893 ~ 1.2992 in.)

○: Crankshaft Main Journal Diameter Marks, "1" or no mark.

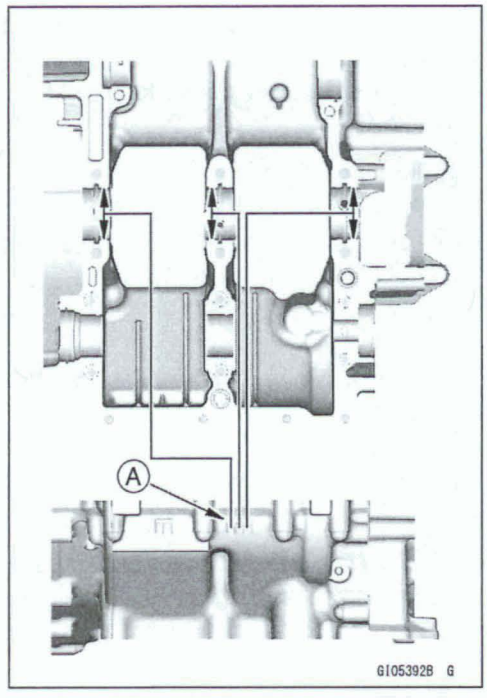
Crankshaft and Connecting Rods

- Measure the main bearing inside diameter, and mark the upper crankcase half in accordance with the inside diameter.
  [A]: Crankcase Main Bearing Inside Diameter Marks, "○" or no mark.

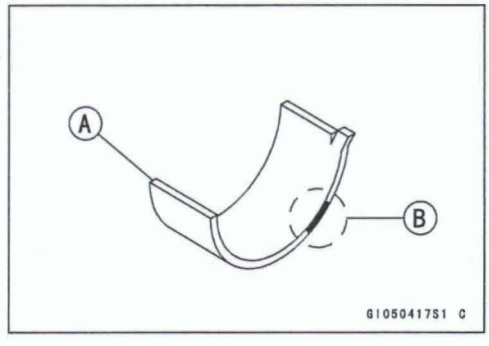
NOTE

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

Crankcase Main Bearing Inside Diameter Marks
○: 36.000 ~ 36.008 mm (1.4173 ~ 1.4176 in.)
None: 36.009 ~ 36.016 mm (1.4177 ~ 1.4179 in.)



- Select the proper bearing insert [A] in accordance with the combination of the crankcase and crankshaft coding.
  Size Color [B]



Crankcase Main Bearing Inside Diameter Marking	Crankshaft Main Journal Diameter Marking	Bearing Insert*		
		Size Color	Part Number	Journal Nos.
○	1	Brown	92139-1868	1, 3
			92139-0882	2
None	1	Black	92139-1867	1, 3
○	None		92139-0881	2
None	None	Blue	92139-1866	1, 3
			92139-0880	2

*: The bearing insert for Nos. 2 journal have an oil groove.

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

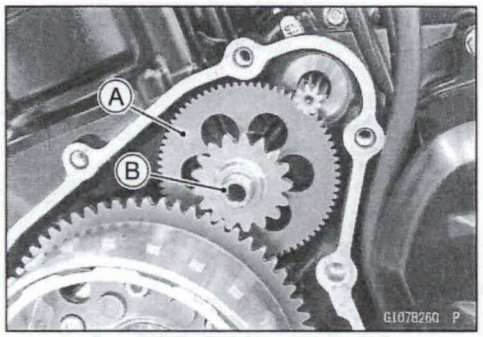
Starter Motor Clutch

Starter Motor Clutch Removal/Installation

- Refer to the Alternator Rotor Removal/Installation in the Electrical System chapter.

Starter Motor Clutch Inspection

- Remove:
  Alternator Cover (see Alternator Cover Removal in the Electrical System chapter)
  Starter Idle Gear [A] and Shaft [B]

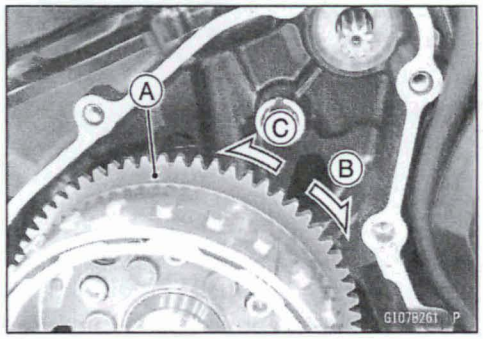


- Turn the starter motor clutch gear [A] by hand. The starter motor clutch gear should turn clockwise [B] freely, but should not turn counterclockwise [C].

★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.



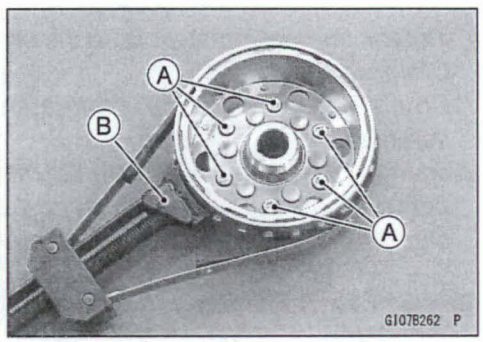
NOTE

○*Examine the starter motor clutch gear as well. Replace it if it worn or damaged.*

Starter Motor Clutch Disassembly

- Remove:
  Alternator Rotor (see Alternator Rotor Removal in the Electrical System chapter)
  Starter Motor Clutch Bolts [A]
  Starter Motor Clutch

Special Tool - Flywheel Holder [B]: 57001-1313



Starter Motor Clutch Assembly

- Apply a non-permanent locking agent to the threads of the starter motor clutch bolts and tighten them.

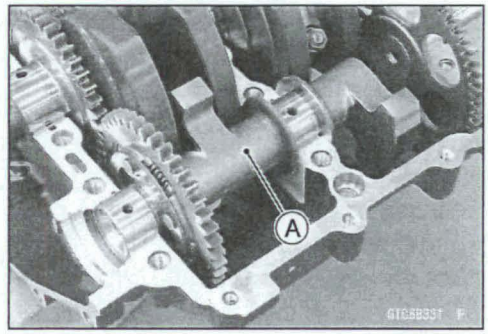
Special Tool - Flywheel Holder: 57001-1313

Torque - Starter Motor Clutch Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)

Balancer

Balancer Removal

- Split the crankcase (see Crankcase Splitting).
- Remove the balancer shaft [A] with the balancer gear.

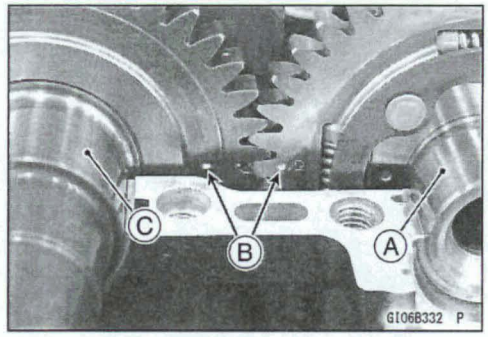


Balancer Installation

- Apply molybdenum disulfide oil solution to the balancer shaft bearing inserts.
- Install the balancer shaft [A].

○Align the timing mark [B].
Crankshaft [C]

- Assemble the crankcase (see Crankcase Assembly).



Balancer Shaft Bearing Insert/Journal Wear Inspection

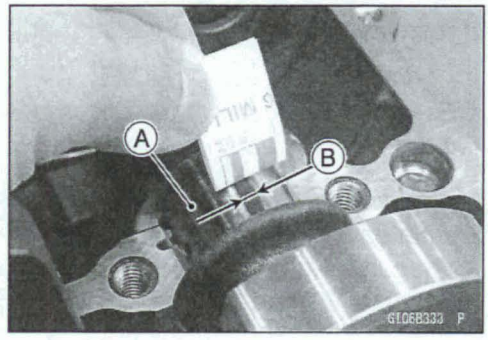
- Measure the bearing insert/journal [A] clearance with plastigage [B].

NOTE

○*Tighten the crankcase bolts to the specified torque (see Crankcase Assembly).*

○*Do not turn the balancer shaft during clearance measurement.*

○*Journal clearance less than 0.025 mm (0.00098 in.) can not be measured by plastigage, however, using genuine parts maintains the minimum standard clearance.*



Balancer Shaft Bearing Insert/Journal Clearance

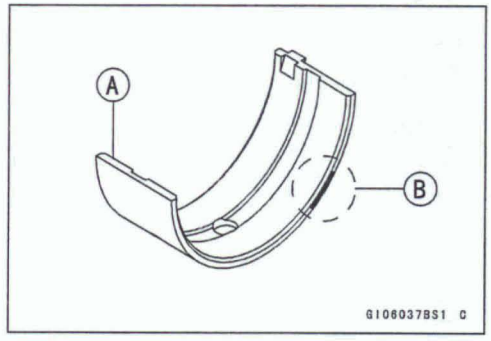
Standard: 0.024 ~ 0.048 mm (0.0009 ~ 0.0019 in.)

Service Limit: 0.08 mm (0.0031 in.)

★If the clearance is within the standard, no bearing replacement is required.

★If the clearance is between 0.048 mm (0.0019 in.) and the service limit 0.08 mm (0.0031 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 balancer shaft journal.



Balancer Shaft Journal Diameter

Standard: 25.984 ~ 26.000 mm (1.0230 ~ 1.0236 in.)

Service Limit: 25.96 mm (1.022 in.)

Balancer

★If any journal has worn past the service limit, replace the balancer shaft with a new one.

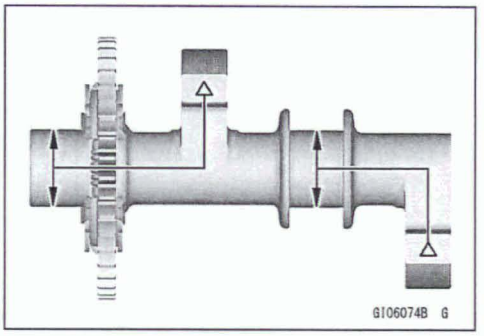
★If the measured journal diameters are not less than the service limit, but do not coincide with the original diameter markings on the balancer shaft, make new marks on it.

Balancer Shaft Journal Diameter Marks

None: 25.984 ~ 25.992 mm (1.0230 ~ 1.02331 in.)

○: 25.993 ~ 26.000 mm (1.02334 ~ 1.0236 in.)

△: Balancer Shaft Journal Diameter Marks, "○" or no mark.



- Measure the main bearing inside diameter, and mark the upper crankcase half in accordance with the inside diameter.

[A]: Balancer Shaft Bearing Inside Diameter Marks, "○" or no mark.

NOTE

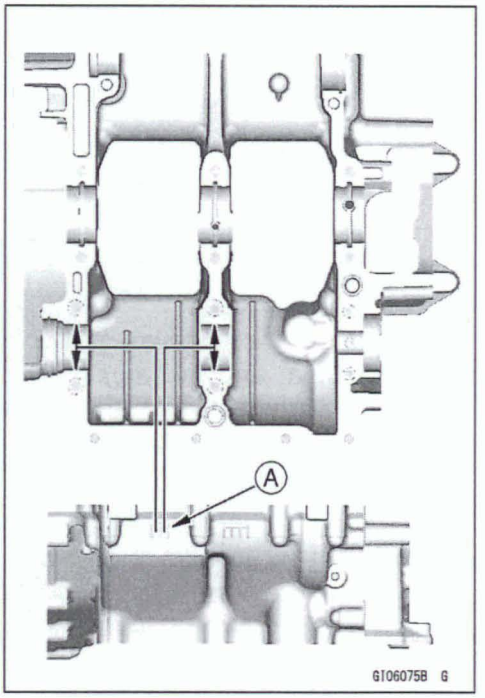
○*Tighten the crankcase bolts to the specified torque (see Crankcase Assembly).*

○*The mark already on the upper crankcase half should almost coincide with the measurement.*

Balancer Shaft Bearing Inside Diameter Marks

○: 29.000 ~ 29.008 mm (1.1417 ~ 1.1420 in.)

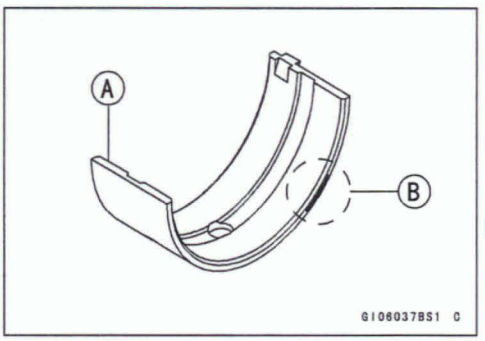
None: 29.009 ~ 29.016 mm (1.1421 ~ 1.1424 in.)



- Select the proper bearing insert [A] in accordance with the combination of the crankcase and balancer shaft coding.

Size Color [B]

Balancer Shaft Journal Diameter Marking	Balancer Shaft Bearing Inside Diameter Marking	Bearing Insert	
		Size Color	Part Number
○	○	Brown	92028-0885
○	None	Black	92028-0884
None	○		
None	None	Blue	92028-0883

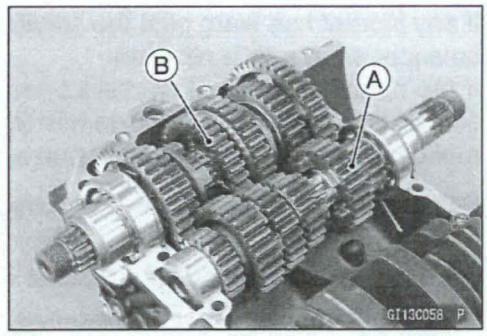


- Install the new inserts in the crankcase and check insert/journal clearance with the plastigage.

Transmission

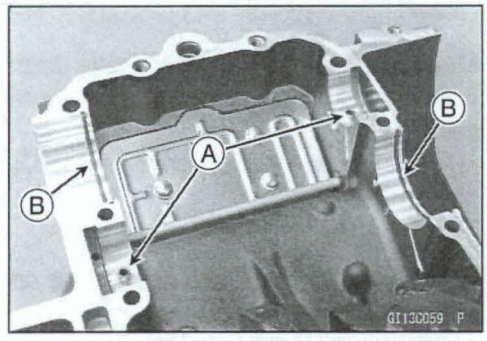
Transmission Shaft Removal

- Split the crankcase (see Crankcase Splitting).
- Remove the drive shaft [A] and output shaft [B].



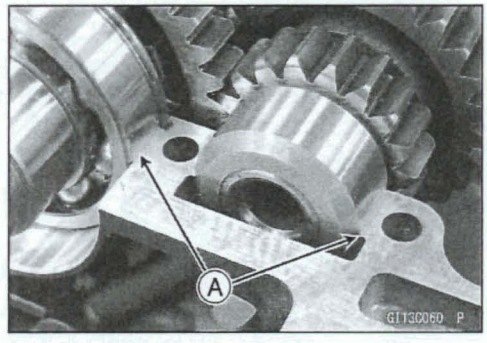
Transmission Shaft Installation

- Check to see that the set pins [A] and set rings [B] are in place.

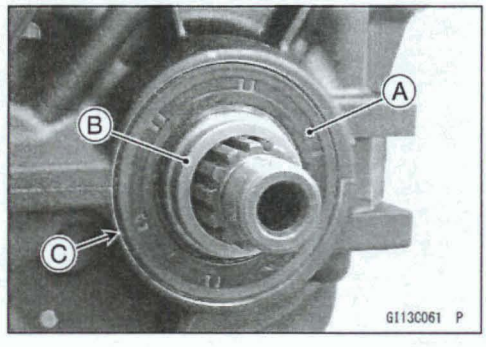


- Apply engine oil to the bearings and transmission gears.

○The bearing set pins and rings must match properly with the holes or grooves in the bearing outer races. When they are properly matched, there is no clearance [A] between the crankcase and the bearing outer races.



- Assemble the crankcase (see Crankcase Assembly).
- Replace the oil seal [A] with a new one.
- Apply grease to the oil seal lips.
- Press in the oil seal onto collar [B] so that the surface of the oil seal is flush with the surface [C] of the crankcase.



Transmission Shaft Disassembly

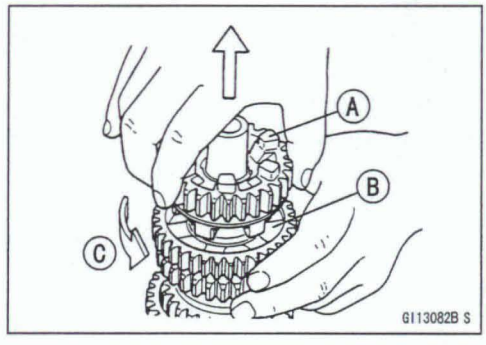
- Remove the transmission shafts (see Transmission Shaft Removal).
- Remove the circlips, disassemble the transmission shafts.

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.

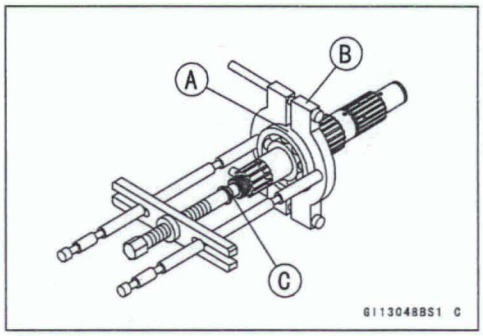


Transmission

- Remove the ball bearing [A] from each shafts.

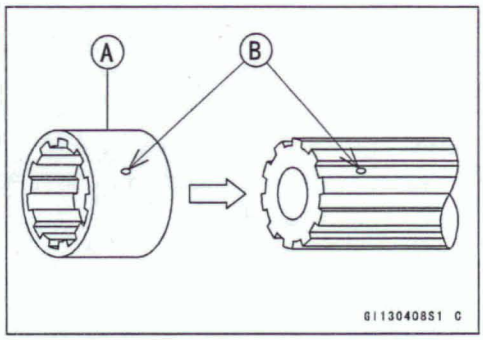
  Special Tools - Bearing Puller [B]: 57001-135
  Bearing Puller Adapter [C]: 57001-317

- Discard the bearing.

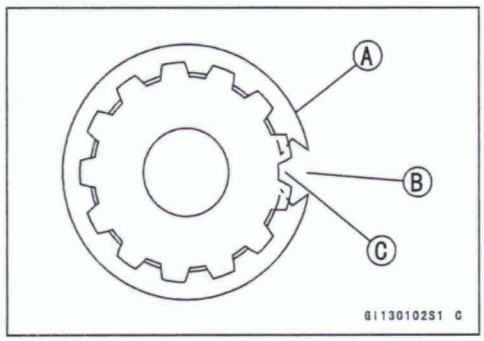


Transmission Shaft Assembly

- Apply engine oil to the bushings, ball bearings and shafts.
- Install the ball bearings on the shafts with the groove toward the clutch side.
- Install the gear bushings [A] on the shaft with their holes [B] aligned.



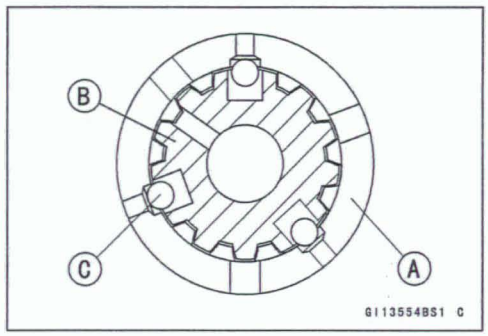
- Replace any circlips removed with new ones.
- Install the circlips [A] so that the opening [B] is aligned with a spline groove [C].



- The drive shaft gears can be recognized by size: the gear with the smallest diameter is 1st gear, and the largest one is 6th gear. Be sure that all parts are put back in the correct sequence and all circlips and washers are properly in place.
- Install the 6th gear bushing onto the drive shaft with their oil holes aligned.
- The output shaft gears can be recognized by size: the gear with the largest diameter is 1st gear, and the smallest one is 6th gear. Be sure that all parts are put back in the correct sequence and all circlips and washers are properly in place.
- Install the 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.

Transmission

- Fit the steel balls into the 5th gear holes in the output shaft, aligning oil hole as shown.
  5th Gear [A]
  Output Shaft [B]
  Steel Balls [C]

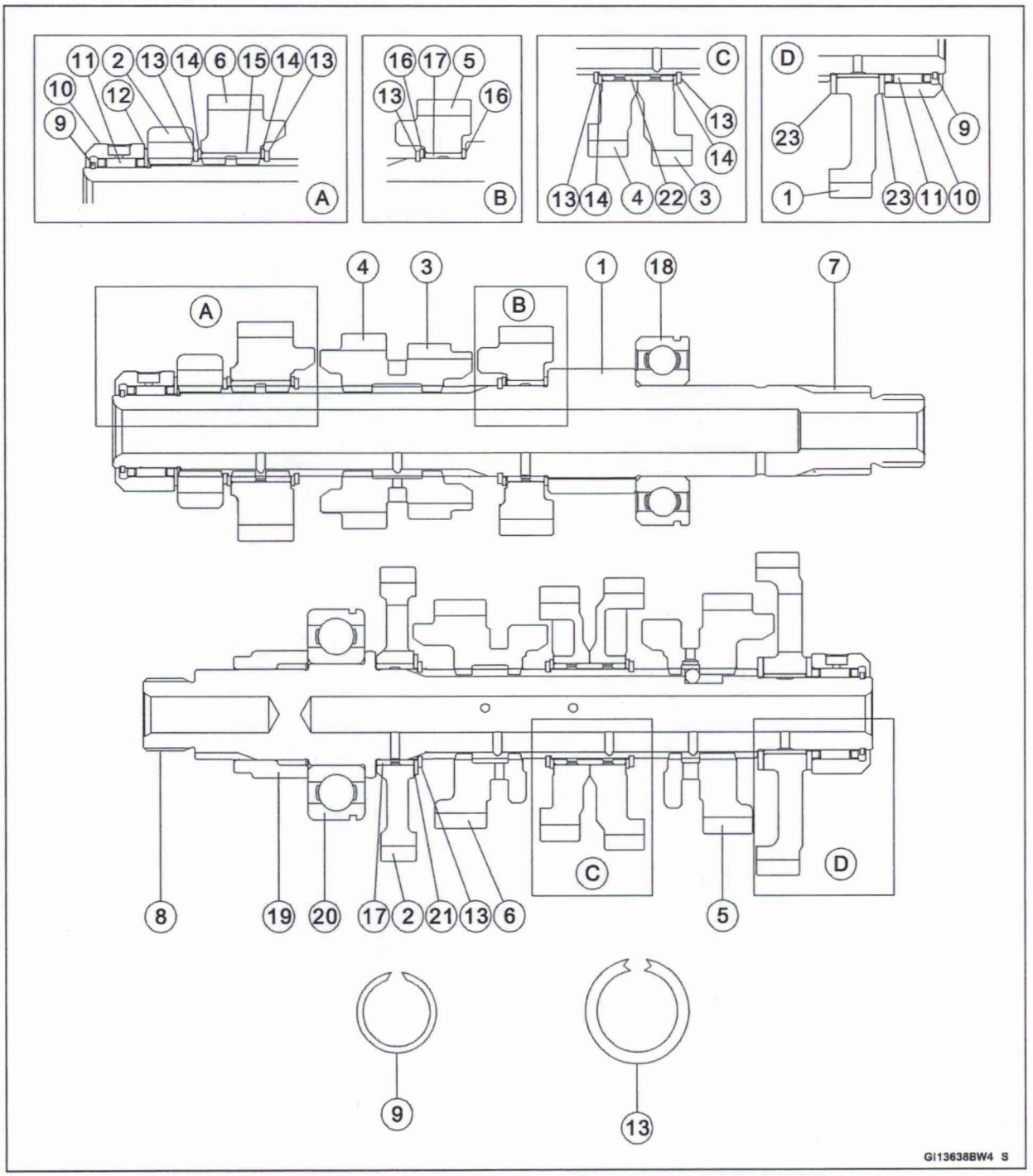


NOTICE
Do not apply grease to the balls to hold them in place. This will cause the positive neutral finder mechanism to malfunction.

○After assembling the 5th gear with steel balls in place on the output shaft, check the ball-locking effect that the 5th gear does not come out of the output shaft when moving it up and down by hand.

- Check that each gear spins or slides freely on the transmission shafts without binding after assembly.

Transmission

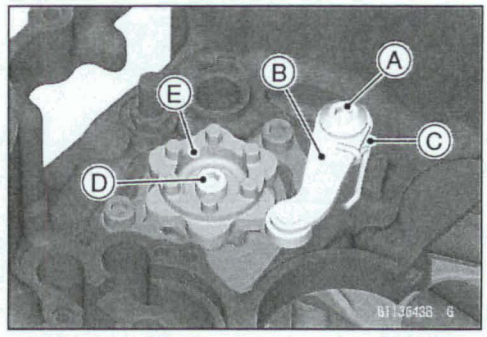


1. 1st Gear
2. 2nd Gear
3. 3rd Gear
4. 4th Gear
5. 5th Gear
6. 6th (Top) Gear
7. Drive Shaft
8. Output Shaft
9. Circlip
10. Bearing Outer Race
11. Needle Bearing
12. Washer, ϕ30 × 20.5 mm (1.2 × 0.8 in.)
13. Circlip
14. Toothed Washer
15. Toothed Bushing, L = 16.6 mm (0.65 in.)
16. Washer, ϕ30 × 25.3 mm (1.2 × 1.0 in.)
17. Bushing, ϕ28 mm (1.1 in.)
18. Ball Bearing, ϕ52 mm (2.0 in.)
19. Collar
20. Ball Bearing, ϕ58 mm (2.3 in.)
21. Washer, ϕ33 × 25.3 mm (1.3 × 1.0 in.)
22. Toothed Bushing, L = 20.0 mm (0.79 in.)
23. Washer, ϕ31 × 20.5 mm (1.2 × 0.8 in.)

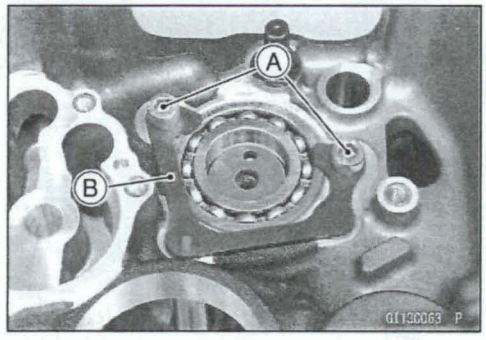
Transmission

Shift Drum and Fork Removal

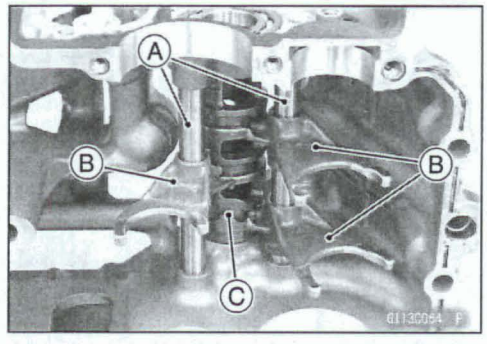
- Remove:
  Transmission Shafts (see Transmission Shaft Removal)
  Gear Positioning Lever Bolt [A]
  Gear Positioning Lever [B]
  Spacer
  Spring [C]
  Shift Drum Cam Bolt [D]
  Shift Drum Cam [E]
  Pin



- Remove:
  Shift Drum Bearing Holder Bolts [A]
  Shift Drum Bearing Holder [B]

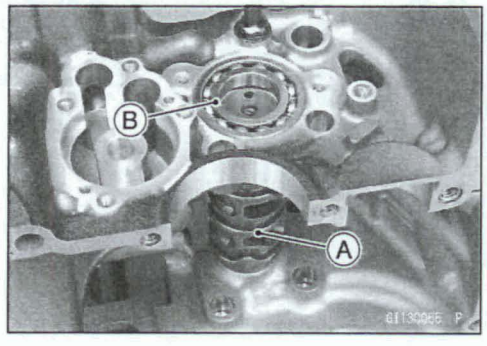


- Remove:
  Shift Rods [A]
  Shift Forks [B]
  Shift Drum [C] and Bearing



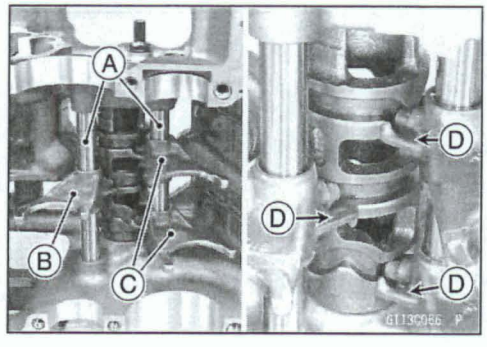
Shift Drum and Fork Installation

- Apply molybdenum disulfide oil solution to the following parts.
  Shift Drum
  Shift Forks
  Shift Rods
- Install:
  Shift Drum [A]
  Shift Drum Bearing [B]



- Install:
  Shift Rods [A]
  Shift Fork (For Drive Shaft) [B]
  Shift Forks (For Output Shaft) [C]

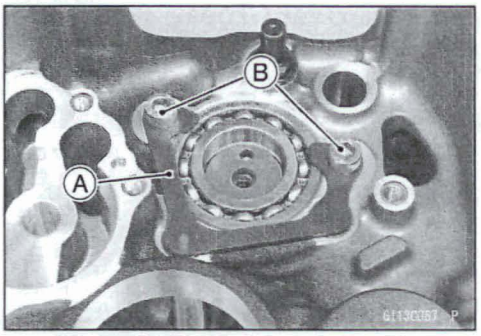
○Face the stoppers [D] on the shift forks inward.
○Fit the shift fork pins to the shift drum grooves as shown.



Transmission

- Install:
  Shift Drum Bearing Holder [A]
- Apply a non-permanent locking agent to the shift drum bearing holder bolts [B].
- Tighten the bolts temporarily.
- Tighten:

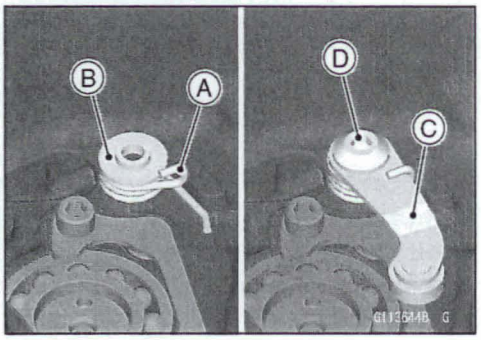
Torque - Shift Drum Bearing Holder Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)



- Install:
  Spring [A]
  Spacer [B]
  Gear Positioning Lever [C]
- Apply a non-permanent locking agent to the gear positioning lever bolt [D].
- Tighten:

Torque - Gear Positioning Lever Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Check the gear positioning lever and spring for smooth operation.

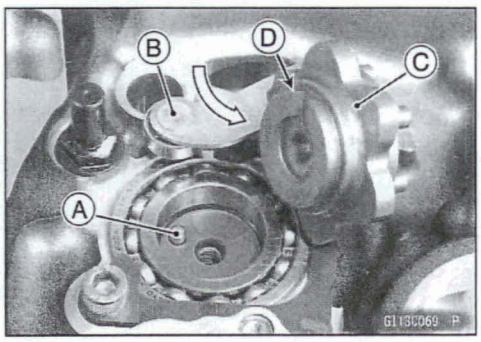


- Install:
  Pin [A]
- While pushing the gear positioning lever [B], install the shift drum cam [C].

○Align the groove [D] with the pin.

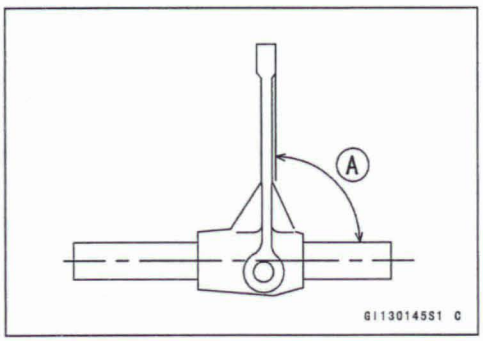
- Apply a non-permanent locking agent to the shift drum cam bolt.
- Tighten:

Torque - Shift Drum Cam Bolt: 12 N·m (1.2 kgf·m, 106 in·lb)



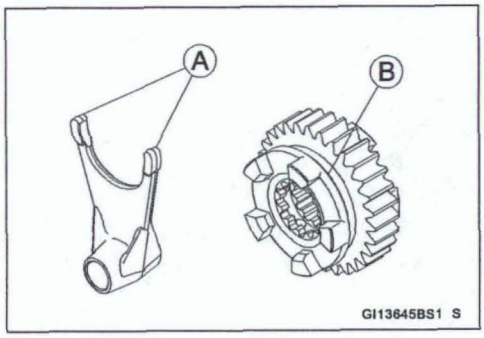
Shift Fork Bending Inspection

- 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]



Transmission

Shift Fork/Gear Groove Wear Inspection



- Measure the thickness of the shift fork ears [A], and measure the width of the gear grooves [B].

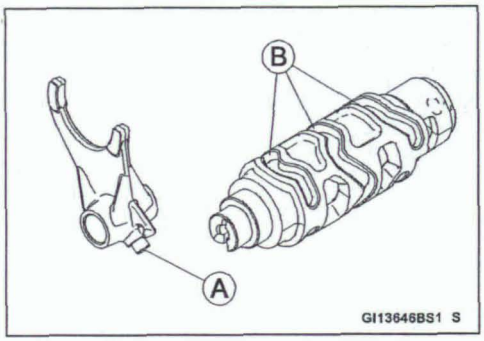
★If the thickness of a shift fork ear is less than the service limit, the shift fork must be replaced.

Shift Fork Ear Thickness
Standard: 4.9 ~ 5.0 mm (0.19 ~ 0.20 in.)
Service Limit: 4.8 mm (0.19 in.)

★If the gear groove is worn over the service limit, the gear must be replaced.

Gear Groove Width
Standard: 5.05 ~ 5.15 mm (0.199 ~ 0.203 in.)
Service Limit: 5.3 mm (0.21 in.)

Shift Fork Guide Pin/Drum Groove Wear Inspection



- Measure the diameter of each shift fork guide pins [A], and measure the width of each shift drum grooves [B].

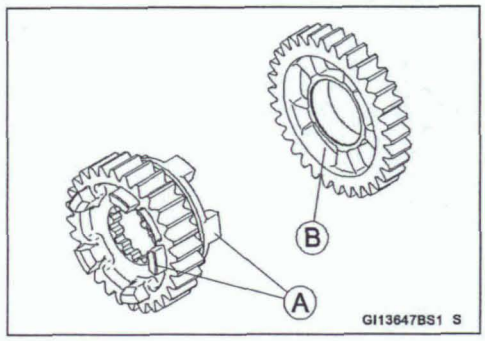
★If the guide pin on any shift fork is less than the service limit, the fork must be replaced.

Shift Fork Guide Pin Diameter
Standard: 5.9 ~ 6.0 mm (0.23 ~ 0.24 in.)
Service Limit: 5.8 mm (0.23 in.)

★If any shift drum groove is worn over the service limit, the drum must be replaced.

Shift Drum Groove Width
Standard: 6.05 ~ 6.20 mm (0.238 ~ 0.244 in.)
Service Limit: 6.3 mm (0.25 in.)

Gear Dog and Gear Dog Hole Damage Inspection



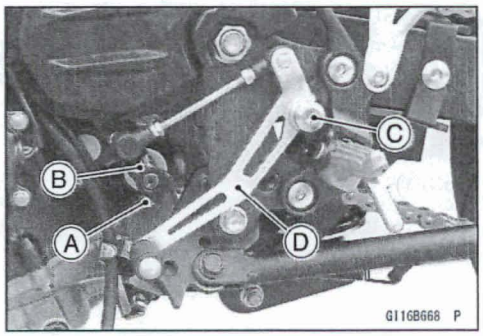
- Visually inspect the gear dogs [A] and gear dog holes [B].

★Replace any damaged gears or gears with excessively worn dogs or dog holes.

External Shift Mechanism

Shift Pedal Removal

- Remove the shift lever clamp bolt [A], and disconnect the shift lever [B] from the shift shaft.
- Remove:
  Shift Pedal Bolt [C]
  Shift Pedal [D]
  Washer

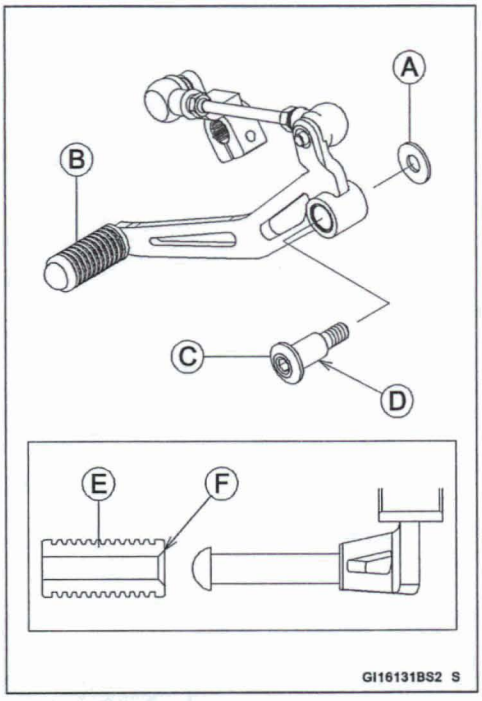


Shift Pedal Installation

- Install:
  Washer [A]
  Shift Pedal [B]
- Apply a non-permanent locking agent to the shift pedal bolt [C].
- Apply grease to the sliding surface [D] of the shift pedal bolt.
- Tighten:

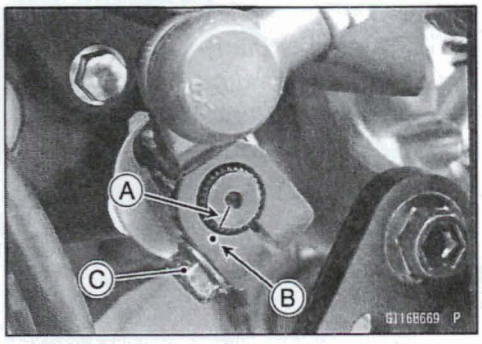
  Torque - Shift Pedal Mounting Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

- When installing the rubber damper [E], Face the chamfered side [F] inward.



- Align the line [A] on the shift shaft with the punch mark [B] on the shift lever.
- Tighten:

  Torque - Shift Lever Clamp Bolt [C]: 12 N·m (1.2 kgf·m, 106 in·lb)



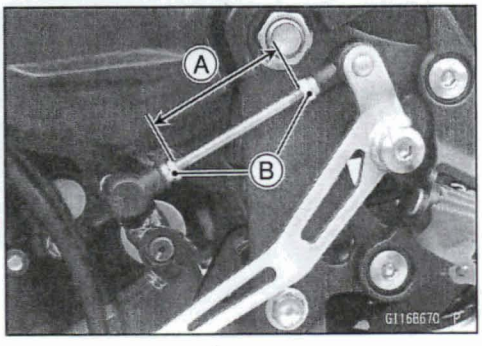
- Adjust the tie-rod length [A] to 60.0 mm (2.36 in.).

○Loosen the tie-rod locknuts [B] and turn the tie-rod.

○The tie-rod locknut (front) has left-hand threads.

- Tighten:

  Torque - Tie-Rod Locknuts: 7.0 N·m (0.71 kgf·m, 62 in·lb)

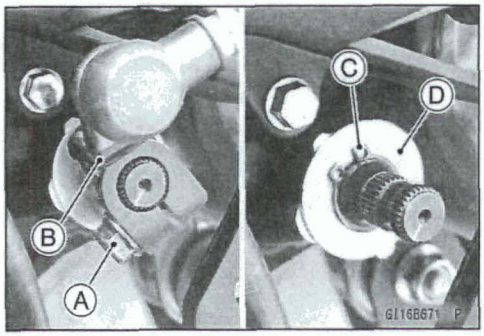


External Shift Mechanism

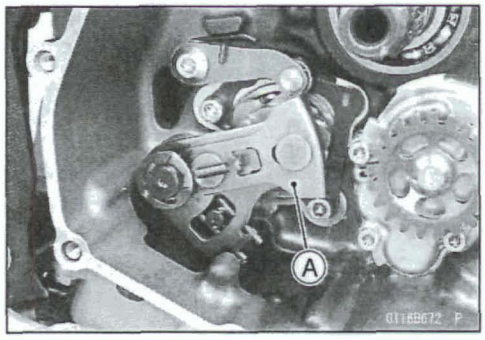
External Shift Mechanism Removal

- Remove:
  Clutch (see Clutch Removal in the Clutch chapter)
- Remove the shift lever clamp bolt [A], and disconnect the shift lever [B] from the shift shaft.
- Remove:
  Circlip [C]
  Washer [D]

Special Tool - Outside Circlip Pliers: 57001-144

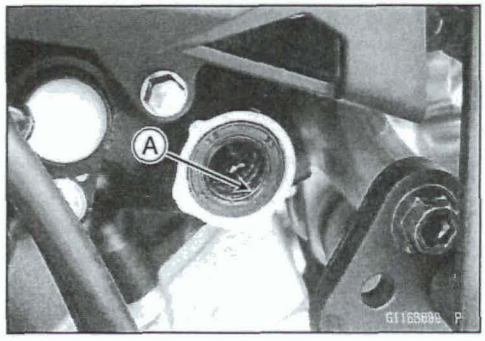


- Remove:
  Shift Shaft Assembly [A]



External Shift Mechanism Installation

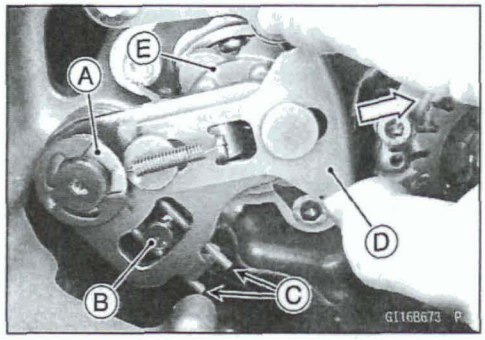
- Apply grease to the oil seal lips [A].



- Install:
  Shift Shaft Assembly [A]

○Fit the return spring pin [B] between the spring ends [C].

○Pull the shift mechanism arm [D], and hang it to the shift drum cam [E].

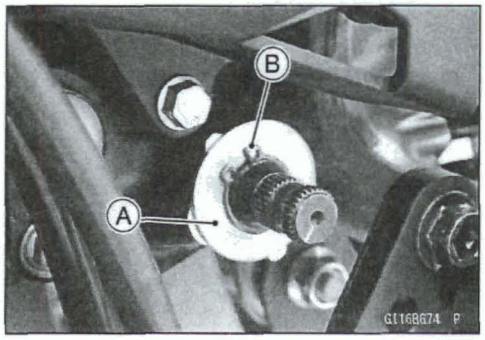


- Install the washer [A].
- Replace the circlip [B] with a new one, and install it.

Special Tool - Outside Circlip Pliers: 57001-144

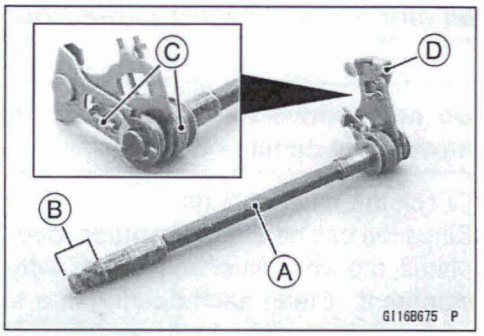
○Fit the circlip into the groove of the shift shaft securely.

- Install the removed parts (see appropriate chapters).



External Shift Mechanism

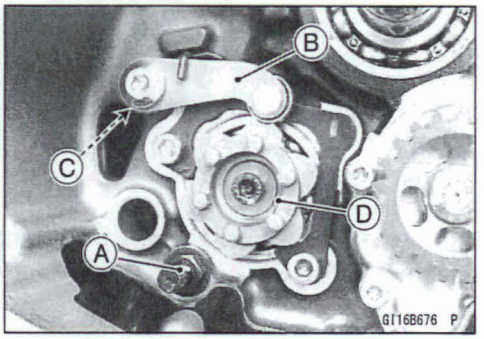
- Check the shift shaft [A] for any damage.
★If the shaft is bent, straighten or replace it.
★If the serrations [B] are damaged, replace the shaft.
★If the springs [C] are damaged in any way, replace them.
★If the shift mechanism arm [D] is damaged in any way, replace the shift shaft.



- Check the shift shaft return spring pin [A] is not loose.
★If it is loose, unscrew it, apply a non-permanent locking agent to the threads, and tighten it.

Torque - Shift Shaft Return Spring Pin: 29 N·m (3.0 kgf·m, 21 ft·lb)

- Check the gear positioning lever [B] and its spring [C] for breaks or distortion.
★If the lever or spring is damaged in any way, replace it.
- Visually inspect the shift drum cam [D].
★If it is badly worn or shows any damage, replace it.



Ball Bearing, Needle Bearing, and Oil Seal

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.

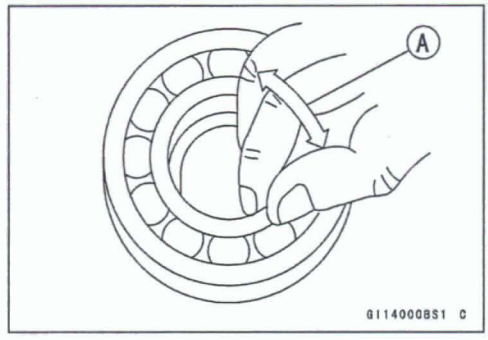
○Spin [A] the bearing by hand to check its condition.

★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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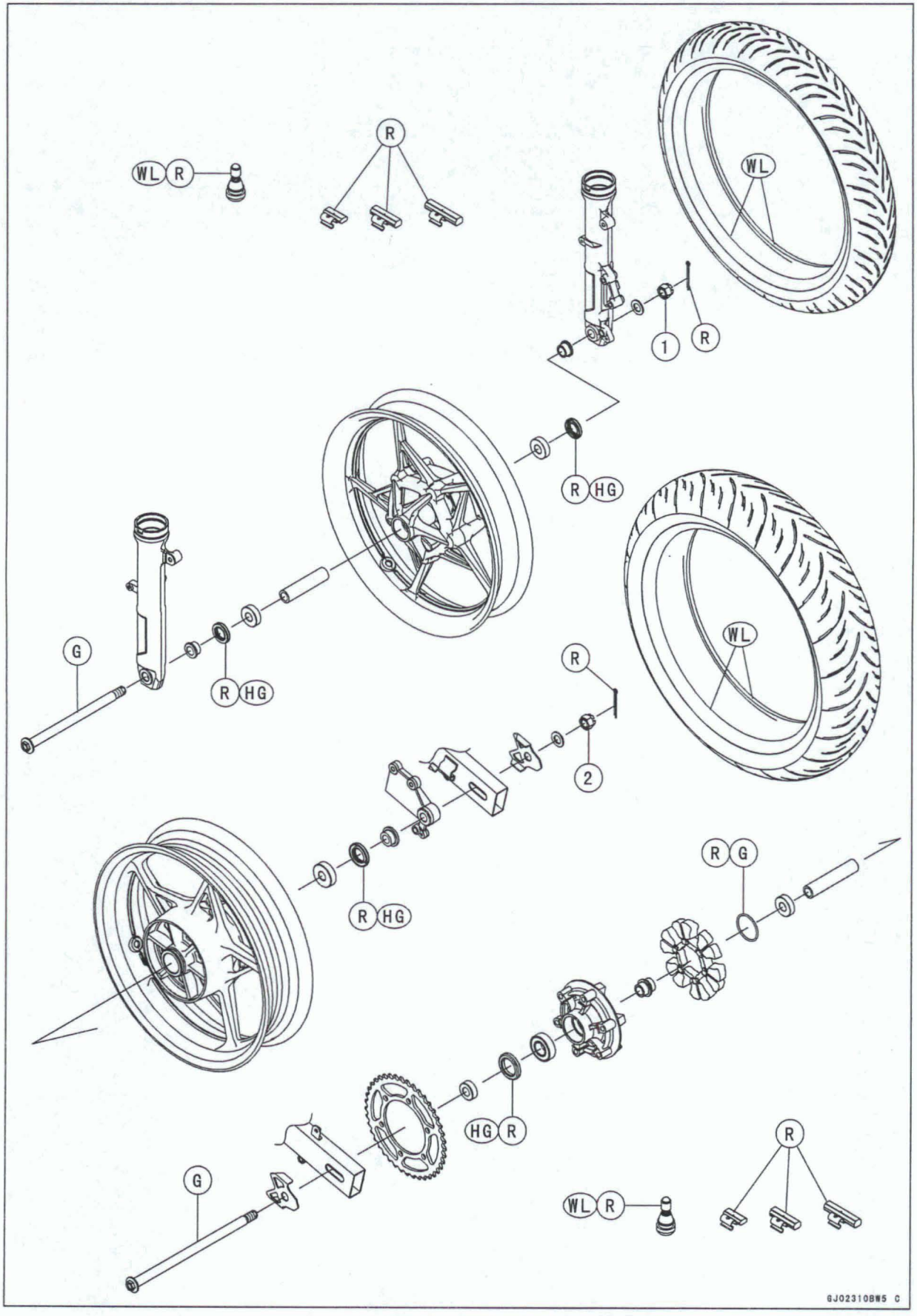
Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Axle Nut	98	10	72	
2	Rear Axle Nut	98	10	72	

G: Apply grease.
HG: Apply high-temperature grease.
R: Replacement Parts
WL: Apply soap and water solution or rubber lubricant.

Specifications

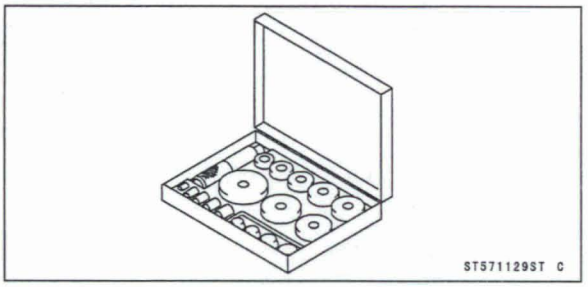
Item	Standard	Service Limit
Wheels (Rims)		
Rim Runout:		
Axial	TIR 0.5 mm (0.02 in.) or less	TIR 1.0 mm (0.04 in.)
Radial	TIR 0.8 mm (0.03 in.) or less	TIR 1.0 mm (0.04 in.)
Axle Runout/100 mm (3.94 in.)	TIR 0.1 mm (0.004 in.) or less	TIR 0.2 mm (0.008 in.)
Wheel Balance	10 g (0.35 oz.) or less	– – –
Balance Weights	10 g (0.35 oz.), 20 g (0.71 oz.), 30 g (1.06 oz.)	– – –
Rim Size:		
Front	17M/C x MT3.00	– – –
Rear	17M/C x MT4.00	– – –
Tires		
Air Pressure (when cold):		
Front	Up to 180 kg (397 lb) load: 200 kPa (2.00 kgf/cm², 28 psi)	
Rear	Up to 180 kg (397 lb) load: 225 kPa (2.25 kgf/cm², 32 psi)	
Tread Depth:		
Front	4.0 mm (0.16 in.)	1 mm (0.04 in.) (AT, CH, DE) 1.6 mm (0.06 in.)
Rear	6.0 mm (0.24 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	DUNLOP	– – –
Type	SPORTMAX, GPR-300F N	– – –
Size	110/70R17 M/C 54H	– – –
Rear:		
Make	DUNLOP	– – –
Type	SPORTMAX, GPR-300 N	– – –
Size	150/60R17 M/C 66H	– – –

⚠ WARNING

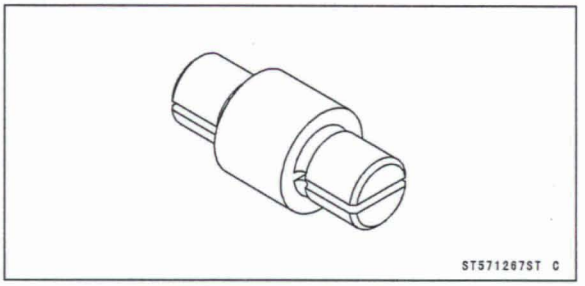
Some replacement tires may adversely affect handling and cause an accident resulting in serious injury or death. To ensure proper handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.

Special Tools

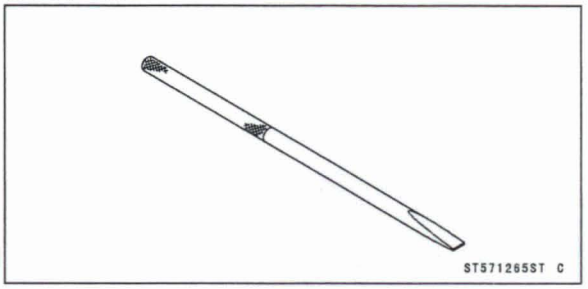
Bearing Driver Set:
57001-1129



Bearing Remover Head, ϕ15 × ϕ17:
57001-1267

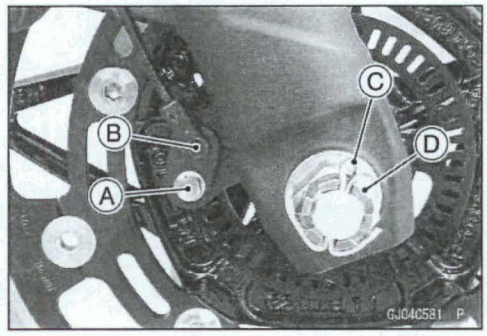


Bearing Remover Shaft, ϕ9:
57001-1265



Wheels (Rims)

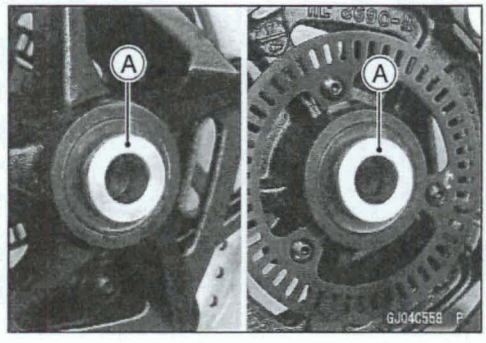
Front Wheel Removal



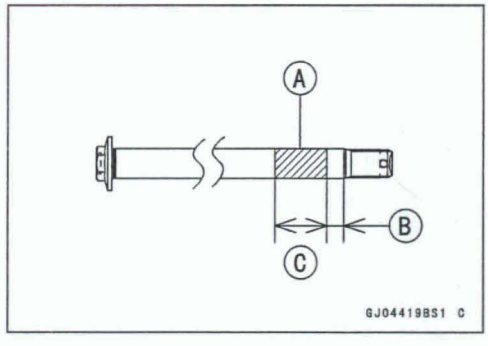
- Remove:
  Front Wheel Rotation Sensor Bolt [A] (ABS Equipped Models)
  Front Wheel Rotation Sensor [B] (ABS Equipped Models)
  Front Caliper (see Front Caliper Removal in the Brakes chapter)
  Cotter Pin [C]
  Axle Nut [D] and Washer
- Raise the front wheel off the ground with a suitable stand.
- Pull out the axle to the left and remove the front wheel from the forks.

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.

Front Wheel Installation



- Apply high-temperature grease to the grease seal lips.
- Fit the collars [A] on the both sides of the hub.



- Apply a thin coat of grease [A] to the front axle for rust prevention.
  About 10 mm (0.4 in.) [B]
  About 30 mm (1.2 in.) [C]

NOTE

○*Do not apply grease to the threads of the axle.*

- Insert the front axle from the left side.
★Wipe off excess grease if necessary.
- Install the washer and axle nut.
- Tighten:

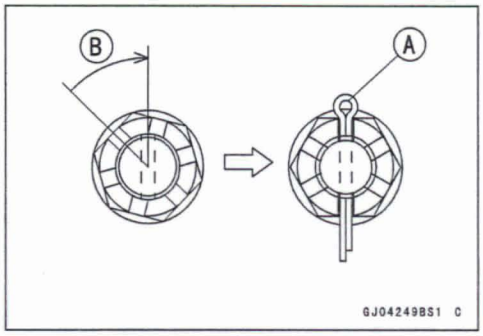
Torque - Front Axle Nut: 98 N·m (10 kgf·m, 72 ft·lb)

Wheels (Rims)

- Insert a new cotter pin [A].

NOTE

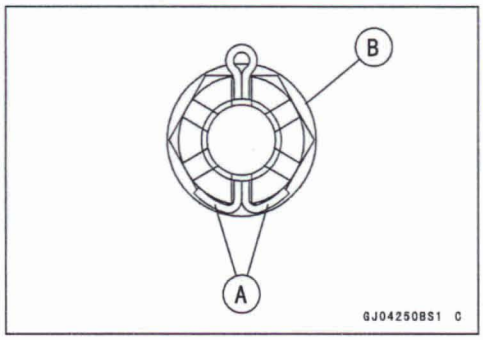
○When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axle, tighten the nut clockwise [B] up to next alignment.
○It should be within 30 degrees.
○Loosen once and tighten again when the slot goes past the nearest hole.



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

⚠ WARNING

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



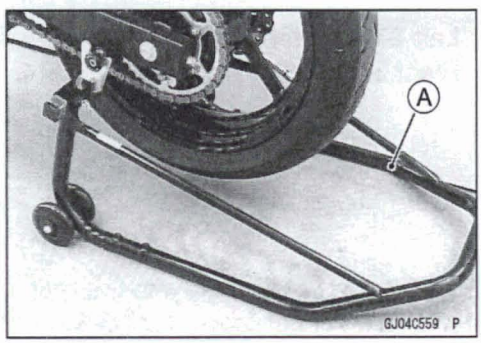
- Install the removed parts (see appropriate chapters).
- Check the front brake effectiveness (see Brake Operation Inspection in the Periodic Maintenance chapter).

⚠ 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.

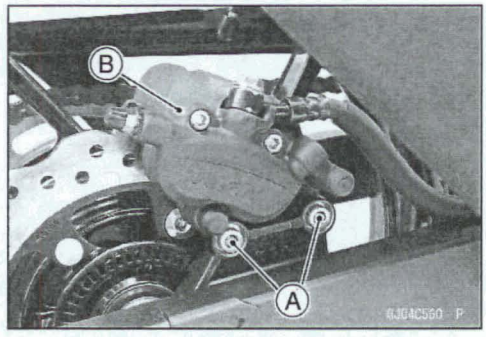
Rear Wheel Removal

- Raise the rear wheel off the ground with the stand [A].

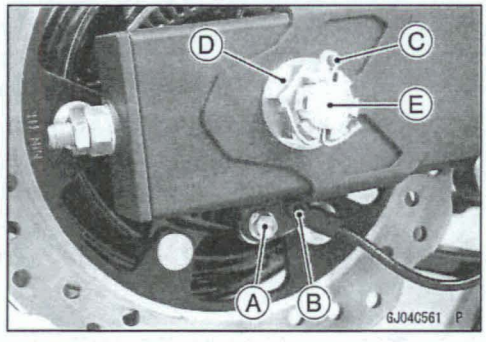


Wheels (Rims)

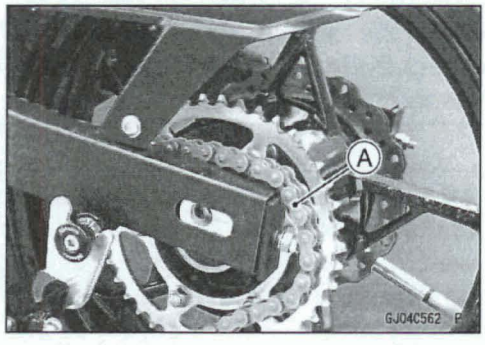
- Remove the rear caliper mounting bolts [A].
- Remove the rear caliper [B] from the rear brake disc.



- Remove:
  Rear Wheel Rotation Sensor Bolt [A]
  Rear Wheel Rotation Sensor [B]
  Cotter Pin [C]
  Axle Nut [D] and Washer
  Axle [E] (from Left Side)



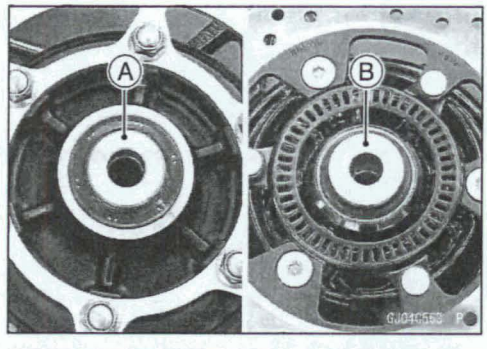
- Remove the drive chain [A] from the rear sprocket toward the left.
- Move the rear wheel back and remove it.



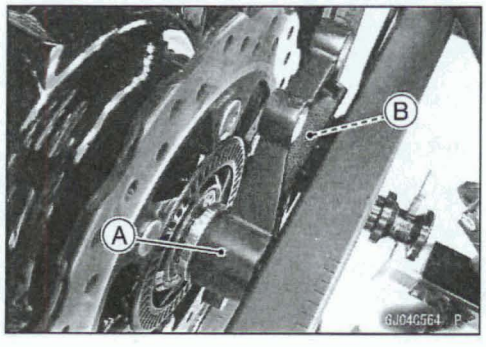
NOTICE
Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

Rear Wheel Installation

- Apply high-temperature grease to the grease seal lips.
- Fit the collars on the both sides of the hub.
  Left Side Collar [A]
  Right Side Collar [B] (with Flange)



- Engage the drive chain with the rear sprocket.
- Install the caliper bracket [A] onto the swingarm stop [B].

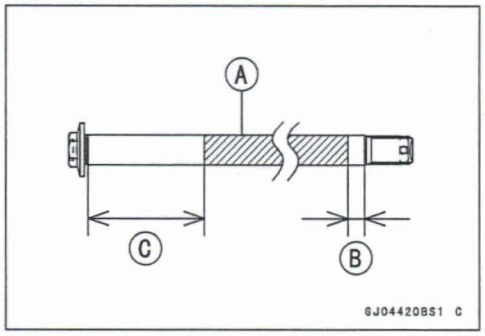


Wheels (Rims)

- Apply a thin coat of grease [A] to the rear axle for rust prevention.
  About 10 mm (0.4 in.) [B]
  About 70 mm (2.8 in.) [C]

NOTE

○*Do not apply grease to the threads of the axle.*



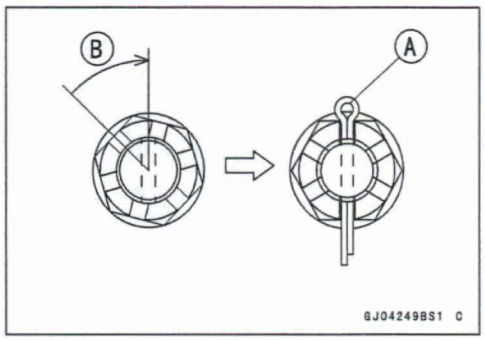
- Insert the rear axle from the left side.
★Wipe off excess grease if necessary.
- Install the washer and rear axle nut.
- Adjust the drive chain slack before tightening the rear axle nut (see Drive Chain Slack Inspection in the Periodic Maintenance chapter).
- Tighten:

Torque - Rear Axle Nut: 98 N·m (10 kgf·m, 72 ft·lb)

- Insert a new cotter pin [A].

NOTE

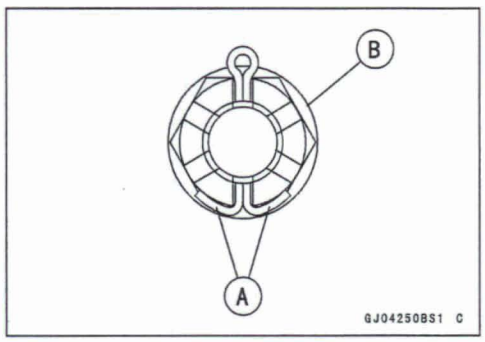
○*When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axle, tighten the nut clockwise [B] up to next alignment.*
○*It should be within 30 degrees.*
○*Loosen once and tighten again when the slot goes past the nearest hole.*



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

⚠ WARNING

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



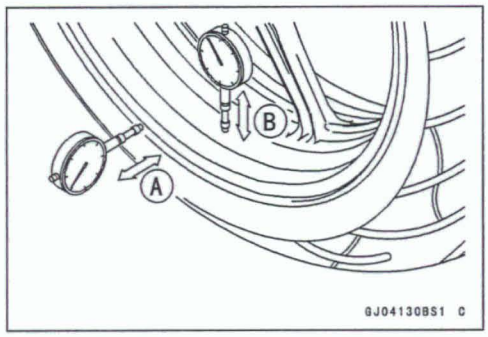
- Install the removed parts (see appropriate chapters).
- Check the rear brake effectiveness (see Brake Operation Inspection in the Periodic Maintenance chapter).

⚠ 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.

Wheels (Rims)

Wheel Inspection



- Raise the front/rear wheel off the ground with a suitable stand.
- Spin the wheel lightly, and check for roughness or binding.

★If roughness or binding is found, replace the hub bearings (see Hub Bearing Removal/Installation).

- Inspect the wheel for small cracks, dents, bending, or warp.

★If there is any damage to the wheel, replace the wheel.

- Remove the wheel, and support it with the tire by the axle.
- Measure the rim runout, axial [A] and radial [B], with a dial gauge.

★If rim runout exceeds the service limit, check the hub bearings (see Hub Bearing Inspection).

★If the problem is not due to the bearings, replace the wheel.

Rim Runout (with tire installed)

Standard:

Axial	**TIR 0.5 mm (0.02 in.) or less**
Radial	**TIR 0.8 mm (0.03 in.) or less**

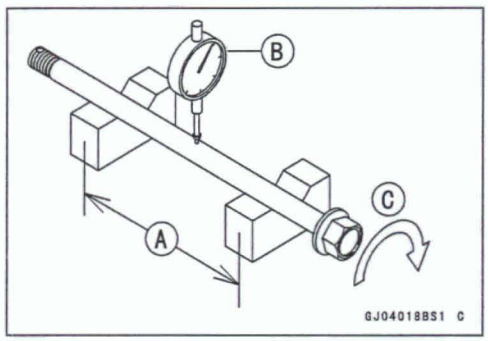
Service Limit:

Axial	**TIR 1.0 mm (0.04 in.)**
Radial	**TIR 1.0 mm (0.04 in.)**

⚠ WARNING

Damaged wheel parts may fail and cause an accident resulting in serious injury or death. Never attempt to repair a damaged wheel part. If the wheel part is damaged, it must be replaced with a new one.

Axle Inspection



- Remove the front and rear axles (see Front/Rear Wheel Removal).
- Visually inspect the front and rear axle for damages.

★If the axle is damaged or bent, replace it.

- Place the axle in V blocks that are 100 mm (3.94 in.) [A] apart, and set a dial gauge [B] on the axle at a point halfway between the blocks. Turn [C] the axle to measure the runout. The difference between the highest and lowest dial readings is the amount of runout.

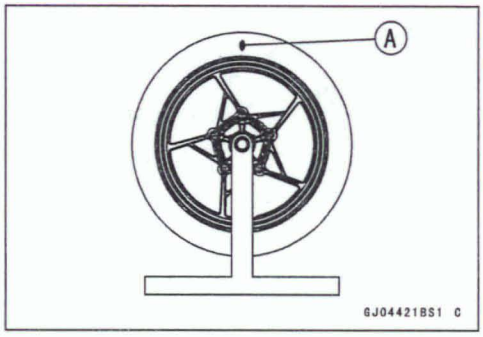
★If axle runout exceeds the service limit, replace the axle.

Axle Runout/100 mm (3.94 in.)

Standard:	**TIR 0.1 mm (0.004 in.) or less**
Service Limit:	**TIR 0.2 mm (0.008 in.)**

Wheels (Rims)

Balance Inspection

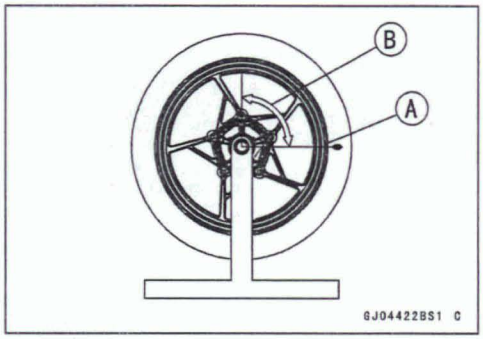


- Remove the front and rear wheels (see Front/Rear Wheel Removal).
- Support the wheel so that it can be spun freely.
- Spin the wheel lightly, and mark [A] the wheel at the top when the wheel stops.

○Repeat this procedure several times. If the wheel stops of its own accord in various positions, it is well balanced.

★If the wheel always stops in one position, adjust the wheel balance (see Balance Adjustment).

Balance Adjustment

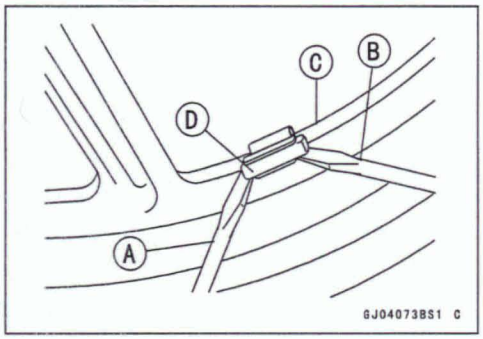


- If the wheel always stops in one position, provisionally attach a balance weight [A] on the rim at the marking using adhesive tape.
- Rotate the wheel 1/4 turn [B], and see whether or not the wheel stops in this position. If it does, the correct balance weight is being used.

★If the wheel rotates and the weight goes up, replace the weight with the next heavier size. If the wheel rotates and the weight goes down, replace the weight with the next lighter size. Repeat these steps until the wheel remains at rest after being rotated 1/4 turn.

- Rotate the wheel another 1/4 turn and then another 1/4 turn to see if the wheel is correctly balanced.
- Repeat the entire procedure as many times as necessary to achieve correct wheel balance.
- Permanently install the balance weight.

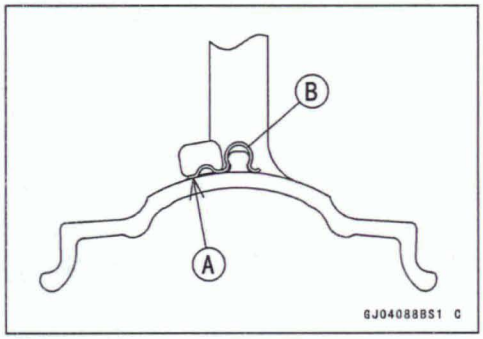
Balance Weight Removal



- Insert a standard tip screwdrivers [A] [B] between the rib [C] and the weight [D].
- Pry the balance weight with two screwdrivers and remove the balance weight.
- Discard the used balance weight.

NOTICE
Do not tap the screwdrivers. The rim could be damaged.

Balance Weight Installation



- Check if the weight portion has any play on the blade [A] and clip [B].

★If it does, discard it.

⚠ WARNING
Unbalanced wheels can create an unsafe riding condition. If the balance weight has any play on the rib of the rim, the blade and/or clip have been stretched. Replace the loose balance weight. Do not reuse used balance weight.

Wheels (Rims)

Balance Weight

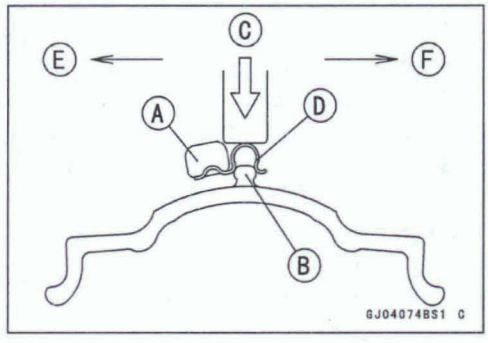
Part Number	Weight
41075-0007	10 g (0.35 oz.)
41075-0008	20 g (0.71 oz.)
41075-0009	30 g (1.06 oz.)

NOTE

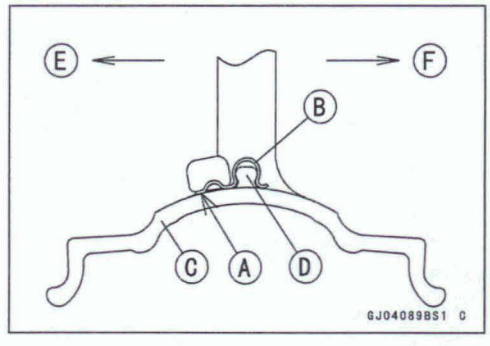
○Balance weights are available from Kawasaki dealers in 10, 20, and 30 grams (0.35, 0.71, and 1.06 oz.) sizes. An imbalance of less than 10 grams (0.35 oz.) will not usually affect running stability.

○Do not use four or more balance weight (more than 90 gram, 3.17 oz.). If the wheel requires an excess balance weight, disassemble the wheel to find the cause.

• Slip the balance weight [A] onto the rib [B] by pushing or lightly hammering [C] the clip [D].
Left Side [E]
Right Side [F]



• 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

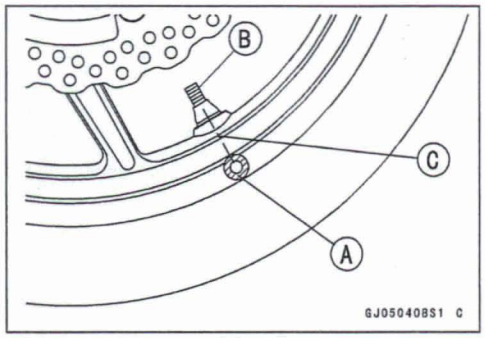
- Refer to the Air Pressure Inspection in the Periodic Maintenance chapter.

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]
  Air Valve [B]
  Align [C]



- Lubricate the tire beads and rim flanges on both sides with a soap and water solution or rubber lubricant. This helps the tire beads slip off the rim flanges.

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.

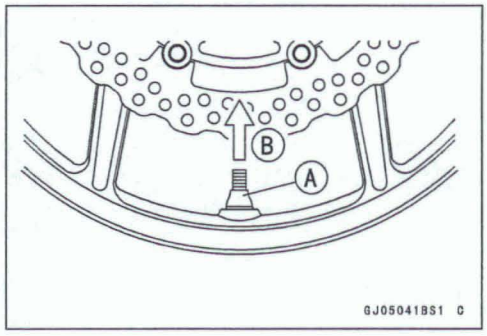
- Inspect the rim and tire, and replace them if necessary.
- Clean the sealing surfaces of the rim and tire, and smooth the sealing surfaces of the rim with a fine emery cloth if necessary.
- Remove the air valve and discard it.

NOTICE
Replace the air valve whenever the tire is replaced. Do not reuse the air valve.

Tires

- Install a new valve in the rim.

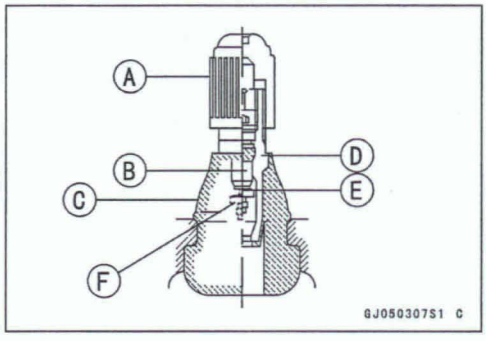
○Remove the valve cap, lubricate the stem seal [A] with a soap and water solution or rubber lubricant, and pull [B] the valve stem through the rim from the inside out until it snaps into place.



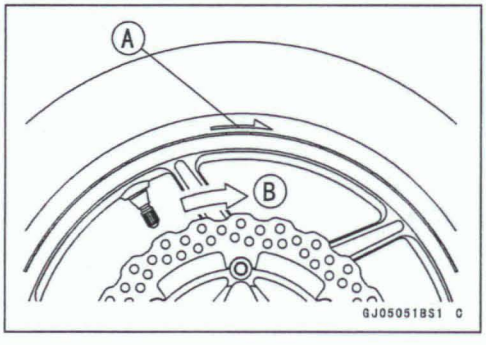
NOTICE

Do not use engine oil or petroleum distillates to lubricate the stem because they will deteriorate the rubber.

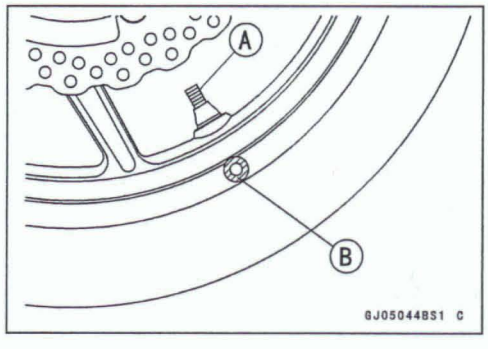
○The air valve is as shown.
Valve Cap [A]
Valve Core [B]
Stem Seal [C]
Valve Stem [D]
Valve Seat [E]
Valve Opened [F]



- 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]



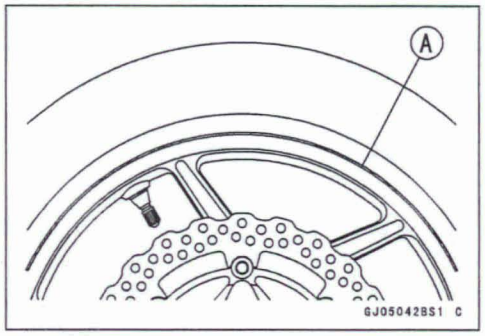
- Position the tire on the rim so that the valve [A] align with the tire balance mark [B] (the chalk mark made during removal, or the yellow paint mark on a new tire).
- Install the tire bead over the rim flange using a suitable commercially available tire changer.
- Lubricate the tire beads and rim 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).

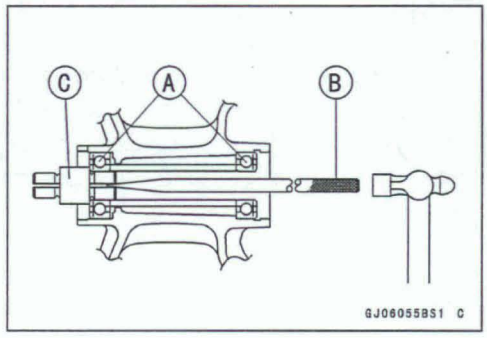
Tire Repair

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).
- Remove:
  Collars
  Coupling (Out of rear hub)
  Grease Seals
- Use the bearing remover to remove the hub bearings [A].



NOTICE

Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

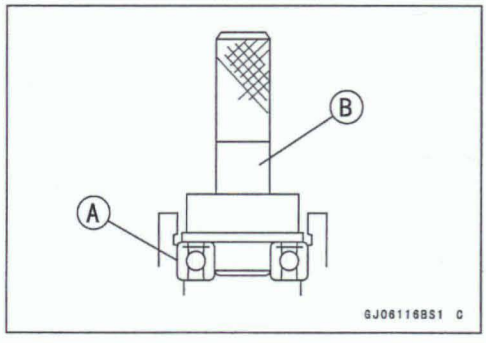
Special Tools - Bearing Remover Shaft, ϕ9 [B]: 57001-1265
Bearing Remover Head, ϕ15 × ϕ17 [C]: 57001-1267

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.
- By the following specified sequence, install the bearings.

○Press in the right side bearing [A] until it is bottomed.

Special Tool - Bearing Driver Set [B]: 57001-1129



○Install the collar into the hub from left side.
○Press in the left side bearing until it is bottomed.

Special Tool - Bearing Driver Set: 57001-1129

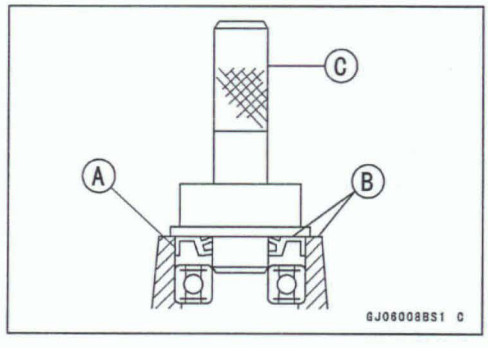
- Confirm that the axle can be inserted smoothly.
- Confirm that the each bearing inner race can be turned smoothly. Then visually inspect that the inner race of the opposite side turns.

★If they do not turn smoothly, remove the bearings and collar and visually inspect the wheel and collar.

- Replace the grease seals with new ones.
- Press in the grease seals [A] so that the seal surface is flush [B] with the end of the hole.

○Apply high-temperature grease to the grease seal lips.

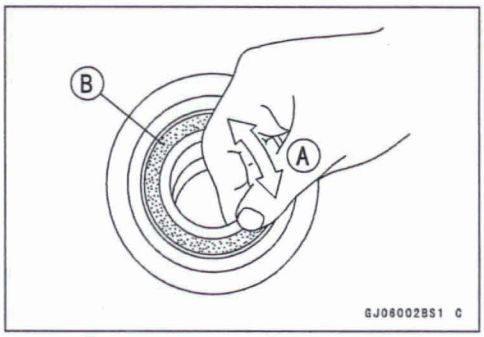
Special Tool - Bearing Driver Set [C]: 57001-1129



Hub Bearing

Hub Bearing Inspection

Since the hub bearings are made to extremely close tolerances, the clearance can not normally be measured.



NOTE

○*Do not remove any bearings for inspection. If any bearings are removed, they will need to be replaced with new ones.*

- Turn each bearing in the hub back and forth [A] while checking for plays, roughness, or binding.

★If bearing play, roughness, or binding is found, replace the bearing.

- Examine the bearing seal [B] for tears or leakage.

★If the seal is torn or is leaking, replace the bearing.

Hub Bearing Lubrication

NOTE

○*Since the hub bearings are packed with grease and sealed, lubrication is not required.*

Final Drive

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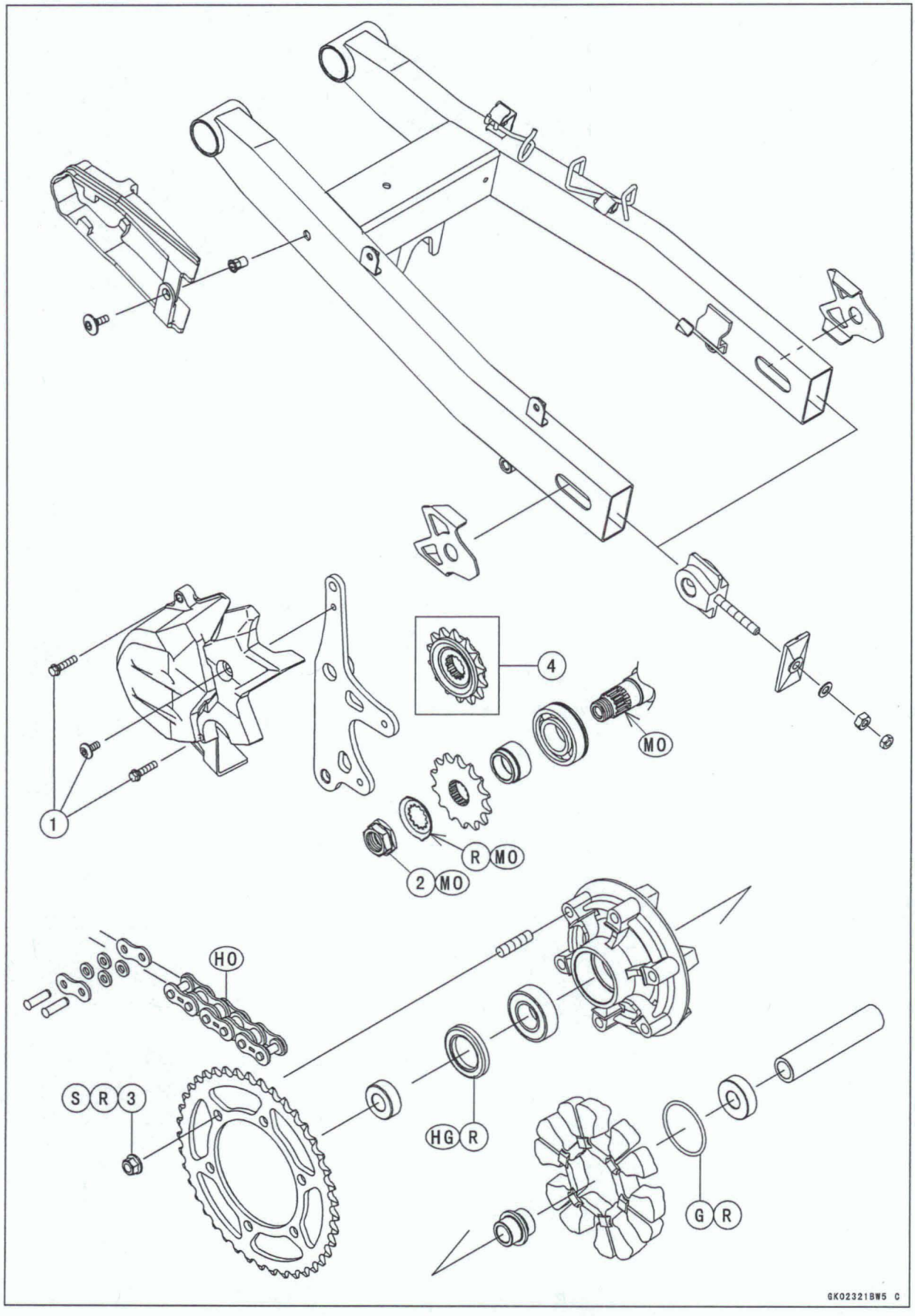
Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Engine Sprocket Cover Bolts	9.8	1.0	87 in·lb	
2	Engine Sprocket Nut	127	13.0	93.7	MO
3	Rear Sprocket Nuts	59	6.0	44	R, S

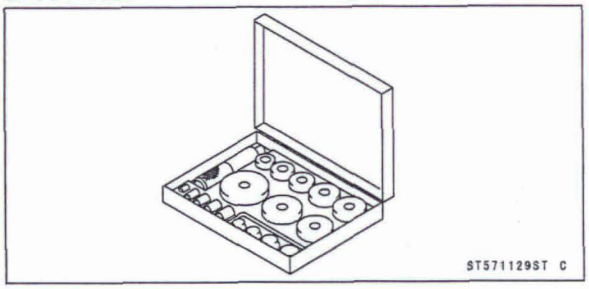
4. US, CA, CAL and PH
G: Apply grease.
HG: Apply high-temperature grease.
HO: Apply heavy oil.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
S: Follow the specified tightening sequence.

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	EK520SRO2	– – –
	EK520LVO3 (when shipping)	– – –
Link	106 links	– – –
Link Pin Outside Diameter (When drive chain replacing)	5.3 ~ 5.7 mm (0.21 ~ 0.22 in.)	– – –
Link Plates Outside Width (When drive chain replacing)	17.35 ~ 17.50 mm (0.6831 ~ 0.6890 in.)	– – –
Sprockets		
Rear Sprocket Warp	TIR 0.4 mm (0.016 in.) or less	TIR 0.5 mm (0.020 in.)

Special Tool

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

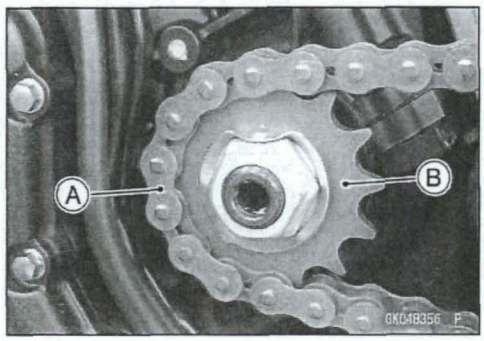
- Refer to the Drive Chain Lubrication Condition in the Periodic Maintenance chapter.

Drive Chain Guide Wear Inspection

- Refer to the Chain Guide Wear Inspection in the Periodic Maintenance chapter.

Drive Chain Removal

- Remove:
  Swingarm (see Swingarm Removal in the Suspension chapter)
- Remove the drive chain [A] from the engine sprocket [B], and take it off the chassis.



Drive Chain Installation

- Install the drive chain to the engine sprocket.
- Install the removed parts (see appropriate chapters).
- Adjust the drive chain slack after installing the chain (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).

Drive Chain Replacement

- Remove:
  Mud Guard (see Mud Guard Removal in the Frame chapter)
  Engine Sprocket Cover (see Engine Sprocket Removal)

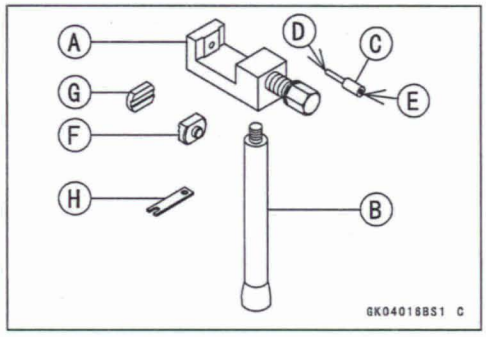
NOTICE
For safety, if the drive chain shall be replaced, replace it using a recommended tool.

Recommended Tool

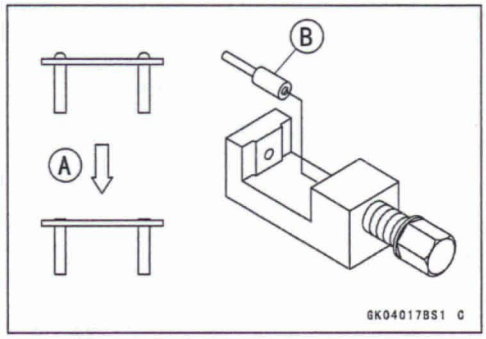
Type:	**EK Joint Tool #50**
Brand:	**ENUMA**

Drive Chain

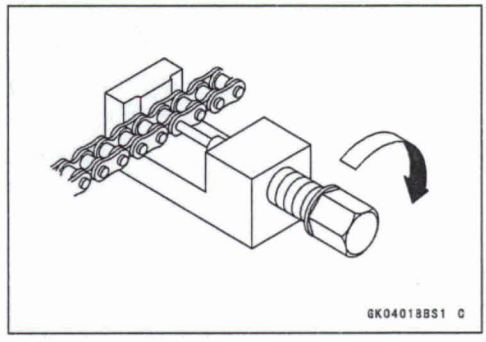
Body [A]
Handlebar [B]
Cutting and Riveting Pin [C]
For Cutting [D]
For Riveting [E]
Plate Holder (A) [F]
Plate Holder (B) [G]
Gauge [H]



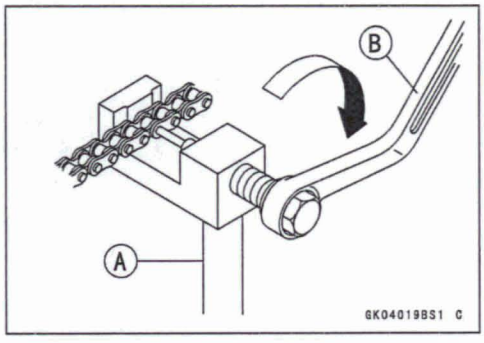
- Grind [A] the pin head to make it flat.
- Set the cutting and riveting pin [B] as shown.



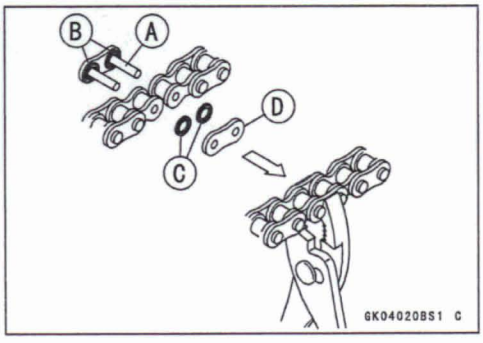
- Screw the pin holder until it touches the link pin.
- Be sure that the cutting pin hits center of the link pin.



- Screw the handlebar [A] into the body.
- Turn the pin holder with the wrench [B] clockwise to extract the link pin.

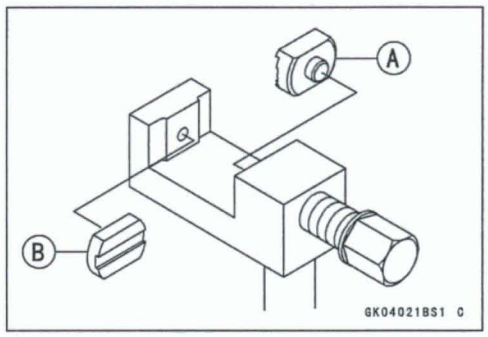


- Replace the link pin, link plate and grease seals.
- Apply grease to the link pins [A] and grease seals [B] [C].
- Engage the drive chain on the engine and rear sprockets.
- Insert the link pins in the drive chain ends.
- Install the grease seals.
- Install the link plate so that the mark [D] faces out.
- Push the link plate by hand or plier to fix it.
- Be sure to set the grease seals correctly.

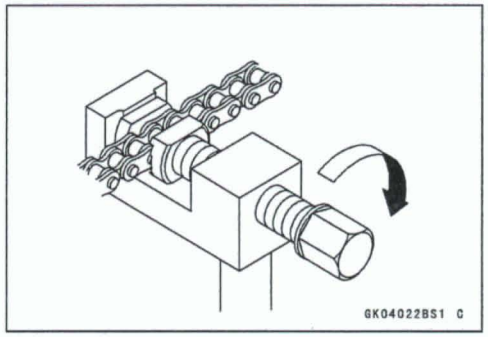


Drive Chain

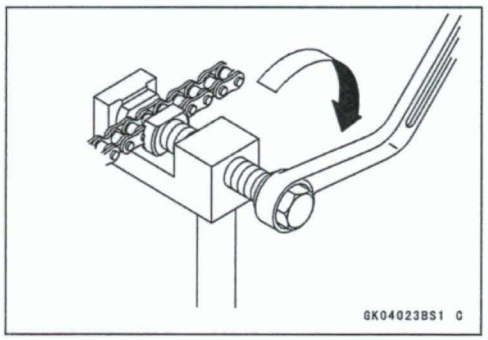
- Set the plate holder (A) [A] and plate holder (B) [B] on the body.



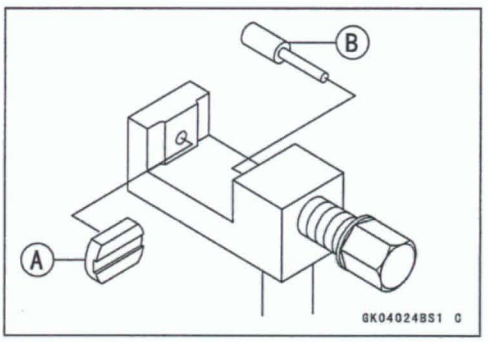
- Fit the plate holder (A) to the link plate.
- Turn the pin holder by hand until the plate holder (B) touches the other link plate.



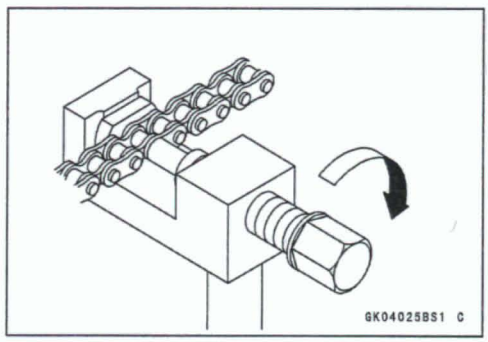
- Turn the pin holder by a wrench clockwise until two pins of link come into groove of the plate holder (A).
- Take off the plate holder.



- Set the plate holder (B) [A] and cutting and riveting pin [B] as shown.

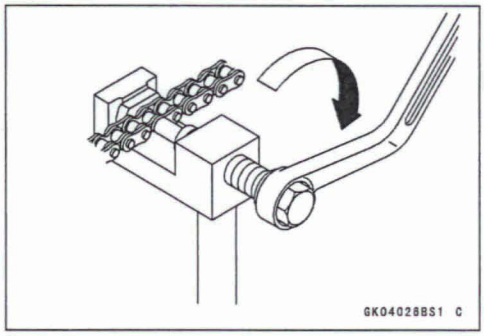


- Turn the pin holder until the riveting pin touches the link pin.



Drive Chain

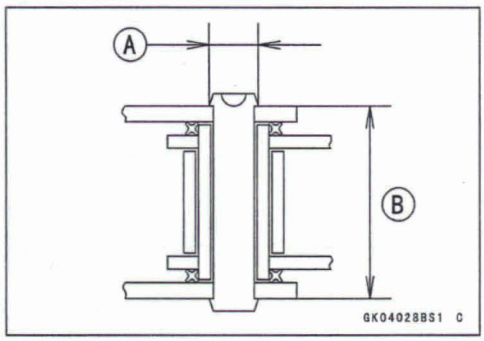
- Turn the wrench clockwise until the tip of riveting pin hits of the link pin.
- Rivet it.
- Same work for the other link pin.



- After staking, check the staked area of the link pin for cracks.
- Measure the outside diameter [A] of the link pin and link plates width [B].

Link Pin Outside Diameter
Standard: 5.3 ~ 5.7 mm (0.21 ~ 0.22 in.)

Link Plates Outside Width
Standard: 17.35 ~ 17.50 mm (0.6831 ~ 0.6890 in.)



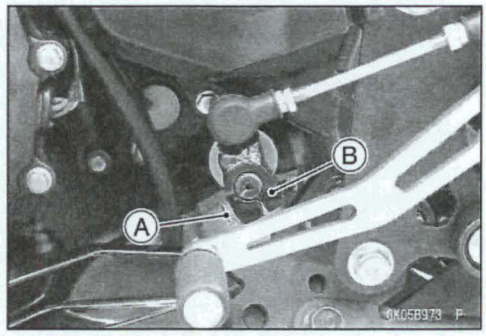
★If the reading exceeds the specified length, cut and rejoin the chain again.

- Check the 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).

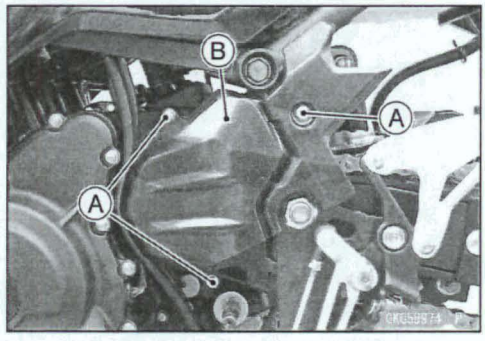
Sprocket, Coupling

Engine Sprocket Removal

- Remove:
  Shift Lever Clamp Bolt [A]
  Shift Lever [B]



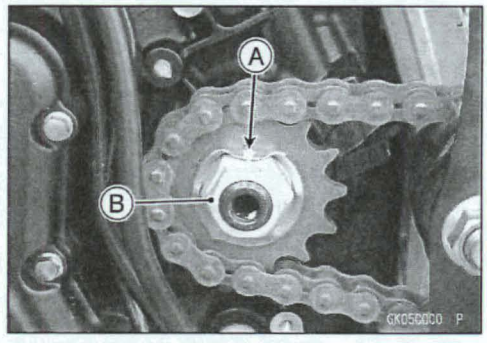
- Remove:
  Engine Sprocket Cover Bolts [A]
  Engine Sprocket Cover [B]



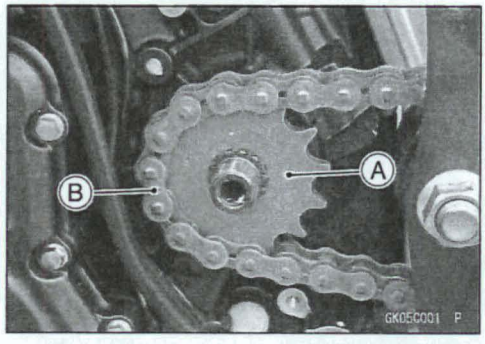
- Flatten out the bended washer [A].
- Remove the engine sprocket nut [B] and washer.

NOTE

○*When loosening the engine sprocket nut, hold the rear brake on.*



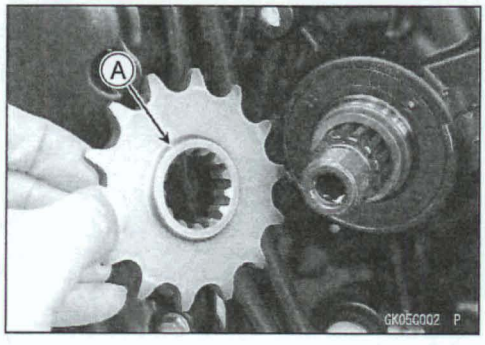
- Raise the rear wheel off the ground with the stand.
- Loosen the drive chain (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).
- Pull the engine sprocket [A] with drive chain [B] off the output shaft.
- Disengage the drive chain from the engine sprocket.



Engine Sprocket Installation

- Replace the sprocket washer and axle cotter pin.
- Install the engine sprocket so that protruding side [A] faces inside.
- Apply molybdenum disulfide oil solution to the threads of output shaft and the surface of washer.
- Tighten:

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



NOTE

○*Tighten the nut while applying the rear brake.*

- Bend the one side of the washer over the nut.

