Kawasaki

Ninja 250R

Motorcycle Service Manual

Quick Reference Guide

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.

Kawasaki

Ninja 250R

Motorcycle Service Manual

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LIST OF ABBREVIATIONS

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

COUNTRY AND AREA CODES

AT	Austria	WVTA (FULL N)	WVTA Model (Full Power)
CH	Switzerland	GB WVTA (FULL N)	WVTA Model (Left Side Traffic Full Power)
DE	Germany		

Foreword

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

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

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

To get the longest life out of your vehicle.

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

How to Use This Manual

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

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

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

⚠ WARNING

This warning symbol identifies special instructions or procedures which, if not correctly followed, could result in personal injury, or loss of life.

CAUTION

This caution symbol identifies special instructions or procedures which, if not strictly observed, could result in damage to or destruction of equipment.

This manual contains four more symbols (in addition to WARNING and CAUTION) which will help you distinguish different types of information.

NOTE

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

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

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

General Information

Table of Contents

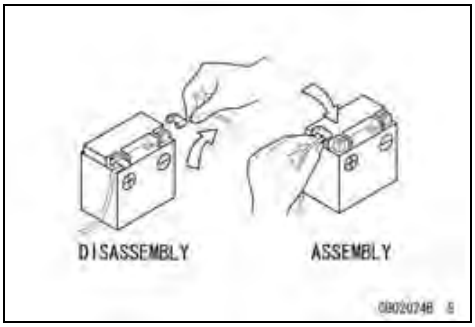
Before Servicing

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.

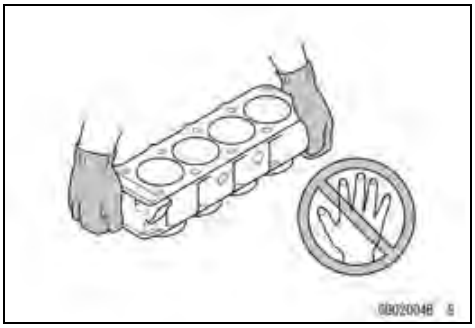
Battery Ground

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.



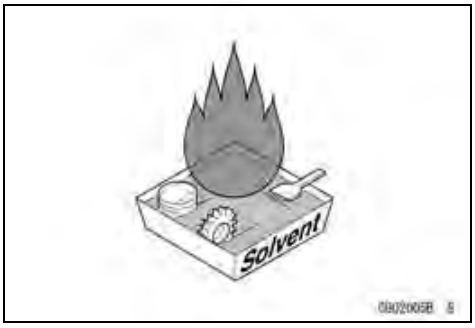
Edges of Parts

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



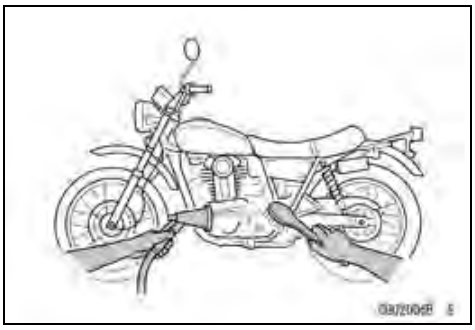
Solvent

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



Cleaning Vehicle before Disassembly

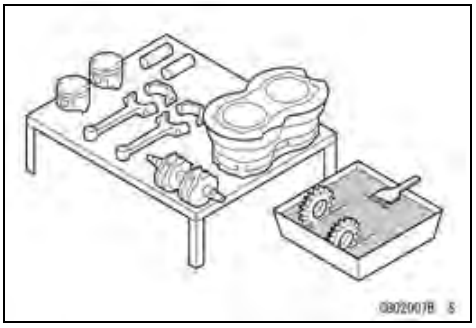
Clean the vehicle thoroughly before disassembly. Dirt or other foreign materials entering into sealed areas during vehicle disassembly can cause excessive wear and decrease performance of the vehicle.



Before Servicing

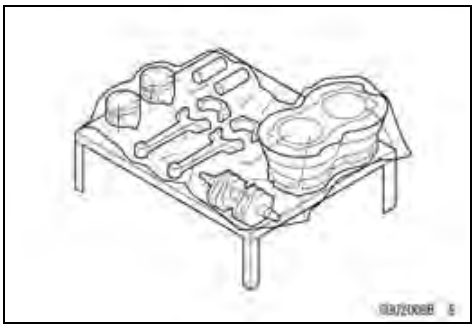
Arrangement and Cleaning of Removed Parts

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



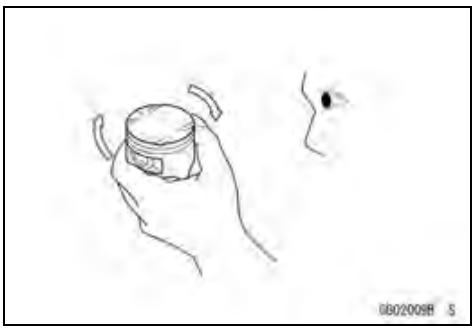
Storage of Removed Parts

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



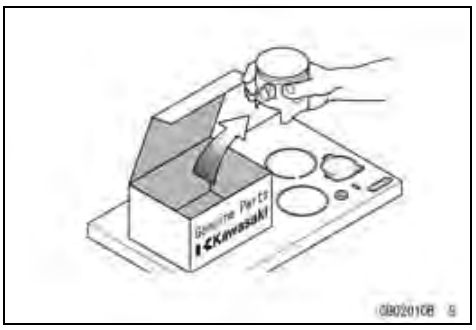
Inspection

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



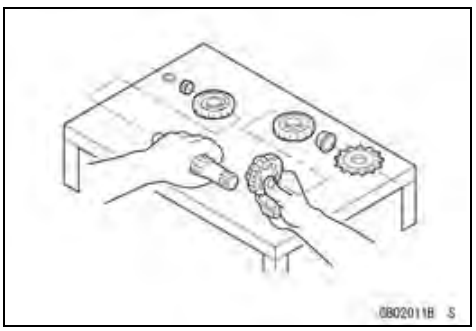
Replacement Parts

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



Assembly Order

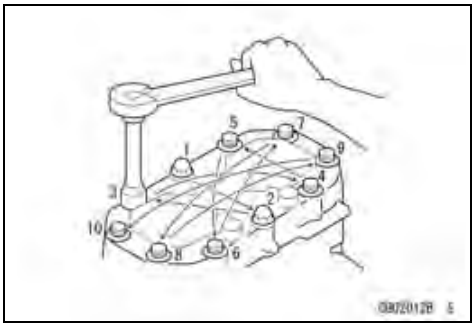
In most cases assembly order is the reverse of disassembly, however, if assembly order is provided in this Service Manual, follow the procedures given.



Before Servicing

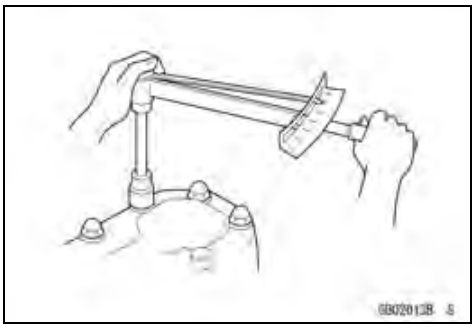
Tightening Sequence

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



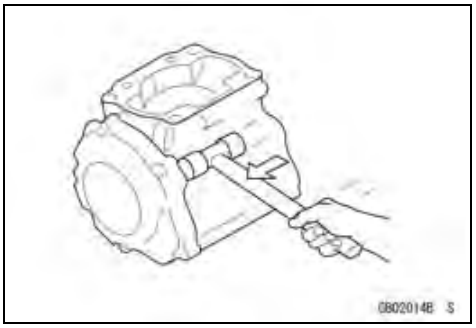
Tightening Torque

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



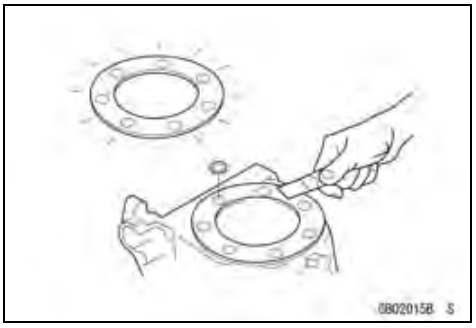
Force

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



Gasket, O-ring

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



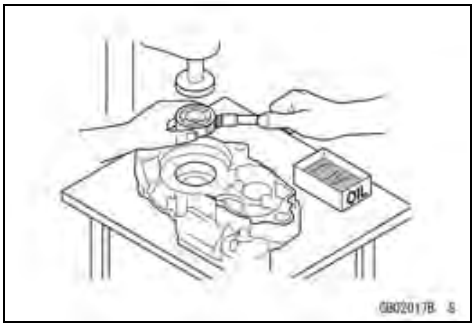
Liquid Gasket, Non-permanent Locking Agent

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

Before Servicing

Press

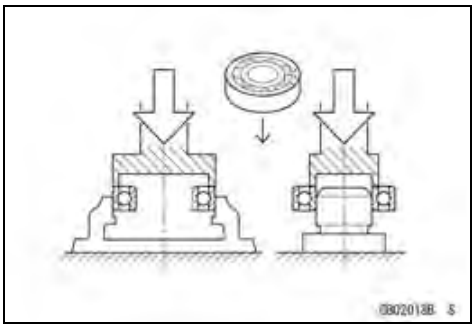
For items such as bearings or oil seals that must be pressed into place, apply small amount of oil to the contact area. Be sure to maintain proper alignment and use smooth movements when installing.