Sprocket, Coupling

- Install the engine sprocket cover.
- Tighten:

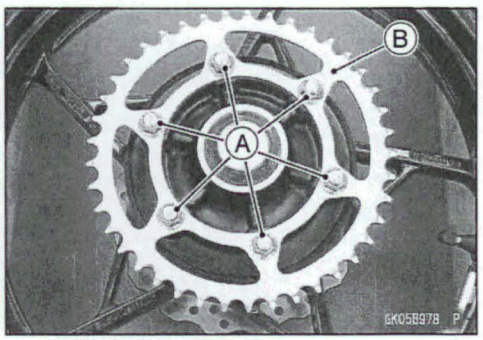
Torque - Engine Sprocket Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Adjust the drive chain slack after installing the engine sprocket (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).
- Install the removed parts (see appropriate chapters).

Rear Sprocket Removal

- Remove the rear wheel (see Rear Wheel Removal in the Wheels/Tires chapter).

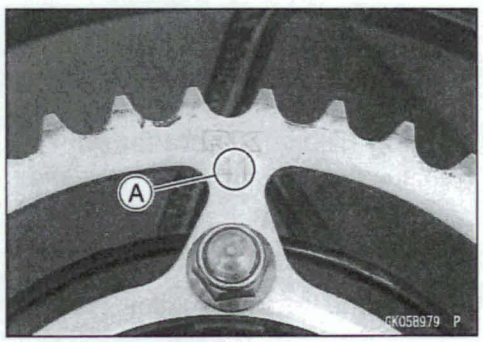
NOTICE
Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.



- Remove:
  Rear Sprocket Nuts [A]
  Rear Sprocket [B]

Rear Sprocket Installation

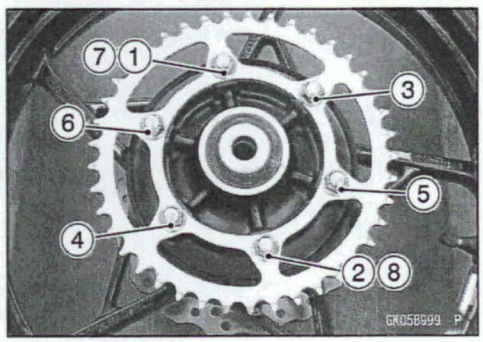
- Install the sprocket facing the tooth number marking [A] outward.



- Replace the rear sprocket nuts with new ones.
- Tighten the rear sprocket nuts following the specified tightening sequence [1 ~ 8].

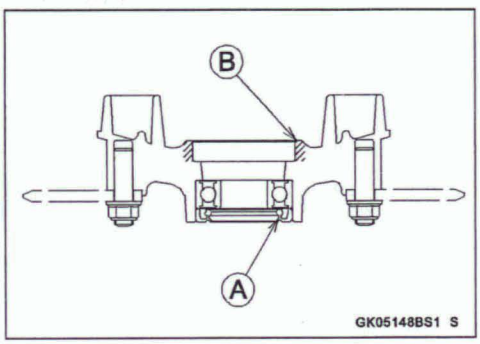
Torque - Rear Sprocket Nuts: 59 N·m (6.0 kgf·m, 44 ft·lb)

- Install the rear wheel (see Rear Wheel Installation in the Wheels/Tires chapter).



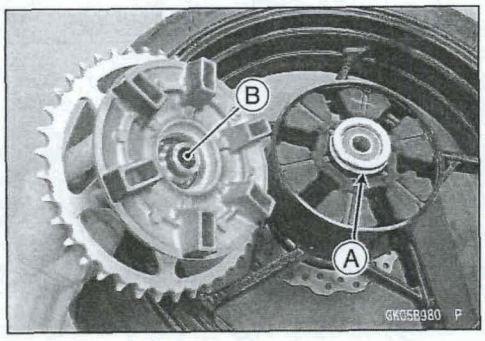
Coupling Installation

- Apply grease to the following.
  Coupling Grease Seal Lips [A]
  Coupling Internal Surface [B]



Sprocket, Coupling

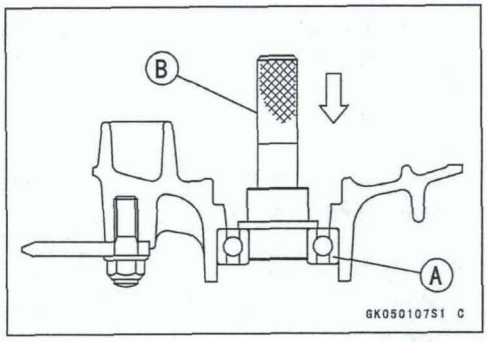
- Replace the O-ring [A] with a new one and apply grease to it.
- Install:
  O-ring
  Collar [B]
  Coupling



Coupling Bearing Removal

- Remove:
  Coupling
  Grease Seal
- 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.

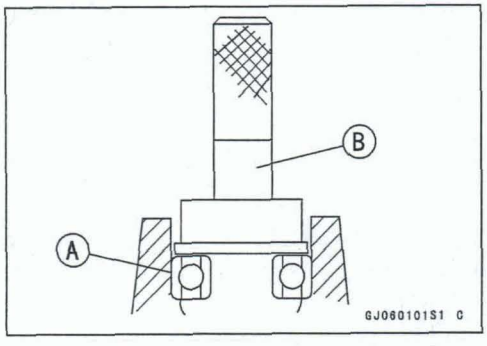
NOTE

○*Install the coupling bearing with the mark faces outside.*

- Press in the bearing [A] until it is bottomed.

Special Tool - Bearing Driver Set [B]: 57001-1129

○Pack the bearing with high-temperature grease.



- Replace the grease seal with a new one.
- Press in the grease seal so that the seal surface is flush with the end of the hole.

○Apply high-temperature grease to the grease seal lips.

Special Tool - Bearing Driver Set: 57001-1129

Coupling Bearing Inspection

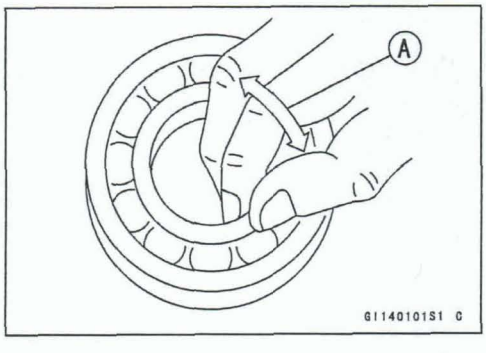
Since the coupling bearing is made to extremely close tolerances, the clearance can not normally be measured.

NOTE

○*It is not necessary to remove the coupling bearing for inspection. If the bearing is removed, it will need to be replaced with a new one.*

- Turn the bearing in the coupling back and forth [A] while checking for plays, roughness or binding.

★If the bearing play, roughness or binding is found, replace the bearing.



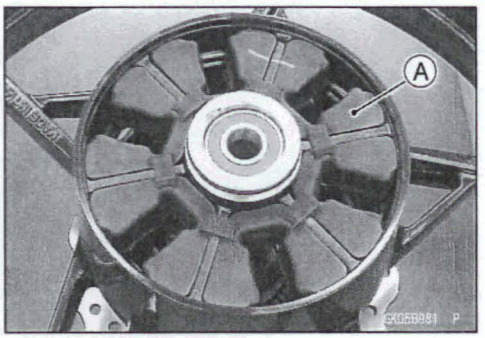
Sprocket, Coupling

Coupling Bearing Lubrication

- Pack the bearing with grease. Turn the bearing around by hand a few times to make sure the grease is distributed uniformly inside the bearing.

Coupling Damper Inspection

- Remove the rear wheel coupling, and inspect the rubber dampers [A].
- Replace the damper if it appears damaged or deteriorated.

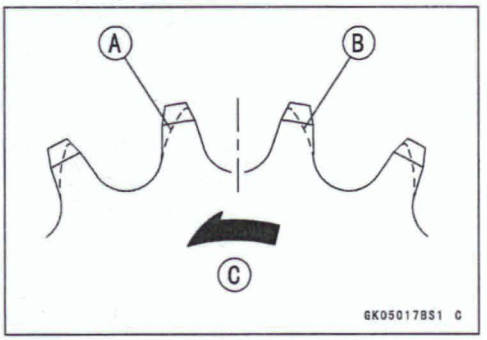


Sprocket Wear Inspection

- Visually inspect the engine and rear sprocket teeth for wear and damage.

★If the teeth are worn as illustrated, replace the sprocket, and inspect the drive chain wear (see Drive Chain Wear Inspection in the Periodic Maintenance chapter).

Worn Tooth (Engine Sprocket) [A]
Worn Tooth (Rear Sprocket) [B]
Direction of Rotation [C]



NOTE

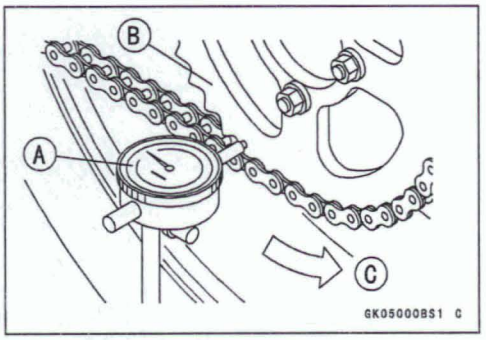
○*If a sprocket requires replacement, the chain is probably worn also. When replacing a sprocket, inspect the chain.*

Rear Sprocket Warp Inspection

- Raise the rear wheel off the ground with the stand so that it will turn freely.
- Set a dial gauge [A] against the rear sprocket [B] near the teeth as shown, and rotate [C] the rear wheel to measure the sprocket runout (warp). The difference between the highest and lowest dial gauge readings is the amount of runout (warp).

★If the runout exceeds the service limit, replace the rear sprocket.

Rear Sprocket Warp
Standard: TIR 0.4 mm (0.016 in.) or less
Service Limit: TIR 0.5 mm (0.020 in.)



Brakes

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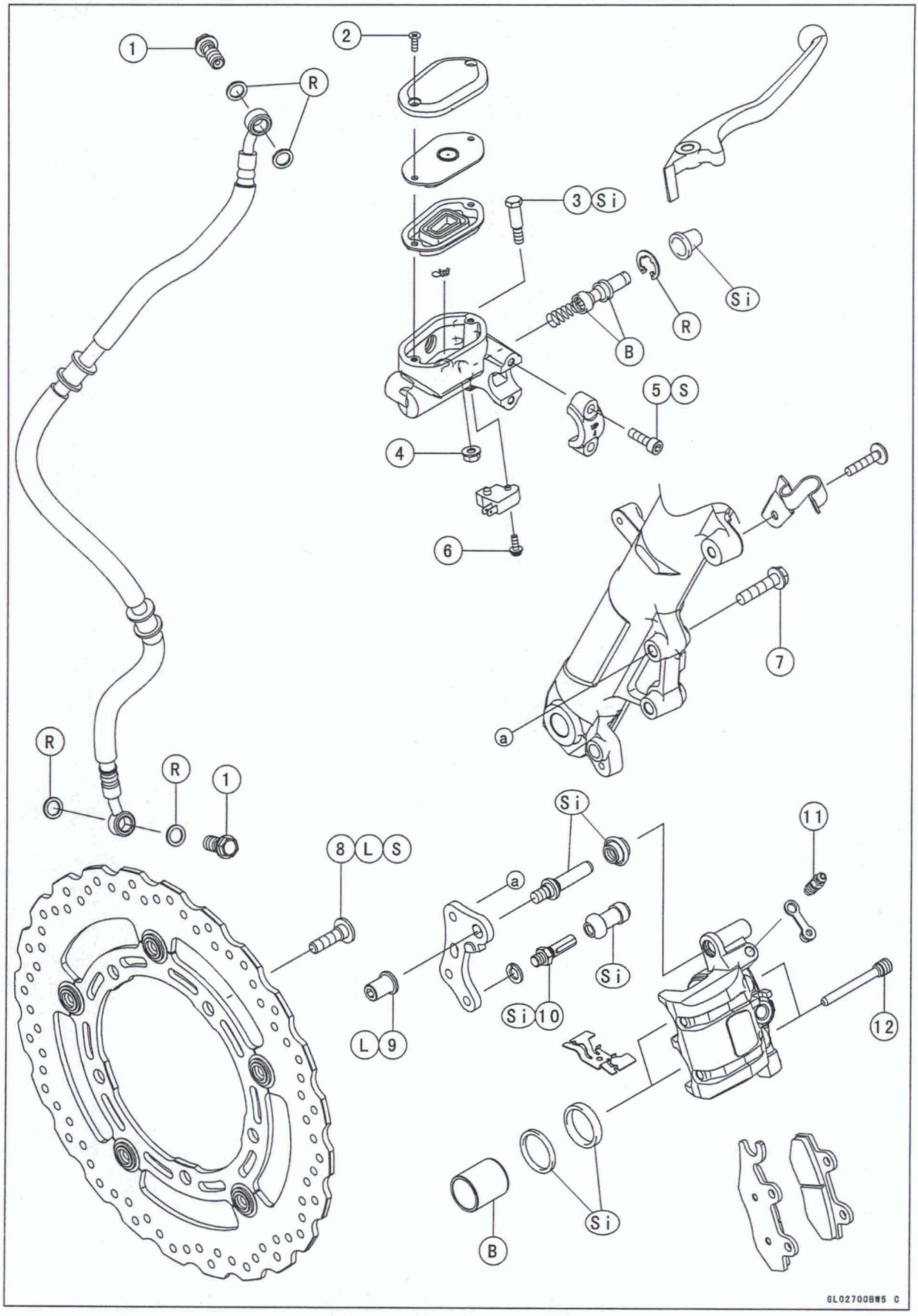
Exploded View

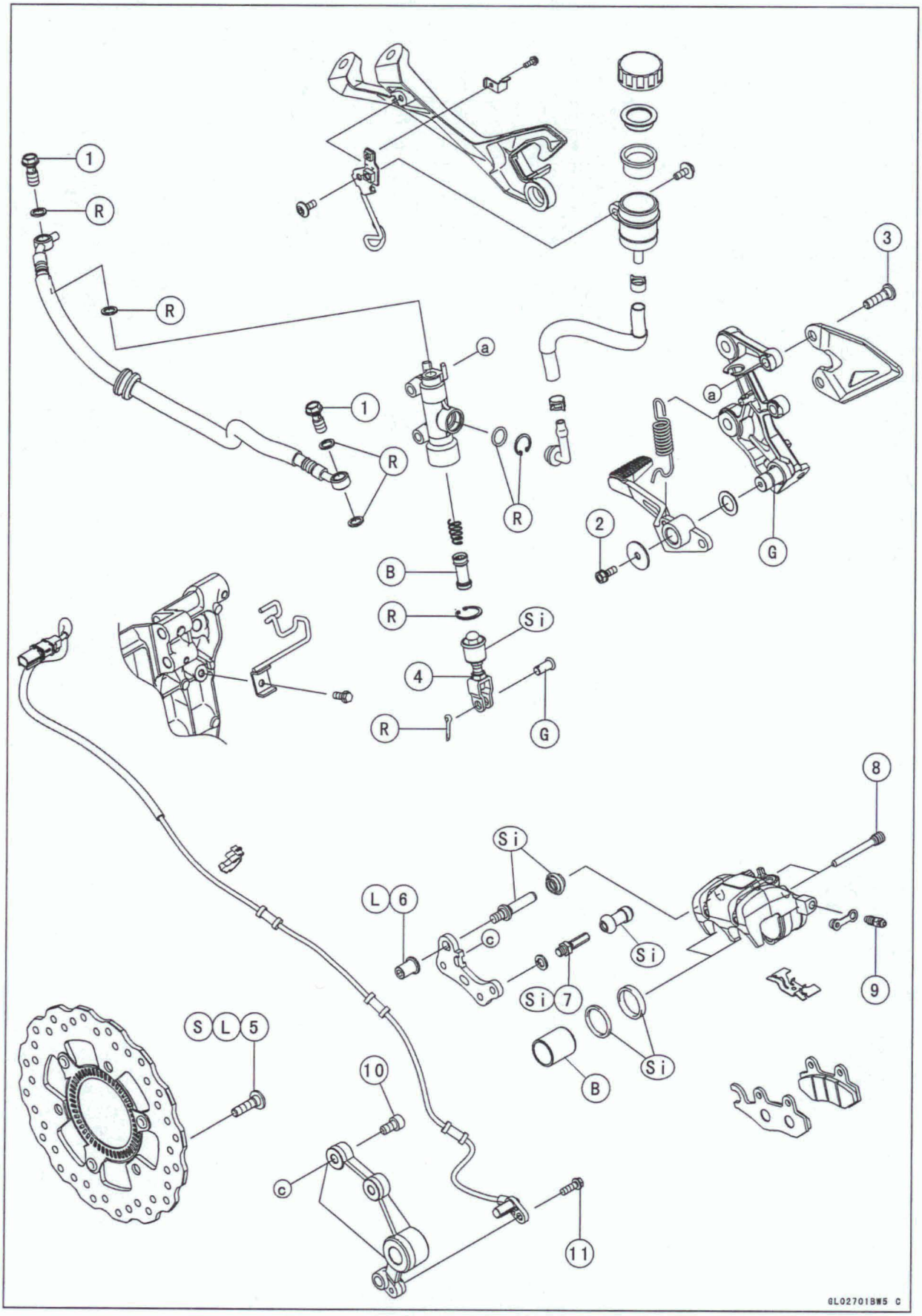


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Brake Hose Banjo Bolts	25	2.5	18	
2	Front Brake Reservoir Cap Screws	1.5	0.15	13 in·lb	
3	Brake Lever Pivot Bolt	5.9	0.60	52 in·lb	Si
4	Brake Lever Pivot Bolt Locknut	5.9	0.60	52 in·lb	
5	Front Master Cylinder Clamp Bolts	8.8	0.90	78 in·lb	S
6	Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
7	Front Caliper Mounting Bolts	25	2.5	18	
8	Brake Disc Mounting Bolts	27	2.8	20	L, S
9	Front Caliper Holder Pin Nut	22	2.2	16	L
10	Front Caliper Holder Pin	17.2	1.75	12.7	Si
11	Bleed Valve	5.4	0.55	48 in·lb	
12	Front Brake Pad Pins	17.2	1.75	12.7	

B: Apply brake fluid.
L: Apply a non-permanent locking agent.
R: Replacement Parts
S: Follow the specified tightening sequence.
Si: Apply silicone grease.

Exploded View



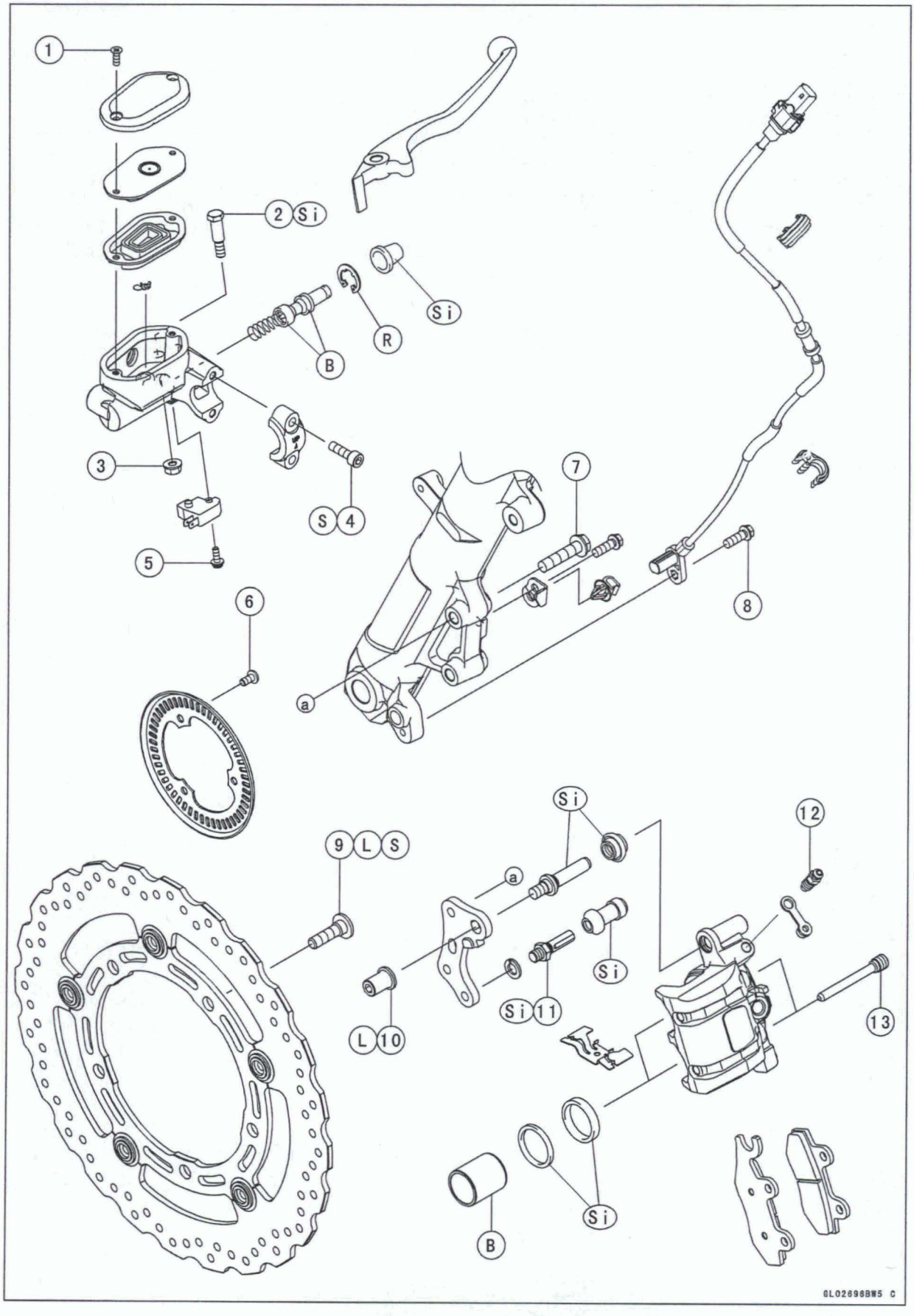
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Brake Hose Banjo Bolts	25	2.5	18	
2	Brake Pedal Bolt	8.8	0.90	78 in lb	
3	Rear Master Cylinder Mounting Bolts	25	2.5	18	
4	Rear Master Cylinder Push Rod Locknut	17.2	1.75	12.7	
5	Brake Disc Mounting Bolts	27	2.8	20	L, S
6	Rear Caliper Holder Pin Nut	22	2.2	16	L
7	Rear Caliper Holder Pin	17.2	1.75	12.7	Si
8	Rear Brake Pad Pins	17.2	1.75	12.7	
9	Bleed Valve	5.4	0.55	48 in lb	
10	Rear Caliper Mounting Bolts	25	2.5	18	
11	Rear Wheel Rotation Sensor Bolt	6.9	0.70	61 in lb	

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.

Exploded View

ABS Equipped Models



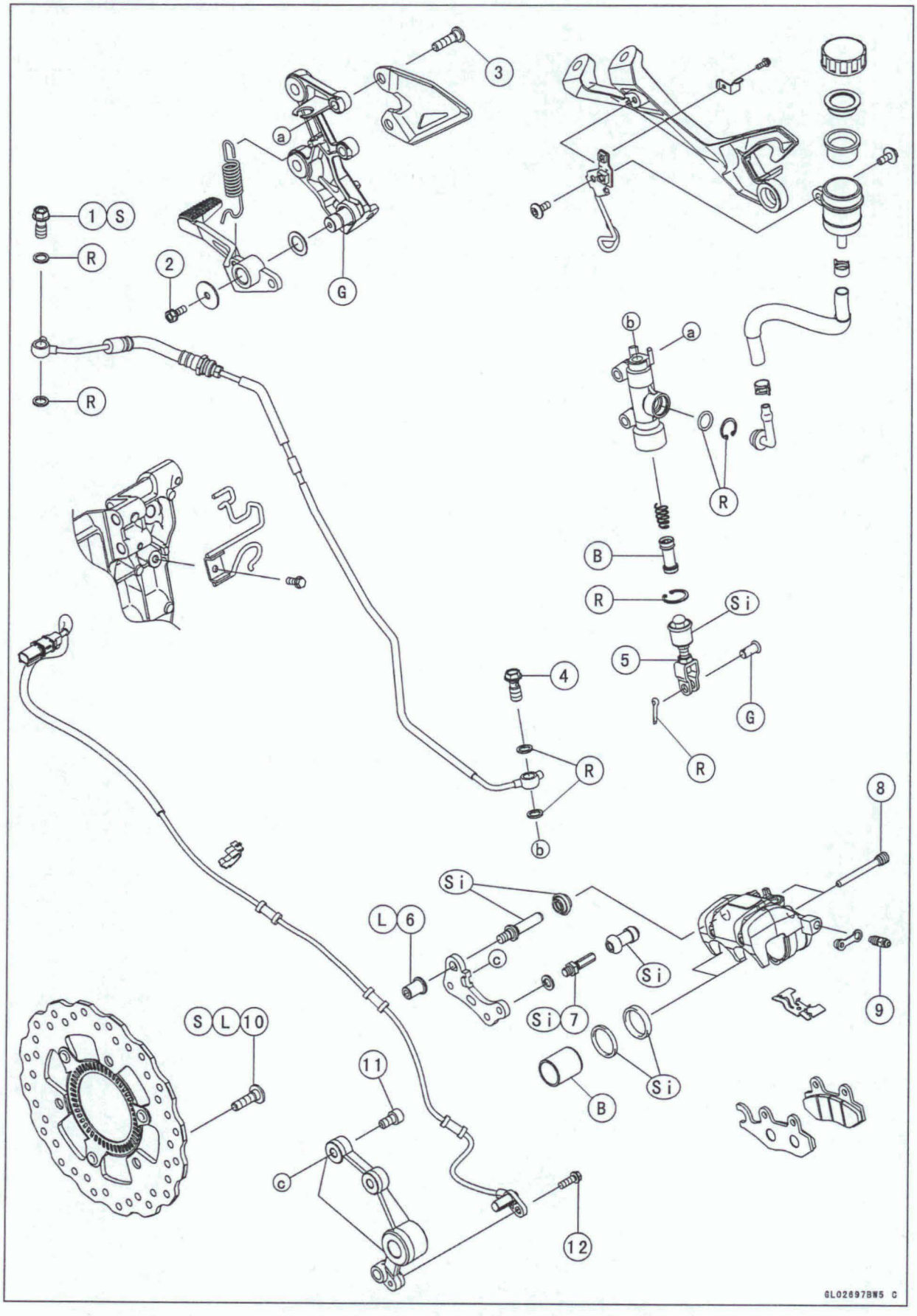
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Brake Reservoir Cap Screws	1.5	0.15	13 in·lb	
2	Brake Lever Pivot Bolt	5.9	0.60	52 in·lb	Si
3	Brake Lever Pivot Bolt Locknut	5.9	0.60	52 in·lb	
4	Front Master Cylinder Clamp Bolts	8.8	0.90	78 in·lb	S
5	Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
6	Front Wheel Rotation Sensor Rotor Bolts	4.15	0.423	37 in·lb	
7	Front Caliper Mounting Bolts	25	2.5	18	
8	Front Wheel Rotation Sensor Bolt	6.9	0.70	61 in·lb	
9	Brake Disc Mounting Bolts	27	2.8	20	L, S
10	Front Caliper Holder Pin Nut	22	2.2	16	L
11	Front Caliper Holder Pin	17.2	1.75	12.7	Si
12	Bleed Valve	5.4	0.55	48 in·lb	
13	Front Brake Pad Pins	17.2	1.75	12.7	

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

ABS Equipped Models



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Brake Hose Banjo Bolt (ABS Hydraulic Unit)	33	3.4	24	S
2	Brake Pedal Bolt	8.8	0.90	78 in·lb	
3	Rear Master Cylinder Mounting Bolts	25	2.5	18	
4	Brake Hose Banjo Bolt	25	2.5	18	
5	Rear Master Cylinder Push Rod Locknut	17.2	1.75	12.7	
6	Rear Caliper Holder Pin Nut	22	2.2	16	L
7	Rear Caliper Holder Pin	17.2	1.75	12.7	Si
8	Rear Brake Pad Pins	17.2	1.75	12.7	
9	Bleed Valve	5.4	0.55	48 in·lb	
10	Brake Disc Mounting Bolts	27	2.8	20	L, S
11	Rear Caliper Mounting Bolts	25	2.5	18	
12	Rear Wheel Rotation Sensor Bolt	6.9	0.70	61 in·lb	

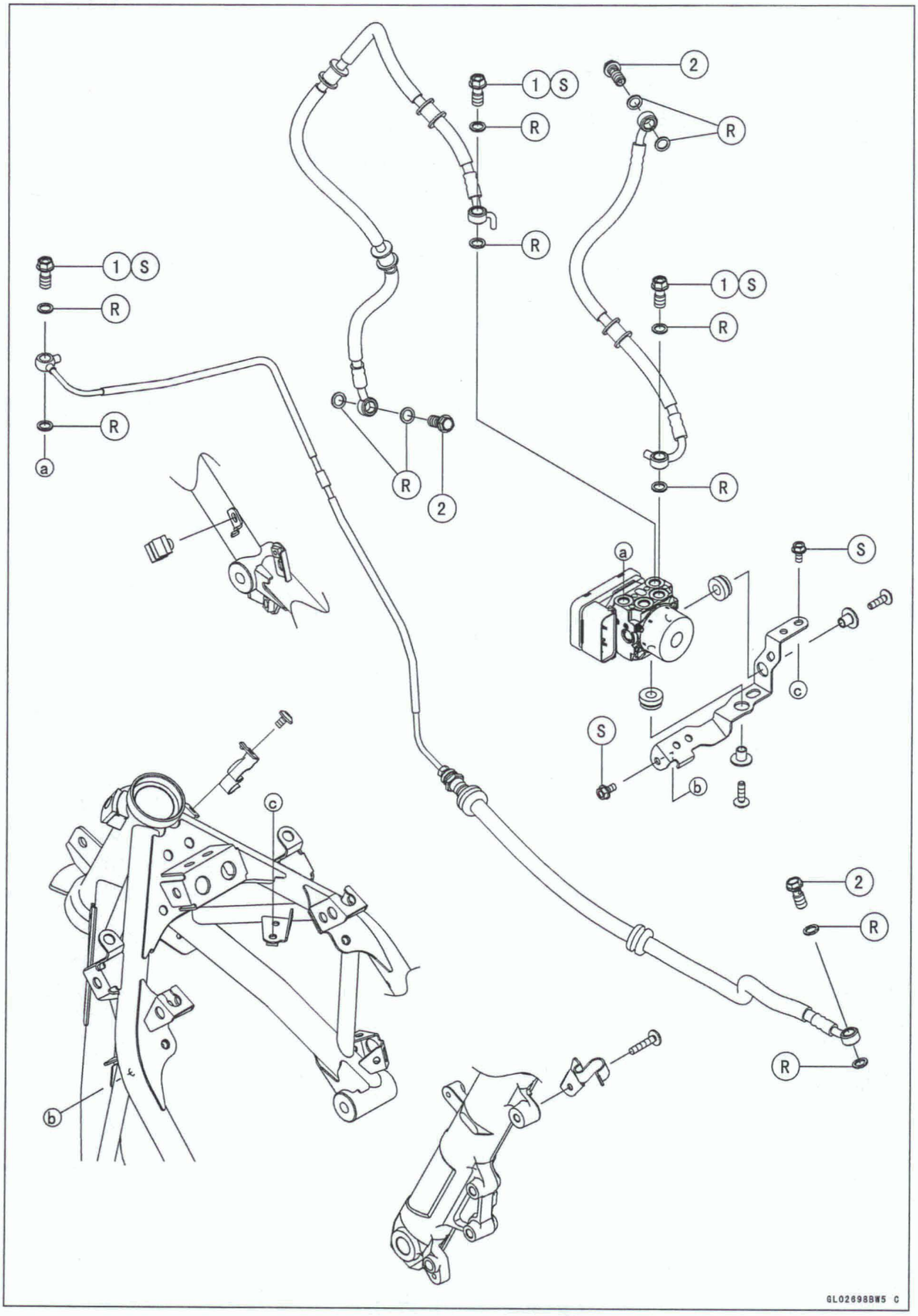
B: Apply brake fluid.
G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts
S: Follow the specified tightening sequence.
Si: Apply silicone grease.

NOTE

○*When disassembling the brake hose and pipe, disassemble them by the unit as shown in the exploded view.*

Exploded View

ABS Equipped Models



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Brake Hose Banjo Bolts (ABS Hydraulic Unit)	33	3.4	24	S
2	Brake Hose Banjo Bolts	25	2.5	18	

R: Replacement Parts
S: Follow the specified tightening sequence.

NOTE

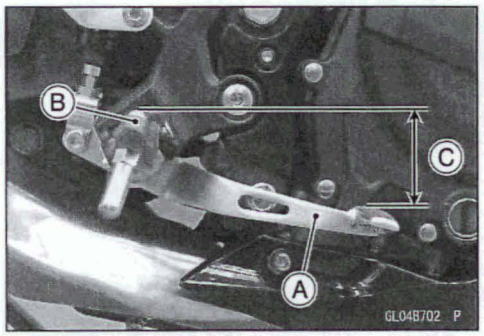
○*When disassembling the brake hose and pipe, disassemble them by the unit as shown in the exploded view.*

Specifications

Item	Standard	Service Limit
Brake Lever, Brake Pedal		
Brake Lever Position	Non-adjustable	– – –
Brake Lever Free Play	Non-adjustable	– – –
Pedal Free Play	Non-adjustable	– – –
Pedal Position	About 55 mm (2.2 in.) below top of footpeg	– – –
Brake Pads		
Lining Thickness:		
Front	4.5 mm (0.18 in.)	1.0 mm (0.04 in.)
Rear	4.5 mm (0.18 in.)	1.5 mm (0.06 in.)
Brake Discs		
Thickness:		
Front	4.3 ~ 4.7 mm (0.17 ~ 0.19 in.)	4.0 mm (0.16 in.)
Rear	4.8 ~ 5.2 mm (0.19 ~ 0.20 in.)	4.5 mm (0.18 in.)
Runout	TIR 0.15 mm (0.0059 in.) or less	TIR 0.3 mm (0.013 in.)
Brake Fluid		
Grade:		
Front	DOT3 or DOT4	– – –
Rear	DOT4	– – –
ABS (Equipped Models)		
ABS Hydraulic Unit:		
Make	NISSIN	– – –
Wheel Rotation Sensor Air Gap:		
Front	0.6 ~ 1.5 mm (0.02 ~ 0.06 in.)	– – –
Rear	0.8 ~ 1.5 mm (0.03 ~ 0.06 in.)	– – –

Brake Pedal

Brake Pedal Position Inspection

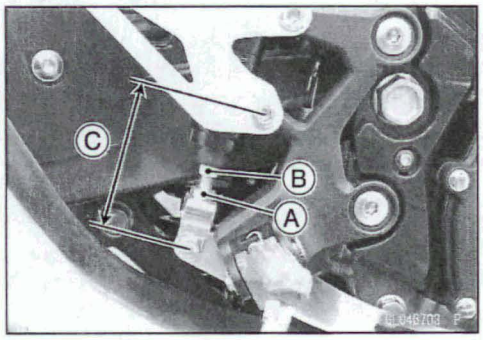


- Check that the brake pedal [A] is in the correct position.
  Footpeg [B]

Pedal Position
Standard: About 55 mm (2.2 in.) [C] below top of footpeg

★If it is incorrect, adjust the brake pedal position.

Brake Pedal Position Adjustment



NOTE

○*Usually it is not necessary to adjust the pedal position, but always adjust it when push rod locknut has been loosened.*

- Loosen the locknut [A] and turn the push rod with the hex head [B] to achieve the correct pedal position.

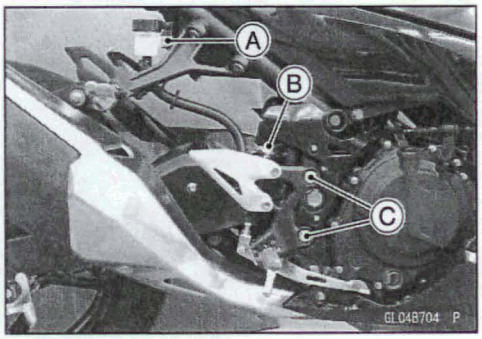
★If the length [C] shown is **78 ±1 mm (3.07 ±0.04 in.)**, the pedal position will be within the standard range.

- Tighten:

Torque - Rear Master Cylinder Push Rod Locknut: 17.2 N·m (1.75 kgf·m, 12.7 ft·lb)

- Check the brake light switch operation (see Brake Light Switch Operation Inspection in the Periodic Maintenance chapter).

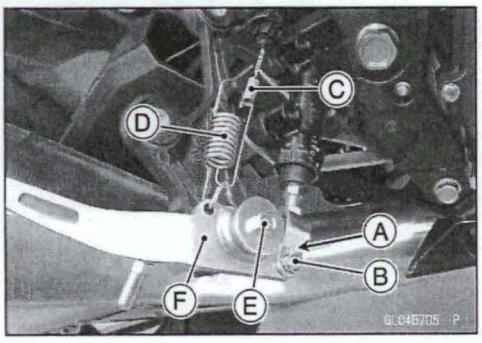
Brake Pedal Removal



- Remove the bolt [A].
- Loosen the banjo bolt [B] and tighten it loosely to prevent the fluid spillage (ABS Equipped Models).

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

- Remove the right front footpeg bracket bolts [C].
- Remove the banjo bolt and disconnect the brake hose (ABS Equipped Models).
- Turn the right front footpeg bracket inside out.



- Remove:
  Cotter Pin [A]
  Joint Pin [B]
  Rear Brake Light Switch Spring [C]
  Return Spring [D]
- Remove the brake pedal bolt [E] and brake pedal [F].

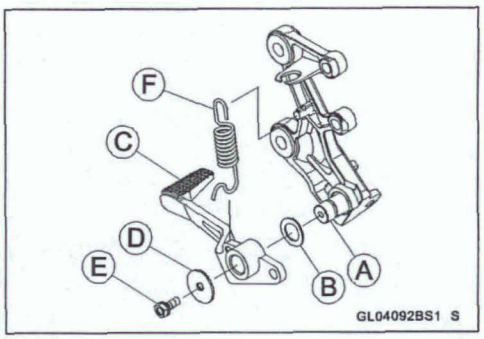
Brake Pedal

Brake Pedal Installation

- Apply grease to the pivot shaft [A] and install the washer [B].
- Install:
  Brake Pedal [C]
  Washer [D]
- Tighten:

Torque - Brake Pedal Bolt [E]: 8.8 N·m (0.90 kgf·m, 78 in·lb)

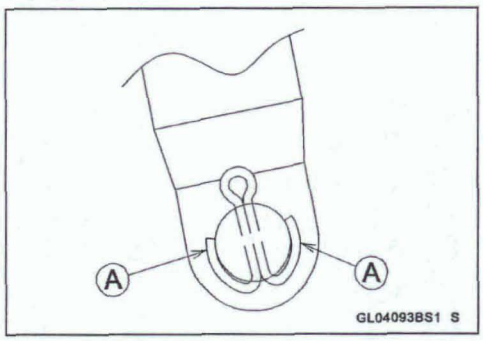
- Hook:
  Rear Brake Light Switch Spring
  Return Spring [F]



- Replace the cotter pin with a new one.
- Insert the joint pin from the outside.
- Insert the cotter pin and bend the pin ends [A].
- Install the right front footpeg bracket, and tighten the bolts.

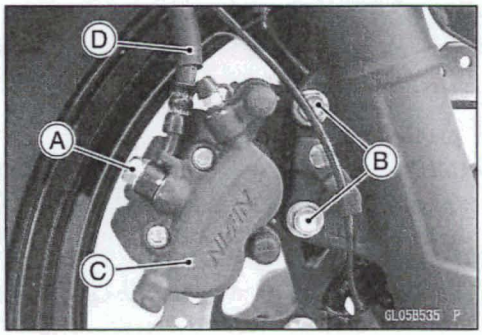
Torque - Front Footpeg Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Check the brake pedal position (see Brake Pedal Position Inspection).
- Install the removed parts (see appropriate chapters).



Calipers

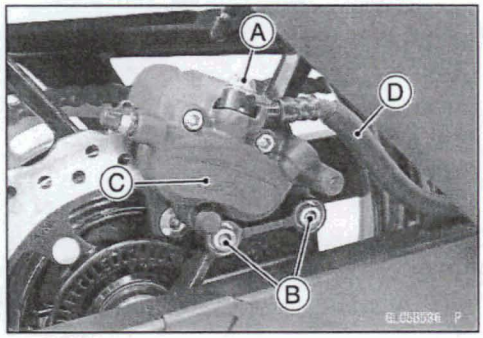
Front Caliper Removal



- Loosen the banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Remove the caliper mounting bolts [B] and caliper [C].
- Remove the banjo bolt to disconnect the brake hose [D] from the caliper (see Brake Hose Removal/Installation).

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

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 caliper [C].
- Remove the banjo bolt and disconnect the brake hose [D] from the caliper (see Brake Hose Removal/Installation).

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

Caliper Installation

- Install the caliper and brake hose lower end.

○Replace the washers on each side of hose fitting with new ones.

○Fit the brake hose fitting into the groove on the caliper.

- Tighten:

Torque - Caliper Mounting Bolts:
Front: 25 N·m (2.5 kgf·m, 18 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.

Front Caliper Assembly

- Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Calipers

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.

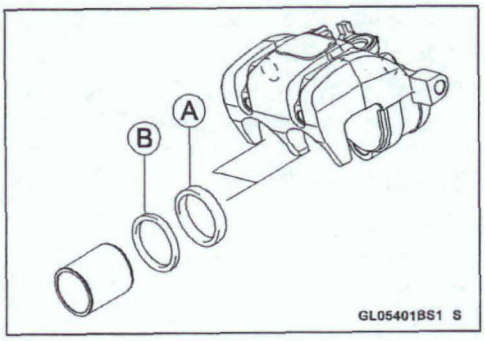
Caliper Fluid Seal Damage Inspection

The fluid seals (piston seals) [A] are 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.

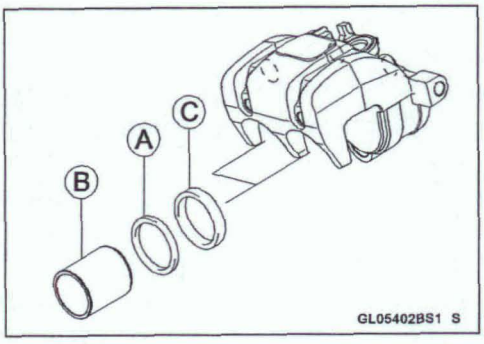


Caliper Dust Seal Damage Inspection

- 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.

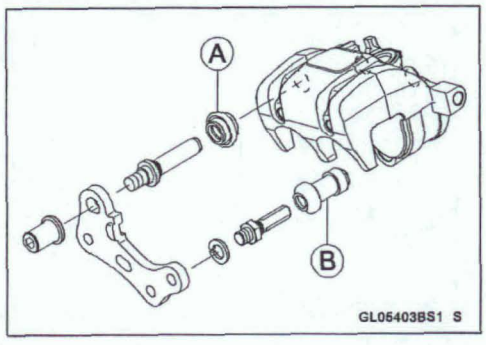
Pistons [B]
Fluid Seals [C]



Caliper Boots Inspection

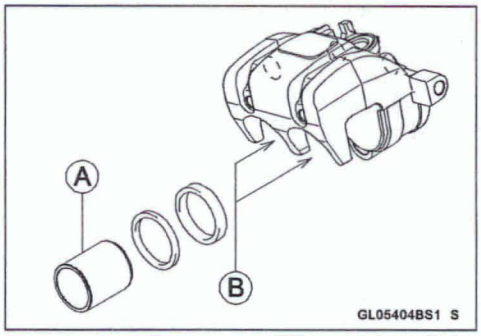
- Check that the dust boot [A] and friction boot [B] are not cracked, worn, swollen, or otherwise damaged.

★If they show any damage, replace it.



Calipers

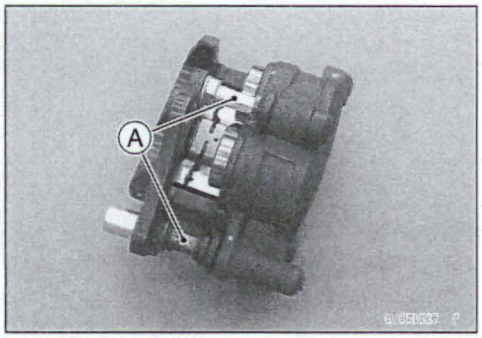
Caliper Piston and Cylinder Damage Inspection



- Visually inspect the pistons [A] and cylinder surfaces [B].

★Replace the caliper if the cylinder and piston are badly scores or rusty.

Caliper Holder Pin Inspection



The caliper body must slide smoothly on the caliper holder pins [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.

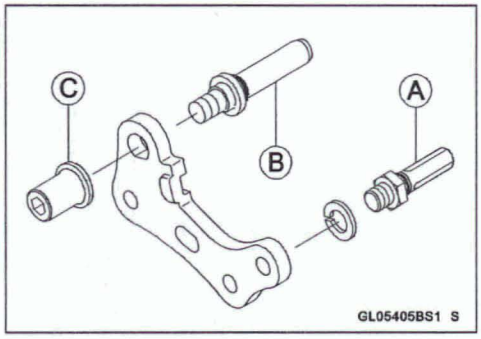
- Check to see that the caliper holder pins are not badly worn or stepped, and that the rubber boots are not damaged.

★If the caliper holder pin is damaged, inspect the caliper holder for warp or deformation. If the caliper holder is in good condition, replace the caliper holder pins [A] [B].

Torque - Caliper Holder Pin: 17.2 N·m (1.75 kgf·m, 12.7 ft·lb)

○Apply a non-permanent locking agent to the threads of the caliper holder pin nut [C].

Torque - Caliper Holder Pin Nut: 22 N·m (2.2 kgf·m, 16 ft·lb)



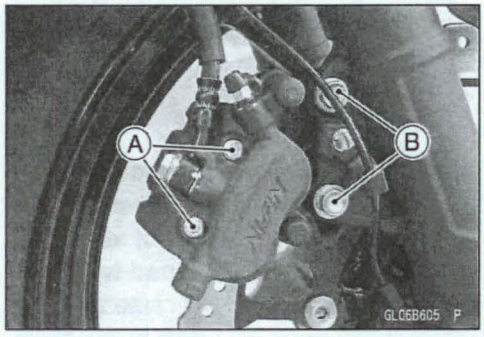
Brake Pads

Brake Pad Removal

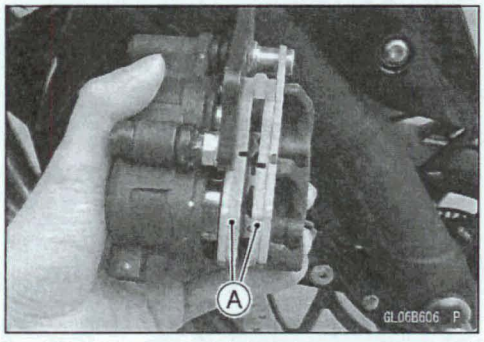
NOTE

○*The procedure to remove the front brake pad is as follows. Removing the rear brake pad is the same as for the front brake pad.*

- Loosen the pad pins [A].
- Remove the caliper mounting bolts [B].
- Remove the caliper with the hose installed.



- Remove:
  Pad Pins
  Brake Pads [A]

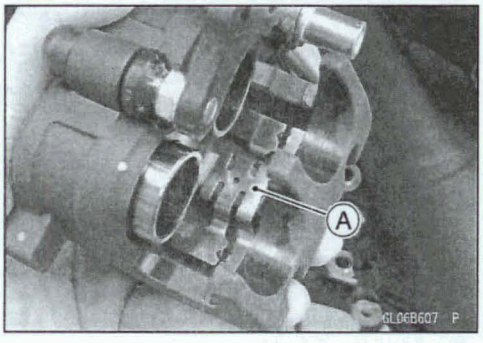


Brake Pad Installation

NOTE

○*The procedure to install the front brake pad is as follows. Installing the rear brake pad is the same as for the front brake pad.*

- Push the caliper pistons in by hand as far as they will go.
- Install the pad spring [A] in its correct position.
- Install the pad on the piston side first, then install the other side pad on the holder.
- Insert the pad pins.



- Install the caliper (see Caliper Installation).
- Tighten:

Torque - Brake Pad Pins: 17.2 N·m (1.75 kgf·m, 12.7 ft·lb)

⚠ WARNING

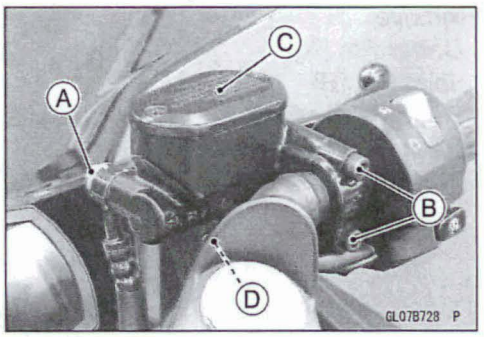
After servicing, it takes several applications of the brake lever or pedal before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever or pedal is obtained by pumping the lever or pedal until the pads are against the disc.

Brake Pad Wear Inspection

- Refer to the Brake Pad Wear Inspection in the Periodic Maintenance chapter.

Master Cylinder

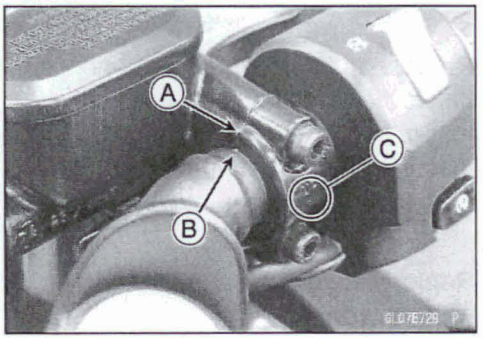
Front Master Cylinder Removal



- Remove the banjo bolt [A] to disconnect the brake hose from the master cylinder (see Brake Hose Removal/Installation).
- Remove the clamp bolts [B] and remove the master cylinder [C] with the reservoir, brake lever, and brake switch as an assembly.
- Disconnect the front brake light switch connector [D].

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

Front Master Cylinder Installation



- Connect the front brake light switch connector.
- Set the front master cylinder to match its mating surface [A] to the punch mark [B] of the handlebar.
- The master cylinder clamp must be installed with the arrow mark [C] upward.
- Tighten the upper clamp bolt first, and then the lower clamp bolt.

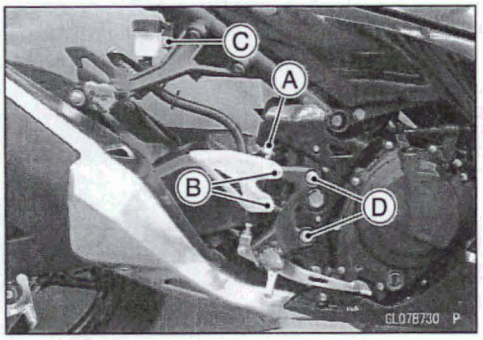
Torque - Front Master Cylinder Clamp Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

- Replace the washers that are on each side of the hose fitting with new ones.
- Tighten:

Torque - Brake Hose Banjo Bolts: 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



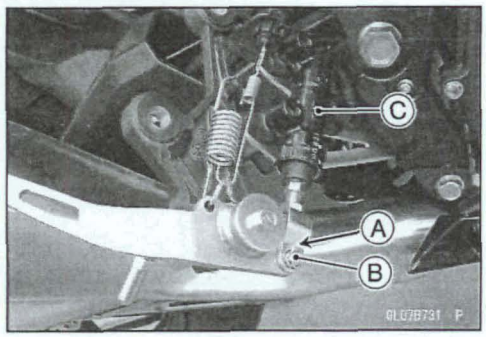
- Loosen the brake hose banjo bolt [A] and rear master cylinder mounting bolts [B].
- Remove:
  Bolt [C]
  Right Front Foot Peg Bracket Bolts [D]
  Brake Hose Banjo Bolt

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

- Drain the brake fluid into a container.
- Turn the right front footpeg bracket inside out.

Master Cylinder

- Remove:
  Cotter Pin [A]
  Joint Pin [B]
  Rear Master Cylinder Mounting Bolts
  Rear Master Cylinder [C]



Rear Master Cylinder Installation

- Tighten:

Torque - Rear Master Cylinder Mounting Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

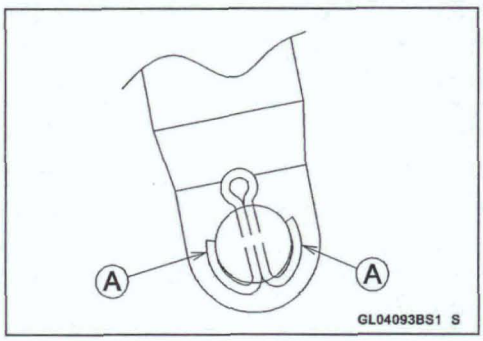
- Replace the cotter pin with a new one.
- Insert the joint pin from the outside.
- Insert the cotter pin and bend the pin end [A].
- Install the right front footpeg bracket, and tighten the bolts.

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

- Replace the washers that are on each side of hose fitting with new ones.
- Fit the brake hose fitting into the groove on the rear master cylinder.
- Tighten:

Torque - Brake Hose Banjo Bolts: 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.



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

- 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.

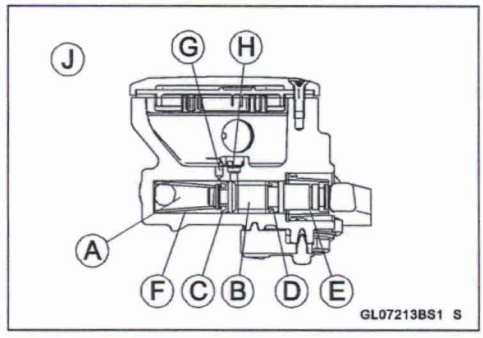
- Check the piston return springs [F] for any damage.

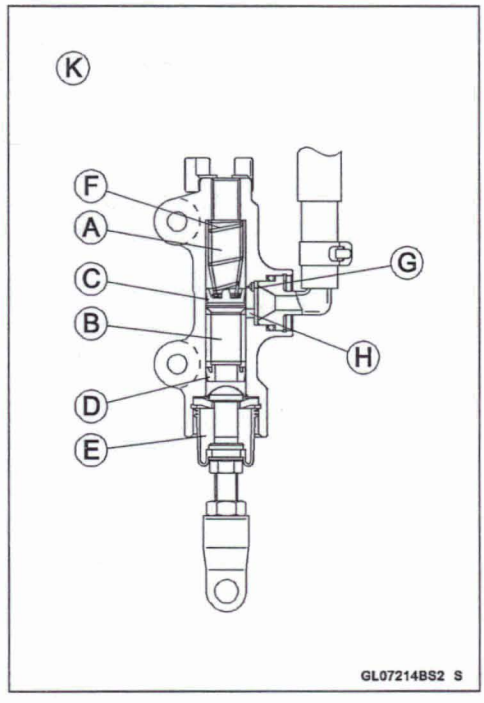
★If the springs are damaged, replace them.

- 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 [J]
Rear Master Cylinder [K]

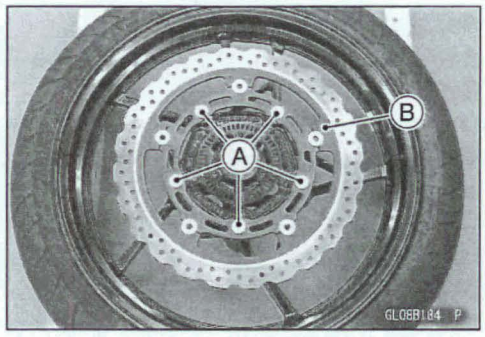




Brake Disc

Brake Disc Removal

- Remove the wheels (see Front/Rear Wheel Removal in the Wheels/Tires chapter).
- Remove the brake disc mounting bolts [A] and brake disc [B].



NOTE

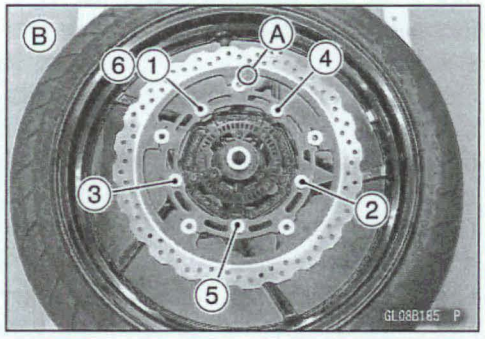
○Handle the wheel rotation sensor rotor carefully and do not apply the external force to deform it. There is a possibility that the sensor cannot read the signal correctly from the rotor.

Brake Disc Installation

- Install the brake disc on the wheel so that the marked side [A] faces out.
- Apply a non-permanent locking agent to the threads of the front and rear brake disc mounting bolts.
- Tighten the front and rear brake disc mounting bolts following the specified tightening sequence.

  Front Brake Disc [B]

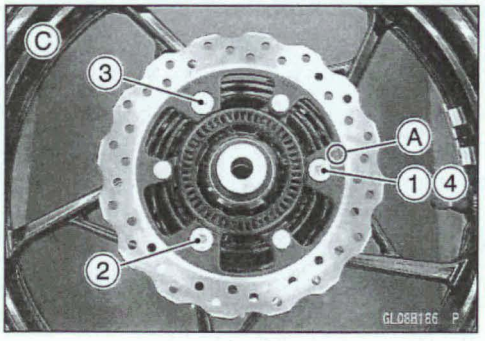
  Rear Brake Disc [C]



Torque - Brake Disc Mounting Bolts: 27 N·m (2.8 kgf·m, 20 ft·lb)

NOTE

○Handle the wheel rotation sensor rotor carefully and do not apply the external force to deform it. There is a possibility that the sensor cannot read the signal correctly from the rotor.

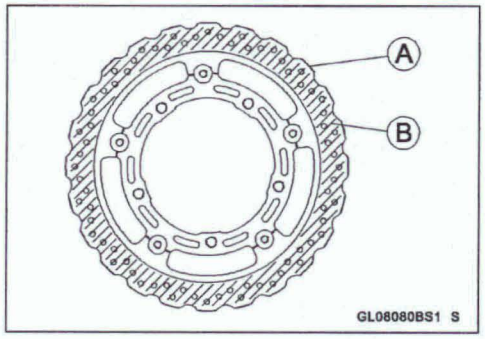


Brake Disc Wear Inspection

- Measure the thickness of each disc [A] at the point where it has worn the most.

★If the disc has worn past the service limit, replace it.

Measuring Area [B]



Brake Discs Thickness

Standard:

Front	**4.3 ~ 4.7 mm (0.17 ~ 0.19 in.)**
Rear	**4.8 ~ 5.2 mm (0.19 ~ 0.20 in.)**

Service Limit:

Front	**4.0 mm (0.16 in.)**
Rear	**4.5 mm (0.18 in.)**

Brake Disc

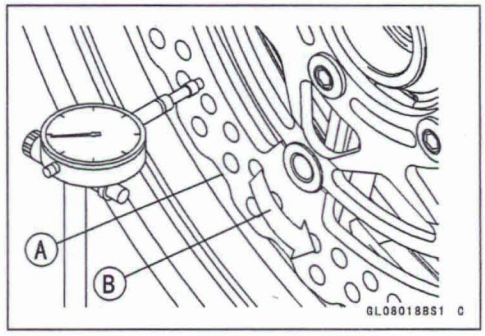
Brake Disc Warp Inspection

- Raise the front/rear wheel off the ground.

○For front disc inspection, turn the handlebar fully to one side.

- Set up a dial gauge against the disc [A] as shown and measure disc runout, while turning [B] the wheel by hand.

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



Disc Runout

Standard:	**TIR 0.15 mm (0.0059 in.) or less**
Service Limit:	**TIR 0.3 mm (0.013 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.

NOTICE

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

NOTE

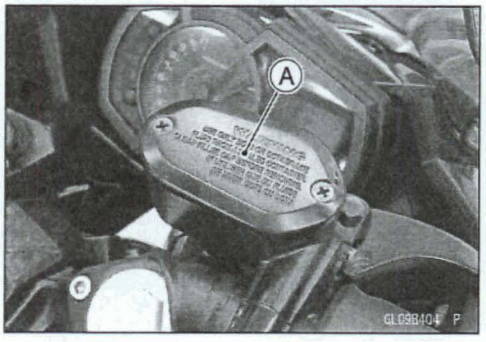
○*The procedure to bleed the front brake line is as follows. Bleeding the rear brake line is the same as for the front brake.*

- Remove the reservoir cap [A], diaphragm plate and diaphragm.
- Fill the reservoir with fresh brake fluid to the upper level line in the reservoir.

Brake Fluid Grade

Front: **DOT3 or DOT4**

Rear: **DOT4**

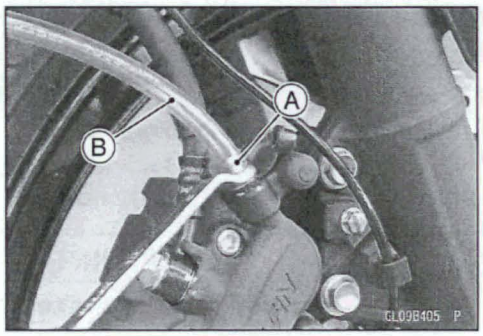


- Slowly pump the brake lever several times until no air bubbles can be seen rising up through the fluid from the holes at the bottom of the reservoir.

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

Brake Fluid

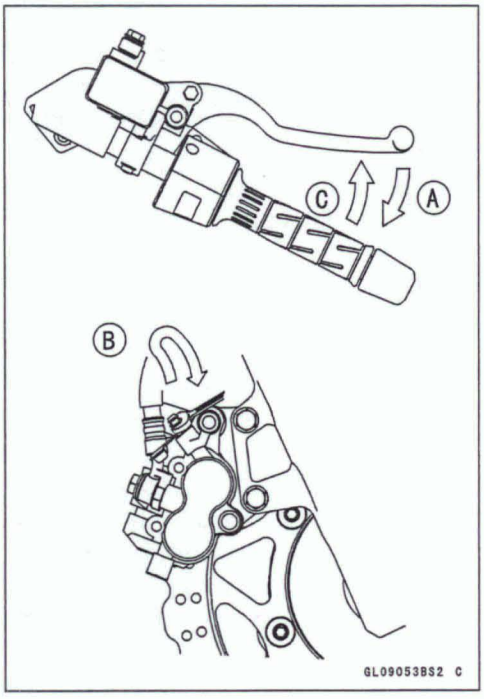
- Remove the rubber cap from the bleed valve [A] on the caliper.
- Attach a clear plastic hose [B] to the bleed valve, and run the other end of the hose into a container.



- 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].



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.*

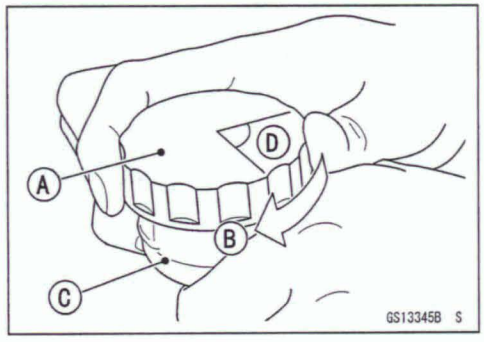
○*Tap the brake hose lightly from the caliper to the reservoir for more complete bleeding.*

- Remove the clear plastic hose.
- Install the diaphragm, diaphragm plate and reservoir cap.
- Tighten:

Torque - Front Brake Reservoir Cap Screws: 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.



Brake Fluid

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

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

- Check the fluid level (see Brake Fluid Level Inspection in the Periodic Maintenance chapter).
- After bleeding is done, check the brake for good braking power, no brake drag, and no fluid leakage.

⚠ WARNING

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

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

Brake Hose

Brake Hose Removal/Installation

- Refer to the Brake Hose and Pipe Replacement in the Periodic Maintenance chapter.

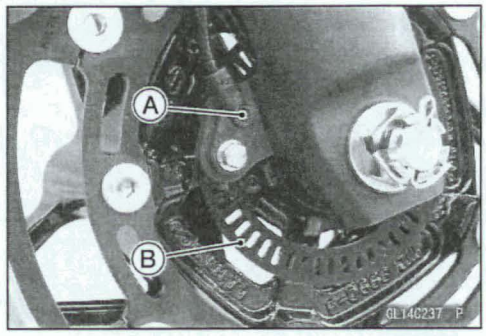
Brake Hose Inspection

- Refer to the Brake Hose and Pipe Damage and Installation Condition Inspection in the Periodic Maintenance chapter.

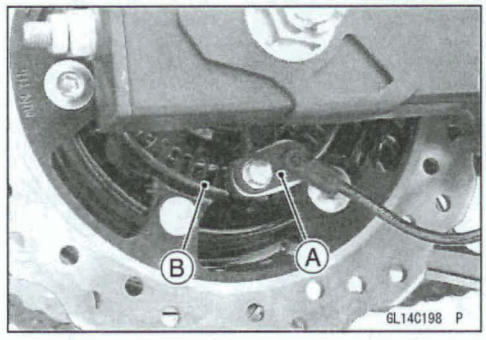
Anti-Lock Brake System (Equipped Models)

Parts Location

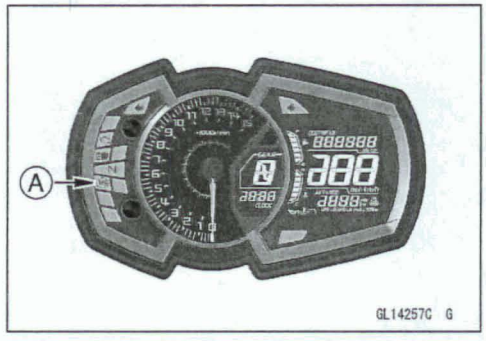
Front Wheel Rotation Sensor [A]
Front Wheel Rotation Sensor Rotor [B]



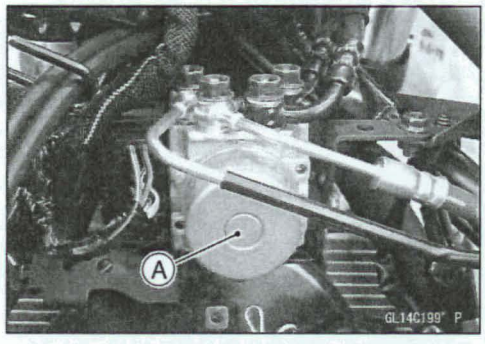
Rear Wheel Rotation Sensor [A]
Rear Wheel Rotation Sensor Rotor [B]



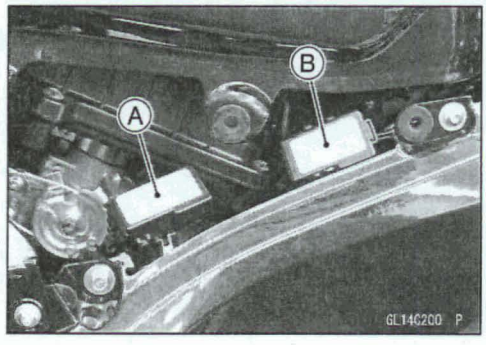
Yellow ABS Indicator Light (LED) [A]



ABS Hydraulic Unit [A]

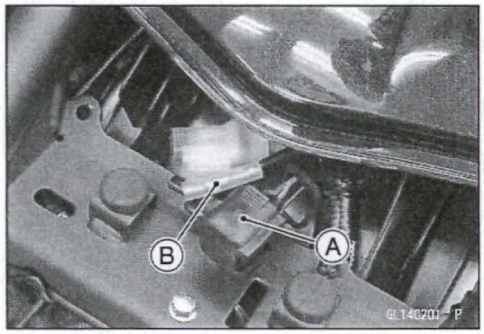


Fuse Box (1) [A]
Fuse Box (2) [B]



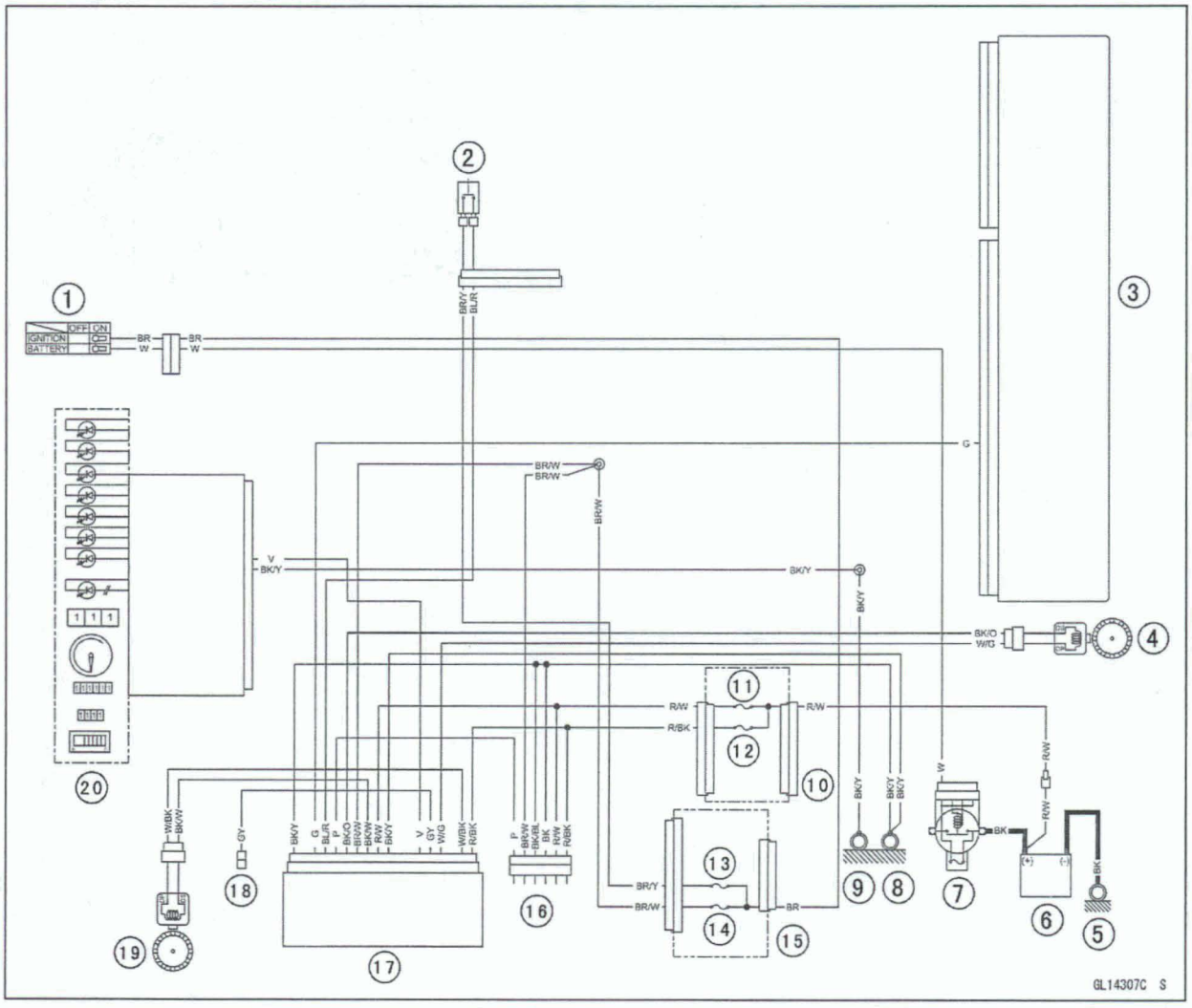
Anti-Lock Brake System (Equipped Models)

ABS Kawasaki Diagnostic System Connector [A]
ABS Self-diagnosis Terminal [B]



Anti-Lock Brake System (Equipped Models)

ABS System Wiring Diagram



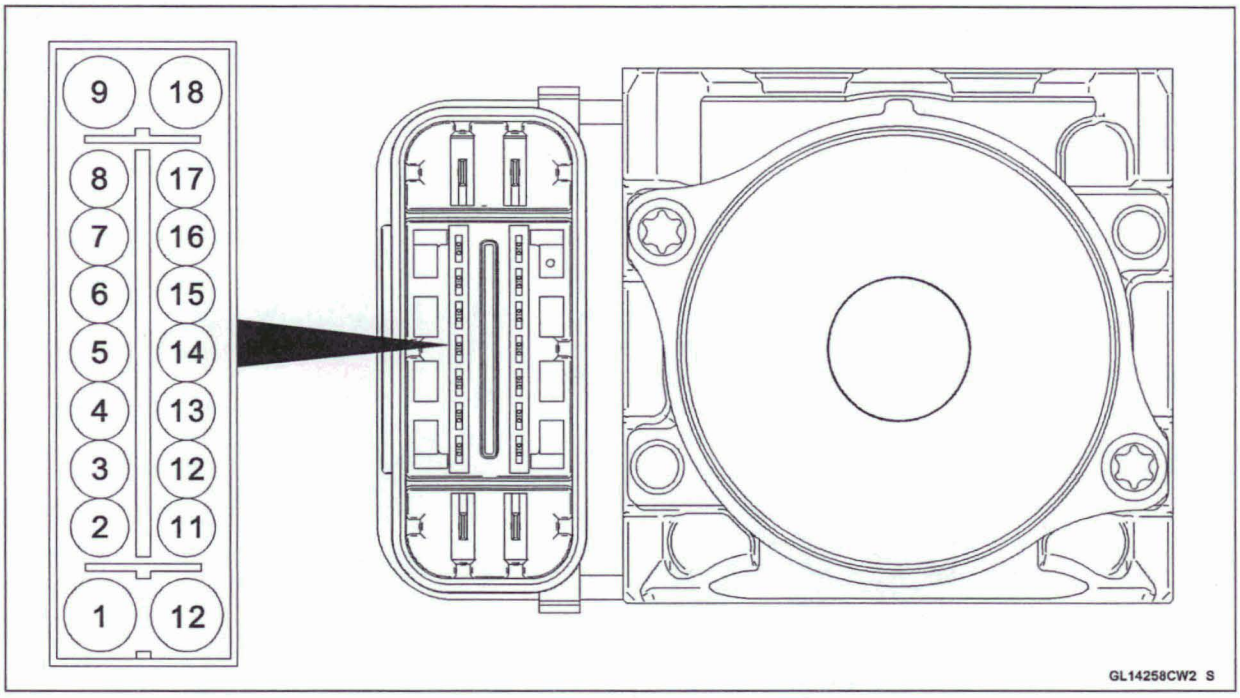
1. Ignition Switch
2. Front Brake Light Switch
3. ECU
4. Rear Wheel Rotation Sensor
5. Engine Ground
6. Battery
7. Main Fuse 30 A
8. Frame Ground 8
9. Frame Ground 4
10. Fuse Box (2)
11. ABS Motor Relay Fuse 30 A
12. ABS Solenoid Valve Relay Fuse 20 A
13. Brake/Horn Fuse 10 A
14. Ignition Fuse 10 A
15. Fuse Box (1)
16. ABS Kawasaki Diagnostic System Connector
17. ABS Hydraulic Unit
18. ABS Self-diagnosis Terminal
19. Front Wheel Rotation Sensor
20. Meter Unit

○Color Codes:

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

Anti-Lock Brake System (Equipped Models)

ABS Hydraulic Unit Terminal Names



1. Ground: BK/Y
2. Unused
3. Rear Wheel Rotation Sensor Signal Output: G
4. Front and Rear Brake Light Switch Signal: BL/R
5. ABS Kawasaki Diagnostic System Terminal: P
6. Power Supply to Rear Wheel Rotation Sensor: BK/O
7. Power Supply: BR/W
8. Power Supply to Front Wheel Rotation Sensor: BK/W
9. Power Supply to ABS Motor Relay: R/W
10. Ground:BK/Y
11. Unused
12. Unused
13. Yellow ABS Indicator Light (LED): V
14. ABS Self-Diagnosis Terminal: GY
15. Rear Wheel Rotation Sensor Signal Input: W/G
16. Unused
17. Front Wheel Rotation Sensor Signal Input: W/BK
18. Power Supply to ABS Solenoid Valve Relay: R/BK

Anti-Lock Brake System (Equipped Models)

ABS Servicing Precautions

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

- This ABS is designed to be used with a 12 V sealed battery as its power source. Do not use any other battery except for a 12 V sealed battery as a power source.
- Do not reverse the battery cable connections. This will damage the ABS hydraulic unit.
- To prevent damage to the ABS parts, do not disconnect the battery cables or any other electrical connections when the ignition switch is on or while the engine is running.
- Take care not to short the leads that are directly connected to the battery positive (+) terminal to the chassis ground.
- Do not turn the ignition switch on while any of the ABS electrical connectors are disconnected. The ABS hydraulic unit memorizes service codes.
- Do not spray water on the electrical parts, ABS parts, connectors, leads and wiring.
- If a transceiver is installed on the motorcycle, make sure that the operation of the ABS is not influenced by electric wave radiated from the antenna. Locate the antenna as far as possible away from the ABS hydraulic unit.
- Whenever the ABS electrical connections are to be disconnected, first turn the ignition switch off.
- The ABS parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
- The ABS parts cannot be disassembled. Even if a fault is found, do not try to disassemble and repair the ABS parts, replace it.
- The ABS has many brake lines, pipes, and leads. And the ABS cannot detect problems with the conventional braking system (brake disc wear, unevenly worn brake pad, and other mechanical faults). To prevent trouble, check the brake lines and pipes for correct routing and connection, the wiring for correct routing, and the brakes for proper braking power. Be sure to check for fluid leakage, and bleed the brake line thoroughly.

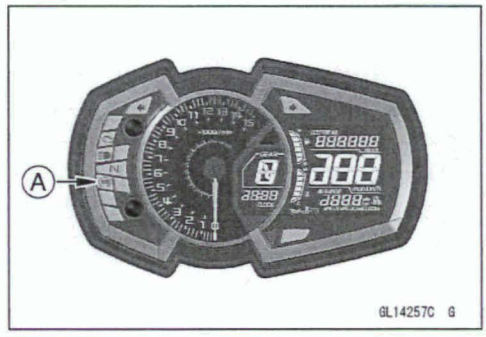
⚠ WARNING

Air in the brake lines diminish braking performance and can cause an accident resulting in injury or death. If any of the brake line fittings, including the ABS hydraulic unit joint nuts, or the bleed valve is opened at any time, the air must be bled completely from the brake line. If the brake lever has a soft or "spongy" feeling mushy when it is applied, there might be air in the brake lines or the brake may be defective. Do not operate the vehicle and service the brake system immediately.

NOTICE

Do not ride the motorcycle with air in the brake line, or the ABS could malfunction.

Anti-Lock Brake System (Equipped Models)



○The yellow ABS indicator light (LED) [A] may light if the tire pressure is incorrect, a non-recommended tire is installed, or the wheel is deformed. If the indicator light lights, remedy the problem and clear the service code.

⚠ WARNING

Use of non-recommended tires may cause malfunctioning of ABS and can lead to extended braking distance resulting in an accident causing serious injury or death. Always use recommended standard tires for this motorcycle.

○The yellow ABS indicator light (LED) may come on if the engine is run with the motorcycle on its stand and the transmission in gear. If the indicator light comes on, just turn the ignition switch off, then clear service code 42, which indicates a "Faulty front wheel rotation sensor."

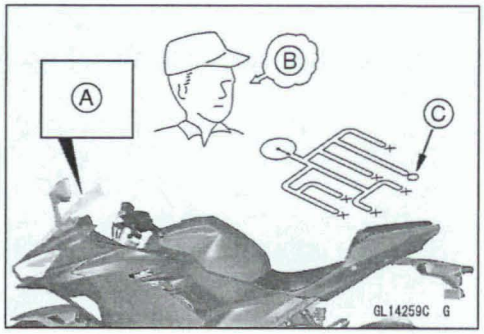
○When the ABS operates, the ABS makes noise and the rider feels the reaction force on the brake lever and brake pedal. This is a normal condition. It informs the rider that the ABS is operating normally.

○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 light (LED) lights. A fully charged battery is a must for conducting reliable self-diagnosis. Test run the motorcycle at a speed of more than 30 km/h (19 mph) to see that the yellow ABS indicator light (LED) does not come on. Finally, test run the motorcycle at a speed of more than 30 km/h (19 mph) and brake suddenly to see that the motorcycle stops without loss of steering control and the ABS operates normally (the reaction force generated is felt in the brake lever and pedal). This completes the final inspection.

Anti-Lock Brake System (Equipped Models)

ABS Troubleshooting Outline



When an abnormality in the system occurs, the yellow ABS indicator light (LED) lights up 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 light (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 light (LED) 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.

Even when the ABS is operating normally, the yellow ABS indicator light (LED) may light up under the conditions listed below. Turn the ignition switch off to stop the indicator light. If the motorcycle runs without erasing the service code, the light may light up again.

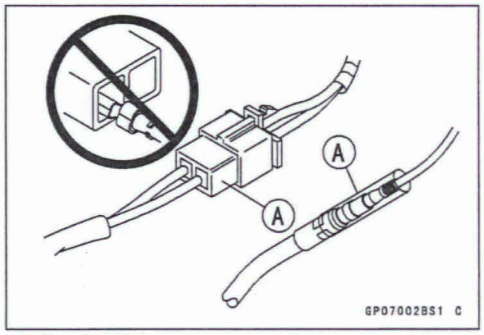
- ○After continuous riding on a rough road.
- ○When the engine is started with the stand raised and the transmission engaged, and the rear wheel turns.
- ○When accelerating so abruptly that the front wheel leaves the ground.
- ○When the ABS has been subjected to strong electrical interference.
- ○When 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 digital meter.

Anti-Lock Brake System (Equipped Models)



- Visually inspect the wiring for signs of burning or fraying.

★If any wiring is poor, replace the damaged wiring.

- Pull each connector [A] apart and inspect it for corrosion, dirt and damage.

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

- Check the wiring for continuity.

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

○Connect the digital meter between the ends of the leads.

★If the digital meter does not read about 0 Ω, the lead is defective. Replace the main harness if necessary.

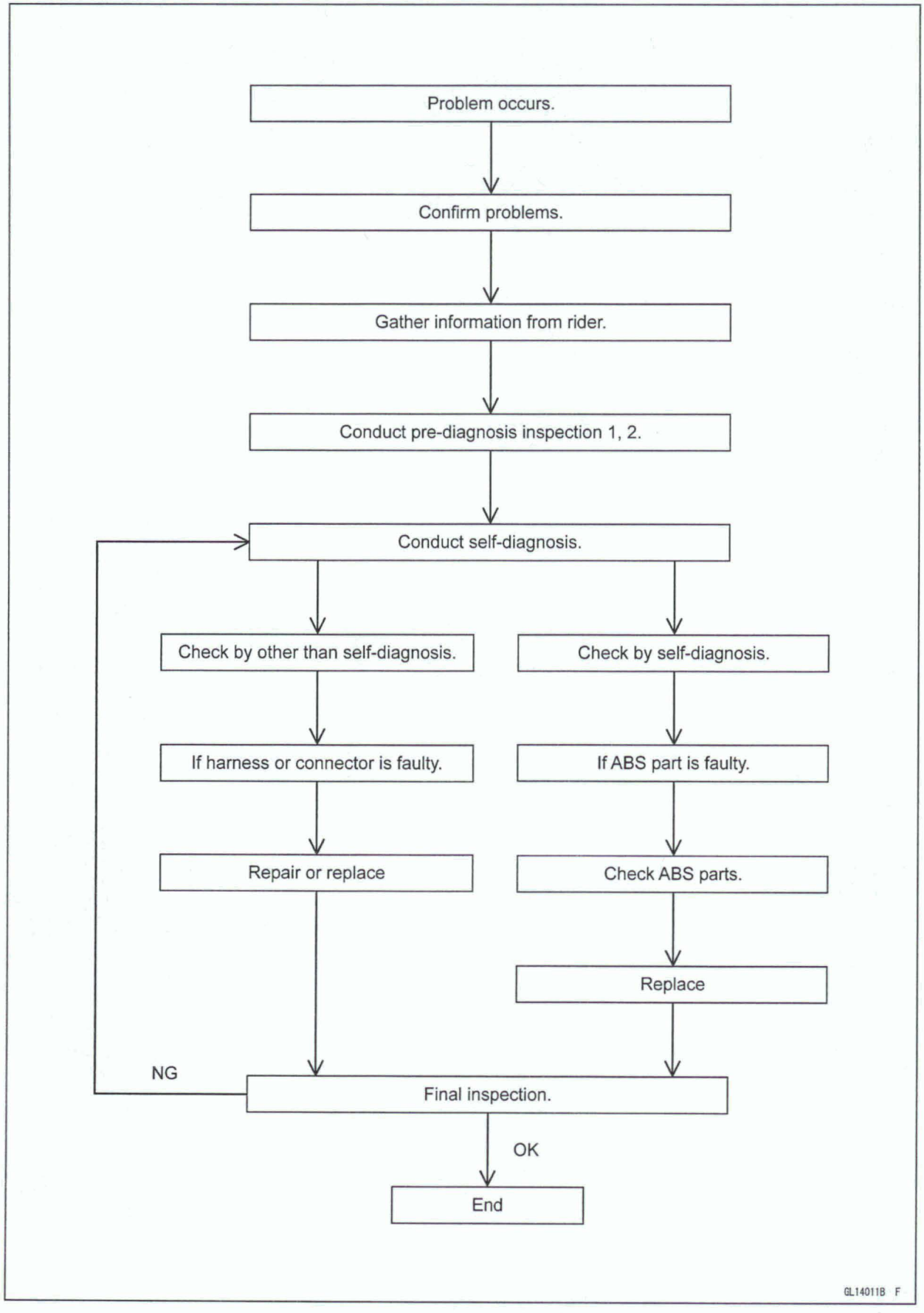
- Narrow down suspicious parts and close in on the faulty ABS part by repeating the continuity tests.

★If no abnormality is found in the wiring or connectors, the ABS parts are the next likely suspects. Check each part one by one.

★If an abnormality is found, replace the affected ABS part.

Anti-Lock Brake System (Equipped Models)

ABS Diagnosis Flow Chart



Inquiries to Rider

- Each rider reacts to problems in different ways, so it is important to confirm what kind of problem the rider is experiencing.
- Try to find out exactly what problem occurs under exactly what conditions by asking the rider; knowing this information may help you reproduce the problem in the workshop.
- The diagnosis sheet will help prevent you from overlooking any key information, so always use it.

Sample Diagnosis Sheet 1

Rider Name: ..... Registration No. (license plate No.): .....
Date of registration: ..... Model: .....
Vin No.: ..... Odometer reading: ..... km or miles
Engine No.: ..... Odometer reading when problem first occured: ..... km or miles

Question	Description			Answer	Advice to customer
Which statement/s best describes the fault with the ABS system?	*Yellow ABS indicator light (LED) illuminated?*	*Flashing*			A fault has been detected with the ABS system.
		Continuous			
		Not working			
	ABS not working				Further inspection by technician required.
	ABS operates too frequently				Continuous riding on rough or un-even surfaces can cause the ABS to operate more frequently.
	Stopping distance too long				
	Does the wheel lock when you apply the brakes				Further inspection by technician required.
	Brake can't be released				
	Other				
Do the front and rear brake levers feel normal during application?	*Normal*				Further inspection by technician required.
	Abnormal	*Long stroke (lever feels soft and moves back close to the handle bar)*			This indicates a probable fault with the braking system and should be inspected immediately.
		Limited stroke (lever feels hard and has little movement)			
		Pulsing/vibrating			
	Which lever? (front, rear or both)				
When does the fault occur?	*During start up / stationary*	*(Is a centre stand or service stand used)*			If the motorcycle engine is left running whilst on its centre or service stand, mechanical drag can cause the rear wheel to rotate. If the rear wheel rotates the ABS system may detect a fault. Turning off the ignition switch and restarting should reset the yellow ABS indicator light (LED) if no problems are detected. However the service code will be stored in the ABS ECU and should be reset by the dealer.
	Driving below 6 km/h (4mph) (Speeds vary depending on model)				The ABS system is not active at these speeds.
	Driving above 6 km/h (4mph) (Speeds vary depending on model)				This may be normal ABS operation if the road conditions are poor.
	When slowing or stopping (Rate of brake application)	*Gradual braking*	*front only*		
			rear only		
			both brakes		
		During abrupt braking	*front only*		Abrupt braking may cause the ABS to function early as the suspension may not have had enough time to react to the situation.
			rear only		
			both brakes		
		There is no specific pattern			
	Other				

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.

Anti-Lock Brake System (Equipped Models)

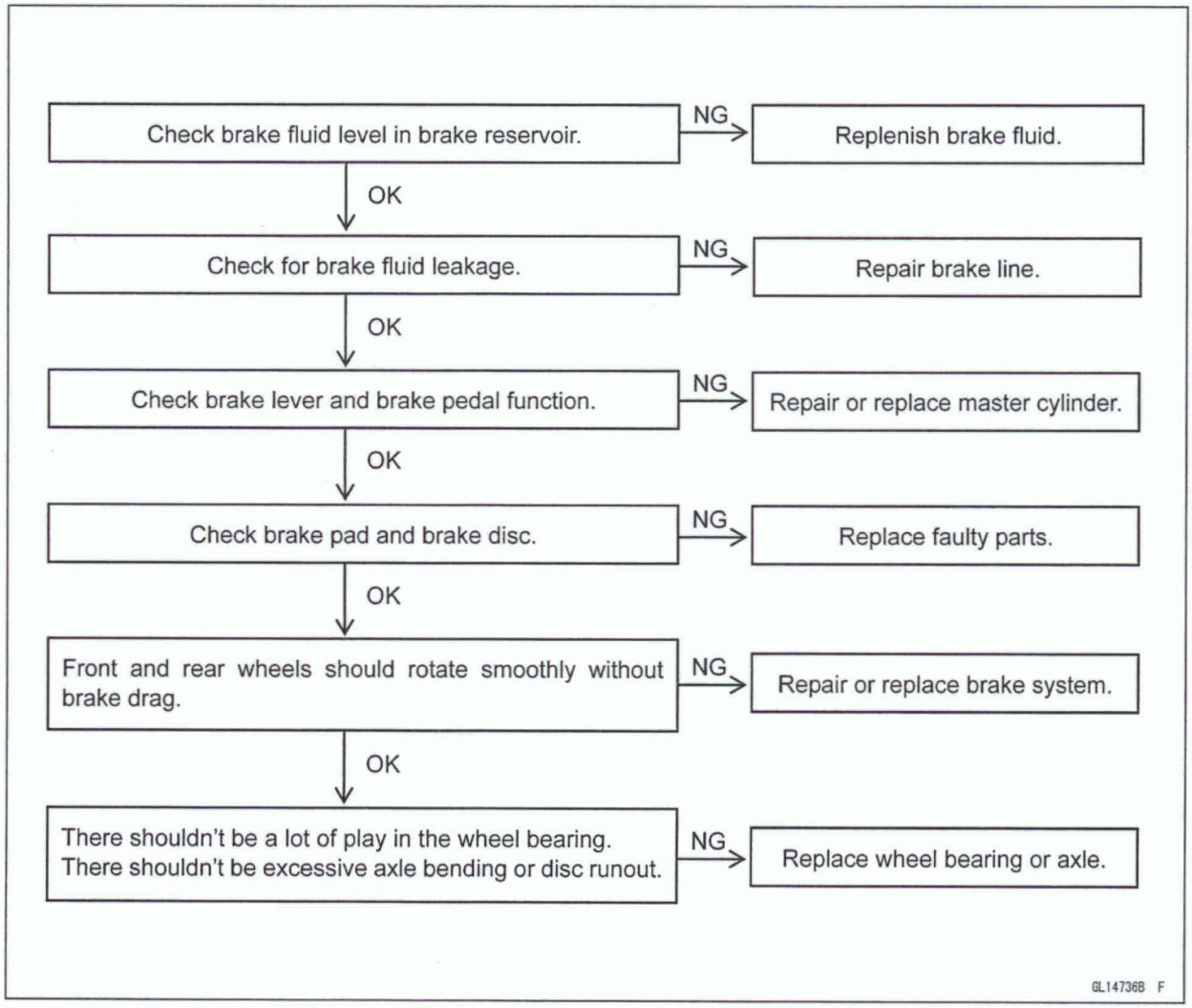
Dealer Findings

Sample Diagnosis Sheet 2

Question/Action	Description		Answer	Advice to technician
Review customer feedback information	*Carefully analyze the information that has been collected from the customer. Use this information to help you perform your initial diagnosis.*			
Check to see if any diagnostic codes are present	*1*			If codes are present refer to service manual.
	2			
	3			
	4			
	5			
Inspect the following	*Battery voltage*			The ABS is designed to be used with a 12 V sealed battery as its power source. Only use the battery specified by the service manual as a power source. If low battery voltage is detected service codes: B52 or B53 will be displayed.
	Tires type/size		Front ..... Rear	Refer to service manual.
	Tire pressures		Front ..... Rear	
	Tire condition		Front ..... Rear	Excessive or abnormal wear can be recognized as an ABS fault.
	Wheel rotation sensor air gap		Front ..... Rear	Refer to service manual. Also check that the wheel orientation is correct.
	Wheel condition (damaged or deformed)		Front ..... Rear	Refer to service manual.
	Brake system general condition		Front ..... Rear	Pad wear/Front and rear operation/Condition of hoses etc.
	Brake disc run-out		Front ..... Rear	Refer to service manual.
Additional information on the yellow ABS indicator light (LED)	*Continuous*	*Stays on all the time while ignition on*		Check for diagnostic trouble codes.
		Turns off when first moving off but turns on again and stays on		
		Turns on when brake(s) are operated		
		Other:		
	Not working	*Turns off soon after moving off*		Test the operation of the light by turning on the ignition. If the light fails to illuminate ensure that the bike is equipped with ABS before inspecting the meter panel for faults as per the service manual.
		Turns off after riding for a while		
		Other:		
	How many times does it flash per 10 seconds?		5, 15, or 20	By flashing the ABS unit is indicating additional fault codes that may not be listed in the service manual. Please carefully count the number of flashes per 10 seconds before contacting Kawasaki. *(Kawasaki may request a video of the flashing sequence)*
			Other: ..... times	

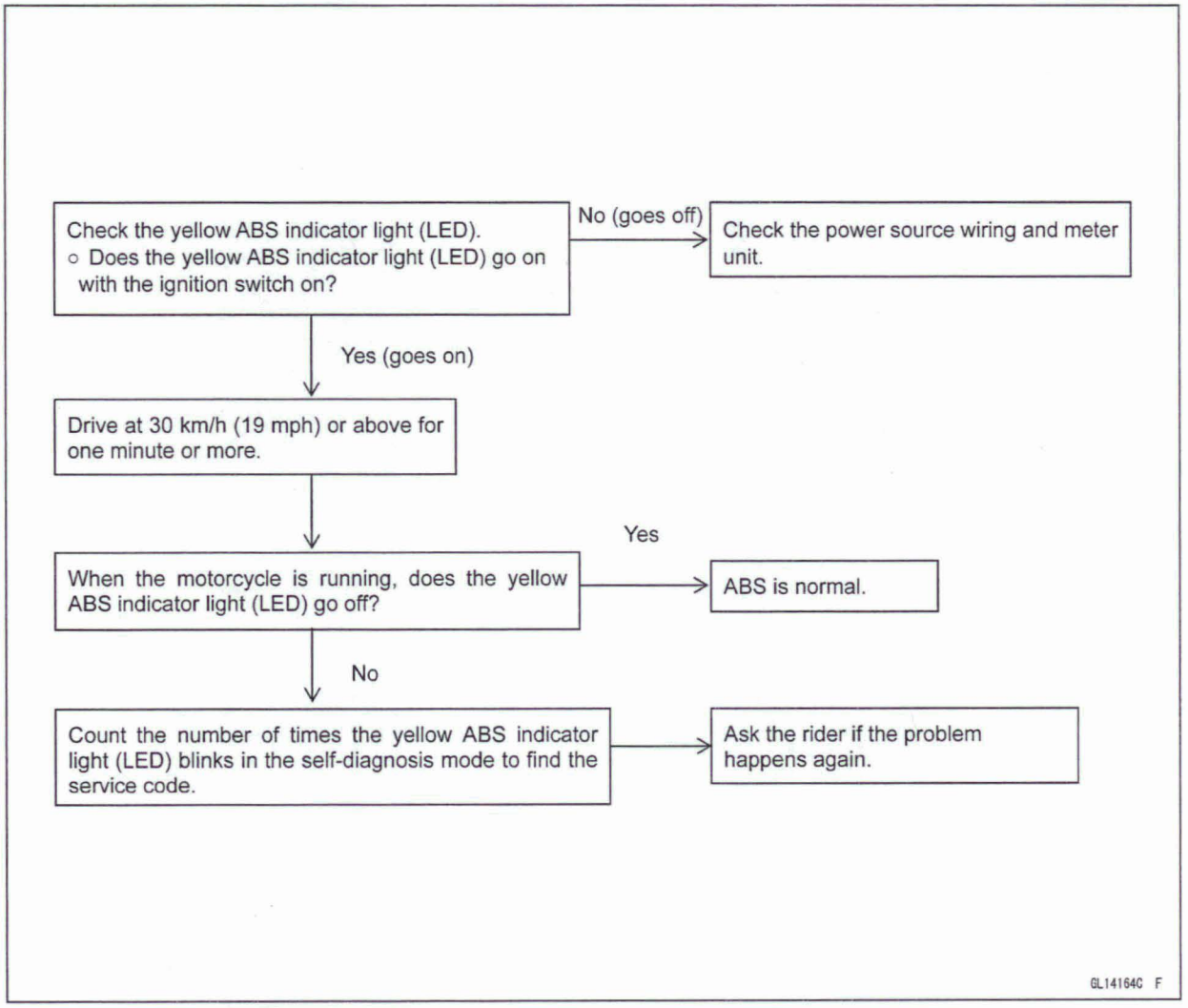
Anti-Lock Brake System (Equipped Models)

Pre-Diagnosis Inspection 1



Anti-Lock Brake System (Equipped Models)

Pre-Diagnosis Inspection 2



Self-diagnosis Outline

When the yellow ABS indicator light (LED) has blinked or come on, the ABS hydraulic unit memorizes and stores the service 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 all service codes. Further service codes are memorized after erasing the preceding all service codes. If there is no fault, the yellow ABS indicator light (LED) lights, indicating that "The ABS is normal."

Self-diagnosis Procedures

○Before performing the self-diagnosis procedures, make sure that the yellow ABS indicator light (LED) [A] stays on to indicate any electrical problem occurring in the ABS.

NOTE

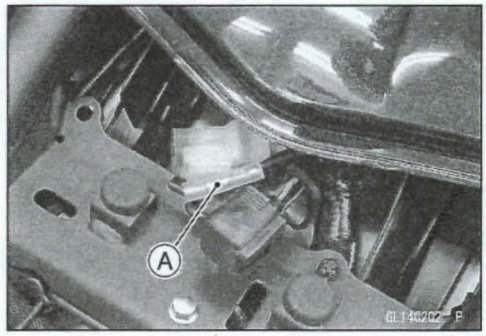
○*Use a fully charged battery for performing self-diagnosis procedure properly. A insufficient battery may cause improperly result.*

○*The self-diagnosis procedures should be done with the motorcycle is stopped.*

Anti-Lock Brake System (Equipped Models)

- The ABS hydraulic unit can be store the service codes including previous ones.
- To read out the current service code, erase the stored service codes once prior reading the service code (see Service Code Clearing Procedures).
- Test ride the motorcycle with 30 km/h (19 mph) or more in a safety area to store the service code, which correspond to the current problems.

- Remove the front seat (see Front Seat Removal in the Frame chapter).
- Ground the self-diagnosis terminal [A] (Gray) to a frame ground, using a suitable auxiliary lead. Keep the auxiliary lead ground during self-diagnosis procedure.
- Turn the ignition switch to on and read the service code (see How to Read Service Code).
- To exit the self-diagnosis mode, remove the auxiliary lead from the self-diagnosis terminal.



NOTE

○*The grounding auxiliary lead must be removed after the self-diagnosis procedure.*

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 frame ground after starting the self-diagnosis mode.