Ball Bearing and Needle Bearing

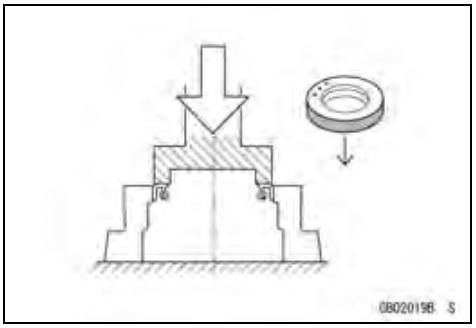
Do not remove pressed ball or needle unless removal is absolutely necessary. Replace with new ones whenever removed. Press bearings with the manufacturer and size marks facing out. Press the bearing into place by putting pressure on the correct bearing race as shown.

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

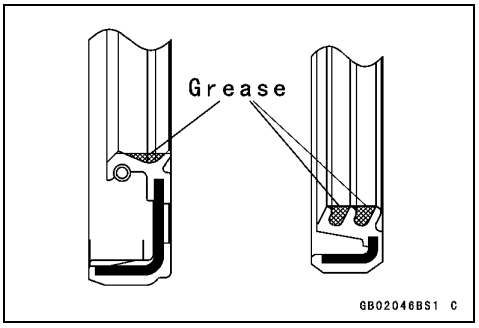


Oil Seal, Grease Seal

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

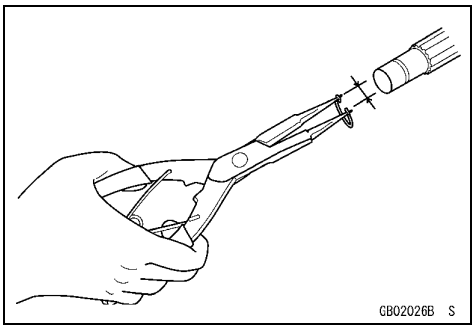


Apply specified grease to the lip of seal before installing the seal.



Circlips, Cotter Pins

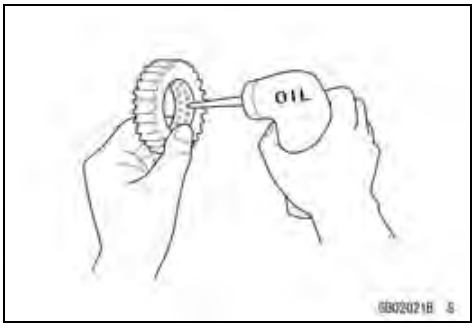
Replace the circlips or cotter pins that were removed with new ones. Take care not to open the clip excessively when installing to prevent deformation.



Before Servicing

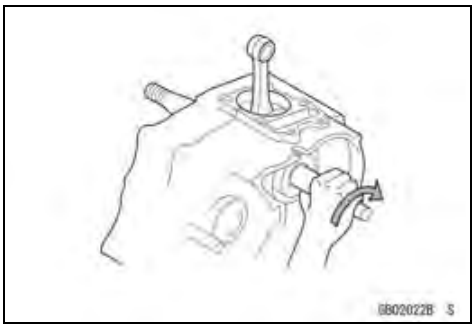
Lubrication

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.



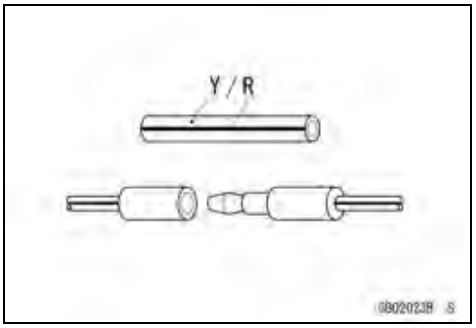
Direction of Engine Rotation

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).



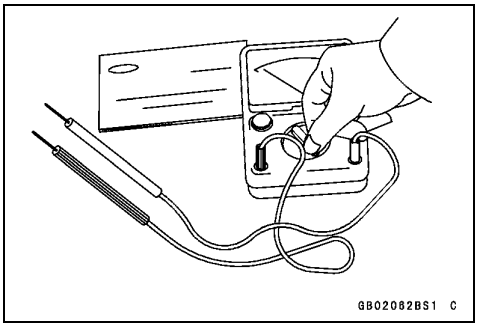
Electrical Wires

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.



Model Identification

EX250K8F Left Side View

EX250K8F Right Side View

Frame Number

Engine Number

General Specifications

Items	EX250K8F
Dimensions	
Overall Length	2 085 mm (82.09 in.)
Overall Width	715 mm (28.15 in.)
Overall Height	1 115 mm (43.90 in.)
Wheelbase	1 400 mm (55.12 in.)
Road Clearance	130 mm (5.12 in.)
Seat Height	775 mm (30.51 in.)
Dry Mass	152 kg (335.2 lb)
Curb Mass:	
Front	82 kg (180.8 lb)
Rear	87 kg (191.8 lb)
Fuel Tank Capacity	17.8 L (4.7 US gal.)
Performance	
Minimum Turning Radius	2.7 m (8.9 ft)
Engine	
Type	4-stroke, DOHC, 2-cylinder
Cooling System	Liquid-cooled
Bore and Stroke	62.0 × 41.2 mm (2.44 × 1.62 in.)
Displacement	249 cm^3 (15.19 cu in.)
Compression Ratio	11.6 : 1
Maximum Horsepower	24 kW (33 PS) @11 000 r/min (rpm)
Maximum Torque	22 N·m (2.2 kgf·m, 16 ft·lb) @8 200 r/min (rpm)
Carburetion System	FI (Fuel Injection) KEIHIN TTK28 × 2
Starting System	Electric starter
Ignition System	Battery and coil (transistorized)
Timing Advance	Electronically advanced (digital igniter in ECU)
Ignition Timing	From 10° BTDC @1 300 r/min (rpm) 38° BTDC @6 000 r/min (rpm)
Spark Plug	NGK CR8E
Cylinder Numbering Method	Left to right, 1-2
Firing Order	1-2
Valve Timing:	
Inlet:	
Open	36° BTDC
Close	56° ABDC
Duration	272°
Exhaust:	
Open	61° BBDC
Close	31° ATDC
Duration	272°

General Specifications

Items	EX250K8F
Lubrication System	Forced lubrication (wet sump)
Engine Oil:	
Type	API SE, SF or SG API SH, SJ or SL with JASO MA
Viscosity	SAE 10W-40
Capacity	1.7 L (1.8 US qt)
Drive Train	
Primary Reduction System:	
Type	Gear
Reduction Ratio	3.087 (71/23)
Clutch Type	Wet multi disc
Transmission:	
Type	6-speed, constant mesh, return shift
Gear Ratios:	
1st	2.600 (39/15)
2nd	1.789 (34/19)
3rd	1.409 (31/22)
4th	1.160 (29/25)
5th	1.000 (27/27)
6th	0.893 (25/28)
Final Drive System:	
Type	Chain drive
Reduction Ratio	3.071 (43/14)
Overall Drive Ratio	8.466 @Top gear
Frame	
Type	Tubular, diamond
Caster (Rake Angle)	26°
Trail	82 mm (3.23 in.)
Front Tire:	
Type	Tubeless
Size	110/70 17 M/C (54S)
Rim Size	17 × 2.75
Rear Tire:	
Type	Tubeless
Size	130/70 17 M/C (62S)
Rim Size	17 × 3.50
Front Suspension:	
Type	Telescopic fork
Wheel Travel	120 mm (4.72 in.)
Rear Suspension:	
Type	Swingarm (uni-trak)
Wheel Travel	130 mm (5.12 in.)

General Specifications

Items	EX250K8F
Brake Type:	
Front	Single disc
Rear	Single disc
Electrical Equipment	
Battery	12 V 8 Ah
Headlight:	
Type	Semi-sealed beam
Bulb:	
High	12 V 55 W (quartz-halogen) × 2
Low	12 V 55 W (quartz-halogen)
Tail/Brake Light	12 V 5/21 W
Alternator:	
Type	Three-phase AC
Rated Output	23.0 A/14.0 V @5 000 r/min (rpm)

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

Unit Conversion Table

Prefixes for Units:

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

Units of Mass:

kg	×	2.205	=	lb
g	×	0.03527	=	oz

Units of Volume:

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

Units of Force:

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

Units of Length:

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

Units of Torque:

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

Units of Pressure:

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

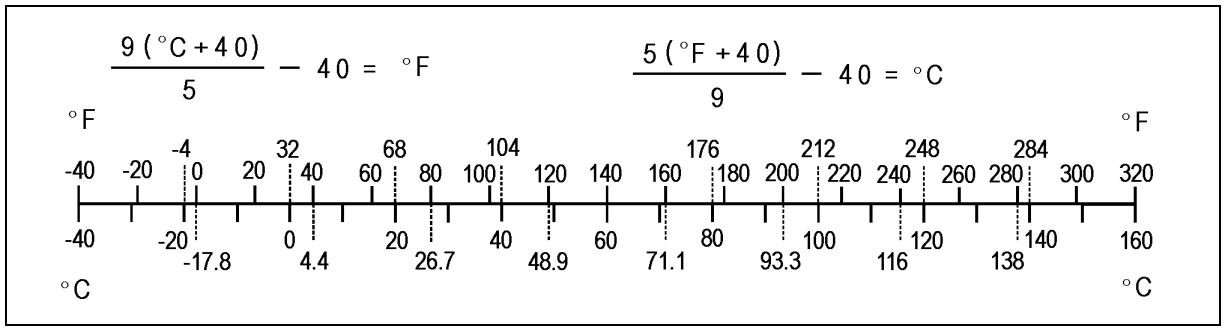
Units of Speed:

km/h	×	0.6214	=	mph

Units of Power:

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

Units of Temperature:



Periodic Maintenance

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Periodic Maintenance Chart

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

Periodic Inspection

FREQUENCY / ITEM	Whichever comes first ➡ / Every ⬇	* ODOMETER READING × 1 000 km (× 1 000 mile) 1 (0.6)	6 (4)	12 (7.5)	18 (12)	24 (15)	30 (20)	36 (24)	See Page
Fuel System									
Air cleaner element - clean				●		●		●	2-14
Throttle control system (play, smooth return, no drag) - inspect	year	●		●		●		●	2-14
Engine vacuum synchronization - inspect				●		●		●	2-15
Idle speed - inspect		●		●		●		●	2-18
Fuel leak (fuel hose and pipe) - inspect	year	●		●		●		●	2-18
Fuel hose and pipe damage - inspect	year	●		●		●		●	2-18
Fuel hose and pipe installation condition - inspect	year	●		●		●		●	2-18
Cooling System									
Coolant level - inspect		●		●		●		●	2-19
Coolant leak (water hose and pipe) - inspect	year	●		●		●		●	2-20
Water hose damage - inspect	year	●		●		●		●	2-20
Water hose installation condition - inspect	year	●		●		●		●	2-20
Engine Top End									
Valve clearance - inspect				●		●		●	2-20
Air suction system damage - inspect				●		●		●	2-23
Clutch									
Clutch operation (play, disengagement, engagement) - inspect		●		●		●		●	2-23
Wheels and Tires									
Tire air pressure - inspect	year			●		●		●	2-24
Wheel/tire damage - inspect				●		●		●	2-25
Tire tread wear, abnormal wear - inspect				●		●		●	2-25
Wheel bearing damage - inspect	year			●		●		●	2-26
Final Drive									
Drive chain lubrication condition - inspect #	Every 600 km (400 mile)								2-26
Drive chain slack - inspect #	Every 1 000 km (600 mile)								2-27
Drive chain wear - inspect #				●		●		●	2-29
Chain guide wear - inspect				●		●		●	2-29
Brakes									
Brake fluid leak (brake hose and pipe) - inspect	year	●	●	●	●	●	●	●	2-30
Brake hose and pipe damage - inspect	year	●	●	●	●	●	●	●	2-30
Brake hose installation condition - inspect	year	●	●	●	●	●	●	●	2-30

2-4 PERIODIC MAINTENANCE

Periodic Maintenance Chart

FREQUENCY / ITEM	Whichever comes first ➡ / ⬇ Every	* ODOMETER READING × 1 000 km (× 1 000 mile)							See Page
		1 (0.6)	6 (4)	12 (7.5)	18 (12)	24 (15)	30 (20)	36 (24)	
Brake fluid level - inspect	6 months	●	●	●	●	●	●	●	2-30
Brake pad wear - inspect #			●	●	●	●	●	●	2-31
Brake operation (effectiveness, play, no drag) - inspect	year	●	●	●	●	●	●	●	2-31
Brake light switch operation - inspect		●	●	●	●	●	●	●	2-32
Suspension									
Front forks/rear shock absorber operation (damping and smooth stroke) - inspect				●		●		●	2-32
Front forks/rear shock absorber oil leak - inspect	year			●		●		●	2-33
Rocker arm operation - inspect				●		●		●	2-33
Tie-rods operation - inspect				●		●		●	2-33
Swingarm pivot - lubricate						●			2-34
Steering									
Steering play - inspect	year	●		●		●		●	2-34
Steering stem bearings - lubricate	2 years					●			2-35
Electrical System									
Lights and switches operation - inspect	year			●		●		●	2-36
Headlight aiming - inspect	year			●		●		●	2-38
Sidestand switch operation - inspect	year			●		●		●	2-39
Engine stop switch operation - inspect	year			●		●		●	2-40
Others									
Chassis parts - lubricate	year			●		●		●	2-40
Bolts and nuts tightness - inspect		●		●		●		●	2-42

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

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

Periodic Maintenance Chart

Periodic Replacement Parts

FREQUENCY / ITEM	Whichever comes first ➡ / Every ⬇	* ODOMETER READING × 1 000 km (× 1 000 mile) 1 (0.6)	12 (7.5)	24 (15)	36 (24)	48 (30)	See Page
Air cleaner element # - replace	2 years						2-43
Fuel hose - replace	4 years					●	2-44
Coolant - change	3 years				●		2-45
Radiator hose and O-ring - replace	3 years				●		2-48
Engine oil # - change	year	●	●	●	●	●	2-48
Oil filter - replace	year	●	●	●	●	●	2-49
Brake hose and pipe - replace	4 years					●	2-50
Brake fluid - change	2 years			●		●	2-50
Rubber parts of master cylinder and caliper - replace	4 years					●	2-51, 2-53
Spark plug - replace			●	●	●	●	2-54

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

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

2-6 PERIODIC MAINTENANCE

Torque and Locking Agent

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

Letters used in the "Remarks" column mean:
G: Apply grease.
L: Apply a non-permanent locking agent.
MO: Apply molybdenum disulfide grease oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
S: Follow the specified tightening sequence.
Si: Apply silicone grease (ex. PBC grease).
SS: Apply silicone sealant.

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Fuel System (DFI)				
Air Cleaner Housing Cap Bolts	2.5	0.25	22 in·lb	
Air Cleaner Housing Mounting Bolts	9.8	1.0	87 in·lb	
Air Cleaner Housing Screws	1.15	0.12	10 in·lb	
Air Duct Clamp Screws	2.0	0.20	18 in·lb	
Crankshaft Sensor Screws	3.0	0.31	27 in·lb	
Delivery Pipe Assy Mounting Screws	3.4	0.35	30 in·lb	
Fuel Pump Bolts	9.8	1.0	87 in·lb	L
Inlet Air Temperature Sensor Screw	1.2	0.12	11 in·lb	
Oxygen Sensor	44.1	4.50	32.5	
Speed Sensor Bolt	7.8	0.80	69 in·lb	L
Throttle Body Assy Holder Clamp Screws	2.0	0.20	18 in·lb	
Water Temperature Sensor	25	2.5	18	
Cooling System				
Coolant Drain Bolt (Cylinder)	5.9	0.60	52 in·lb	
Coolant Drain Bolt (Water Pump)	9.8	1.0	87 in·lb	
Radiator Bolts	9.8	1.0	87 in·lb	
Radiator Cap Bracket Bolt	9.8	1.0	87 in·lb	
Radiator (Water) Hose Clamp Screws	1.5	0.15	13 in·lb	
Reserve Tank Bolts	9.8	1.0	87 in·lb	
Reserve Tank Bracket Bolts	9.8	1.0	87 in·lb	
Reserve Tank Cap	–	–	–	Hand -Tighten
Resistor Bolt	7.8	0.80	69 in·lb	
Thermostat Cover Bolts	9.8	1.0	87 in·lb	
Thermostat Housing Mounting Bolts	9.8	1.0	87 in·lb	
Water Hose Fitting Bolts	9.8	1.0	87 in·lb	
Water Pipe Bolts	9.8	1.0	87 in·lb	
Water Pump Bolts	9.8	1.0	87 in·lb	
Water Pump Cover Bolts	9.8	1.0	87 in·lb	
Water Temperature Sensor	25	2.5	18	
Engine Top End				
Air Suction Valve Cover Bolts	9.8	1.0	87 in·lb	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Air Switching Valve Bracket Bolts	9.8	1.0	87 in·lb	
Camshaft Cap Bolts	12	1.2	106 in·lb	S
Camshaft Chain Tensioner Cap Bolt	5.0	0.51	44 in·lb	
Camshaft Chain Tensioner Mounting Bolts	9.8	1.0	87 in·lb	
Camshaft Sprocket Bolts	15	1.5	11	L
Coolant Drain Bolt (Cylinder)	5.9	0.60	52 in·lb	
Cylinder Head Bolts (M8)	31.4	3.2	23.2	MO, S
Cylinder Head Bolt (M6)	12	1.2	106 in·lb	S
Cylinder Head Cover Bolts	9.8	1.0	87 in·lb	
Cylinder Head Jacket Plugs	20	2.0	15	L
Exhaust Pipe Holder Nuts	12	1.2	106 in·lb	
Exhaust Pipe Mounting Bolt	9.8	1.0	87 in·lb	
Muffler Body Clamp Bolt	17	1.7	13	
Muffler Body Mounting Bolt	30	3.1	22	
Muffler Body Rear Cover Bolts	9.8	1.0	87 in·lb	L
Muffler Cover Bolts	9.8	1.0	87 in·lb	
Muffler Cover Clamp Bolt	9.8	1.0	87 in·lb	
Muffler Cover Clamp Screw	6.9	0.70	61 in·lb	
Rear Camshaft Chain Guide Bolt	17	1.7	13	
Spark Plugs	13	1.3	115 in·lb	
Throttle Body Assy Holder Clamp Screws	2.0	0.20	18 in·lb	
Clutch				
Clutch Cover Bolts	9.8	1.0	87 in·lb	
Clutch Hub Nut	132	13.5	97.4	
Clutch Lever Clamp Bolt	8.8	0.90	78 in·lb	
Clutch Spring Bolts	8.8	0.90	78 in·lb	
Oil Filler Plug	–	–	–	Hand -Tighten
Engine Lubrication System				
Crankcase Oil Passage Plug	15	1.5	11	
Engine Oil Drain Bolt (Crankcase)	19.6	2.0	14.5	
Engine Oil Drain Bolt (Oil Screen Cover)	19.6	2.0	14.5	
Oil Breather Mounting Bolts	9.8	1.0	87 in·lb	L
Oil Filter Mounting Bolt	19.6	2.0	14.5	
Oil Hose Banjo Bolts	19.6	2.0	14.5	
Oil Passage Plugs	20	2.0	15	L
Oil Pipe Banjo Bolt	12	1.2	106 in·lb	
Oil Pressure Relief Valve	15	1.5	11	L
Oil Pressure Switch	15	1.5	11	SS
Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	G
Oil Pump Mounting Bolts	9.8	1.0	87 in·lb	L
Oil Screen Cover Bolts	9.8	1.0	87 in·lb	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Engine Removal/Installation				
Engine Mounting Bracket Bolts and Nuts	69	7.0	51	
Engine Mounting Nuts	69	7.0	51	
Crankshaft/Transmission				
Connecting Rod Big End Nuts	27.5	2.8	20	MO
Crankcase Bolts (M8, L = 90 mm)	24	2.4	18	MO, S
Crankcase Bolts (M8, L = 73 mm)	19	1.9	14	MO, S
Crankcase Bolts (M6)	12	1.2	106 in·lb	
Neutral Switch	15	1.5	11	
Oil Breather Mounting Bolts	9.8	1.0	87 in·lb	L
Shift Drum Bearing Holder Bolts	12	1.2	106 in·lb	L
Shift Drum Pin Plate Bolt	9.0	0.92	80 in·lb	L
Shift Drum Positioning Bolt	24.5	2.5	18	
Shift Lever Bolt	12	1.2	106 in·lb	
Shift Pedal Mounting Bolt	25	2.5	18	
Shift Shaft Return Spring Pin	19.6	2.0	14.5	L
Starter Motor Clutch Bolts	34.3	3.5	25	L
Tie-Rod Locknuts	7.0	0.71	62 in·lb	
Wheels/Tires				
Front Axle Nut	88	9.0	65	
Rear Axle Nut	98	10.0	72.3	
Final Drive				
Engine Sprocket Cover Bolts	9.8	1.0	87 in·lb	
Engine Sprocket Nut	127	13.0	93.7	MO
Rear Axle Nut	98	10.0	72.3	
Rear Sprocket Nuts	59	6.0	44	
Speed Sensor Mounting Bracket Bolts	9.8	1.0	87 in·lb	L
Brakes				
Bleed Valves	5.5	0.56	49 in·lb	L
Brake Hose Banjo Bolts	25	2.5	18	
Brake Lever Pivot Bolt	5.9	0.60	52 in·lb	Si
Brake Lever Pivot Bolt Locknut	5.9	0.60	52 in·lb	
Brake Pedal Bolt	8.8	0.90	78 in·lb	
Front Brake Disc Mounting Bolts	27	2.8	20	L
Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
Front Brake Pad Pins	17.2	1.8	13	
Front Brake Reservoir Cap Screws	1.5	0.15	13 in·lb	
Front Caliper Holder Pin Bolt	17.2	1.8	13	Si
Front Caliper Mounting Bolts	25	2.5	18	
Front Master Cylinder Clamp Bolts	8.8	0.90	78 in·lb	S
Rear Brake Disc Mounting Bolts	27	2.8	20	L
Rear Brake Pad Pins	17.2	1.8	13	
Rear Caliper Holder Pin Bolt	17.2	1.8	13	Si