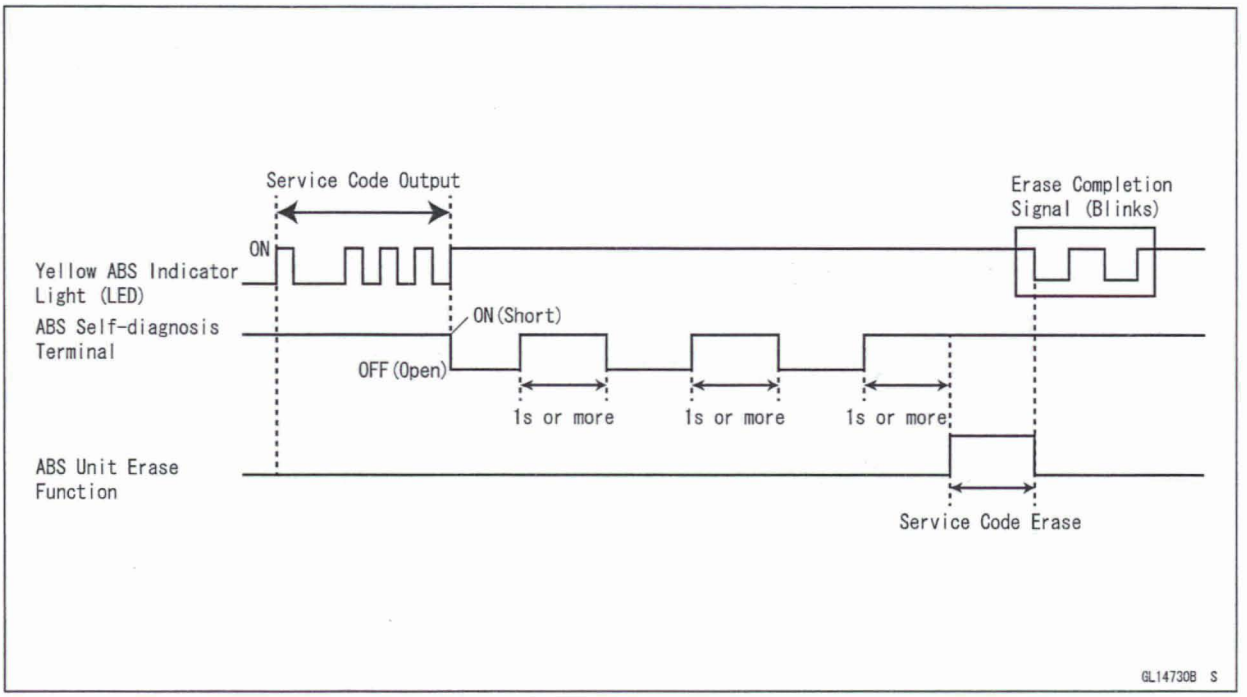
○The service code can be erased by grounding (time for at least one second) and ungrounding the ABS self-diagnosis terminal three times or more within about 12.5 seconds after starting the erase mode and grounding it.

○The yellow ABS indicator light (LED) remains lit during the erase mode.

○After erasing, the yellow ABS indicator light (LED) blinks two times and lights.

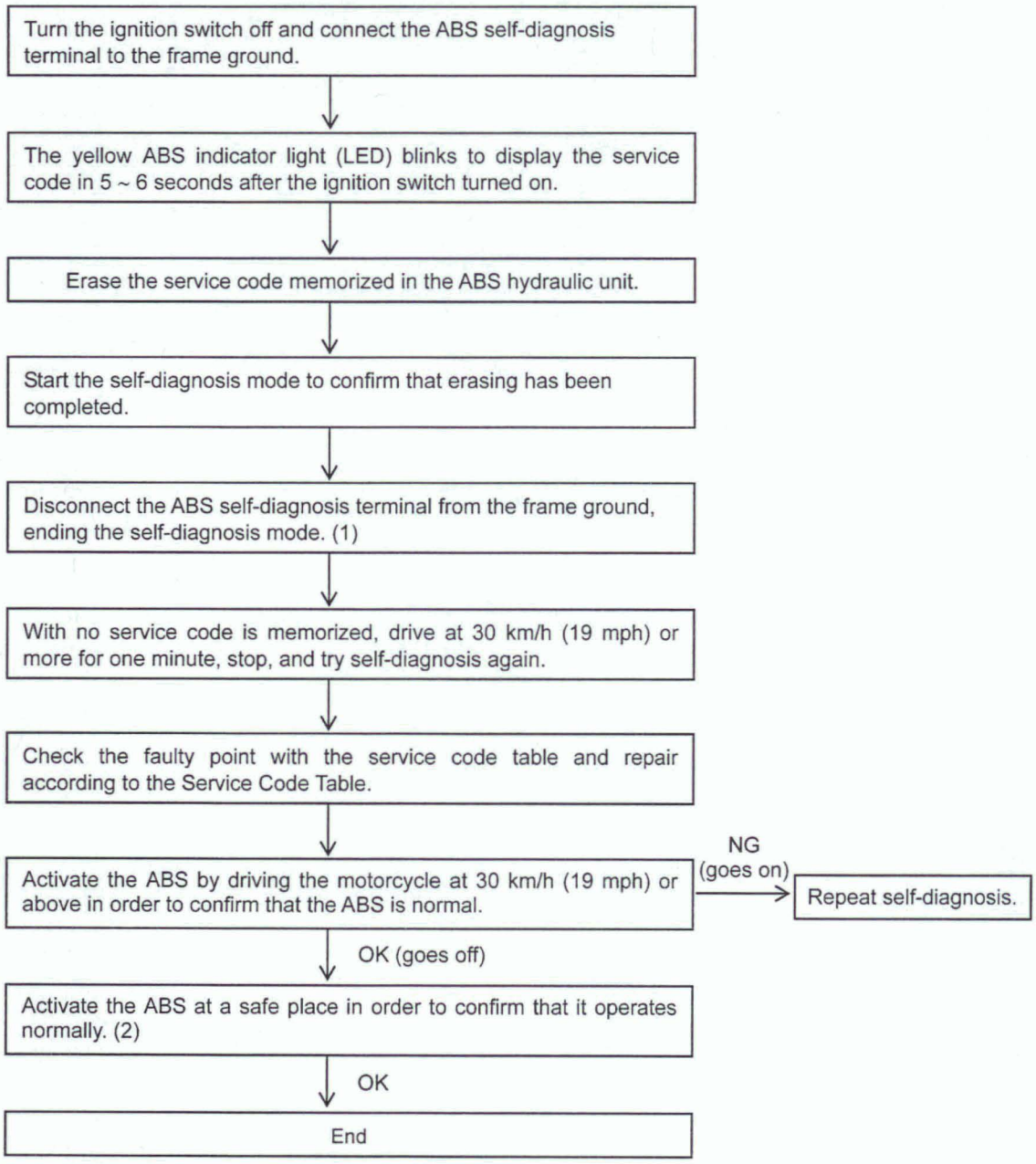
○Once erasing is finished, enter the self-diagnosis mode again to confirm that the service codes have been erased. If the ABS has been reset and all codes have been erased, the yellow ABS indicator light (LED) lights.

Anti-Lock Brake System (Equipped Models)



Anti-Lock Brake System (Equipped Models)

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.

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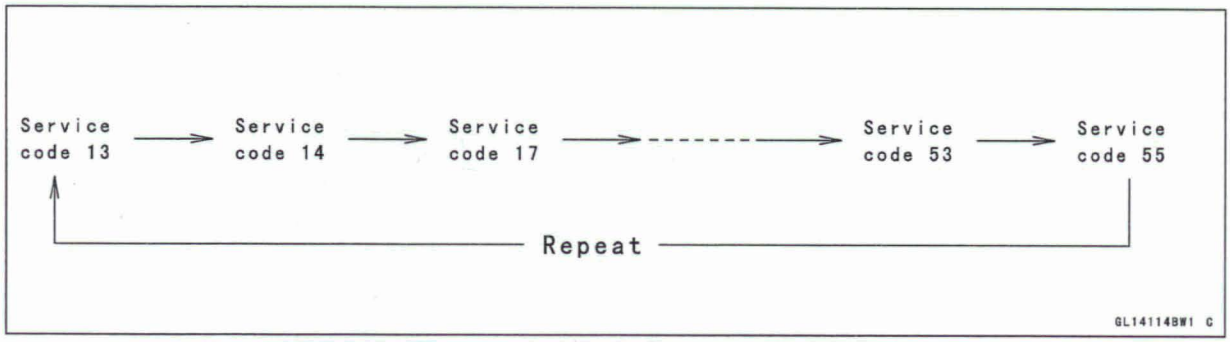
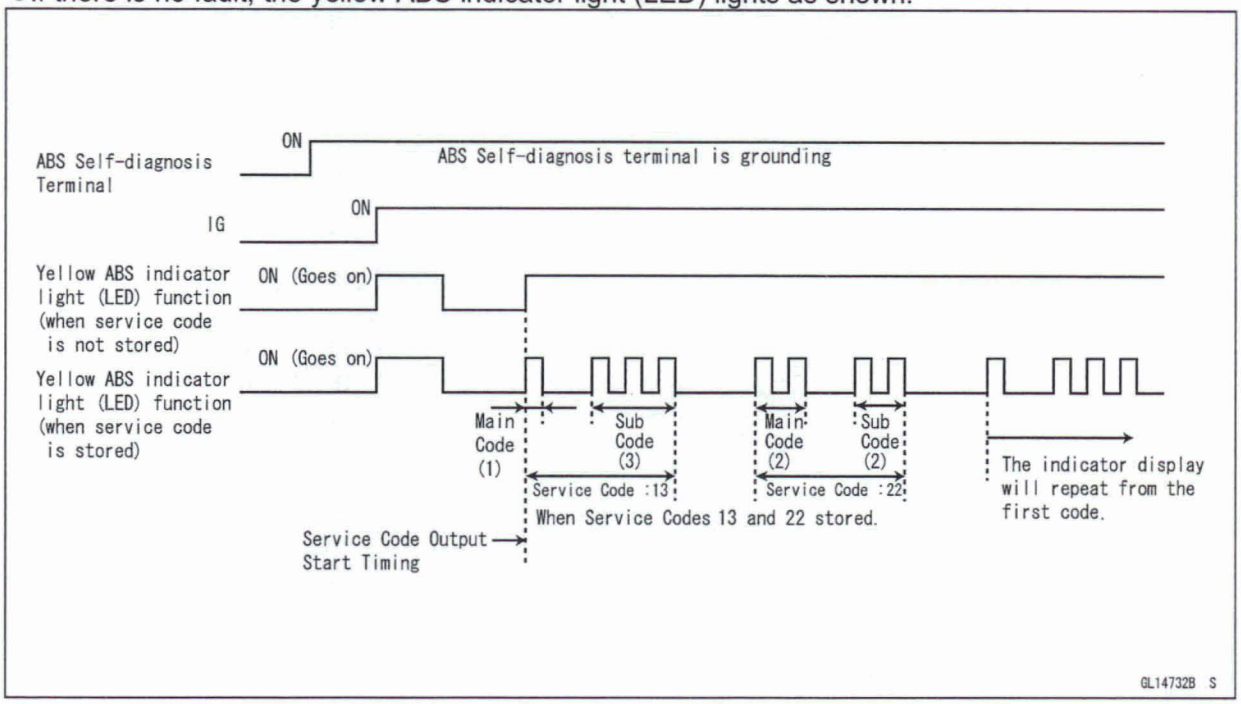
Anti-Lock Brake System (Equipped Models)

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 all service codes can be stored.
○For the display pattern, the display will begin starting from the small number code entered, then the display is repeated from the smallest number code once again.



○If there is no fault, the yellow ABS indicator light (LED) lights as shown.



How to Erase Service Codes

○Even if the ignition switch is turned 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 (Equipped Models)

Service Code Table

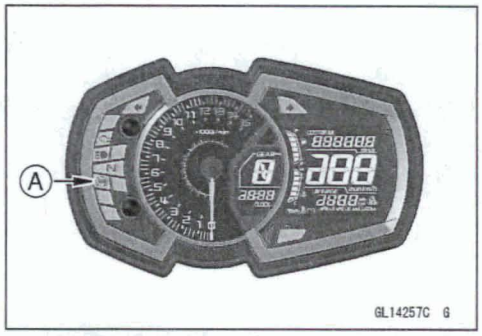
Service Code	Yellow ABS Indicator Light (LED)	Problems	Light State
–	Stays on* (Error function after the ignition switch turned on)	Main harness, meter unit, wheel rotation sensor(s) or ABS unit abnormal	ON
–	Does not go on (When the ignition switch turned on)	Main harness, meter unit or ABS unit abnormal	OFF
13		Rear intake solenoid valve trouble (wiring shorted or open)	ON
14		Rear outlet solenoid valve trouble (wiring shorted or open)	ON
17		Front intake solenoid valve trouble (wiring shorted or open)	ON
18		Front outlet solenoid valve trouble (wiring shorted or open)	ON
19		ABS solenoid valve relay trouble [stuck relay (ON or OFF)]	ON
25		Front, rear wheel rotation difference abnormal (substandard tire)	ON
35		ABS motor trouble (mechanical stuck)	ON
42		Front wheel rotation sensor signal abnormal (sensor or rotor missing, too large clearance, rotor tooth worn or missing)	ON
43		Front wheel rotation sensor wiring (wiring shorted or open, connector bad connection)	ON
44		Rear wheel rotation sensor signal abnormal (sensor or rotor missing, too large clearance, rotor tooth worn or missing)	ON
45		Rear wheel rotation sensor wiring (wiring shorted or open, connector bad connection)	ON
52		Power supply voltage abnormal (low-voltage)	ON
53		Power supply voltage abnormal (high-voltage)	ON
55		ABS Hydraulic Unit Internal Error (ECU operation abnormal)	ON

*: In spite of the service code is not stored, the yellow ABS Indicator Light (LED) does not go off when the 2 seconds later from the ignition switch turned on.

Anti-Lock Brake System (Equipped Models)

Yellow ABS Indicator Light (LED) Inspection

OIn this model, the yellow ABS indicator light (LED) [A] goes on or blinks by the control of the ABS hydraulic unit.



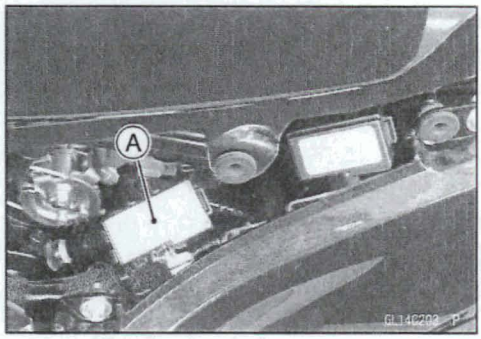
Yellow ABS Indicator Light (LED) Stays ON (Error function after the ignition switch turned on - No Service Code)

- Perform the Pre-Diagnosis Inspection 1.
- Check the system connectors for loose or poorly contact.

Step 1

- Check the ignition fuse 10 A in the fuse box (1) [A] for blown.

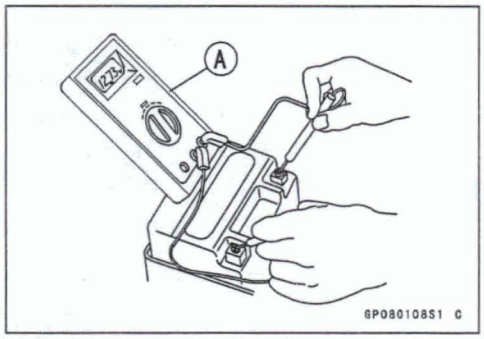
★If the fuse is blown, replace the fuse.
★If the fuse is not blown, go to next step.



Step 2

- Measure the battery terminal voltage using a voltmeter [A].

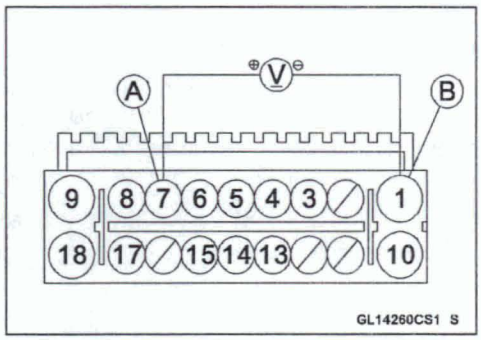
OThe battery voltage should be within 10 ~ 16 V.
★If the voltage without specifications, recharge or replace the battery.
★If the voltage within specifications, go to next step.



Step 3

- Disconnect the ABS hydraulic unit connector.
- Check the voltage between the terminal 7 (BR/W) (+) [A] and terminal 1 (BK/Y) (–) [B] of the ABS hydraulic unit connector.

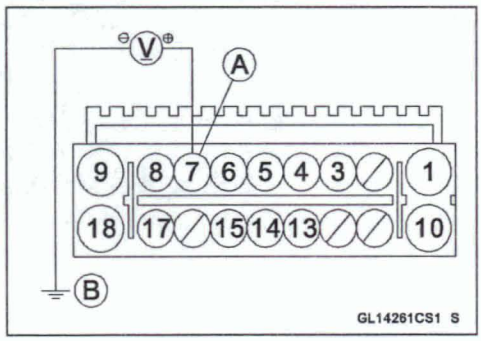
OThe battery voltage (10 ~ 16 V) should be appeared while the ignition switch turned on.
★If the battery voltage appeared, go to step 4.
★If the battery voltage does not appear, go to next step.



Step 3-1

- Check the voltage between the terminal 7 (BR/W) (+) [A] of the ABS hydraulic unit connector and a frame ground (–) [B].

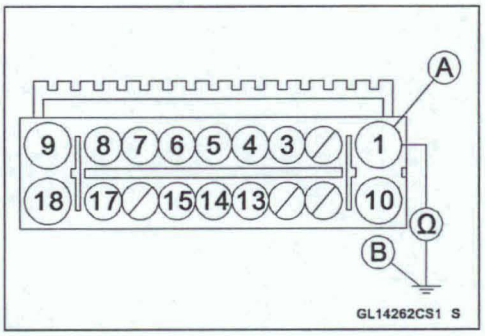
OThe battery voltage (10 ~ 16 V) should be appeared while the ignition switch turned on.
★If the battery voltage does not appear, repair or replace the main harness.
★If the battery voltage appeared, go to next step.



Anti-Lock Brake System (Equipped Models)

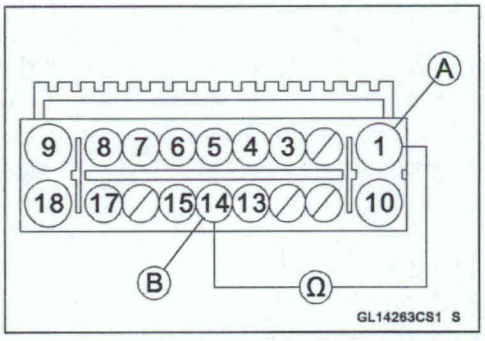
Step 3-2
- Check for continuity between the terminal 1 (BK/Y) [A] of the ABS hydraulic unit connector and a frame ground [B].

★If there is no continuity, repair or replace the main harness.
★If there is continuity, replace the ABS hydraulic unit.



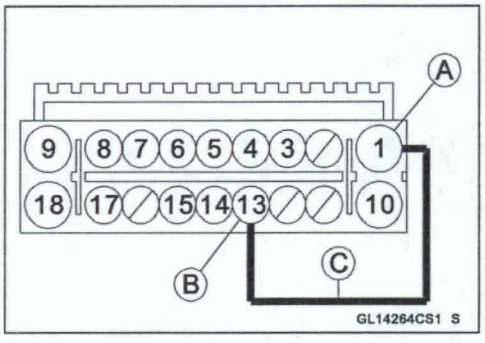
Step 4
- With the self-diagnosis terminal connected to the ground, check for continuity between the terminal 1 (BK/Y) [A] and terminal 14 (GY) [B] of the ABS hydraulic unit connector.

★If there is no continuity, repair or replace the main harness.
★If there is continuity, go to next step.



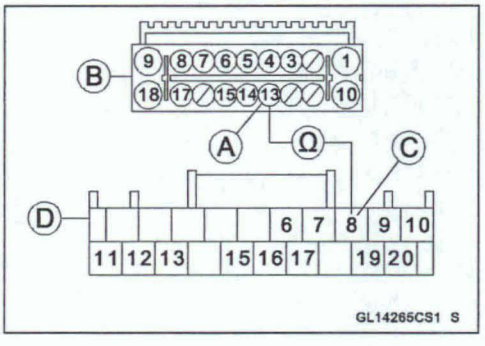
Step 5
- Jump the terminal 1 (BK/Y) [A] and terminal 13 (V) [B] at the ABS hydraulic unit connector using a jumper read [C].
- Check the yellow ABS indicator light (LED) with the ignition switch turned on.

★If the indicator goes off, replace the ABS hydraulic unit.
★If the indicator goes on, go to next step.



Step 6
- Disconnect the connector from the meter unit (see Meter Unit Removal in the Electrical System chapter).
- Check for continuity between the terminal 13 (V) [A] of the ABS hydraulic unit connector [B] and terminal 8 (V) [C] of the meter connector [D].

★If there is no continuity, repair or replace the main harness.
★If there is continuity, replace the meter unit with a new one.



Yellow ABS Indicator Light (LED) does not go on (When the Ignition Switch turned on)
- Perform the Pre-Diagnosis Inspection 1.
- Check the system connectors for loose or poorly contact.

Step 1
- Check the meter fuse 10 A in the fuse box (1) for blown.

★If the fuse is blown, replace the fuse.
★If the fuse is not blown, go to next step.

Anti-Lock Brake System (Equipped Models)

Step 2

- Disconnect the ABS hydraulic unit connector and check the yellow ABS indicator light (LED) for function.

○The yellow ABS indicator light (LED) should goes on when the ignition switch turned on.

★If the indicator does not goes on, go to next step.

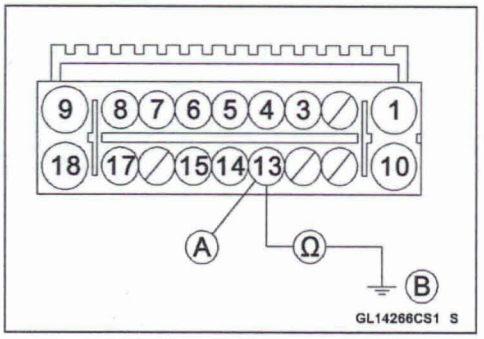
★If the indicator goes on, go to step 3.

Step 2-1

- Disconnect the connector from the meter unit (see Meter Unit Removal in the Electrical System chapter).
- Check for continuity between the terminal 13 (V) [A] of the ABS hydraulic unit connector and a frame ground [B].

★If there is continuity, repair or replace the main harness.

★If there is no continuity, replace the meter unit with a new one.



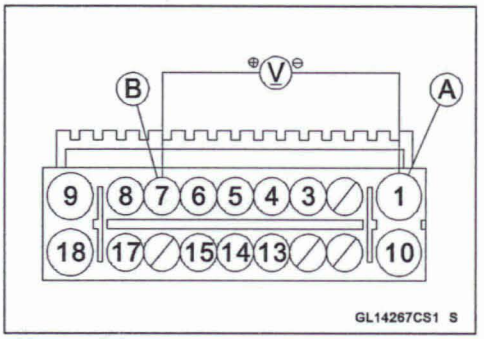
Step 3

- Check the voltage between the terminal 1 (BK/Y) (–) [A] and terminal 7 (BR/W) (+) [B] of the ABS hydraulic unit connector.

○The battery voltage (10 ~ 16 V) should not appear while the ignition switch turned off.

★If the battery voltage appeared, repair or replace the main harness.

★If the battery voltage does not appear, go to next step.



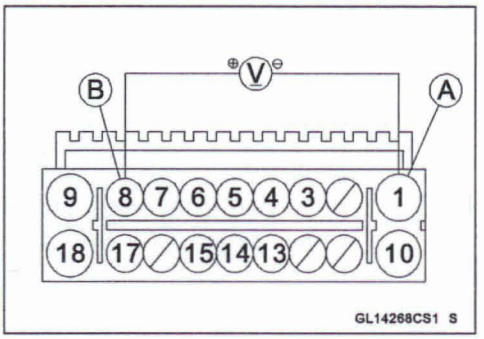
Step 4

- Check the voltage between the terminal 1 (BK/Y) (–) [A] and terminal 8 (BK/W) (+) [B] of the ABS hydraulic unit connector.

○The battery voltage (10 ~ 16 V) should not appear while the ignition switch turned off.

★If the battery voltage appeared, repair or replace the main harness.

★If the battery voltage does not appear, go to next step.



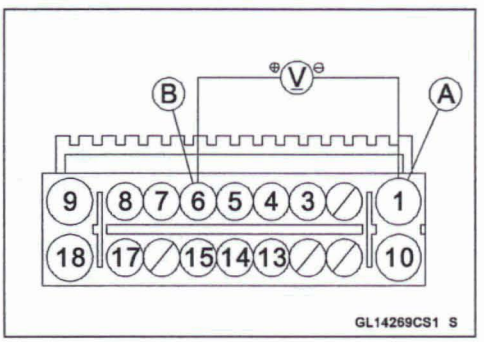
Step 5

- Check the voltage between the terminal 1 (BK/Y) (–) [A] and terminal 6 (BK/O) (+) [B] of the ABS hydraulic unit connector.

○The battery voltage (10 ~ 16 V) should not appear while the ignition switch turned off.

★If the battery voltage appeared, repair or replace the main harness.

★If the battery voltage does not appear, replace the ABS hydraulic unit.



Anti-Lock Brake System (Equipped Models)

ABS Unit Solenoid Valve Inspection (Service Code 13, 14, 17, 18)

○These codes indicate there is a problem in the solenoid valves, which integrated into the ABS Hydraulic Unit. Therefore the solenoid valves cannot be checked directly.

- Check the system connectors for loose or poorly contact.
- In order to confirm a existing problem in the system, erase the service code and then perform the pre-diagnosis inspection 1 and 2.

★If same service code is indicated again, faulty solenoid valve in the ABS hydraulic unit. Replace the ABS hydraulic unit.

★If the service code does not indicate, ABS system is normal (service code is not stored; temporary failure).

ABS Solenoid Valve Relay Inspection (Service Code 19)

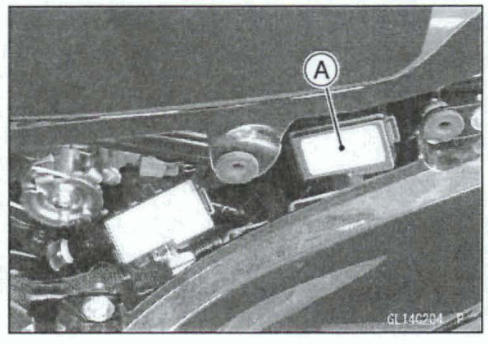
- Perform the Pre-Diagnosis Inspection 1 and 2.
- Check the system connectors for loose or poorly contact.

Step 1

- Check the ABS solenoid valve relay fuse 20 A in the fuse box (2) [A] for blown.

★If the ABS solenoid valve relay fuse is blown, replace the fuse.

★If the fuse is not blown, go to next step.



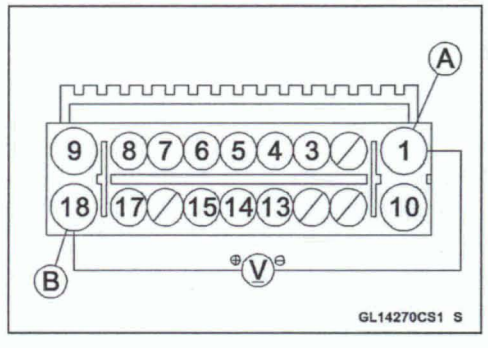
Step 2

- Disconnect the ABS hydraulic unit connector.
- Check the voltage between the terminal 1 (BK/Y) (–) [A] and terminal 18 (R/BK) (+) [B] of the ABS hydraulic unit connector.

○The battery voltage (10 ~ 16 V) should appear while the ignition switch turned on.

★If the battery voltage does not appear, repair or replace the main harness.

★If the battery voltage appeared, replace the ABS hydraulic unit.



Front, Rear Wheel Rotation Difference Abnormal Inspection (Service Code 25)

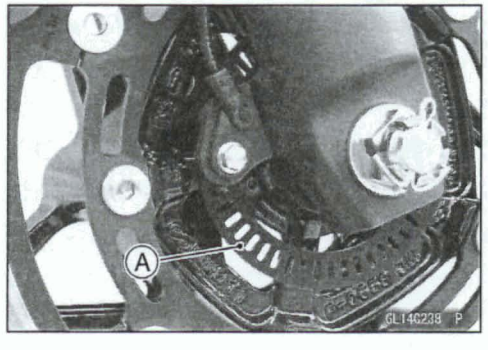
- Perform the Pre-Diagnosis Inspection 1 and 2.

Step 1

- Check the front and rear tire/wheel conditions for tire pressure, tire size/types, abnormal wear and deformations (see Wheels/Tires in the Periodic Maintenance chapter).

★If the tire and/or wheel are in bad condition, correct them to the normal condition.

★If there is no problem, go to next step.



Step 2

- Visually inspect the sensor rotor [A] for missing teeth or clogging with foreign matter (see Wheel Rotation Sensor Rotor Inspection).

★Clean or correct the parts if necessary.

★If the all parts correct, go to next step.

Anti-Lock Brake System (Equipped Models)

Step 3
- Measure the front and rear wheel rotation sensor air gaps (see Wheel Rotation Sensor Air Gap Inspection).

★If the air gap is not within the specification, recheck the hub bearing, sensor, sensor rotor and sensor installation condition.

★If the air gap is within the specification, replace the ABS hydraulic unit.

ABS Motor Inspection (Service Code 35)
- Perform the Pre-Diagnosis Inspection 1 and 2.
- Check the system connectors for loose or poorly contact.
- In order to confirm a existing problem in the system, erase the service code and then recheck the yellow ABS indicator light (LED).

★If same service code is indicated again, faulty ABS Motor in the ABS hydraulic unit. Replace the ABS hydraulic unit.

★If the service code does not indicate, ABS system is normal (service code is not stored; temporary failure).

Wheel Rotation Sensor Signal Abnormal Inspection (Front: Service Code 42) (Rear: Service Code 44)
- Perform the Pre-Diagnosis Inspection 1 and 2.
- Check the system connectors for loose or poorly contact.

Step 1
- Measure the front or rear wheel rotation sensor air gap (see Wheel Rotation Sensor Air Gap Inspection).

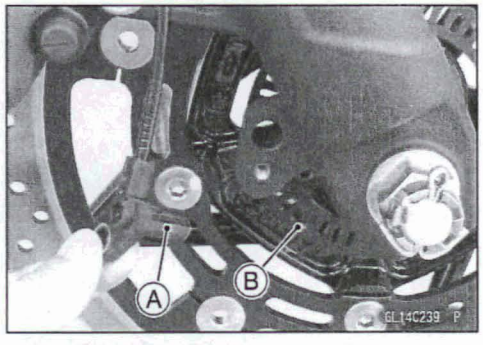
★If the air gap is not within the specification, recheck the hub bearing, sensor, sensor rotor and sensor installation condition.

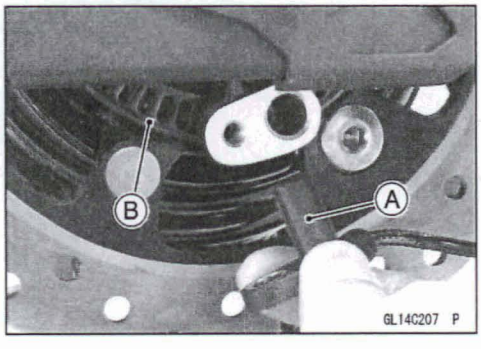
★If the air gap is within the specification, go to next step.

Step 2
- Check that there is iron or other magnetic deposits between the front or rear wheel rotation sensor [A] and sensor rotor, and the sensor rotor slots [B] for obstructions.
- Check the installation condition of the sensor for looseness.
- Check the sensor tip and sensor rotor slots for deformation or damage (e.g. chipped sensor rotor teeth).

★If the sensor and sensor rotor in bad condition, clean or replace the faulty parts.

★If all items are correct, go to next step.





Anti-Lock Brake System (Equipped Models)

Step 3
- Check the front and rear tire/wheel conditions for tire pressure, tire size/types, abnormal wear and deformations (see Wheels/Tires in the Periodic Maintenance chapter).

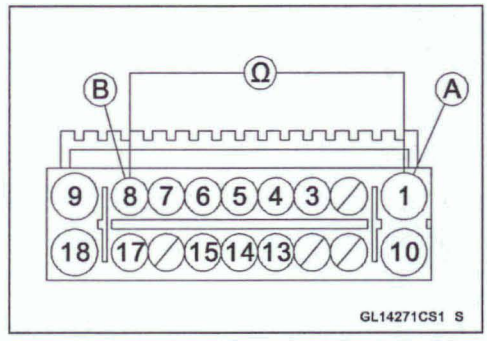
★If the tire and/or wheel are in bad condition, correct them if necessary and recheck.
★If all items are good condition, replace the ABS unit.

Front Wheel Rotation Sensor Wiring Inspection (Service Code 43)

○This code is indicates there is a trouble in the front wheel rotation sensor.
- Perform the Pre-Diagnosis Inspection 1 and 2.
- Check the system connectors for loose or poorly contact.

Step 1
- Disconnect the ABS hydraulic unit connector.
- Check for continuity between the terminal 1 (BK/Y) [A] and terminal 8 (BK/W) [B] of the ABS hydraulic unit connector.

★If there is continuity, go to next step.
★If there is no continuity, go to step 2.

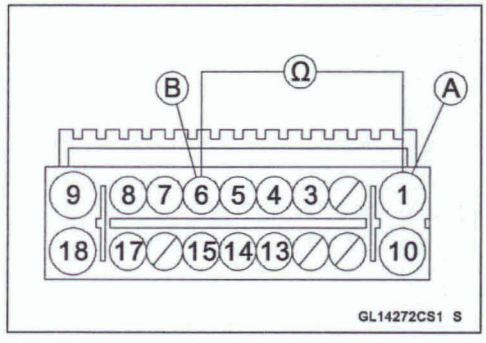


Step 1-1
- Disconnect the front wheel rotation sensor connector [A].
- Recheck the continuity between the terminal 1 (BK/Y) and terminal 8 (BK/W) of the ABS hydraulic unit connector.

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the front wheel rotation sensor.

Step 2
- Check for continuity between the terminal 1 (BK/Y) [A] and terminal 6 (BK/O) [B] of the ABS hydraulic unit connector.

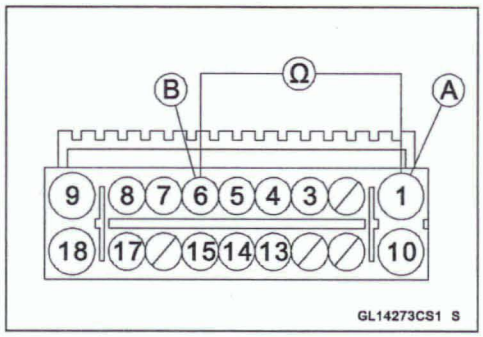
★If there is continuity, go to next step.
★If there is no continuity, go to step 3.



Anti-Lock Brake System (Equipped Models)

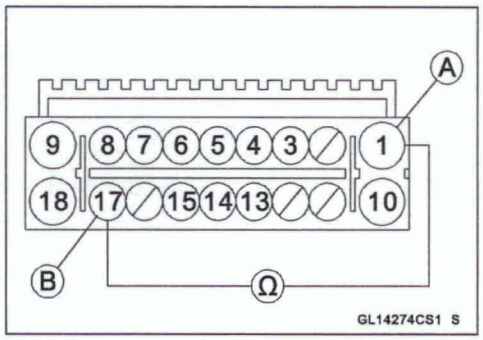
Step 2-1
- Disconnect the rear wheel rotation sensor connector.
- Recheck the continuity between the terminal 1 (BK/Y) [A] and terminal 6 (BK/O) [B] of the ABS hydraulic unit connector.

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the rear wheel rotation sensor.



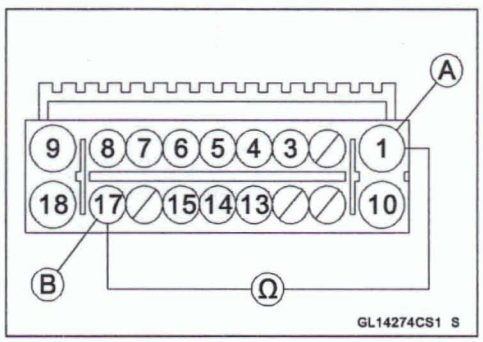
Step 3
- Connect the front wheel rotation sensor connector.
- Check for continuity between the terminal 1 (BK/Y) [A] and terminal 17 (W/BK) [B] of the ABS hydraulic unit connector.

★If there is continuity, go to next step.
★If there is no continuity, go to step 4.



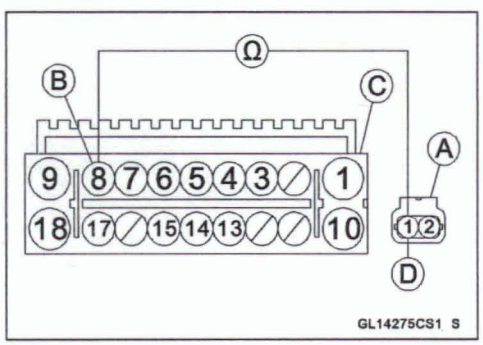
Step 3-1
- Disconnect the front wheel rotation sensor connector.
- Recheck the continuity between the terminal 1 (BK/Y) [A] and terminal 17 (W/BK) [B] of the ABS hydraulic unit connector.

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the front wheel rotation sensor.



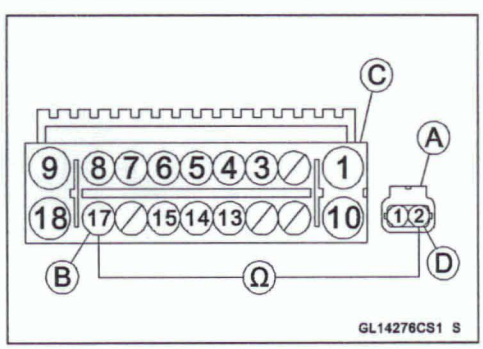
Step 4
- Disconnect the front wheel rotation sensor connector [A].
- Check for continuity between the terminal 8 (BK/W) [B] of the ABS hydraulic unit connector [C] and terminal 1 (BK/W) [D] of the front wheel rotation sensor connector (main harness side).

★If there is no continuity, repair or replace the main harness.
★If there is continuity, go to next step.



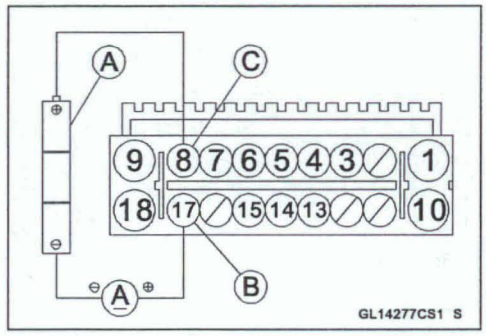
Step 5
- With disconnecting the front wheel rotation sensor connector [A], check for continuity between the terminal 17 (W/BK) [B] of the ABS hydraulic unit connector [C] and the 2 (W/BK) terminal [D] of the front wheel rotation sensor connector (main harness side).

★If there is no continuity, repair or replace the main harness.
★If there is continuity, go to next step.



Anti-Lock Brake System (Equipped Models)

Step 6



- Connect the front wheel rotation sensor connector.
- Connect the 4.5 ~ 5.0 V DC power (e.g. three AA dry battery in series [A]) between the terminal 17 (W/BK) (–) [B] and terminal 8 (BK/W) (+) [C] of the ABS hydraulic unit connector to measure DC amperage.

○Be careful not to reverse connection of the DC power polarity.

○The measured DC amperage should be within 3 ~ 17 mA.

★If measurement is abnormal, replace the front wheel rotation sensor.

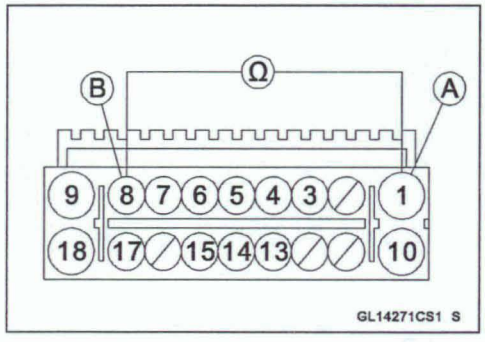
★If measurement is normal, replace the ABS hydraulic unit.

Rear Wheel Rotation Sensor Wiring Inspection (Service Code 45)

○This code is indicates there is a trouble in the rear wheel rotation sensor. However the front and rear wheel rotation sensor inspection should be performed if this code is indicated.

- Perform the Pre-Diagnosis Inspection 1 and 2.
- Check the system connectors for loose or poorly contact.

Step 1



- Disconnect the ABS hydraulic unit connector.
- Check for continuity between the terminal 1 (BK/Y) [A] and terminal 8 (W/BK) [B] of the ABS hydraulic unit connector.

★If there is continuity, go to next step.

★If there is no continuity, go to step 2.

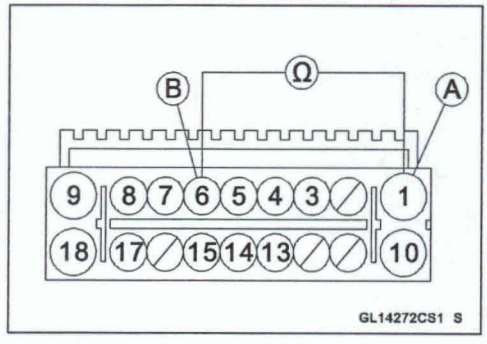
Step 1-1

- Disconnect the front wheel rotation sensor connector [A].
- Recheck the continuity between the terminal 9 (BK/Y) and terminal 8 (W/BK) of the ABS hydraulic unit connector.

★If there is continuity, repair or replace the main harness.

★If there is no continuity, replace the front wheel rotation sensor.

Step 2



- Check for continuity between the terminal 1 (BK/Y) [A] and terminal 6 (BK/O) [B] of the ABS hydraulic unit connector.

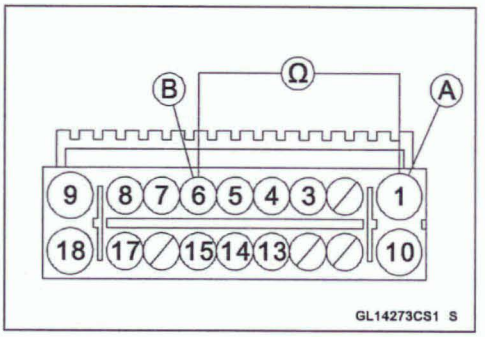
★If there is continuity, go to next step.

★If there is no continuity, go to step 3.

Anti-Lock Brake System (Equipped Models)

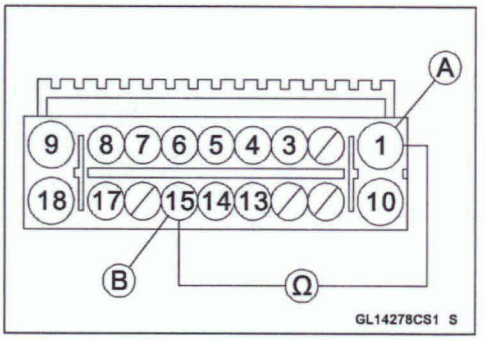
Step 2-1
- Disconnect the rear wheel rotation sensor connector.
- Recheck the continuity between the terminal 1 (BK/Y) [A] and terminal 6 (BK/O) [B] of the ABS hydraulic unit connector.

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the rear wheel rotation sensor.



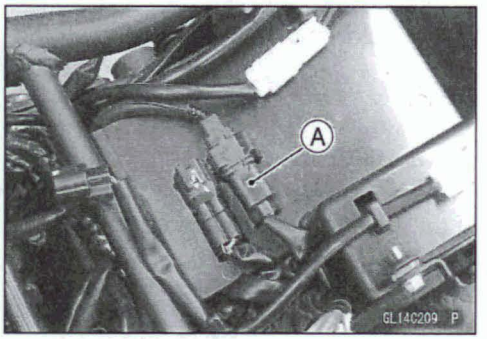
Step 3
- Connect the rear wheel rotation sensor connector.
- Check for continuity between the terminal 1 (BK/Y) [A] and terminal 15 (W/G) [B] of the ABS hydraulic unit connector.

★If there is continuity, go to next step.
★If there is no continuity, go to step 4.



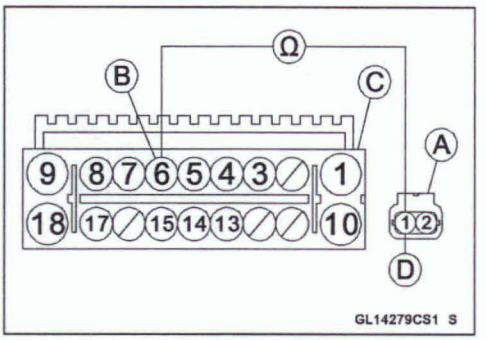
Step 3-1
- Disconnect the rear wheel rotation sensor connector [A].
- Recheck the continuity between the terminal 1 (BK/Y) and terminal 15 (W/G) of the ABS hydraulic unit connector.

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the rear wheel rotation sensor.



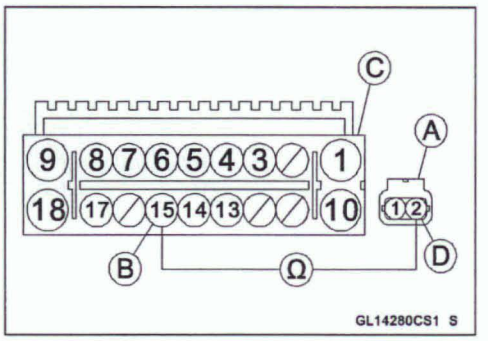
Step 4
- Disconnect the rear wheel rotation sensor connector [A].
- Check for continuity between the terminal 6 (BK/O) [B] of the ABS hydraulic unit connector [C] and terminal 1 (BK/O) [D] of the rear wheel rotation sensor connector (main harness side).

★If there is no continuity, repair or replace the main harness.
★If there is continuity, go to next step.



Step 5
- With disconnecting the rear wheel rotation sensor connector [A], check for continuity between the terminal 15 (W/G) [B] of the ABS hydraulic unit connector [C] and terminal 2 (W/G) [D] of the rear wheel rotation sensor connector (main harness side).

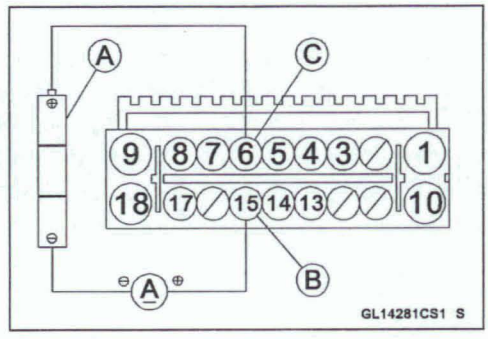
★If there is no continuity, repair or replace the main harness.
★If there is continuity, go to next step.



Anti-Lock Brake System (Equipped Models)

Step 6
- Connect the rear wheel rotation sensor connector.
- Connect the 4.5 ~ 5.0 V DC power (e.g. three AA dry battery in series [A]) between the terminal 15 (W/G) (–) [B] and terminal 6 (BK/O) (+) [C] of the ABS hydraulic unit connector to measure DC amperage.

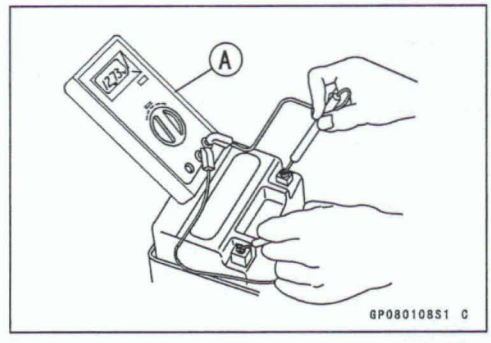
○Be careful not to reverse connection of the DC power polarity.
○The measured DC amperage should be within 3 ~ 17 mA.
★If measurement is abnormal, replace the rear wheel rotation sensor.
★If measurement is normal, replace the ABS hydraulic unit.



Power Supply Voltage Abnormal Inspection (Service Code 52: Low Voltage) (Service Code 53: High Voltage)

Step 1
- Measure the battery terminal voltage using a voltmeter [A].

○The battery voltage should be within 10 ~ 16 V.
★If the voltage is not within the specifications, recharge or replace the battery.
★If the voltage within the specifications, go to next step.

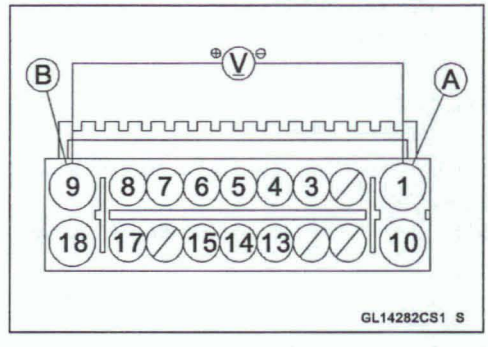


Step 2
- Check the ABS motor relay fuse 30 A and ABS solenoid valve relay fuse 20 A in the fuse box (2) [A] for blown.

★If the fuse(s) is blown, replace the fuse(s).
★If the fuse(s) is not blown, go to next step.

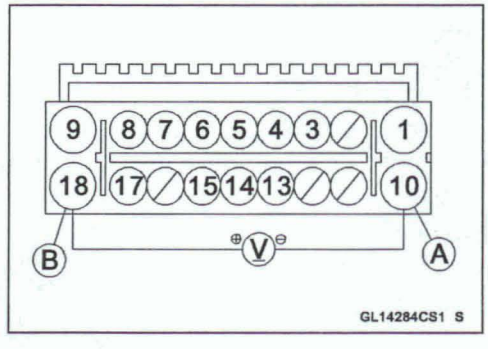
Step 3
- Disconnect the ABS hydraulic unit connector.
- Check the voltage between the terminal 1 (BK/Y) (–) [A] and terminal 9 (R/W) (+) [B] of the ABS hydraulic unit connector.

○The battery voltage (10 ~ 16 V) should appear while the ignition switch turned on.
★If the battery voltage does not appear, repair or replace the main harness.
★If the battery voltage appeared, go to next step.



Step 4
- Disconnect the ABS hydraulic unit connector.
- Check the voltage between the terminal 10 (BK/Y) (–) [A] and terminal 18 (R/BK) (+) [B] of the ABS hydraulic unit connector.

○The battery voltage (10 ~ 16 V) should appear while the ignition switch turned on.
★If the battery voltage does not appear, repair or replace the main harness.
★If the battery voltage appeared, go to next step.



Anti-Lock Brake System (Equipped Models)

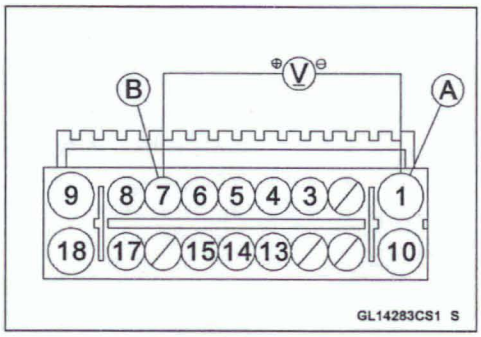
Step 5

- Check the voltage between the terminal 1 (BK/Y) (–) [A] and terminal 7 (BR/W) (+) [B] of the ABS hydraulic unit connector.

○The battery voltage (10 ~ 16 V) should appear while the ignition switch turned on.

★If the battery voltage not appeared, repair or replace the main harness.

★If the battery voltage does appear, replace the ABS hydraulic unit.



ABS Hydraulic Unit Internal Error Inspection (Service Code 55)

○This service code indicates there is an internal error for the ECU integrated with the ABS hydraulic unit regarding the wheel speed detection.

- Perform the Pre-Diagnosis Inspection 1 and 2.
- Check the system connectors for loose or poorly contact.

Step 1

- Measure the front and rear wheel rotation sensor air gaps (see Wheel Rotation Sensor Air Gap Inspection).

★If the air gap is not within the specification, correct the air gap accordingly.

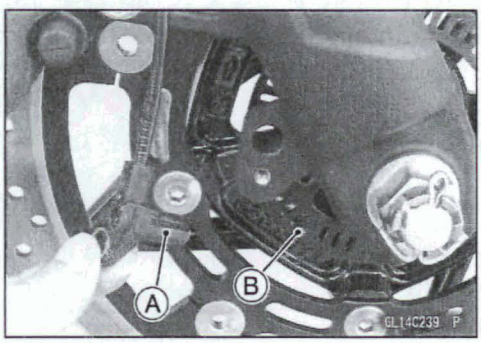
★If the air gap is within the specification, go to next step.

Step 2

- Check that there is iron or other magnetic deposits between the both wheel rotation sensor [A] and sensor rotor, and the sensor rotor slots [B] for obstructions.
- Check the installation condition of the sensor for looseness.
- Check the sensor tip and sensor rotor slots for deformation or damage (e.g. chipped sensor rotor teeth).

★If the sensor and sensor rotor in bad condition, clean or replace the faulty parts.

★If all items are correct, go to next step.



Step 3

- Check the front and rear tire/wheel conditions for tire pressure, tire size/types, abnormal wear and deformations (see Wheels/Tires in the Periodic Maintenance chapter).

★If the tire and/or wheel are in bad condition, correct them to the normal condition.

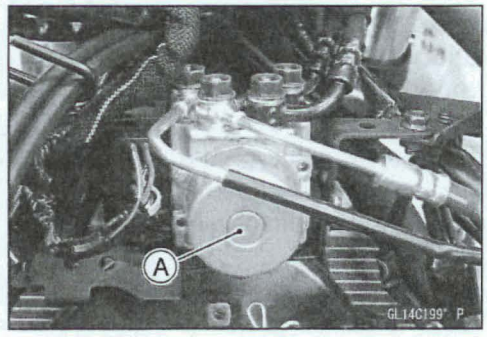
★If there is no problem, replace the ABS hydraulic unit.

Anti-Lock Brake System (Equipped Models)

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.



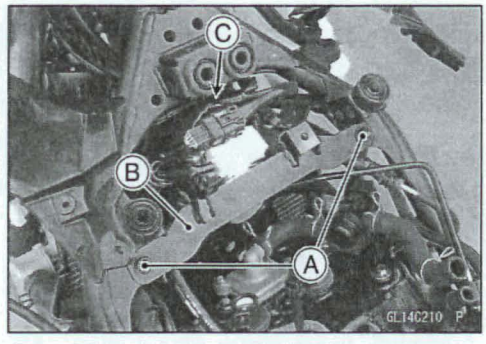
NOTICE

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

- 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.
○Be sure to place a cloth under the ABS hydraulic unit.

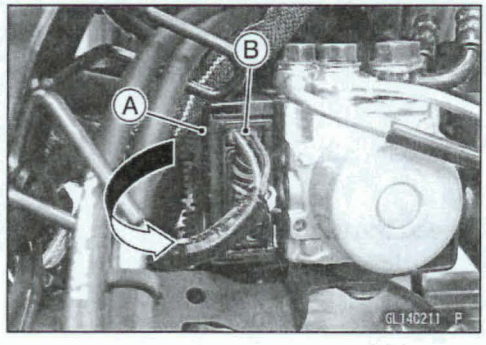
- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter)
  Air Cleaner Housing Bracket Bolts [A]
  Air Cleaner Housing Bracket [B]
- Open the clamp [C].



- Pull the lever [A] to disconnect the ABS hydraulic unit connector [B].

NOTICE

To protect the ABS hydraulic unit from the electrical surge, always disconnect the ABS hydraulic unit connector while the ignition switch is turned off.

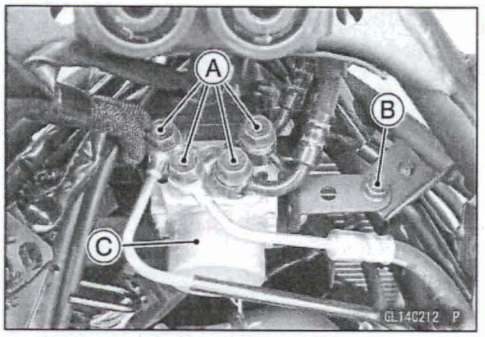


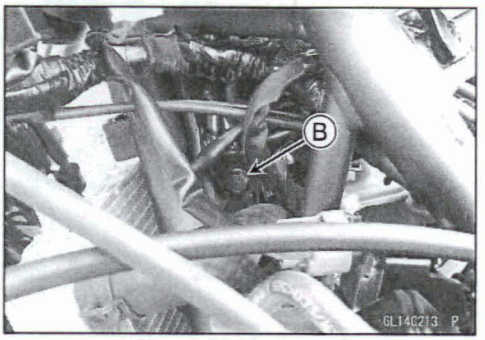
Anti-Lock Brake System (Equipped Models)

- Remove:
  Brake Hose Banjo Bolts (ABS Hydraulic Unit) [A]
  ABS Hydraulic Unit Bracket Bolts [B]
  ABS Hydraulic Unit [C]

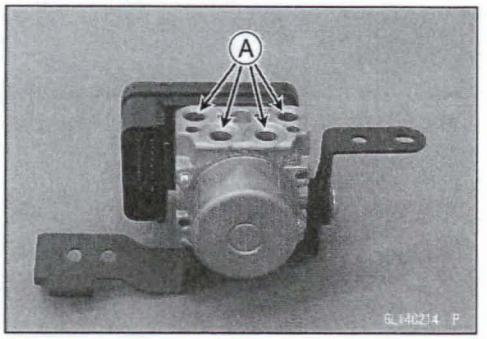
NOTE

○*Be careful not to bend the brake pipe while removing the ABS hydraulic unit.*





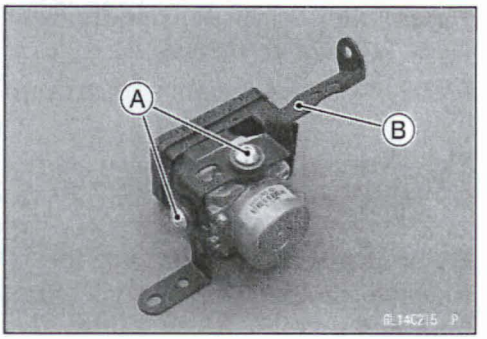
- Plug the port [A] on the ABS hydraulic unit to prevent entering a foreign matter into the unit.
- Wrap the brake pipe openings with a vinyl bag to prevent brake fluid leakage and entering a foreign matter into the hydraulic system.



NOTICE

• Do not allow entering a foreign matter into the hydraulic system while disconnecting the hydraulic lines.
• Brake fluid quickly ruins painted plastic surfaces; any spilled fluid should be completely washed away immediately.

- Remove:
  Bolts [A] and Collars
  Bracket [B]



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

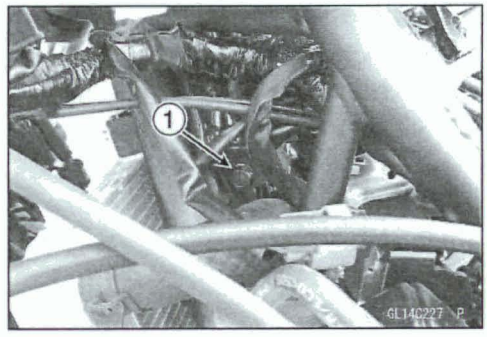
NOTICE

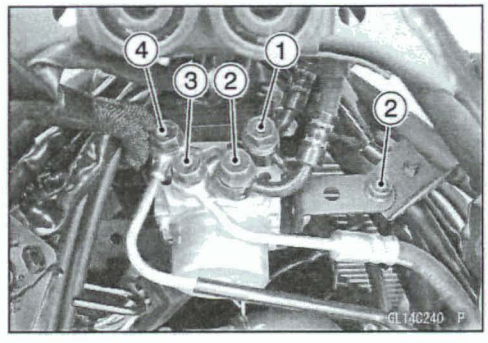
Brake fluid quickly damage painted plastic surfaces; any spilled fluid should be completely washed away immediately.

Anti-Lock Brake System (Equipped Models)

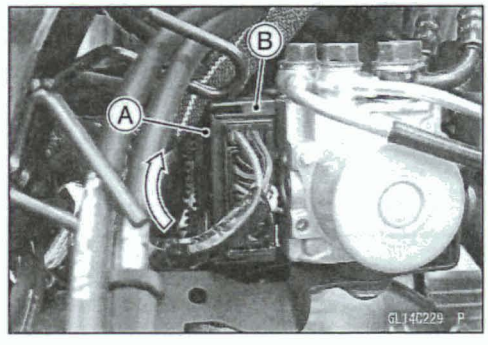
- Install the ABS hydraulic unit together with the bracket, and tighten the bolts following the specified tightening sequence [1 ~ 2].
- Replace the washers that are on each side of pipe fitting with new ones.
- Install the brake hoses (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Tighten the brake hose banjo bolts (ABS hydraulic unit) following the specified tightening sequence [1 ~ 4].

Torque - Brake Hose Banjo Bolts (ABS Hydraulic Unit): 33 N·m (3.4 kgf·m, 24 ft·lb)





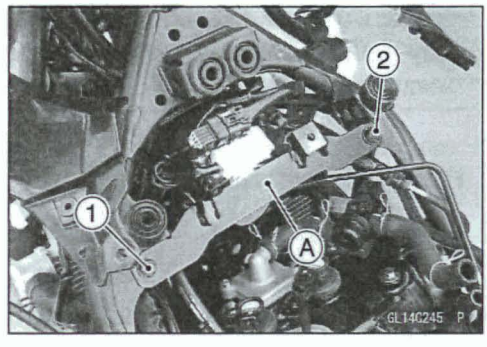
- Push the lever [A] to connect the ABS hydraulic unit connector [B].
- Bleed the brake line (see Brake Line Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.



- Install the air cleaner housing bracket [A].
- Tighten the air cleaner housing bracket bolts following the specified tightening sequence [1 ~ 2].

Torque - Air Cleaner Housing Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Install the removed parts (see appropriate chapters).



ABS Hydraulic Unit Inspection

- Remove the ABS hydraulic unit (see ABS Hydraulic Unit Removal).
- Visually inspect the ABS hydraulic unit.

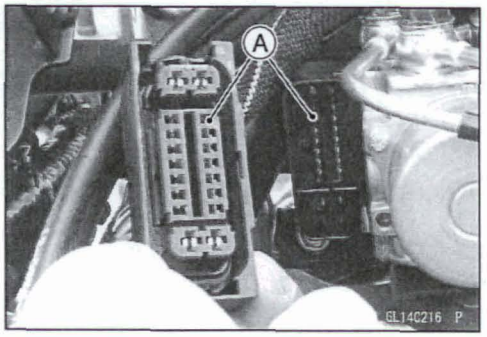
★Replace the ABS hydraulic unit if any of them are cracked, or otherwise damaged.

Anti-Lock Brake System (Equipped Models)

- 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.

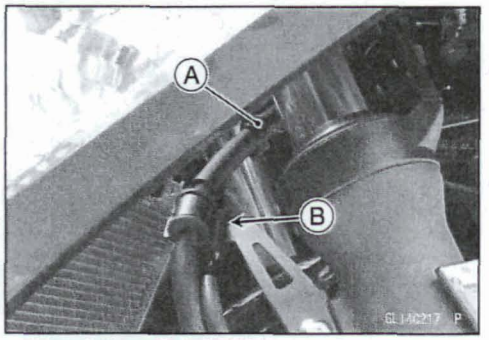


Front Wheel Rotation Sensor Removal

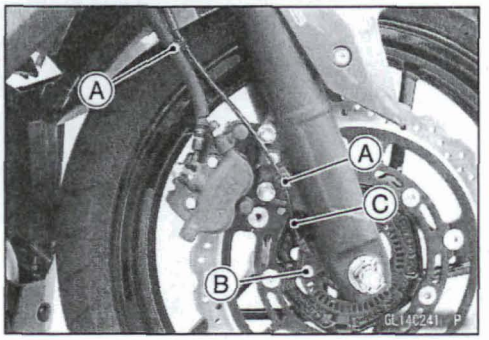
NOTICE
The wheel rotation sensor should be handled carefully, never struck sharply, as with a hammer, or allowed to fall on a hard surface since the wheel rotation sensor is precision made. Be careful not to get water or mud on the wheel rotation sensor. **Do not try to disassemble or repair the wheel rotation sensor.**

- Disconnect the front wheel rotation sensor connector [A] and free the connector from the bracket.

- Clear the sensor lead from the clamp [A] and bracket [B].



- Remove:
  Clamps [A]
  Front Wheel Rotation Sensor Bolt [B]
  Front Wheel Rotation Sensor [C]



Anti-Lock Brake System (Equipped Models)

Front Wheel Rotation Sensor Installation

- Installation is the reverse of removal.

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

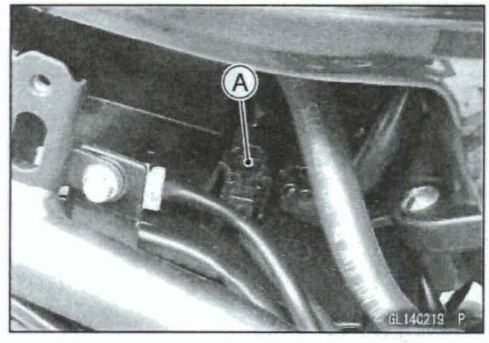
○Tighten:

Torque - Front Wheel Rotation Sensor Bolt: 6.9 N·m (0.70 kgf·m, 61 in·lb)

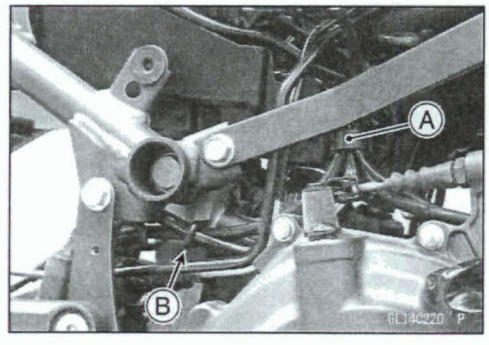
Rear Wheel Rotation Sensor Removal

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:
  Right Middle Fairing (see Middle Fairing Removal in the Frame chapter)
  Frame Cover (see Frame Cover Removal in the Frame chapter)
  Mud Guard (see Mud Guard Removal in the Frame chapter)
- Disconnect the rear wheel rotation sensor connector [A] and free the connector from the battery case cover.

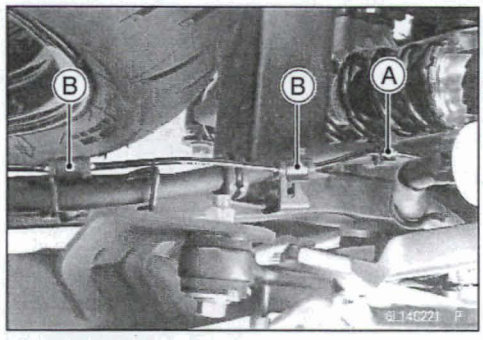


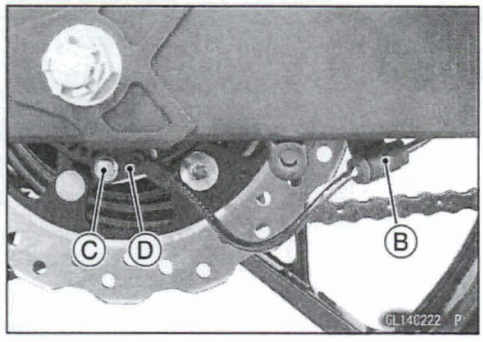
- Open the clamp [A].
- Clear the sensor lead from the bracket [B].



Anti-Lock Brake System (Equipped Models)

- Remove the clamp [A].
- Clear the sensor lead from the brackets [B].
- Remove:
  Rear Wheel Rotation Sensor Bolt [C]
  Rear Wheel Rotation Sensor [D]





Rear Wheel Rotation Sensor Installation

- Installation is the reverse of removal.

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

○Tighten:

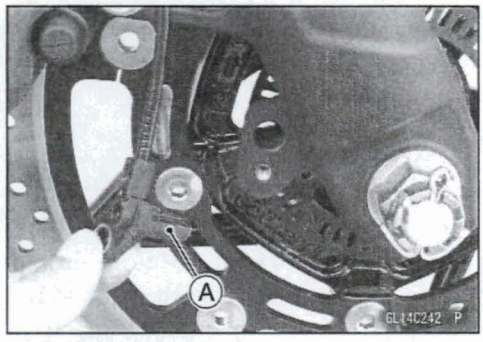
Torque - Rear Wheel Rotation Sensor Bolt: 6.9 N·m (0.70 kgf·m, 61 in·lb)

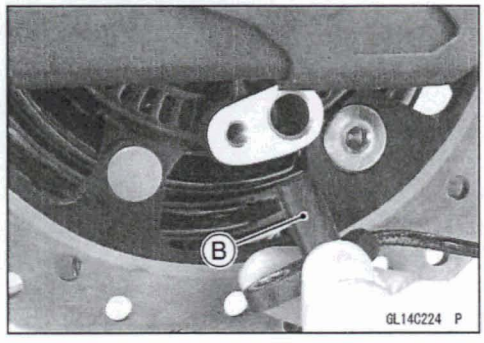
Wheel Rotation Sensor Inspection

- 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.

★If electrical failure is suspected on the sensors, perform the electrical check (see Service Code 43 Step 6 for front sensor or Service Code 45 Step 6 for rear sensor).





Anti-Lock Brake System (Equipped Models)

Wheel Rotation Sensor Air Gap Inspection

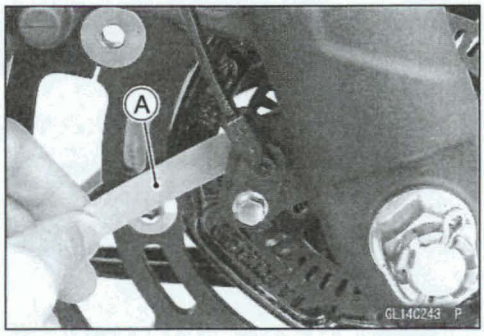
- Raise the front/rear wheel off the ground (see Front/Rear Wheel Removal in the Wheels/Tires chapter).
- Measure the air gap between the sensor and sensor rotor at several points.

Thickness Gauge [A]

Air Gap

Standard:

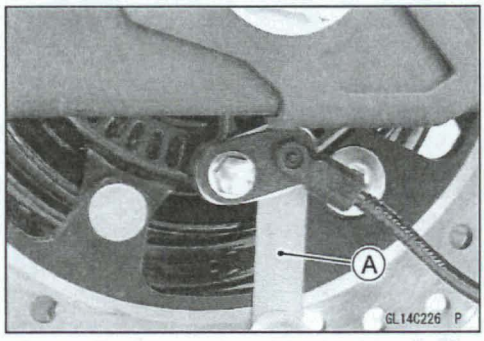
Front	**0.6 ~ 1.5 mm (0.02 ~ 0.06 in.)**
Rear	**0.8 ~ 1.5 mm (0.03 ~ 0.06 in.)**



NOTE

○*The sensor air gap cannot be adjusted.*

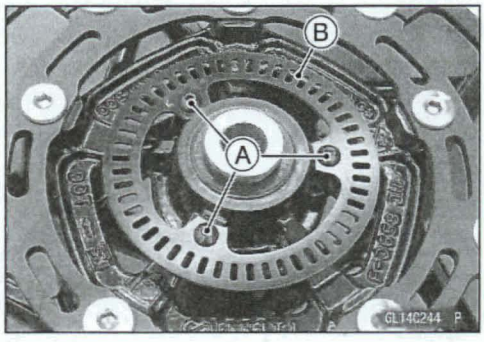
★If the air gap is not within the specification, inspect the hub bearing (see Hub Bearing Inspection in the Wheels/Tires chapter), sensor, sensor rotor and sensor installation condition (see Wheel Rotation Sensor Inspection).



Front Wheel Rotation Sensor Rotor Removal

- Remove:

Front Wheel (see Front Wheel Removal in the Wheels/Tires chapter)
Front Wheel Rotation Sensor Rotor Bolts [A]
Front Wheel Rotation Sensor Rotor [B]



NOTE

○*Handle the wheel rotation sensor rotor carefully and do not apply the external force to deform it. There is a possibility that the sensor cannot read the signal correctly from the rotor.*

Front Wheel Rotation Sensor Rotor Installation

- Install the front wheel rotation sensor rotor and tighten the front wheel rotation sensor rotor bolts.

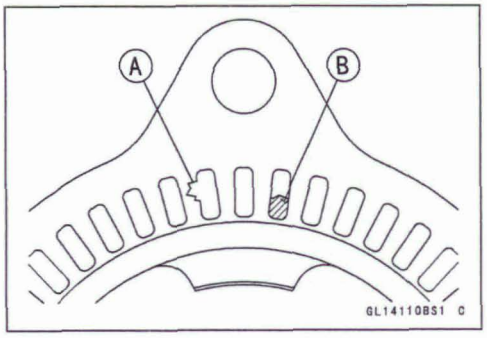
Torque - Front Wheel Rotation Sensor Rotor Bolts: 4.15 N·m (0.423 kgf·m, 37 in·lb)

NOTE

○*Handle the wheel rotation sensor rotor carefully and do not apply the external force to deform it. There is a possibility that the sensor cannot read the signal correctly from the rotor.*

Anti-Lock Brake System (Equipped Models)

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.

Fuse 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

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

Suspension

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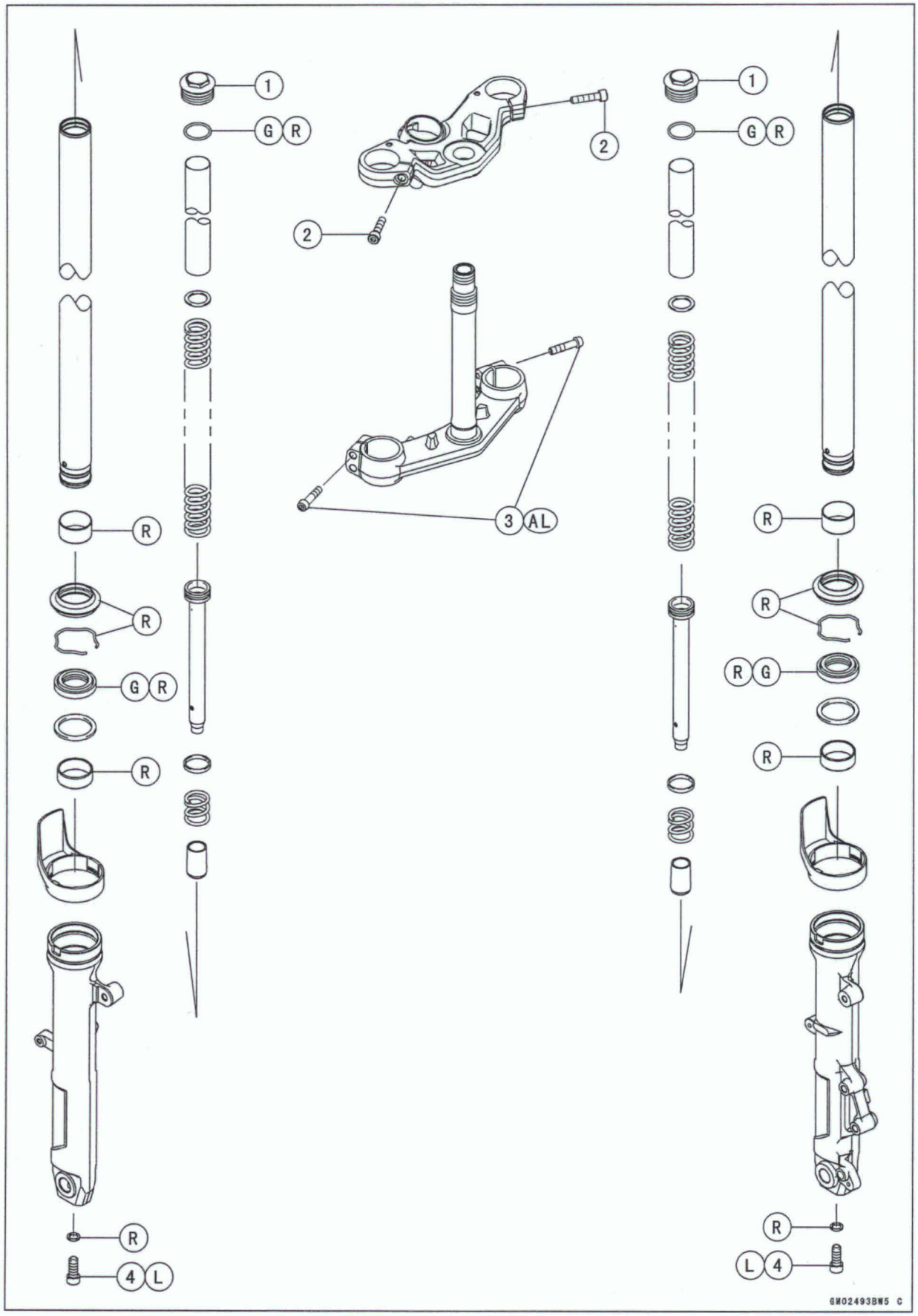
Exploded View

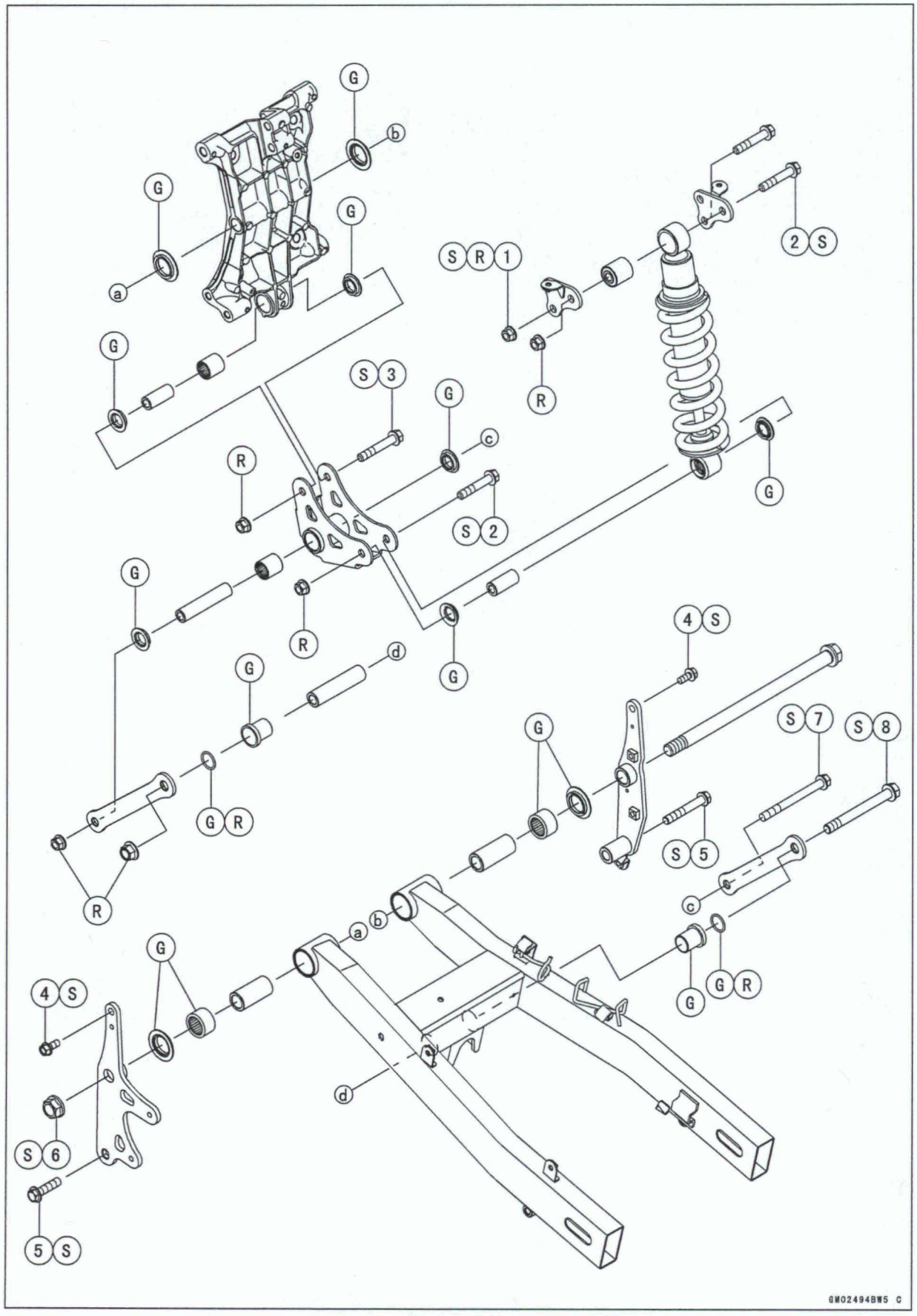


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Fork Top Plugs	30	3.1	22	
2	Upper Front Fork Clamp Bolts	20	2.0	15	
3	Lower Front Fork Clamp Bolts	23	2.3	17	AL
4	Front Fork Bottom Allen Bolts	20	2.0	15	L

AL: Tighten the two clamp bolts alternately two times to ensure tightening torque.
G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Rear Shock Absorber Bracket Nuts	34	3.5	25	R, S
2	Rear Shock Absorber Bolts	34	3.5	25	S
3	Rocker Arm Bolt	34	3.5	25	S
4	Upper Swingarm Side Bracket Bolts	20	2.0	15	S
5	Lower Swingarm Side Bracket Bolts	34	3.5	25	S
6	Swingarm Pivot Shaft Nut	108	11.0	79.7	S
7	Lower Tie-Rod Bolt	50	5.1	37	S
8	Upper Tie-Rod Bolt	59	6.0	44	S

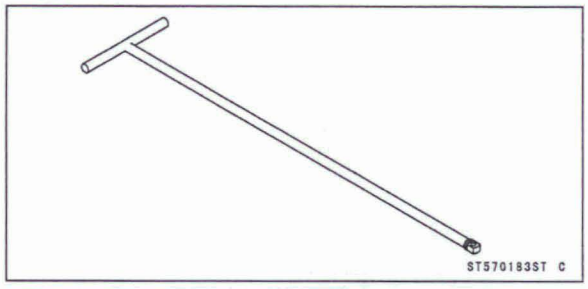
G: Apply grease.
R: Replacement Parts
S: Follow the specified tightening sequence.

Specifications

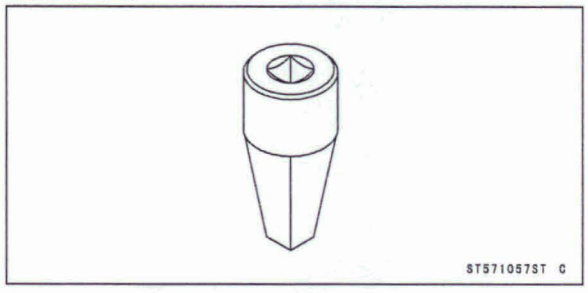
Item	Standard
Front Fork (Per One Unit)	
Fork Inner Tube Diameter	ϕ41 mm (1.6 in.)
Air Pressure	Atmospheric pressure (Non-adjustable)
Suspension Oil	Kawasaki SS-8 or equivalent
Amount:	
When Changing Oil	Approx. 450 mL (15.2 US oz.)
After Disassembly and Completely Dry	526 ±2.5 mL (17.8 ±0.085 US oz.)
Fork Oil Level	88 ±2 mm (3.5 ±0.08 in.) (fully compressed, without spring, below from the top of the inner tube)
Fork Spring Free Length	297.5 mm (11.71 in.) (Service Limit: 292 mm (11.5 in.))
Rear Shock Absorber	
Spring Preload Setting Position	2nd position (Adjustable Range: 1st ←→ 5th position)
Gas Pressure	1 000 kPa (10.20 kgf/cm², 145 psi, Non-adjustable)

Special Tools

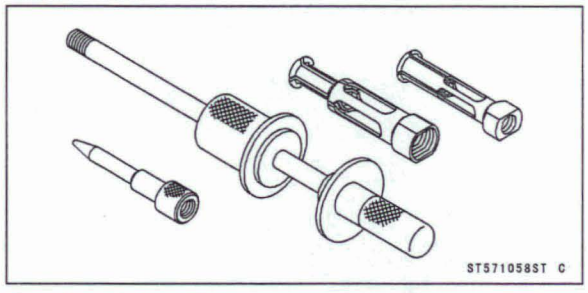
Fork Cylinder Holder Handle:
57001-183



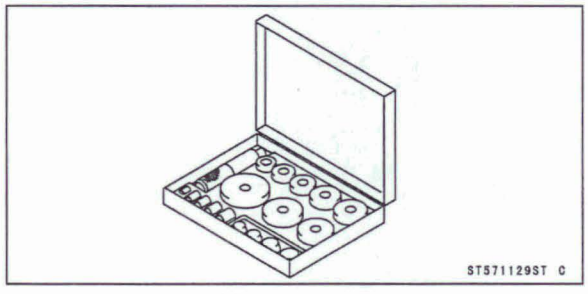
Fork Cylinder Holder Adapter:
57001-1057



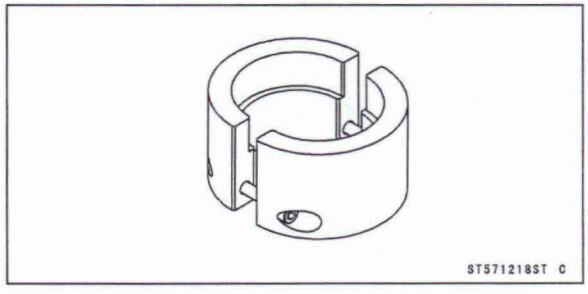
Oil Seal & Bearing Remover:
57001-1058



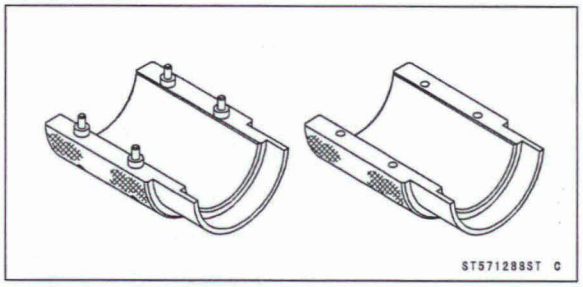
Bearing Driver Set:
57001-1129



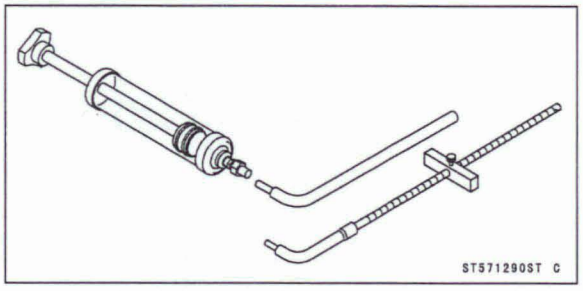
Fork Outer Tube Weight:
57001-1218



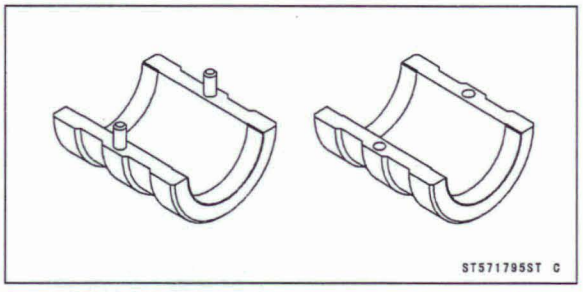
Fork Oil Seal Driver, ϕ41:
57001-1288



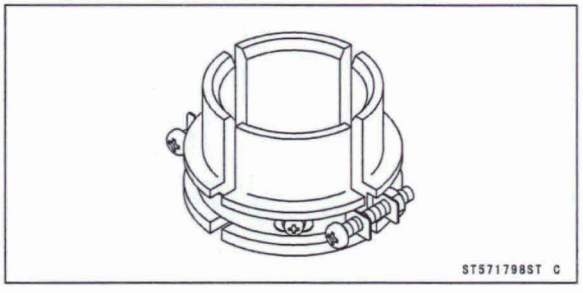
Fork Oil Level Gauge:
57001-1290



Fork Oil Seal Driver Weight, ϕ26 ~ ϕ46:
57001-1795



Fork Oil Seal Driver Attachment, ϕ36 ~ ϕ46:
57001-1798



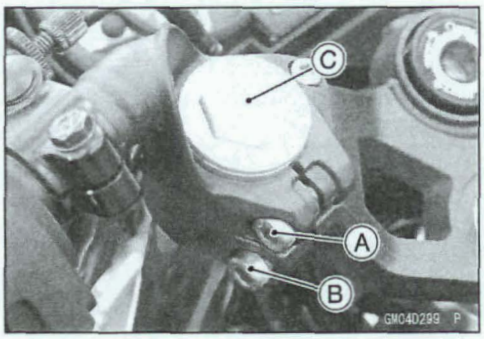
Front Fork

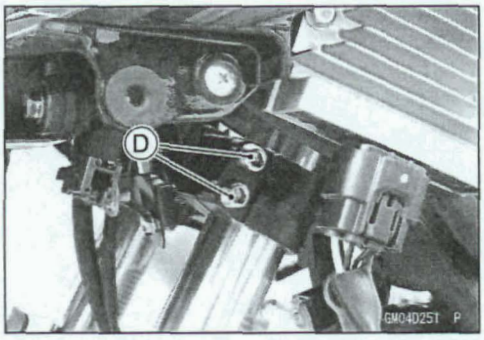
Front Fork Removal (Each Fork Leg)

- Remove:
  Middle Fairings (see Middle 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)

★If fork leg is to be disassembled, loosen the handlebar clamp bolt [A] and upper front fork clamp bolt [B], front fork top plug [C] beforehand.

- Loosen:
  Handlebar Clamp Bolt
  Upper Front Fork Clamp Bolt
  Lower Front Fork Clamp Bolts [D]
- With a twisting motion, remove the fork leg down and out.

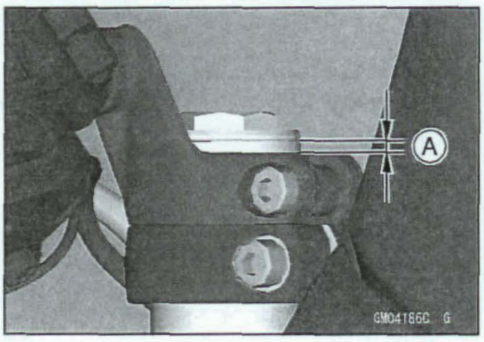




Front Fork Installation (Each Fork Leg)

- Install the fork leg.
- Position the fork leg so that top end of the inner tube as shown.
  About 3 mm (0.1 in.) [A]
- Tighten:

Torque - Lower Front Fork Clamp Bolts: 23 N·m (2.3 kgf·m, 17 ft·lb)



NOTE

○*Tighten the two lower front fork clamp bolts alternately two times to ensure even tightening torque.*

★Tighten the front fork top plug to the specified torque if the front fork top plug is removed.

Torque - Front Fork Top Plugs: 30 N·m (3.1 kgf·m, 22 ft·lb)

NOTE

○*Tighten the top plug before tightening the handlebar clamp bolt and upper front fork clamp bolt.*

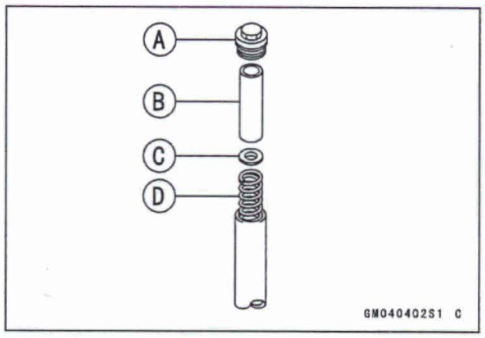
- Tighten:

Torque - Upper Front Fork Clamp Bolt: 20 N·m (2.0 kgf·m, 15 ft·lb)
Handlebar Clamp Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

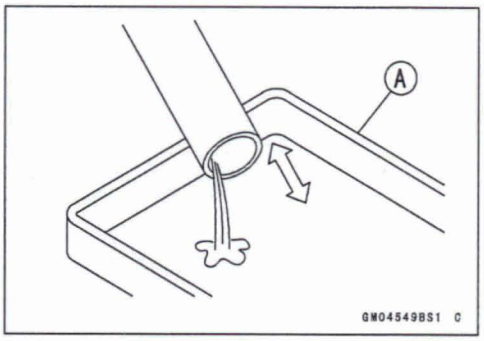
- Install the removed parts (see appropriate chapters).

Front Fork

Front Fork Oil Change

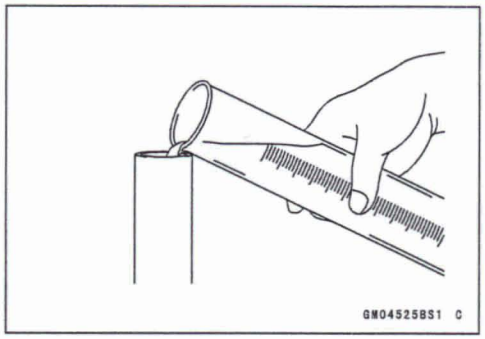


- Remove:
  Front Fork (see Front Fork Removal)
  Front Fork Top Plug [A] with O-ring
  Spacer [B]
  Fork Spring Seat [C]
  Fork Spring [D]



- Drain the fork oil into a suitable container [A].

○Pump the inner tube up and down at least 10 times to expel the oil from the fork.



- Hold the fork tube upright, pour in the type and amount of fork oil specified.

Suspension Oil - SS-8 (1 L): 44091-0007

Amount (Per Side):

When changing oil:

Approx. 450 mL (15.2 US oz.)

After disassembly and completely dry:

526 ±2.5 mL (17.8 ±0.085 US oz.)

NOTE

○*Move the outer tube up and down a few times to remove the air that is trapped in the fork oil in order to stabilize the oil level.*

Front Fork

- Hold the outer tube vertically in a vise and compress the fork completely.
- Wait until the oil level stabilizes.
- Use the fork oil level gauge [A] to measure the distance between the top of the inner tube to the oil level.

Special Tool - Fork Oil Level Gauge: 57001-1290

○Set the oil level gauge stopper [B] so that the distance [C] from the bottom of the stopper to the lower end of the pipe is the standard oil level distance.

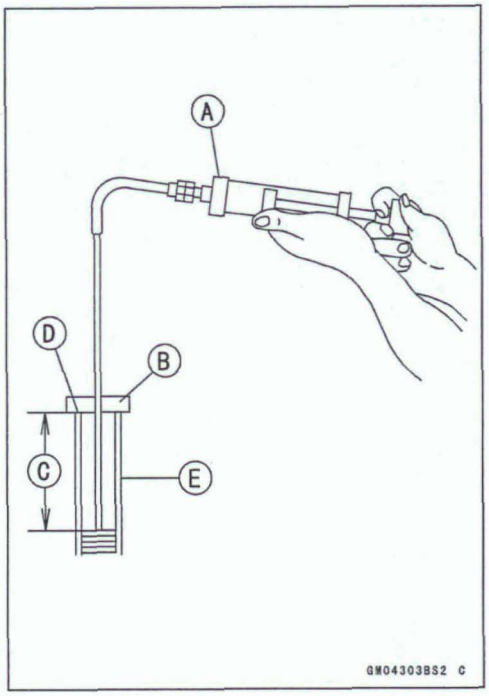
○A correct measurement can not be obtained unless the level gauge pipe is placed in the center of the inner tube.

Fork Oil Level (fully compressed, without fork spring)
Standard: 88 ±2 mm (3.5 ±0.08 in.)

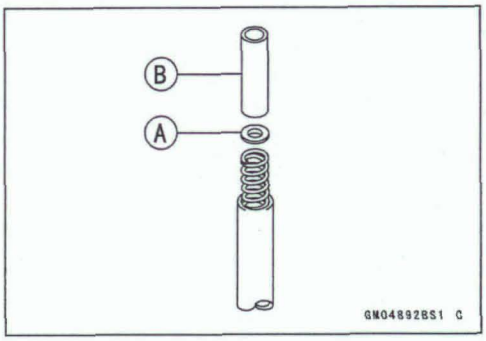
○Place the stopper of the level gauge at the top [D] of the inner tube [E] and pull the handle slowly to draw out the excess oil from fork into the gauge, thus attaining the standard level.

★If not oil is drawn out, there is not enough oil in the fork. Pour in some more oil and measure again.

- Repeat the same procedure for adjusting the other fork.



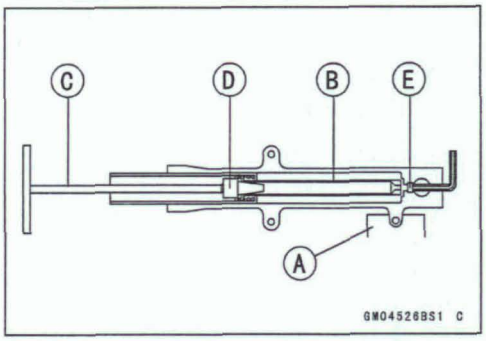
- Install:
  Fork Spring
  Fork Spring Seat [A]
  Spacer [B]
- Replace the top plug O-ring with a new one.
- Apply grease to the top plug O-ring.
- Install:
  Front Fork Top Plug
  Front Fork (see Front Fork Installation)



Front Fork Disassembly

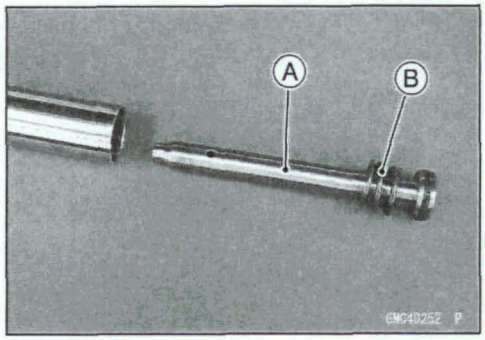
- Drain the fork oil (see Front Fork Oil Change).
- Hold the fork leg horizontally in a vise [A].
- Hold the cylinder unit [B] by using the special tools.

Special Tools - Fork Cylinder Holder Handle [C]: 57001-183
Fork Cylinder Holder Adapter [D]: 57001 -1057



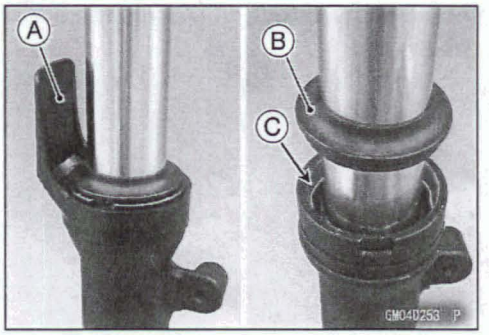
- Remove the Allen bolt [E] and gasket from the bottom of the outer tube.

- Remove the cylinder unit [A] and spring [B] from the inner tube.



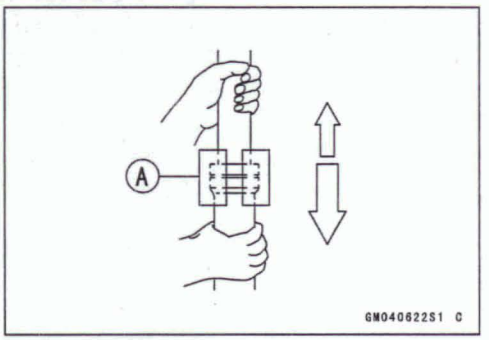
Front Fork

- Remove the following parts from the top of the outer tube.
  Fork Guard [A]
  Dust Seal [B]
  Retaining Ring [C]

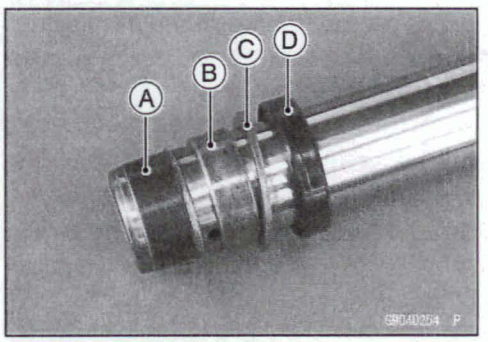


- Use the fork outer tube weight [A] to separate the inner tube from the outer tube. Holding the inner tube by hand in a vertical position, pull down the outer tube several times to pull out the inner tube.

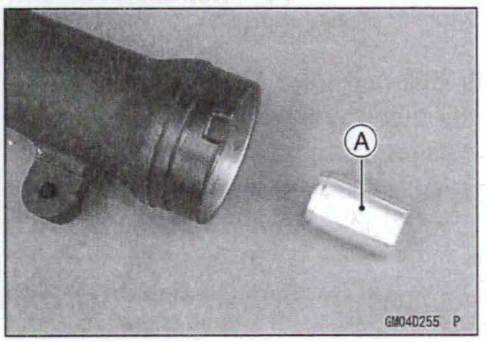
  Special Tool - Fork Outer Tube Weight: 57001-1218



- Remove:
  Inner Guide Bushing [A]
  Outer Guide Bushing [B]
  Washer [C]
  Oil Seal [D]

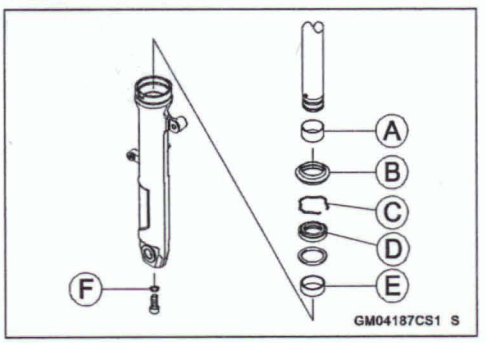


- Remove the cylinder base [A] from the bottom of the outer tube.