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Rear Caliper Mounting Bolts	25	2.5	18	
Rear Master Cylinder Mounting Bolts	25	2.5	18	
Rear Master Cylinder Push Rod Locknut	17.2	1.8	13	
Suspension				
Front Fork Bottom Allen Bolts	20	2.0	15	L
Lower Front Fork Clamp Bolts	30	3.1	22	
Rear Shock Absorber Nuts	59	6.0	44	
Swingarm Pivot Shaft Nut	98	10.0	72.3	
Tie-Rod Nuts	59	6.0	44	
Uni-Trak Rocker Arm Nut	59	6.0	44	
Upper Front Fork Clamp Bolts	20	2.0	15	
Steering				
Handlebar Mounting Bolts	25	2.5	18	
Lower Front Fork Clamp Bolts	30	3.1	22	
Steering Stem Head Bolt	44	4.5	32	
Steering Stem Nut	4.9	0.50	43 in·lb	
Switch Housing Screws	3.5	0.36	31 in·lb	
Upper Front Fork Clamp Bolts	20	2.0	15	
Frame				
Front Footpeg Bracket Bolts	25	2.5	18	
Rear Footpeg Bracket Bolts	25	2.5	18	
Sidestand Nut	39	4.0	29	
Sidestand Switch Bolt	8.8	0.90	78 in·lb	L
Windshield Mounting Bolts	0.42	0.043	3.7 in·lb	
Electrical System				
Alternator Cover Bolts	9.8	1.0	87 in·lb	
Alternator Rotor Bolt	88.2	9.0	65	S
Crankshaft Sensor Screws	3.0	0.31	27 in·lb	
Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
Fuel Pump Bolts	9.8	1.0	87 in·lb	L
License Plate Light Cover Screws	0.90	0.092	8.0 in·lb	
License Plate Light Mounting Screws	1.2	0.12	11 in·lb	
Neutral Switch	15	1.5	11	
Oil Pressure Switch	15	1.5	11	SS
Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	G
Oxygen Sensor	44.1	4.50	32.5	
Plugs (Alternator Cover)	–	–	–	Hand -Tighten
Regulator/Rectifier Bolts	9.8	1.0	87 in·lb	
Resistor Bolt	7.8	0.80	69 in·lb	
Sidestand Switch Bolt	8.8	0.90	78 in·lb	L
Spark Plugs	13	1.3	115 in·lb	
Speed Sensor Bolt	7.8	0.80	69 in·lb	L

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Starter Motor Cable Terminal Nut	9.8	1.0	87 in·lb	
Starter Motor Clutch Bolts	34.3	3.5	25	L
Starter Motor Mounting Bolts	9.8	1.0	87 in·lb	
Starter Motor Terminal Locknut	6.9	0.70	61 in·lb	
Starter Motor Through Bolts	3.4	0.35	30 in·lb	
Starter Relay Cable Terminal Nuts	5.0	0.51	44 in·lb	
Stator Coil Bolts	12	1.2	106 in·lb	
Switch Housing Screws	3.5	0.36	31 in·lb	
Tail/Brake Light Mounting Bolts	5.9	0.60	52 in·lb	
Water Temperature Sensor	25	2.5	18	

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

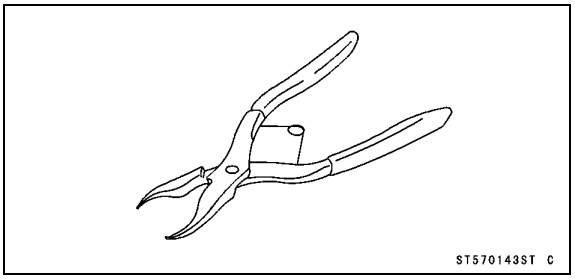
Item	Standard	Service Limit
Fuel System (DFI)		
Throttle Grip Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	– – –
Idle Speed	1 300 ±50 r/min (rpm)	– – –
Throttle Body Vacuum	24.0 ±1.33 kPa (180 ±10 mmHg) at idle speed	– – –
Bypass Screws (Turn Out)	0 ~ 2 1/2 (for reference)	– – –
Air Cleaner Element	Polyurethane foam	– – –
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	1.5 L (1.6 US qt)	– – –
Engine Top End		
Valve Clearance:		
Exhaust	0.22 ~ 0.29 mm (0.0087 ~ 0.0114 in.)	– – –
Inlet	0.15 ~ 0.24 mm (0.0059 ~ 0.0094 in.)	– – –
Clutch		
Clutch Lever Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	– – –
Engine Lubrication System		
Engine Oil:		
Type	API SE, SF or SG API SH, SJ or SL with JASO MA	– – –
Viscosity	SAE 10W-40	– – –
Capacity	1.3 L (1.4 US qt) (when filter is not removed)	– – –
	1.6 L (1.7 US qt) (when filter is removed)	– – –
	1.7 L (1.8 US qt) (when engine is completely dry)	– – –
Level	Between upper and lower level lines (Wait 2 ~ 3 minutes after idling or running)	– – –
Wheels/Tires		
Tread Depth:		
Front:		
IRC	4.2 mm (0.17 in.)	1 mm (0.04 in.), (AT, CH, DE) 1.6 mm (0.06 in.)
BRIDGESTONE	4.6 mm (0.18 in.)	
DUNLOP	4.5 mm (0.18 in.)	
Rear:		
IRC	6.5 mm (0.26 in.)	Up to 130 km/h (80 mph): 2 mm (0.08 in.), Over 130 km/h (80 mph): 3 mm (0.12 in.)
BRIDGESTONE	7.0 mm (0.28 in.)	
DUNLOP	7.4 mm (0.29 in.)	

Specifications

Item	Standard	Service Limit
Air Pressure (when Cold):		
Front	Up to 170 kg (375 lb) load: 200 kPa (2.00 kgf/cm², 28 psi)	– – –
Rear	Up to 170 kg (375 lb) load: 225 kPa (2.25 kgf/cm², 32 psi)	– – –
Final Drive		
Drive Chain Slack	20 ~ 30 mm (0.8 ~ 1.2 in.)	– – –
Drive Chain Wear (20-link Length)	317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)	323 mm (12.7 in.)
Standard Chain:		
Make	ENUMA	– – –
Type	EK520SR-O_2	– – –
Link	106 links	– – –
Brakes		
Brake Fluid:		
Grade	DOT4	– – –
Brake Pad Lining Thickness:		
Front	4.5 mm (0.18 in.)	1 mm (0.04 in.)
Rear	4.5 mm (0.18 in.)	1 mm (0.04 in.)
Brake Light Timing:		
Front	Pulled ON	– – –
Rear	ON after about 10 mm (0.39 in.) of pedal travel	– – –
Electrical System		
Spark Plug:		
Type	NGK CR8E	– – –
Gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)	– – –

Special Tools

Inside Circlip Pliers:
57001-143



Filler Cap Driver:
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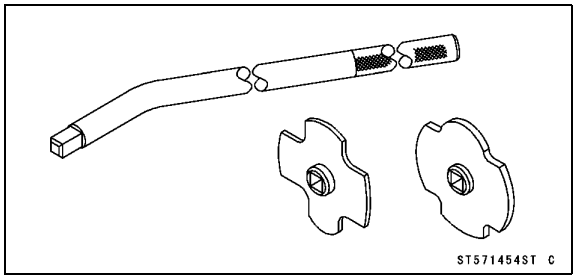
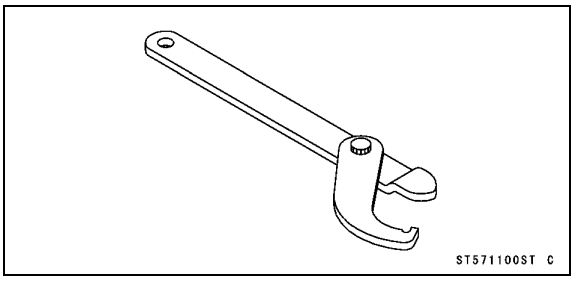


Steering Stem Nut Wrench:
57001-1100



Throttle Sensor Setting Adapter:
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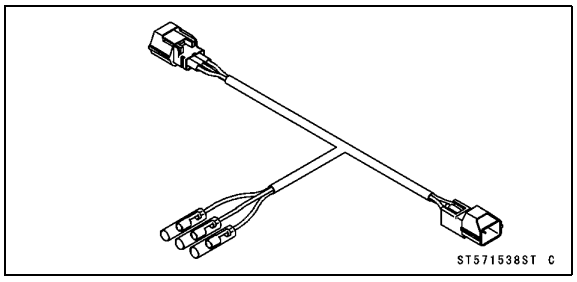

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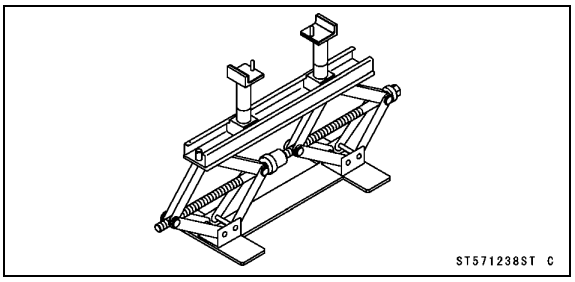

Extension Tube:
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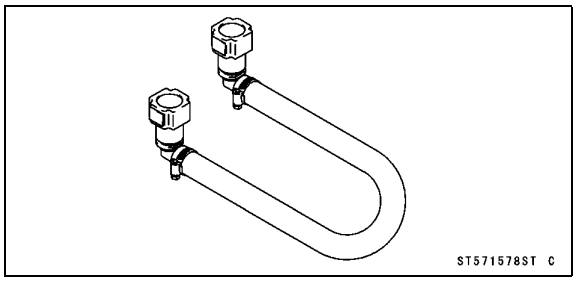

Vacuum Gauge:
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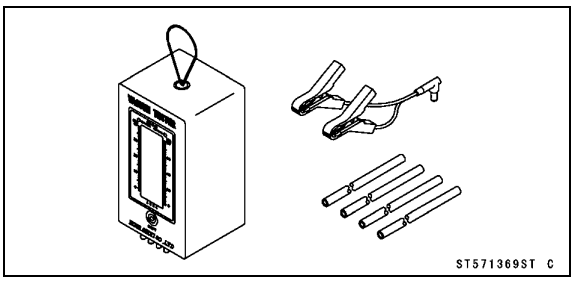
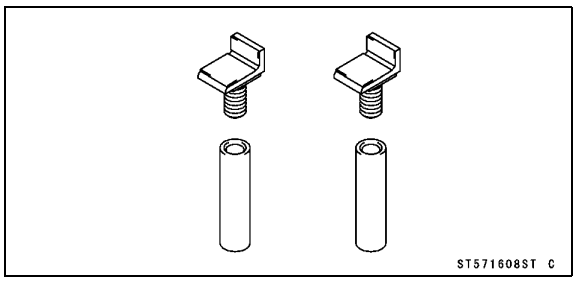


Jack Attachment:
57001-1608



Periodic Maintenance Procedures

Fuel System (DFI)

Air Cleaner Element Cleaning

NOTE

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

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

⚠ WARNING

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

CAUTION

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

● Remove the element [A] (see Air Cleaner Element Replacement).

⚠ WARNING

Clean the element in a well-ventilated area, and make sure that there are no sparks or flame anywhere near the working area.
Because of the danger of highly flammable liquids, do not use gasoline or a low-flash point solvent to clean the element.

● Clean the element in a bath of high-flash point solvent, and then dry it with compressed air or by shaking it.
● After cleaning, saturate a clean, lint-free towel with SE, SF, or SG class SAE 30 oil and apply the oil to the element by tapping the element outside with the towel.
● Visually check the element for tears or breaks.
● If the element has any tears or breaks, replace the element.

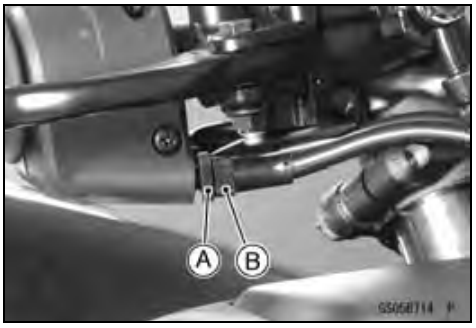
Throttle Control System Inspection

● Check that the throttle grip [A] moves smoothly from full open to close, and the throttle closes quickly and completely by the return spring in all steering positions.
★ If the throttle grip does not return properly, check the throttle cable routing, grip free play, and cable damage. Then lubricate the throttle cable.
● Check the throttle grip free play [B].

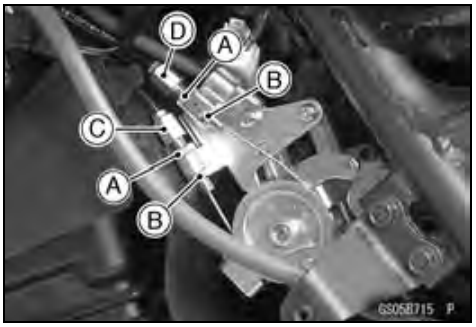
Throttle Grip Free Play
Standard: 2 ~ 3 mm (0.08 ~ 0.12 in.)

Periodic Maintenance Procedures

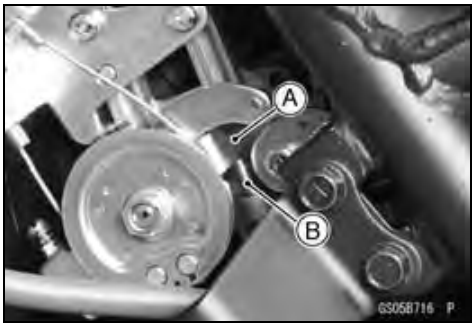
★If the free play is incorrect, adjust the throttle cable as follows.
- Loosen the locknut [A].
- Turn the adjuster [B] until the proper amount of free play can be obtained.
- Tighten the locknut against the adjuster securely.



★If the throttle grip free play can not be adjusted with the adjuster, use the adjusters in the lower ends of the throttle cables.
- Remove:
  Left Side Cover (see Side Cover Removal in the Frame chapter)
  Left Lower Fairing (see Lower Fairing Removal in the Frame chapter)
- Turn out both upper nuts [A] and turn in both lower nuts [B] as far as they will go so as to give the throttle grip plenty of play.
- With the throttle grip completely closed, turn out the lower nut and turn in the upper nut of the decelerator cable [C] until the inner cable just becomes tight.
- Turn out the lower nut and turn in the upper nut of the accelerator cable [D] until the correct free play is obtained.



- Check that the throttle linkage lever [A] stops against the adjusting screw [B] with the throttle grip closed.



Engine Vacuum Synchronization Inspection

NOTE

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

- Situate the motorcycle so that it is vertical.
- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Pull off the rubber caps [A] from the fittings of each throttle body.

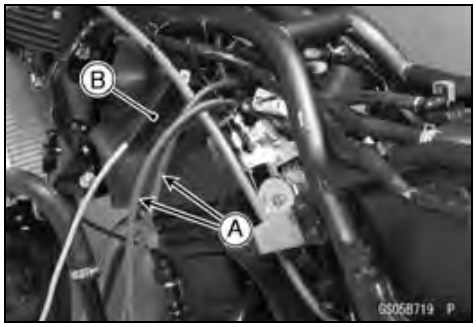
Periodic Maintenance Procedures

● Pull off the air switching valve hose [A] from the air cleaner housing.
● Plug the air switching valve hose end and air cleaner housing fitting.