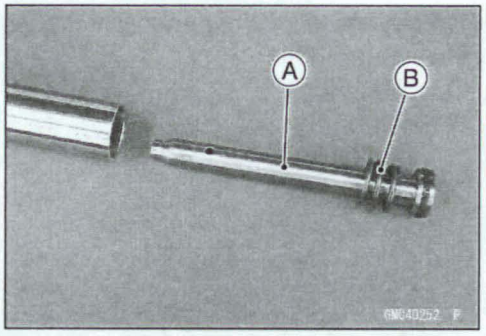
Front Fork Assembly

- Replace the following parts with new ones.
  Inner Guide Bushing [A]
  Dust Seal [B]
  Retaining Ring [C]
  Oil Seal [D]
  Outer Guide Bushing [E]
  Front Fork Bottom Allen Bolt Gasket [F]
- Install the new inner guide bushing to the groove on the inner tube.

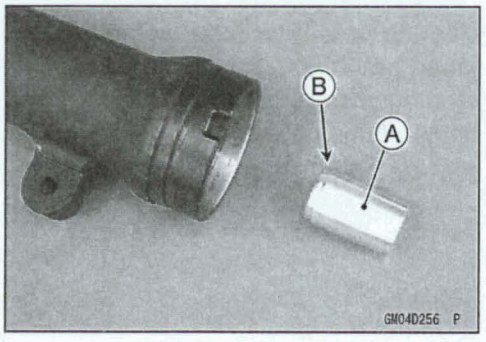


Front Fork

- Insert the cylinder unit [A] and the spring [B] into the inner tube.



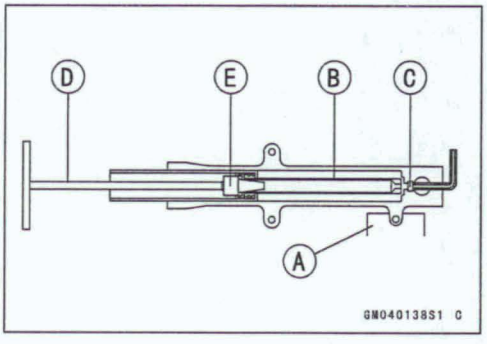
- Install the cylinder base [A] so that stepped side [B] faces downward into the bottom groove of the outer tube.
- Install the inner tube and cylinder unit as a set into the outer tube.



- Install a new bottom Allen bolt gasket.
- Apply a non-permanent locking agent to the threads of the bottom Allen bolt.
- Hold the outer tube horizontally in a vise [A], stop the cylinder unit [B] with the special tools, then tighten the Allen bolt [C].

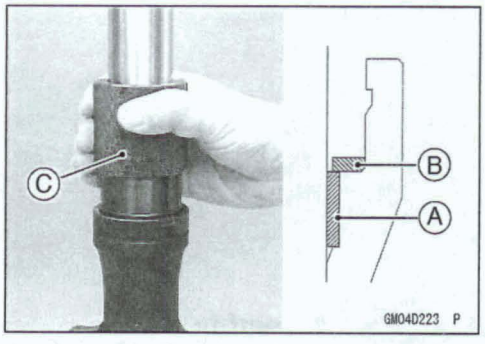
Special Tools - Fork Cylinder Holder Handle [D]: 57001-183
Fork Cylinder Holder Adapter [E]: 57001 -1057

Torque - Front Fork Bottom Allen Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)



- Install the outer guide bushing [A] and washer [B] into the outer tube using the fork oil seal driver [C], until the washer is bottomed.

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

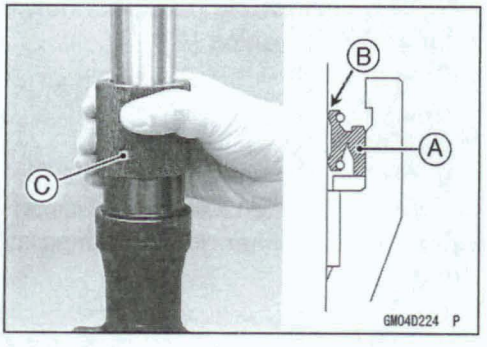


- Apply grease to the oil seal lips, and install the oil seal [A] to the outer tube from the top.

○Install the oil seal with its lip side [B] facing up.

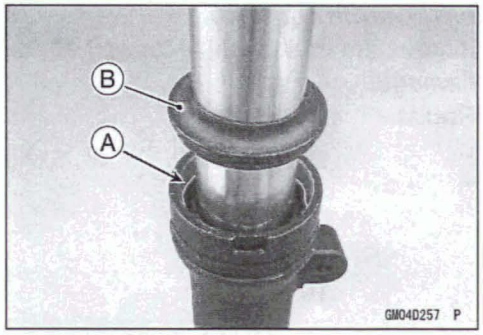
- Install the oil seal into the outer tube using the fork oil seal driver [C] until the oil seal is bottomed.

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

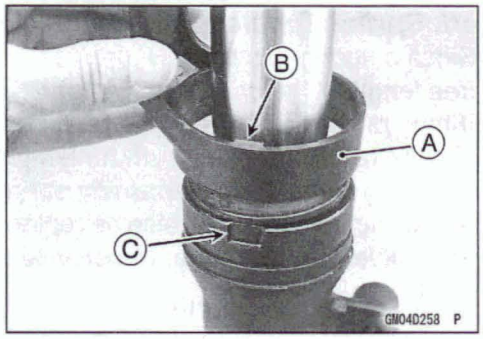


Front Fork

- Install the retaining ring [A] to the groove in the outer tube.
- Install the dust seal [B].



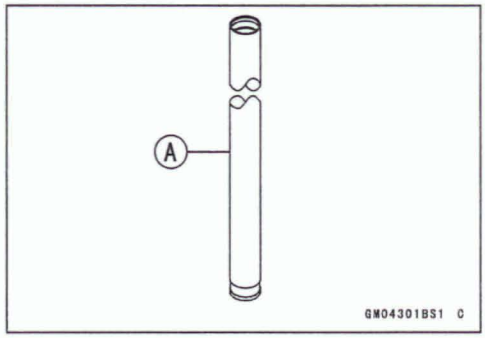
- Install the fork guard [A] to the outer tube aligning the tab [B] with the groove [C] on the outer tube.
- Pour in the specified type of oil (see Front Fork Oil Change).
- Install the front fork (see Front Fork Installation).



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.

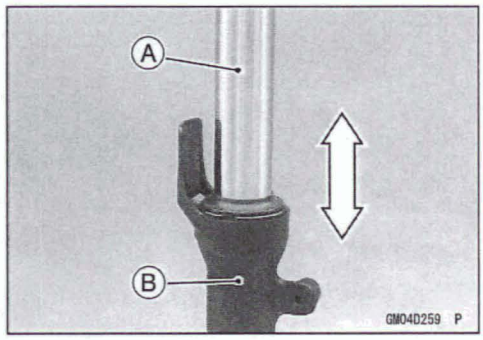


NOTICE

If the inner tube is badly bent or creased, replace it. Excessive bending, followed by subsequent straightening, can weaken the inner tube.

- Temporarily assemble the inner [A] and outer [B] tubes, and pump 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

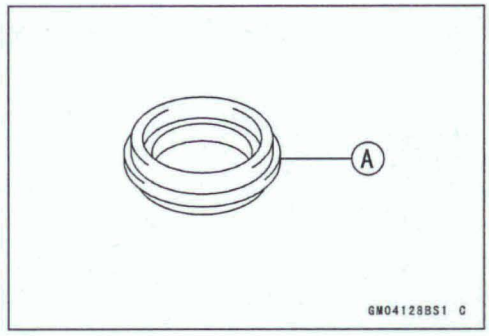
A straightened inner or outer fork tube may fall in use, possibly causing an accident resulting in serious injury or death. Replace a badly bent or damaged inner or outer tube and inspect the other tube carefully before reusing it.

Front Fork

Dust Seal Inspection

- Inspect the dust seal [A] for any signs of deterioration or damage.

★Replace it if necessary.



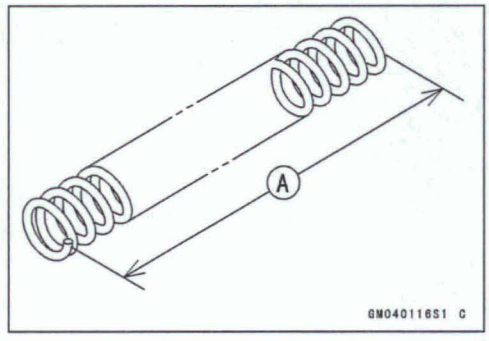
Fork Spring Tension Inspection

- Since a spring becomes shorter as it weakens, check its free length [A] to determine its condition.

★If the spring of either fork leg is shorter than the service limit, it must be replaced. If the length of a replacement spring and that of the remaining spring vary greatly, the remaining spring should also be replaced in order to keep the fork legs balanced for motorcycle stability.

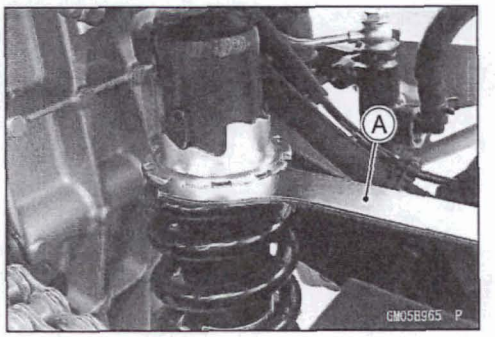
Fork Spring Free Length

Standard:	**297.5 mm (11.71 in.)**
Service Limit:	**292 mm (11.5 in.)**



Rear Shock Absorber

Spring Preload Adjustment



- Using the wrench [A] from the tool kit, turn the adjusting nut to adjust the spring preload.

○The standard adjuster setting is 2nd position.

Spring Preload Setting

Standard Position: **2nd position**

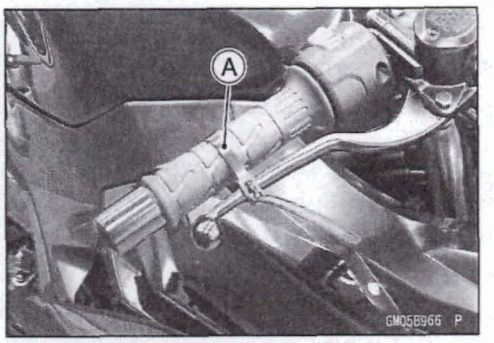
Adjustable Range: **1st ~ 5th position**

★If the compression of the spring is not suited to the operating conditions, adjust it to an appropriate position by referring to the table below.

Spring Preload Adjustment

Adjuster Position	Shock Absorber Hardness	Load	Road Conditions	Driving Speed
1st	Soft	Light	Good	Low
↑	↑	↑	↑	↑
↓	↓	↓	↓	↓
5th	Hard	Heavy	Bad	Highway

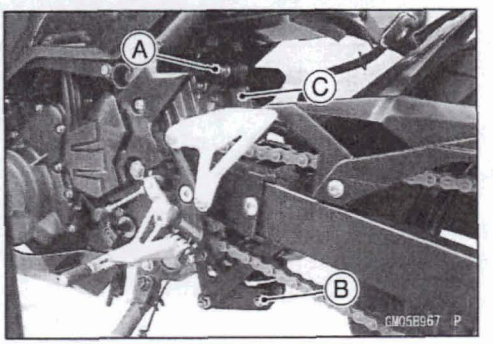
Rear Shock Absorber Removal



- Squeeze the brake lever slowly and hold it with a band [A].

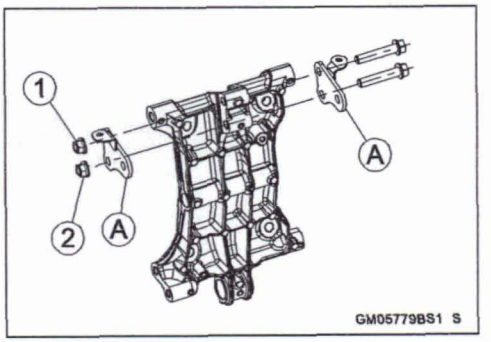
⚠ WARNING

Be sure to hold the front brake when removing the shock absorber, or the motorcycle may fall over. It could cause an accident and injury.



- Loosen:
  Upper Rear Shock Absorber Nut [A]
  Lower Rear Shock Absorber Nut [B]
- Support the frame using the suitable stand.
- Remove:
  Upper Rear Shock Absorber Nut and Bolt
  Lower Rear Shock Absorber Nut and Bolt
- Remove the shock absorber [C] from upside.

Rear Shock Absorber Installation



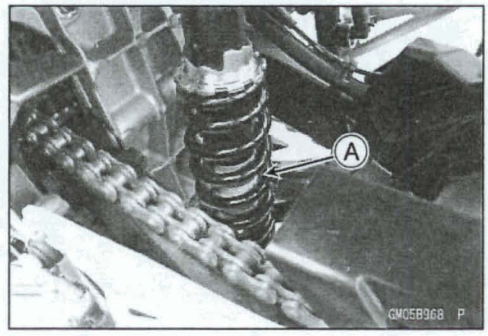
- Install the rear shock absorber brackets [A] if necessary.
- Replace the rear shock absorber bracket nuts with new ones.
- Tighten the rear shock absorber bracket nuts following the tightening sequence [1 ~ 2].

Torque - Rear Shock Absorber Bracket Nuts: 34 N·m (3.5 kgf·m, 25 ft·lb)

Rear Shock Absorber

- Replace:
  Rear Shock Absorber Nuts
- Install the rear shock absorber so that the label side faces rearward [A].
- Tighten:

Torque - Rear Shock Absorber Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)



NOTE

○*Tighten the upper rear shock absorber bolt first, next the lower rear shock absorber bolt.*

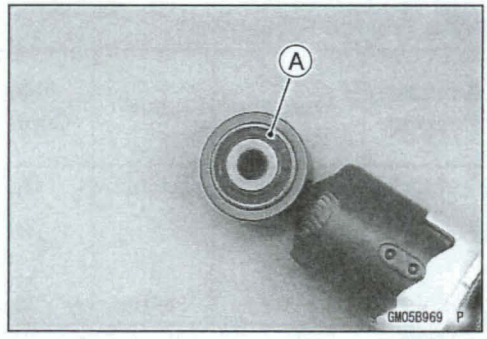
Rear Shock Absorber Inspection

- Remove the rear shock absorber (see Rear Shock Absorber Removal).
- Visually inspect the following items.
  Oil Leakage
  Crack or Dent

★If there is any damage to the rear shock absorber, replace it.

- Visually inspect the rubber bushing [A].

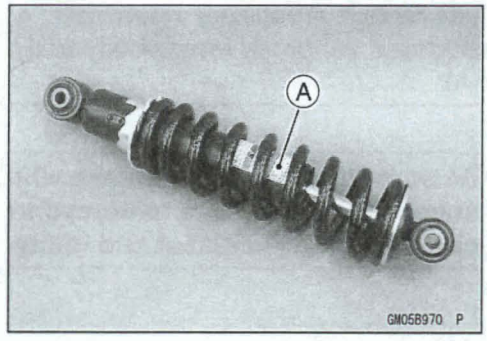
★If it show any signs of damage, replace it.



Rear Shock Absorber Scrapping

⚠ WARNING

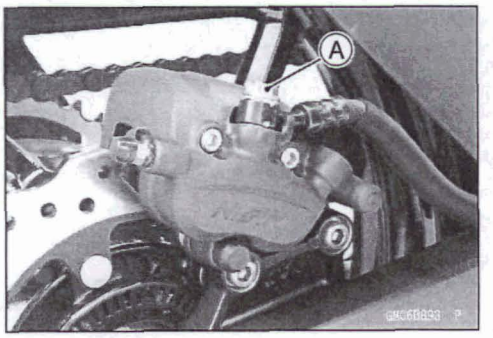
Since the rear shock absorber contains nitrogen gas, do not incinerate the rear shock absorber without first releasing the gas or it may explode.
Before a rear shock absorber is scrapped, drill a hole at the point [A] shown to release the nitrogen gas completely. Wear safety glasses when drilling the hole, as the gas may below out bits of drilled metal when the hole opens.



- Remove the rear shock absorber (see Rear Shock Absorber Removal).
- Drill the cylinder of the shock absorber using about 2 mm (0.08 in.) drillbit.

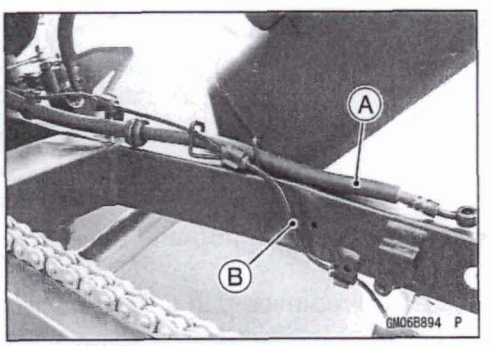
Swingarm

Swingarm Removal

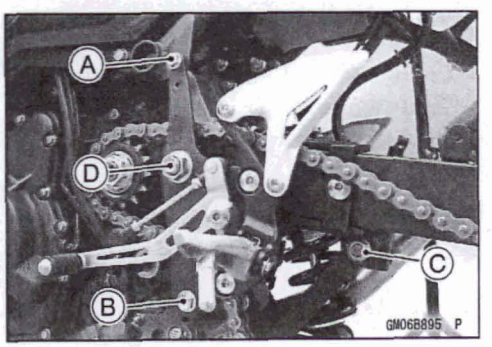


- Loosen the rear brake hose banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Remove:
  Muffler Cover (see Muffler Removal in the Engine Top End chapter)
  Frame Cover (see Frame Cover Removal in the Frame chapter)
  Engine Sprocket Cover (see Engine Sprocket Removal in the Final Drive chapter)
  Rear Wheel (see Rear Wheel Removal in the Wheels/Tires chapter)
  Mud Guard (see Mud Guard Removal in the Frame chapter)
- Remove the banjo bolt and disconnect the brake hose from the caliper (see Brake Hose and Pipe Replacement in the Periodic Maintenance chapter).

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



- Free the brake hose [A] and rear wheel rotation sensor lead [B] from the swingarm.

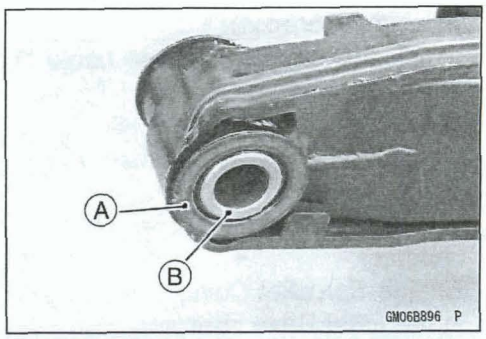


- Loosen:
  Swingarm Bracket Bolts [A] [B]
  Upper Tie-Rod Nut [C]
  Swingarm Pivot Shaft Nut [D]
- Support the frame using the suitable stand.
- Remove:
  Upper Tie-Rod Nut and Bolt
  Swingarm Pivot Shaft Nut and Bolt
  Swingarm

Swingarm

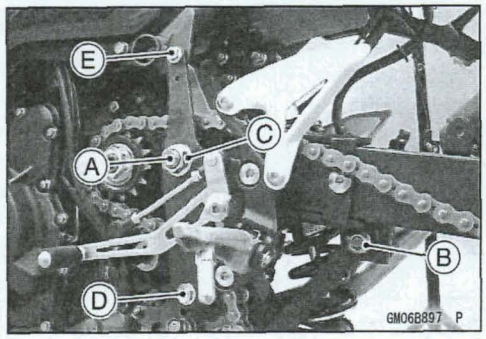
Swingarm Installation

- Apply grease to the lips of the grease seals [A].
- Be sure to install the grease seals and sleeves [B] to the swingarm.



- Install the swingarm and insert the swingarm pivot shaft [A] from the right side.
- Replace:
  Upper Tie-Rod Nut [B]
  O-rings
- Apply grease to the O-rings.
- Tighten the bolts and nuts following the specified tightening sequence.

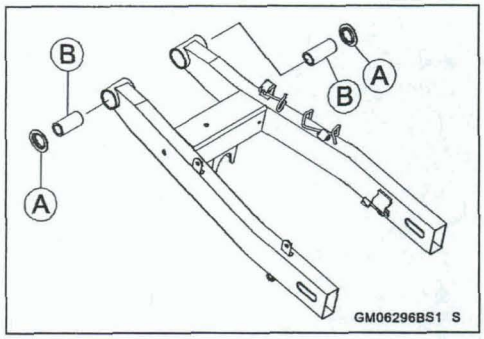
Torque - Swingarm Pivot Shaft Nut [C]: 108 N·m (11.0 kgf·m, 79.7 ft·lb)
Left Lower Swingarm Side Bracket Bolt [D]: 34 N·m (3.5 kgf·m, 25 ft·lb)
Left Upper Swingarm Side Bracket Bolt [E]: 20 N·m (2.0 kgf·m, 15 ft·lb)
Right Lower Swingarm Side Bracket Bolt: 34 N·m (3.5 kgf·m, 25 ft·lb)
Right Upper Swingarm Side Bracket Bolt: 20 N·m (2.0 kgf·m, 15 ft·lb)
Upper Tie-Rod Bolt: 59 N·m (6.0 kgf·m, 44 ft·lb)



- Move the swingarm up and down to check for abnormal friction.
- Install the removed parts (see appropriate chapters).

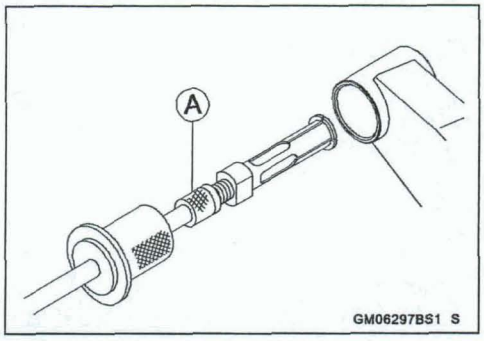
Swingarm Bearing Removal

- Remove:
  Swingarm (see Swingarm Removal)
  Grease Seals [A]
  Sleeves [B]



- Remove the needle bearings.

Special Tool - Oil Seal & Bearing Remover [A]: 57001-1058



Swingarm Bearing Installation

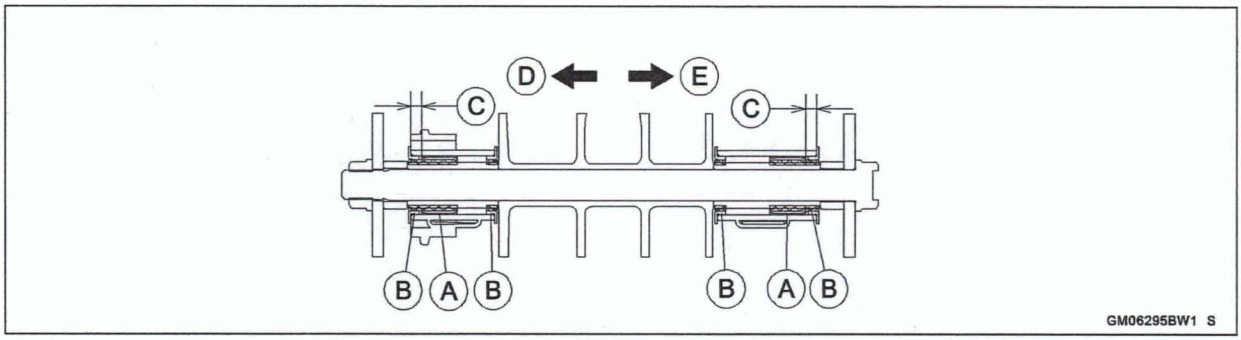
- Apply plenty of grease to the needle bearings.

Swingarm

- Install the needle bearings [A] and grease seals [B] position as shown.

Special Tool - Bearing Driver Set: 57001-1129

6 mm (0.24 in.) [C]
Left Side [D]
Right Side [E]



GM06295BW1 S

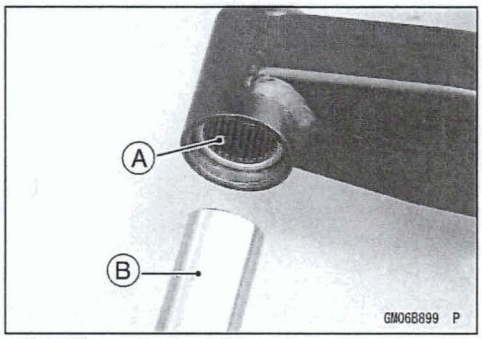
Swingarm Bearing, Sleeve Inspection

NOTICE
Do not remove the bearings for inspection. Removal may damage them.

- Inspect the needle bearings [A] installed in the swingarm.

○The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, visually inspect the bearing for abrasion, discoloration, or other damage.

★If the needle bearing and sleeve [B] show any signs of abnormal wear, discoloration, or damage, replace them as a set.



GM06B899 P

Swingarm Bearing Lubrication

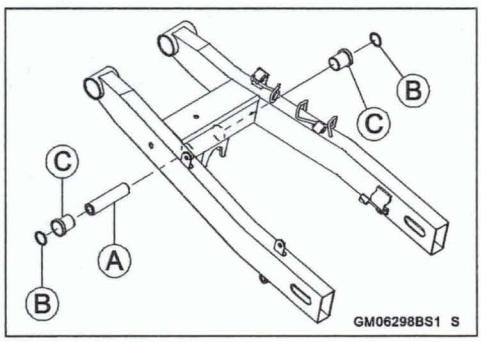
- Refer to the Swingarm Pivot Lubrication in the Periodic Maintenance chapter.

Swingarm Bushing Removal

- Remove:

Swingarm (see Swingarm Removal)
Sleeve [A]
O-rings [B]
Swingarm Bushings [C]

Special Tool - Oil Seal & Bearing Remover: 57001-1058



GM06298BS1 S

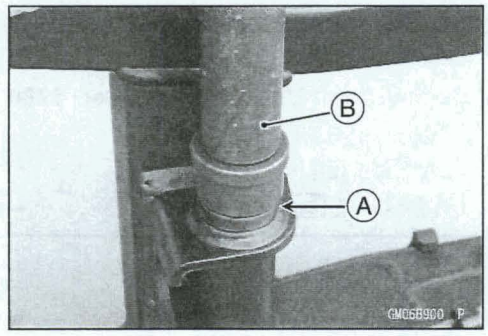
Swingarm

Swingarm Bushing Installation

- Press the swingarm bushings [A] until they are bottomed.

  Special Tool - Bearing Driver Set [B]: 57001-1129

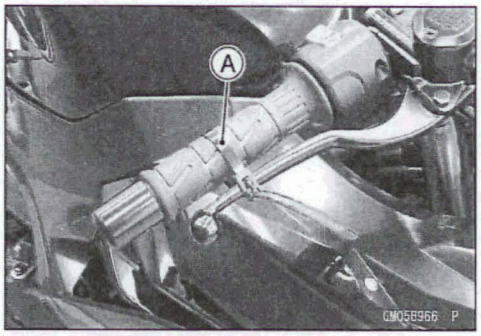
- Apply grease to the inside of the bushings.



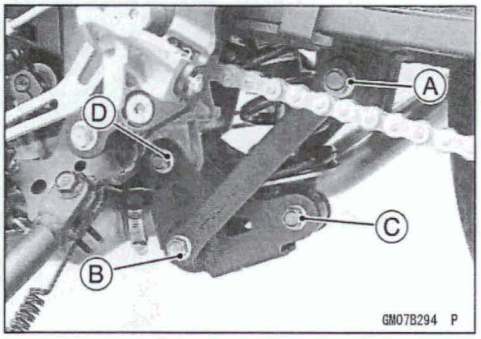
Tie-Rod, Rocker Arm

Tie-Rod Removal

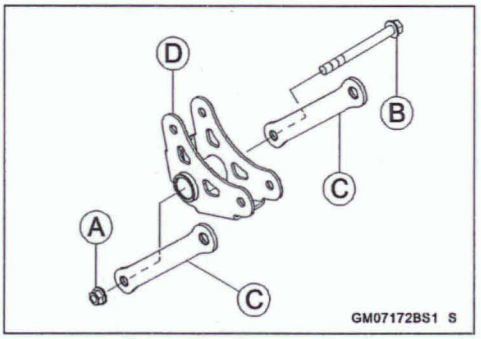
- Squeeze the brake lever slowly and hold it with a band [A].
- Remove:
  Muffler Cover (see Muffler Removal in the Engine Top End Chapter)



- Loosen:
  Upper Tie-Rod Nut [A]
  Lower Tie-Rod Nut [B]
  Lower Rear Shock Absorber Nut [C]
  Rocker Arm Nut [D]
- Support the frame using the suitable stand.
- Remove:
  Upper Tie-Rod Nut and Bolt
  Lower Rear Shock Absorber Nut and Bolt
  Rocker Arm Nut and Bolt



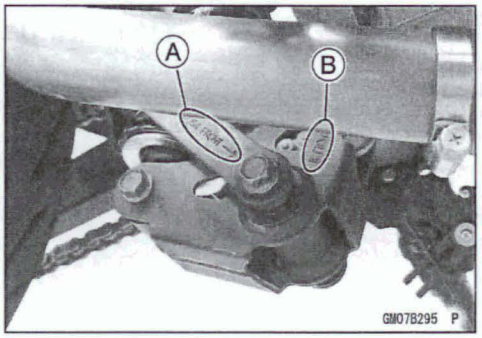
- Remove:
  Lower Tie-Rod Nut [A] and Bolt [B]
  Tie-Rods [C]
  Rocker Arm [D]



Tie-Rod Installation

- Apply grease to the inside of the oil seals.
- Replace the following nuts with new ones.
  Tie-Rod Nuts
  Rocker Arm Nut
  Lower Rear Shock Absorber Nut
- Install the tie-rods so that the marked side [A] faces outside and rocker arm side.
- Install the lower tie-rod bolt and nut.
- Install the rocker arm so that the marked side [B] faces front right side.
- Tighten the bolts and nuts following the specified tightening sequence.

Torque - Rocker Arm Bolt: 34 N·m (3.5 kgf·m, 25 ft·lb)
Lower Rear Shock Absorber Bolt: 34 N·m (3.5 kgf·m, 25 ft·lb)
Lower Tie-Rod Bolt: 50 N·m (5.1 kgf·m, 37 ft·lb)
Upper Tie-Rod Bolt: 59 N·m (6.0 kgf·m, 44 ft·lb)



Rocker Arm Removal

- Refer to the Tie-rod Removal.

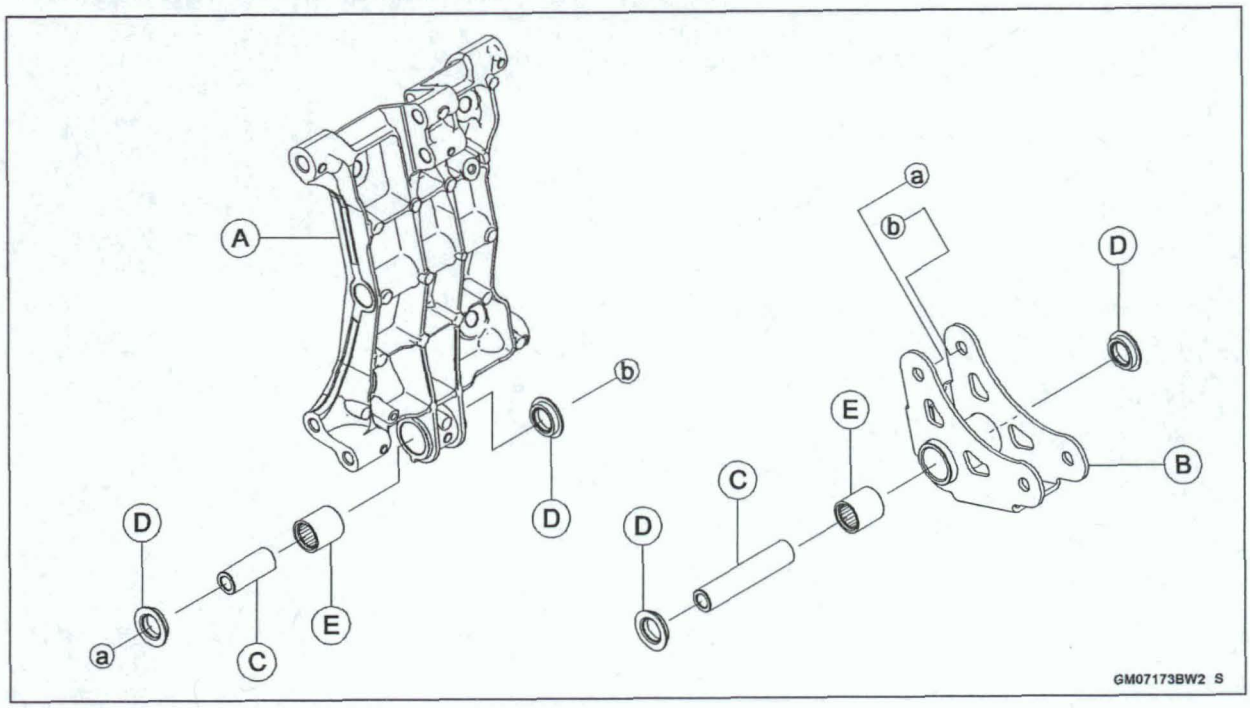
Rocker Arm Installation

- Refer to the Tie-rod Installation.

Tie-Rod, Rocker Arm

Tie-Rod and Rocker Arm Bearing Removal

- Remove:
  Swingarm Mounting Plate [A] (see Engine Removal in the Engine Removal/Installation chapter)
  Rear Shock Absorber (see Rear Shocker Absorber Removal)
  Rocker Arm [B] (see Tie-Rod Removal)
  Sleeves [C]
  Oil Seals [D]
- Remove the needle bearings [E] using a suitable tool.



Tie-Rod and Rocker Arm Bearing Installation

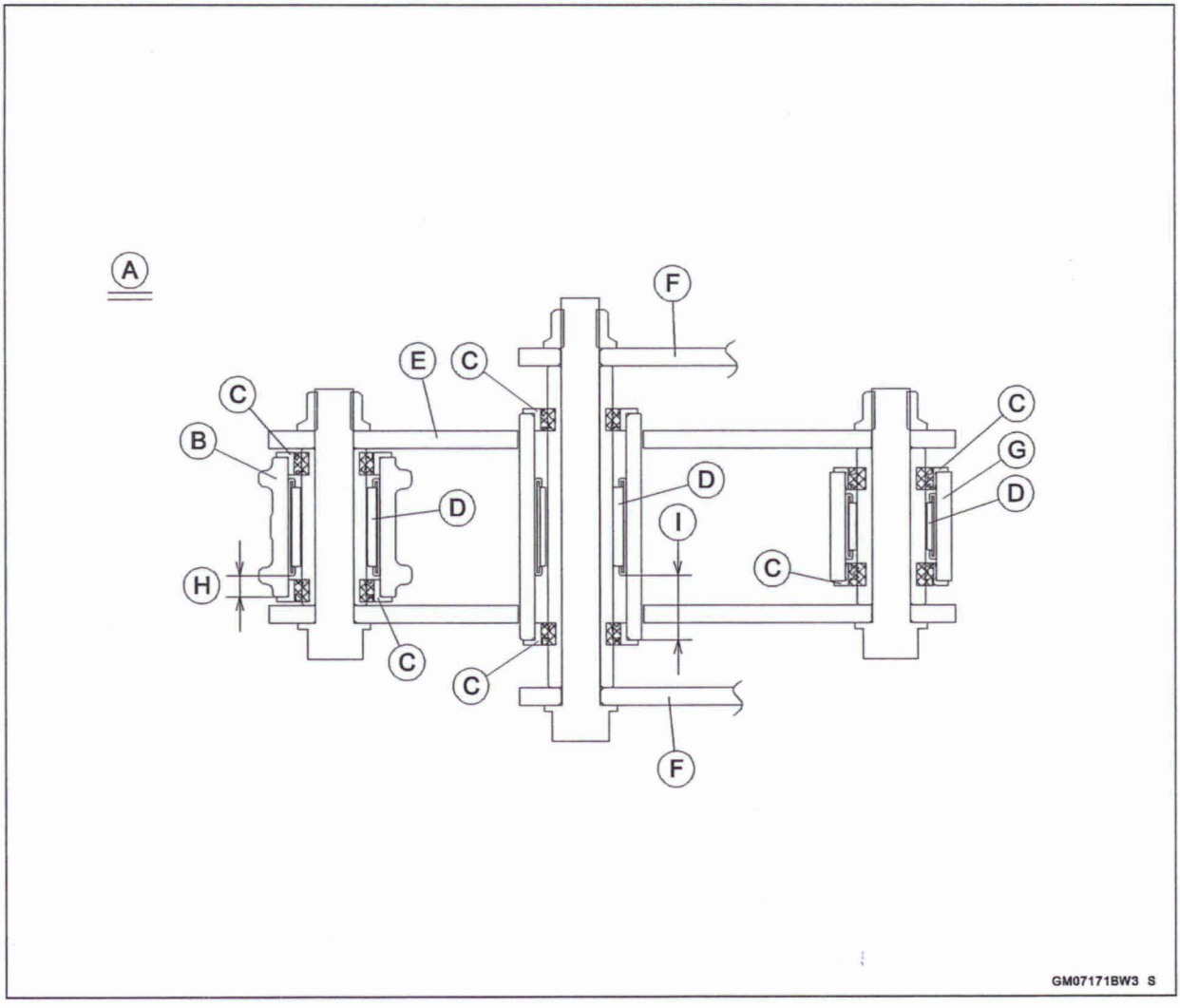
- Replace the needle bearing and oil seals with new ones.
- Install the needle bearings.

○The installing positions are as shown.

Special Tool - Bearing Driver Set: 57001-1129

- Apply plenty of grease to the lips of the oil seals.
- Install the oil seals.

Tie-Rod, Rocker Arm



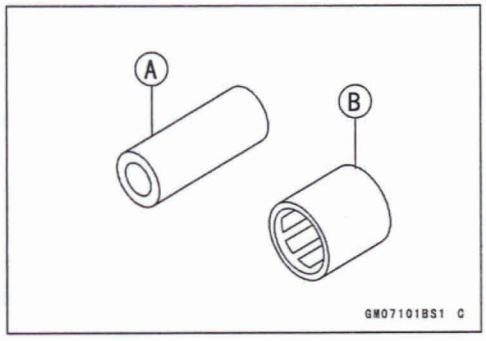
Viewed from Bottom [A]
Swingarm Mounting Plate [B]
Grease Seals [C]
Needle Bearings [D]
Rocker Arm [E]
Tie-Rods [F]
Rear Shock Absorber [G]
5.5 ±0.5 mm (0.22 ±0.02 in.) [H]
16.8 ±0.5 mm (0.66 ±0.02 in.) [I]

Rocker Arm/Tie-Rod Bearing, Sleeve Inspection

NOTICE
Do not remove the bearings for inspection. Removal may damage them.

- Visually inspect the rocker arm, 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.



Tie-Rod, Rocker Arm

Rocker Arm/Tie-Rod Bearing Lubrication

NOTE

○*Since the bearings are packed with grease, lubrication is not required.*

Steering

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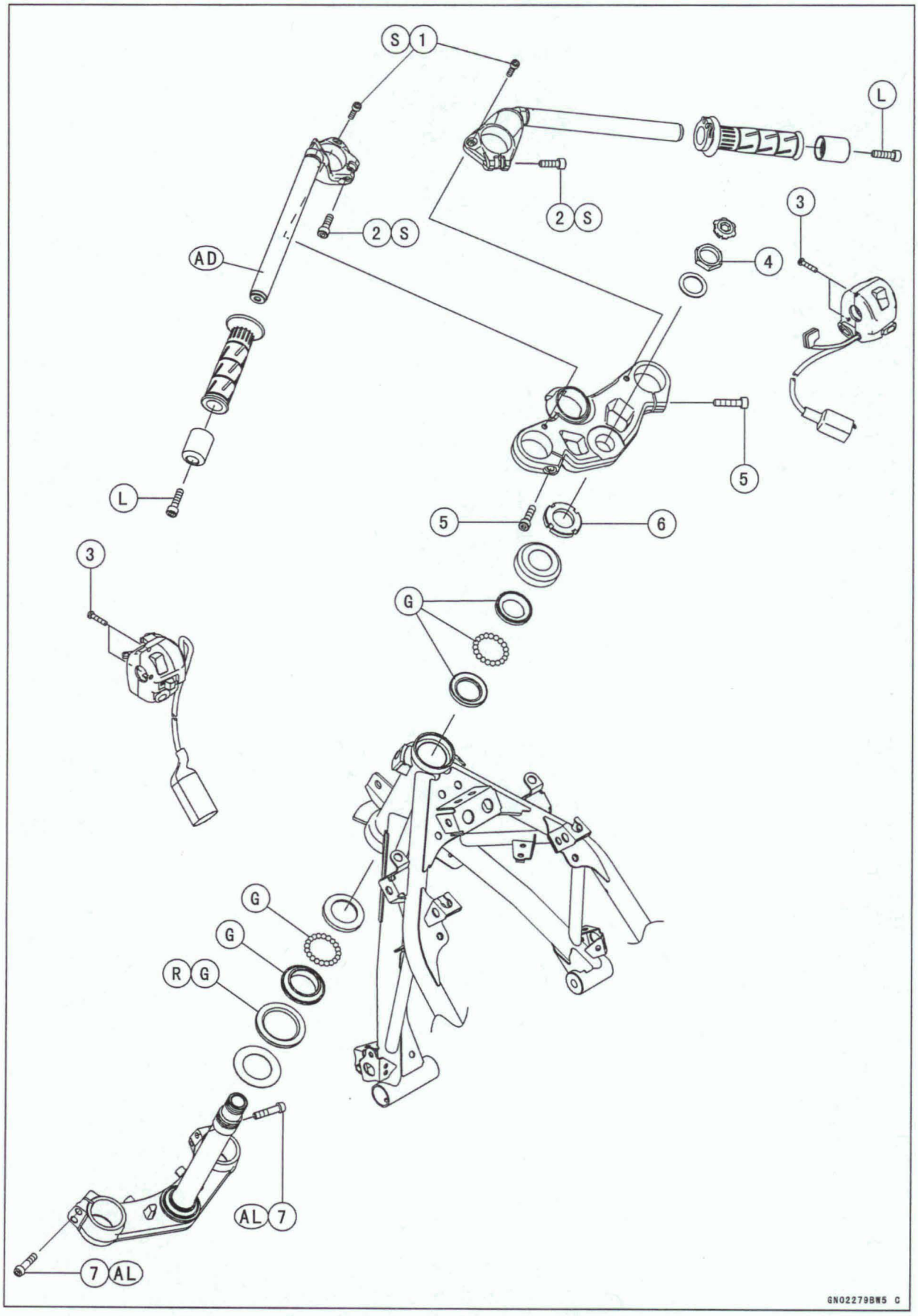
Exploded View



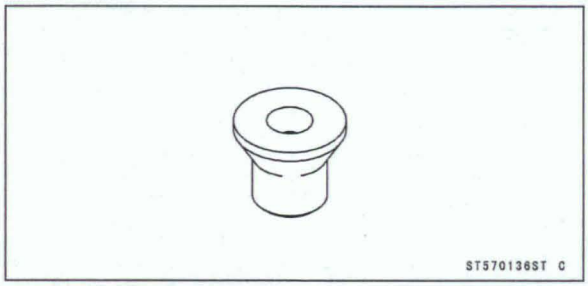
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Handlebar Mounting Bolts	9.8	1.0	87 in·lb	S
2	Handlebar Clamp Bolts	25	2.5	18	S
3	Switch Housing Screws	3.5	0.36	31 in·lb	
4	Steering Stem Head Nut	49	5.0	36	
5	Upper Front Fork Clamp Bolts	20	2.0	15	
6	Steering Stem Nut	4.9	0.50	43 in·lb	
7	Lower Front Fork Clamp Bolts	23	2.3	17	AL

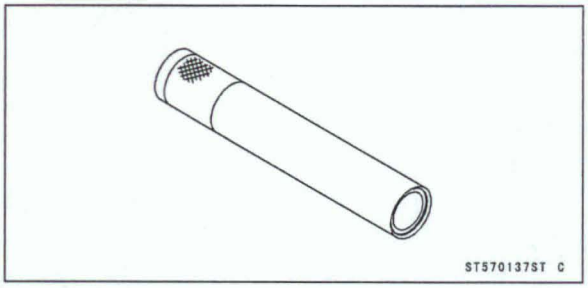
AD: Apply adhesive.
AL: Tighten the two clamp bolts alternately two times to ensure tightening torque.
G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts
S: Follow the specified tightening sequence.

Special Tools

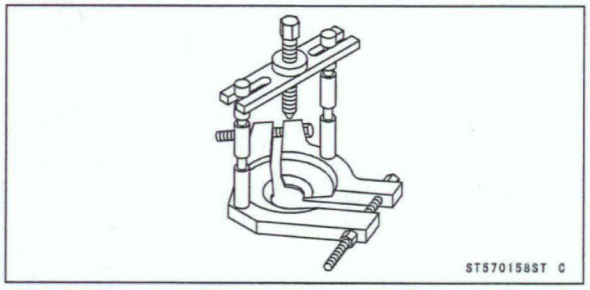
Bearing Puller Adapter:
57001-136



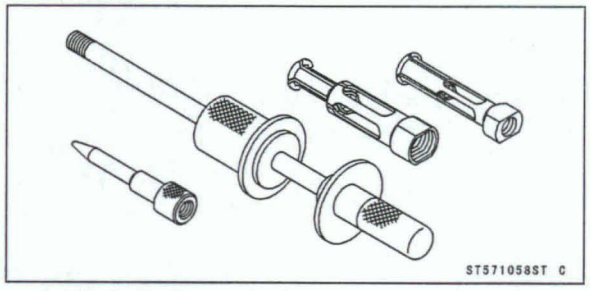
Steering Stem Bearing Driver:
57001-137



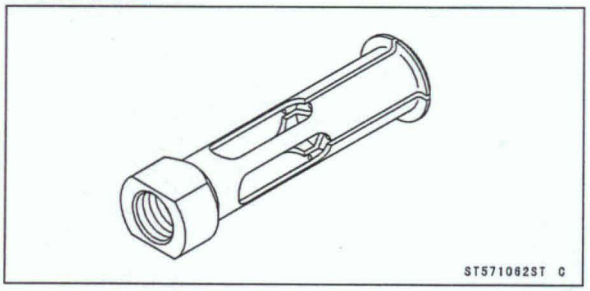
Bearing Puller:
57001-158



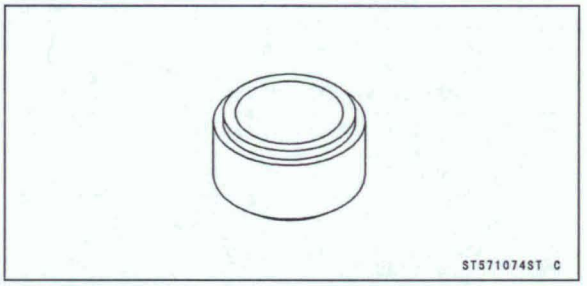
Oil Seal & Bearing Remover:
57001-1058



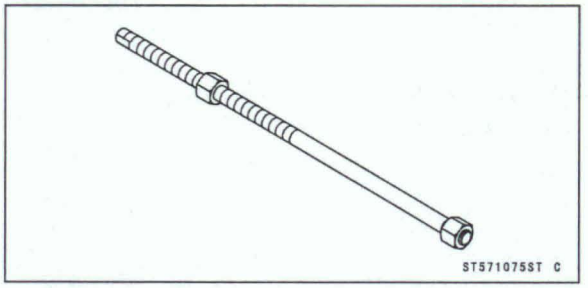
Oil Seal & Bearing Remover, Adapter B:
57001-1062



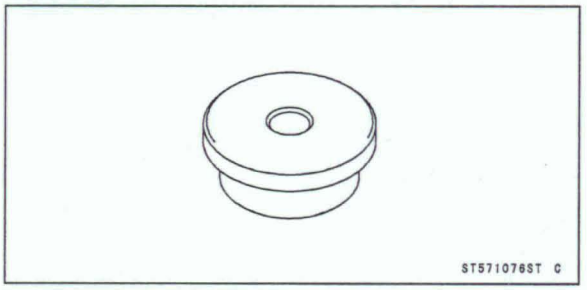
Steering Stem Bearing Driver Adapter, ϕ34.5:
57001-1074



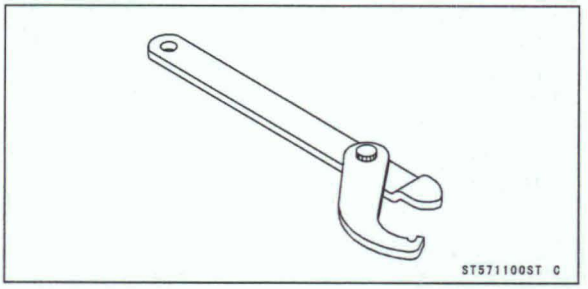
Head Pipe Outer Race Press Shaft:
57001-1075



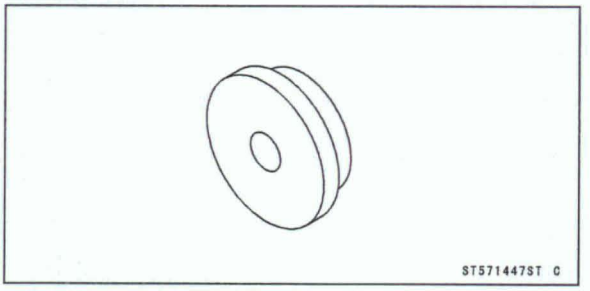
Head Pipe Outer Race Driver, ϕ51.5:
57001-1076



Steering Stem Nut Wrench:
57001-1100

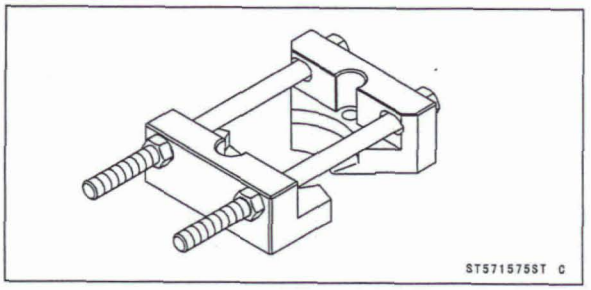


Head Pipe Outer Race Driver, ϕ47:
57001-1447

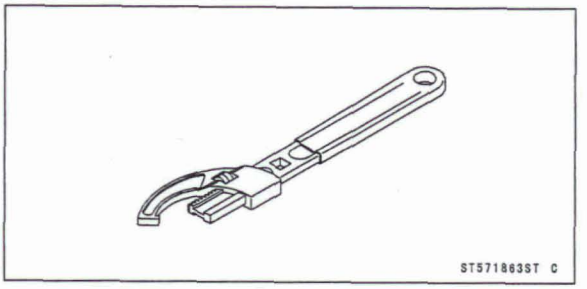


Special Tools

Bearing Puller:
57001-1575



Adjustable Hook Wrench:
57001-1863



Steering

Steering Inspection

- Refer to the Steering Play Inspection in the Periodic Maintenance chapter.

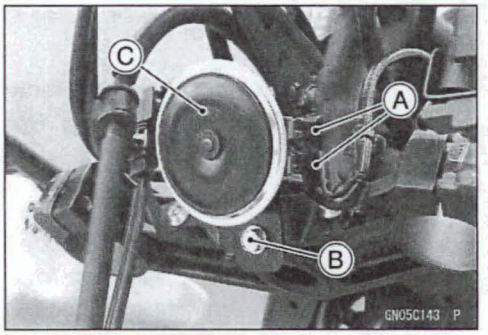
Steering Adjustment

- Refer to the Steering Play Adjustment in the Periodic Maintenance chapter.

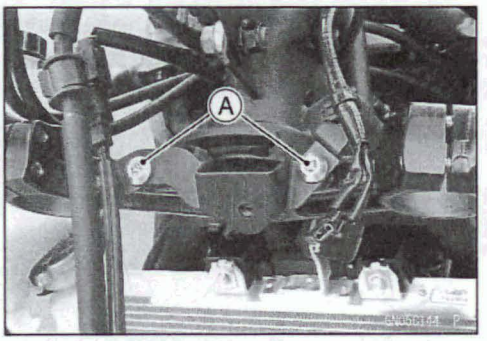
Steering Stem

Stem, Stem Bearing Removal

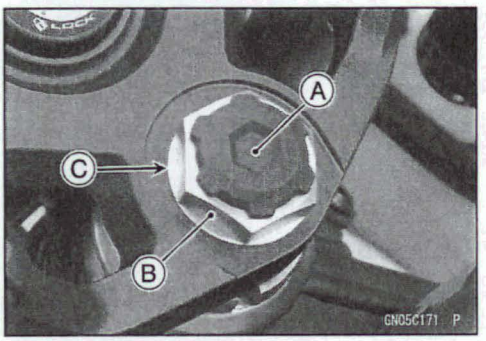
- Remove:
  Upper Inner Cover (see Upper Inner Cover Removal in the Frame chapter)
  Front Forks (see Front Fork Removal in the Suspension chapter)
- Disconnect the horn lead connectors [A].
- Remove:
  Bolt [B]
  Horn [C]



- Remove the bolts [A].



- Remove:
  Steering Stem Head Nut Plug [A]
  Steering Stem Head Nut [B]
  Washer [C]
- Move the steering stem head aside.



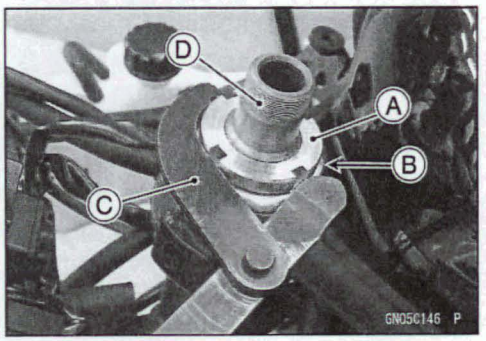
- Pushing up the stem base, and remove the steering stem nut [A] and stem cap [B].

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

- Remove:
  Steering Stem [D]
  Upper Ball Bearing Inner Race and Ball Bearings

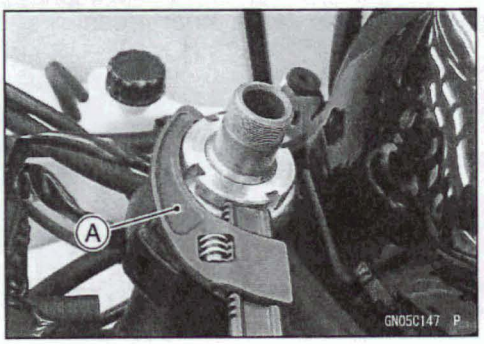
NOTE

○*Be aware of removing the steering stem so that the stem bearing steel balls are not lost.*



○You may remove the steering stem nut using the adjustable hook wrench [A].

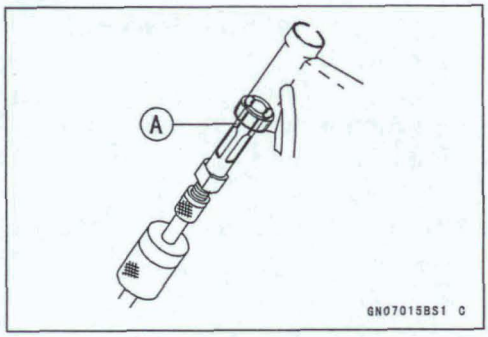
Special Tool - Adjustable Hook Wrench: 57001-1863



Steering Stem

- Remove the upper and lower outer races using the remover [A].

Special Tools - Oil Seal & Bearing Remover: 57001-1058
Oil Seal & Bearing Remover, Adapter B: 57001-1062

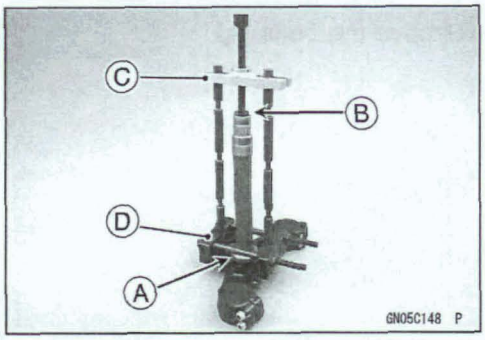


NOTE

○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 inner race [A] (with its oil seal) which is pressed onto the steering stem using the bearing puller and adapter.

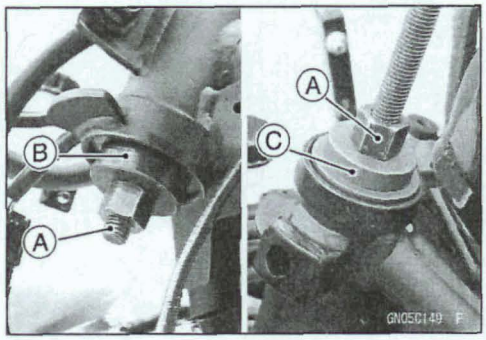
Special Tools - Bearing Puller Adapter [B]: 57001-136
Bearing Puller [C]: 57001-158
Bearing Puller [D]: 57001-1575



Stem, Stem Bearing Installation

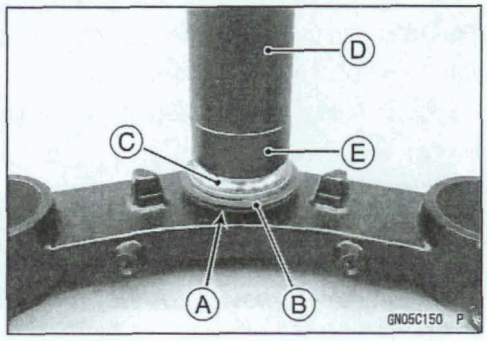
- Replace the bearing outer races with new ones.
- Drive them into the head pipe at the same time.

Special Tools - Head Pipe Outer Race Press Shaft [A]: 57001-1075
Head Pipe Outer Race Driver, ϕ51.5 [B]: 57001-1076
Head Pipe Outer Race Driver, ϕ47 [C]: 57001-1447



- Replace the bearing inner races and oil seal with new ones.
- Apply grease to the oil seal.
- Install the washer [A] and oil seal [B] on the steering stem, and drive the ball bearing inner race [C] applied grease onto the stem.

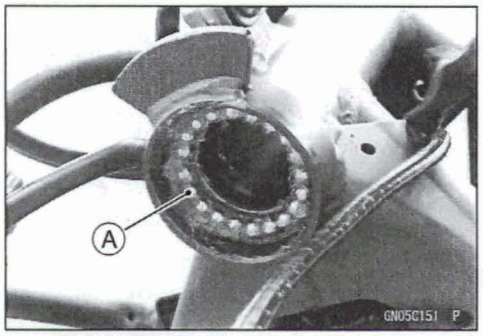
Special Tools - Steering Stem Bearing Driver [D]: 57001-137
Steering Stem Bearing Driver Adapter, ϕ34.5 [E]: 57001-1074



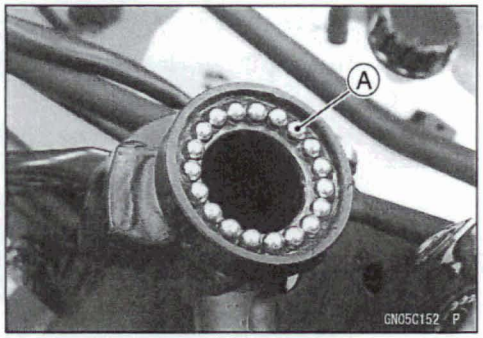
- Apply grease to the inner races.

Steering Stem

- Apply grease to the lower ball bearings (20) [A] and outer race, and install the ball bearings onto the outer race.

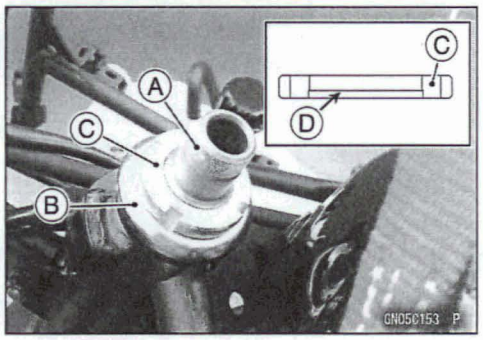


- Apply grease to the upper ball bearings (19) [A] and outer race, and install the ball bearings onto the outer race.



- Install the steering stem [A] carefully through the head pipe so that the steel balls on the head pipe does not fall.
- Apply grease to the upper ball bearing inner race and install it.
- Install the stem cap [B] and steering stem nut [C], and tighten it by hand.

○Install the steering stem nut with stepped side [D] facing down.



- Settle the bearings in place as follows.

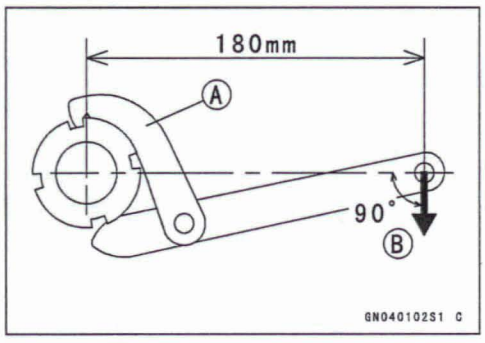
○Tighten the steering stem nut with **35 N·m (3.6 kgf·m, 26 ft·lb)** of torque first (Pull the steering stem nut wrench [A] at the hole by 194 N (19.8 kgf) force [B] in the direction shown), and loosen it a fraction of a turn until it turns lightly. Afterward tighten it again with specified torque using the steering stem nut wrench.

○Check that there is no play and the steering stem turns smoothly without rattles. If not, the steering stem bearings may be damaged.

○You may tighten the steering stem nut using the adjustable hook wrench.

Special Tool - Steering Stem Nut Wrench: 57001-1100 or Adjustable Hook Wrench: 57001-1863

Torque - Steering Stem Nut: 4.9 N·m (0.50 kgf·m, 43 in·lb)

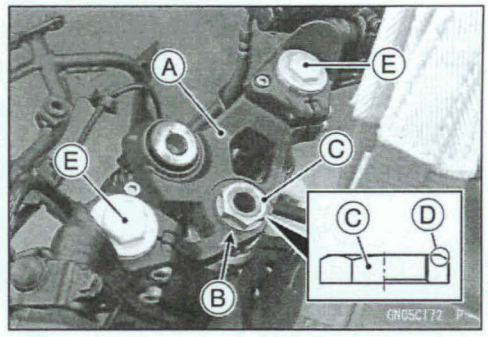


Steering Stem

- Install the stem head [A].
- Install the washer [B], and tighten the stem head nut [C] temporarily.

○Install the stem nut with the chamfer side [D] facing up.

- Temporarily install the front forks [E] (see Front Fork Installation in the Suspension chapter).



NOTE

○*Tighten the lower front fork bolts loosely. Do not tighten the upper front bolts at this time.*

- Tighten the stem head nut.

Torque - Steering Stem Head Nut: 49 N·m (5.0 kgf·m, 36 ft·lb)

- Reinstall the front forks (see Front Fork Installation in the Suspension chapter).

⚠ WARNING

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

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

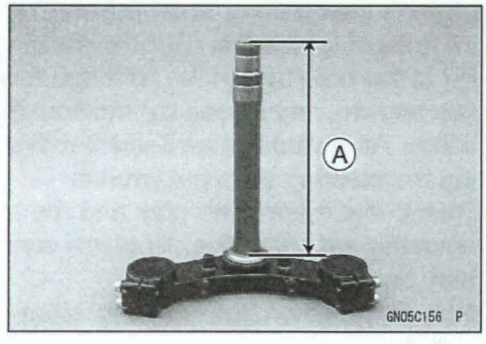
Steering Stem Bearing Lubrication

- 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 [A].

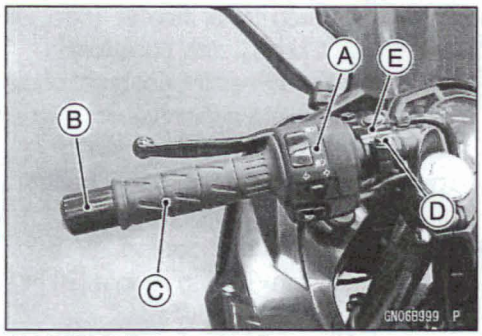
★If the steering stem is bent, replace it with a new one.



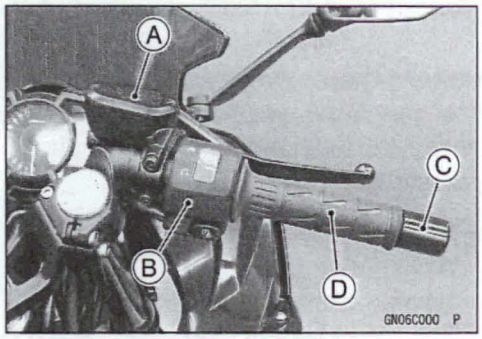
Handlebar

Handlebar Removal

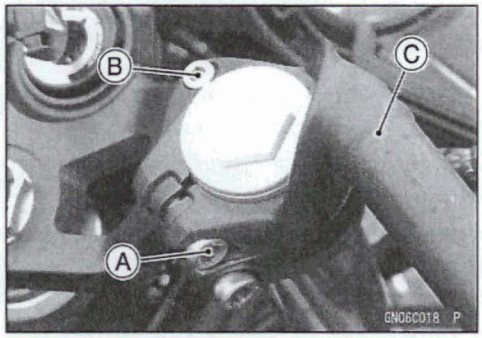
- Remove:
  Left Switch Housing [A]
  Handlebar Weight [B]
  Left Handlebar Grip [C]
  Clutch Lever Holder Clamp Bolt [D]
  Clutch Lever Assembly [E]



- Remove:
  Front Master Cylinder [A] (see Front Master Cylinder Removal in the Brakes chapter)
  Right Switch Housing [B]
  Handlebar Weight [C]
  Throttle Grip [D]



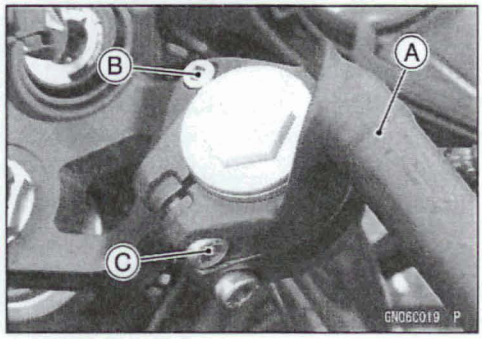
- Loosen the handlebar clamp bolt [A].
- Remove:
  Handlebar Mounting Bolt [B]
  Handlebar [C]



Handlebar Installation

- Install the handlebar [A].
- Tighten the following bolts temporarily.
  Handlebar Mounting Bolt [B]
  Handlebar Clamp Bolt [C]
- Tighten the handlebar mounting bolt first, and then the handlebar clamp bolt.

Torque - Handlebar Mounting Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)
Handlebar Clamp Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)



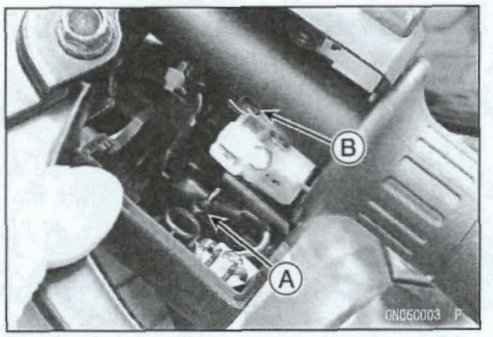
Handlebar

- Install the clutch lever holder (see Clutch Lever Holder Installation in the Clutch chapter).
- 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 cement to the handlebar, and install the left handlebar grip.
- Install the left switch housing.

○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)



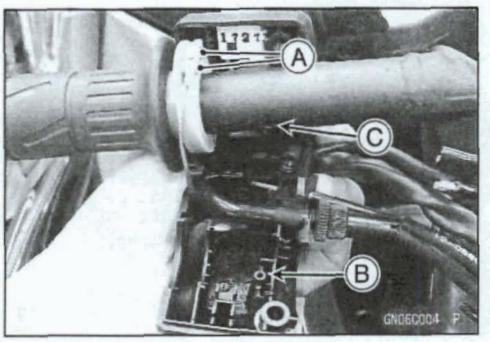
- Apply a non-permanent locking agent to the threads of the handlebar weight bolt.
- Install the left handlebar weight and tighten the handlebar weight bolt.

- Install:
  Throttle Grip
  Throttle Cable Tips [A]
  Right Switch Housing

○Fit the projection [B] into a hole [C] in the handlebar.

- Tighten:

Torque - Switch Housing Screws: 3.5 N·m (0.36 kgf·m, 31 in·lb)



- Apply a non-permanent locking agent to the threads of the handlebar weight bolt.
- Install the right handlebar weight and tighten the handlebar weight bolt.

- Install:
  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).
- Install the removed parts (see appropriate chapters).
- Adjust the throttle grip free play (see Throttle Control System Inspection in the Periodic Maintenance chapter).

Frame

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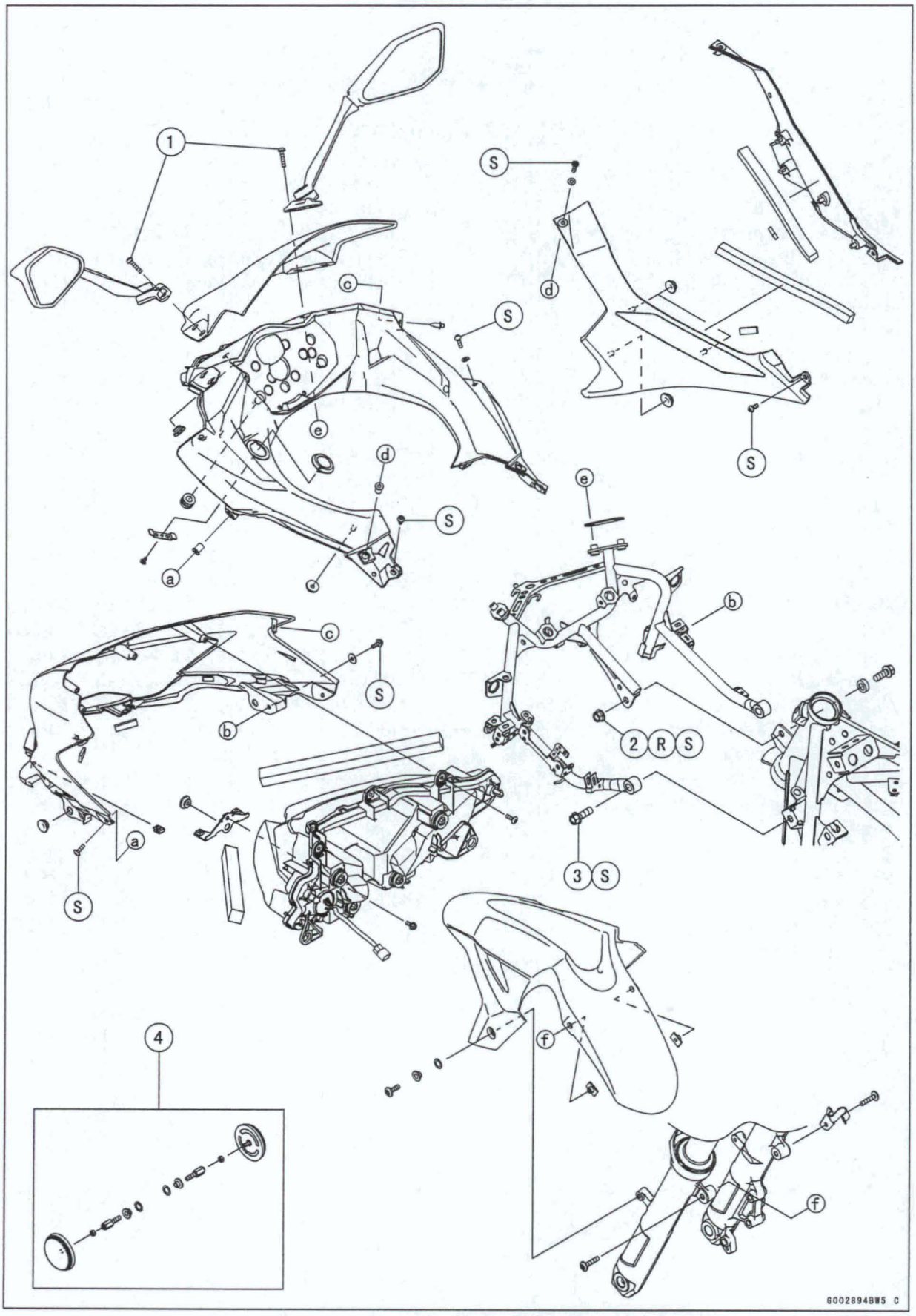
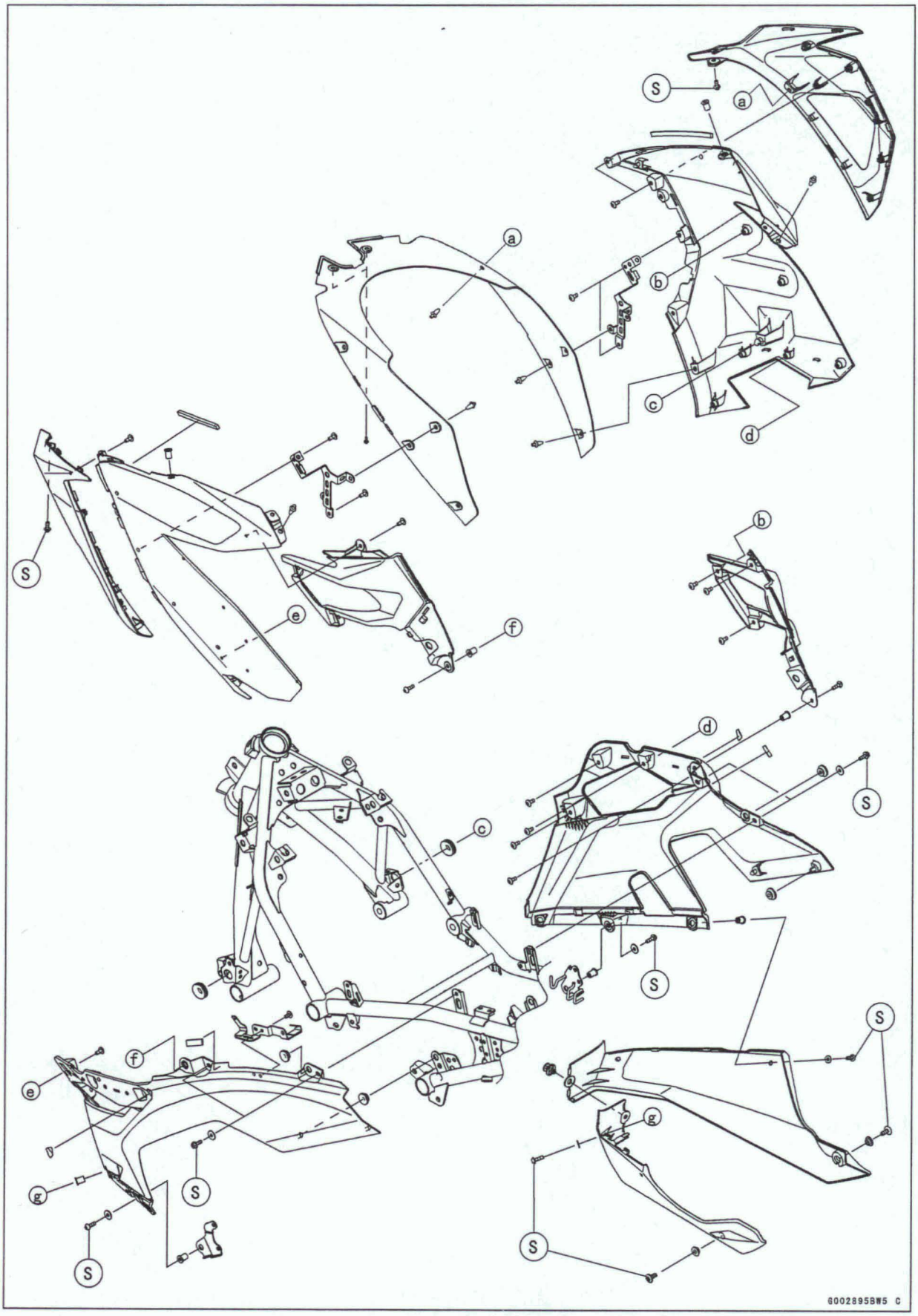


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Rear View Mirror Bolts	8.8	0.90	78 in·lb	
2	Upper Fairing Bracket Nut	34	3.5	25	R, S
3	Upper Fairing Bracket Bolts	34	3.5	25	S

4. US, CA and CAL
R: Replacement Parts
S: Follow the specified tightening sequence.

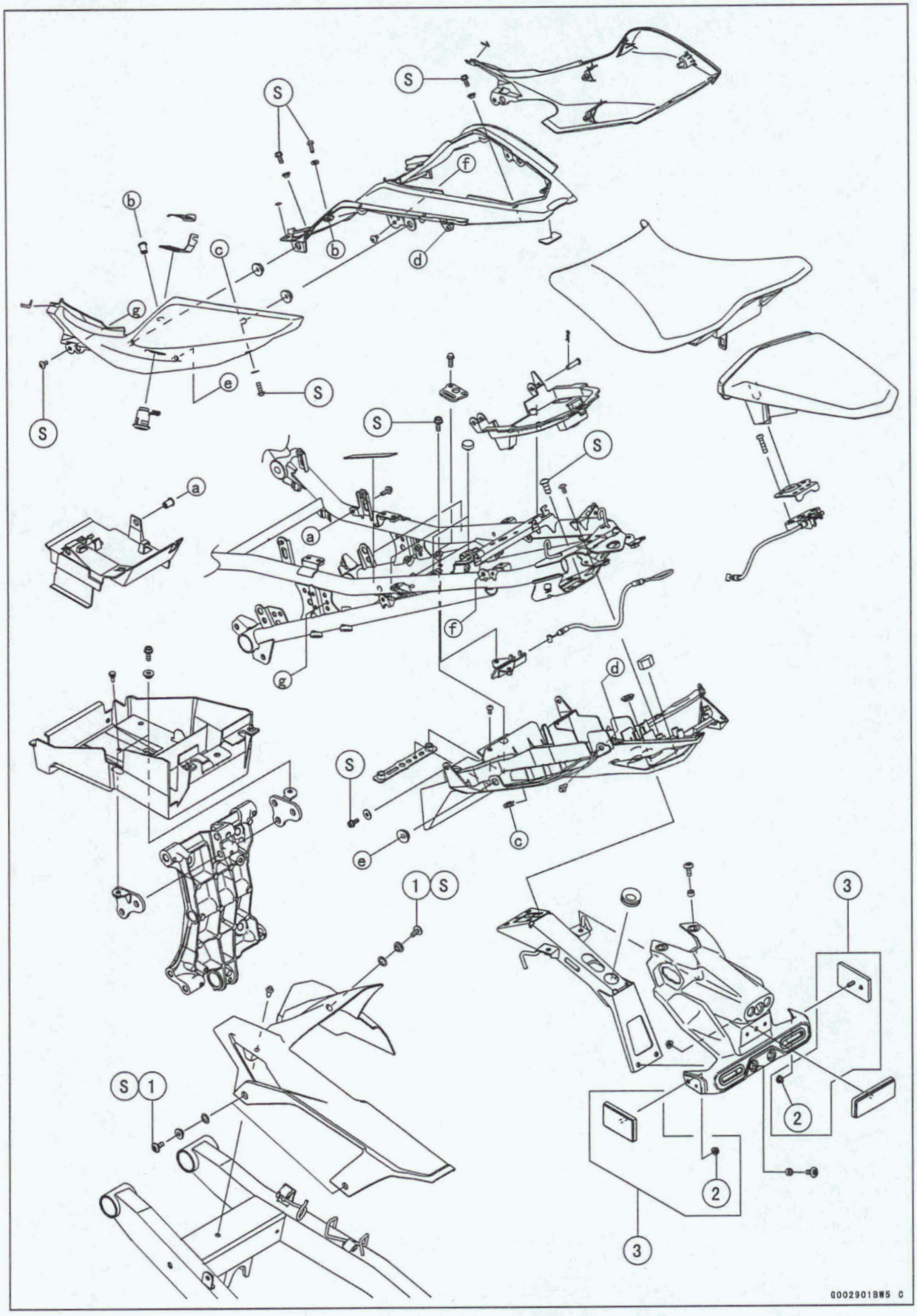
Exploded View



Exploded View

S: Follow the specified tightening sequence.

Exploded View

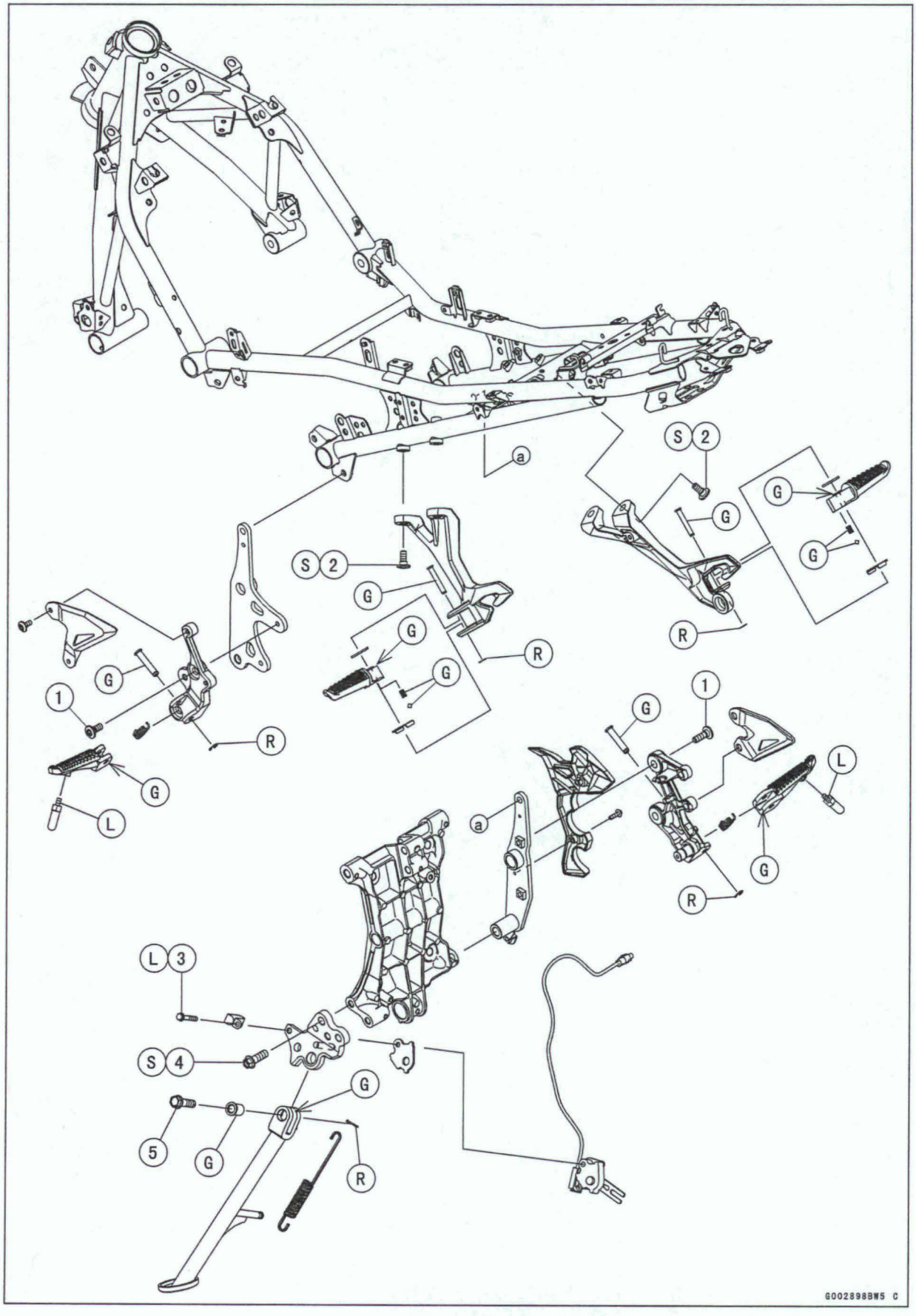


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Mud Guard Bolts	8.8	0.90	78 in·lb	S
2	Reflector Nuts	3.0	0.31	27 in·lb	

3. Equipped Models
S: Follow the specified tightening sequence.

Exploded View



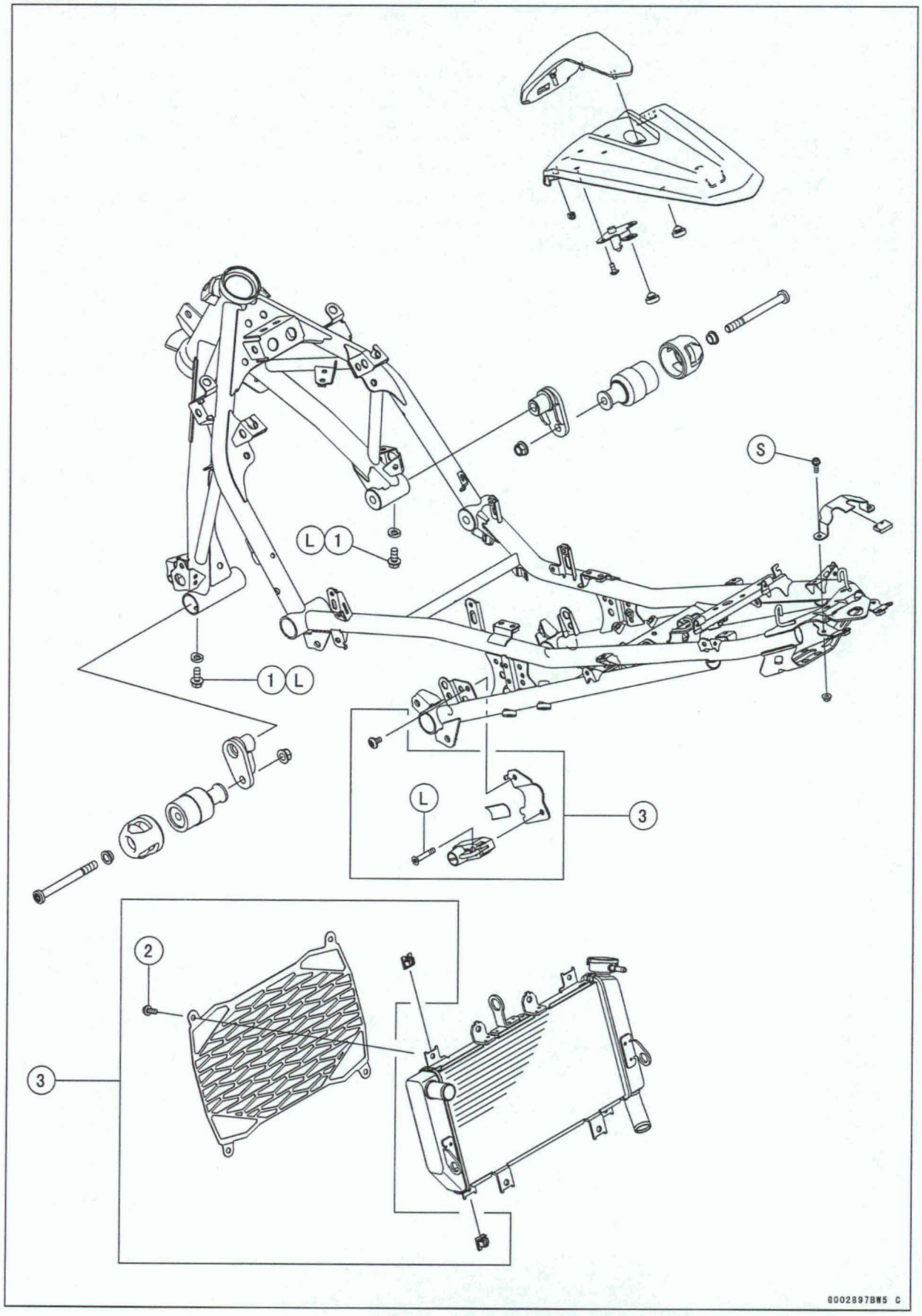
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Footpeg Bracket Bolts	25	2.5	18	
2	Rear Footpeg Bracket Bolts	25	2.5	18	S
3	Side Stand Switch Bolt	8.8	0.90	78 in·lb	L
4	Side Stand Bracket Bolts	49	5.0	36	S
5	Side Stand Bolt	44	4.5	32	

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

Exploded View

EX400J



Exploded View

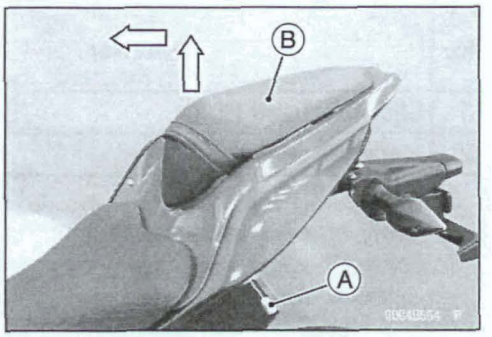
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Slider Bracket Bolts	29	3.0	21	L
2	Radiator Guard Bolts	6.9	0.70	61 in·lb	

3. MY
L: Apply a non-permanent locking agent.
S: Follow the specified tightening sequence.

Seats

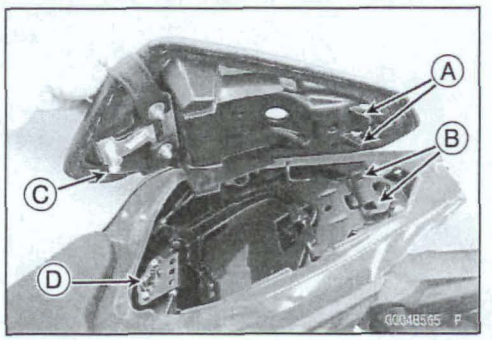
Rear Seat Removal

- Insert the ignition key [A] into the seat lock.
- Turn the key clockwise, and pull up the front part of rear seat [B].
- Remove the rear seat forward.



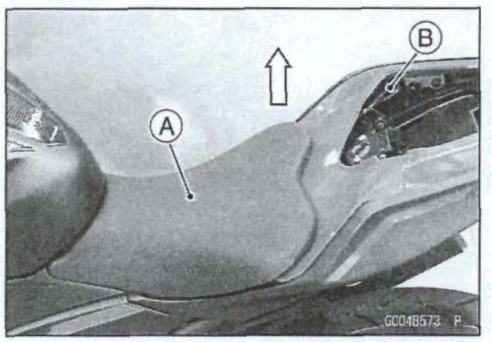
Rear Seat Installation

- Insert the rear seat tabs [A] to the slots [B] on the frame.
- Insert the seat lock projection [C] into the latch hole [D].
- Push down the front part of the rear seat until the lock clicks.



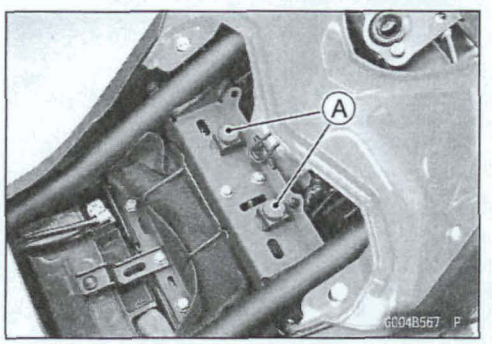
Front Seat Removal

- Remove the rear seat (see Rear Seat Removal).
- Pull up the rear part of front seat [A] while pulling the seat lock cable [B] backward.
- Remove the front seat.

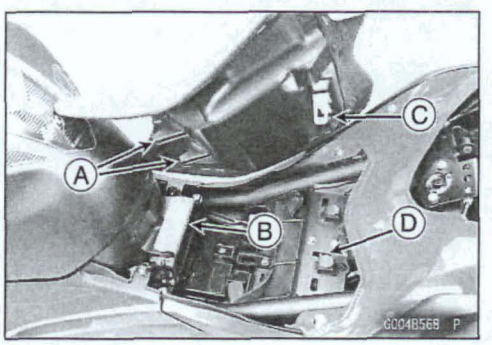


Front Seat Installation

- Check that the dampers [A] are in place.



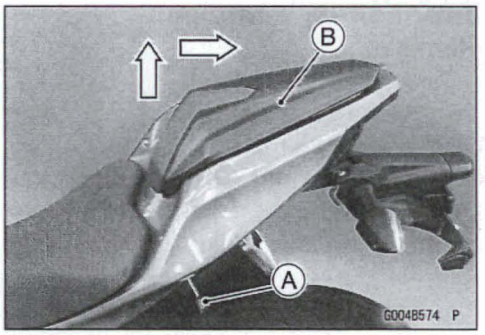
- Insert the front seat tabs [A] to the bracket [B].
- Insert the seat lock projection [C] into the latch hole [D].
- Push down the rear part of the front seat until the lock clicks.
- Install the rear seat (see Rear Seat Installation).



Seats

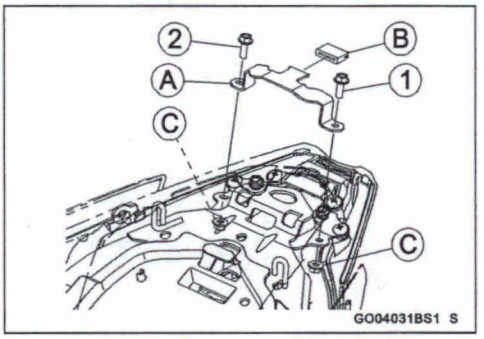
Pillion Seat Cover Removal (Equipped Models)

- Insert the ignition key [A] into the seat lock.
- Turn the key clockwise, and pull up the front part of pillion seat cover [B].
- Remove the pillion seat cover backward.

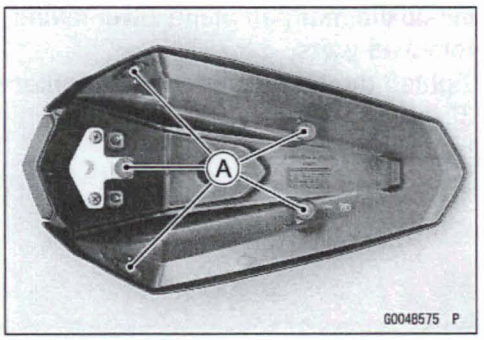


Pillion Seat Cover Installation (Equipped Models)

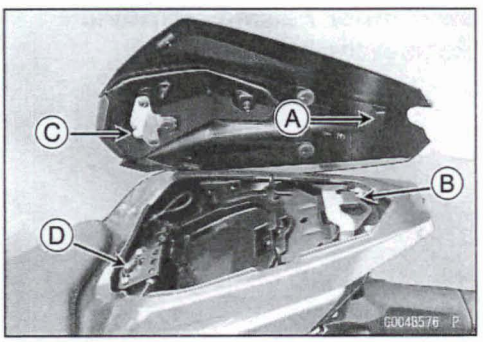
- When installing the pillion seat cover bracket [A], note the following.
- Install:
  Damper [B]
  Bracket
  Bolts
  Nuts [C]
- Tighten the bolts following the specified tightening sequence [1 ~ 2].



- Check that the dampers [A] are in place.



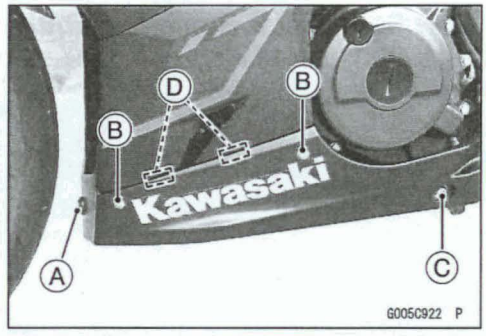
- Insert the slot [A] on the pillion seat cover into the damper [B].
- Insert the seat lock projection [C] into the latch hole [D].
- Push down the front part of the pillion seat cover until the lock clicks.



Fairings

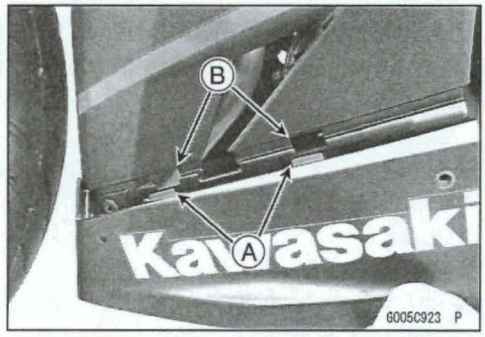
Lower Fairing Removal

- Remove:
  Quick Rivet [A]
  Bolts and Washers [B]
  Bolt and Collar [C]
- Pull the lower part of lower fairing to out side, and clear the tabs [D].
- Remove the lower fairing.

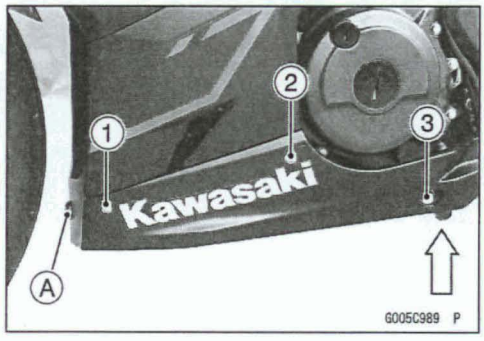


Lower Fairing Installation

- Insert the tabs [A] on the lower fairing into the slots [B] on the middle fairing.



- Lift up the rear part of the lower fairing while installing the removed parts.
- Tighten the bolts following the tightening sequence [1 ~ 3].
- Install the quick rivet [A].

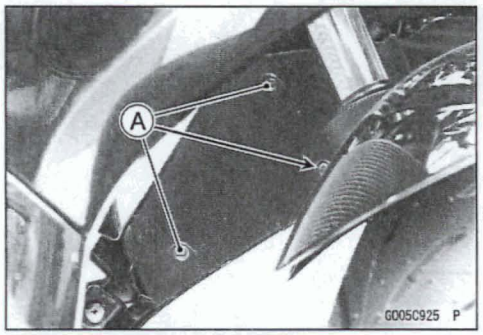


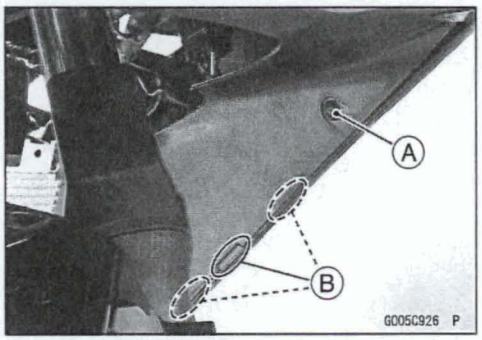
Lower Inner Fairing Removal

- Remove the bolts [A].

Fairings

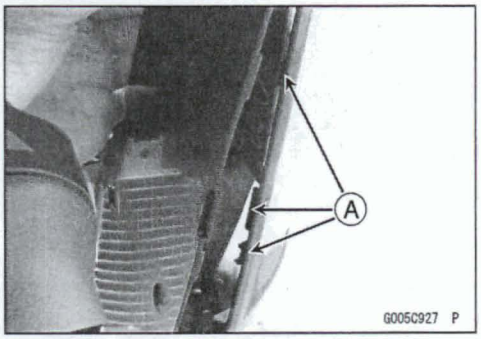
- Remove the quick rivets [A] (both sides).
- Pull the lower inner fairing to clear the tabs [B] on both sides, and remove the lower inner fairing.





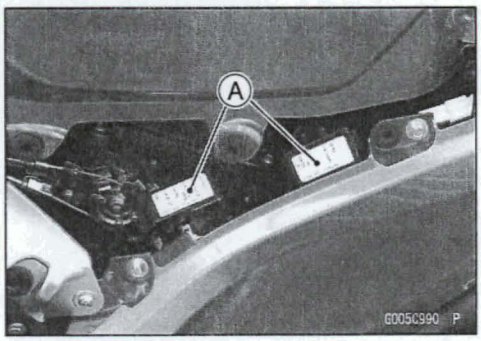
Lower Inner Fairing Installation

- Installation is the reverse of removal.
- Insert the lower inner fairing to the tabs [A] on the middle fairing.

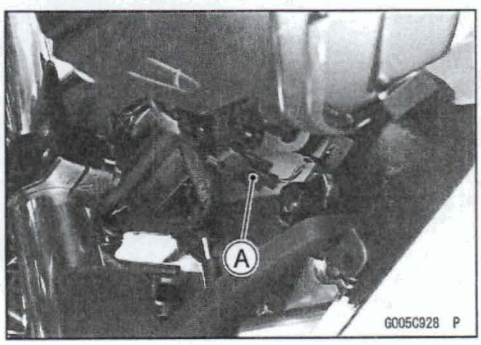


Middle Fairing Removal

- Remove:
  Lower Fairings (see Lower Fairing Removal)
  Lower Inner Fairing (see Lower Inner Fairing Removal)
  Side Covers (Side Cover Removal)
  Fuse Boxes [A] (Left Side Only)

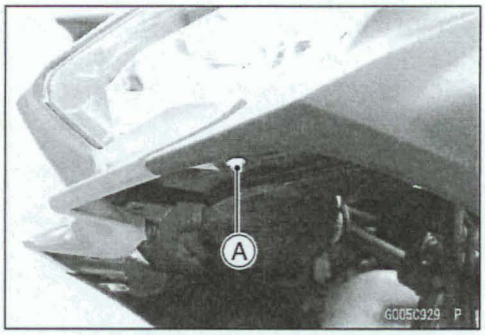


- Disconnect the front turn signal light lead connector [A].