● Connect a vacuum gauge (special tool) and hoses [A] to the fittings on the throttle body.

Special Tool - Vacuum Gauge: 57001-1369

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



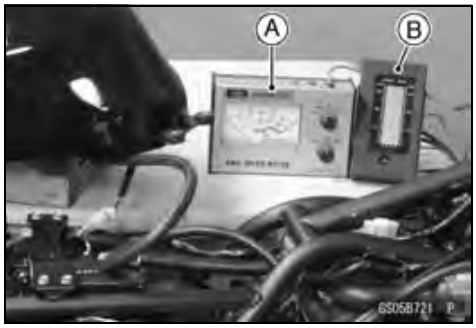
● Remove the fuel hose (see Fuel Hose Replacement).
● Connect the following parts temporary.
Fuel Pump Lead Connector [A]
Extension Tube [B]

Special Tool - Extension Tube: 57001-1578

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

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

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



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

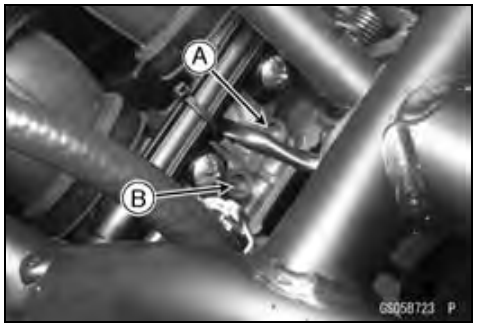
● While idling the engine, inspect the throttle body vacuum, using the vacuum gauge [B].

Throttle Body Vacuum
Standard: 24.0 ±1.33 kPa (180 ±10 mmHg) at idle speed

★If any one vacuum is not within the specification, turn in the bypass screws until it seats fully but not tightly.

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

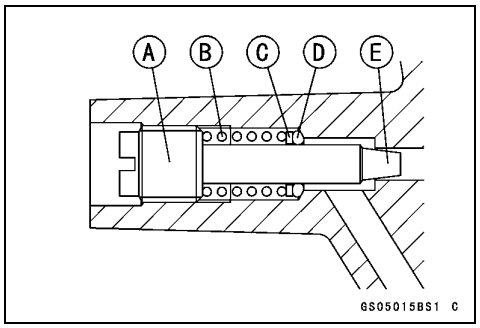
Periodic Maintenance Procedures



- Turn out the bypass screw of the higher vacuum between #1 [A] and #2 [B] to the lower vacuum.
- Open and close the throttle valves after each measurement and adjust the idle speed as necessary.
- Inspect the vacuums as before.

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

★If any vacuum can not be adjusted within the specification, remove the bypass screws #1, #2 and clean them.



- Remove:
  Bypass Screw [A]
  Spring [B]
  Washer [C]
  O-ring [D]
- Check the bypass screw and its hole for carbon deposits.

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

- Replace the O-ring with a new one.
- Check the tapered portion [E] of the bypass screw for wear or damage.

★If the bypass screw is worn or damaged, replace it.

- Turn in the bypass screw until it seats fully but not tightly.
- Repeat the same procedure for other bypass screw.
- Repeat the synchronization.

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

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538

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

Standard: DC 1.020 ~ 1.050 V at idle throttle opening

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

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

Periodic Maintenance Procedures

Idle Speed Inspection

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

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

⚠ WARNING

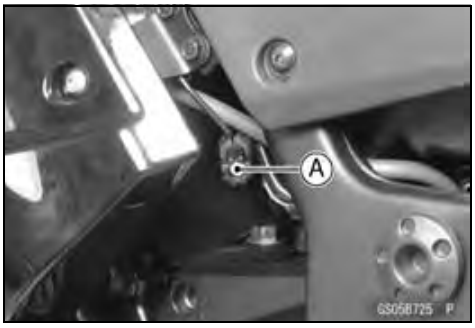
Operation with improperly adjusted, incorrectly routed or damaged cables could result in an unsafe riding condition.

- Check the idle speed.

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

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

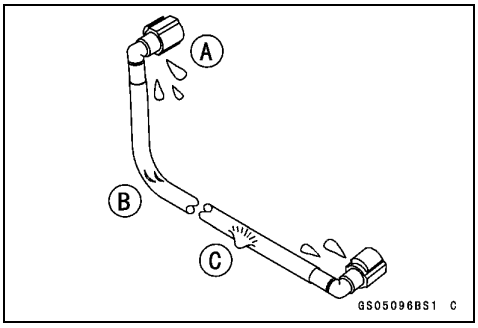
Idle Speed Adjustment



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

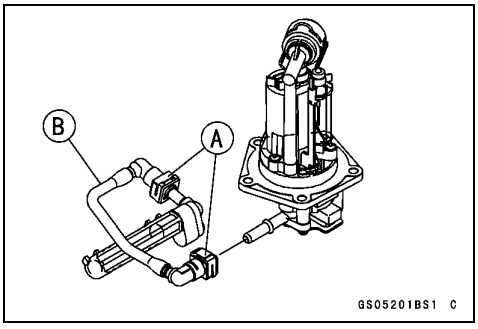
○Open and close the throttle a few times to make sure that the idle speed is within the specified range. Readjust if necessary.

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



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

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

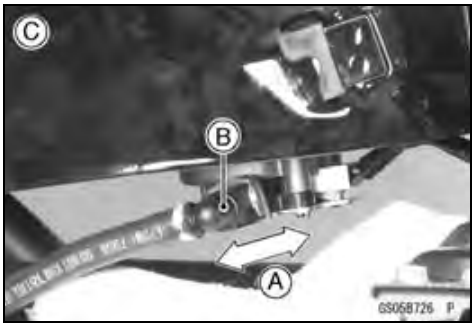


- Check that the hose is routed according to Cable, Wire, and Hose Routing section in the Appendix chapter.

★Replace the hose if it has been sharply bent or kinked.
Hose Joints [A]
Fuel Hose [B]

Periodic Maintenance Procedures

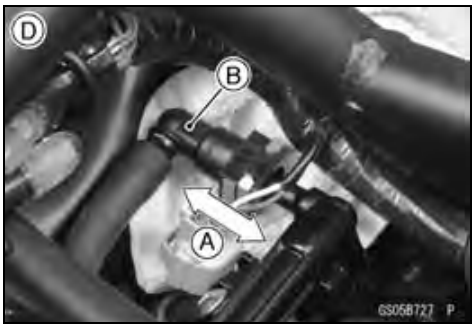
● Check that the hose joints are securely connected.
○Push and pull [A] the hose joint [B] back and forth more than two times, and make sure it is locked and does not come off.
Fuel Pump Side [C]
Throttle Body Assy Side [D]



⚠ WARNING

Make sure the hose joint is installed correctly on the fuel supply pipe or the fuel could leak.

★If it comes off, reinstall the hose joint.

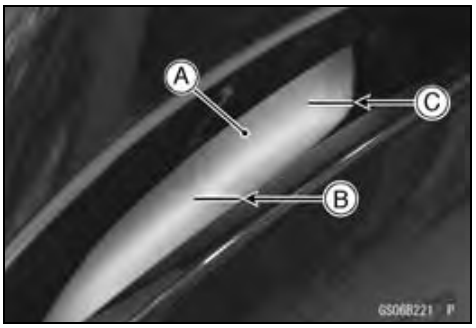


Cooling System

Coolant Level Inspection

NOTE

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



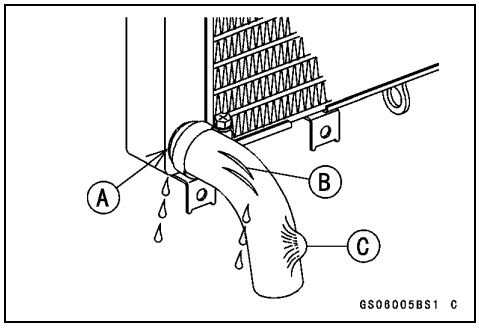
● Check the coolant level in the reserve tank [A] with the motorcycle held perpendicular (Do not use the sidestand.).
★If the coolant level is lower than the "L" level line [B], unscrew the reserve tank cap and add coolant to the "F" level line [C].
"L": low
"F": full

CAUTION

For refilling, add the specified mixture of coolant and soft water. Adding water alone dilutes the coolant and degrades its anticorrosion properties. The diluted coolant can attack the aluminum engine parts. In an emergency, soft water alone can be added. But the diluted coolant must be returned to the correct mixture ratio within a few days.
If coolant must be added often or the 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.

Periodic Maintenance Procedures

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



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

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

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

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

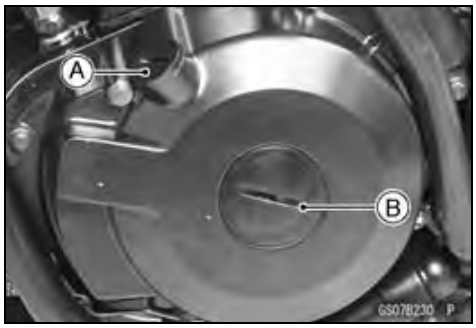
Torque - Radiator (Water) Hose Clamp Screws: 1.5 N·m (0.15 kgf·m, 13 in·lb)

Engine Top End

Valve Clearance Inspection

NOTE

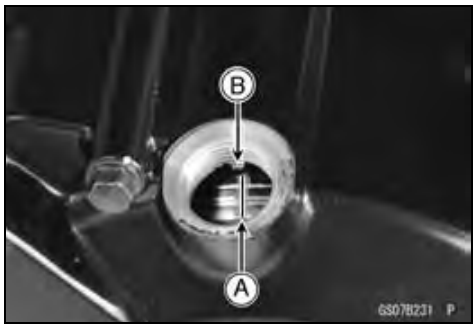
○*Valve clearance must be checked and adjusted when the engine is cold (at room temperature).*



● 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

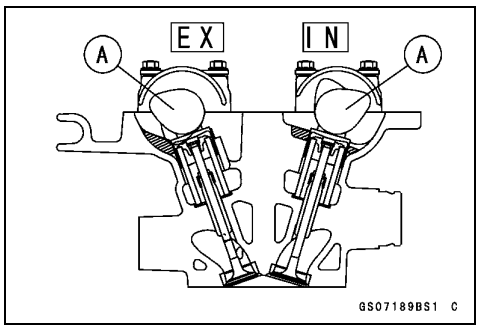
● Check the valve clearance when the pistons are at TDC.



○The pistons are numbered beginning with the engine left side.

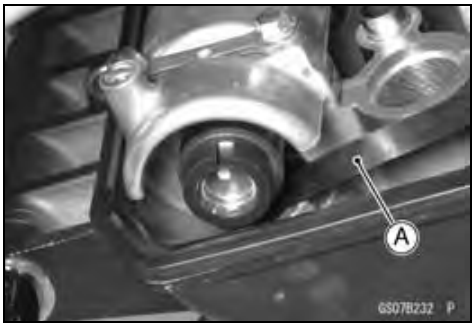
● Using a wrench on the alternator rotor bolt, turn the crankshaft counterclockwise until the "2T" mark [A] on the alternator rotor is aligned with the projection [B] in the inspection window on the alternator cover.

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



Periodic Maintenance Procedures

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



Valve Clearance
Standard:
Exhaust 0.22 ~ 0.29 mm (0.0087 ~ 0.0114 in.)
Inlet 0.15 ~ 0.24 mm (0.0059 ~ 0.0094 in.)

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

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

NOTE

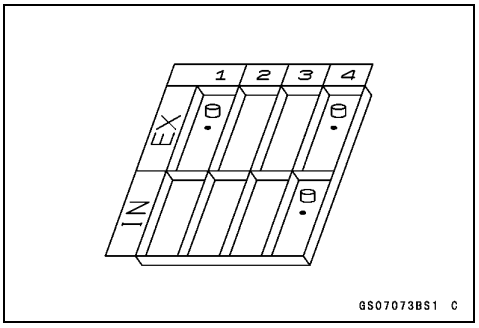
○*Check the valve clearance using this method only. Checking the clearance at any other cam position may result in improper valve clearance.*

Valve Clearance Measuring Position
#2 Piston TDC at End of Compression Stroke:
Inlet 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.

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 = 0.255 mm (Exhaust), 0.195 mm (Inlet))
[d] Replace Shim Thickness

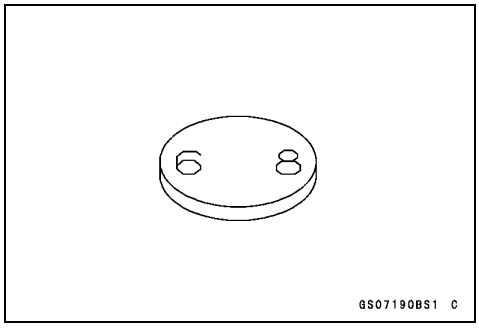
Example (Inlet):
2.90 + 0.45 – 0.195 = 3.155 mm

○Exchange the shim for the 3.175 size shim.

Periodic Maintenance Procedures

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
2.675	92180-1174	68
2.70	92180-1022	70
2.725	92180-1175	73
2.75	92180-1024	75
2.775	92180-1176	78
2.80	92180-1026	80
2.825	92180-1177	83
2.85	92180-1028	85
2.875	92180-1178	88
2.90	92180-1030	90
2.925	92180-1179	93
2.95	92180-1032	95
2.975	92180-1180	98
3.00	92180-1034	00
3.025	92180-1181	03
3.05	92180-1036	05
3.075	92180-1182	08
3.10	92180-1038	10
3.125	92180-1183	13
3.15	92180-1040	15
3.175	92180-1184	18
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

CAUTION

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 or the valve lifter to keep the shim in place during camshaft installation.

CAUTION

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.

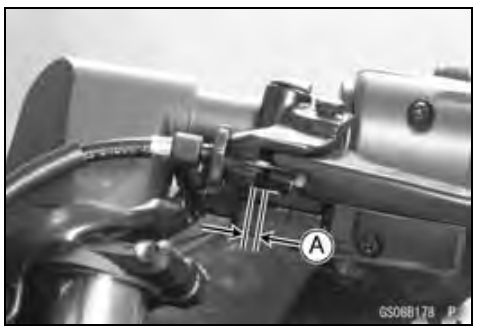
● Apply molybdenum disulfide oil solution to the valve lifter surface and install the lifter.
● Install the camshaft (see Camshaft Installation in the Engine Top End chapter).
● Recheck the valve clearance and readjust if necessary.
● Install the removed parts (see appropriate chapters).

Air Suction System Damage Inspection

● Remove:
Lower Fairings (see Lower Fairing Removal in the Frame chapter)
Fuel Tank Bolts (see Fuel Tank Removal in the Fuel System (DFI) chapter)
● Pull the air switching valve hose [A] out of 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



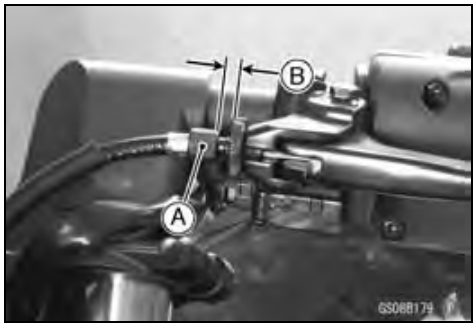
● Pull the clutch lever just enough to take up the free play [A].
● Measure the gap between the lever and the lever holder.
★If the gap is too wide, the clutch may not release fully. If the gap is too narrow, the clutch may not engage fully. In either case, adjust it.

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

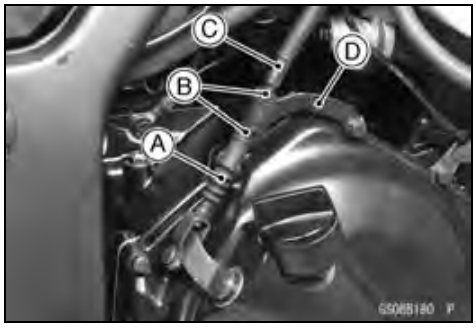
Periodic Maintenance Procedures

⚠ WARNING

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



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



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

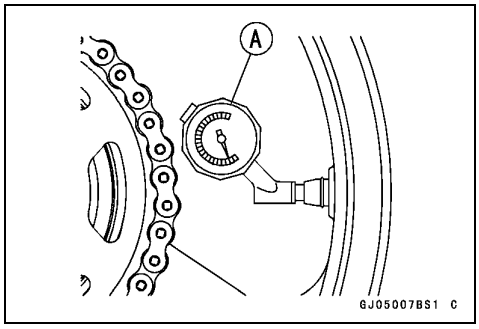
⚠ WARNING

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

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

Wheels/Tires

Air Pressure Inspection



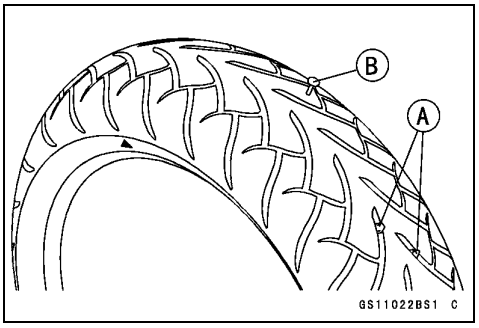
- Remove the air valve cap.
- Measure the tire air pressure with an air pressure gauge [A] when the tires are cold (that is, when the motorcycle has not been ridden more than a mile during the past 3 hours).
- Install the air valve cap.
- ★Adjust the tire air pressure according to the specifications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

Air Pressure (when Cold)

Front:	**Up to 170 kg (375 lb) load: 200 kPa (2.00 kgf/cm², 28 psi)**
Rear:	**Up to 170 kg (375 lb) load: 225 kPa (2.25 kgf/cm², 32 psi)**

Periodic Maintenance Procedures

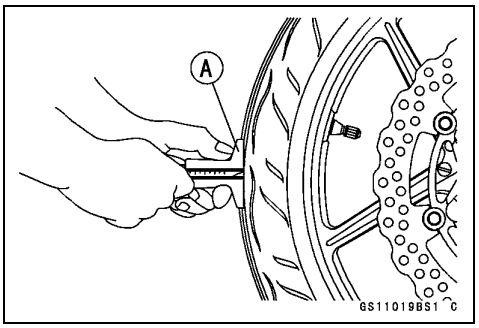
Wheel/Tire Damage Inspection



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

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

Tire Tread Wear Inspection



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

- Measure the tread depth at the center of the tread with a depth gauge [A]. Since the tire may wear unevenly, take measurement at several places.

★If any measurement is less than the service limit, replace the tire (see Tire Removal/Installation in the Wheels/Tires chapter).