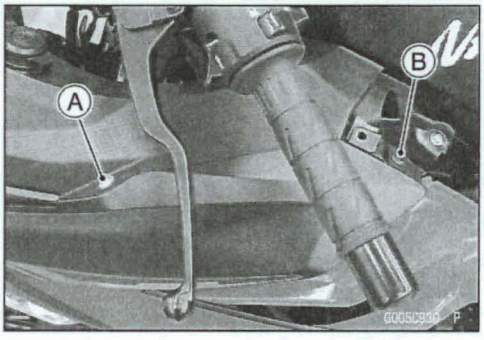


Fairings

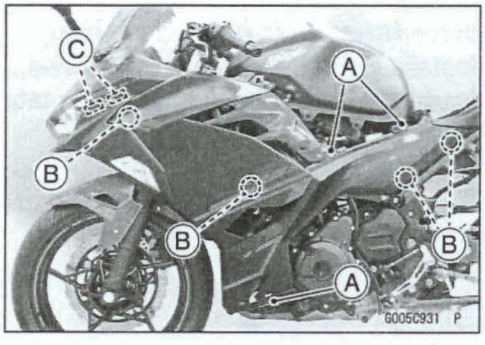
- Remove the bolt [A].



- Remove:
  Bolt [A] and Washer
  Quick Rivet [B]

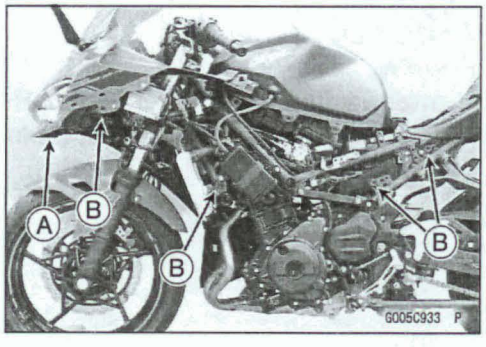


- Remove the bolts [A] and washers.
- Pull the middle fairing outward to clear the projections [B] and tabs [C].
- Remove the middle fairing.



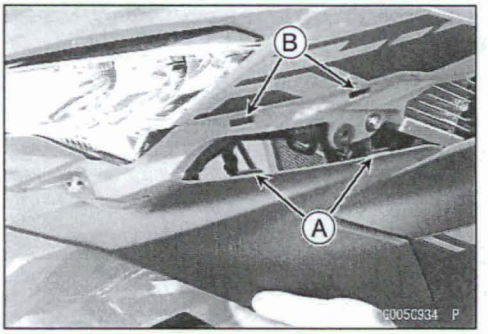
Middle Fairing Installation

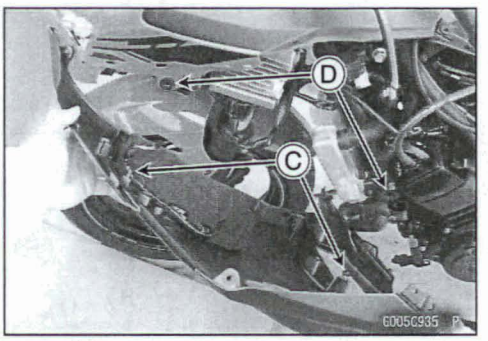
- Installation is the reverse of removal.
- Check that the clip nut [A] and grommets [B] are in place.

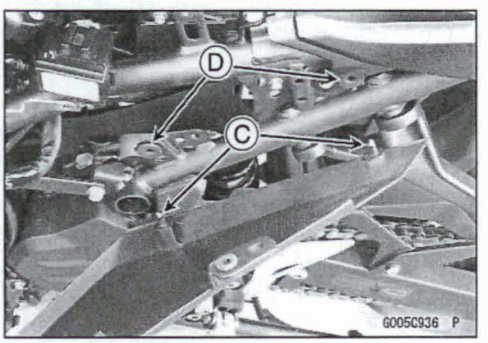


Fairings

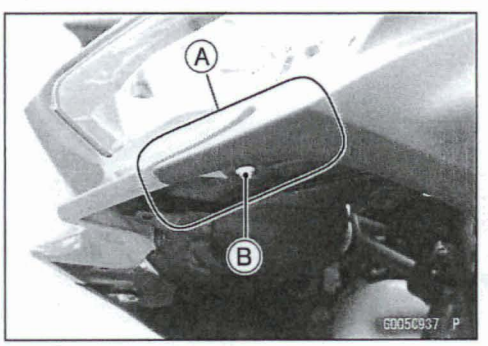
- Insert the tabs [A] into the slots [B].
- Insert the projections [C] into the grommets [D].



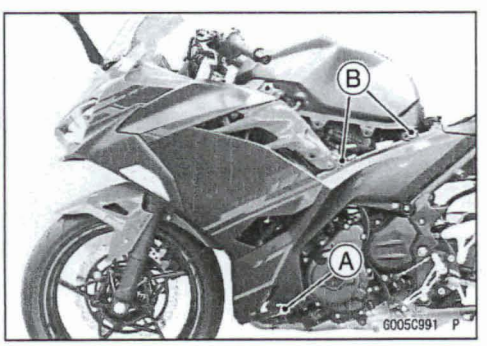




- Push the front part [A] of the middle fairing while installing the bolt [B].



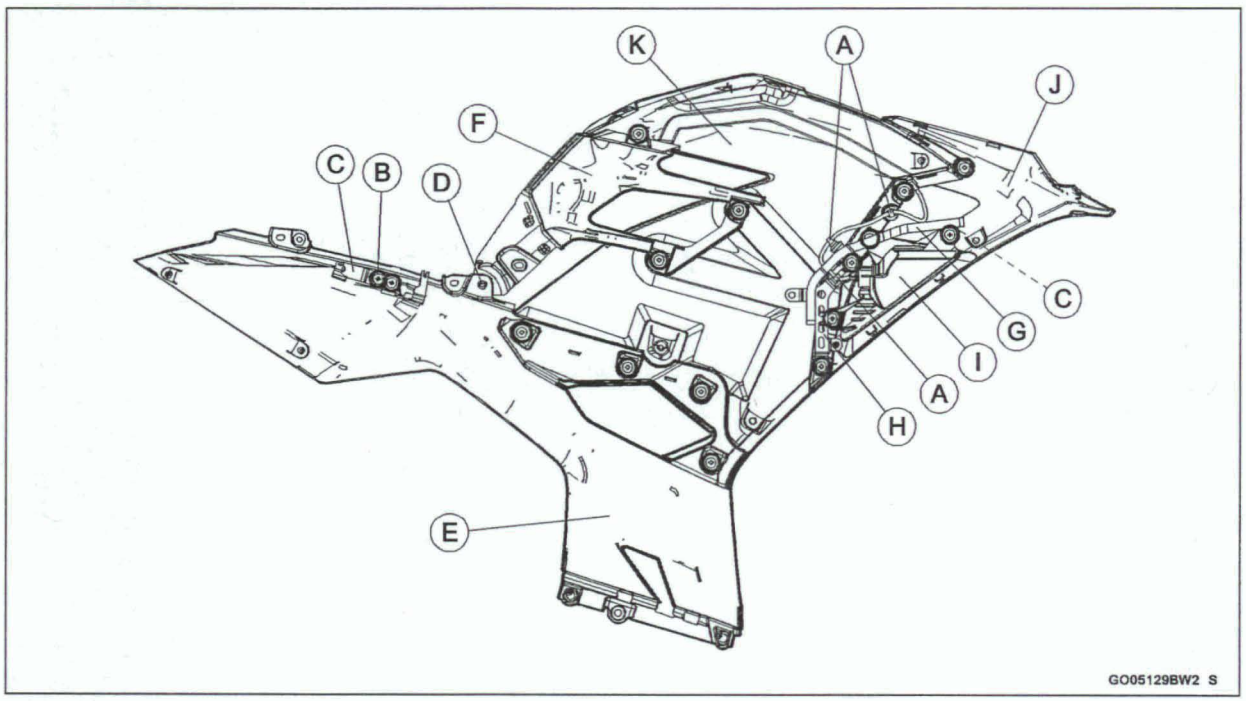
- Tighten the lower bolt [A] first, and then tighten the upper bolts [B].
- Install the removed parts (see appropriate chapters).



Fairings

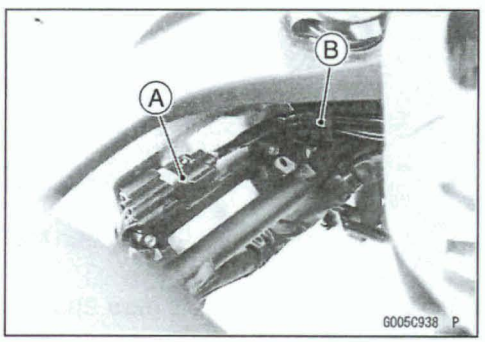
Middle Fairing Disassembly/Assembly

- Open the clamps [A].
- Remove:
  Screws [B]
  Brackets [C] (Left Side Only)
  Bolt and Nut [D]
  Lower Middle Fairing [E]
  Fin [F]
  Pad [G] (Left Side Only)
  Bracket [H]
  Turn Signal Light [I]
  Turn Signal Light Cover [J]
  Upper Middle Fairing [K]
- Installation is the reverse of removal.



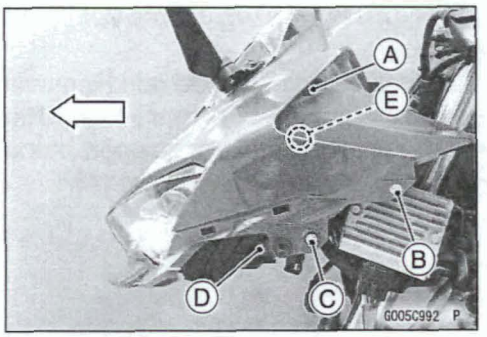
Upper Fairing Removal

- Remove:
  Middle Fairings (see Middle Fairing Removal)
- Disconnect the headlight lead connector [A].
- Open the clamp [B].



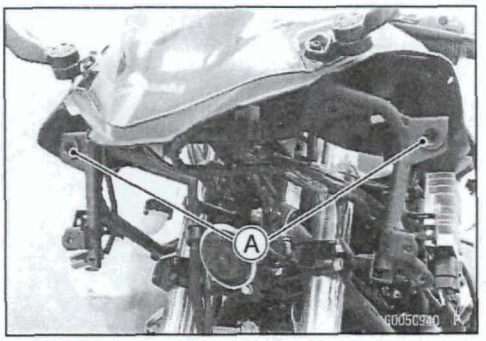
Fairings

- Remove:
  Quick Rivet [A] (Both Sides)
  Screw [B] (Both Sides)
  Bolt and Washer [C] (Both Sides)
  Headlight Mounting Bolt [D] (Both Sides)
- Move the upper fairing forward to remove it from the grommet [E] (both sides).

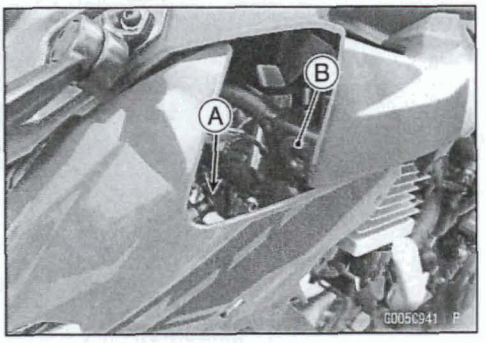


Upper Fairing Installation

- Installation is the reverse of removal.
- Check that the grommets [A] are in place.

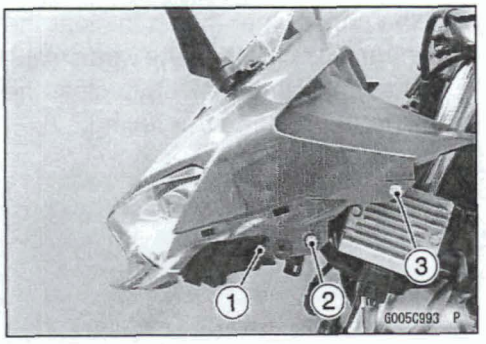


- Insert the projection [A] into the grommet [B] (both sides).



- Tighten the bolts and screws following the tightening sequence [1 ~ 3].
  Headlight Mounting Bolt [1] (Both Sides)
  Bolt and Washer [2] (Both Sides)
  Screw [3] (Both Sides)

  Torque - Headlight Mounting Bolts: 8.8 N·m (0.70 kgf·m, 78 in·lb)

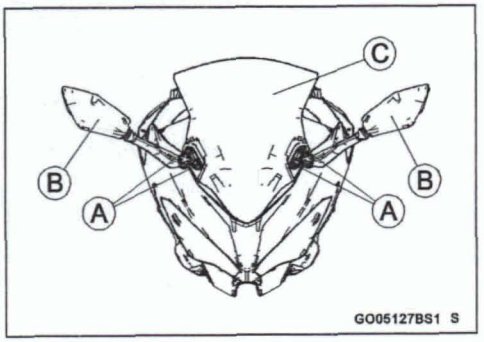


- Run the cable, leads and harness correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

Windshield Removal/Installation

- Remove:
  Rear View Mirror Bolts [A]
  Rear View Mirrors [B]
  Windshield [C]
- Installation is the reverse of removal.
- Tighten:

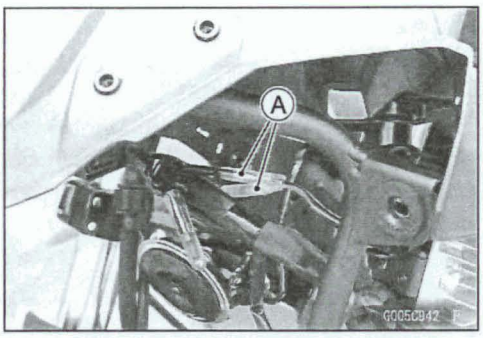
  Torque - Rear View Mirror Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)



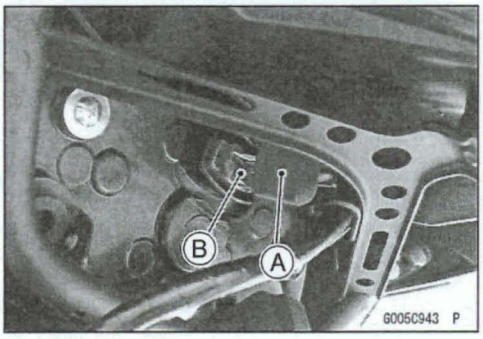
Fairings

Upper Inner Fairing Removal

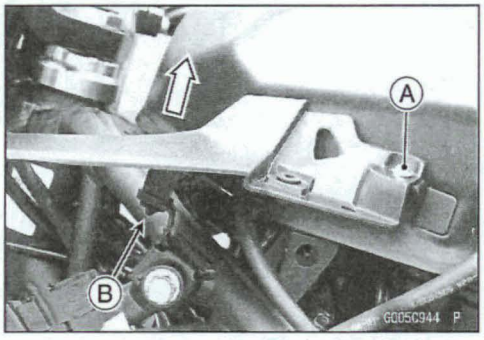
- Remove:
  Windshield (see Windshield Removal/Installation)
  Upper Fairing (see Upper Fairing Removal)
- For accessory socket equipped models, disconnect the accessory socket connectors [A].



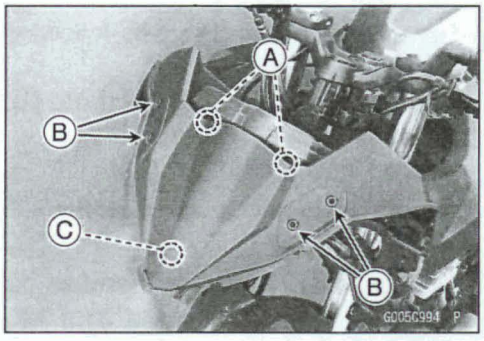
- Slide the dust cover [A], and disconnect the meter connector [B].



- Remove the bolt [A] and washer (both sides).
- Pull up the upper inner fairing to clear the projection [B] (both sides).

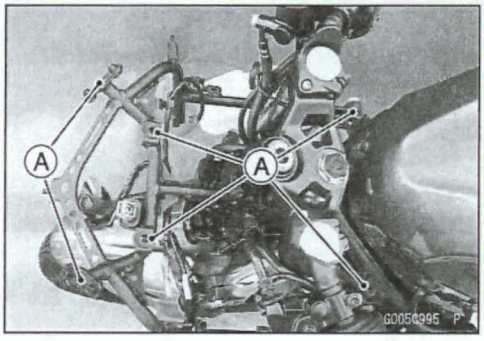


- Pull the upper inner fairing to clear the projections [A].
- Clear the holes [B] from the windshield mounting portions.
- Pull the upper inner fairing to clear the projection [C].
- Remove the upper inner fairing.



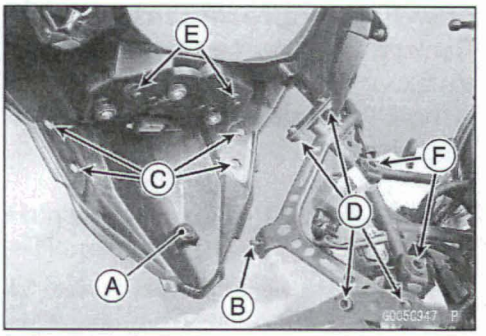
Upper Inner Fairing Installation

- Installation is the reverse of removal.
- Check that the grommets [A] are in place.

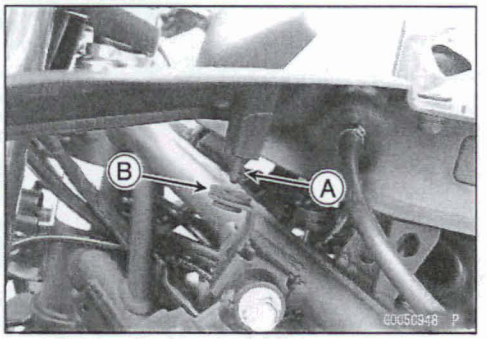


Fairings

- Check that the grommet [A] is in place.
- Insert the grommet to the projection [B].
- Fit the holes [C] to the windshield mounting portions [D].
- Insert the projections [E] to the grommet [F].

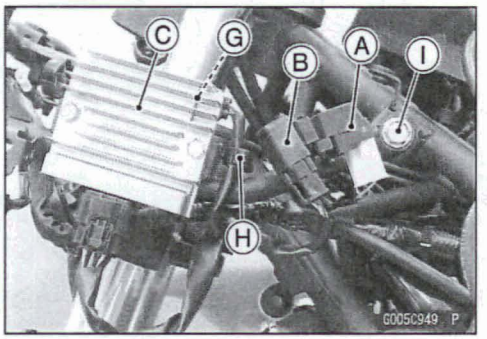


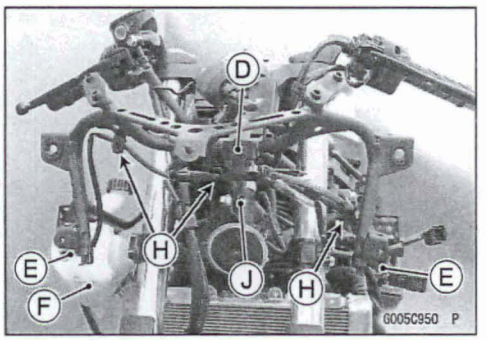
- Insert the projection [A] to the grommet [B] (both sides).



Upper Fairing Bracket Removal

- Remove:
  Upper Inner Fairing (see Upper Inner Fairing Removal)
  Turn Signal Relay [A]
  Accessory Relay [B] (Equipped Models)
  Regulator/Rectifier [C] (see Regulator/Rectifier Removal in the Electrical System chapter)
  Vehicle-down Sensor [D] (see Vehicle-down Sensor Removal in the Electrical System chapter)
  Turn Signal Light Lead Connectors [E]
  Coolant Reserve Tank [F] (see Coolant Reserve Tank Removal)
  Head Light Lead Connector [G]
- Open the clamps [H].
- Remove:
  Upper Fairing Bracket Bolt [I] (Both Sides)
  Upper Fairing Bracket Nut [J], Bolt and Spacer
  Upper Fairing Bracket





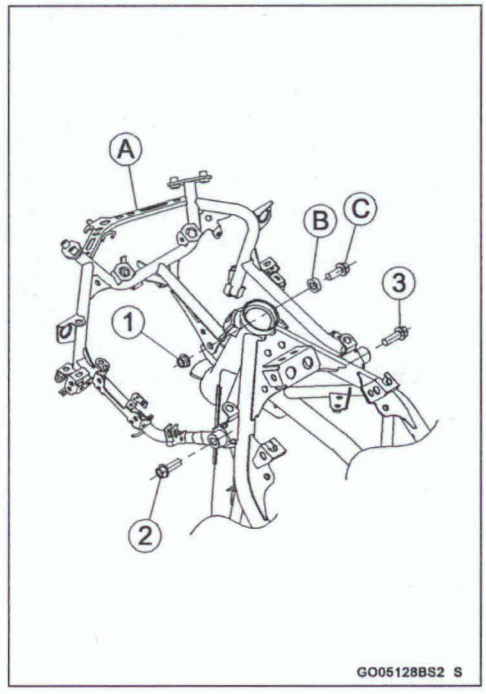
Fairings

Upper Fairing Bracket Installation

- Replace the upper fairing bracket nut [1] with a new one.
- Install:
  Upper Fairing Bracket [A]
  Spacer [B]
  Bolt [C]
- Tighten the upper fairing bracket nut and bolts following the specified tightening sequence [1 ~ 3].

Torque - Upper Fairing Bracket Nut: 34 N·m (3.5 kgf·m, 25 ft·lb)
Upper Fairing Bracket Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)

- Install the removed parts (see appropriate chapters).



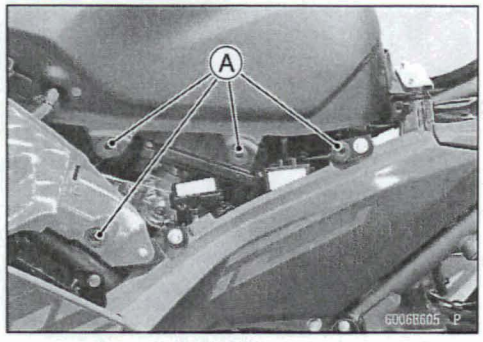
Covers

Side Cover Removal

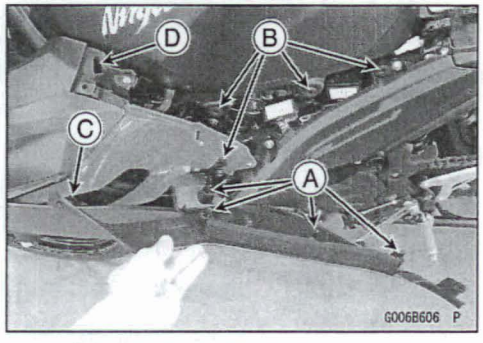
- Remove:
  Front Seat (see Front Seat Removal)
  Bolt [A]
  Bolt [B] and Washer
- Pull the side cover outward to clear the projections [C].

Side Cover Installation

- Check that the grommets [A] are in place.



- Insert the projections [A] into the grommets [B].
- Insert the projection [C] into the hole [D].

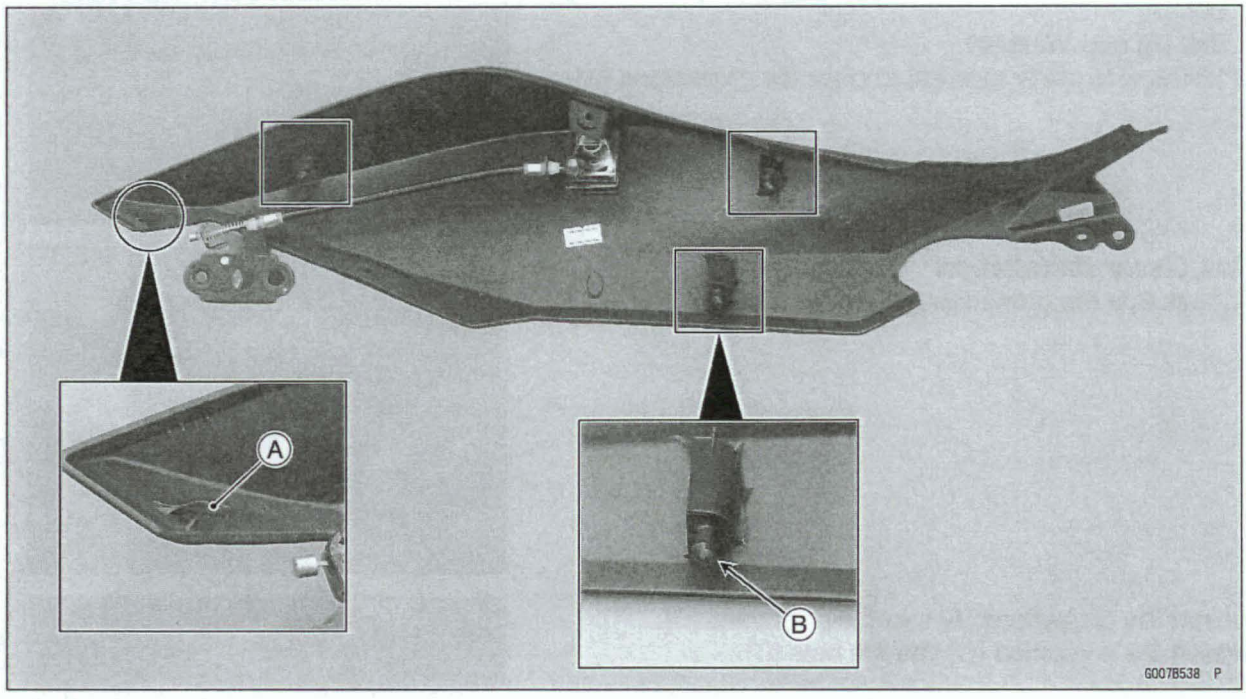


- Tighten the bolts following the specified tightening sequence [1 ~ 2].

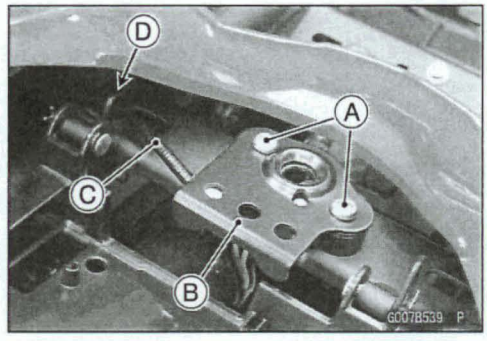
Seat Covers

Side Seat Cover Removal

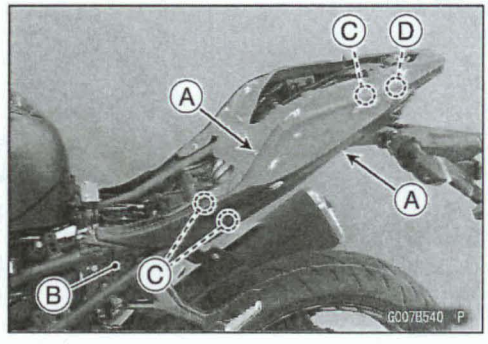
Hook [A]
Projections [B]



- Remove:
  Middle Fairings (see Middle Fairing Removal)
  Screws [A] (Left Side Only)
  Plate [B] (Left Side Only)
- Clear the cable [C] from the bracket [D] (Left Side Only).



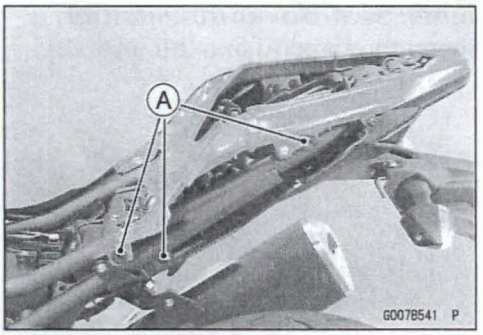
- Remove:
  Bolts [A] and Washers
  Screw [B]
- Pull the side seat cover outward to clear the projections [C].
- Pull the side seat cover backward to clear the hook [D].



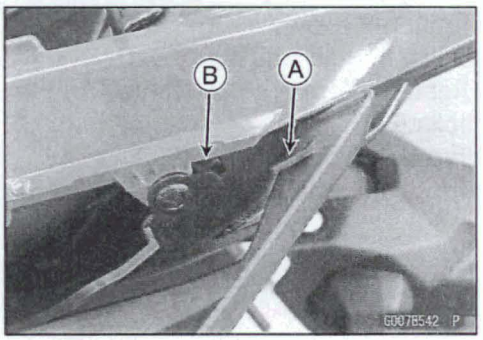
Seat Covers

Side Seat Cover Installation

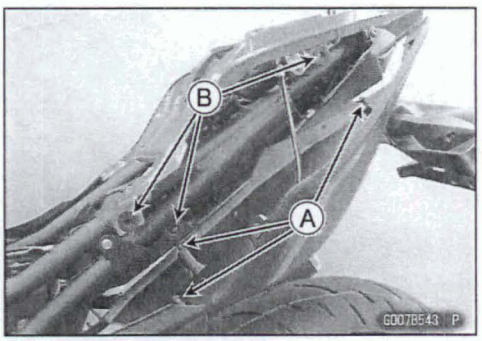
- Check that the grommets [A] are in place.



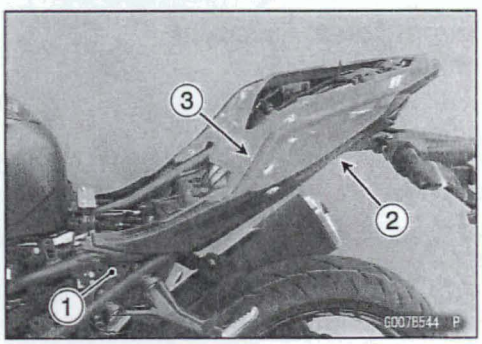
- Insert the hook [A] into the slot [B].



- Insert the projections [A] into the grommets [B].

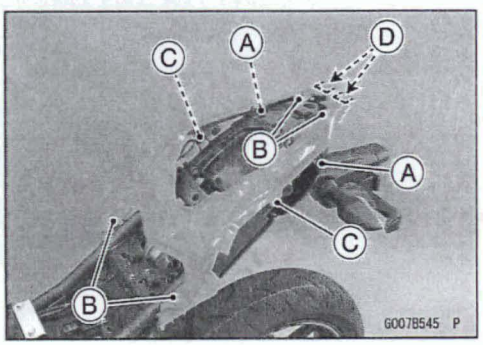


- Tighten the screws and bolts following the specified tightening sequence [1 ~ 3].



Center Seat Cover Removal

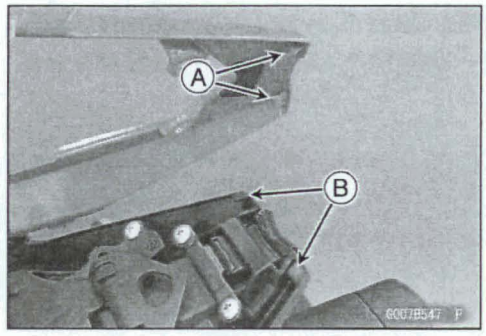
- Remove:
  Side Seat Covers (see Side Seat Cover Removal)
  Quick Rivets [A]
  Bolts [B] and collars
  Screws [C]
- Pull the center seat cover backward to clear the tabs [D].



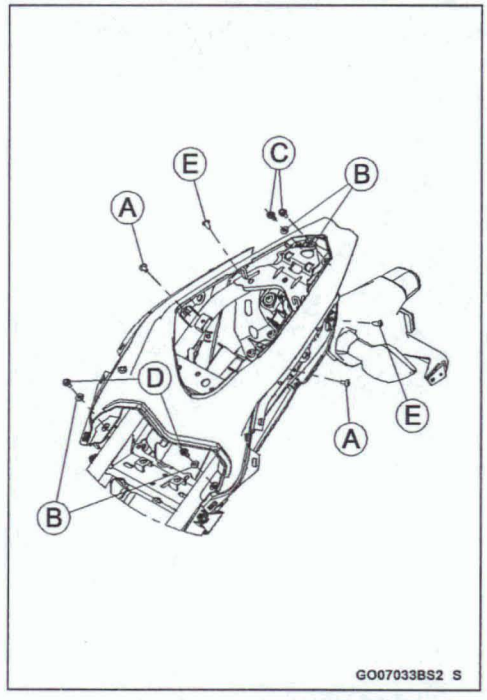
Seat Covers

Center Seat Cover Installation

- Insert the tabs [A] into the slots [B].

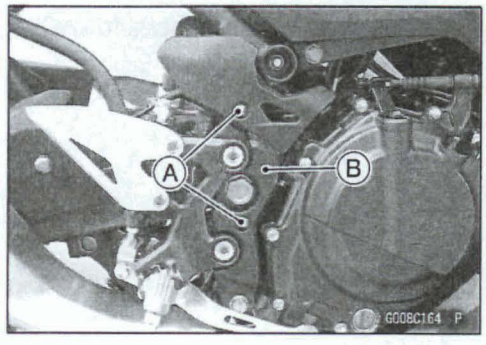


- Tighten the screws [A].
- Install the collars [B].
- Tighten the rear bolts [C] first, and then tighten the front bolts [D].
- Install the quick rivets [E].
- Install the removed parts (see appropriate chapters).



Frame Cover Removal

- Remove:
  Bolts [A] and Washers
  Frame Cover [B]



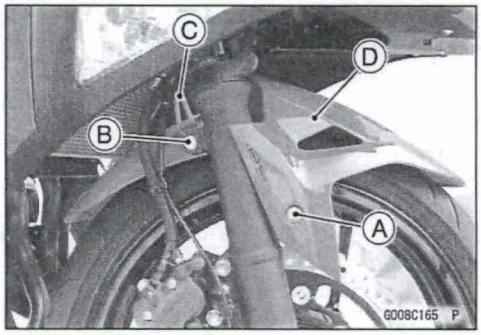
Frame Cover Installation

- Installation is the reverse of removal.

Fenders

Front Fender Removal

- Remove:
  Reflector (Equipped Models, Both Sides)
  Bolt [A] with Collar and Washer (Both Sides)
  Bolt [B] (Both Sides)
  Bracket [C]
  Front Fender [D]

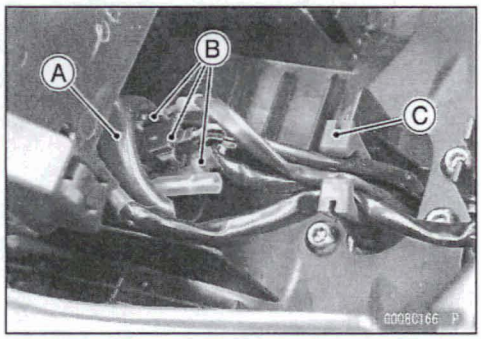


Front Fender Installation

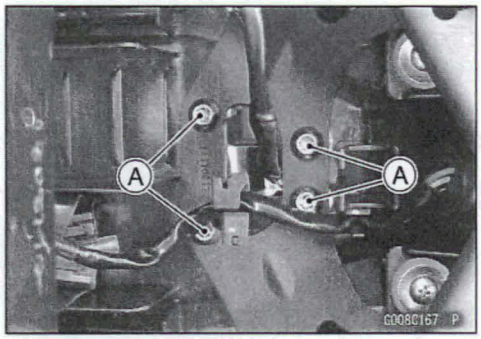
- Installation is the reverse of removal.

Flap Removal

- Remove the rear seat (see Rear Seat Removal).
- Open the compartment cover.
- Slide the cover [A].
- Disconnect each connectors [B].
- Free the connector leads from the damper [C].

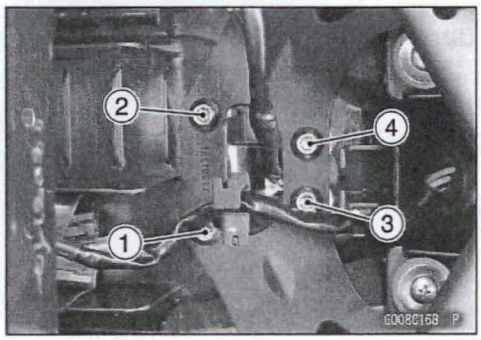


- Remove the bolts [A] and flap assembly.



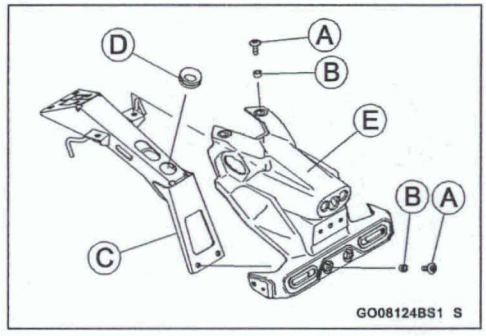
Flap Installation

- Install the flap assembly.
- Tighten the bolts following the specified tightening sequence [1 ~ 4].
- Run the hoses, leads and harness correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).



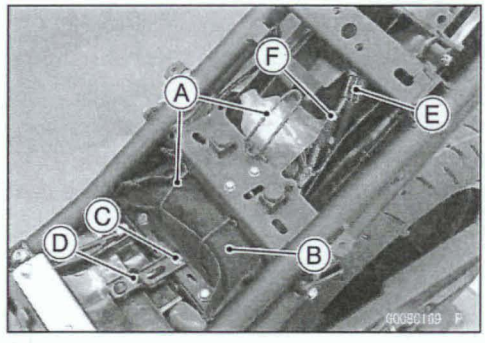
Fenders

Flap Disassembly/Assembly

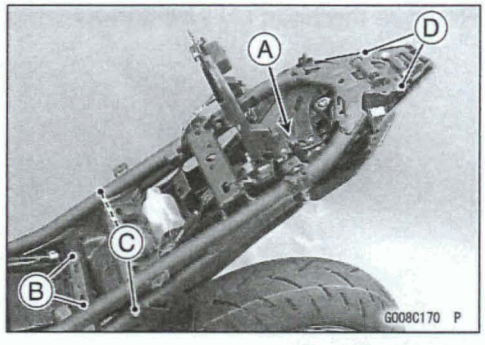


- Remove:
  - Bolts [A]
  - Collars [B]
  - Bracket [C]
  - Grommet [D]
  - Flap [E]
  - Turn Signal Lights
  - License Plate Light
- Assembly is the reverse of removal.
- Run the cables, leads, harness and hose correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Rear Fender Removal

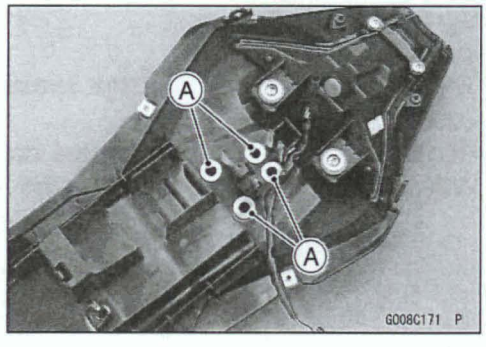


- Remove:
  - Center Seat Cover (see Center Seat Cover Removal)
  - Flap (see Flap Removal)
  - Bands [A]
  - Owner's Tool [B]
  - Bolt [C]
  - Bracket [D]
- Disconnect the brake/tail light lead connector [E].
- Open the band [F].



- Free the brake/tail light lead from the damper [A].
- Remove:
  - Bolts [B]
  - Bolts [C] and Washers
  - Screws [D]
- Remove the rear fender backward.

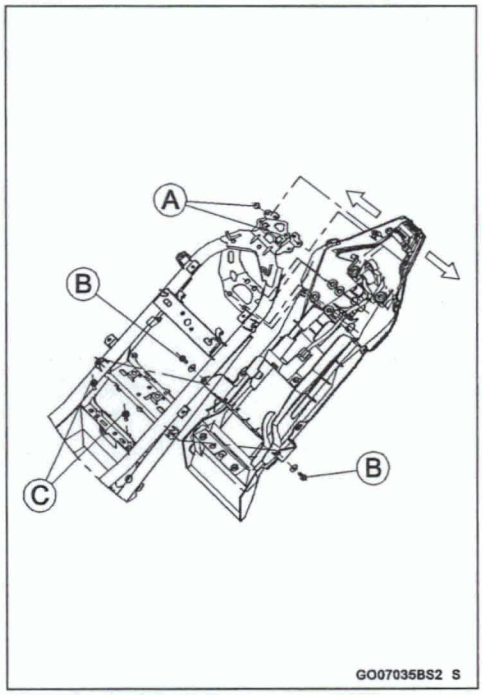
Rear Fender Installation



- Check that the collars [A] are in place.
- Install the rear fender.
- Run the cables, leads, harness and hose correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

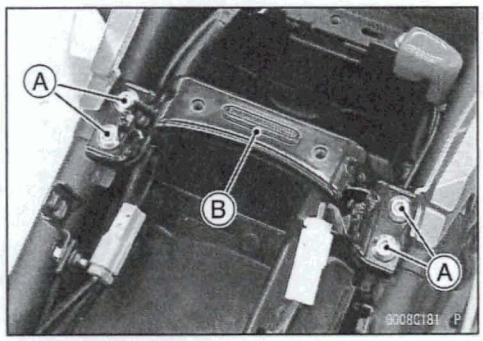
Fenders

- Pull the rear part of the rear fender to outside while tightening the screws [A].
- Tighten the rear bolts [B] first, and then tighten the front bolts [C].

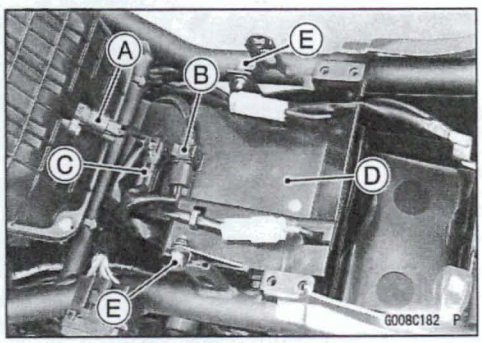


Battery Case Cover Removal

- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Battery (see Battery Removal in the Electrical System chapter)
  Fuel Tank Bracket Bolts [A]
  Fuel Tank Bracket [B]

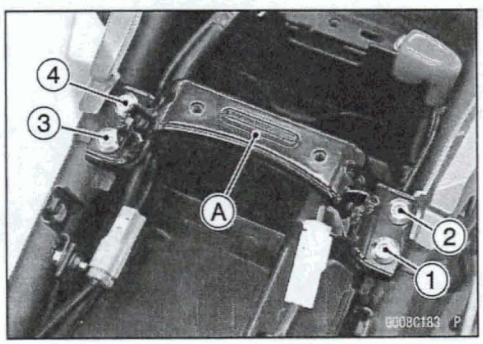


- Disconnect the intake air temperature sensor connector [A].
- Remove:
  Rear Wheel Rotation Sensor Lead Connector [B]
  Fuel Pump Lead Connector [C]
- Clear the leads from the battery case cover [D].
- Remove the bolts [E].
- Pull up the front part of the battery case cover, and remove it.



Battery Case Cover Installation

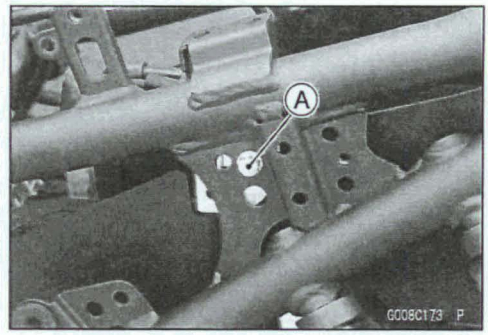
- Installation is the reverse of removal.
- Install the fuel tank bracket [A].
- Run the cables, leads, harness and hose correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Tighten the fuel tank bracket bolts following the specified tightening sequence [1 ~ 4].



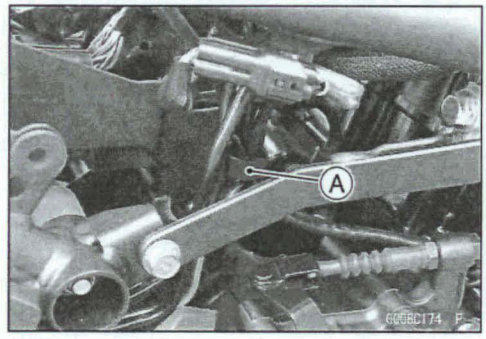
Fenders

Battery Case Removal

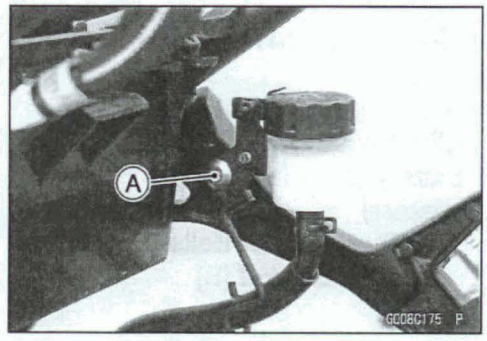
- Remove:
  Rear Fender (see Rear Fender Removal)
  Battery Case Cover (see Battery Case Cover Removal)
  Bolt [A]



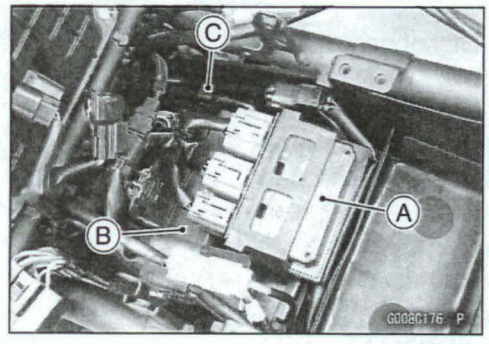
- Open the clamp [A].



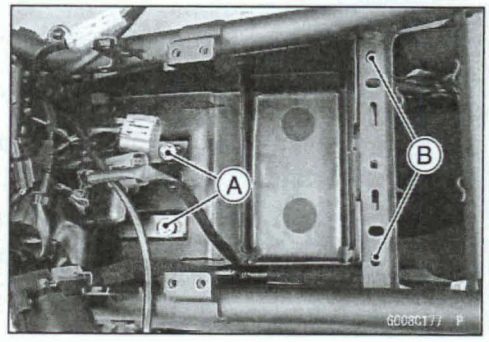
- Remove the bolt [A].



- Remove:
  Relay Box [A]
  ECU [B]
- Open the clamp [C].



- Remove the bolts [A] and washers.
- Push down the battery case to clear the tabs [B].
- Remove the battery case backward.



Fenders

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).

Frame

Frame Inspection

- Visually inspect the frame for cracks, dents, bending, or warp.

★If there is any damage to the frame, replace it.

⚠ WARNING

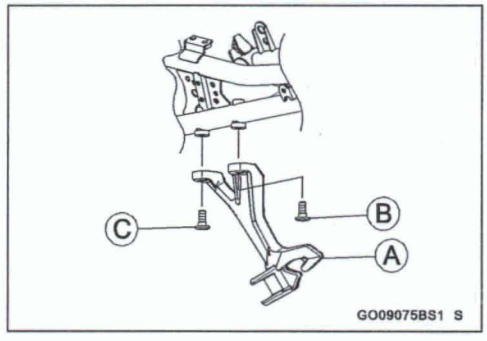
A repaired frame may fail in use, possibly causing an accident resulting in injury or death. If the frame is bent, dented, cracked, or warped, replace it.

Rear Footpeg Bracket Installation

- Install the rear footpeg bracket [A].
- Tighten the rear footpeg bracket bolt (rear) [B] first, and then tighten the rear footpeg bracket bolt (front) [C].

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

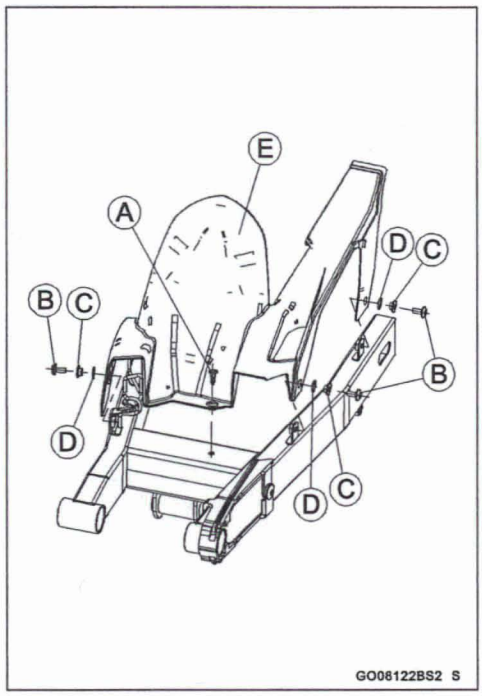
- Install the removed parts (see appropriate chapters).



Guard

Mud Guard Removal

- Remove:
  Quick Rivet [A]
  Mud Guard Bolts [B]
  Collars [C]
  Washers [D]
  Mud Guard [E]



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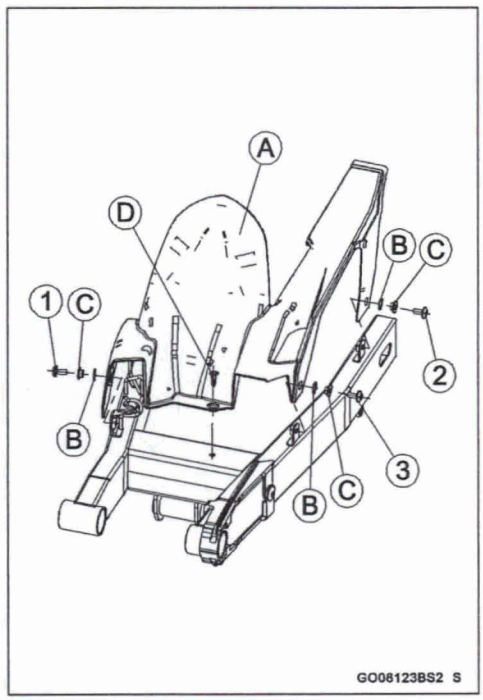
Mud Guard Installation

- Install:
  Mud Guard [A]
  Washers [B]
  Collars [C]
- Tighten the mud guard bolts following the tightening sequence [1 ~ 3].

  Torque - Mud Guard Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)
- Install the quick rivet [D].

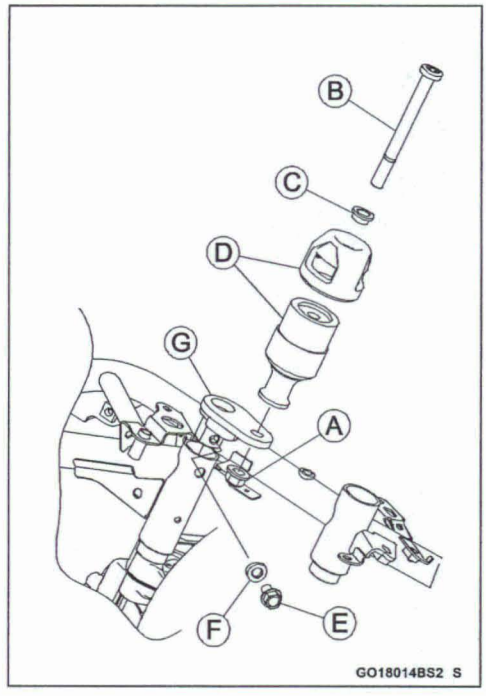


GO08123BS2 S

Guard

Slider Removal (Equipped Models)

- Remove:
  Middle Fairing (see Middle Fairing Removal)
  Nut [A]
  Bolt [B]
  Collar [C]
  Slider Assemblies [D]
  Slider Bracket Bolt [E]
  Collar [F]
  Bracket [G]



Guard

Slider Installation (Equipped Models)

- Replace the nuts [A] with new ones.
  Viewed from Bottom [B]
- Install:
  Left Bracket [C]
  Right Bracket [D]

○Align the hole of the bracket with the hole of the frame.

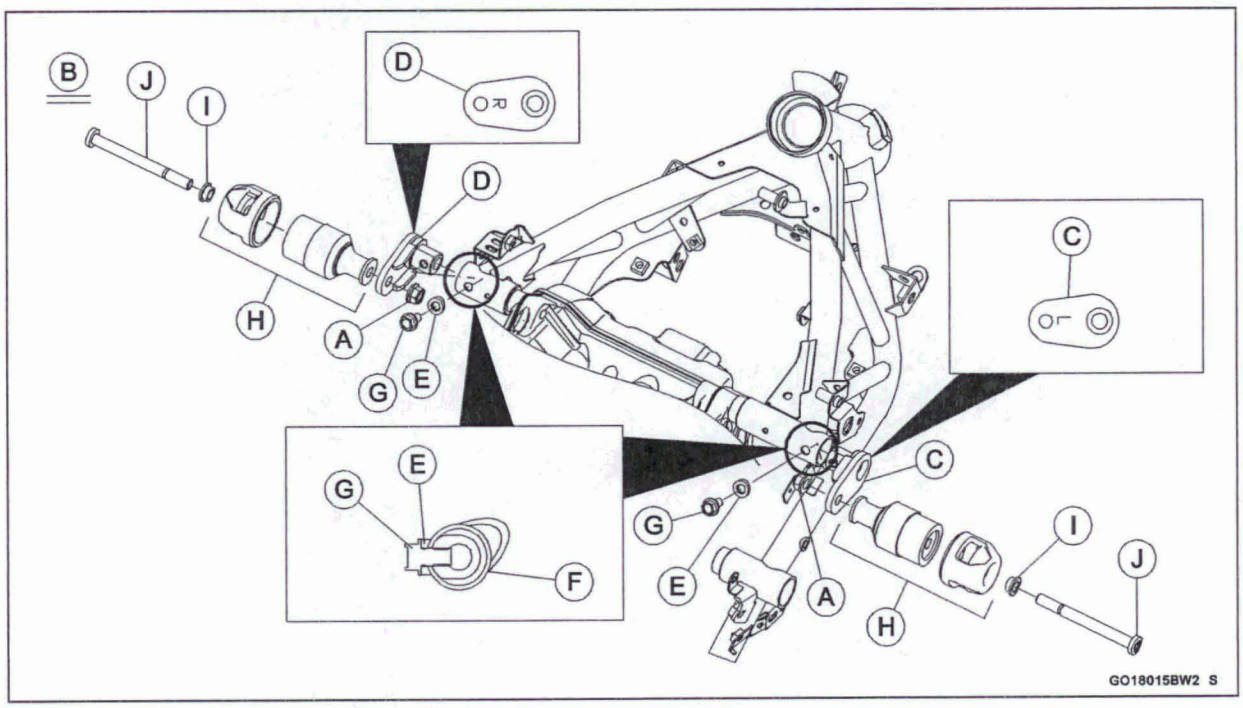
NOTE

○*The left bracket is indicated the "L" mark.*
○*The right bracket is indicated the "R" mark.*

- Fit the collars [E] along the pipe shape of the frame [F].
- Tighten:

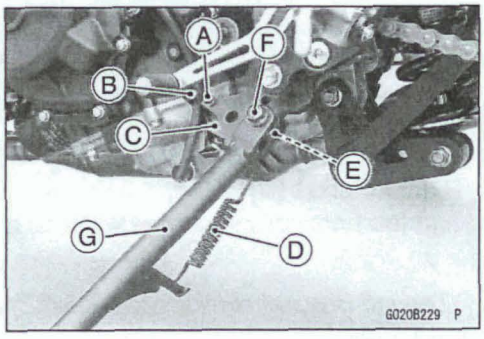
Torque - Slider Bracket Bolts [G]: 29 N·m (3.0 kgf·m, 21 ft·lb)

- Install:
  Slider Assemblies [H]
  Collars [I]
  Bolts [J]
  Nuts



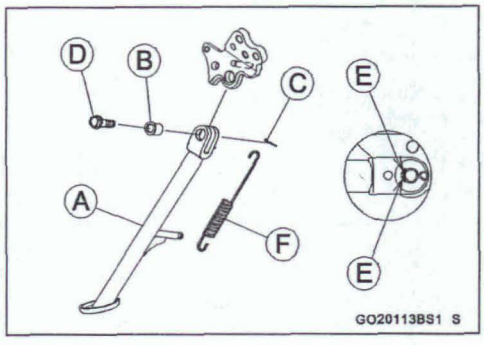
Side Stand

Side Stand Removal



- Raise the rear wheel off the ground with the stand.
- Remove the left lower fairing (see Lower Fairing Removal).
- Remove:
  Side Stand Switch Bolt [A]
  Clamp [B]
  Plate [C]
  Side Stand Switch
  Spring [D]
  Cotter Pin [E]
  Side Stand Bolt [F]
  Collar
  Side Stand [G]

Side Stand Installation



- Apply grease to the sliding area of the side stand [A] and collar [B].
- Replace the cotter pin [C] with a new one.
- Tighten:

  Torque - Side Stand Bolt [D]: 44 N·m (4.5 kgf·m, 32 ft·lb)

- Insert the cotter pin and bend the pin ends [E].
- Hook the spring [F] in the direction as shown.
- Install the side stand switch.
- Apply a non-permanent locking agent to the threads of the side stand switch bolt, and tighten it.

  Torque - Side Stand Switch Bolt: 8.8 N·m (0.90 kgf·m, 78 in·lb)

- Run the lead and hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.
- Install the left lower fairing (see Lower Fairing Installation).

Pads

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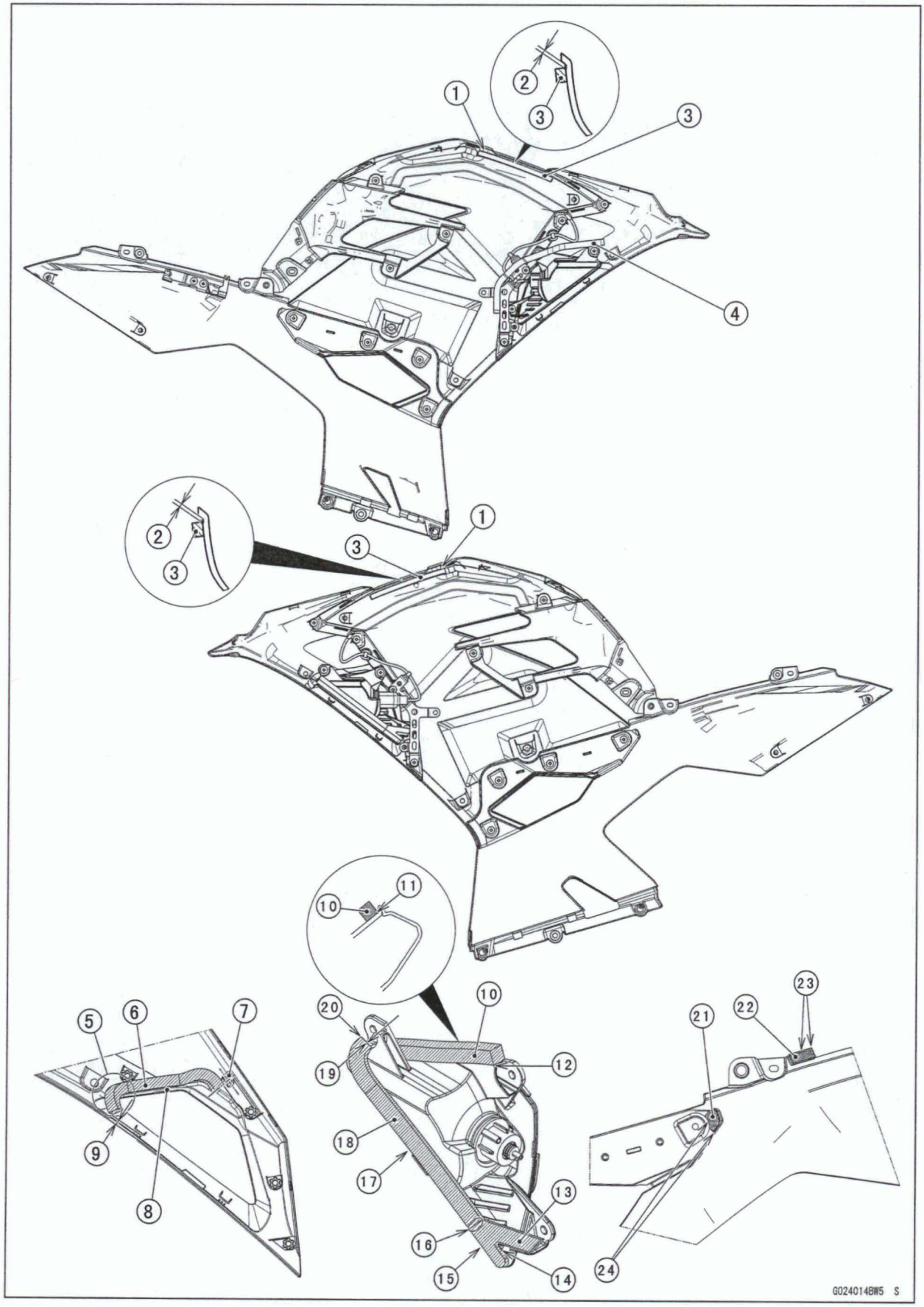
Pads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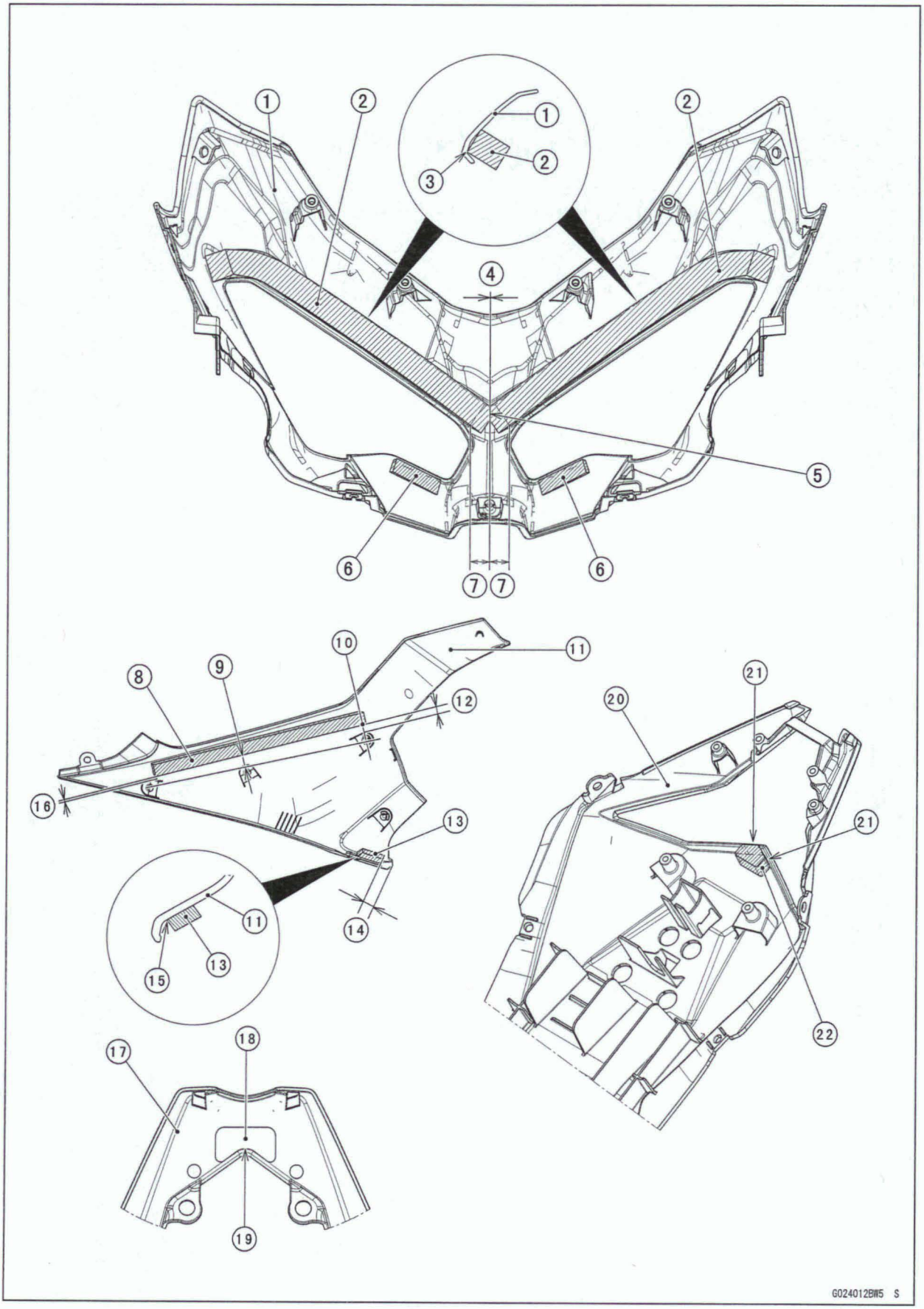
G024014BW5 S

Pads

Middle Fairing

1. Fit the pad to the rib of the upper middle fairing.
2. About 2 mm (0.08 in.)
3. Pad
4. Pad (Left Side Only)
5. Fit the pad to the corner of the hole for front turn signal light.
6. Pad (Right Side Only)
7. Fit the pad end to the center of the boss.
8. Fit the pad to the rounded end of the hole for front turn signal light.
9. About 10 mm (0.39 in.)
10. Pad (Right Side Only)
11. Fit the pad to the rounded end of the front turn signal light.
12. Fit the pad to the edge of the front turn signal light.
13. Pad (Right Side Only)
14. Do not close the hole with the pad.
15. Fit the pad to the edge of the front turn signal light.
16. Fit the pad ends.
17. Fit the pad to the edge of the front turn signal light.
18. Pad (Right Side Only)
19. 0 mm (0 in.)
20. Fit the pad to the edge of the front turn signal light.
21. Pad (Both Sides)
22. Pad (Both Sides)
23. Fit the pad to the edge of the lower middle fairing.
24. Fit the pad to the rounded end of the lower middle fairing.

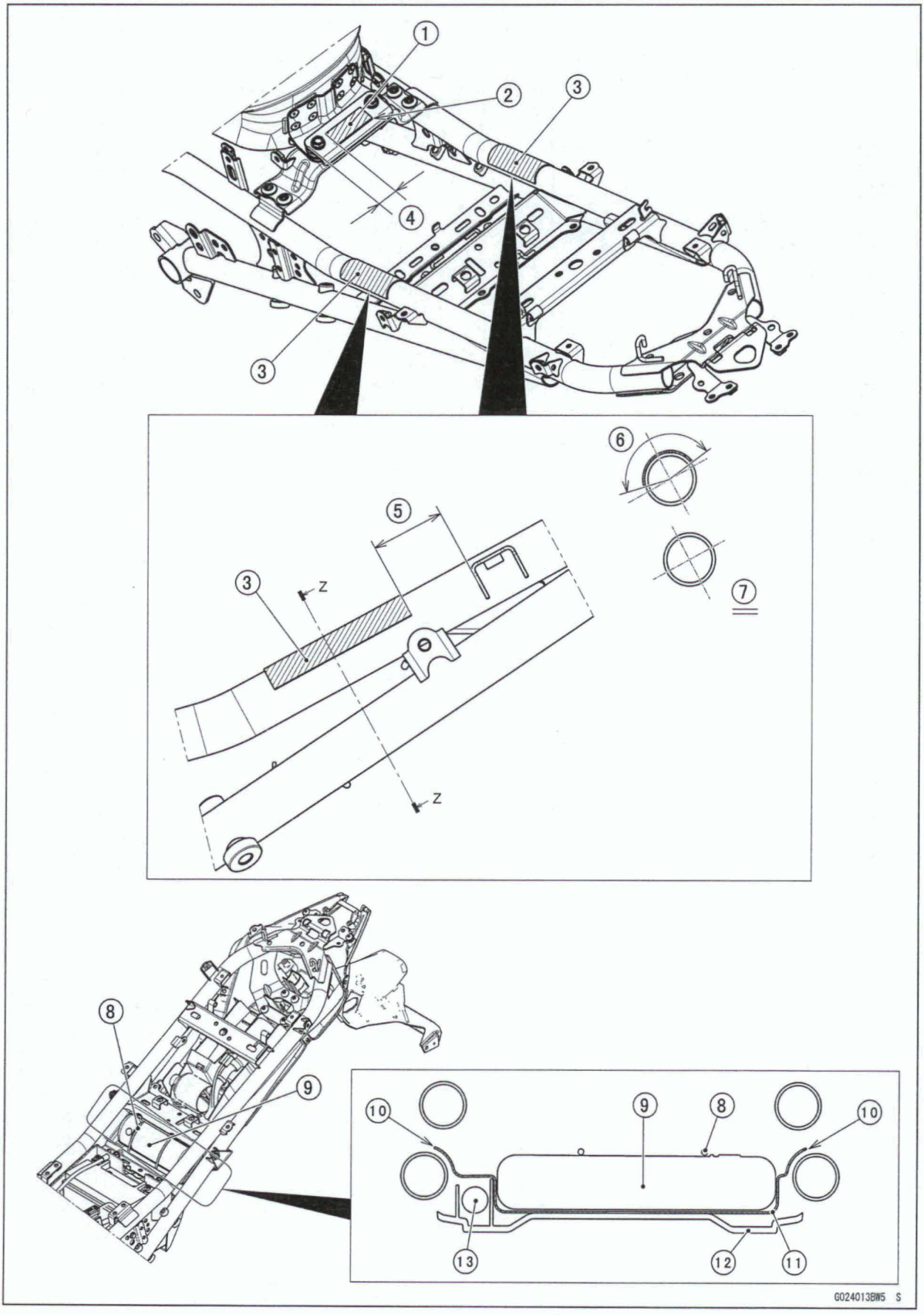
Pads



Pads

1. Upper Fairing
2. Pad
3. Fit the pad to the rounded end of the upper fairing.
4. 0 mm (0 in.)
5. Fit the pad ends.
6. Pad (Fit the line of the upper fairing.)
7. About 15 mm (0.59 in.)
8. Pad (Both Sides)
9. Reference: 13 mm (0.51 in.)
10. Fit the pad end to the center of the boss.
11. Side Cover
12. About 10 mm (0.39 in.)
13. Damper
14. About 20 mm (0.79 in.)
15. Fit the damper to the rounded end of the side cover.
16. About 3.5 mm (0.14 in.)
17. Center Seat Cover
18. Pad
19. Fit the pad to the rounded end of the center seat cover.
20. Rear Fender
21. Fit the pad to the rounded end of the rear fender.
22. Pad

Pads



Pads

1. Pad
2. Fit the pad to the rounded end of the bracket.
3. Pad
4. About 25 mm (0.98 in.)
5. About 35 mm (1.38 in.)
6. Reference: 158°
7. Section Z-Z
8. Band
9. Owner's Tool
10. Position the pad between the frame pipes.
11. Pad
12. Rear Fender
13. Main Harness

Electrical System

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Exploded View

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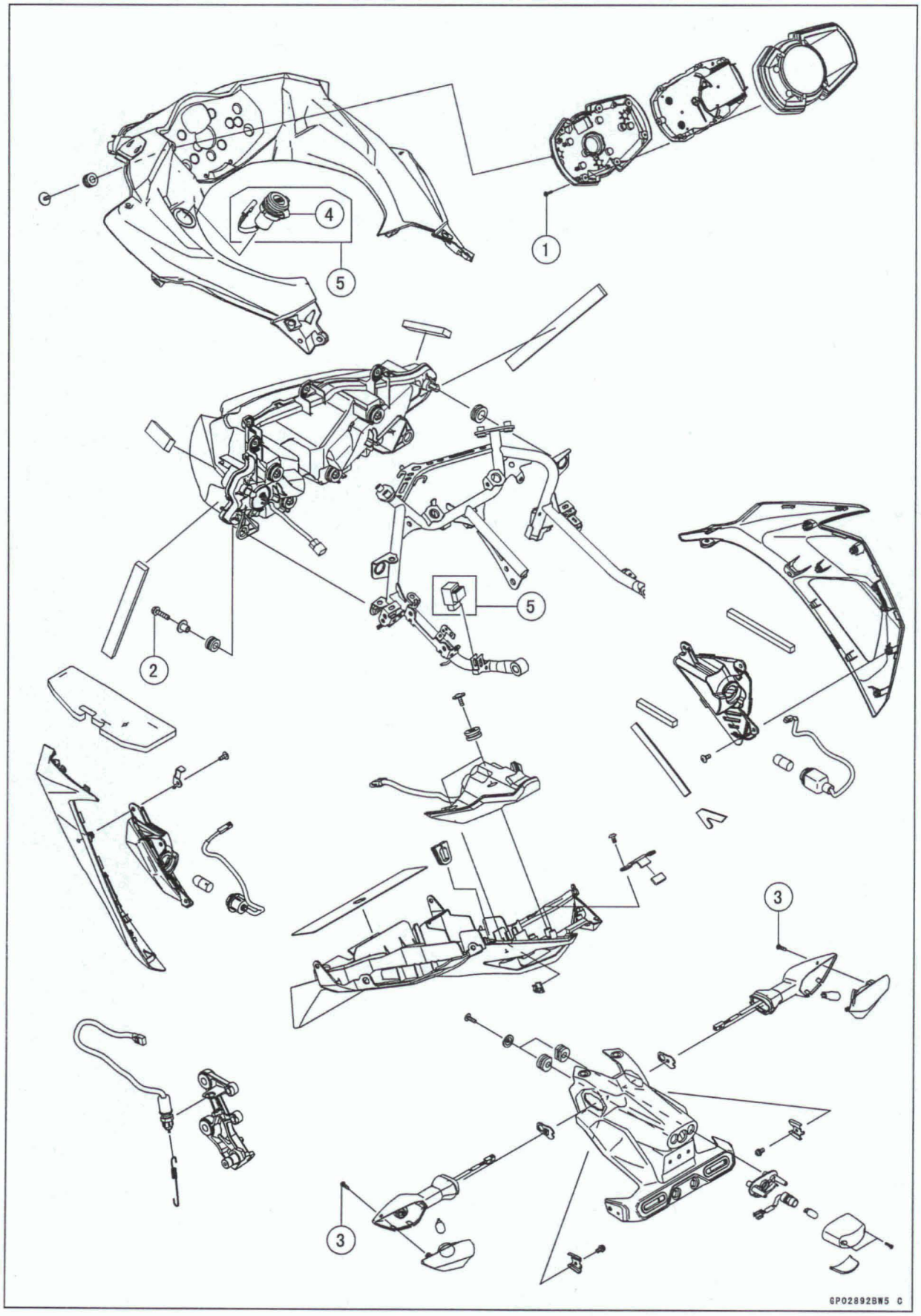
Exploded View

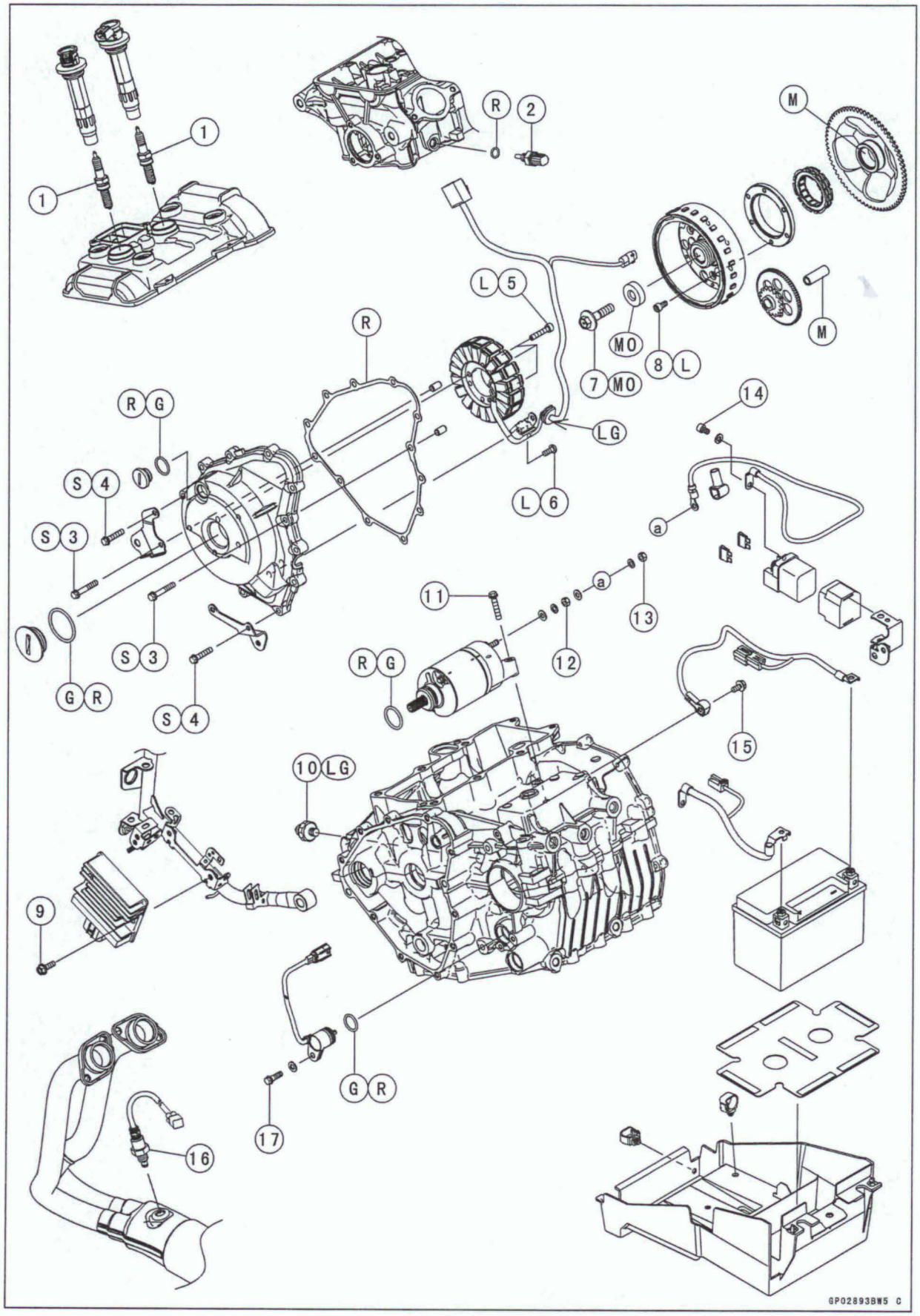


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Meter Assembly Screws	1.2	0.12	11 in·lb	
2	Headlight Mounting Bolts	8.8	0.90	78 in·lb	
3	Turn Signal Light Lens Screws	1.0	0.10	8.9 in·lb	
4	Accessory Socket Nut	2.8	0.29	25 in·lb	

5. Equipped Models

Exploded View

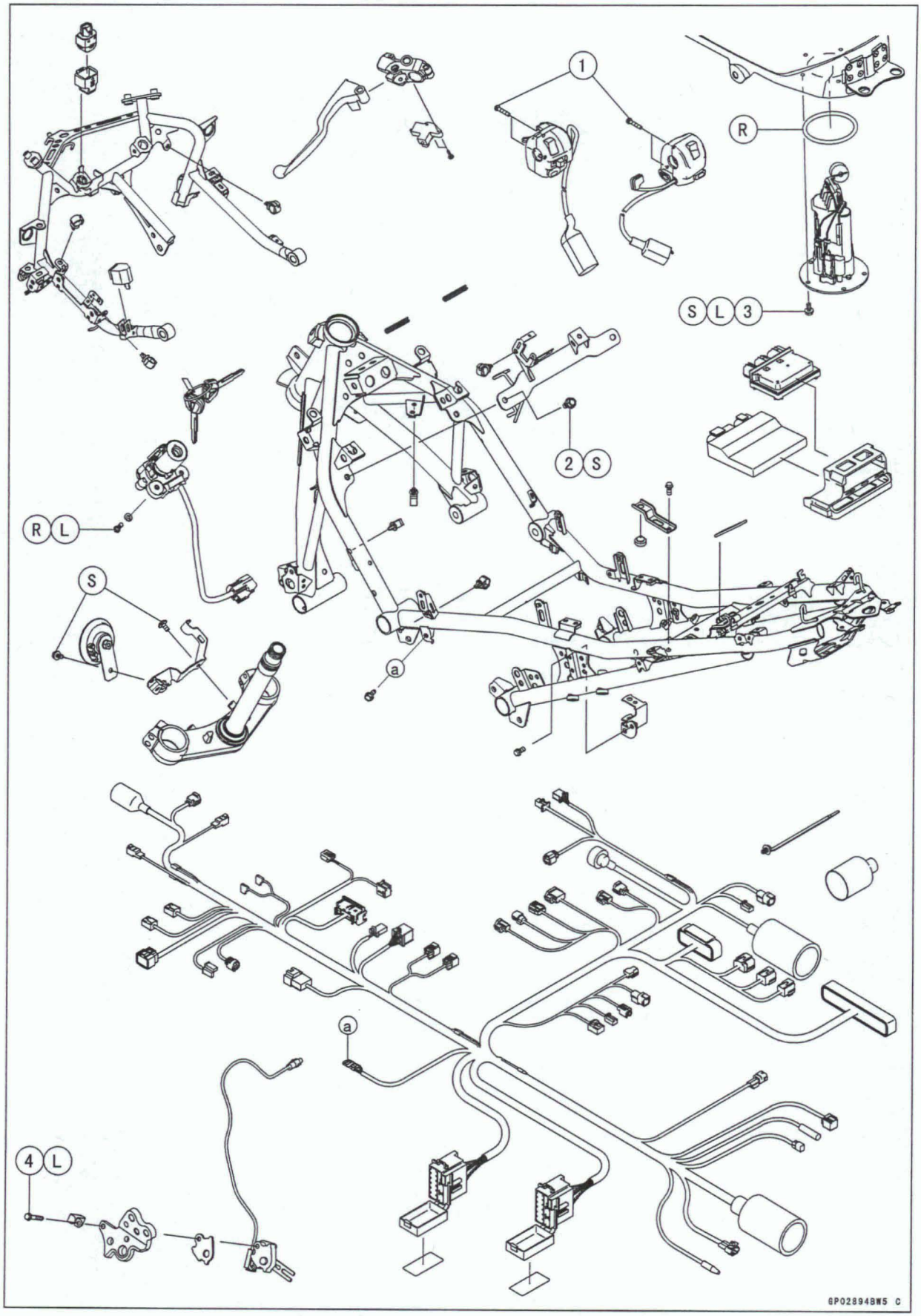


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Spark Plugs	13	1.3	115 in·lb	
2	Water Temperature Sensor	12	1.2	106 in·lb	
3	Alternator Cover Bolts (L = 35 mm)	9.8	1.0	87 in·lb	S
4	Alternator Cover Bolts (L = 28 mm)	9.8	1.0	87 in·lb	S
5	Stator Coil Bolts	12	1.2	106 in·lb	L
6	Crankshaft Sensor Screws	5.2	0.53	46 in·lb	L
7	Alternator Rotor Bolt	80	8.2	59	MO
8	Starter Motor Clutch Bolts	12	1.2	106 in·lb	L
9	Regulator/Rectifier Bolts	9.8	1.0	87 in·lb	
10	Oil Pressure Switch	15	1.5	11	LG
11	Starter Motor Mounting Bolts	9.8	1.0	87 in·lb	
12	Starter Motor Terminal Locknut	3.5	0.36	31 in·lb	
13	Starter Motor Cable Terminal Nut	9.8	1.0	87 in·lb	
14	Starter Relay Terminal Bolts	3.6	0.37	32 in·lb	
15	Engine Ground Lead Bolt	9.8	1.0	87 in·lb	
16	Oxygen Sensor	25	2.5	18	
17	Gear Position Sensor Bolt	9.8	1.0	87 in·lb	

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

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Switch Housing Screws	3.5	0.36	31 in·lb	
2	Air Cleaner Housing Bracket Bolts	25	2.5	18	S
3	Fuel Pump Bolts	9.8	1.0	87 in·lb	L, S
4	Side Stand Switch Bolt	8.8	0.90	78 in·lb	L

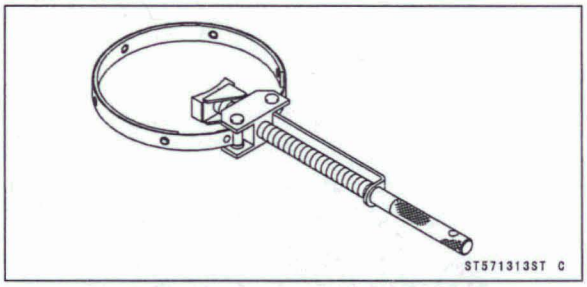
L: Apply a non-permanent locking agent.
R: Replacement Parts
S: Follow the specified tightening sequence.

Specifications

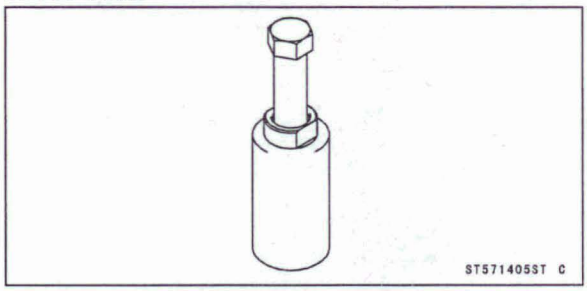
Item	Standard
Battery	
Type	Sealed Battery
Model Name	FTX9-BS
Capacity	12 V 8 Ah (10 HR)
Voltage	12.6 V or more
Gross Weight	3.0 kg (6.6 lb)
Electrolyte Volume	0.41 L (25 cu in.)
Charging System	
Type	Three-phase AC
Charging Voltage (Regulator/Rectifier Output Voltage)	DC 14.5 ~ 14.9 V @25°C (77°F)
Alternator Output Voltage	AC 54 V or more @4 000 r/min (rpm)
Stator Coil Resistance	0.05 ~ 0.6 Ω @23°C (73°F)
Ignition System	
Crankshaft Sensor:	
Resistance	180 ~ 280 Ω @23°C (73°F)
Peak Voltage	5.4 V or more
Stick Coil:	
Primary Winding Resistance	1.11 ~ 1.50 Ω @20°C (68°F)
Secondary Winding Resistance	6.4 ~ 9.6 kΩ @20°C (68°F)
Primary Peak Voltage	118 V or more
Spark Plug:	
Type	NGK LMAR9G
Gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 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.) of 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 ~ 11 Ω
Empty Position	213 ~ 219 Ω

Special Tools and Sealant

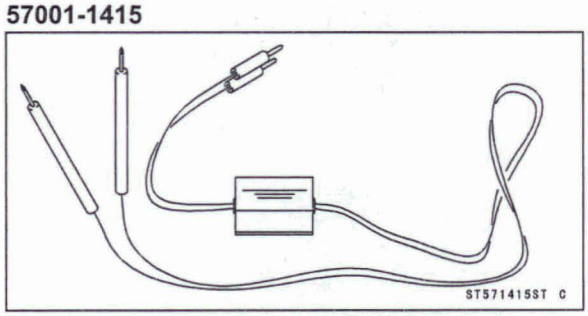
Flywheel Holder:
57001-1313



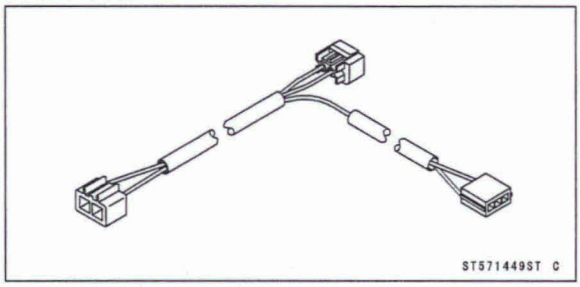
Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5:
57001-1405



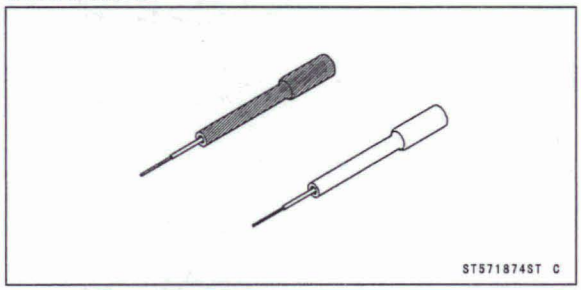
Peak Voltage Adapter:
57001-1415



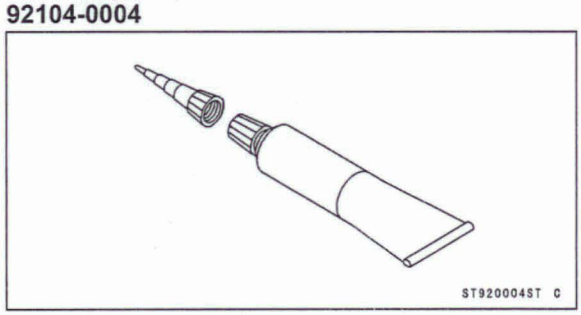
Lead Wire - Peak Voltage Adapter:
57001-1449



Needle Adapter Set:
57001-1874

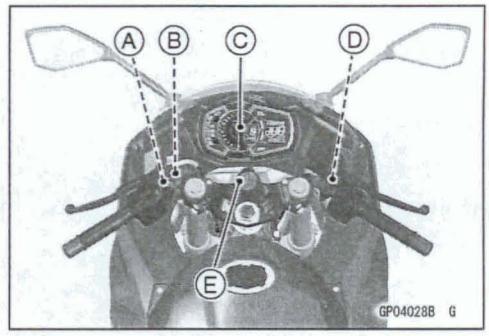


Liquid Gasket, TB1211F:
92104-0004

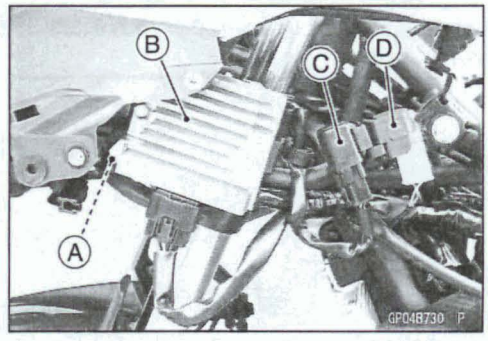


Parts Location

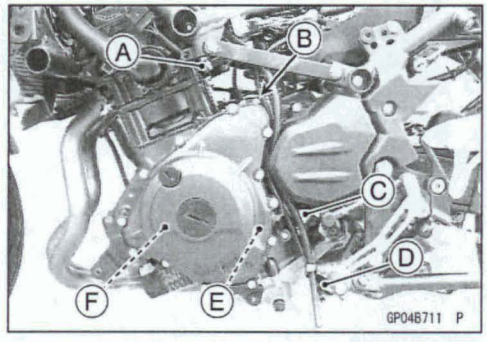
Starter Lockout Switch [A]
Accessory Socket [B] (Equipped Models)
Meter Unit [C]
Front Brake Light Switch [D]
Ignition Switch [E]



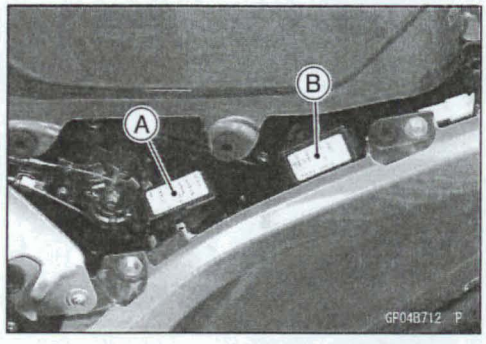
Horn [A]
Regulator/Rectifier [B]
Accessory Relay [C] (Equipped Models)
Turn Signal Relay [D]



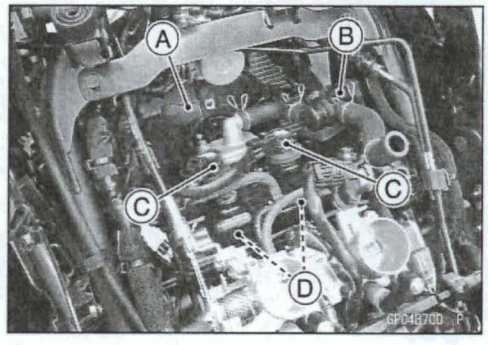
Water Temperature Sensor [A]
Starter Motor [B]
Gear Position Sensor [C]
Side Stand Switch [D]
Crankshaft Sensor [E]
Alternator [F]



Fuse Box (1) [A]
Fuse Box (2) [B]

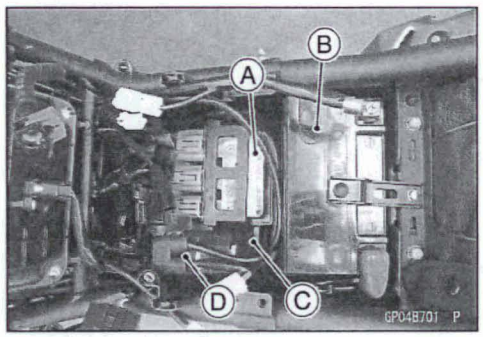


Radiator Fan Motor [A]
Air Switching Valve [B]
Stick Coils [C]
Spark Plugs [D]

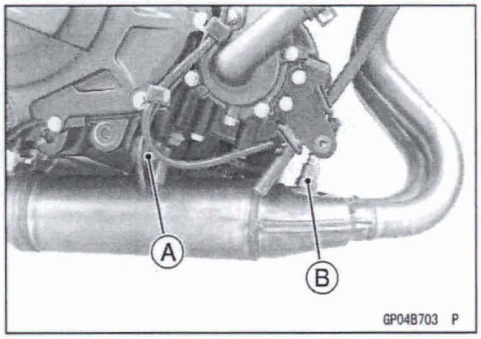


Parts Location

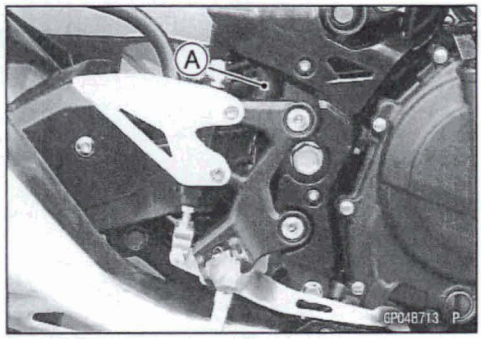
Relay Box [A]
Battery [B]
ECU [C]
Starter Relay [D]



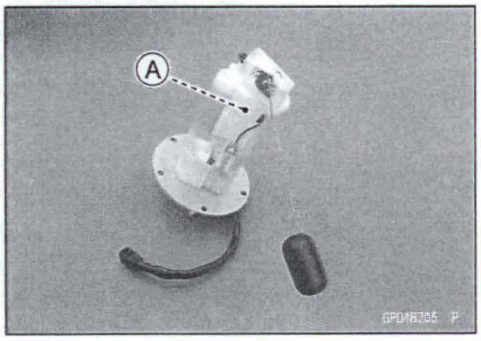
Oil Pressure Switch [A]
Oxygen Sensor [B]



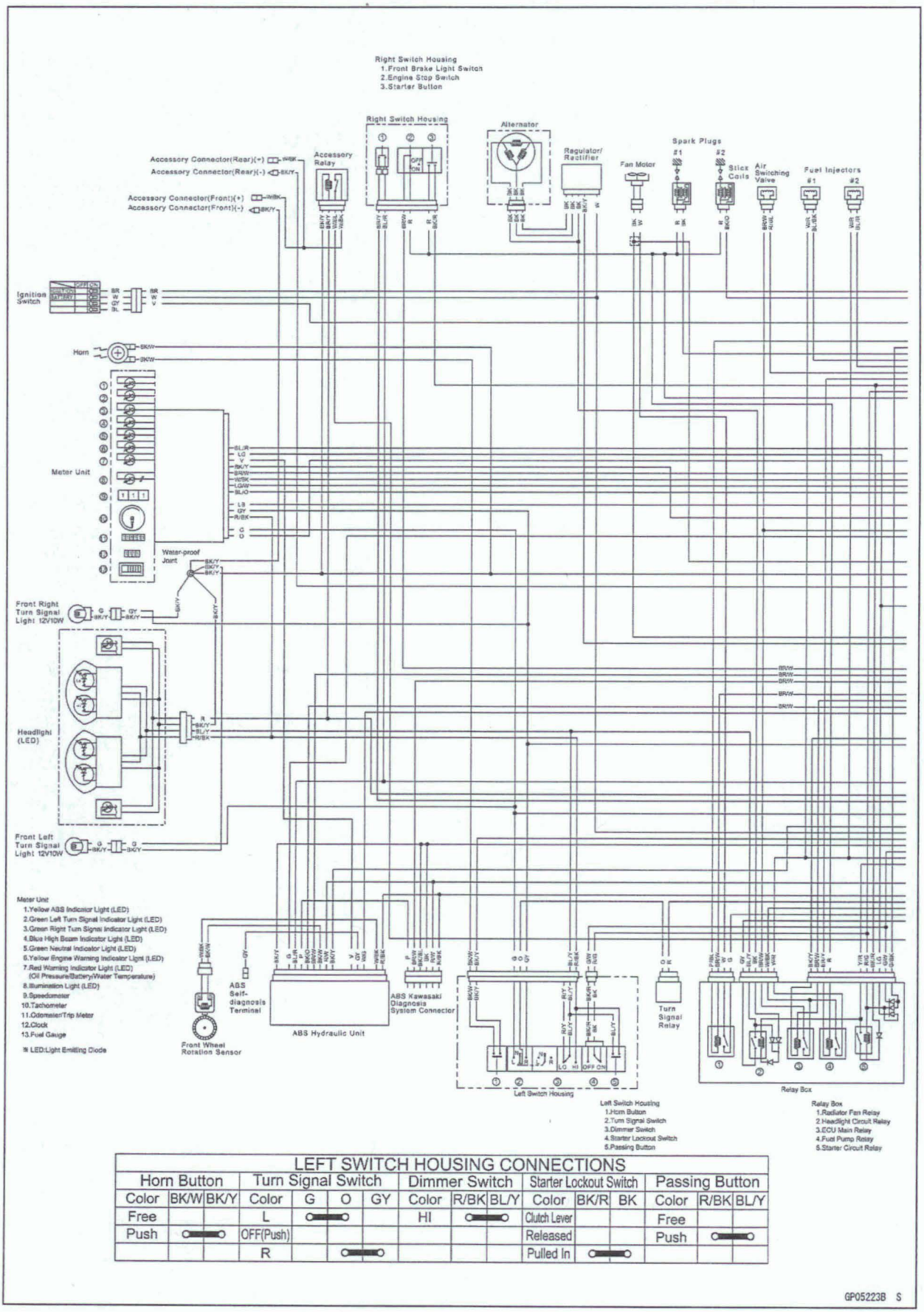
Rear Brake Light Switch [A]



Fuel Level Sensor [A]



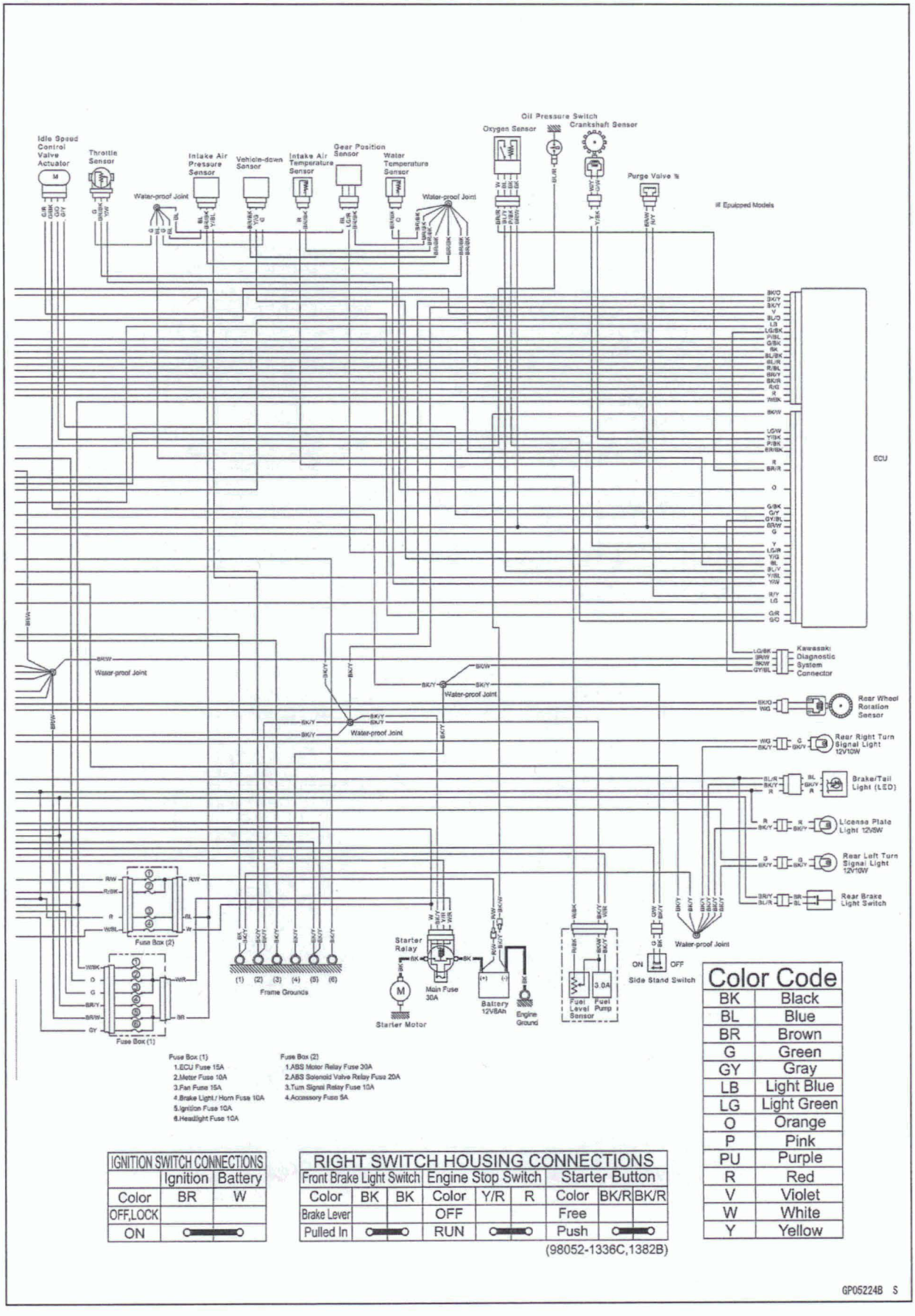
Wiring Diagram (EX400G/J)



LEFT SWITCH HOUSING CONNECTIONS

Horn Button			Turn Signal Switch				Dimmer Switch			Starter Lockout Switch			Passing Button		
Color	BK/W	BK/Y	Color	G	O	GY	Color	R/BK	BL/Y	Color	BK/R	BK	Color	R/BK	BL/Y
Free			L	○			HI	○		Clutch Lever			Free		
Push	○		OFF(Push)							Released			Push	○	
			R		○					Pulled In	○				

Wiring Diagram (EX400G/J)



Fuse Box (1)
1.ECU Fuse 15A
2.Meter Fuse 10A
3.Fan Fuse 15A
4.Brake Light / Horn Fuse 10A
5.Ignition Fuse 10A
6.Headlight Fuse 10A

Fuse Box (2)
1.ABS Motor Relay Fuse 30A
2.ABS Solenoid Valve Relay Fuse 20A
3.Turn Signal Relay Fuse 10A
4.Accessory Fuse 5A

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

IGNITION SWITCH CONNECTIONS

	Ignition	Battery
Color	BR	W
OFF,LOCK		
ON	○——	——○

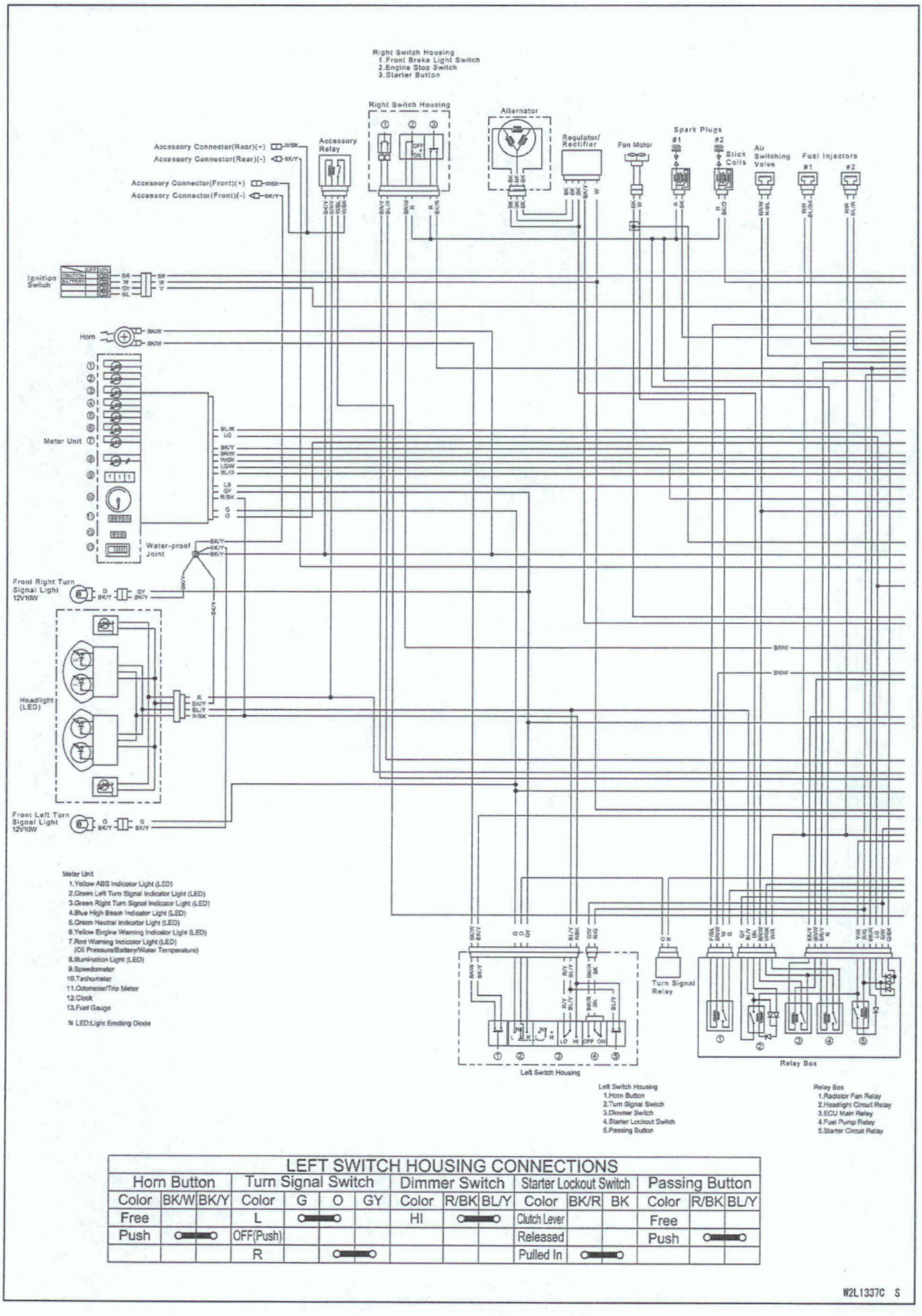
RIGHT SWITCH HOUSING CONNECTIONS

Front Brake Light Switch			Engine Stop Switch			Starter Button		
Color	BK	BK	Color	Y/R	R	Color	BK/R	BK/R
Brake Lever			OFF			Free		
Pulled In	○——	——○	RUN	○——	——○	Push	○——	——○

(98052-1336C,1382B)

GP05224B S

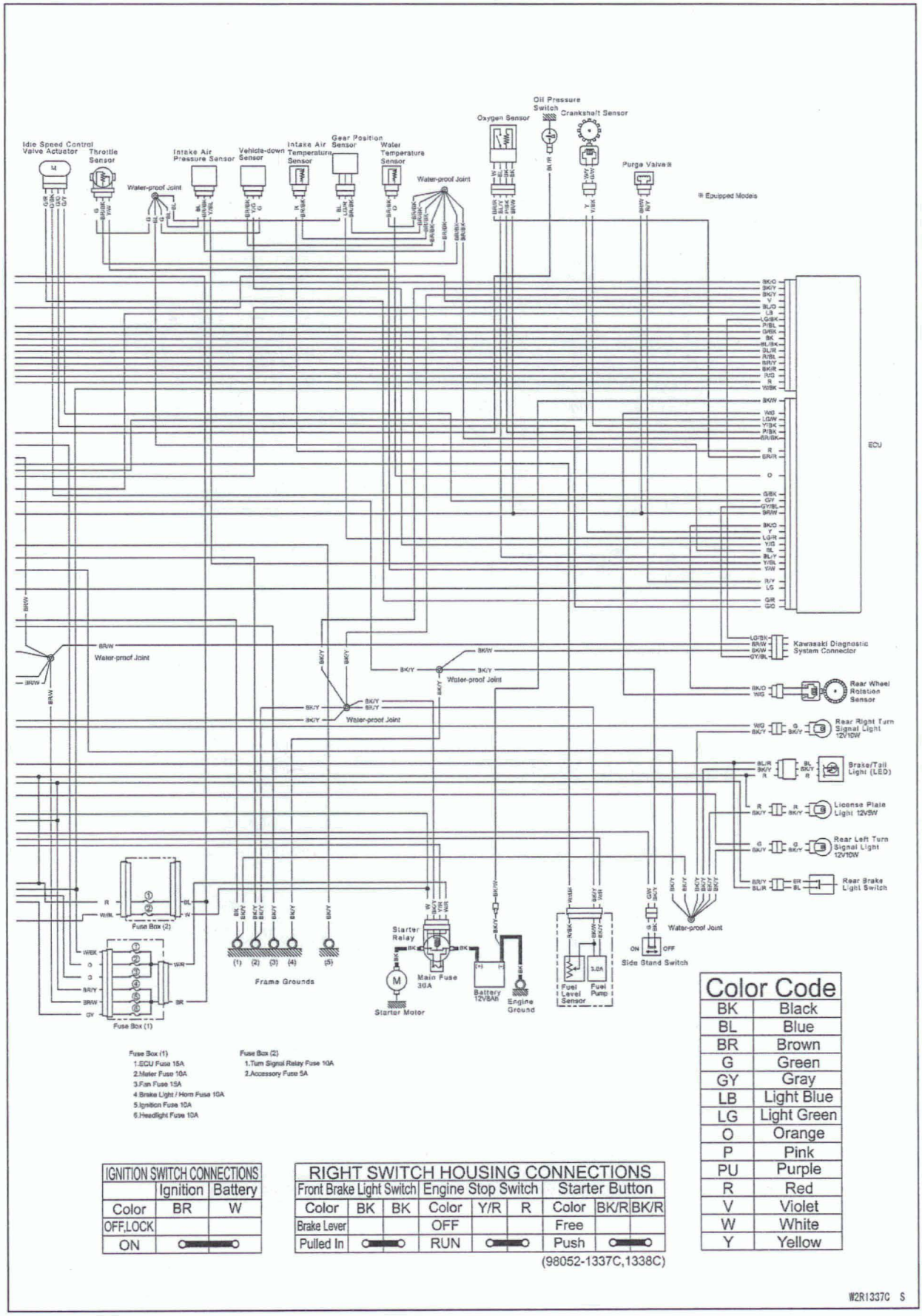
Wiring Diagram (EX400H)



LEFT SWITCH HOUSING CONNECTIONS														
Horn Button			Turn Signal Switch				Dimmer Switch			Starter Lockout Switch			Passing Button		
Color	BK/W	BK/Y	Color	G	O	GY	Color	R/BK	BL/Y	Color	BK/R	BK	Color	R/BK	BL/Y
Free			L	●			HI	●		Clutch Lever			Free		
Push	●		OFF(Push)							Released			Push	●	
			R		●					Pulled In	●				

W2L1337C S

Wiring Diagram (EX400H)



Fuse Box (1)
1.ECU Fuse 15A
2.Meter Fuse 10A
3.Fan Fuse 15A
4.Brake Light / Horn Fuse 10A
5.Ignition Fuse 10A
6.Headlight Fuse 10A

Fuse Box (2)
1.Turn Signal Relay Fuse 10A
2.Accessory Fuse 5A

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

IGNITION SWITCH CONNECTIONS		
	Ignition	Battery
Color	BR	W
OFF,LOCK		
ON	●	●

RIGHT SWITCH HOUSING CONNECTIONS								
Front Brake Light Switch			Engine Stop Switch			Starter Button		
Color	BK	BK	Color	Y/R	R	Color	BK/R	BK/R
Brake Lever			OFF			Free		
Pulled In	●	●	RUN	●	●	Push	●	●

(98052-1337C,1338C)

W2R1337C S

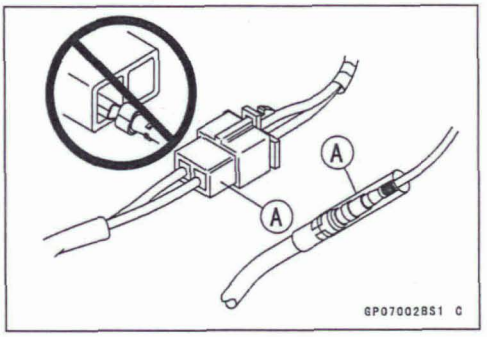
Precautions

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.

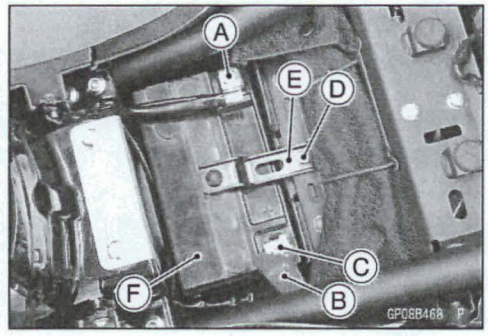
○Connect a tester between the ends of the leads.

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



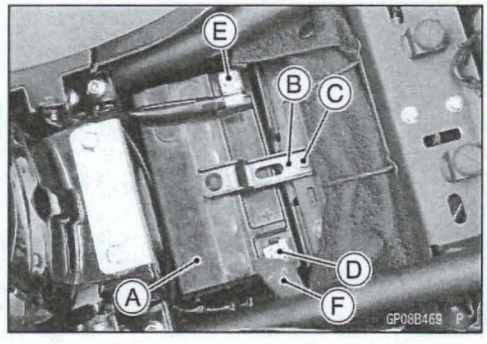
NOTICE

Be sure to disconnect the negative (–) cable first.

- Slide out the positive (+) terminal cap [B] and disconnect the positive (+) cable [C].
- Remove:
  Bolt [D]
  Bracket [E]
  Battery [F]

Battery Installation

- Turn the ignition switch off.
- Put the battery [A] into the battery case.
- Install the bracket [B] and tighten the bolt [C] securely.
- Connect the positive (+) cable [D] first.
- Connect the negative (–) cable [E].
- Apply a light coat of grease on the battery terminals to prevent corrosion.
- Cover the (+) terminal with the red cap [F].
- Install the removed parts (see appropriate chapters).



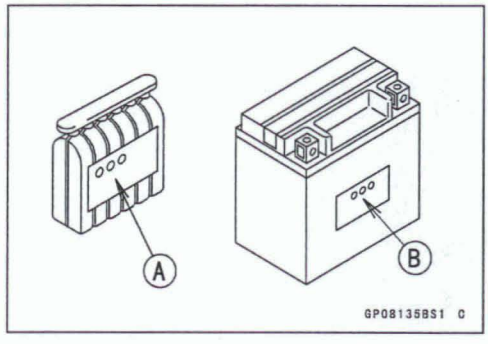
Battery Activation

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

EX400G/H/J: FTX9-BS



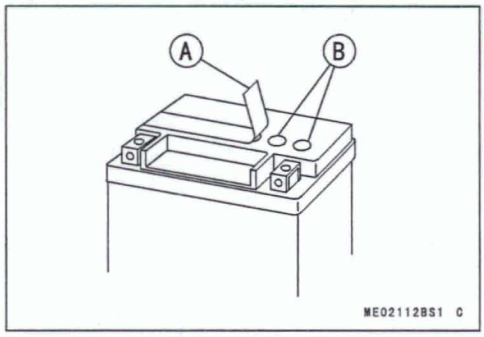
NOTICE

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

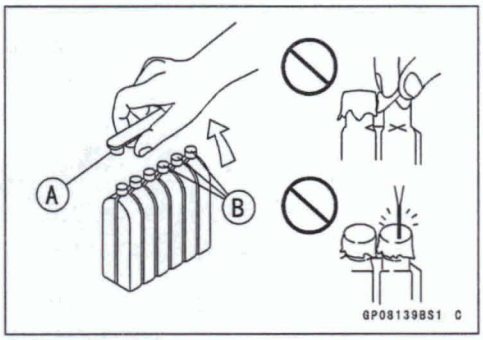
Sulfuric acid in battery electrolyte can cause severe burns. To prevent burns, wear protective clothing and safety glasses when handling electrolyte. If the electrolyte comes in contact with your skin or eyes, wash the area with liberal amounts of water and seek medical attention for more severe burns.

- 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.*

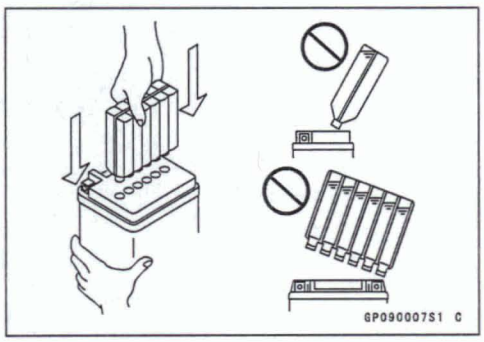
- Remove the electrolyte container from the vinyl bag.
- Detach the strip of caps [A] from the container and set aside, these will be used later to seal the battery.



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.



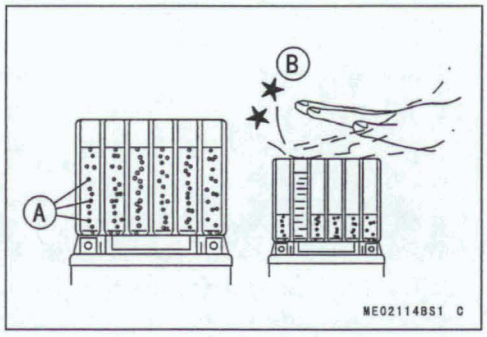
NOTE

○*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

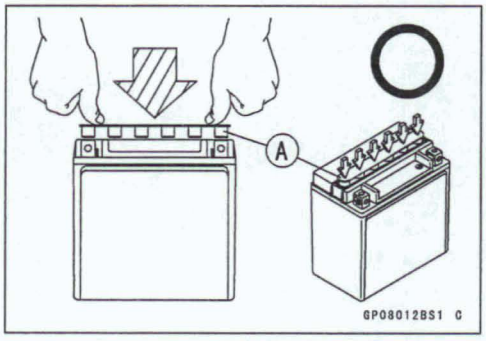
○*Be careful not to have the battery fall down.*

- 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.

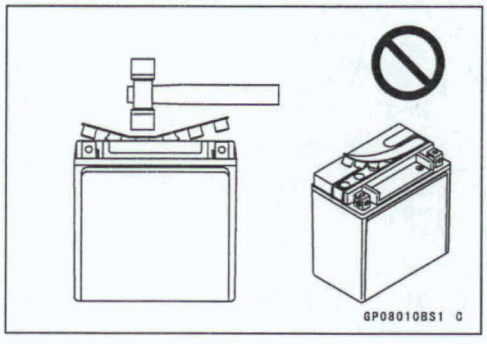


NOTICE

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 12.6 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 12.6 V repeat the charging cycle and load test. If still below 12.6 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

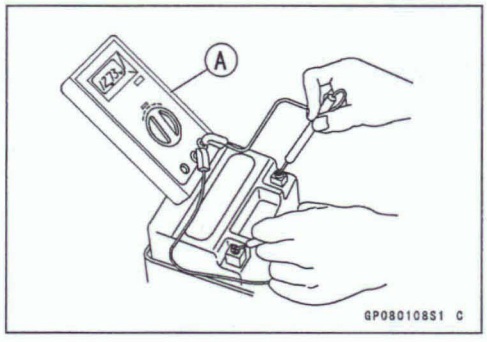
A sealed battery can fully display its performance only when combined with a proper vehicle electric system. Therefore, replace a sealed battery only on a motorcycle which was originally equipped with a sealed battery.

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.

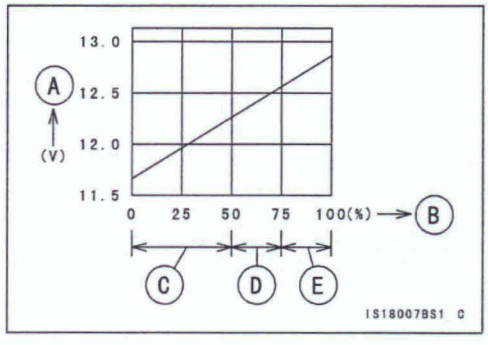


NOTE

○*Measure with a digital voltmeter which can be read one decimal place voltage.*

★If the reading is 12.6 V or more, no refresh charge is required, however, if the read is below the specified, refresh charge is required.

Battery Terminal Voltage
Standard: 12.6 V or more



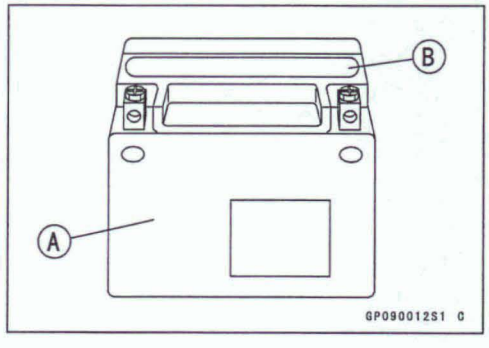
Terminal Voltage (V) [A]
Battery Charge Rate (%) [B]
Refresh charge is required [C]
Note [D]
Good [E]

Refreshing Charge

- Remove the battery [A] (see Battery Removal).
- Do refresh charge by following method according to the battery terminal voltage.

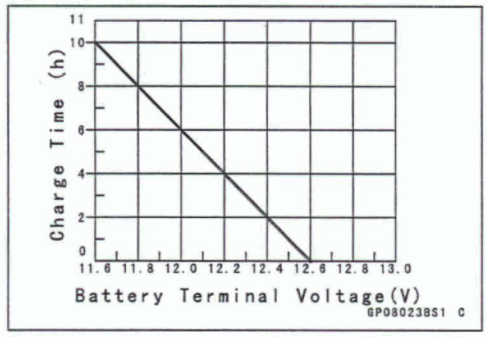
⚠ WARNING

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 12.6 V
Standard Charge: 0.9 A × 5 ~ 10 h (see following chart)
Quick Charge: 4 A × 1 h

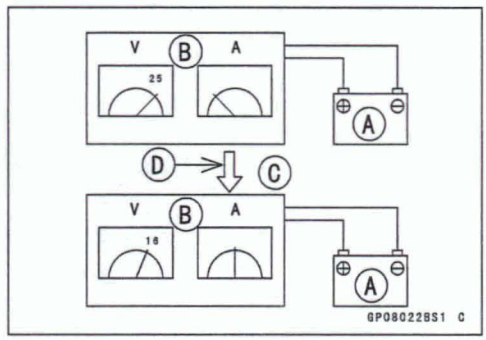


NOTICE
If possible, do not quick charge. If quick charge is done unavoidably, do standard charge later on.

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]

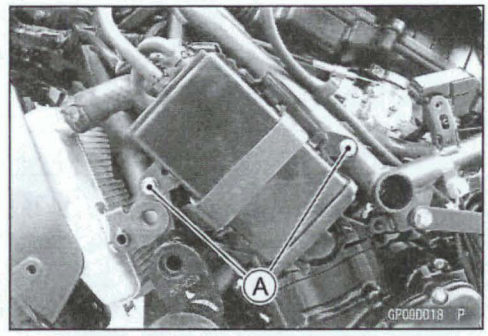
• Determine the battery condition after refresh charge.
○Determine the condition of the battery left for 30 minutes after completion of the charge by measuring the terminal voltage according to the table below.

Criteria	Judgement
12.6 V or higher	Good
12.0 ~ lower than 12.6 V	Charge insufficient → Recharge
lower than 12.0 V	Unserviceable → Replace

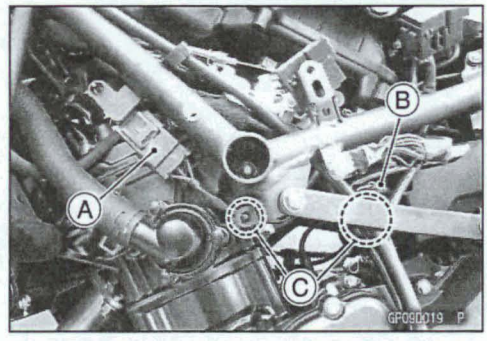
Charging System

Alternator Cover Removal

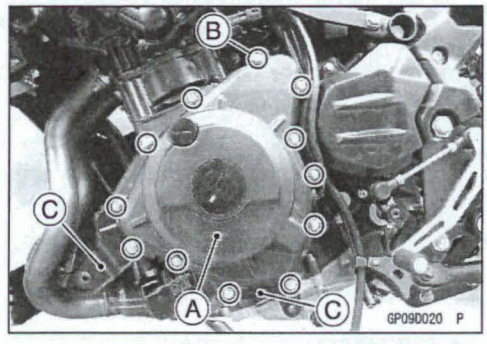
- Drain:
  Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
- Remove:
  Battery Case Cover (see Battery Case Cover Removal in the Frame chapter)
  Canister Bracket Bolts [A] (Equipped Models)



- Disconnect the alternator lead connector [A] and crankshaft sensor lead connector [B].
- Clear each lead [C].



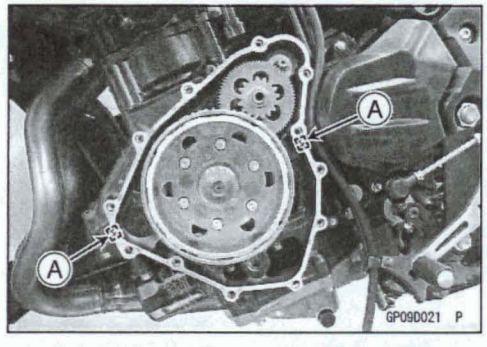
- Place a suitable container under the alternator cover [A].
- Remove:
  Alternator Cover Bolts [B]
  Brackets [C]
  Alternator Cover
  Gasket
  Dowel Pins



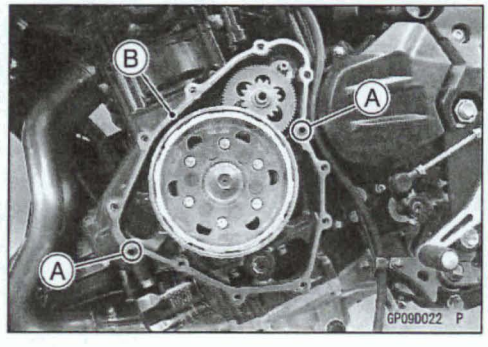
Alternator Cover Installation

- 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



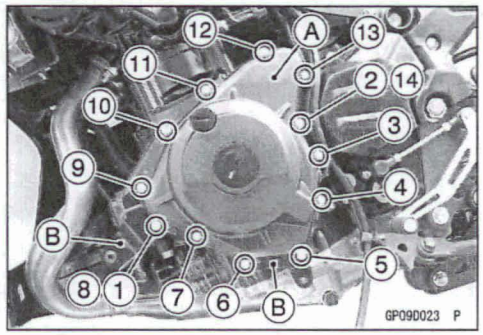
- Replace the alternator cover gasket with a new one.
- Install the dowel pins [A] and new gasket [B] on the crankcase.



Charging System

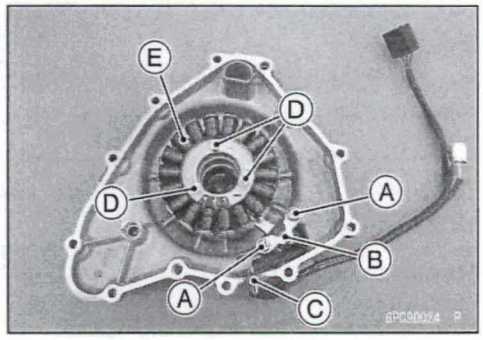
- Install the alternator cover [A] and brackets [B].
- Tighten the alternator cover bolts following the specified tightening sequence [1 ~ 14].
  L = 35 mm (1.4 in.) [1, 2]
  L = 28 mm (1.1 in.) [except 1,2]

  Torque - Alternator Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)
- Run the leads 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)
  Crankshaft Sensor Screws [A]
  Crankshaft Sensor [B]
  Lead Grommet [C]
  Stator Coil Bolts [D]
  Stator Coil [E]



Stator Coil Installation

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

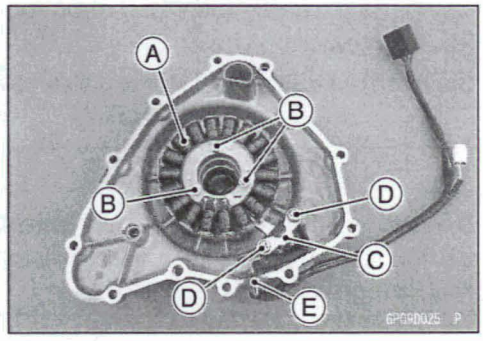
  Torque - Stator Coil Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)
- Install the crankshaft sensor [C].

○When installing the sensor which is fastened by screws, tighten the screws after placing the sensor on the bottom surface completely.

- Apply a non-permanent locking agent to the threads of the crankshaft sensor screws [D] and tighten them.

  Torque - Crankshaft Sensor Screws: 5.2 N·m (0.53 kgf·m, 46 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 [E], and fit the grommet into the notch of the cover securely.

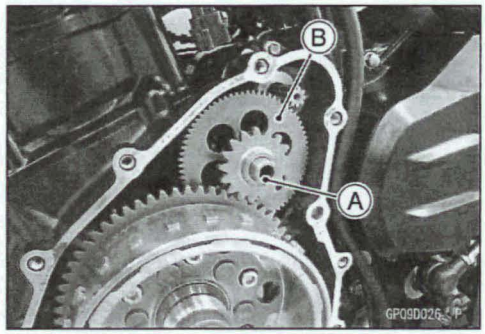
  Sealant - Liquid Gasket, TB1211F: 92104-0004
- Install the alternator cover (see Alternator Cover Installation).



Charging System

Alternator Rotor Removal

- Remove:
  Alternator Cover (see Alternator Cover Removal)
  Shaft [A]
  Starter Idle Gear [B]

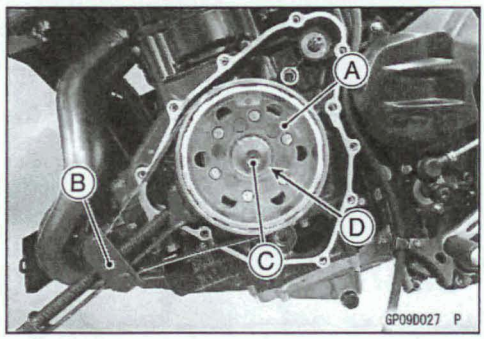


- Hold the alternator rotor [A] firmly with the flywheel holder [B].

  Special Tool - Flywheel Holder: 57001-1313

NOTICE
Do not hold the alternator rotor using the projections at outside of the rotor.

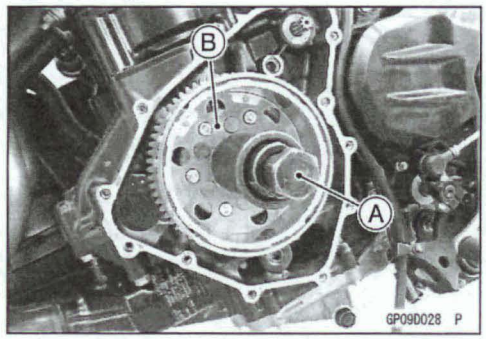
- Remove the rotor bolt [C] and washer [D].



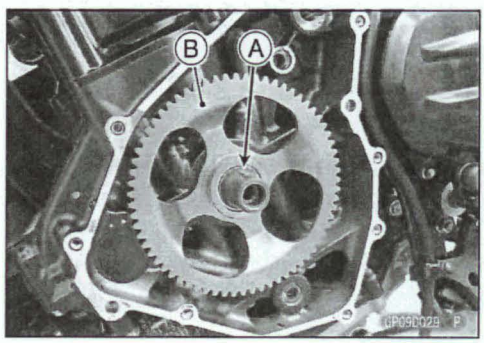
- Using the flywheel puller [A], remove the alternator rotor [B] from the crankshaft.

  Special Tool - Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5: 57001-1405

NOTICE
Do not attempt to strike the alternator rotor itself. Striking the rotor can cause the magnets to lose their magnetism.

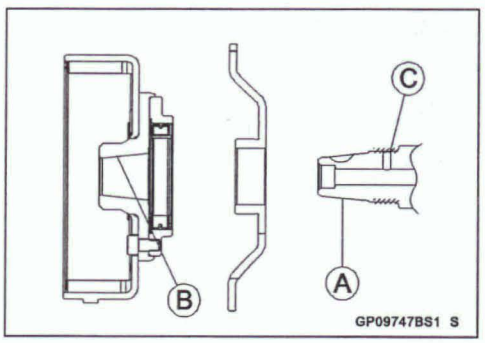


- Remove:
  Woodruff Key [A]
  Starter Clutch Gear [B]



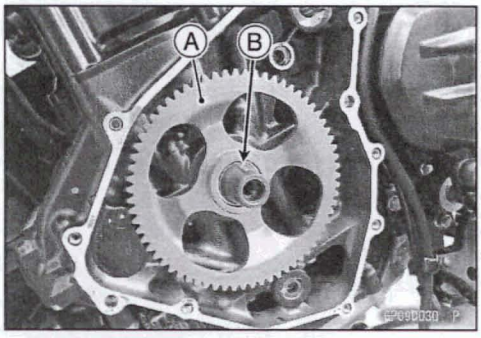
Alternator Rotor Installation

- Using a cleaning fluid, clean off any oil or dirt on the following portions and dry them with a clean cloth.
  Crankshaft Tapered Portion [A]
  Alternator Rotor Tapered Portion [B]
- Apply a thin coat of molybdenum disulfide grease to the crankshaft [C].

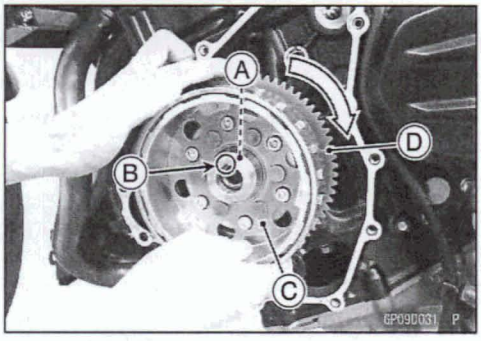


Charging System

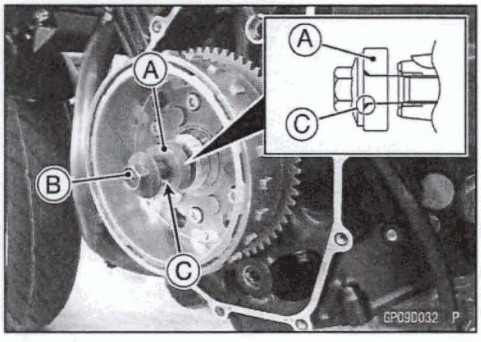
- Install the starter clutch gear [A].
- Again, clean the crankshaft tapered portion and dry there.
- Fit the woodruff key [B] securely in the slot in the crankshaft before installing the alternator rotor.



- Align the woodruff key [A] on the crankshaft with the key way [B] in the alternator rotor [C].
- Install the alternator rotor while turning the starter clutch gear [D] clockwise until it engaged into the starter clutch case.



- Using a cleaning fluid, clean off any oil or dirt on the following areas and dry them with a clean cloth.
  Both Sides of the Washer [A]
  Threads and Seating Area of the Alternator Rotor Bolt [B]
  Threads in the Crankshaft End
- Apply molybdenum disulfide oil solution to the threads of the alternator rotor bolt and both sides of the washer.
- Install the washer with its chamfer [C] side facing out.
- Install the rotor bolt and tighten it lightly.



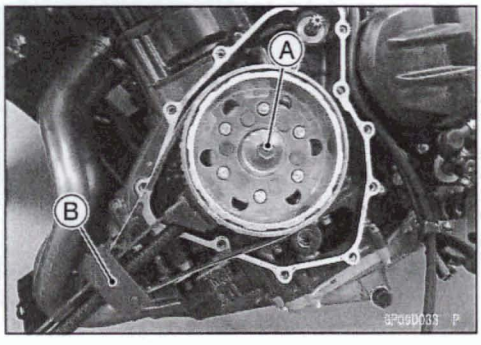
NOTICE
To avoid damaging the components by improperly fitting, make sure that the starter clutch gear turns clockwise freely with the rotor bolt tightened lightly. If the starter clutch gear becomes binding or turns hardly, reinstall it.

NOTE

○*Confirm the alternator rotor fit or not to the crankshaft before tightening it with specified torque.*

- Tighten the rotor bolt [A] with 55 N·m (5.6 kgf·m, 41 ft·lb) of torque.

Special Tool - Flywheel Holder [B]: 57001-1313

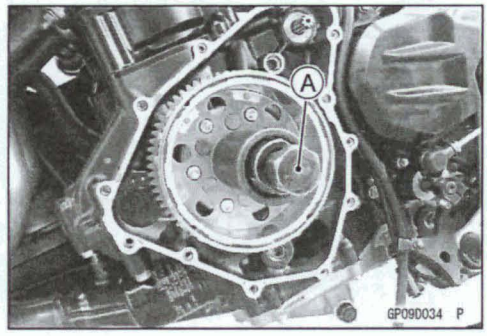


NOTICE
Do not hold the alternator rotor using the projections at outside of the rotor.

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: 57001-1405



★If the rotor is not pulled out with 20 N·m (2.0 kgf·m, 15 ft·lb) of drawing torque, it is installed correctly.

★If the rotor is pulled out with under 20 N·m (2.0 kgf·m, 15 ft·lb) of drawing torque, clean off any oil dirt or flaw of the crankshaft and rotor tapered portion, and dry them with a clean cloth. Then, confirm that it is not pulled out with above torque.

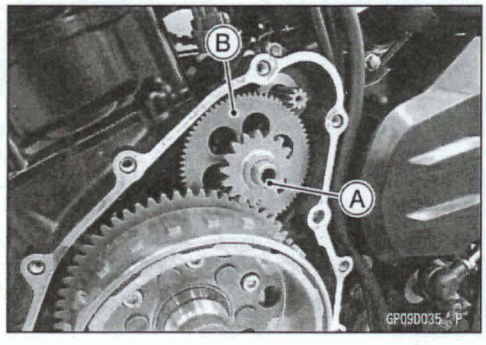
- Tighten the alternator rotor bolt while holding the alternator rotor firmly with the flywheel holder.

Special Tool - Flywheel Holder: 57001-1313

NOTICE
Do not hold the alternator rotor using the projections at outside of the rotor.

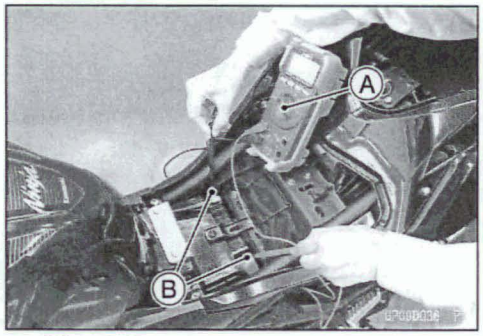
Torque - Alternator Rotor Bolt: 80 N·m (8.2 kgf·m, 59 ft·lb)

- Apply a thin coat of molybdenum disulfide grease to the shaft [A], and install it and starter idle gear [B].
- Install the alternator cover (see Alternator Cover Installation).



Charging System

Charging Voltage Inspection



- Check the battery condition (see Charging Condition Inspection).
- Warm up the engine to obtain actual alternator operating conditions.
- Remove the front seat (see Front Seat Removal in the Frame chapter).
- Check that the ignition switch is turned off, and connect a tester [A] to the battery terminals [B].
- Start the engine, and note the voltage readings at various engine speeds (except idling engine speed) with the headlight turned on and then turned off (To turn off the headlight, disconnect the headlight connector 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 14.5 ~ 14.9 V

- Turn off the ignition switch to stop the engine, and disconnect a tester.

★If the charging voltage is kept between the values given in the table, the charging system is considered to be working normally.

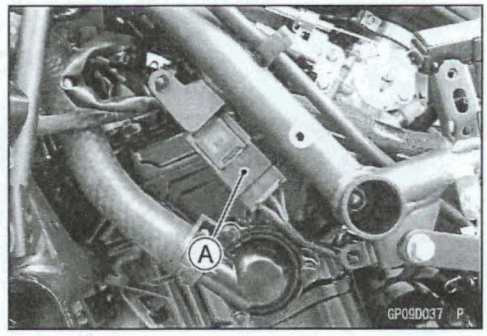
★If the charging voltage is much higher than the values specified in the table, the regulator/rectifier is defective or the regulator/rectifier leads are loose or open.

★If the charging voltage does not rise as the engine speed increases, then the regulator/rectifier is defective or the alternator output is insufficient for the loads. Check the alternator and regulator/rectifier to determine which part is defective.

Alternator Inspection

There are three types of alternator failures: short, open (wire burned out), or loss in rotor magnetism. A short or open in one of the coil wires will result in either a low output, or no output at all. A loss in rotor magnetism, which may be caused by dropping or hitting the alternator, by leaving it near an electromagnetic field, or just by aging, will result in low output.

Charging System



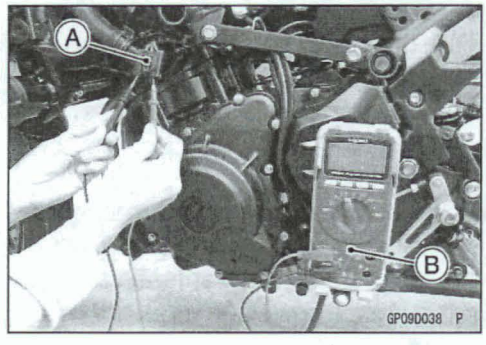
- To check the alternator output voltage, do the following procedures.

○Turn the ignition switch off.
○Remove the left middle fairing (see Middle Fairing Removal in the Frame chapter).
○Remove the canister bracket bolts (equipped models).
○Disconnect the alternator lead connector [A].
○Connect a tester as shown in the table 1.
○Start the engine.
○Run it at the rpm given in the table 1.
○Note the voltage readings (total 3 measurements).

Table 1 Alternator Output Voltage @4 000 r/min (rpm)

Connections		Reading
Tester (+) to	Tester (–) to	
One Black Lead	Another Black Lead	AC 54 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.
○Disconnect the alternator lead connector [A].
○Connect a tester [B] as shown in the table 2.
○Note the readings (total 3 measurements).

Table 2 Stator Coil Resistance @23°C (73°F)

Connections		Reading
Tester (+) to	Tester (–) to	
One Black Lead	Another Black Lead	0.05 ~ 0.6 Ω

- When measuring the resistance, use a tester that can measure the standard value.

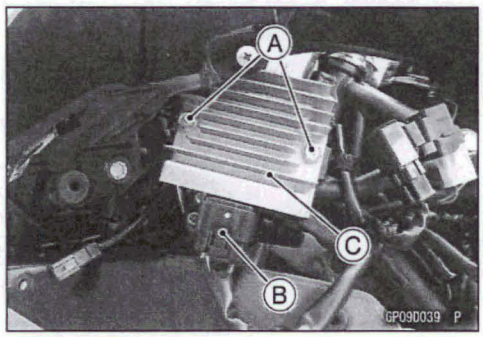
★If there is more resistance than shown in the table, or no tester reading (infinity) for any two leads, the stator has an open lead and must be replaced. Much less than this resistance means the stator is shorted, and must be replaced.

- Measure the resistance between each of the black lead 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 Middle Fairing (see Middle Fairing Removal in the Frame chapter)
  Regulator/Rectifier Bolts [A]
- Disconnect the connector [B] and remove the regulator/rectifier [C].

Regulator/Rectifier Installation

- Installation is the reverse of removal.
- Tighten:

Torque - Regulator/Rectifier Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Install the removed parts (see appropriate chapters).

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

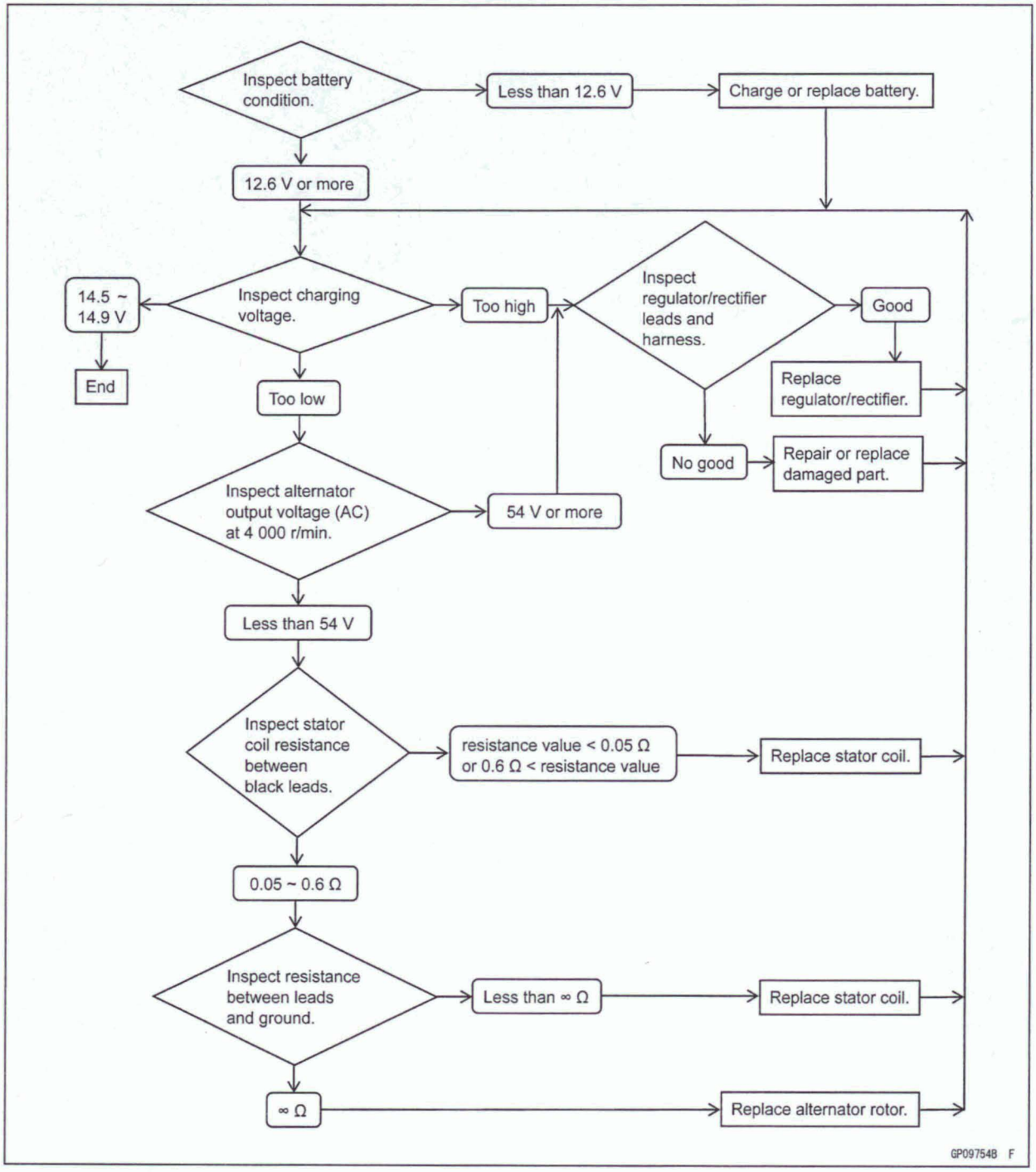
○*Even when the charging system is working properly, the battery may discharge if the motorcycle is equipped with too many accessories.*

- 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

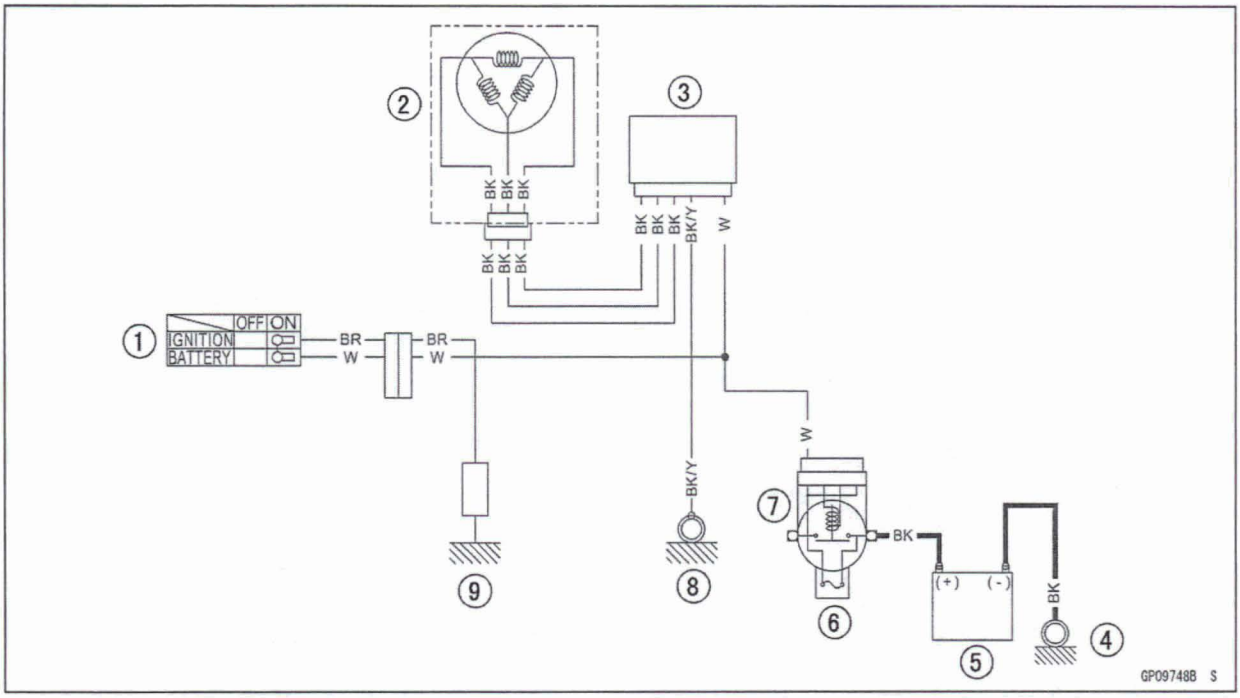
- Recharge the battery if it is discharged.

Charging System



Charging System

Charging System Circuit



1. Ignition Switch
2. Alternator
3. Regulator/Rectifier
4. Engine Ground
5. Battery
6. Main Fuse 30 A
7. Starter Relay
8. Frame Ground (3)
9. Load

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

- Refer to the Stator Coil Removal.

Crankshaft Sensor Installation

- Refer to the Stator Coil Installation.

Crankshaft Sensor Inspection

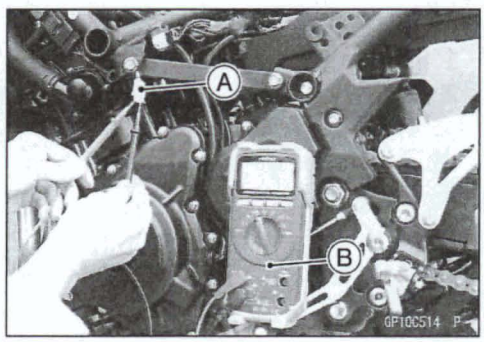
- Remove:
  Battery Case Cover (see Battery Case Cover Removal in the Frame chapter)
- Disconnect the crankshaft sensor lead connector [A].
- Using a tester [B], measure resistance between the white/yellow lead and green/white lead terminals in the connector.

Crankshaft Sensor Resistance:
180 ~ 280 Ω @23°C (73°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.

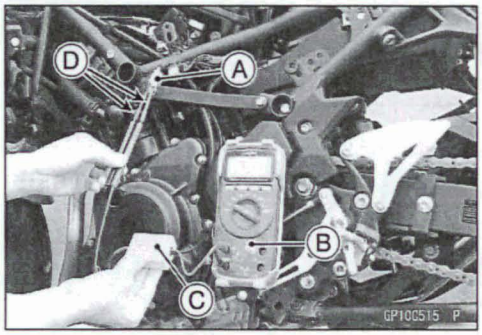
- Using the highest resistance range of the tester, measure the resistance between the crankshaft sensor leads and chassis ground.

★Any tester reading less than infinity (∞) indicates a short, necessitating replacement of the crankshaft sensor and stator coil as an assembly.



Ignition System

Crankshaft Sensor Peak Voltage Inspection



NOTE

○*Be sure the battery is fully charged.*

- Remove:
  Battery Case Cover (see Battery Case Cover Removal in the Frame chapter)
- Disconnect the crankshaft sensor lead connector [A].
- Using a tester [B] and peak voltage adapter [C], measure crankshaft sensor peak voltage at the connector.

Special Tools - Peak Voltage Adapter: 57001-1415
Type: KEK-54-9-B
Needle Adapter Set [D]: 57001-1874

Connections:

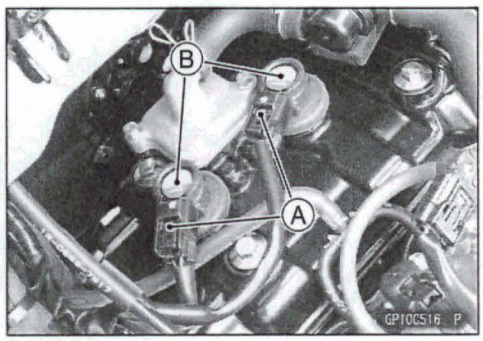
Crankshaft Sensor Lead		Peak Voltage Adapter		Tester
White/Yellow	←	Red	→	(+)
Green/White	←	Black	→	(–)

- Temporarily install the battery (see Battery Installation).
- Turn the ignition switch and engine stop switch on.
- Pushing the starter button, turn the engine 4 ~ 5 seconds with the transmission gear in neutral to measure the crankshaft sensor peak voltage.
- Repeat the measurement 5 or more times.

Crankshaft Sensor Peak Voltage
Standard: 5.4 V or more

★If the tester reading is not specified one, inspect the crankshaft sensor (see Crankshaft Sensor Inspection).

Stick Coil Removal



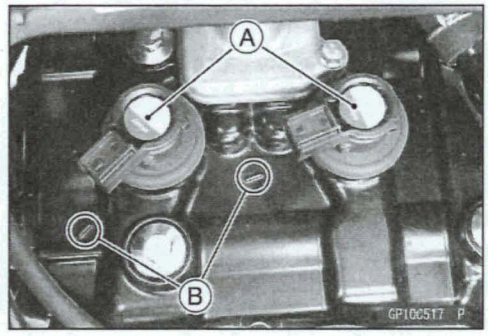
NOTICE
Never drop the stick coils especially on a hard surface. Such a shock to the stick coils can damage it.

- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal in the Fuel System (DFI) chapter)
- Disconnect the stick coil connectors [A].
- Pull the stick coils [B] off the spark plugs.

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

Ignition System

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).

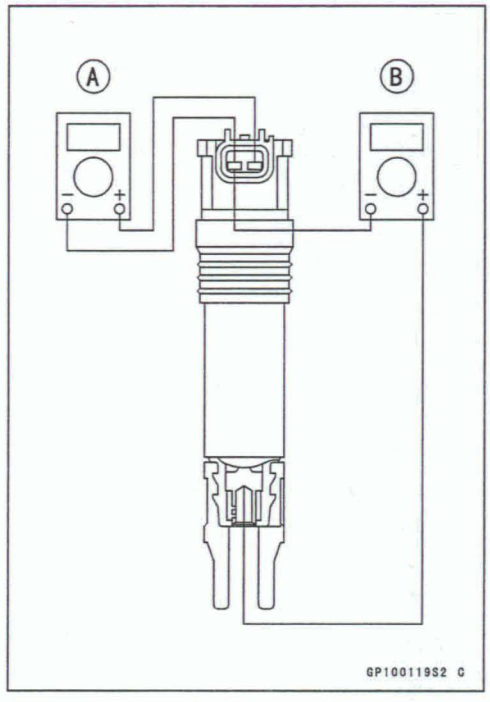
Stick Coil Inspection

- 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:	**1.11 ~ 1.50 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.

Ignition System

Stick Coil Primary Peak Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

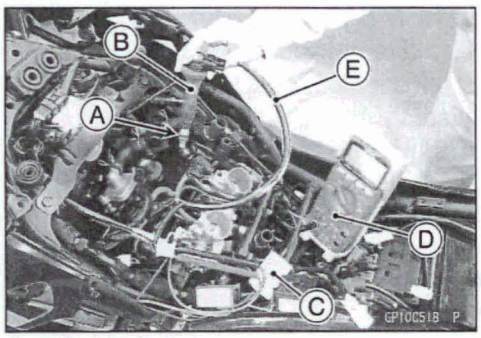
- Remove the stick coils (see Stick Coil Removal), but do not remove the spark plugs.
- Measure the primary peak voltage as follows.

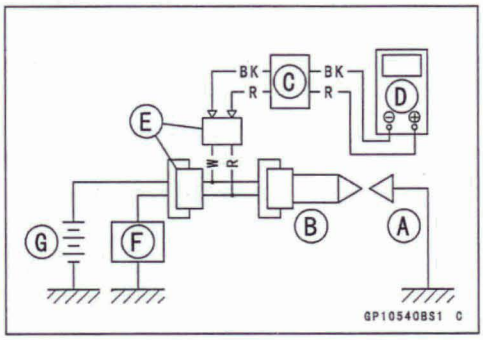
○Install the new spark plug [A] into each stick coil [B], and ground them onto the engine.
○Connect the peak voltage adapter [C] into a tester [D].
○Connect the adapter to the lead wire-peak voltage adapter [E] which is connected between the stick coil connector and stick coil.

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 (R)
Adapter (BK, –) to lead wire-peak voltage adapter (W)





⚠ WARNING

To avoid extremely high voltage shocks, do not touch the spark plugs or tester connections.

- Turn the ignition switch and engine stop switch on.
- Pushing the starter button, turn the engine 4 ~ 5 seconds with the transmission gear in neutral to measure the primary peak voltage.
- Repeat the measurements 5 times for one stick coil.

Stick Coil Primary Peak Voltage
Standard: 118 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

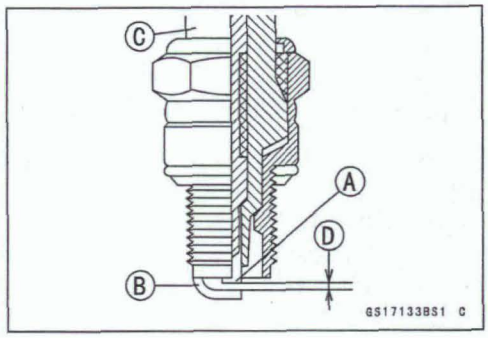
- Refer to the Spark Plug Replacement in the Periodic Maintenance chapter.

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: 0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)

- Use the standard spark plug or its equivalent.

Spark Plug: NGK LMAR9G

Interlock Operation Inspection

- Raise the rear wheel off the ground using the stand (see Rear Wheel Removal in the Wheels/Tires chapter).
- 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.
★If their parts are normality, replace the ECU.

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, gear position sensor, side stand switch and relay box.
★If their parts are normality, replace the ECU.

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 → Pulled in

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

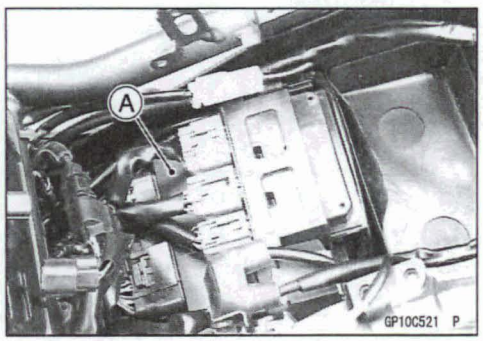
○The IC igniter is built in the ECU [A].

- Refer to the following items.

Interlock Operation Inspection (see Interlock Operation Inspection)

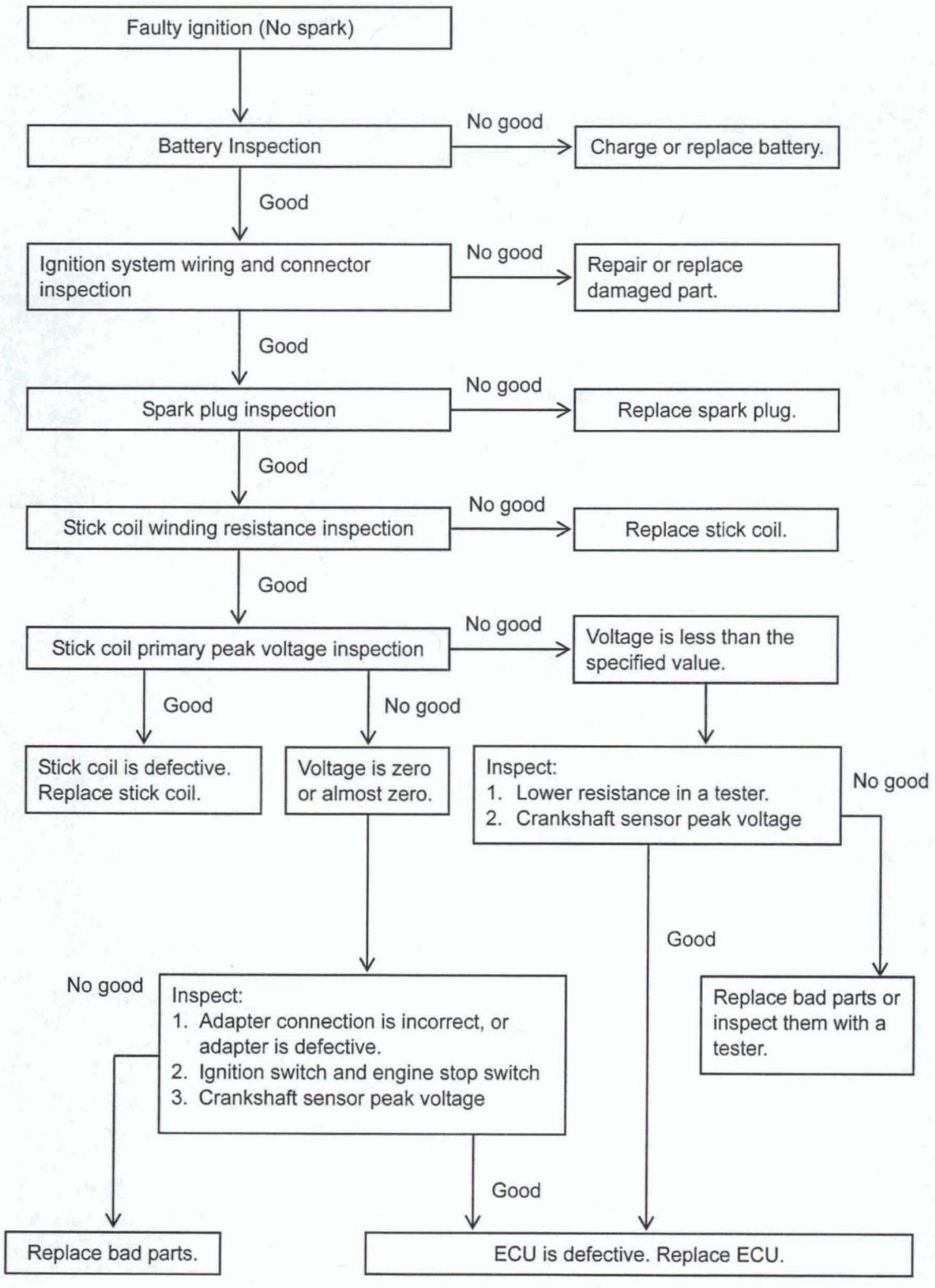
Ignition System Troubleshooting (see Ignition System section)

ECU Power Supply Inspection (see ECU Power Supply Inspection in the Fuel System (DFI) chapter)



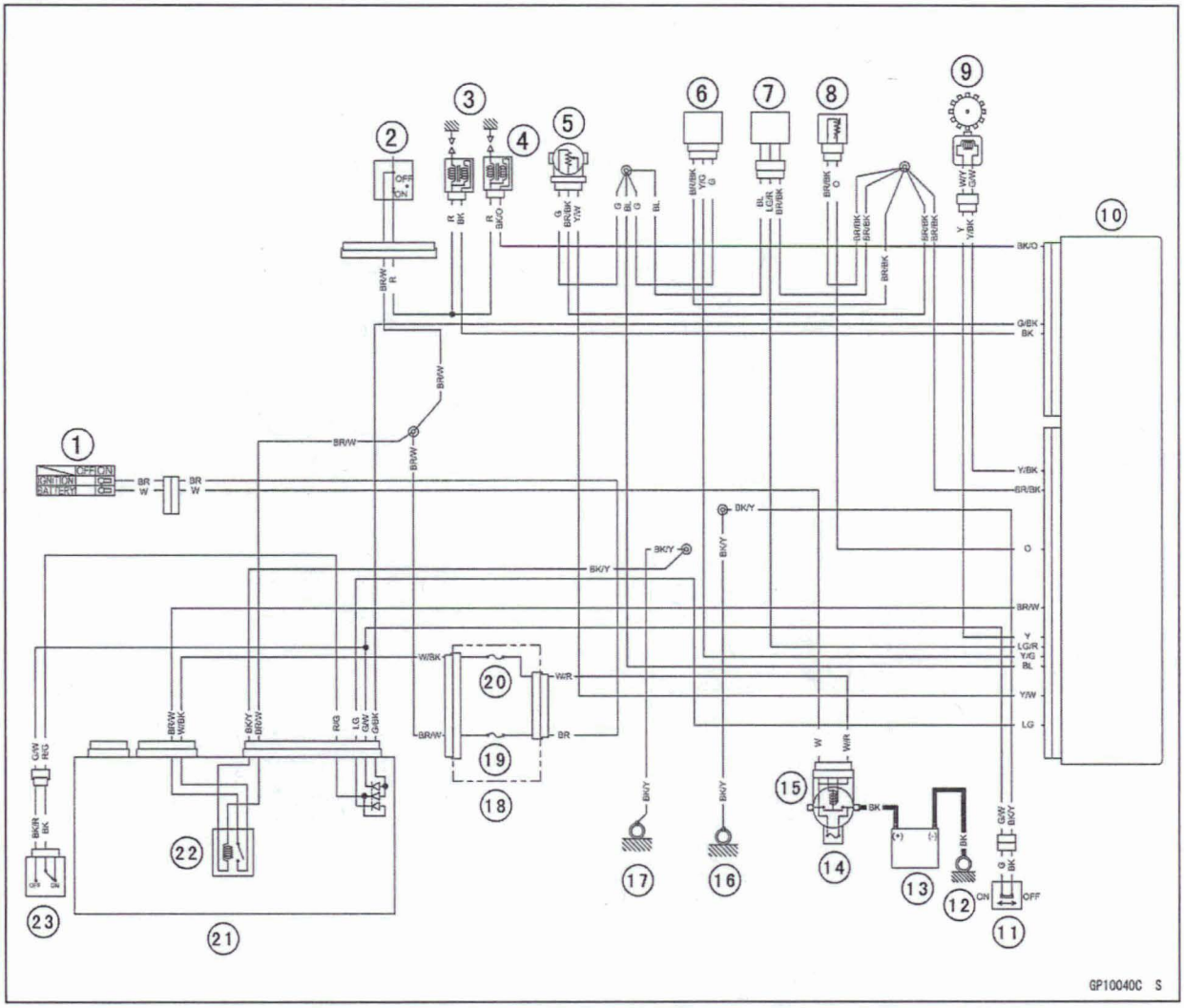
Ignition System

Ignition System Troubleshooting



Ignition System

Ignition System Circuit



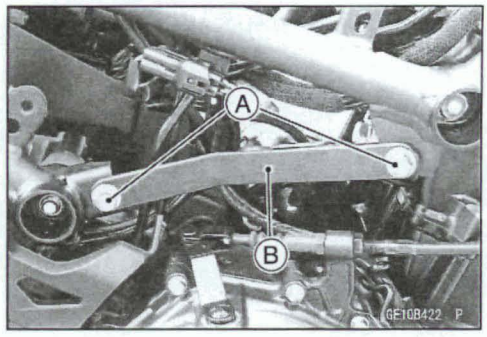
1. Ignition Switch
2. Engine Stop Switch
3. Spark Plugs
4. Stick Coils
5. Throttle Sensor
6. Vehicle-down Sensor
7. Gear Position Sensor
8. Water Temperature Sensor
9. Crankshaft Sensor
10. ECU
11. Side Stand Switch
12. Engine Ground
13. Battery
14. Main Fuse 30 A
15. Starter Relay
16. Frame Ground (4)
17. Frame Ground (2)
18. Fuse Box (1)
19. Ignition Fuse 10 A
20. ECU Fuse 15 A
21. Relay Box
22. ECU Main Relay
23. Starter Lockout Switch

Electric Starter System

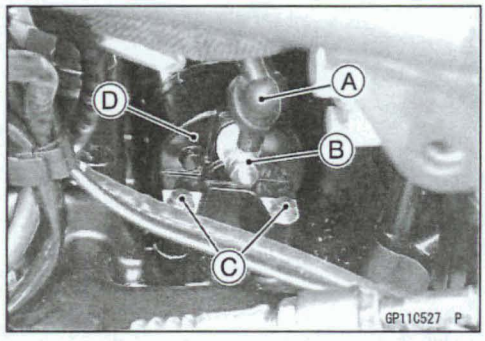
Starter Motor Removal

NOTICE

Do not tap the starter motor shaft or body. Tapping the shaft or body could damage the motor.



- Remove:
  Right Middle Fairing (see Middle Fairing Removal in the Frame chapter)
  Frame Bracket Bolts [A]
  Right Frame Bracket [B]

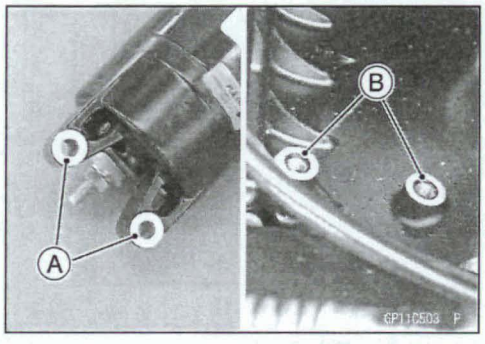


- Slide back the rubber cap [A] and remove the starter motor cable terminal nut [B].
- Remove:
  Starter Motor Mounting Bolts [C]
  Starter Motor [D]

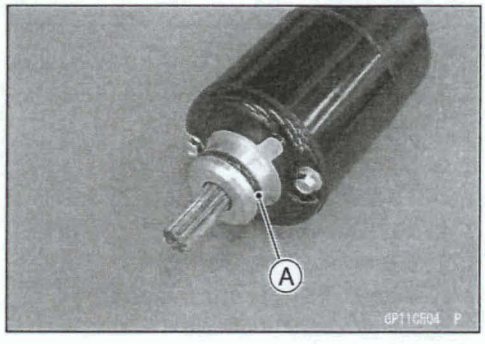
Starter Motor Installation

NOTICE

Do not tap the starter motor shaft or body. Tapping the shaft or body could damage the motor.

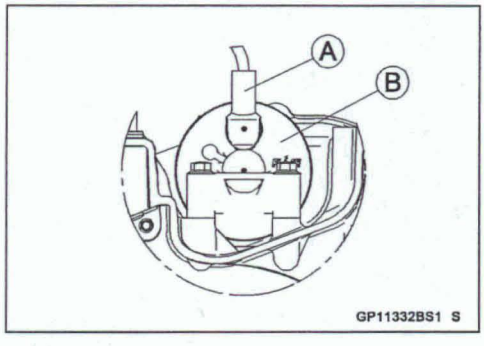


- When installing the starter motor, clean the starter motor legs [A] and crankcase [B] where the starter motor is grounded.



- Replace the O-ring [A] with a new one and apply grease to the O-ring.
- Install the starter motor on the crankcase and tighten the starter motor mounting bolts.

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



- Connect the starter motor cable [A] to the starter motor [B] as shown.
- Tighten:

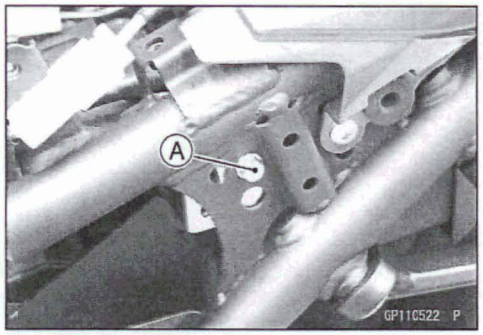
Torque - Starter Motor Cable Terminal Nut: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Slide the rubber cap to the original position.
- Install the removed parts (see appropriate chapters).

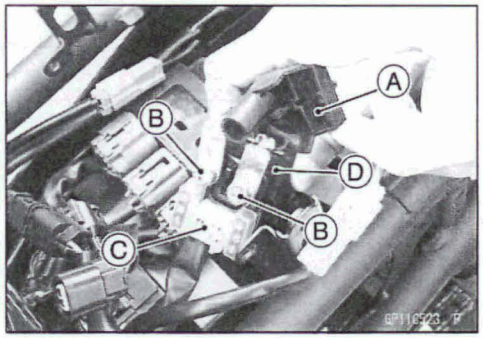
Electric Starter System

Starter Relay Inspection

- Remove:
  Battery Case Cover (see Battery Case Cover Removal in the Frame chapter)
  Bolt [A]



- Slide the dust cover [A] and remove the starter relay terminal bolts [B].
- Disconnect the connector [C].
- Remove the starter relay [D] from the bracket.

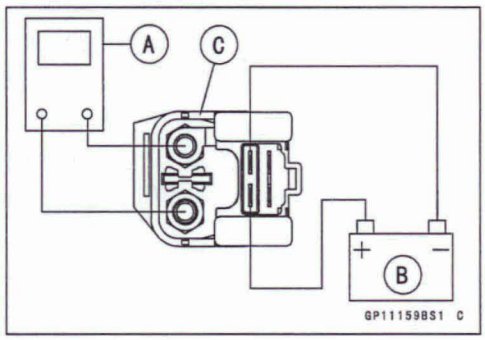


- Connect a tester [A] and 12 V battery [B] to the starter relay [C] as shown.

★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

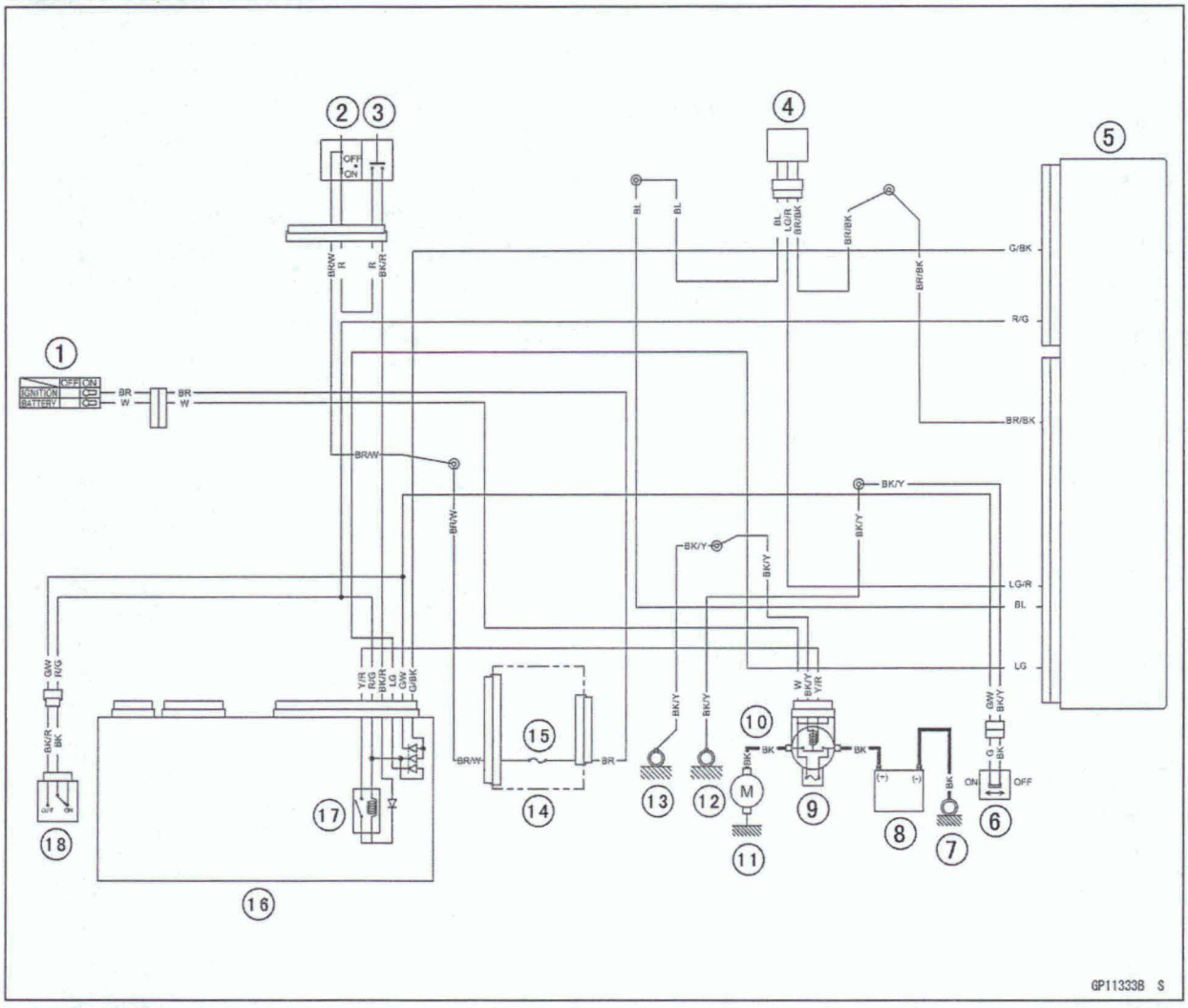


- Installation is the reverse of removal.
- Tighten:

Torque - Starter Relay Terminal Bolts: 3.6 N·m (0.37 kgf·m, 32 in·lb)

Electric Starter System

Electric Starter Circuit



1. Ignition Switch
2. Engine Stop Switch
3. Starter Button
4. Gear Position Sensor
5. ECU
6. Side Stand Switch
7. Engine Ground
8. Battery
9. Main Fuse 30 A
10. Starter Relay
11. Starter Motor
12. Frame Ground (4)
13. Frame Ground (2)
14. Fuse Box (1)
15. Ignition Fuse 10 A
16. Relay Box
17. Starter Circuit Relay
18. Starter Lockout Switch

Lighting System

This motorcycle adopt the daylight system and have a headlight circuit 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

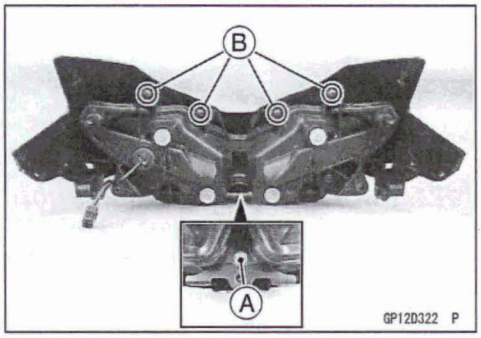
- Refer to the Headlight Aiming Inspection in the Periodic Maintenance chapter.

Headlight Beam Vertical Adjustment

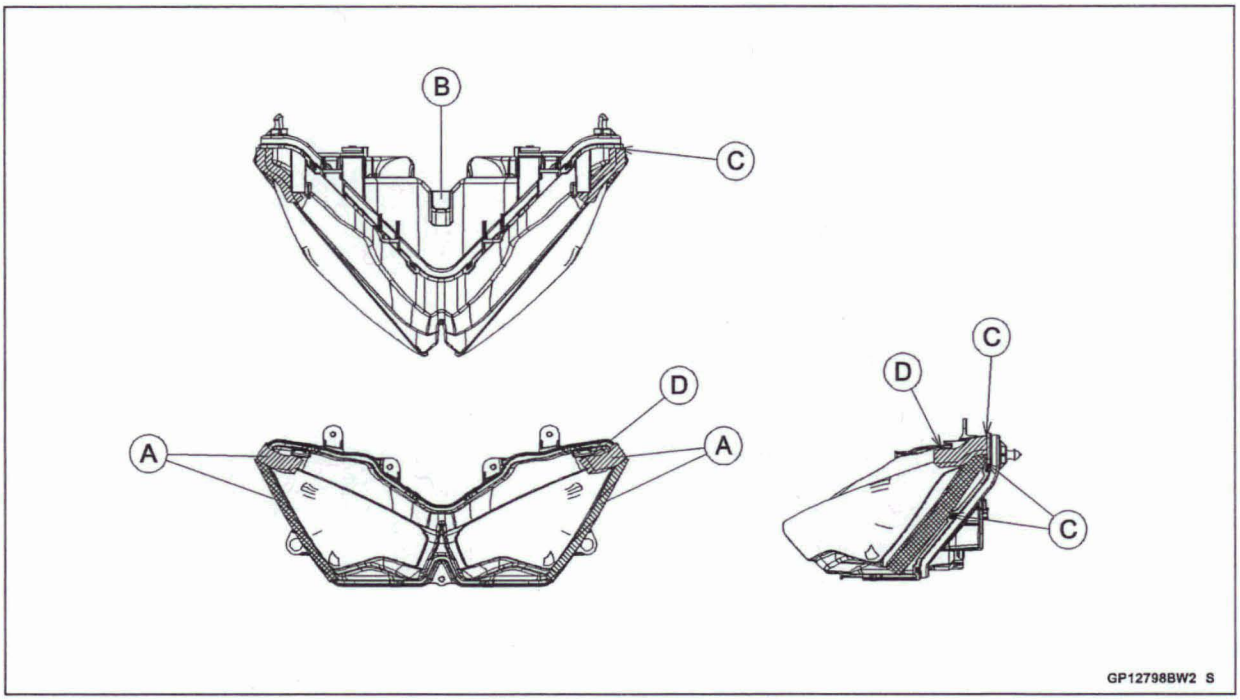
- Refer to the Headlight Aiming Inspection in the Periodic Maintenance chapter.

Headlight (LED) Assembly Removal/Installation

- Remove:
  Upper Fairing (see Upper Fairing Removal in the Frame chapter)
  Bolt [A]
  Screws [B]



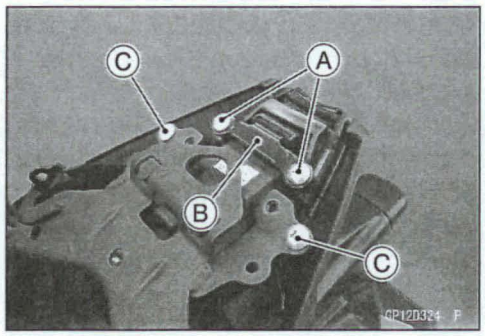
- Installation is the reverse of removal.
- When installing the pads [A], install them as shown.
  [B] Headlight
  [C] Fit the pads to the edge of the headlight.
  [D] Fit the pads under the rib of the headlight.



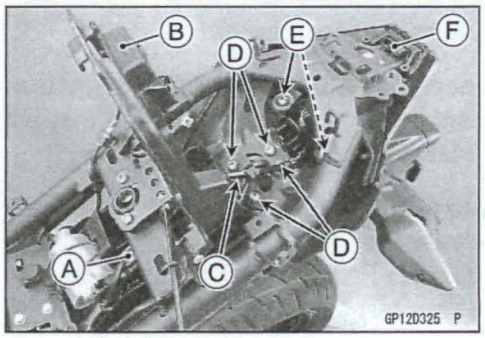
Lighting System

Brake/Tail Light (LED) Removal

- Remove:
  Seat Covers (see Seat Cover Removal in the Frame chapter)
  Screws [A]
  Bracket [B]
  Screws [C]

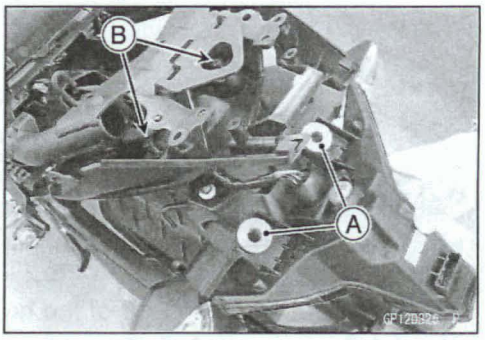


- Disconnect the brake/tail light lead connector [A].
- Lift up the compartment cover [B].
- Clear the brake/tail light lead [C].
- Remove the bolts [D].
- Remove the screws [E] and brake/tail light (LED) [F].

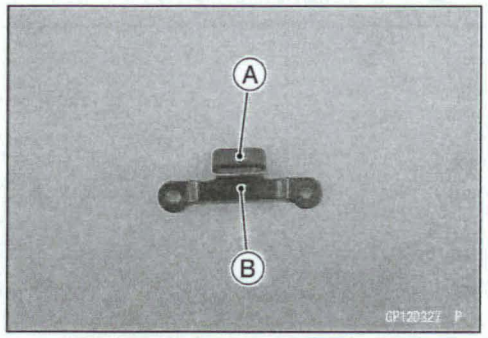


Brake/Tail Light (LED) Installation

- Installation is the reverse of removal.
- Fit the grommets [A] to the projections [B].

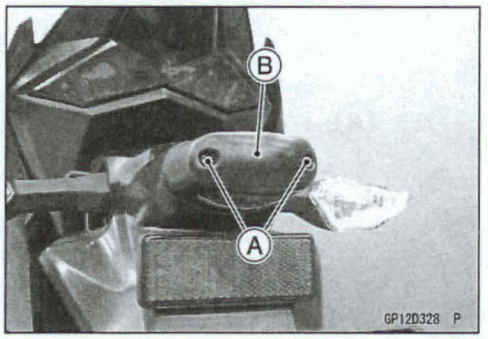


- Install the damper [A] to the bracket [B].



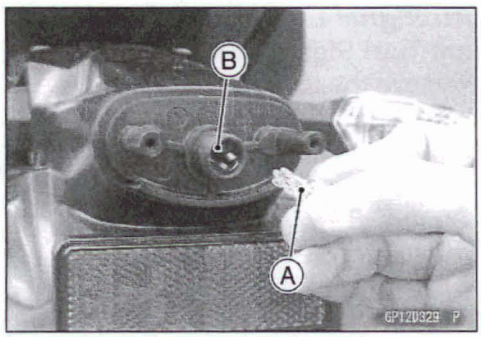
License Plate Light Bulb Replacement

- Remove:
  License Plate Light Cover Screws [A]
  License Plate Light Cover [B] and Lens



Lighting System

- Pull the bulb [A] out of the socket [B].

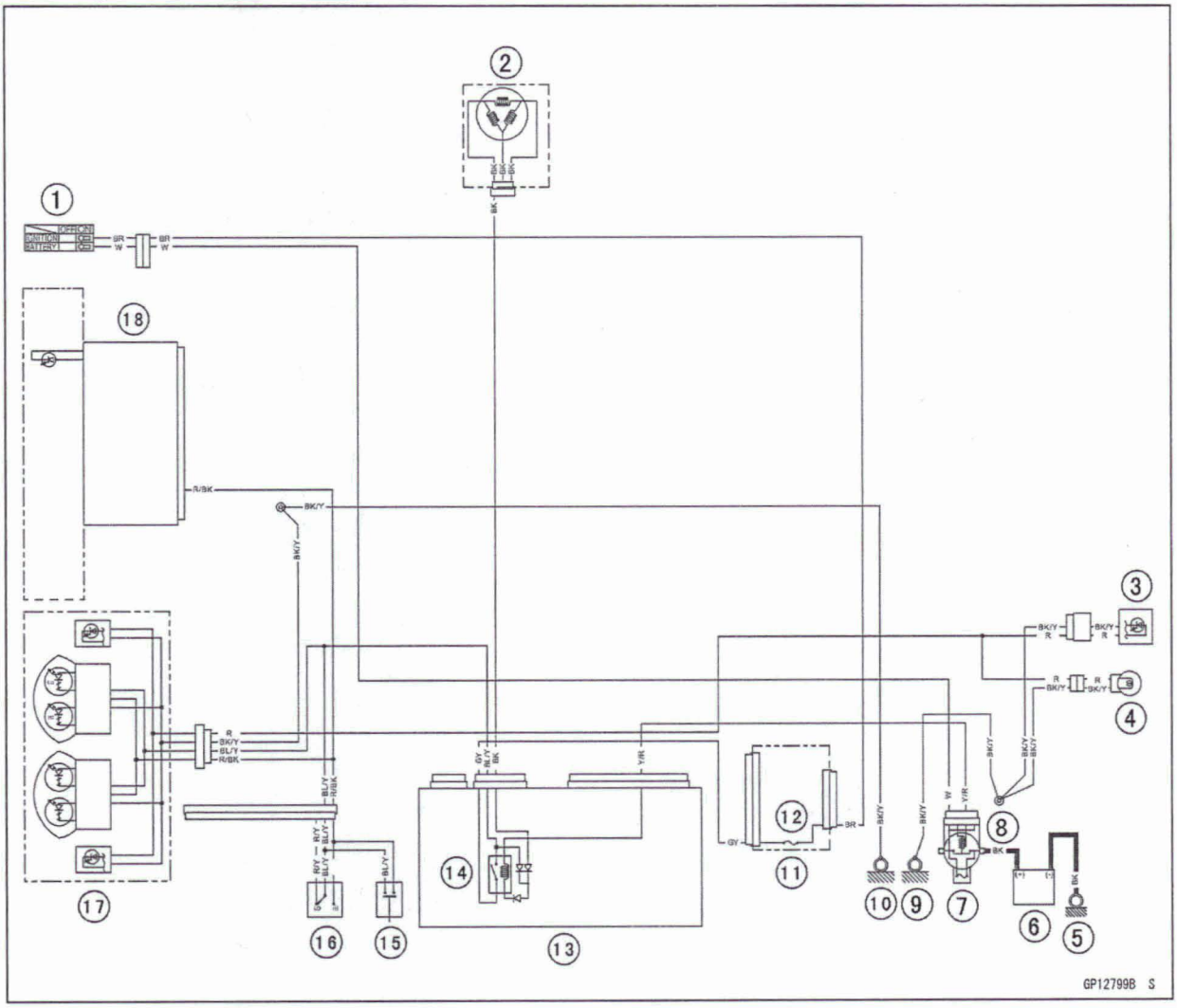


NOTICE

Do not turn the bulb. Pull the bulb out to prevent damage to the bulb. Do not use bulb rated for greater wattage then the specified value.

- Replace the bulb with a new one.
- Insert the bulb into the socket.
- Install the license plate light cover.
- Tighten the license plate light cover screws securely.

Headlight/Tail Light Circuit



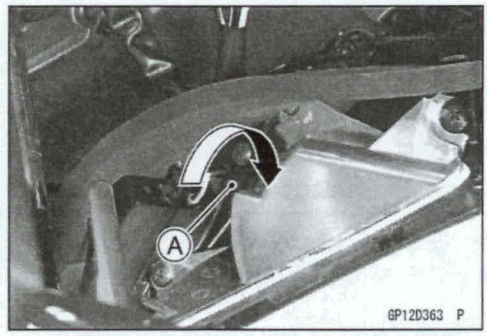
1. Ignition Switch
2. Alternator
3. Brake/Tail Light (LED)
4. License Plate Light 12 V 5 W
5. Engine Ground
6. Battery
7. Main Fuse 30 A
8. Starter Relay
9. Frame Ground (1)
10. Frame Ground (2)
11. Fuse Box (1)
12. Headlight Fuse 10 A
13. Relay Box
14. Headlight Circuit Relay
15. Passing Button
16. Dimmer Switch
17. Headlight (LED)
18. Meter Unit

Lighting System

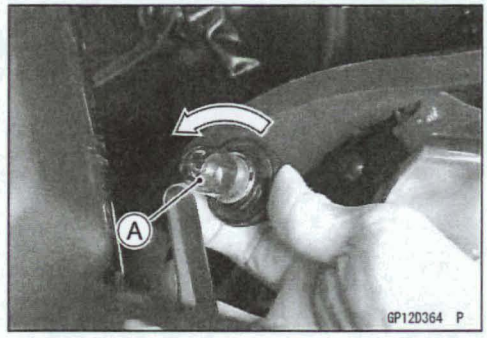
Turn Signal Light Bulb Replacement

Front Turn Signal Light

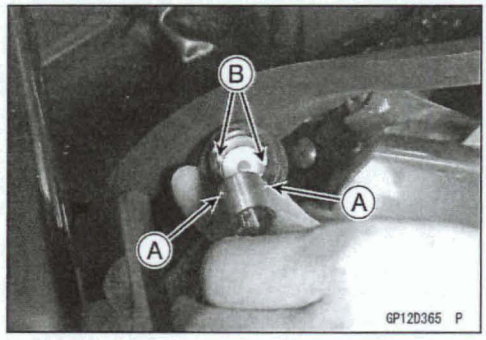
- Remove the lower inner fairing (see Lower Inner Fairing Removal in the Frame chapter).
- Turn the socket [A] counterclockwise and remove it.



- Push and turn the bulb [A] counterclockwise and remove it.



- Insert the new bulb by aligning its pins [A] with the grooves [B] in the socket.
- Push and turn the bulb clockwise.



- Fit the projections [A] of the socket to the grooves [B] of the turn signal light body.

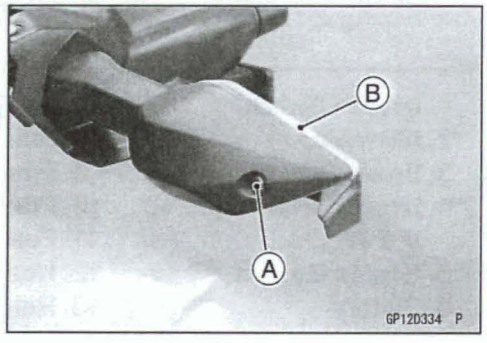
○In this photo, the middle fairing has been removed for clarity.

- Turn the socket clockwise.
- Install the lower inner fairing (see Lower Inner Fairing Installation in the Frame chapter).

Rear Turn Signal Light

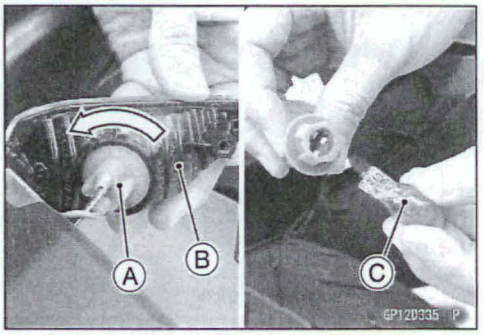
- Remove:

Turn Signal Light Lens Screw [A]
Turn Signal Light Lens Housing [B]



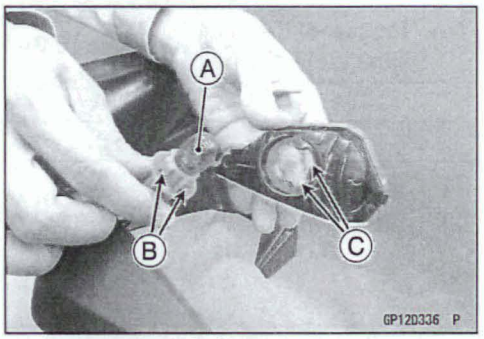
Lighting System

- Turn the socket [A] counterclockwise and remove it from the lens housing [B].
- Pull out the bulb [C] straight from the socket.



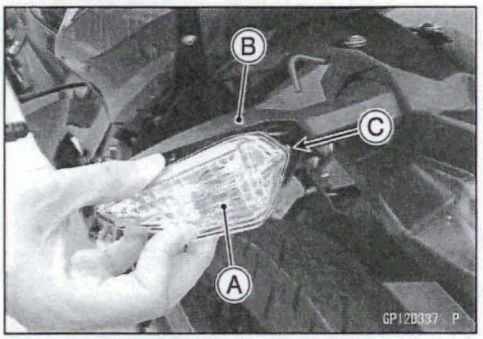
NOTICE
Do not turn the bulb. Pull the bulb out to prevent damage to the bulb. Do not use bulb rated for greater wattage then the specified value.

- Replace the bulb [A] with a new one.
- Insert the new bulb into the socket.
- Insert the socket by aligning its tabs [B] with the cutouts [C] of the lens housing.
- Turn the socket clockwise until it stops.



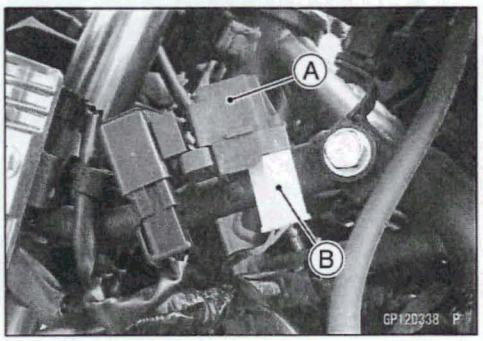
- Fit the lens housing [A] to the light case [B] by inserting the projection [C] on the lens housing to the inside of the light case.
- Tighten:

Torque - Turn Signal Light Lens Screw: 1.0 N·m (0.10 kgf·m, 8.9 in·lb)



Turn Signal Relay Inspection

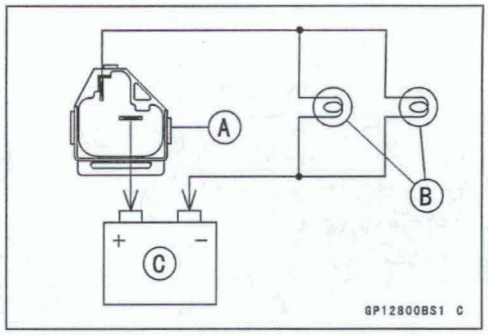
- Remove:
  Left Middle Fairing (see Middle Fairing Removal in the Frame chapter)
  Turn Signal Relay [A]
- Disconnect the turn signal relay connector [B].



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.



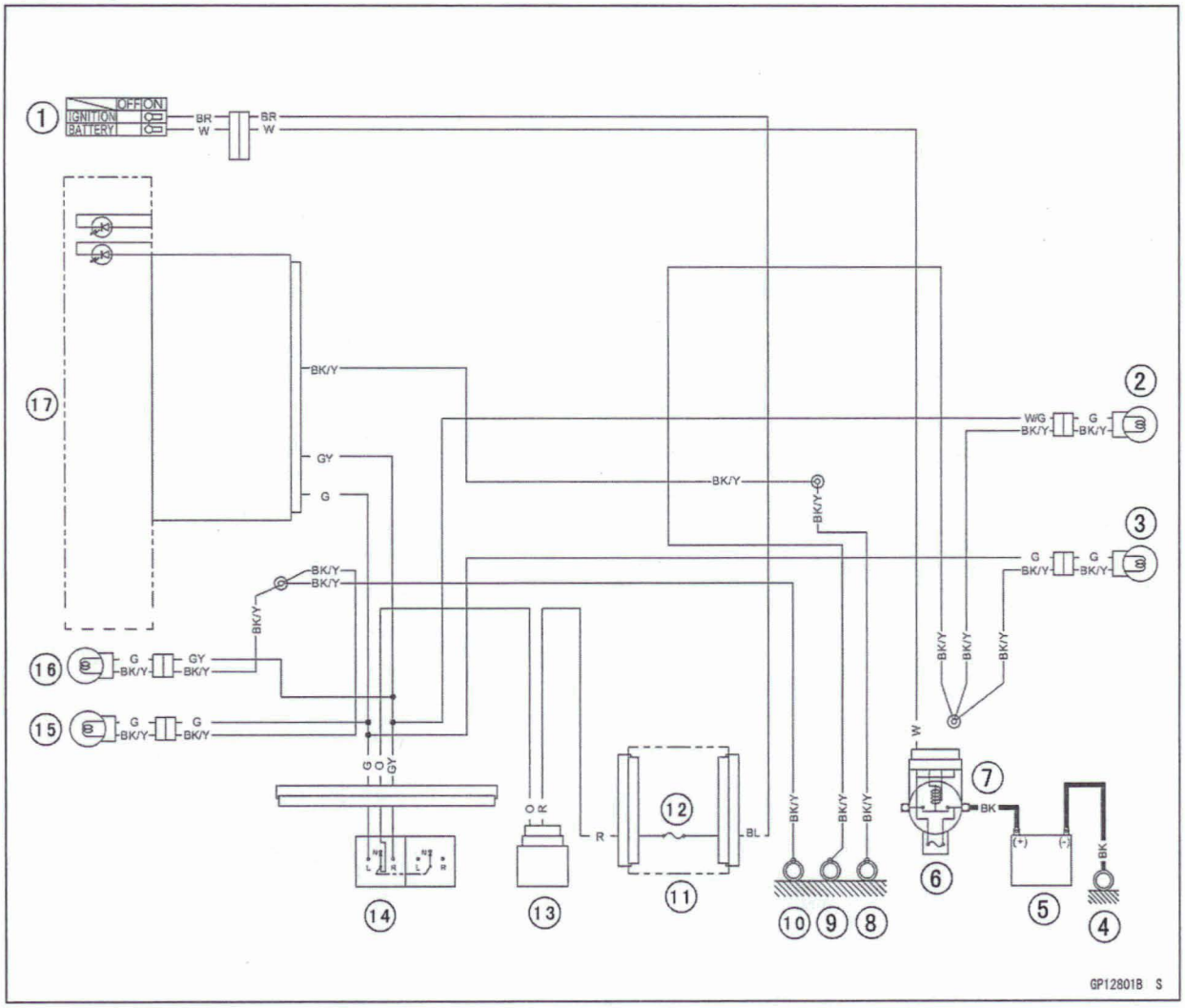
Testing Turn Signal Relay

Load		Blinking Times (c/m*)
The Number of Turn Signal Lights	Wattage (W)	
1**	10	140 or more
2	20	60 ~ 120

(*): Cycle(s) per minute
(**): Correspond to "one light burned out."

Lighting System

Turn Signal Light Circuit



1. Ignition Switch
2. Rear Right Turn Signal Light 12 V 10 W
3. Rear Left Turn Signal Light 12 V 10 W
4. Engine Ground
5. Battery
6. Main Fuse 30 A
7. Starter Relay
8. Frame Ground (4)
9. Frame Ground (1)
10. Frame Ground (2)
11. Fuse Box (2)
12. Turn Signal Relay Fuse 10 A
13. Turn Signal Relay
14. Turn Signal Switch
15. Front Left Turn Signal Light 12 V 10 W
16. Front Right Turn Signal Light 12 V 10 W
17. Meter Unit

Air Switching Valve

Air Switching Valve Operation Test

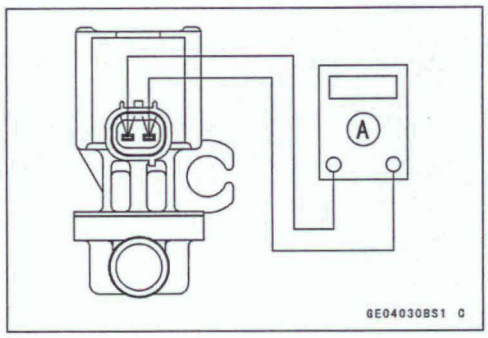
- Refer to the Air Suction System Damage Inspection in the Periodic Maintenance chapter.

Air Switching Valve Unit Test

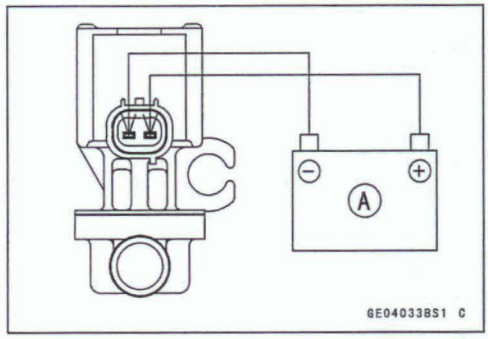
- Remove the air switching valve (see Air Switching Valve Removal in the Engine Top End chapter).
- Connect a digital meter [A] to the air switching valve terminals as shown.

Air Switching Valve Resistance
Standard: 20 ~ 24 Ω @20°C (68°F)

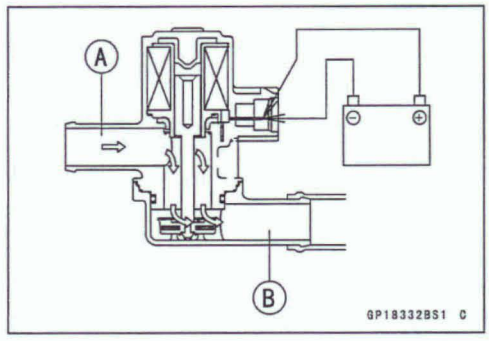
★If the digital meter does not read as specified value, replace it with a new one.



- 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 duct [B].

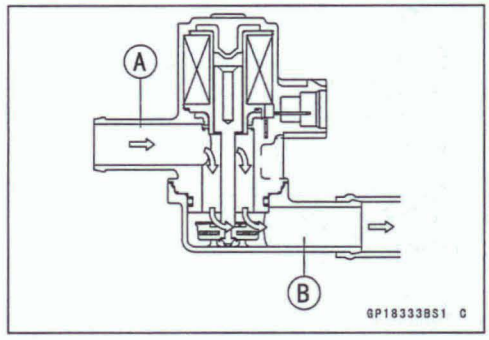


- Disconnect the 12 V battery.
- Blow the air to the intake air duct [A] again, and make sure flow the blown air from the outlet air duct [B].

★If the air switching valve does not operate as described, replace it with a new one.

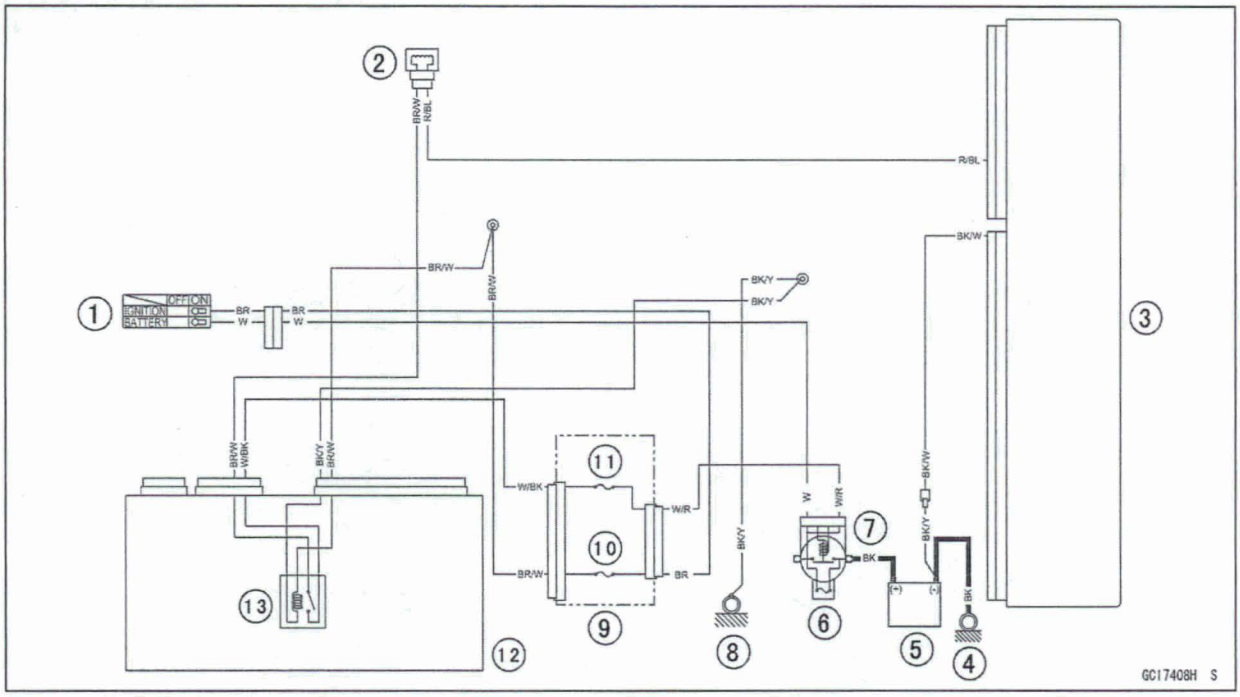
NOTE

○*To check air flow through the air switching valve, just blow through the air switching valve hose (intake side).*



Air Switching Valve

Air Switching Valve Circuit



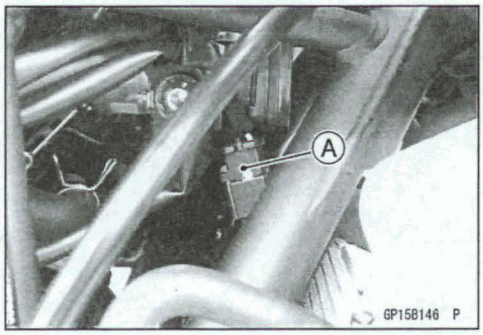
1. Ignition Switch
2. Air Switching Valve
3. ECU
4. Engine Ground
5. Battery
6. Main Fuse 30 A
7. Starter Relay
8. Frame Ground (2)
9. Fuse Box (1)
10. Ignition Fuse 10 A
11. ECU Fuse 15 A
12. Relay Box
13. ECU Main Relay

Radiator Fan System

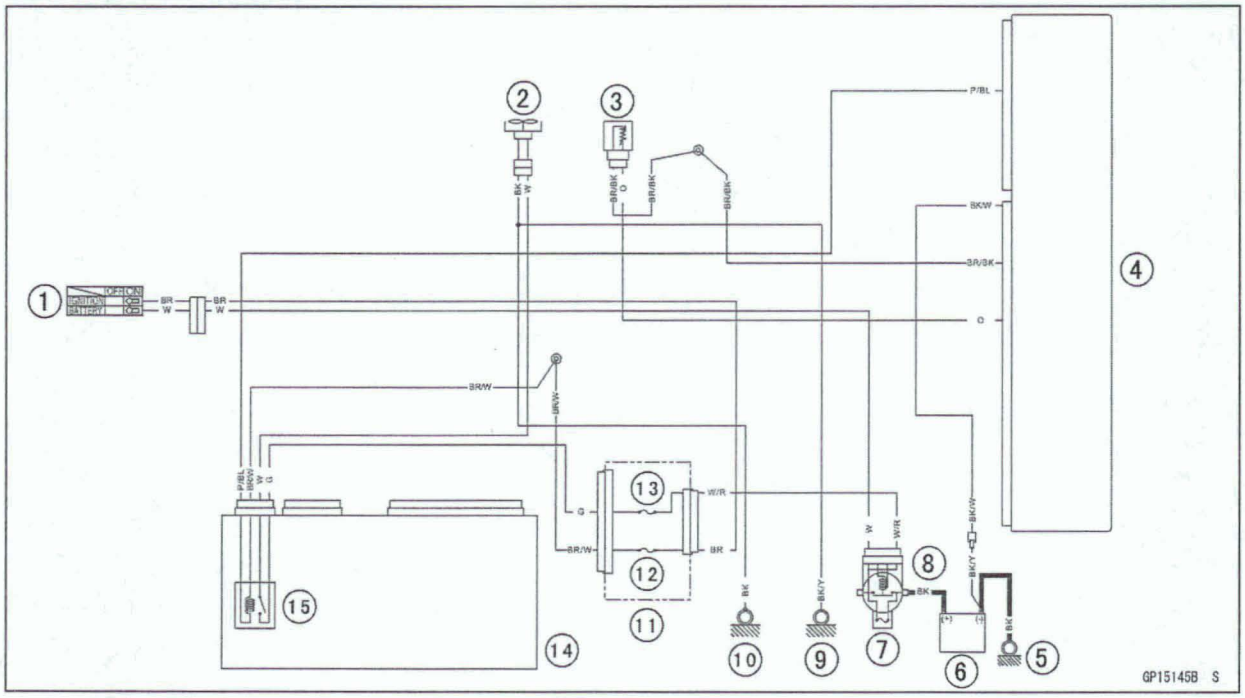
Fan Motor Inspection

- Remove the right middle fairing (see Middle Fairing Removal in the Frame chapter).
- Disconnect the connector [A].
- Using an auxiliary leads, supply battery power to the fan motor.

★If the fan does not rotate, the fan motor is defective and must be replaced.



Radiator Fan Circuit

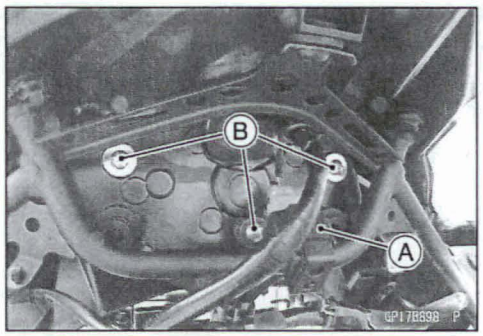


1. Ignition Switch
2. Fan Motor
3. Water Temperature Sensor
4. ECU
5. Engine Ground
6. Battery
7. Main Fuse 30 A
8. Starter Relay
9. Frame Ground (6)
10. Frame Ground (1)
11. Fuse Box (1)
12. Ignition Fuse 10 A
13. Fan Fuse 15 A
14. Relay Box
15. Radiator Fan Relay

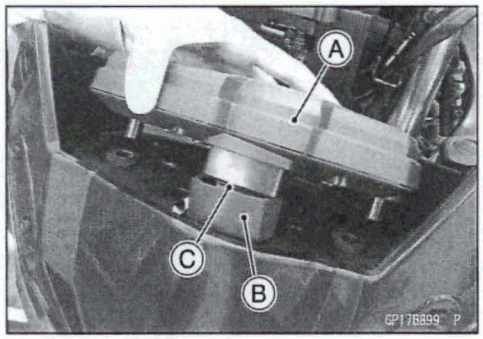
Meter, Gauge, Indicator Unit

Meter Unit Removal

- Remove:
  Headlight (LED) Assembly (see Headlight (LED) Assembly Removal/Installation)
  Vehicle-down Sensor [A] (see Vehicle-down Sensor Removal in the Fuel System (DFI) chapter)
  Meter Mounting Screws [B]

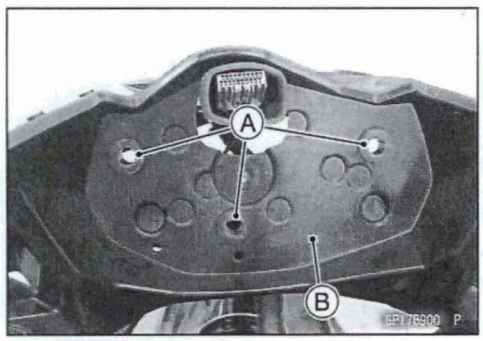


- Pull up the meter unit [A].
- Slide the dust cover [B], and disconnect the meter connector [C].

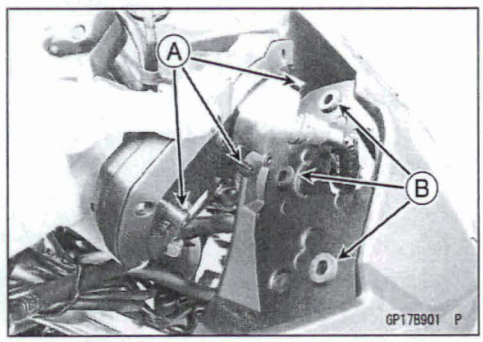


Meter Unit Installation

- Installation is the reverse of removal.
- Check that the grommets [A] are in place on the upper inner fairing [B].

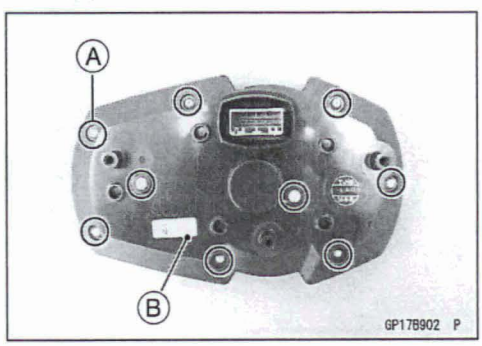


- Insert the projections [A] in the grommets [B].
- Install the removed parts (see appropriate chapters).



Meter Unit Disassembly/Assembly

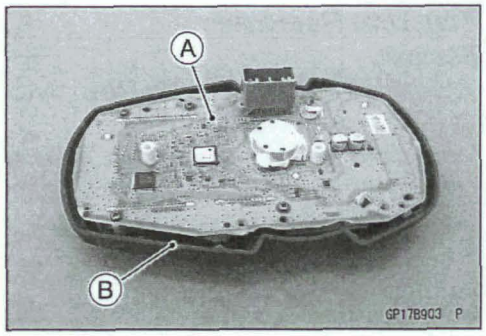
- Remove:
  Meter Unit (see Meter Unit Removal)
  Meter Assembly Screws [A]
  Lower Meter Cover [B]



Meter, Gauge, Indicator Unit

- Separate the meter assembly [A] and upper meter cover [B].
- Assembly is the reverse of removal.
- Tighten:

Torque - Meter Assembly Screws: 1.2 N·m (0.12 kgf·m, 11 in·lb)



Meter Operation Inspection

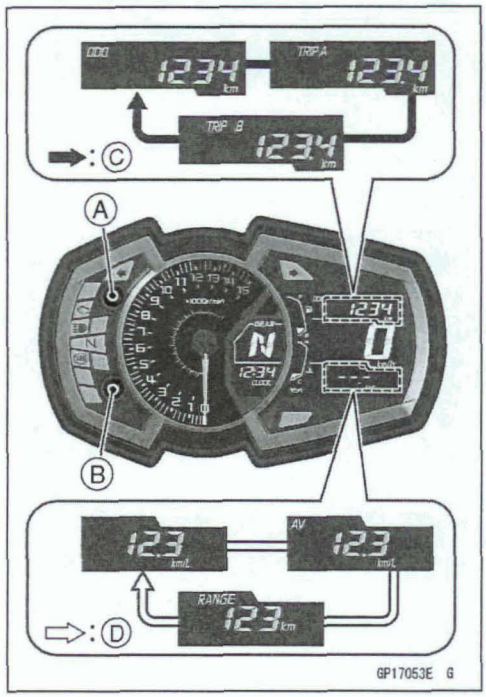
Check 1: Meter Unit Switching Inspection

Display Mode Setting

- Turn the ignition switch on and check the following.
- By pushing the upper meter button [A] or lower meter button [B] each time, check that the display changes as shown.

Pushing Upper Meter Button [C]
Pushing Lower Meter Button [D]

★If the display function does not work, replace the meter assembly.



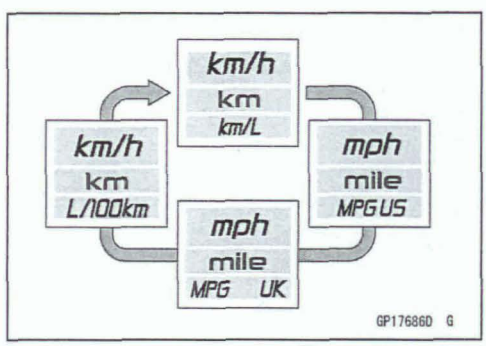
Unit Setting

- Set the ODO mode by pushing the upper meter button.
- By pushing the lower meter button each time while the upper meter 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 assembly.

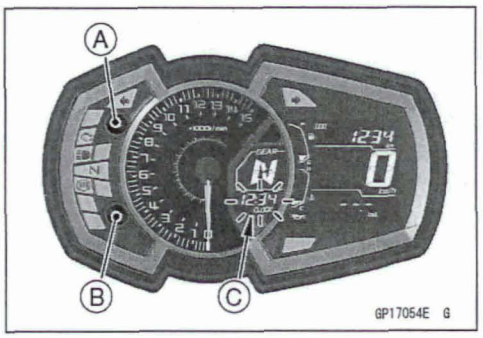


Meter, Gauge, Indicator Unit

Clock Setting

- Push the upper meter button [A] and lower meter button [B] and hold it.

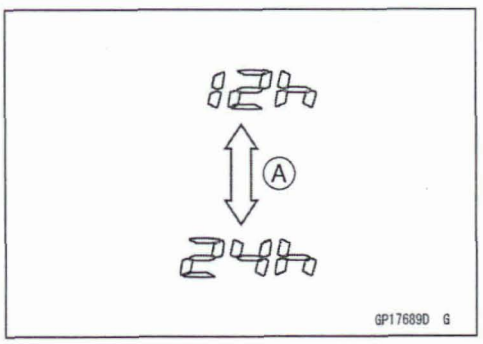
○The clock setting menu (hour and minute) should blink [C].



- Push the lower meter button and hold it.

○"12h" or "24h" display is appeared.

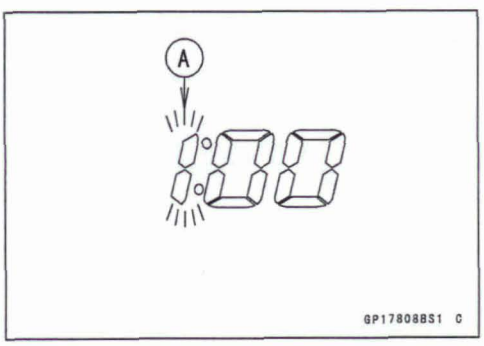
- Push the upper meter button to select "12h" or "24h" [A].



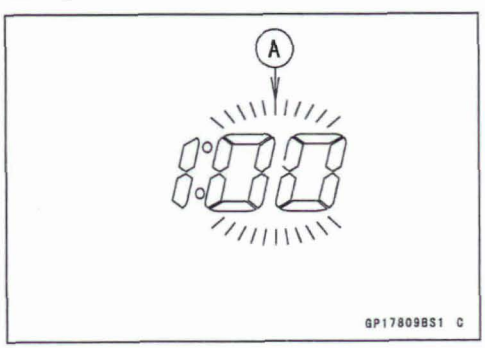
- Push the lower meter button.

○The hour display [A] starts blinking.

- By pushing the upper meter button each time, check that the hour display changes.

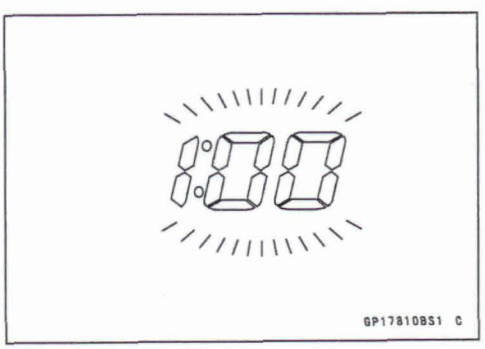


- By pushing the lower meter button, check that the hour display decides and minute display [A] starts blinking.
- By pushing the upper meter button each time, check that the minute display changes.



- 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. This blinking returns the hour setting display.

★If the display function does not work, replace the meter assembly.



Meter, Gauge, Indicator Unit

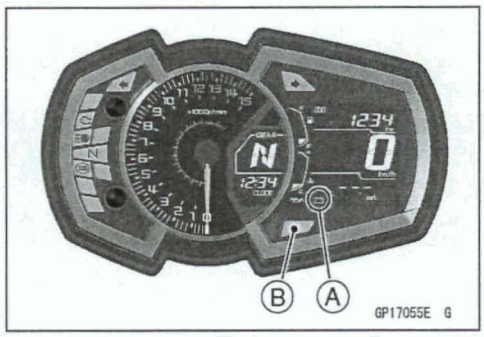
Meter System Inspection

Check 2-1: 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 light (LED) [B] go on.

★If the battery warning indicator and red warning indicator light (LED) go on, inspect the charging voltage (see Charging Voltage Inspection).

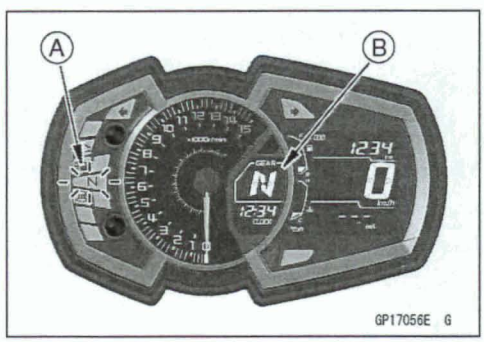
★If the charging voltage is good, replace the meter assembly.



Check 2-2: Gear Position Indicator 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 is displayed the "N" position [B].

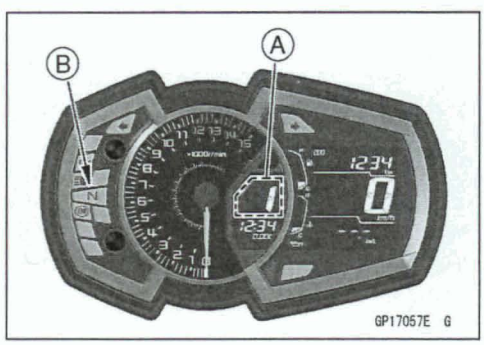


- Set the low gear position, and check that the display changes to "1" mark [A] and the green neutral indicator light (LED) [B] goes off.
- Using the rear stand, raise the rear wheel off the ground.
- Rotate the rear wheel by hand and change the gear position.
- Check that the display corresponding to each gear position (1, N, 2, 3, 4, 5 or 6) appears.

★If the display function does not work, check the following parts.

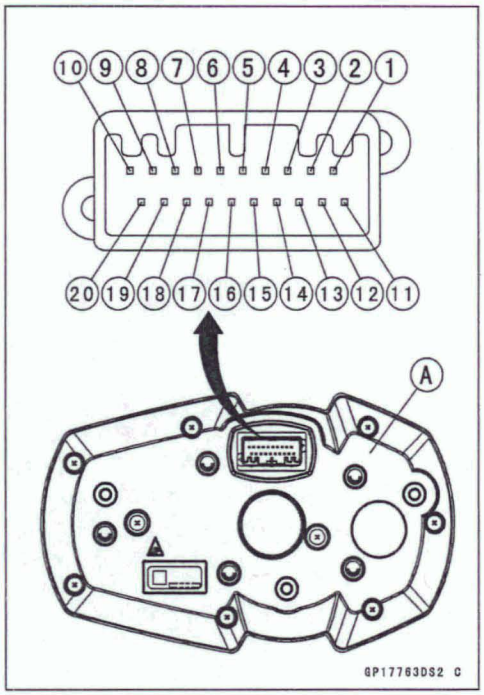
Gear Position Sensor (see Gear Position Sensor Input Voltage Inspection in the Fuel System (DFI) chapter)
Wiring (see Meter Unit Circuit)

★If the above parts are good, replace the meter assembly and/or ECU.



Meter, Gauge, Indicator Unit

Meter Unit Inspection



- Remove the meter unit [A] (see Meter Unit Removal).

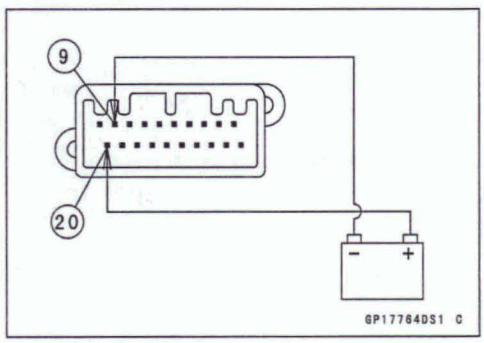
[1] Unused
[2] Unused
[3] Unused
[4] Unused
[5] Unused
[6] Red Warning Indicator Light (LED) (–)
[7] Green Neutral Indicator Light (LED) (–)
[8] Yellow ABS Indicator Light (LED) (–) [Equipped Models]
[9] Ground (–)
[10] Ignition (+)
[11] Fuel Level Sensor
[12] Rear Wheel Rotation Sensor Pulse
[13] ECU Communication Line
[14] Unused
[15] Tachometer Pulse
[16] Green Right Turn Signal Indicator Light (LED) (+)
[17] Blue High Beam Indicator Light (LED) (+)
[18] Unused
[19] Green Left Turn Signal Indicator Light (LED) (+)
[20] Battery (+)

NOTICE
Do not drop the meter unit. Do not short each terminal.

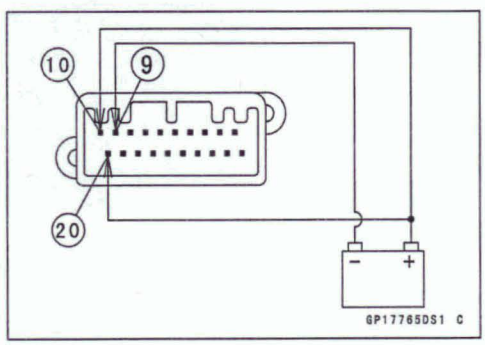
Check 3-1: Meter Unit Primary Operation Check

- 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].

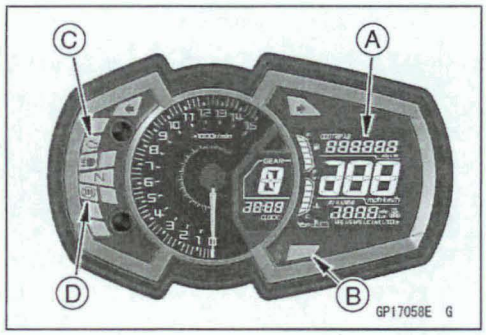


- Connect the terminal [10] to the battery (+) terminal.



Meter, Gauge, Indicator Unit

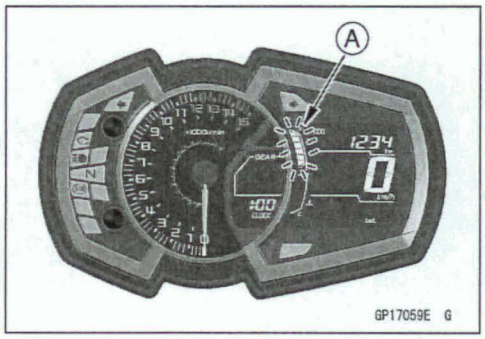
• Check the following items.
○The tachometer needle sweeps to the maximum reading, then sweeps back to the minimum reading.
○The LCD display and meter illuminations should turn on.
○All the LCD segments [A] appear for few seconds.
○The red warning indicator light (LED) [B] goes on for few seconds.
○Following indicator lights remain on.
Yellow Engine Warning Indicator Light (LED) [C]
Yellow ABS Indicator Light (LED) [D] (if equipped)
★If the meter unit does not work properly, replace the meter assembly.



NOTE

○*This meter unit has a failure detection function of the communication. When the communication error was detected, the meter unit alerts the rider by the yellow engine warning indicator light (LED) goes on.*

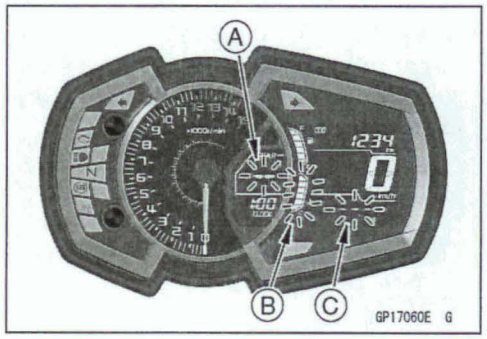
○Make sure that the fuel gauge segments [A] and indicator on the LCD start blinking approx. 5 seconds after turning on the meter unit.
★If the meter unit does not work properly, replace the meter assembly.



NOTE

○*This meter unit has a failure detection function (for open or short) of the fuel gauge. When the fuel gauge is open or short, the meter unit alerts the rider by the all fuel gauge segments blink in the display.*

• 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]
All Segments of Water Temperature Gauge [B] and Indicator
Multifunction Display with "- -.-" Message [C]



NOTE

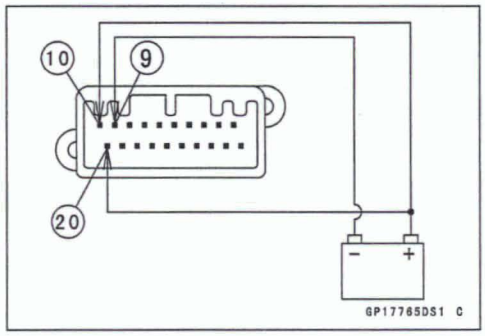
○*This meter unit has a failure detection function (for open or short) of the water temperature gauge. When the water temperature gauge is open or short, the meter unit alerts the rider by the all water temperature gauge segments blink in the display.*

★If the meter unit does not work properly, replace the meter assembly.

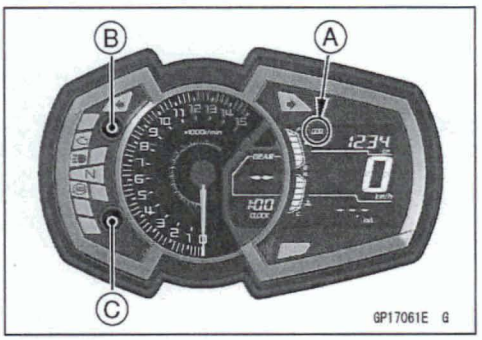
Meter, Gauge, Indicator Unit

Check 3-2: Meter Communication Line (Service Code 39) Check

- Connect the leads in the same circuit as Check 3-1.
- The yellow engine warning indicator light (LED) should remains on.



- Set the ODO mode [A] by pushing the upper meter button [B].
- Push the upper meter button and lower meter button [C] simultaneously for more than 2 seconds.



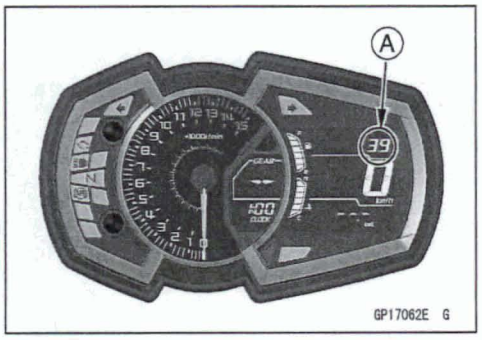
- Check the following items.

○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 properly, replace the meter assembly.



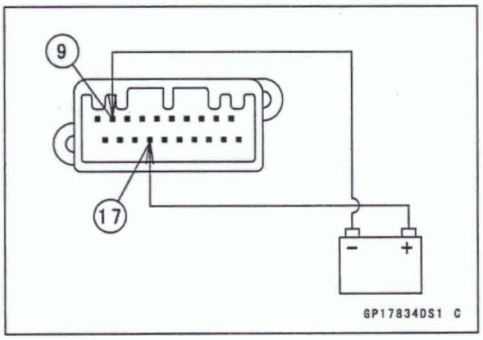
NOTE

○*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: Blue High Beam Indicator Light (LED) Inspection

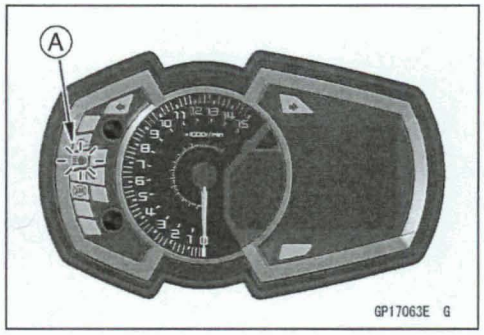
- Connect the terminal [17] to the battery (+) terminal.
- Connect the terminal [9] to the battery (–) terminal.



Meter, Gauge, Indicator Unit

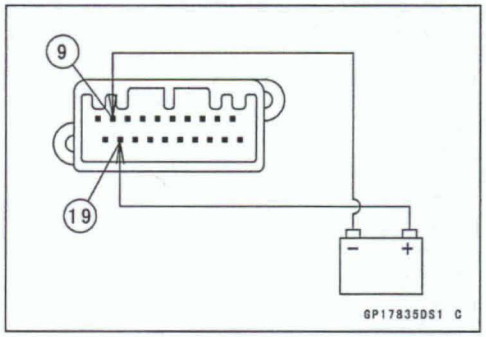
- Check that the blue high beam indicator light (LED) [A] goes on.

★If the indicator light (LED) does not go on, replace the meter assembly.



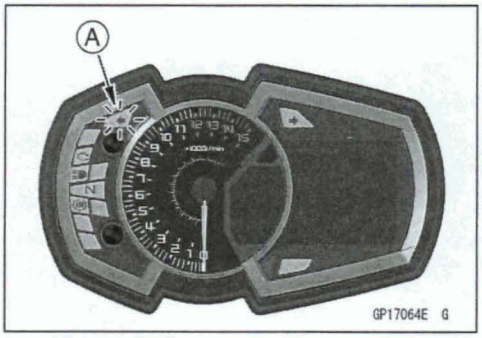
Check 3-4: Green Left Turn Signal Indicator Light (LED) Inspection

- Connect the terminal [19] to the battery (+) terminal.
- Connect the terminal [9] to the battery (–) terminal.



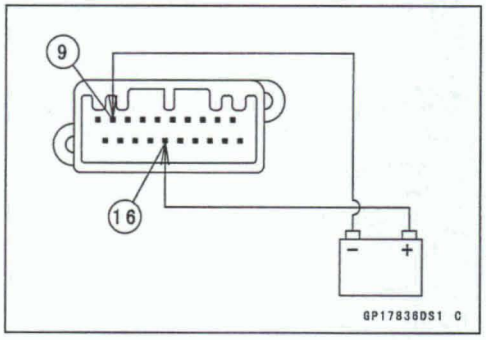
- Check that the green left turn signal indicator light (LED) [A] goes on.

★If the indicator light (LED) does not go on, replace the meter assembly.



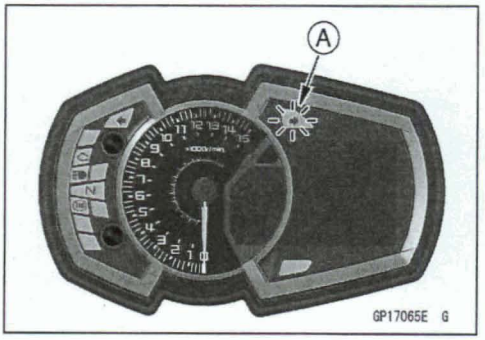
Check 3-5: Green Right Turn Signal Indicator Light (LED) Inspection

- Connect the terminal [16] to the battery (+) terminal.
- Connect the terminal [9] to the battery (–) terminal.



- Check that the green right turn signal indicator light (LED) [A] goes on.

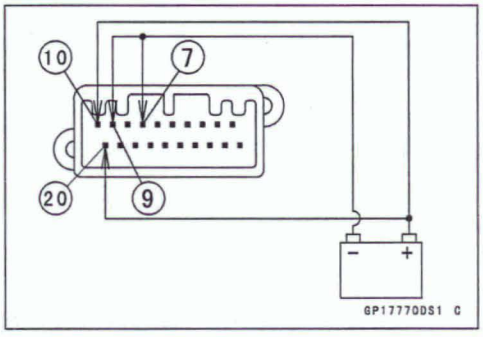
★If the indicator light (LED) does not go on, replace the meter assembly.



Meter, Gauge, Indicator Unit

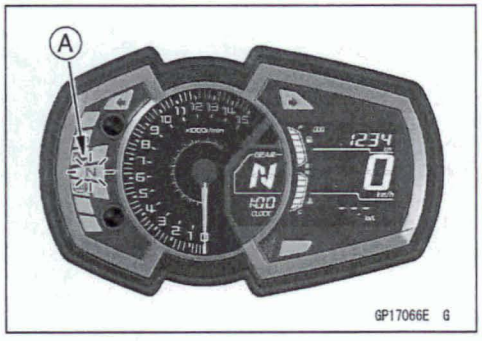
Check 3-6: Green Neutral Indicator Light (LED) Inspection

- 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 light (LED) [A] goes on.

★If the indicator light (LED) does not go on, replace the meter assembly.

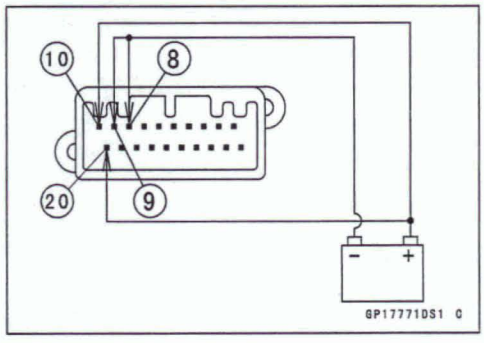


Check 3-7: Yellow ABS Indicator Light (LED) Inspection (Equipped Model)

- Connect the leads in the same circuit as Check 3-1.

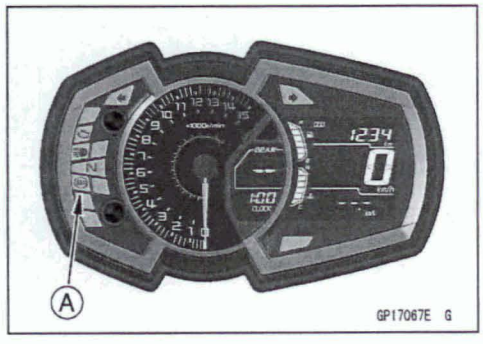
○The yellow ABS indicator light (LED) goes on.

- Connect the terminal [8] to the battery (–) terminal.



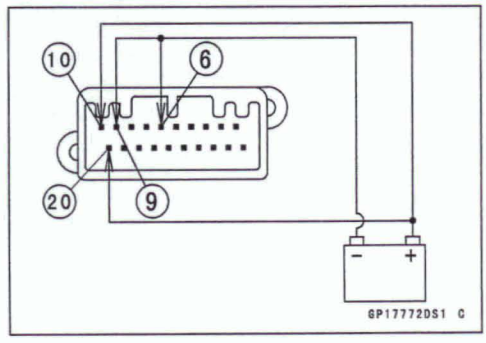
- Check that the yellow ABS indicator light (LED) [A] goes off.

★If the indicator light (LED) does not go off, replace the meter assembly.



Check 3-8: Red Warning Indicator Light (LED) Inspection (Oil Pressure Warning)

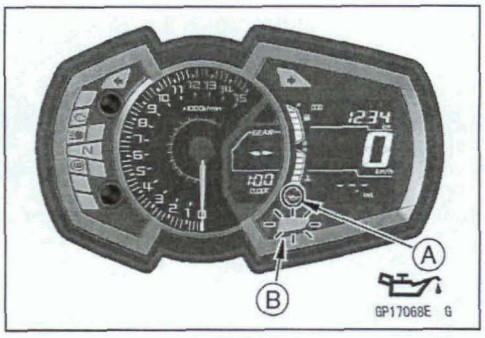
- Connect the leads in the same circuit as Check 3-1.
- Connect the terminal [6] to the battery (–) terminal.



Meter, Gauge, Indicator Unit

- Check that the oil pressure warning indicator [A] and red warning indicator light (LED) [B] goes on approx. 5 seconds later.

★If the oil pressure warning indicator and indicator light (LED) does not go on, replace the meter assembly.

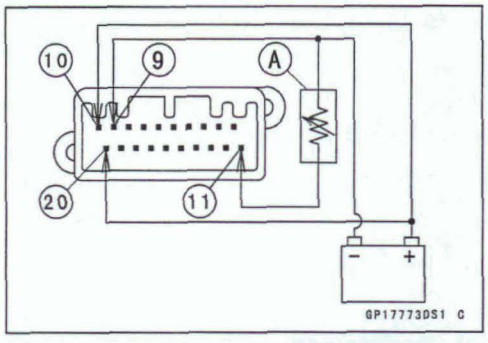


Check 3-9: Fuel Gauge Inspection

- 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.

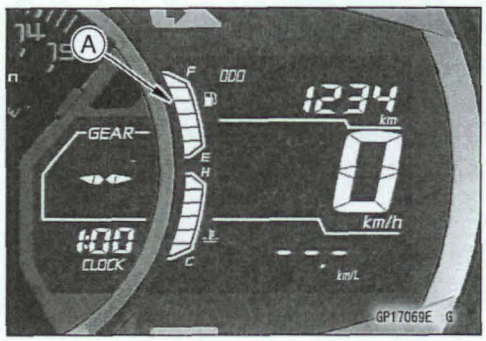


- Check that the number of segments on the fuel gauge [A] matches the resistance value of the variable rheostat.

○After changing the resistance between the terminal [11] and ground, the segment(s) in the fuel gauge should change after 15 seconds.

Variable Rheostat Resistance (Ω)	Display Segments
35	6 segments go on
65	5 segments go on
95	4 segments go on
125	3 segments go on
155	2 segments go on
185	1 segment goes on
215	1 segment and fuel level warning indicator blinks

★If the display function does not work properly, replace the meter assembly.



Meter, Gauge, Indicator Unit

Check 3-10: Speedometer Check

- 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 445 Hz.

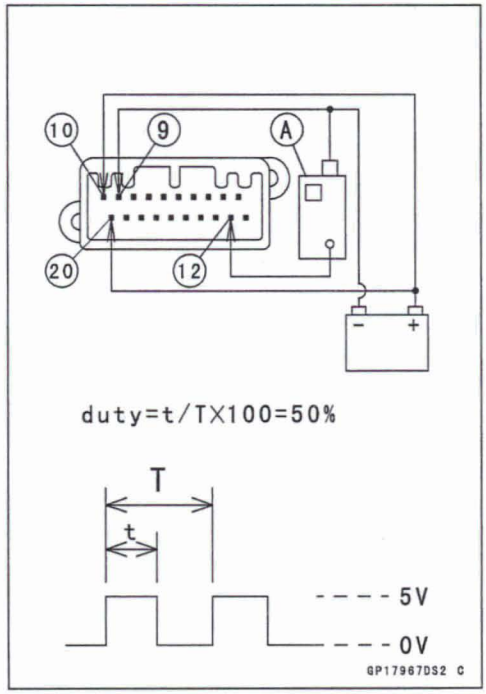
○Indicates approximately 60 mph if the input frequency is approximately 715 Hz.

★If the meter function does not work properly, replace the meter assembly.

NOTE

○*The input frequency of the oscillator adds the integrated value of the odometer.*

○*The integrated value of the odometer cannot be reset.*



Check 3-11: Odometer Check

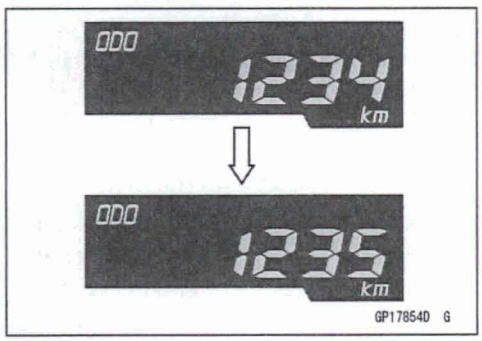
- Check the odometer with the speedometer check in the same way.

★If value indicated in the odometer is not added, replace the meter assembly.

NOTE

○*When the figures come to 999999, they are stopped and locked.*

○*The integrated value of the odometer cannot be reset.*



Check 3-12: Trip A/B Meter Check

- Check the trip meter with the speedometer check in the same way.

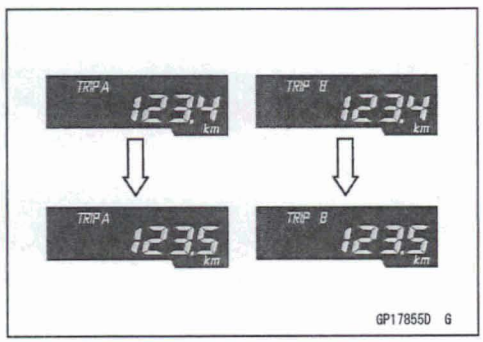
★If value indicated in the trip meter is not added, replace the meter assembly.

- Check that when the upper 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 assembly.

NOTE

○*The data of the trip meters are maintained even if the battery is disconnected.*



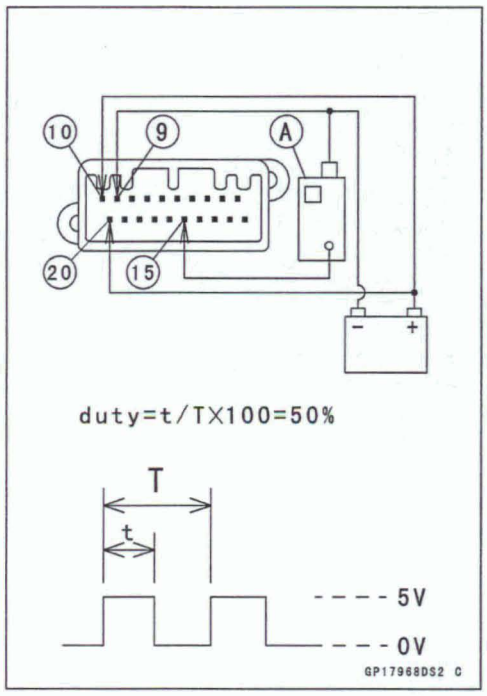
Meter, Gauge, Indicator Unit

Check 3-13: Tachometer Check

- 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 6 000 rpm if the input frequency is approximately 200 Hz.

★If the meter function does not work properly, replace the meter assembly.



Check 3-14: 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 (Service Code 41, 42) section in the Fuel System (DFI) chapter)
Rear Wheel Rotation Sensor (see Rear Wheel Rotation Sensor (Service Code 24) section in the Fuel System (DFI) chapter)
Crankshaft Sensor (see Crankshaft Sensor Inspection)

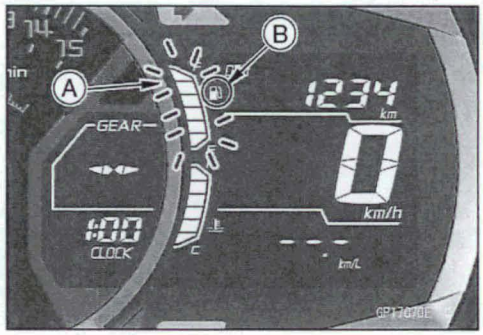
- When the coolant temperature gauge is faulty indication check the following items.

Wiring (see Wiring Inspection)
ECU Communication Line (see ECU Communication Line Inspection in the Fuel System (DFI) chapter)
Water Temperature Sensor (see Water Temperature Sensor Inspection)

★If the above items are good, replace the meter assembly and/or ECU.

Meter, Gauge, Indicator Unit

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.*

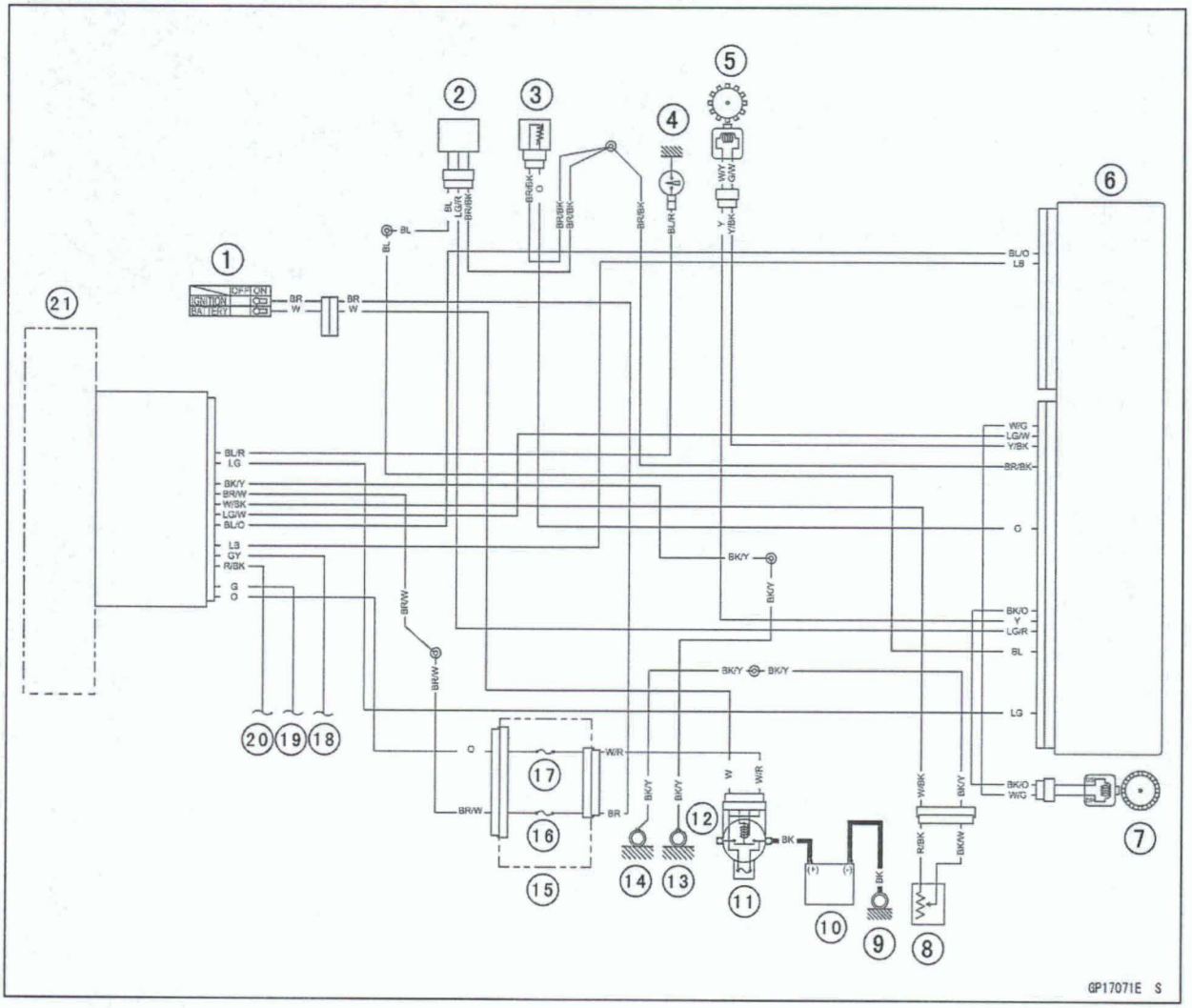
○The all segments [A] of the fuel gauge and fuel level warning indicator [B] in the display will blink. (This function is Fuel Level Sensor Line Self-Diagnosis Mode.)

★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 assembly.

Meter, Gauge, Indicator Unit

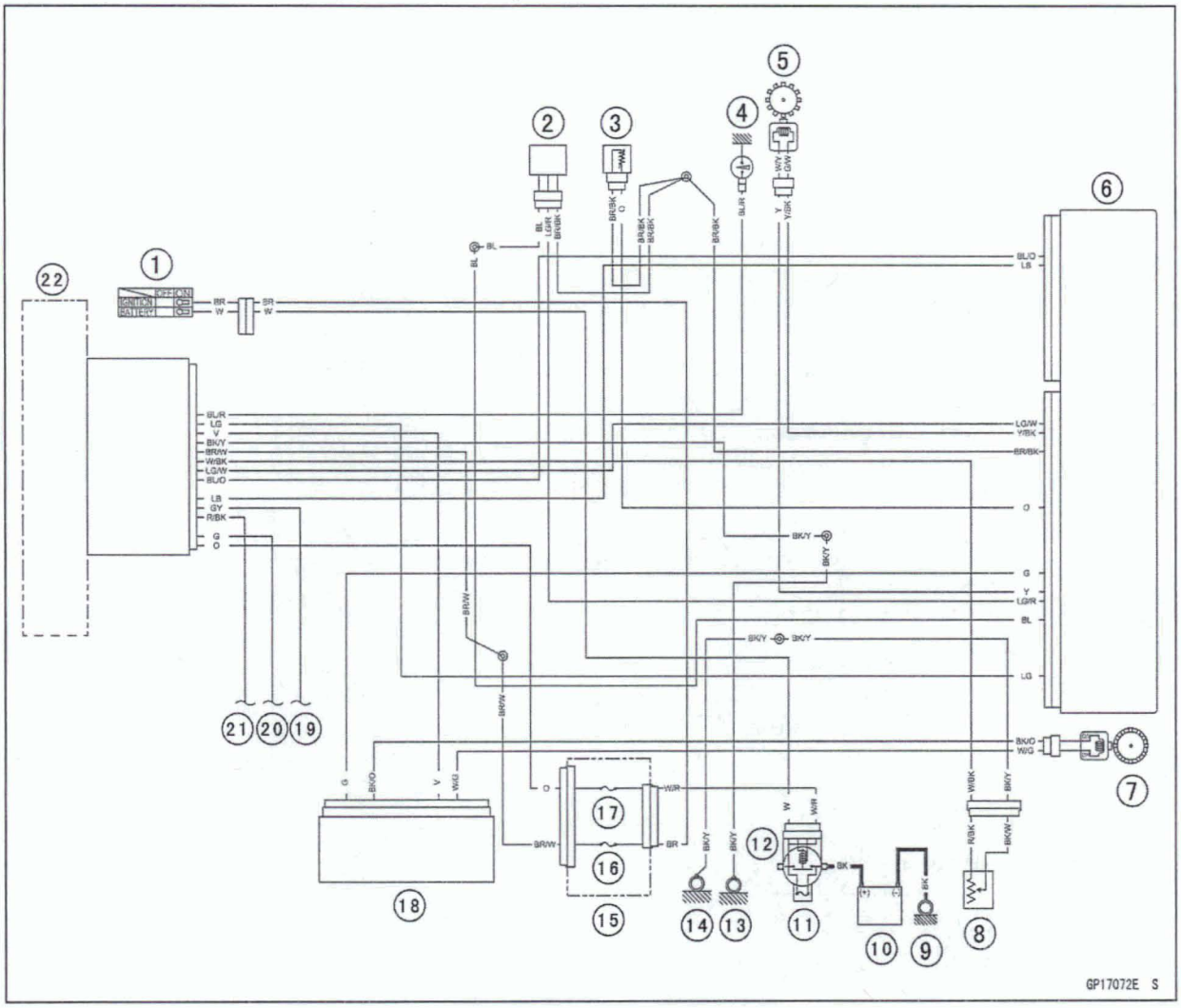
Meter Circuit



1. Ignition Switch
2. Gear Position Sensor
3. Water Temperature Sensor
4. Oil Pressure Switch
5. Crankshaft Sensor
6. ECU
7. Rear Wheel Rotation Sensor
8. Fuel Level Sensor
9. Engine Ground
10. Battery
11. Main Fuse 30 A
12. Starter Relay
13. Frame Ground (4)
14. Frame Ground (2)
15. Fuse Box (1)
16. Ignition Fuse 10 A
17. Meter Fuse 10 A
18. To Turn Signal Switch (Right)
19. To Turn Signal Switch (Left)
20. To Headlight Hi Beam
21. Meter Unit

Meter, Gauge, Indicator Unit

Meter Circuit (ABS Equipped Models)



1. Ignition Switch
2. Gear Position Sensor
3. Water Temperature Sensor
4. Oil Pressure Switch
5. Crankshaft Sensor
6. ECU
7. Rear Wheel Rotation Sensor
8. Fuel Level Sensor
9. Engine Ground
10. Battery
11. Main Fuse 30 A
12. Starter Relay
13. Frame Ground (4)
14. Frame Ground (2)
15. Fuse Box (1)
16. Ignition Fuse 10 A
17. Meter Fuse 10 A
18. ABS Hydraulic Unit
19. To Turn Signal Switch (Right)
20. To Turn Signal Switch (Left)
21. To Headlight Hi Beam
22. Meter Unit

Switches and Sensors

Brake Light Timing Inspection

- Refer to the Brake Light Switch Operation Inspection in the Periodic Maintenance chapter.

Brake Light Timing Adjustment

- Refer to the Brake Light Switch Operation Inspection in the Periodic Maintenance chapter.

Switch Inspection

- Using a digital meter, check to see that only the connections shown in the table have continuity.

○For the switch housings and the ignition switch, refer to the tables in the Wiring Diagram.

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

Rear Brake Light Switch Connections

Rear Brake Light Switch Connections		
Color	BR	BL
When brake pedal is pushed down	○——	——○
When brake pedal is released		

Side Stand Switch Connections

Side Stand Switch Connections		
Color	BK	G
When side stand is down		
When side stand is up	○——	——○

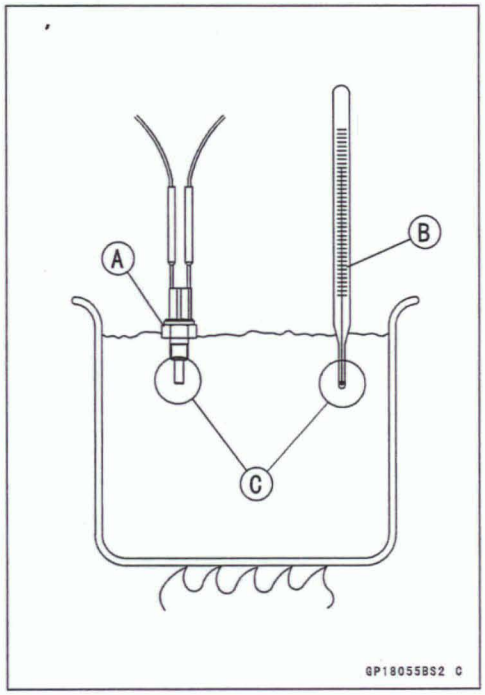
Oil Pressure Switch Connections*

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 temperature-sensing projection is submerged.
- Suspend an accurate thermometer [B] with temperature -sensing projection [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 coolant while stirring the coolant gently.
- Using a digital meter, measure the internal resistance of the sensor.

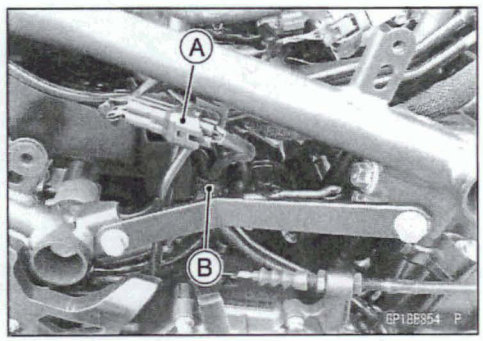
★If the digital meter does not show the specified values, replace the sensor.

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

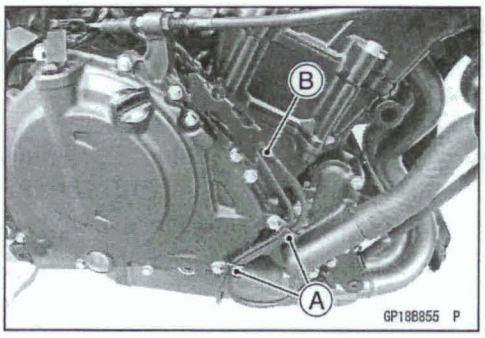


NOTICE
Never drop the sensor especially on a hard surface. Such a shock to the sensor can damage it.

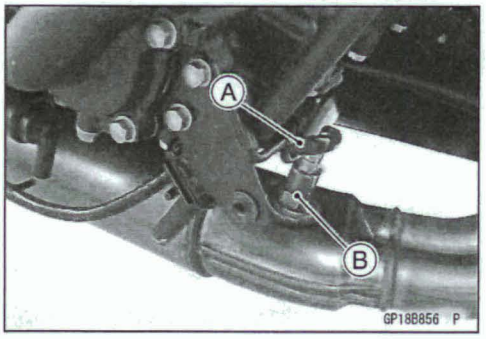
NOTICE
Do not pull strongly, twist, or bend the oxygen sensor lead. This may cause the wiring open.

- Remove:
  Right Middle Fairing (see Middle Fairing Removal in the Frame chapter)
- Disconnect the oxygen sensor lead connector [A].
- Open the clamp [B].

- Open the clamps [A].
- Clear the lead [B].



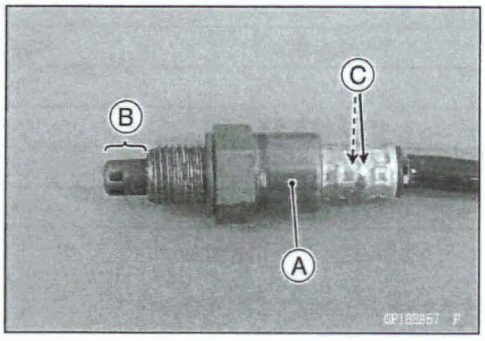
- Clear the lead [A].
- Remove the oxygen sensor [B].



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: 25 N·m (2.5 kgf·m, 18 ft·lb)

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

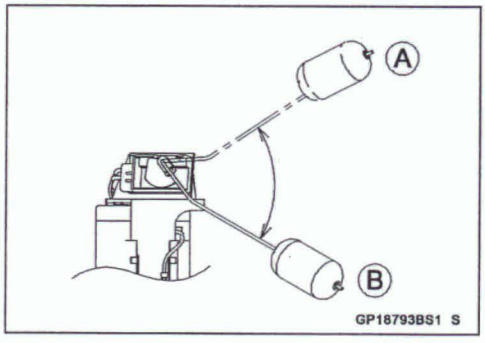
Oxygen Sensor Inspection

- 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]

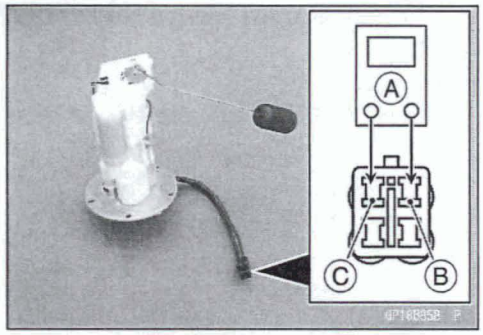


Switches and Sensors

- Using a digital meter [A], measure the resistance between the R/BK lead [B] and BK/W lead [C] terminals.

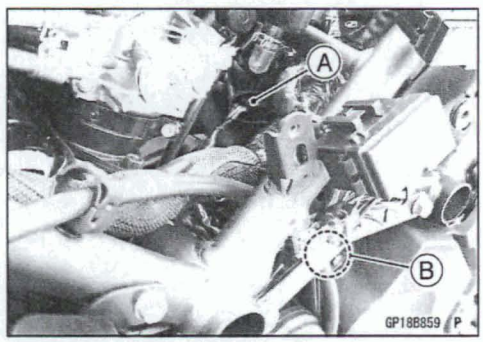
★If the digital meter readings are not as specified, or do not change smoothly according as the float moves up and down, replace the fuel pump.

Fuel Level Sensor Resistance
Standard: Full Position: 9 ~ 11 Ω
Empty Position: 213 ~ 219 Ω

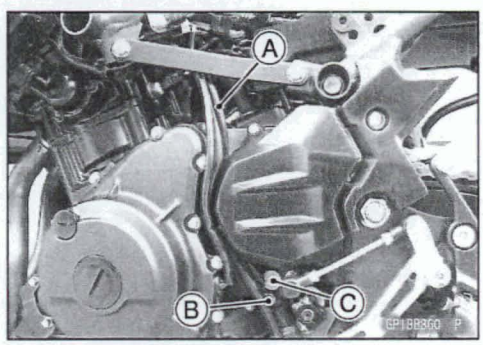


Gear Position Sensor Removal

- Remove:
  Battery Case Cover (see Battery Case Cover Removal in the Frame chapter)
- Disconnect the gear position sensor lead connector [A].
- Clear the lead [B].

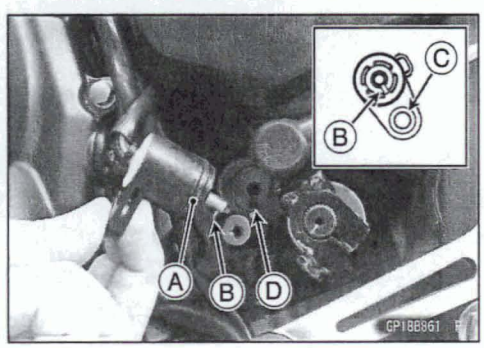


- Clear the gear position sensor lead [A].
- Remove:
  Gear Position Sensor Bolt [B] and Washer
  Gear Position Sensor [C]



Gear Position Sensor Installation

- Replace the O-ring [A] with a new one.
- Apply grease to the new O-ring and install it.
- Face the pin [B] to the bolt hole side [C].
- Make sure that the transmission is shifted into the neutral.
- Fit the pin of the gear position sensor to the groove [D] of the shift drum.



- Tighten the gear position sensor bolt with washer.

○When installing the sensor which is fastened by bolt, tighten the bolt after placing the sensor on the bottom surface completely.

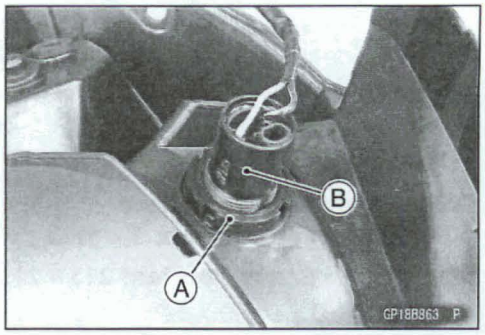
Torque - Gear Position Sensor Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

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

Switches and Sensors

Accessory Socket Removal/Installation (Equipped Models)

- Remove:
  Upper Inner Fairing (see Upper Inner Fairing Removal in the Frame chapter)
  Accessory Socket Nut [A]
  Accessory Socket [B]



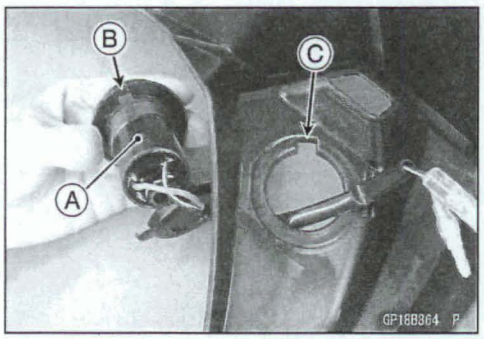
- Installation is the reverse of removal.
- Insert the accessory socket [A] to the upper inner fairing.

○Align the tab [B] with the cut-out [C].

- Tighten:

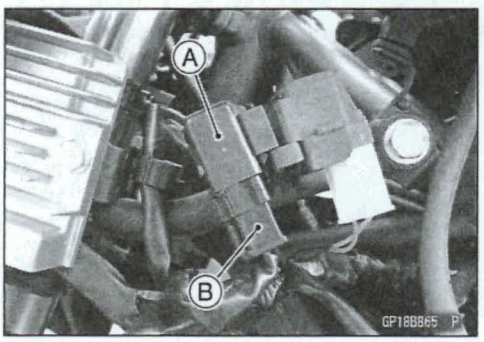
Torque - Accessory Socket Nut: 2.8 N·m (0.29 kgf·m, 25 in·lb)

- Install the removed parts (see appropriate chapters).



Accessory Relay Inspection (Equipped Models)

- Remove:
  Left Middle Fairing (see Middle Fairing Removal in the Frame chapter)
- Remove the accessory relay [A].
- Disconnect the accessory relay connector [B].

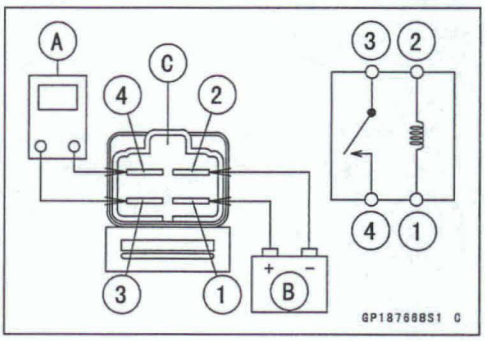


- Connect a digital meter [A] between the relay terminals [3] and [4].
- Connect a 12 V battery [B] between the relay terminals [1] and [2].

★If the relay [C] does not work as specified, the relay is defective. Replace the relay.

Testing Relay

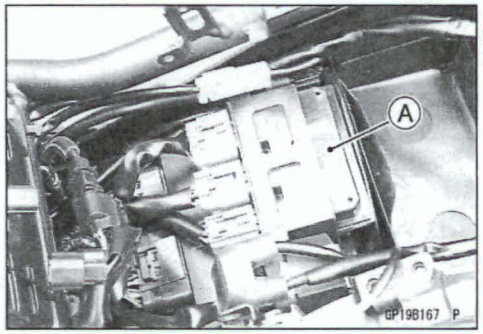
Criteria: **When battery is connected → 0 Ω**
When battery is disconnected → ∞ Ω



Relay Box

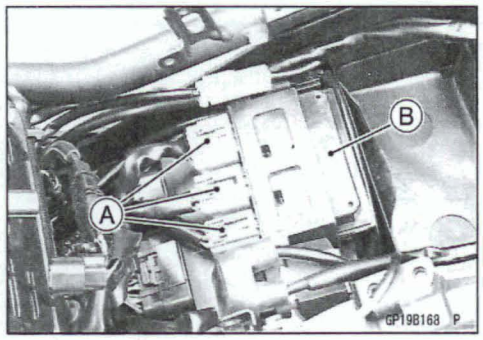
NOTE

○*The relay box [A] has relays and diodes. The relays and diodes can not be removed.*



Relay Box Removal

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



- Remove:
  Battery Case Cover (see Battery Case Cover Removal in the Frame chapter)
- Disconnect the connectors [A] and remove the relay box [B].

Relay Box Installation

- Installation is the reverse of removal.

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

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	∞
Radiator 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 Circuit Relay	2-11	1-3	0
ECU Main Relay	4-5	7-6	0
Fuel Pump Relay	9-10	7-8	0
Radiator Fan Relay	18-19	17-20	0

	Battery Connection (+) (–)	Tester Connection DC 25 V Range (+) (–)	Tester Reading (V)
Starter Circuit Relay	16-12	11-12	Battery Voltage

(+): Apply positive lead.
(–): Apply negative lead.

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

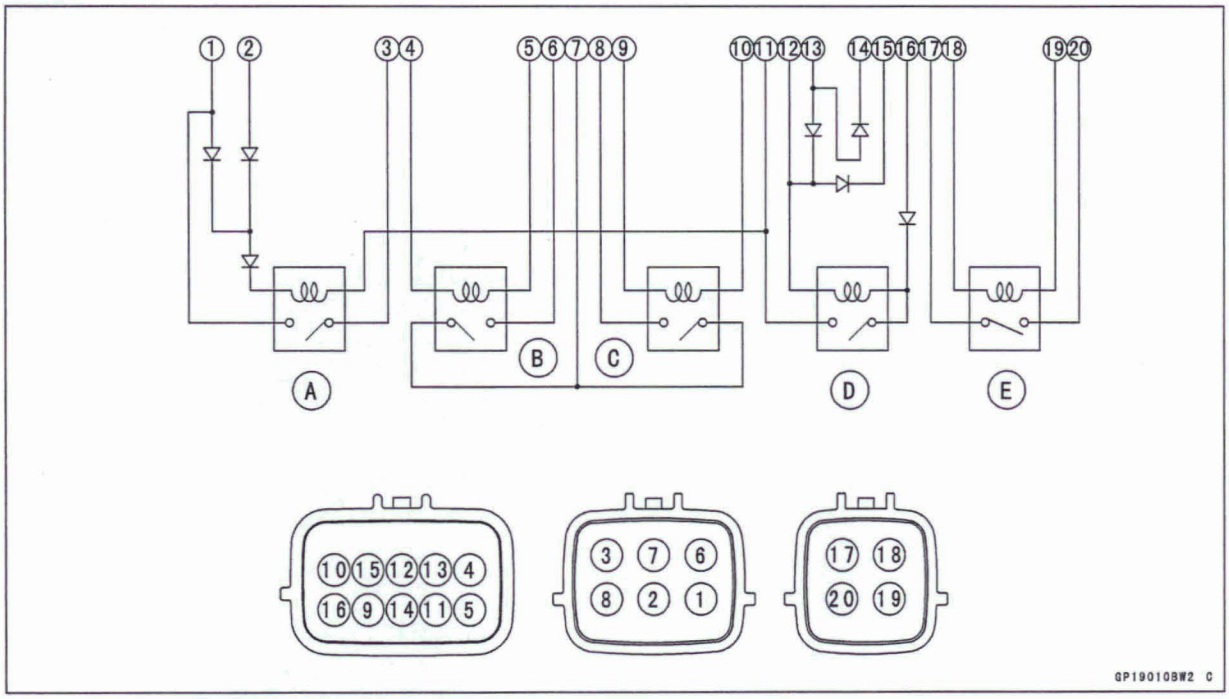
★The resistance should be low in one direction and more than ten times as much in the other direction. If any diode shows low or high in both directions, the diode is defective and the relay box must be replaced.

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

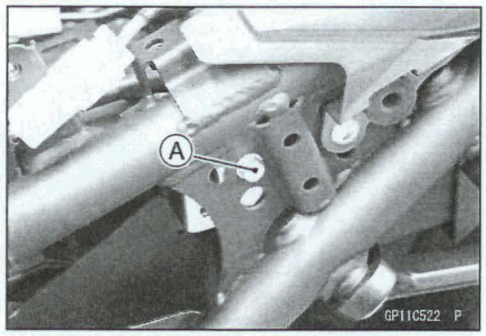


A: Headlight Circuit Relay
B: ECU Main Relay
C: Fuel Pump Relay
D: Starter Circuit Relay
E: Radiator Fan Relay

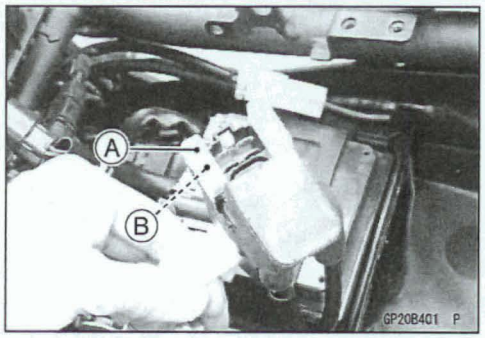
Fuse

30 A Main Fuse Removal

- Remove:
  Battery Case Cover (see Battery Case Cover Removal in the Frame chapter)
  Bolt [A]

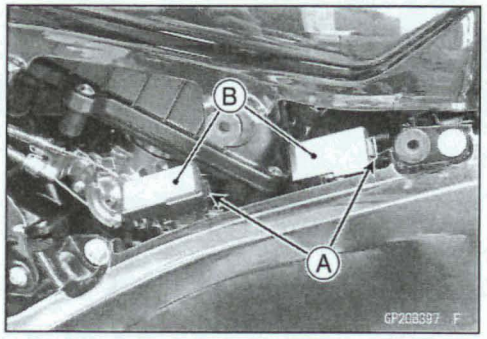


- Disconnect the connector.
- Remove:
  30 A Main Fuse Cover [A]
- Pull out the main fuse [B] from the starter relay with a needle nose pliers.

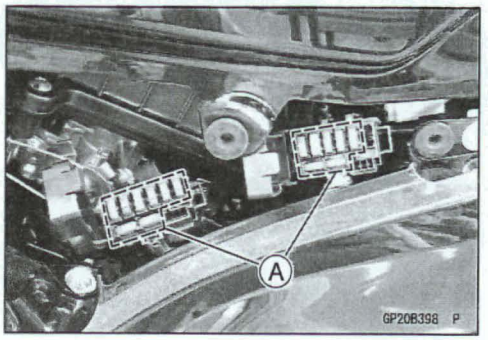


Fuse Box Fuse Removal

- Remove:
  Left Side Cover (see Side Cover Removal in the Frame chapter)
- Unlock the hooks [A] to lift up the lids [B].



- Pull the sub fuses [A] straight out from the fuse box with a needle nose pliers.



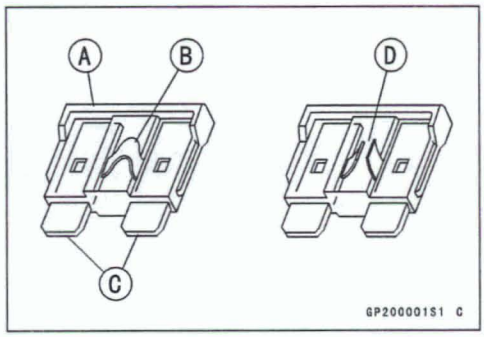
Fuse Installation

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

- Install the fuse box fuses on the original position as specified on the lid.

Fuse

Fuse Inspection



- Remove the fuse (see 30 A Main Fuse Removal or 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

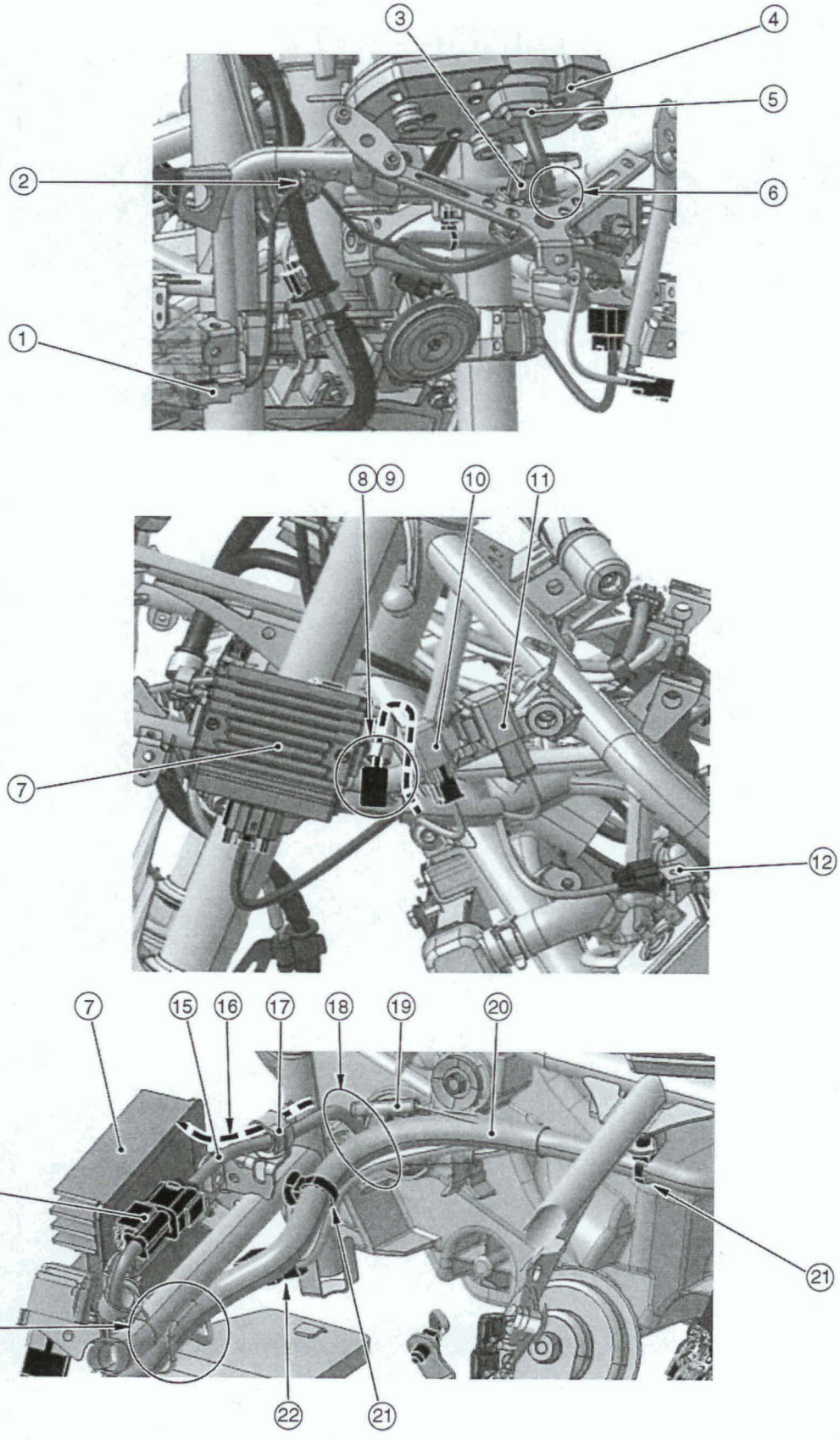
When replacing a fuse, be sure the new fuse matches the specified fuse rating for that circuit. Installation of a fuse with a higher rating may cause damage to wiring and components.

Appendix

Table of Contents

Cable, Wire, and Hose Routing 17-2
Troubleshooting Guide 17-48

Cable, Wire, and Hose Routing

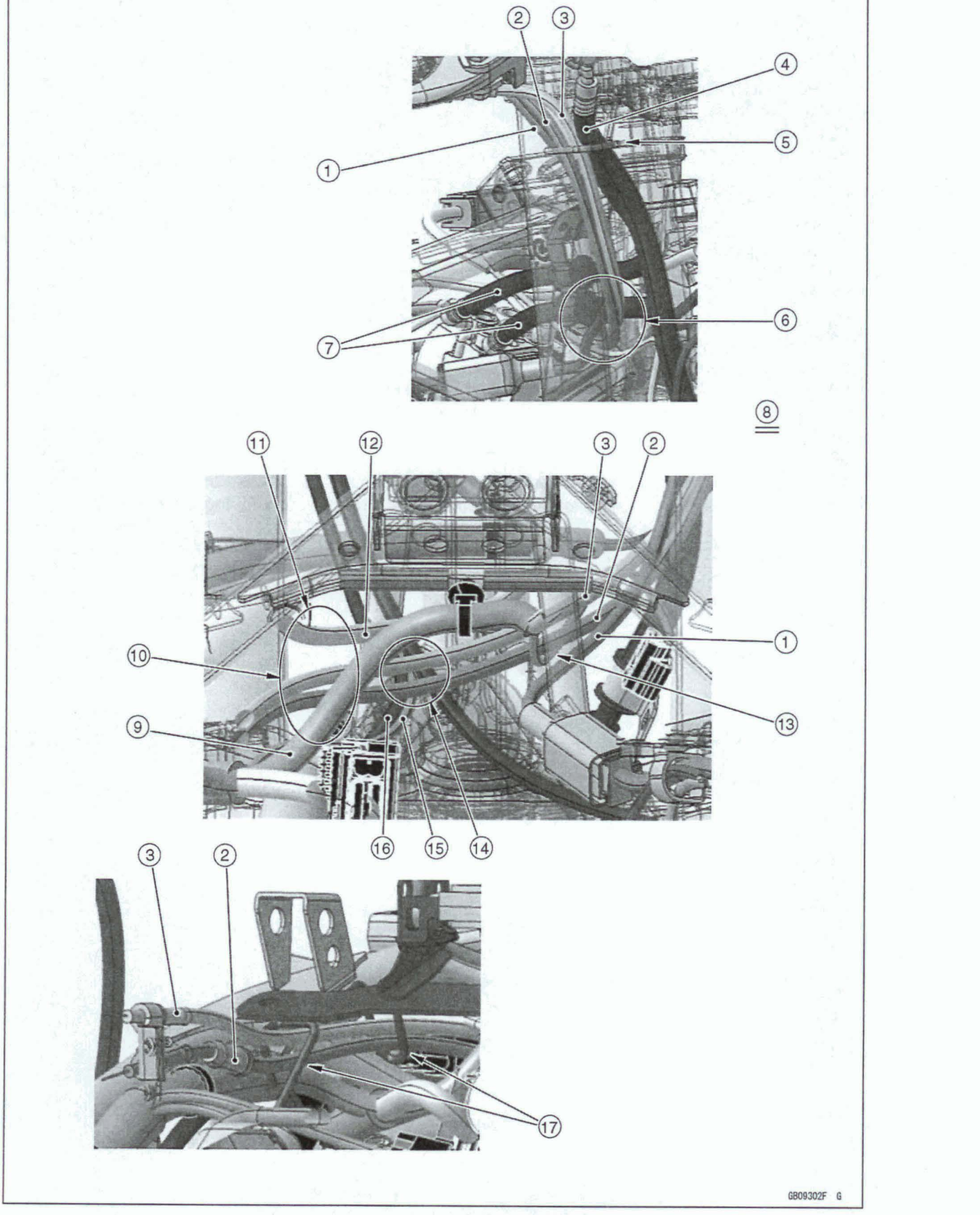


GB09301F G

Cable, Wire, and Hose Routing

1. Front Right Turn Signal Light Lead Connector (Install it to the upper fairing bracket.)
2. Clamp (Hold the front right turn signal light lead.)
3. Vehicle-down Sensor
4. Meter
5. Meter Lead Connector
6. Run the meter lead through the clamp.
7. Regulator/Rectifier
8. Clamp (Hold the headlight lead and accessory relay lead, and make accessory relay lead connector face down.) (EX400G/H)
9. Clamp (Hold the headlight lead.) (EX400J)
10. Accessory Relay (EX400J)
11. Turn Signal Relay
12. Purge Valve (Evaporative Emission Control System Equipped Models)
13. Run the main harness through the clamp.
14. Headlight Lead Connector (Install it to the upper fairing bracket.)
15. Headlight Lead
16. Accessory Connector Lead (EX400J)
17. Clamp (Hold the accessory connector lead (EX400J) and headlight lead.)
18. Run the headlight lead to the upside of the main harness.
19. Accessory Connector
20. Main Harness
21. Clamps (Hold the main harness, and install it to the upper fairing bracket.)
22. Front Left Turn Signal Light Lead Connector (Install it to the upper fairing bracket.)

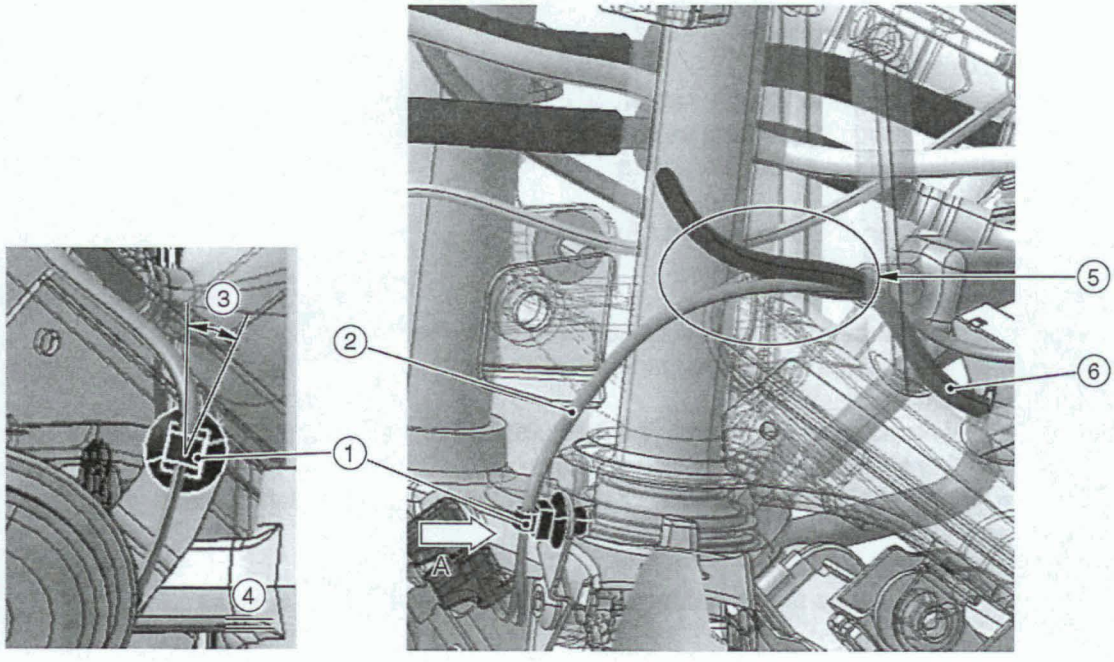
Cable, Wire, and Hose Routing

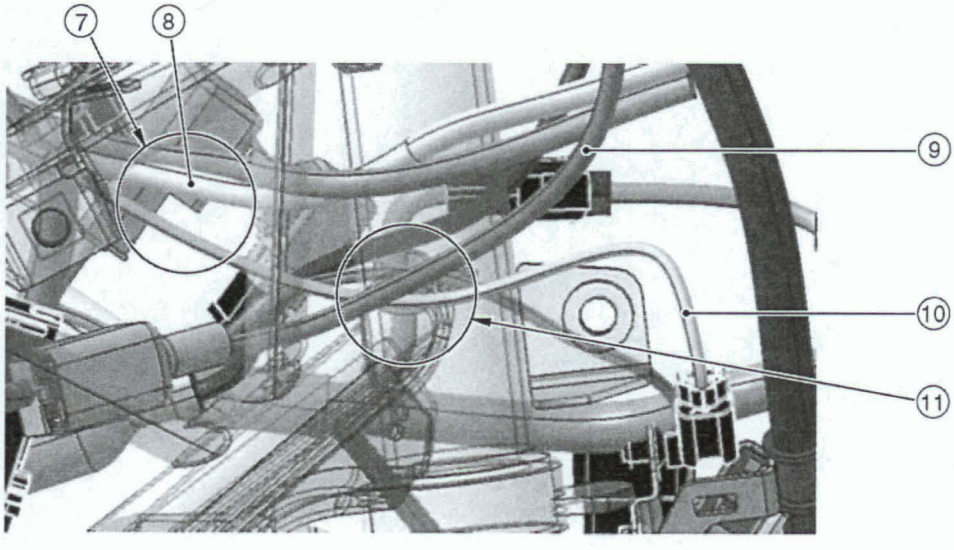


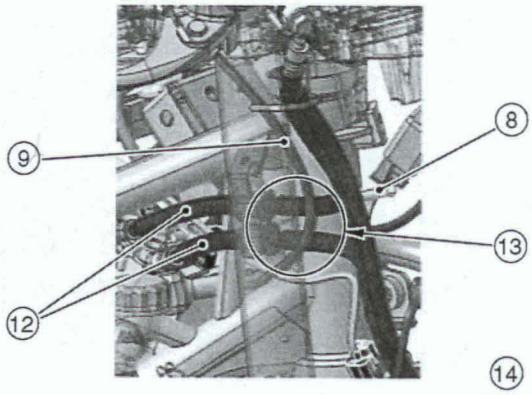
Cable, Wire, and Hose Routing

1. Right Switch Housing Lead
2. Throttle Cable (Decelerator)
3. Throttle Cable (Accelerator)
4. Front Brake Hose
5. Run the front brake hose, throttle cable (accelerator), throttle cable (decelerator) and right switch housing lead through the clamp as shown.
6. Run the throttle cables under the right switch housing lead and front brake hose (ABS equipped models).
7. Front Brake Hoses (ABS Equipped Models)
8. Viewed from Front Right Side
9. Main Harness
10. Run the throttle cables to the outside of the main harness.
11. Run the throttle cables under the ignition switch lead.
12. Ignition Switch Lead
13. Front Wheel Rotation Sensor Lead (ABS Equipped Models) (Run the throttle cables to the upside of the front wheel rotation sensor lead.)
14. Run the throttle cables to the upside of the horn lead and left switch housing lead.
15. Horn Lead
16. Left Switch Housing Lead
17. Run the throttle cables through the clamps.

Cable, Wire, and Hose Routing







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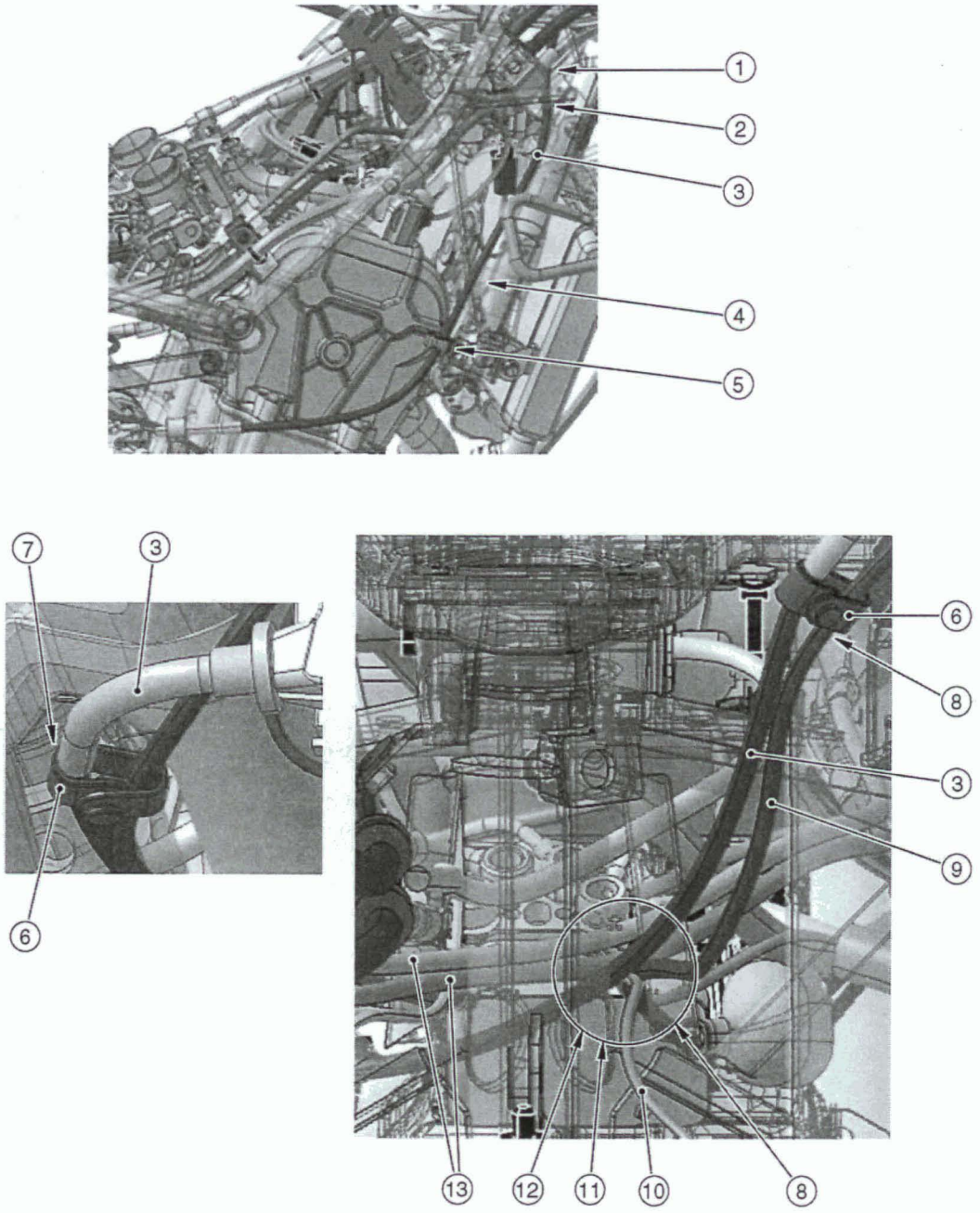
Cable, Wire, and Hose Routing

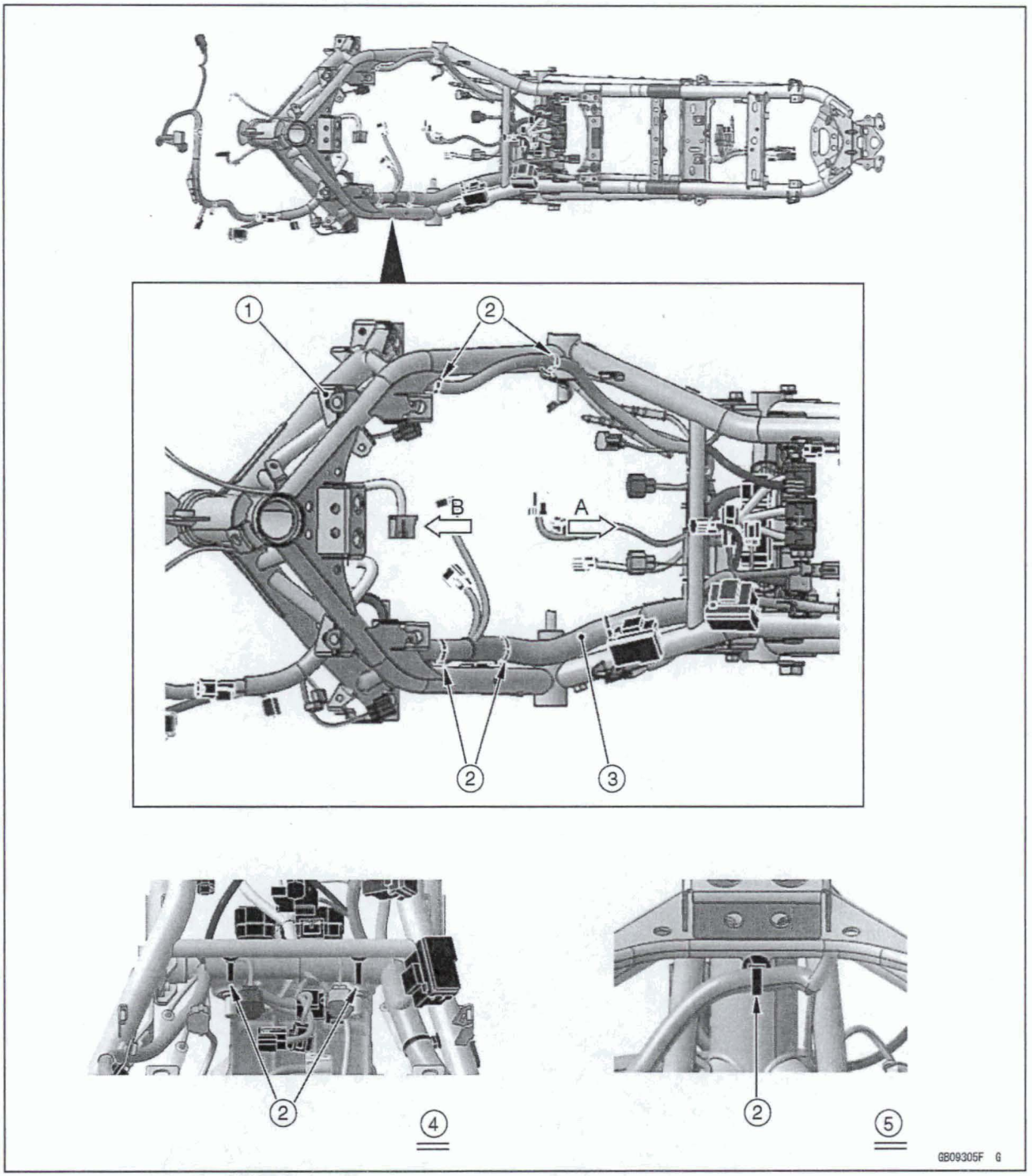
1. Clamp (Hold the horn lead, and install the clamp to the horn bracket.)
2. Horn Lead
3. Tilt the clamp to the outside of the vehicle as shown.
4. Viewed from A
5. Run the horn lead between the left switch housing lead and frame pipe.
6. Left Switch Housing Lead
7. Run the front wheel rotation sensor lead (ABS equipped models) under the ignition switch lead.
8. Ignition Switch Lead
9. Right Switch Housing Lead
10. Front Wheel Rotation Sensor Lead (ABS Equipped Models)
11. Run the front wheel rotation sensor lead (ABS equipped models) between the right switch housing lead and frame pipe.
12. Front Brake Hoses (ABS Equipped Models)
13. Run the front brake hose (ABS equipped models) between the ignition switch lead and right switch housing lead.
14. Viewed from Front Right Side

Cable, Wire, and Hose Routing



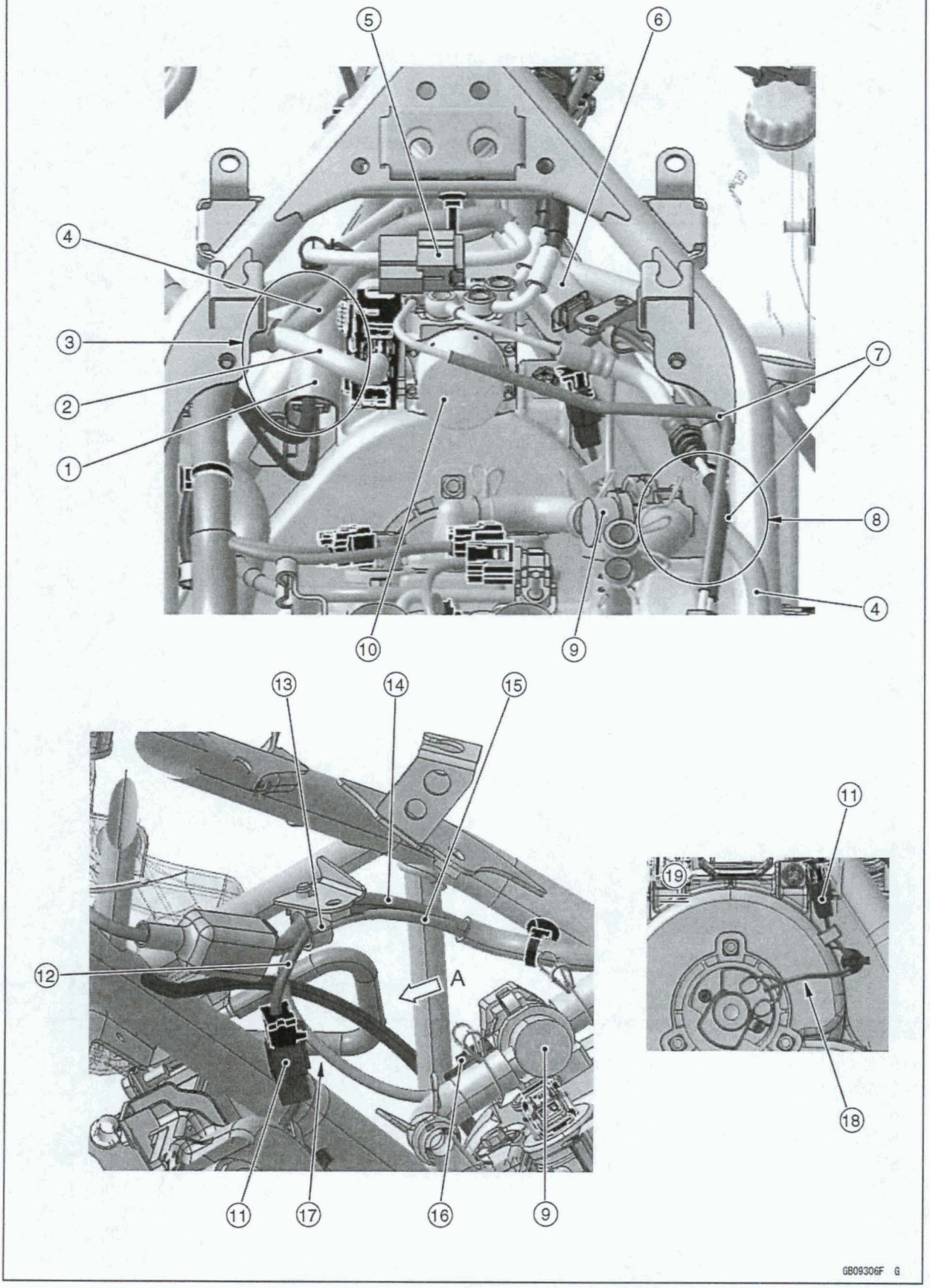
1. Run the clutch cable under the right switch housing lead.
2. Run the clutch cable to the inside of the frame.
3. Clutch Cable
4. Run the clutch cable to the outside of the frame.
5. Clamp (Hold the clutch cable.)
6. Clamp (Hold the clutch cable and left switch housing lead.)
7. Install the clamp along the joint of the clutch cable.
8. Run the clutch cable to the inside of left switch housing lead.
9. Left Switch Housing Lead
10. Horn Lead
11. Run the clutch cable between the horn lead and frame pipe.
12. Run the clutch cable under the throttle cables.
13. Throttle Cables

Cable, Wire, and Hose Routing



1. Frame
2. Clamps (Hold the main harness, and install them to the frame.)
3. Main Harness
4. Viewed from A
5. Viewed from B

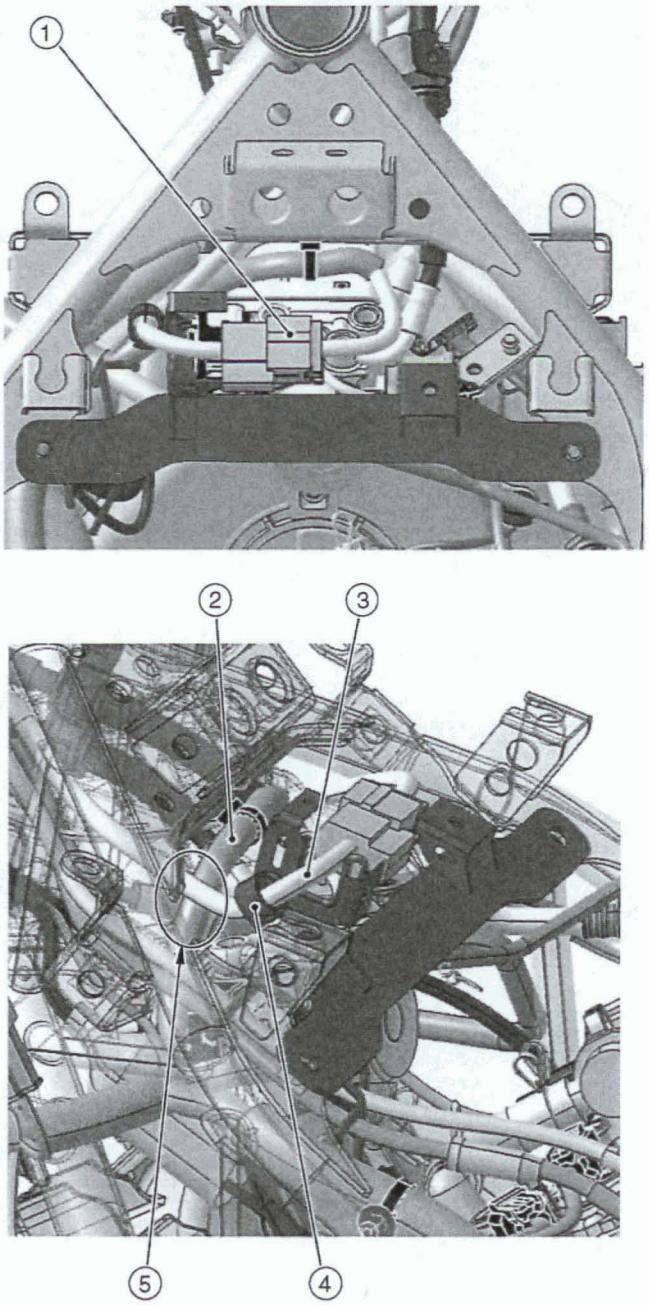
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

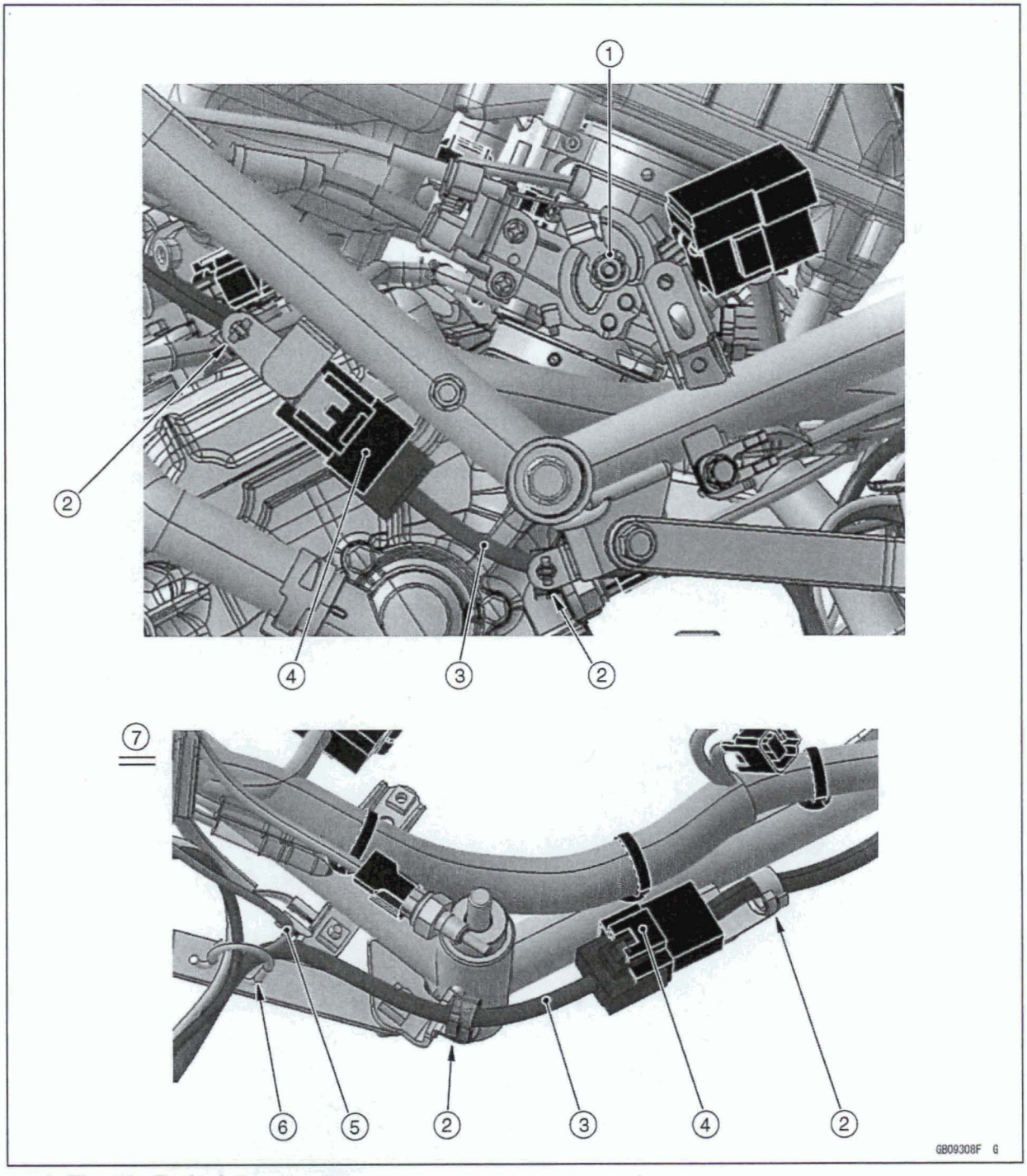
1. Left Switch Housing Lead Connector
2. ABS Hydraulic Unit Lead (ABS Equipped Models)
3. Run the left switch housing lead connector under the main harness and ABS hydraulic unit lead (ABS equipped models).
4. Main Harness
5. Ignition Switch Lead Connector
6. Right Switch Housing Lead Connector
7. ABS Brake Pipes (ABS Equipped Models)
8. Run the main harness under the ABS brake pipes (ABS equipped models).
9. Air Switching Valve
10. ABS Hydraulic Unit (ABS Equipped Models)
11. Radiator Fan Motor Lead Connector
12. Radiator Fan Motor Lead
13. Clamp (Hold the right switch housing lead, radiator fan motor lead and air switching valve lead.)
14. Right Switch Housing Lead
15. Air Switching Valve Lead
16. Air Switching Valve Lead Connector
17. Run the radiator fan motor lead to front side of the air switching valve lead.
18. Run the radiator fan motor lead as shown.
19. Viewed from A

Cable, Wire, and Hose Routing



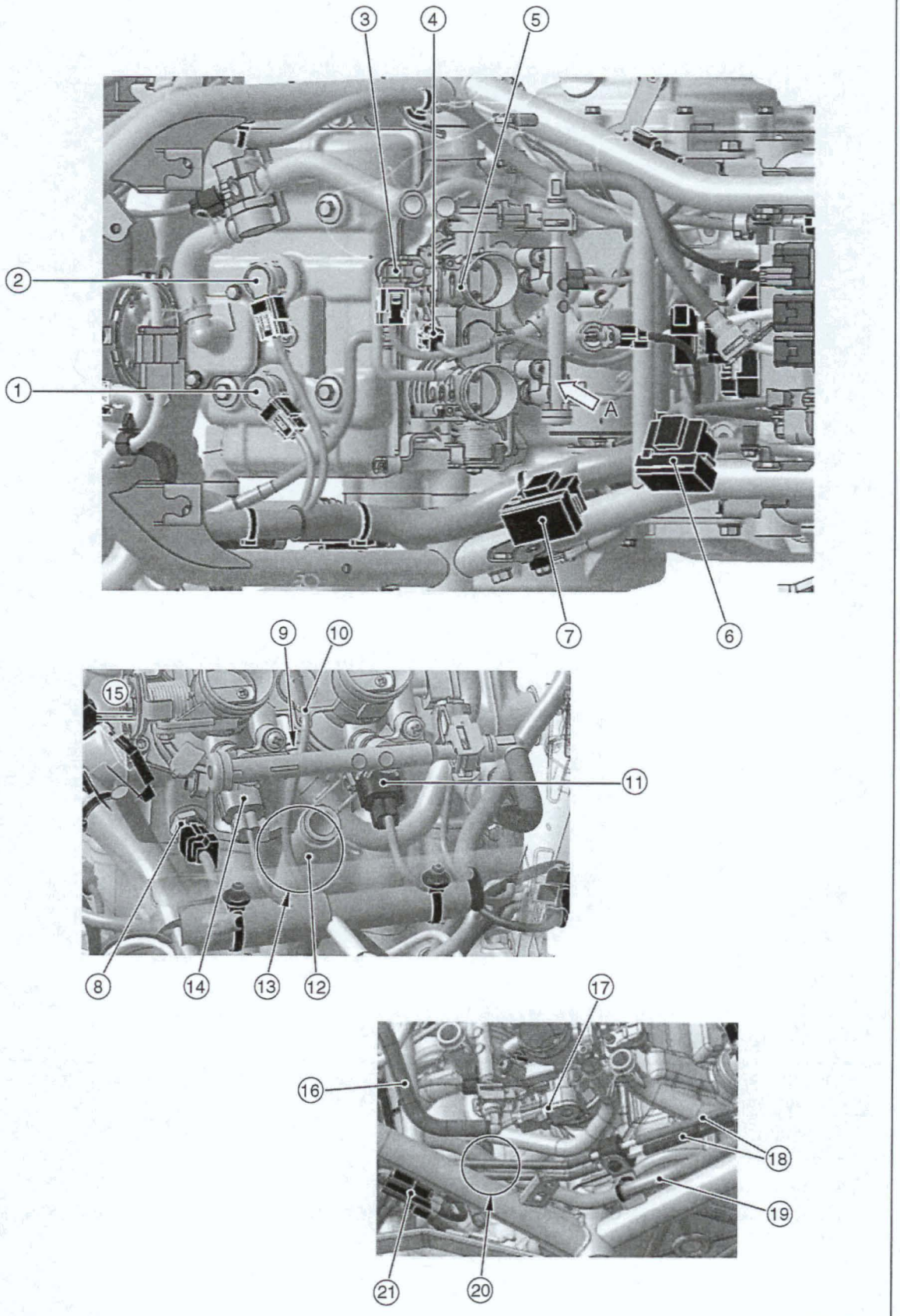
1. Ignition Switch Lead Connector (Connect it connector and install the bracket.)
2. Main Harness
3. Ignition Switch Lead
4. Clamp (Hold the ignition switch lead.)
5. Run the ignition switch lead to the upside of the main harness.

Cable, Wire, and Hose Routing



1. Throttle Body Assy
2. Clamps (Hold the alternator lead.)
3. Alternator Lead
4. Alternator Lead Connector (Install it to the bracket.)
5. Crankshaft Sensor Lead
6. Run the alternator lead, crankshaft sensor lead, gear position sensor lead and side stand switch lead through the clamp.
7. Opposite View

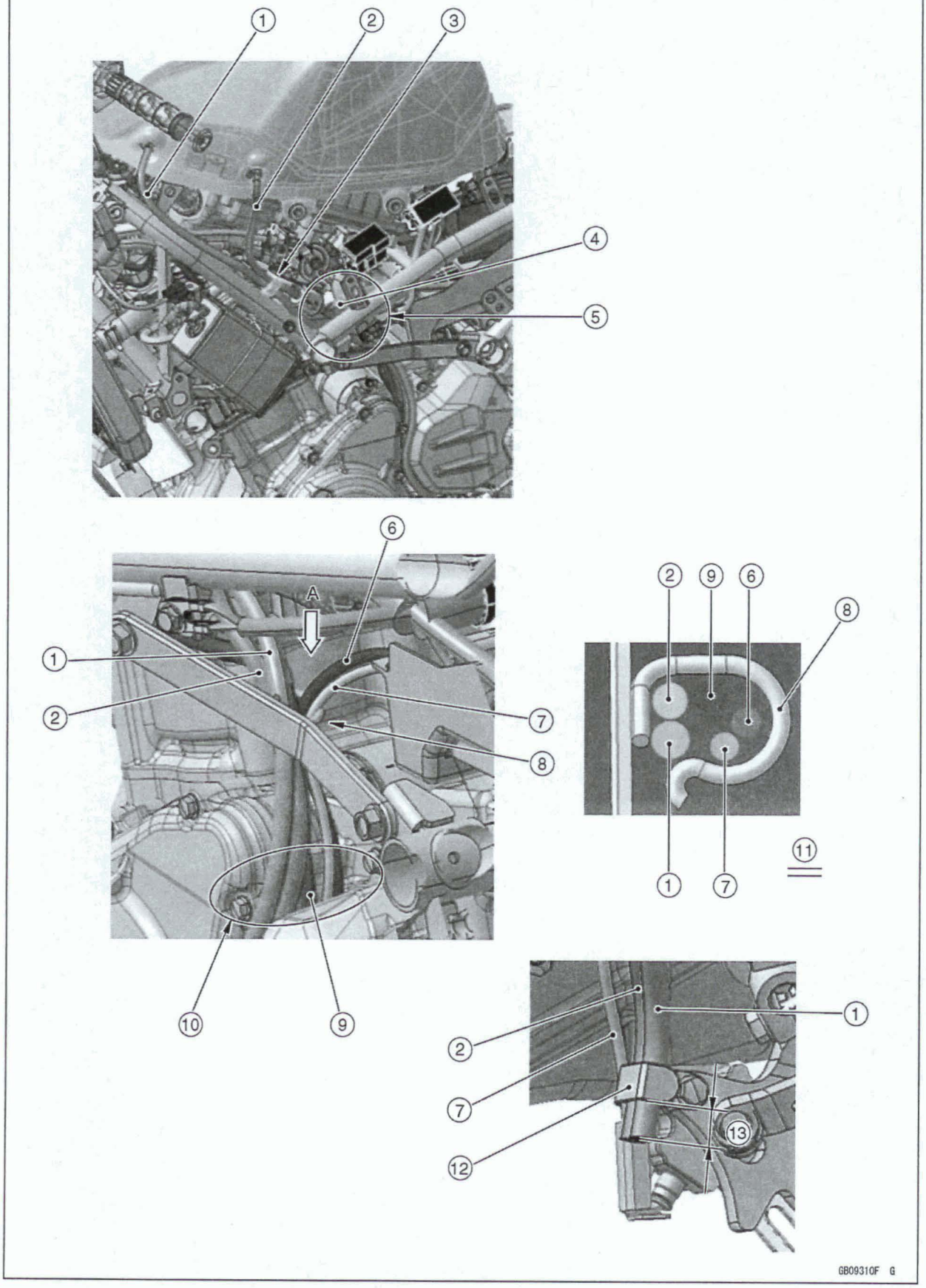
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Stick Coil #1
2. Stick Coil #2
3. Intake Air Pressure Sensor
4. Idle Speed Control Valve Actuator
5. Throttle Body Assy
6. Fuse Box (2)
7. Fuse Box (1)
8. Water Temperature Sensor
9. Run the lead [10] under the fuel pipe.
10. Lead (to Intake Air Pressure Sensor and Idle Speed Control Valve Actuator)
11. Fuel Injector #2
12. Breather Hose
13. Run the lead [10] to the left side of the breather hose.
14. Fuel Injector #1
15. Viewed from A
16. Fuel Hose
17. Main Throttle Sensor
18. ABS Brake Pipes (ABS Equipped Models)
19. Main Harness
20. Run the main harness under the ABS brake pipes (ABS equipped models).
21. Oxygen Sensor Lead Connector

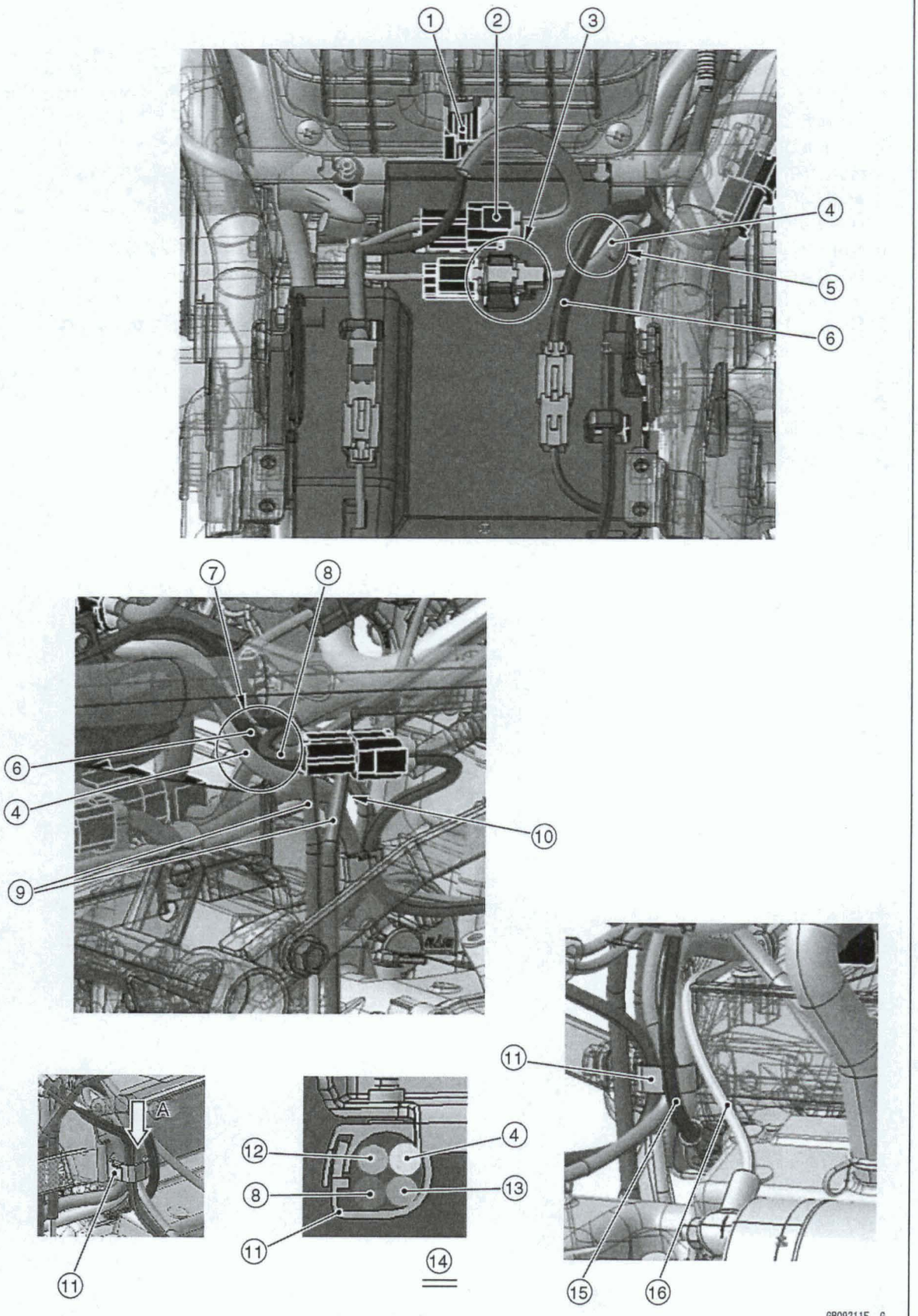
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Fuel Tank Drain Hose
2. Fuel Tank Breather Hose
3. Clamp (Hold the fuel tank drain hose and fuel tank breather hose.)
4. Main Harness
5. Run the fuel tank drain hose and fuel tank breather hose between the main harness and frame.
6. Gear Position Sensor Lead
7. Side Stand Switch Lead
8. Run the fuel tank drain hose, fuel tank breather hose, alternator lead, side stand switch lead and gear position sensor lead through the clamp.
9. Alternator Lead
10. Run the fuel tank drain hose, fuel tank breather hose, alternator lead, side stand switch lead and gear position sensor lead in turn from outside the vehicle as shown.
11. Viewed from A
12. Clamp (Hold the fuel tank drain hose, fuel tank breather hose and side stand switch lead in turn from outside the vehicle as shown.)
13. 10 mm (0.39 in.)

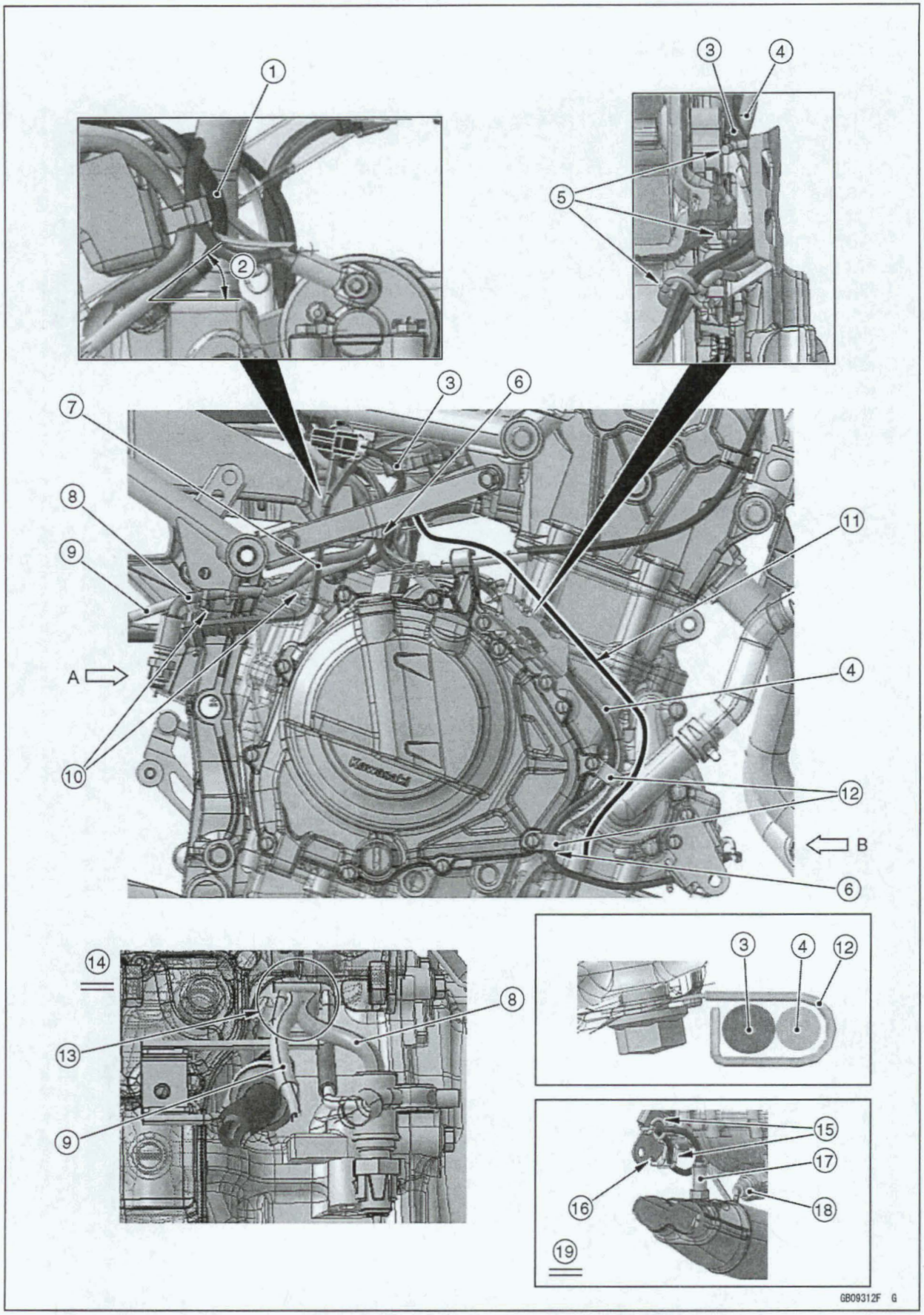
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Intake Air Temperature Sensor Lead Connector
2. Fuel Pump Lead Connector
3. Rear Wheel Rotation Sensor Lead Connector (The cutout of the connector faces upward.)
4. Rear Wheel Rotation Sensor Lead
5. Run the rear wheel rotation sensor lead under the battery negative (–) cable.
6. Battery Negative (–) Cable
7. Run the rear wheel rotation sensor lead and battery negative (–) cable under the oxygen sensor lead.
8. Oxygen Sensor Lead
9. ABS Brake Pipes (ABS Equipped Models)
10. Run the ABS brake pipes (ABS equipped models) to front side of the oxygen sensor.
11. Clamp (Hold the rear wheel rotation sensor lead, rear brake light switch lead, oil pressure switch lead and oxygen sensor lead.)
12. Rear Brake Light Switch Lead
13. Oil Pressure Switch Lead
14. Viewed from A
15. Battery Negative (–) Cable
16. Starter Motor Cable (Run the starter motor cable to the most inside of the leads.)

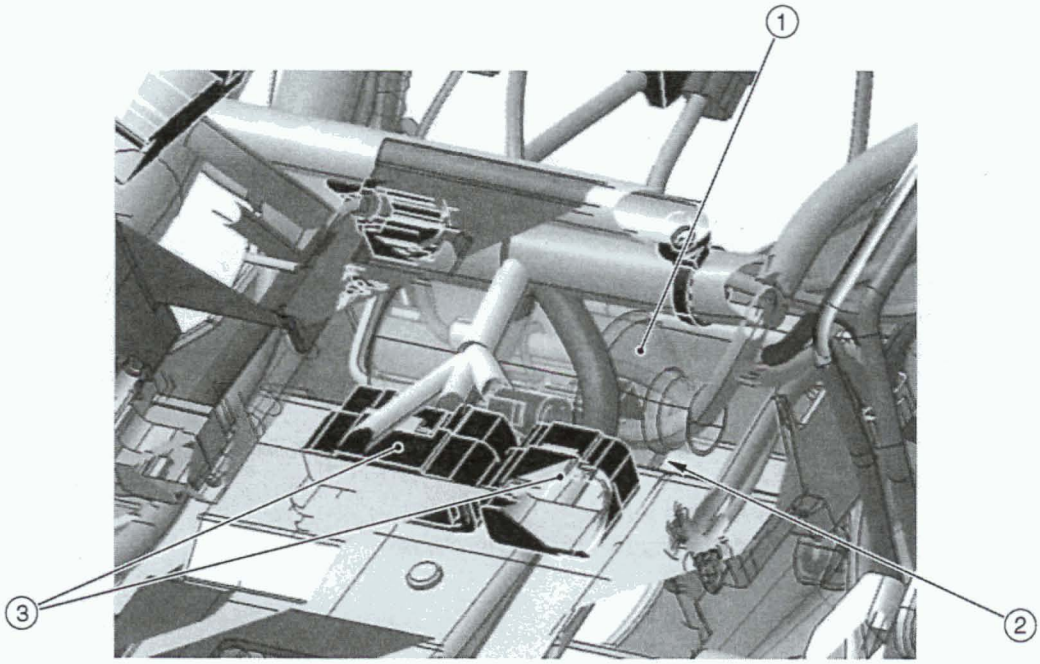
Cable, Wire, and Hose Routing

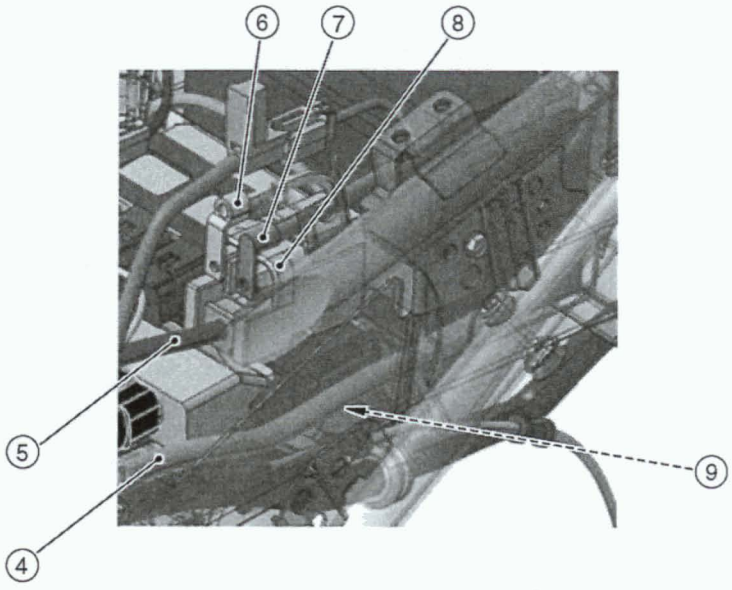


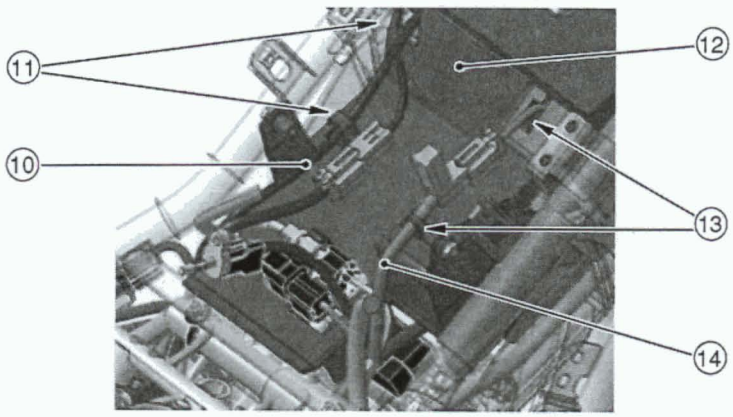
Cable, Wire, and Hose Routing

1. Battery Negative (–) Cable
2. About 30°
3. Oxygen Sensor Lead
4. Oil Pressure Switch Lead
5. Run the oil pressure switch lead and oxygen sensor lead through the clamps.
6. Align the mark of the oxygen sensor lead with the clamps.
7. ABS Brake Pipes (ABS Equipped Models)
8. Rear Brake Light Switch Lead
9. Rear Wheel Rotation Sensor Lead
10. Run the rear wheel rotation sensor lead and rear brake light switch lead to the inside of the ABS brake pipes (ABS equipped models).
11. Do not twist and stretch the oxygen sensor lead and oil pressure switch lead in line area.
12. Clamps (Hold the oxygen sensor lead and oil pressure switch lead. Do not touch the water pump.)
13. Run the rear wheel rotation sensor lead to the inside of the rear brake light switch lead.
14. Viewed from A
15. Clamps (Hold the oxygen sensor lead.)
16. Do not pass the oxygen sensor lead through the clamp.
17. Oxygen Sensor
18. Oil Pressure Switch
19. Viewed from B

Cable, Wire, and Hose Routing







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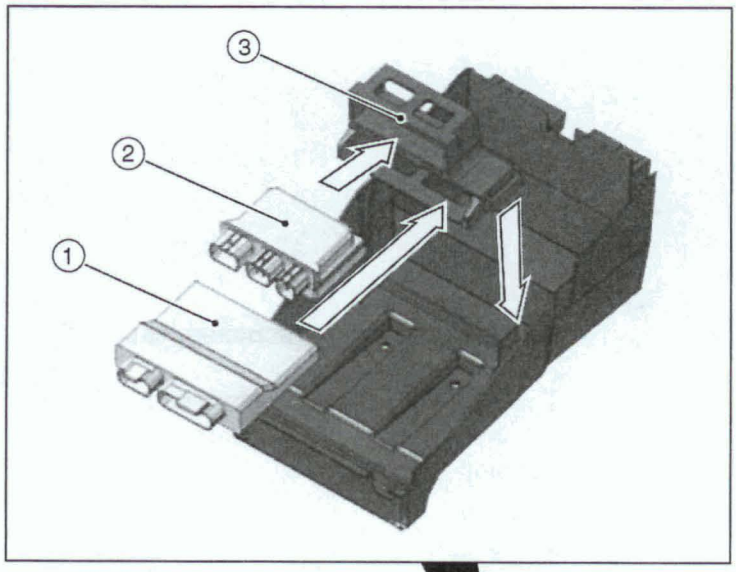
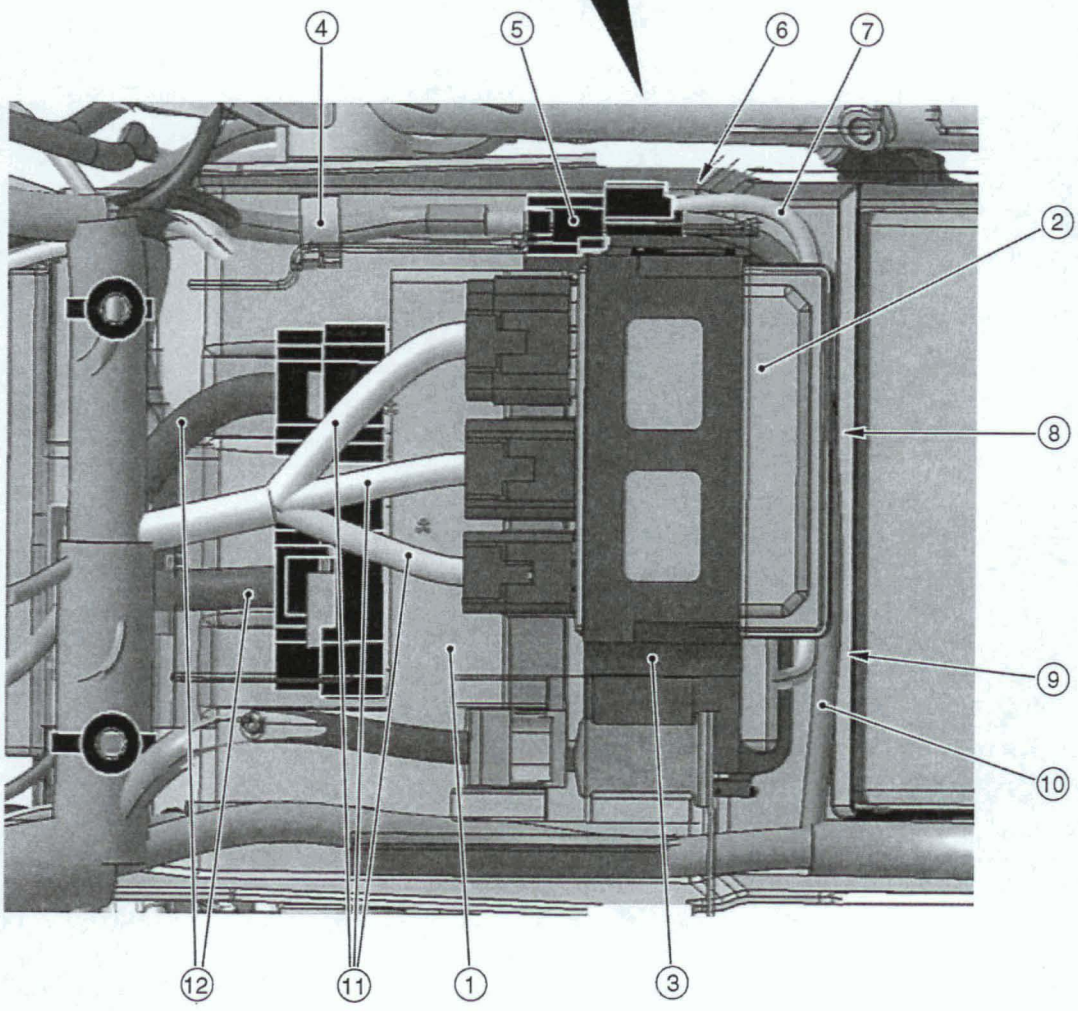
Cable, Wire, and Hose Routing

1. Cover the gear position sensor lead connector, side stand switch lead connector and crankshaft sensor lead connector with the rubber boot.
2. Run the gear position sensor lead, side stand switch lead and crankshaft sensor lead under the ECU Lead.
3. ECU Lead Connectors
4. Main Harness
5. Starter Relay Lead
6. Starter Motor Cable
7. Battery Positive (+) Cable
8. Starter Relay (Install it to the bracket.)
9. Run the main harness under the starter relay.
10. Battery Negative (–) Cable
11. Run the battery negative (–) cable through hooks of the battery case cover.
12. Battery Case Cover
13. Run the battery positive (+) cable through hooks of the battery case cover (ABS equipped models).
14. Battery Positive (+) Cable (ABS Equipped Models)

Cable, Wire, and Hose Routing





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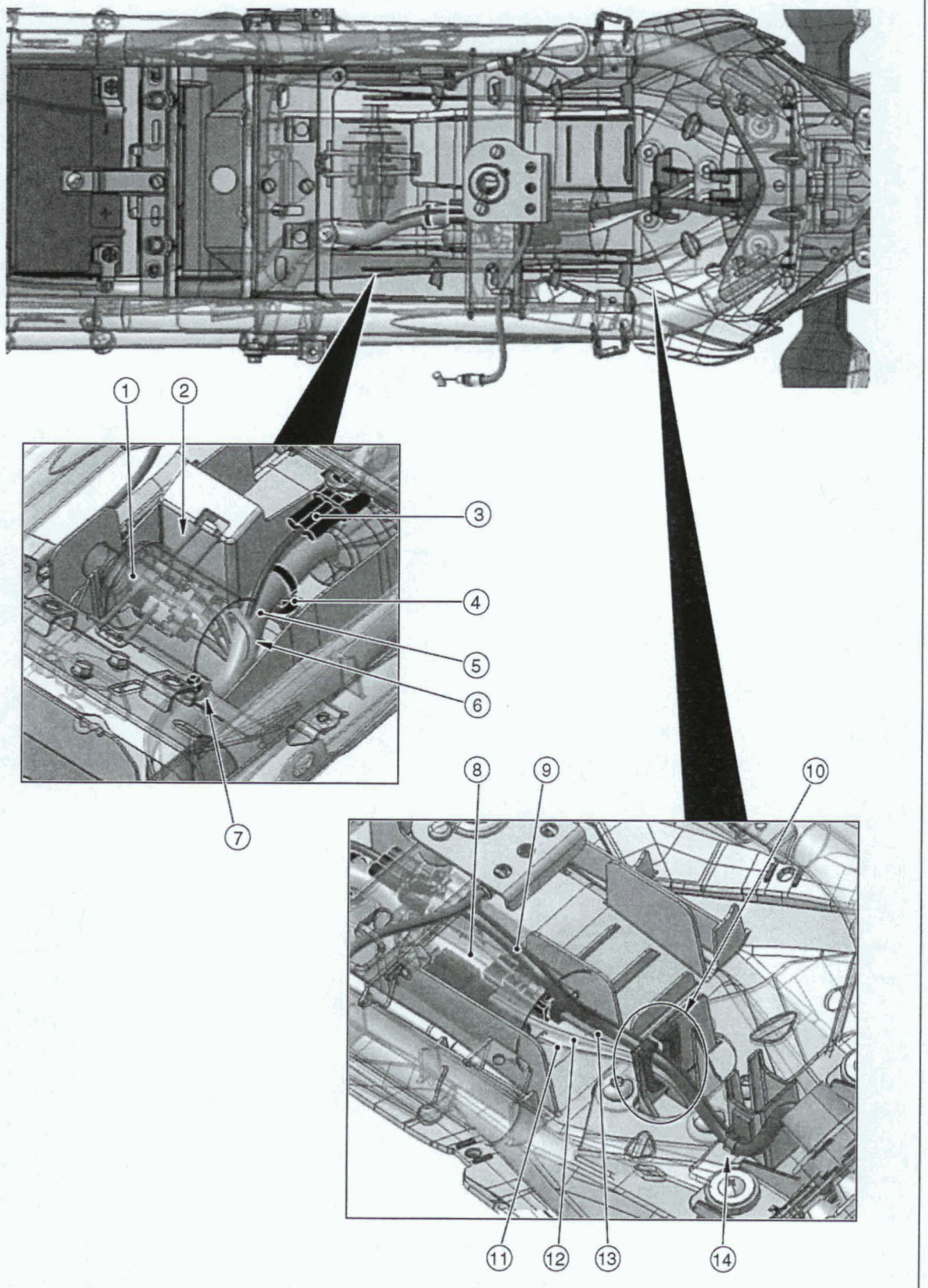
Cable, Wire, and Hose Routing

1. ECU (Install it to the damper.)
2. Relay Box (Install it to the damper.)
3. Damper
4. Clamp (Hold the rear brake light switch lead and starter motor cable.)
5. Rear Brake Light Switch Lead Connector
6. Run the starter motor cable under the ECU and rear brake light switch lead.
7. Starter Motor Cable
8. Run the rear brake light switch lead through the downside of the ECU.
9. Run the rear brake light switch lead and starter motor cable through the backside of the ECU.
10. Rear Brake Light Switch Lead
11. Relay Box Leads
12. ECU Leads

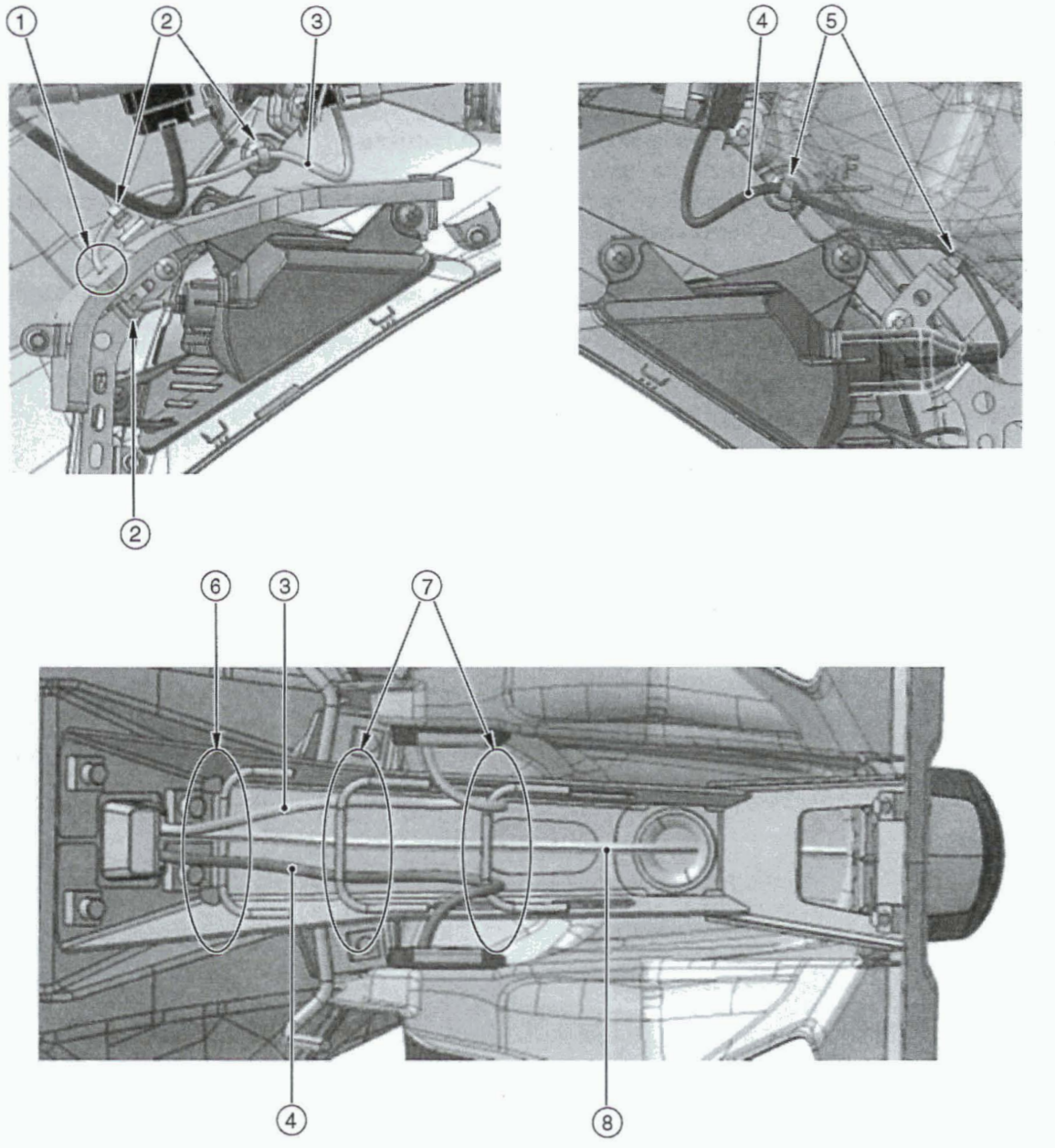
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

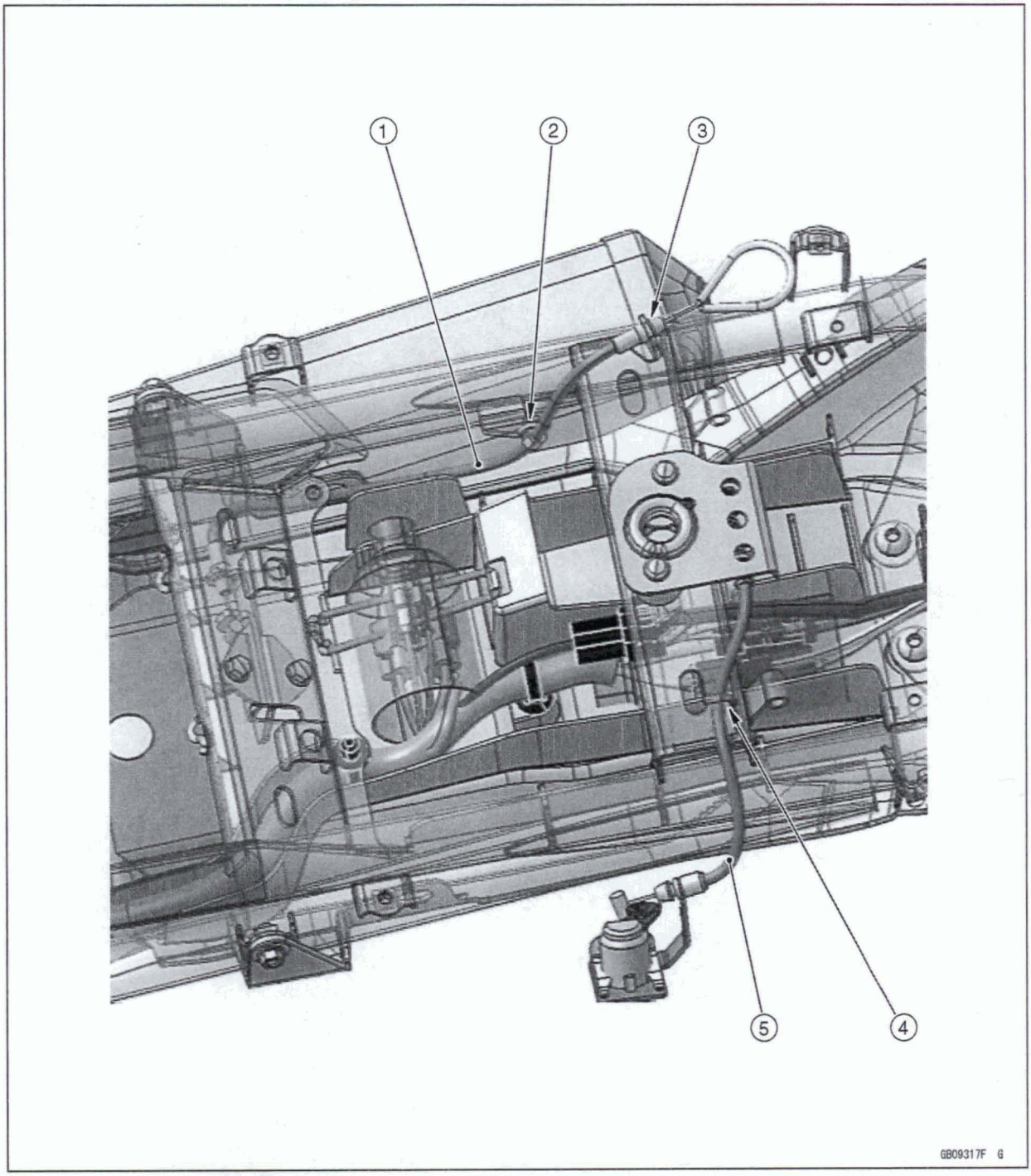
1. Cover the ABS kawasaki diagnosis system connector (equipped models), ABS self-diagnosis terminal (equipped models), kawasaki diagnostic system connector and water-proof joint with the rubber boot.
2. Band (Hold the rubber boot.)
3. Brake/Tail Light Lead Connector (Install it to the frame.)
4. Clamp (Hold the main harness, and install it to the rear fender.)
5. Main Harness
6. Run the water-proof joint to the upside of the main harness.
7. Clamp (Hold the main harness to the frame.)
8. Cover the rear turn signal light lead connectors and license plate light lead connector with the rubber boot. Do not run the brake/tail light lead in the rubber boot.
9. Brake/Tail Light Lead
10. Run the rear turn signal light leads, license plate light lead and brake/tail light lead through the damper.
11. Rear Left Turn Signal Light Lead
12. License Plate Light Lead
13. Rear Right Turn Signal Light Lead
14. Clamp (Hold the brake/tail light lead.)

Cable, Wire, and Hose Routing



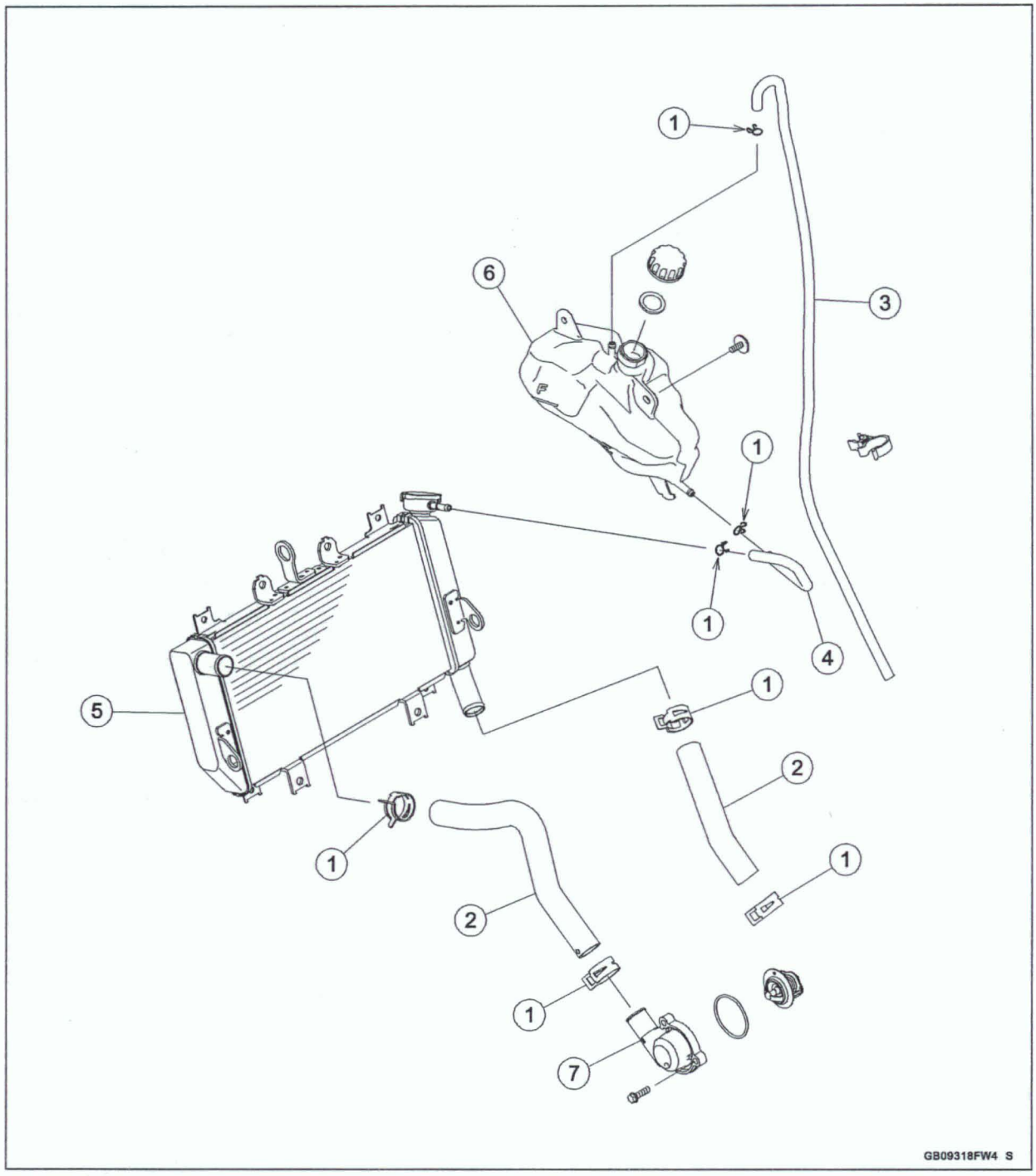
1. Run the rear left turn signal light lead into the hole of the pad.
2. Clamps (Hold the rear left turn signal light lead.)
3. Rear Left Turn Signal Light Lead
4. Rear Right Turn Signal Light Lead
5. Clamps (Hold the rear right turn signal light lead.)
6. Run the rear turn signal light leads and license plate light lead underside the guide.
7. Run the rear turn signal light leads and license plate light lead upside the guides.
8. License Plate Light Lead

Cable, Wire, and Hose Routing



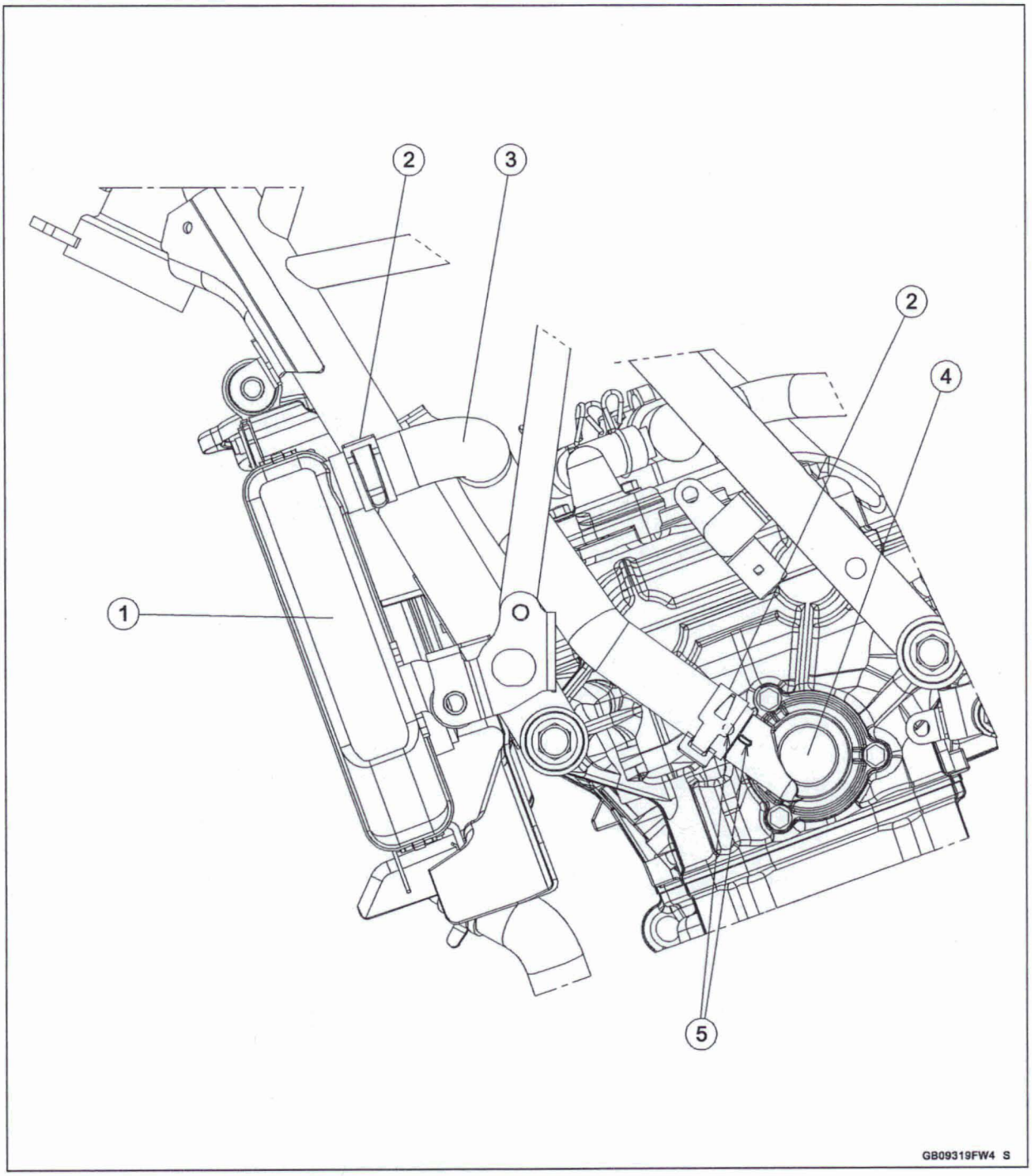
1. Seat Lock Cable (Front)
2. Clamp (Hold the seat lock cable (front).)
3. Install seat lock cable (rear) to the frame hook.
4. Run the seat lock cable (rear) through the front side of the guide.
5. Seat Lock Cable (Rear)

Cable, Wire, and Hose Routing



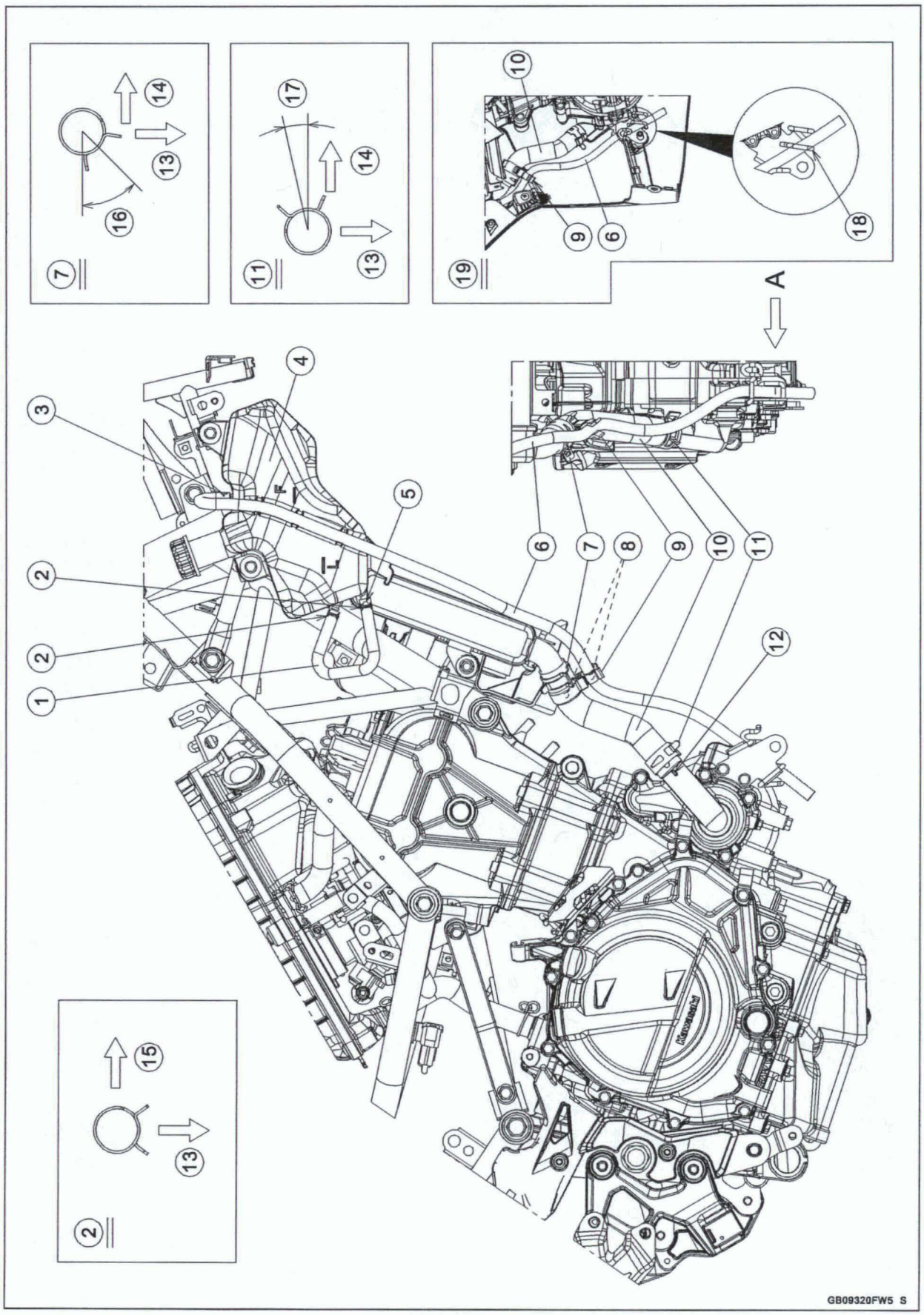
1. Install the clamps as shown.
2. Water Hoses
3. Reserve Tank Overflow Hose
4. Radiator Overflow Hose
5. Radiator
6. Coolant Reserve Tank
7. Thermostat Cover

Cable, Wire, and Hose Routing



1. Radiator
2. Install the clamps as shown.
3. Water Hose
4. Thermostat Cover
5. Align the white paint mark of the water hose with the projection on the thermostat cover.

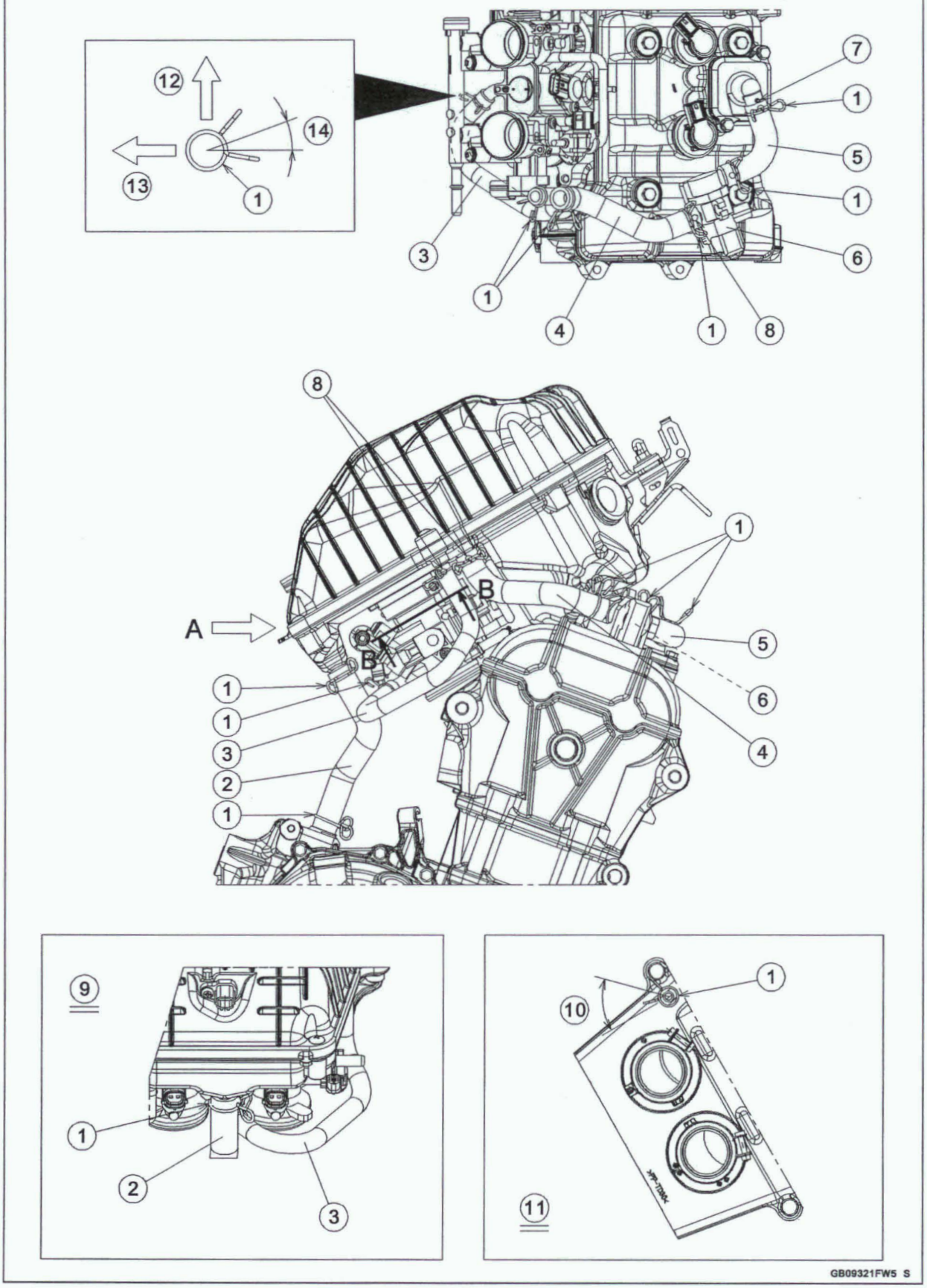
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Radiator Overflow Hose
2. Clamps (Hold the radiator overflow hose.)
3. Clamp (Hold the reserve tank overflow hose.)
4. Coolant Reserve Tank
5. Install the radiator overflow hose so that the white paint mark faces right of vehicle.
6. Reserve Tank Overflow Hose
7. Install the clamp as shown.
8. White Paint Marks
9. Clamp (Hold the reserve tank overflow hose and water hose at the white painted marks of the their.)
10. Water Hose
11. Install the clamp as shown.
12. Align the white paint mark of the water hose with the projection on the water pump cover.
13. Right Side of Vehicle
14. Front Side of Vehicle
15. Upper Side of Vehicle
16. 45°
17. 10°
18. Run the reserve tank overflow hose through the clamp.
19. Viewed from A

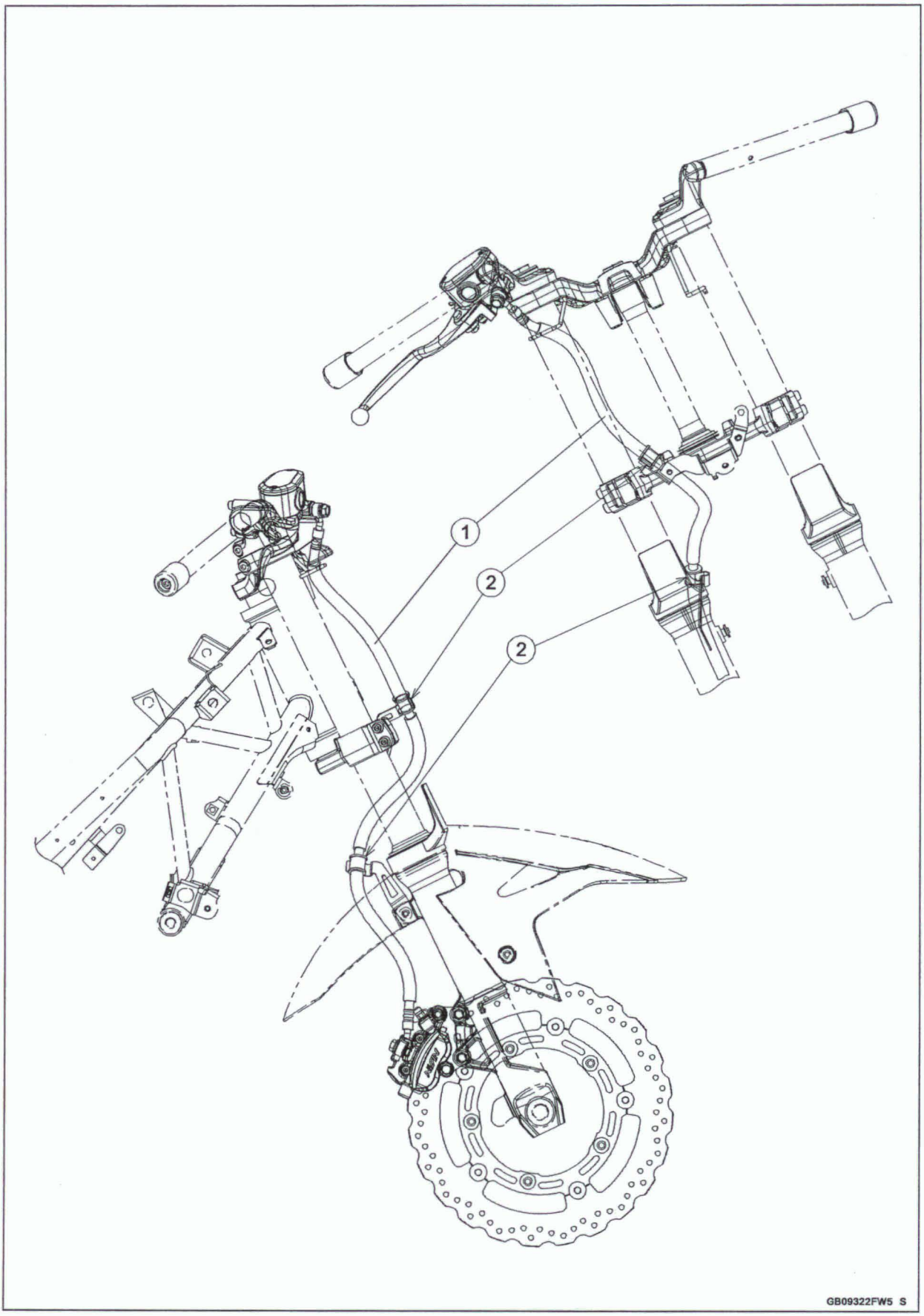
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Install the clamps as shown.
2. Crankcase Breather Hose
3. Air Intake Hose (to Throttle Body Assy)
4. Air Switching Valve Hose (to Air Cleaner Housing)
5. Air Switching Valve Hose (to Air Switching Valve)
6. Air Switching Valve
7. Align the white paint mark of the air switching valve [5] with the mark on the fitting.
8. White Paint Marks
9. Viewed from A
10. About 45°
11. Section B-B
12. Left Side of Vehicle
13. Lower Side of Vehicle
14. About 20°

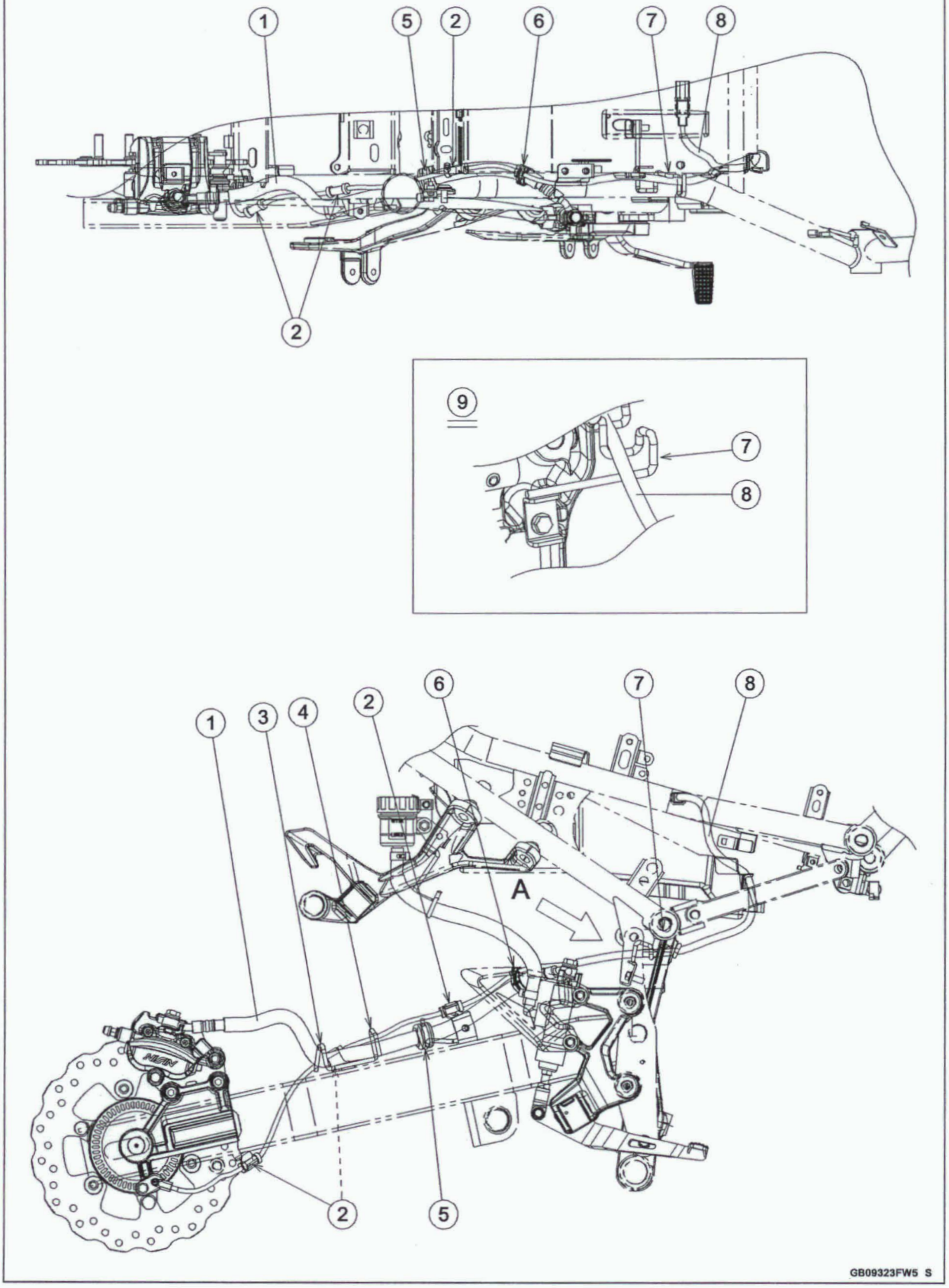
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Front Brake Hose
2. Clamps (Hold the front brake hose.)

Cable, Wire, and Hose Routing

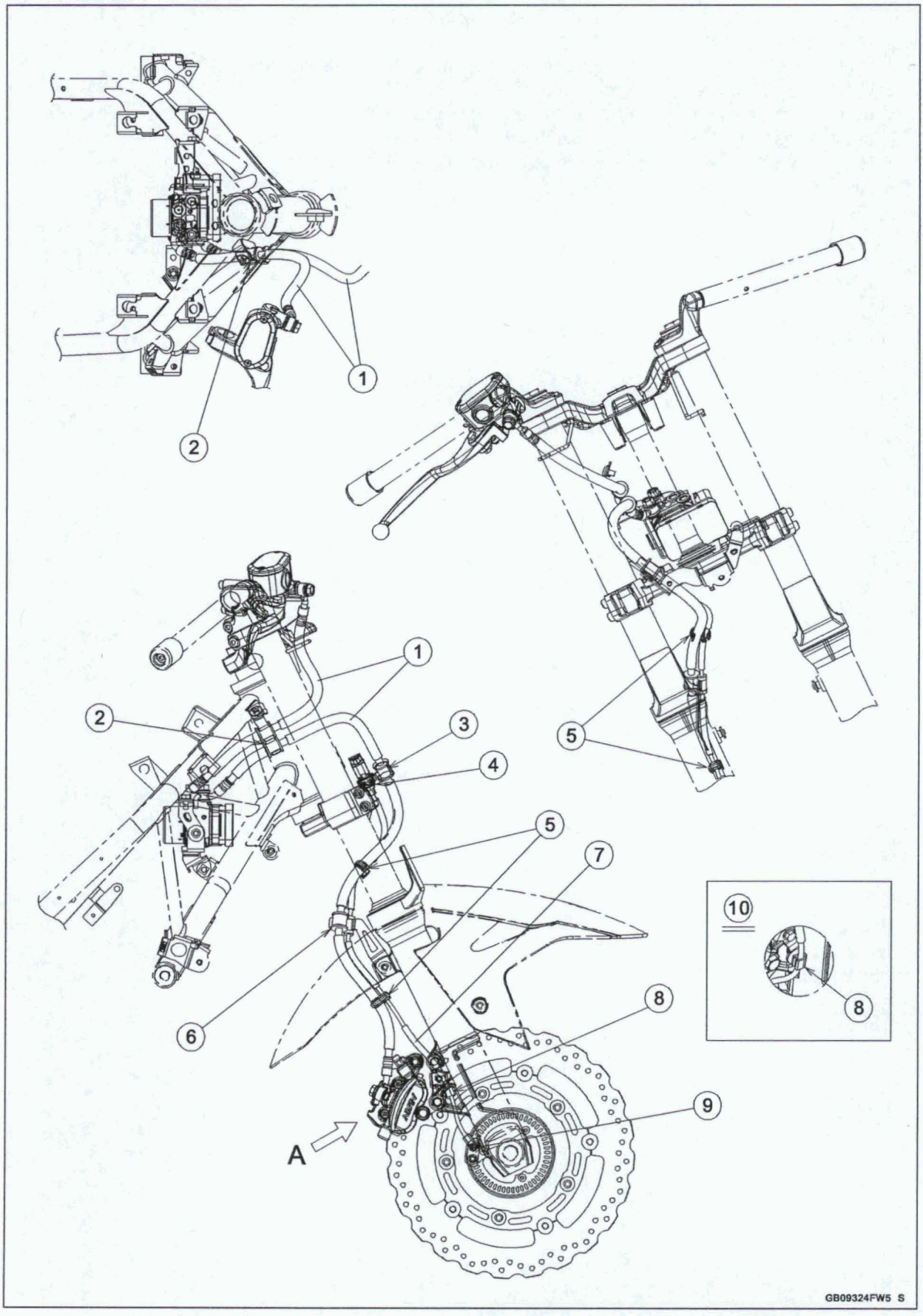


Cable, Wire, and Hose Routing

1. Rear Brake Hose
2. Clamps (Hold the rear wheel rotation sensor lead.)
3. Run the rear brake hose into the guide.
4. Run the rear wheel rotation sensor lead and rear brake hose into the guide.
5. Guide (Hold the rear brake hose.)
6. Clamp (Hold the rear brake hose and rear wheel rotation sensor lead at the white painted mark of the sensor lead. Position the clamp so that the open side faces inside.)
7. Run the rear wheel rotation sensor lead into the guide.
8. Rear Wheel Rotation Sensor Lead
9. Viewed from A

Cable, Wire, and Hose Routing

ABS Equipped Models

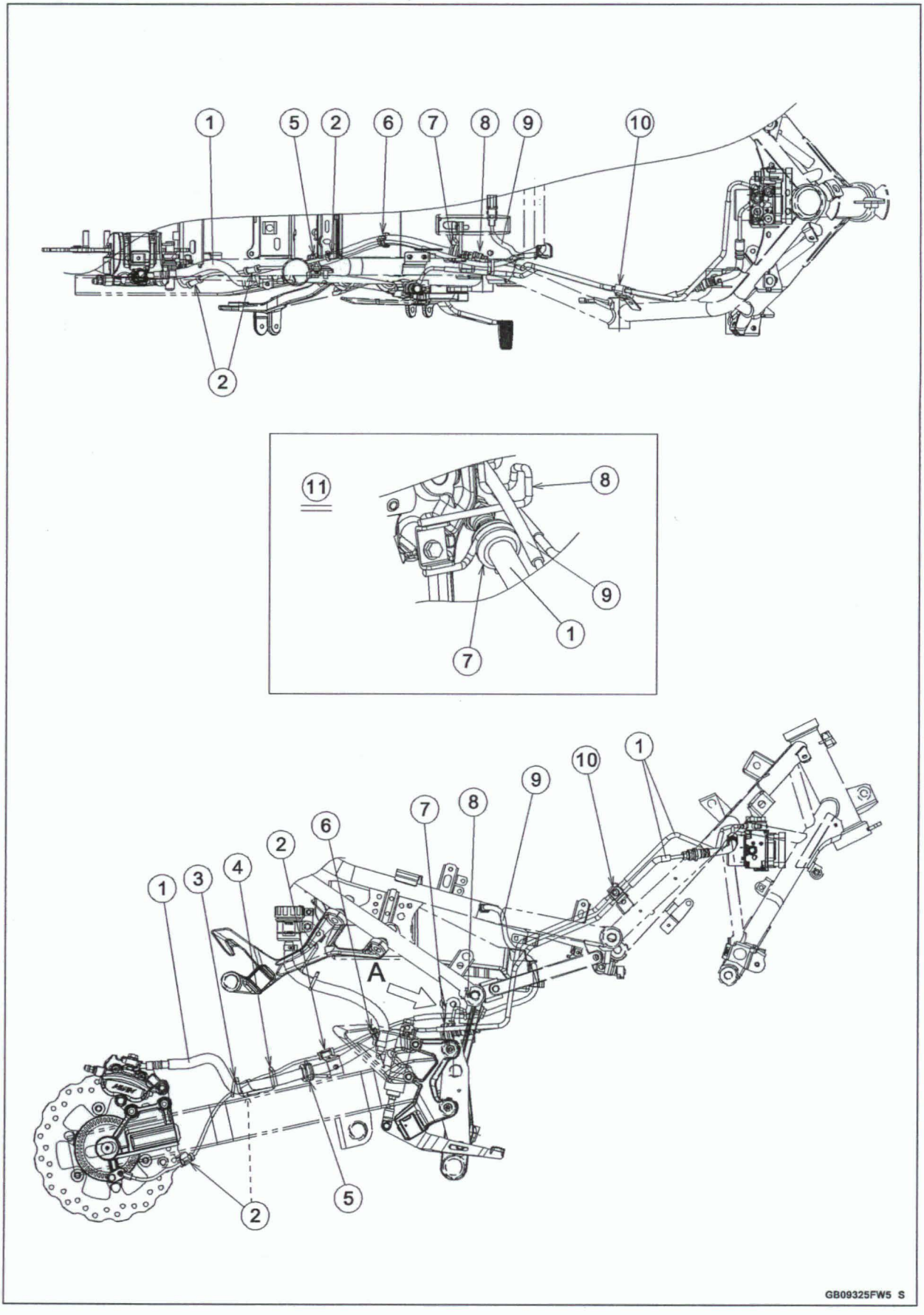


Cable, Wire, and Hose Routing

1. Front Brake Hoses
2. Clamp (Hold the front brake hoses.)
3. Clamp (Hold the front brake hose.)
4. Front Wheel Rotation Sensor Lead Connector (Install it to the bracket.)
5. Clamps (Hold the front brake hose and front wheel rotation sensor lead at the white painted mark of the front sensor lead.)
6. Clamp (Hold the front brake hose and front wheel rotation sensor lead.)
7. Front Wheel Rotation Sensor Lead
8. Clamp (Hold the front wheel rotation sensor lead. Face the open side of the clamp to the rear side.)
9. Front Wheel Rotation Sensor
10. Viewed from A

Cable, Wire, and Hose Routing

ABS Equipped Models

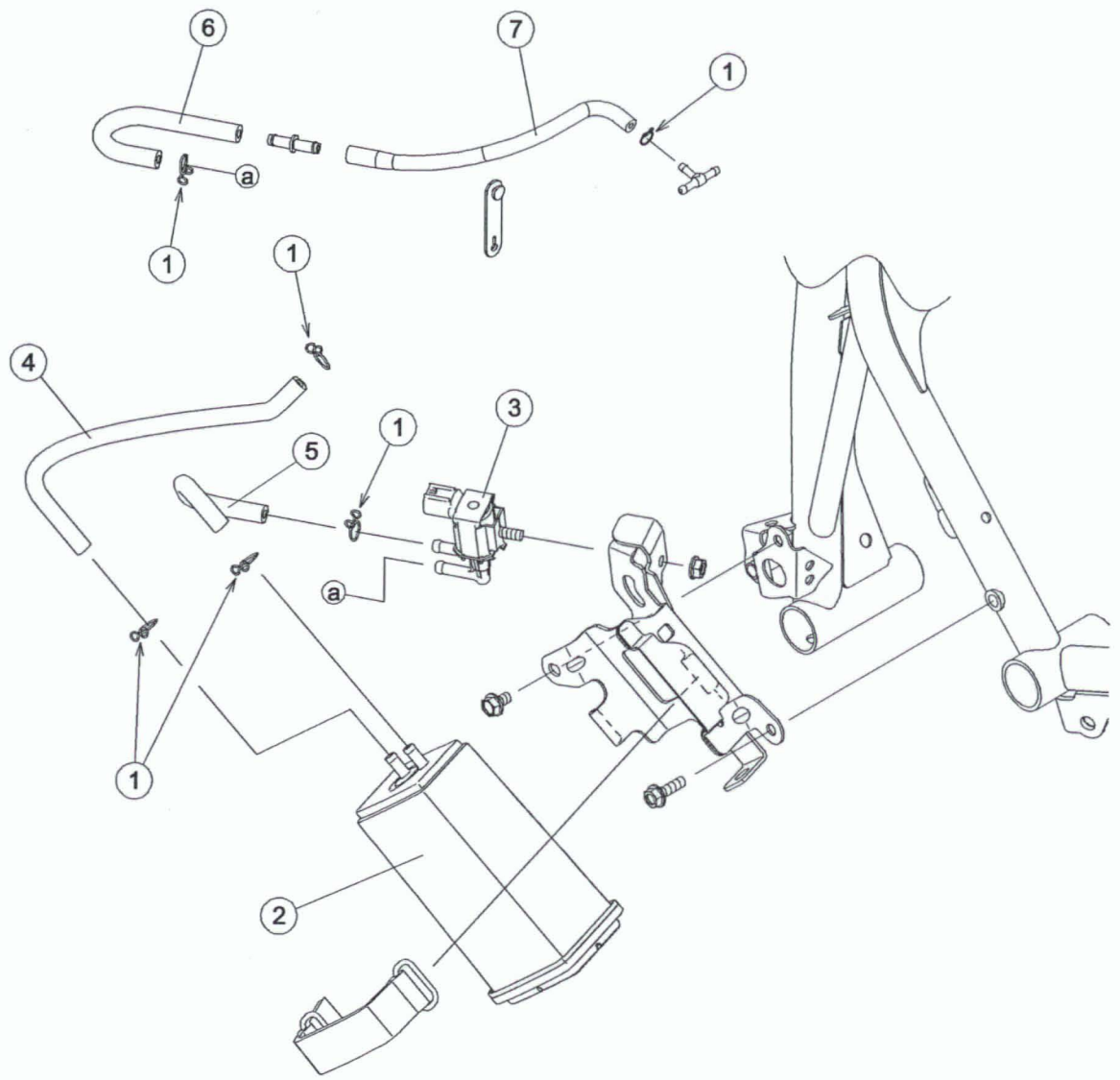


Cable, Wire, and Hose Routing

1. Rear Brake Hoses
2. Clamps (Hold the rear wheel rotation sensor lead.)
3. Run the rear brake hose into the guide.
4. Run the rear wheel rotation sensor lead and rear brake hose into the guide.
5. Guide (Hold the rear brake hose.)
6. Clamp (Hold the rear brake hose and rear wheel rotation sensor lead at the white painted mark of the sensor lead. Position the clamp so that the open side faces inside.)
7. Guide (Hold the rear brake hose.)
8. Run the rear wheel rotation sensor lead into the guide.
9. Rear Wheel Rotation Sensor Lead
10. Clamp (Hold the rear brake hoses.)
11. Viewed from A

Cable, Wire, and Hose Routing

Evaporative Emission Control System Equipped Models



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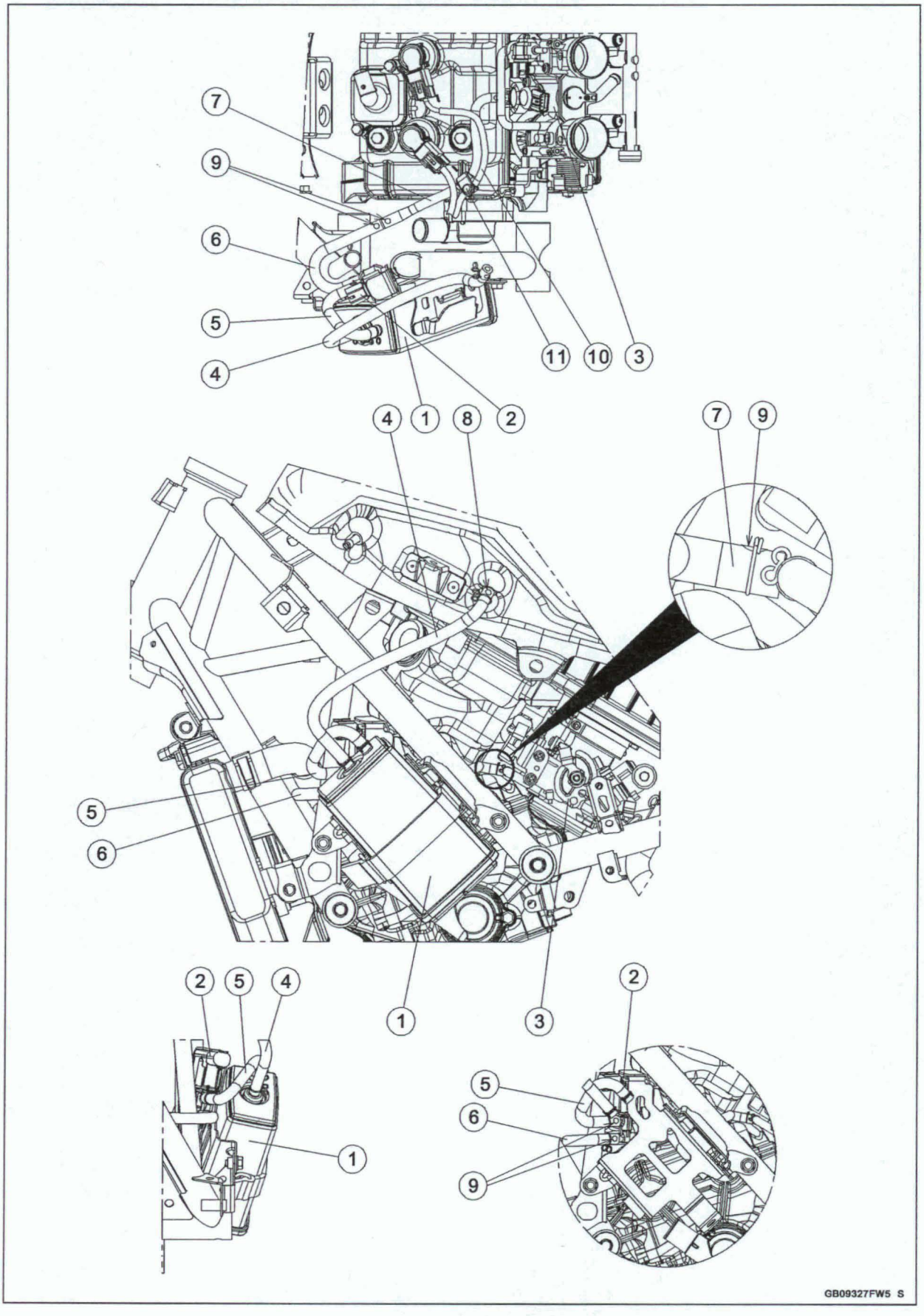
Cable, Wire, and Hose Routing

1. Install the clamps as shown.
2. Canister
3. Purge Valve
4. Fuel Tank Breather Hose (Fuel Tank ~ Canister)
5. Purge Hose (Canister ~ Purge Valve)
6. Purge Hose (to Purge Valve)
7. Purge Hose (to Throttle Body Assy)

Cable, Wire, and Hose Routing

Evaporative Emission Control System Equipped Models



Cable, Wire, and Hose Routing

1. Canister
2. Purge Valve
3. Throttle Body Assy
4. Fuel Tank Breather Hose (Fuel Tank ~ Canister)
5. Purge Hose (Canister ~ Purge Valve)
6. Purge Hose (to Purge Valve)
7. Purge Hose (to Throttle Body Assy)
8. Blue Paint Mark
9. Green Paint Mark
10. Stick Coil #2
11. Clamp (Hold the purge hose [7] and stick coil #2 lead at the green tape position of the purge hose.)

Troubleshooting Guide

NOTE

○*Refer to the Fuel System (DFI) 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 or ignition fuse blown

Starter motor rotating but engine doesn't turn over:
- Vehicle-down sensor (DFI) coming off
- 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

Engine flooded:
- Clean spark plug and adjust plug gap
- Starting technique faulty
- (When flooded, do not crank the engine with the throttle fully opened. This promotes engine flood because more fuel is supplied automatically by DFI.)

No spark; spark weak:
- Vehicle-down sensor (DFI) coming off
- Ignition switch not on
- Engine stop switch turned to stop position
- Clutch lever not pulled in or gear not in neutral
- Battery voltage low
- 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 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 cap.

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
- 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
- Pilot passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Fuel tank air vent obstructed
- Fuel pump trouble
- Fuel to injector insufficient

Troubleshooting Guide

Fuel line clogged
Throttle body assy holder loose
Air cleaner housing holder loose

Compression low:
Spark plug loose
Cylinder head not sufficiently tightened down
No valve clearance
Cylinder, piston worn
Piston ring bad (worn, weak, broken, or sticking)
Piston ring/groove clearance excessive
Cylinder head gasket damaged
Cylinder head warped
Valve spring broken or weak
Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)
Camshaft cam worn

Run-on (dieseling):
Ignition switch trouble
Engine stop switch trouble
Fuel injector trouble
Carbon accumulating on valve seating surface
Engine overheating

Other:
ECU trouble
Throttle body assy not synchronizing
Engine oil viscosity too high
Drive train trouble
Brake dragging
Clutch slipping
Engine overheating
Air suction valve trouble
Air switching valve trouble

Poor Running or No Power at High Speed:

Firing incorrect:
Spark plug dirty, broken, or maladjusted
Spark plug incorrect
Stick coil shorted or not in good contact
Stick coil trouble
ECU trouble
Crankshaft sensor 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
Crankshaft sensor trouble

Miscellaneous:
Throttle valve won't fully open
Brake dragging
Clutch slipping
Engine overheating
Engine oil level too high
Engine oil viscosity too high
Drive train trouble
Camshaft cam worn
Air suction valve trouble
Air switching valve trouble
Catalytic converter melt down due to muffler overheating (KLEEN)

Overheating:

Firing incorrect:
Spark plug dirty, broken, or maladjusted
Spark plug incorrect
ECU trouble

Muffler overheating:
For KLEEN, do not run the engine even if with only one cylinder misfiring or poor running (Request the nearest service facility to correct it)
For KLEEN, do not push-start with a dead battery (Connect another full-charged battery with jumper cables, and start the engine using the electric starter)
For KLEEN, do not start the engine under misfire due to spark plug fouling or poor connection of the stick coil
For KLEEN, do not coast the motorcycle with the ignition switch off (Turn the ignition switch on and run the engine)
ECU trouble

Fuel/air mixture incorrect:
Throttle body assy holder loose
Air cleaner housing holder loose
Air cleaner poorly sealed, or missing
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
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:

Cooling system component incorrect:
Thermostat trouble
Radiator fan relay trouble
Water Temperature sensor broken

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
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

Abnormal Drive Train Noise:

Clutch noise:
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 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
Right and left front fork oil level incorrect

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