Tread Depth

Standard:

Front:

IRC	**4.2 mm (0.17 in.)**
BRIDGESTONE	**4.6 mm (0.18 in.)**
DUNLOP	**4.5 mm (0.18 in.)**

Rear:

IRC	**6.5 mm (0.26 in.)**
BRIDGESTONE	**7.0 mm (0.28 in.)**
DUNLOP	**7.4 mm (0.29 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

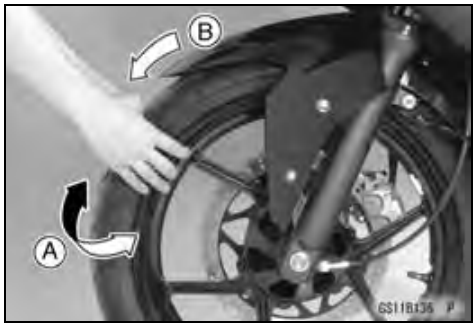
To ensure safe handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.

NOTE

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

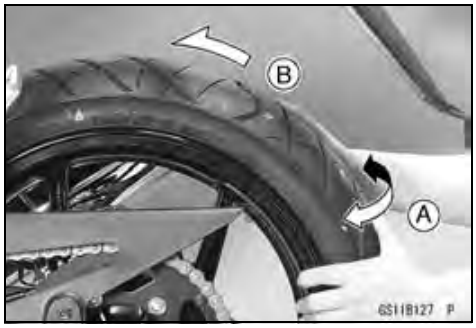
Periodic Maintenance Procedures

Wheel Bearing Damage Inspection



- Raise the front wheel off the ground with the jack (see Front Wheel Removal in the Wheels/Tires chapter).
- Turn the handlebar all the way to the right or left.
- Inspect the roughness of the front wheel bearing by pushing and pulling [A] the wheel.
- Spin [B] the front wheel lightly, and check for smoothly turn, roughness, binding or noise.

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



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

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

Final Drive

Drive Chain Lubrication Condition Inspection

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

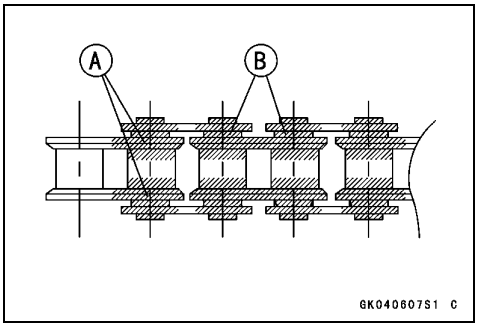
CAUTION

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

Periodic Maintenance Procedures

- Apply oil to the sides of the rollers so that oil will penetrate to the rollers and bushings. Apply the oil to the O-rings so that the O-rings will be coated with oil.
- Wipe off any excess oil.

Oil Applied Areas [A]
O-rings [B]



Drive Chain Slack Inspection

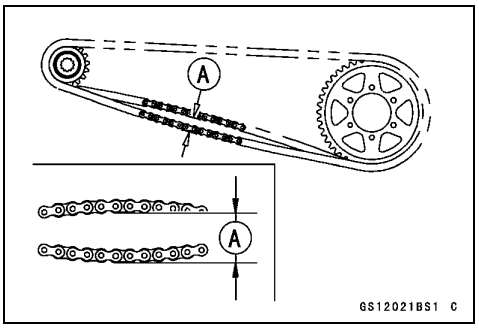
NOTE

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

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

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

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



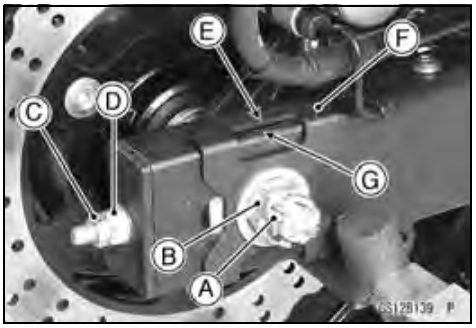
Drive Chain Slack Adjustment

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

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

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

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

- Tighten both chain adjuster locknuts securely.
- Tighten:

Torque - Rear Axle Nut: 98 N·m (10.0 kgf·m, 72.3 ft·lb)

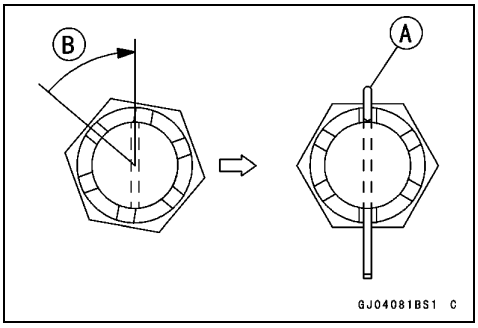
- Turn the wheel, measure the chain slack again at the tightest position, and readjust if necessary.

Periodic Maintenance Procedures

● Insert a new cotter pin [A].

NOTE

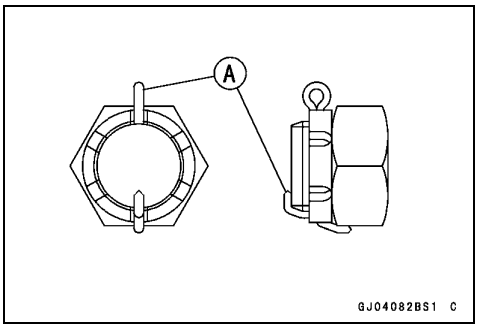
○*When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axle, tighten the nut clockwise [B] up to next alignment.*
○*It should be within 30°.*
○*Loosen once and tighten again when the slot goes past the nearest hole.*



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

⚠ WARNING

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



Wheel Alignment Inspection

● Check that the notch [A] on the left alignment indicator [B] aligns with the same swingarm mark or position [C] that the right alignment indicator notch aligns with.
★If they do not, adjust the chain slack and align the wheel alignment (see Drive Chain Slack Adjustment).

NOTE

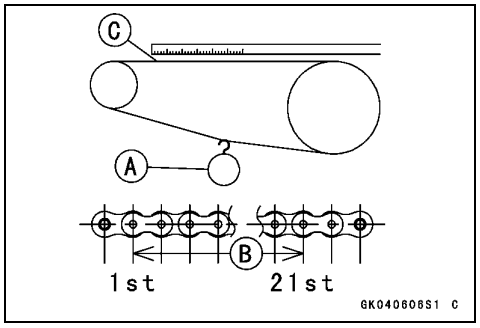
○*Wheel alignment can be also checked using the straightedge or string method.*

⚠ WARNING

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

Periodic Maintenance Procedures

Drive Chain Wear Inspection



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

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

★Lubricate the drive chain if it appears dry.

- Stretch the chain taut by hanging a 98 N (10 kg, 20 lb) weight [A] on the chain.
- Measure the length of 20 links [B] on the straight part [C] of the chain from the pin center of the 1st pin to the pin center of the 21st pin. Since the chain may wear unevenly, take measurements at several places.

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

Drive Chain 20-link Length

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

Service Limit: **323 mm (12.7 in.)**

⚠ WARNING

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

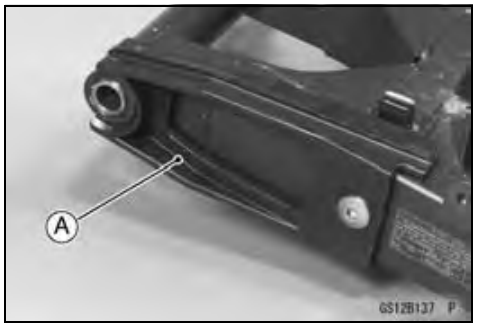
Standard Chain

Make: **ENUMA**

Type: **EK520SR-O_2**

Link: **106 links**

Chain Guide Wear Inspection



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

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

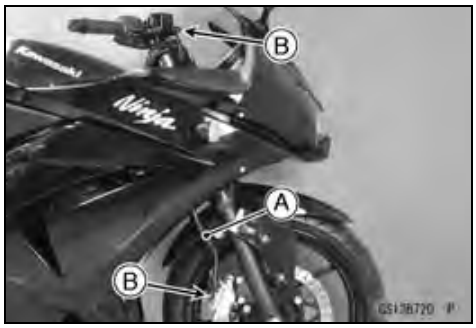
Periodic Maintenance Procedures

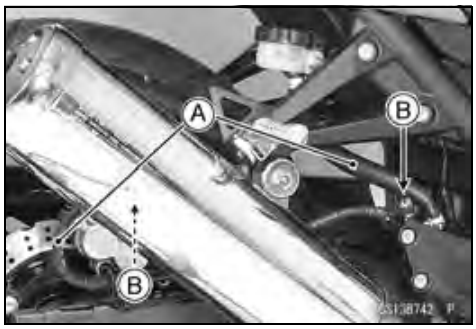
Brakes

Brake Fluid Leak (Brake Hose and Pipe) Inspection

● Apply the brake lever or pedal and inspect the brake fluid leak from the brake hoses [A] and fittings [B].

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





Brake Hose and Pipe Damage and Installation Condition Inspection

● Inspect the brake hoses and fittings for deterioration, cracks and signs of leakage.

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

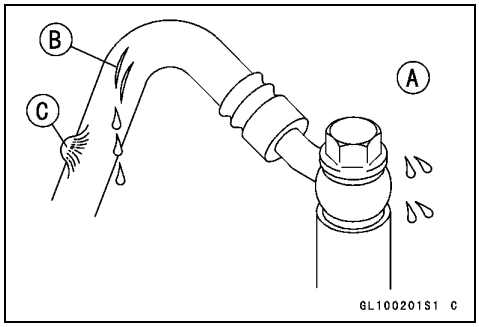
★Replace the hose if any crack [B], bulge [C] or leakage is noticed.

★Tighten any brake hose banjo bolts.

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

● Inspect the brake hose routing.

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



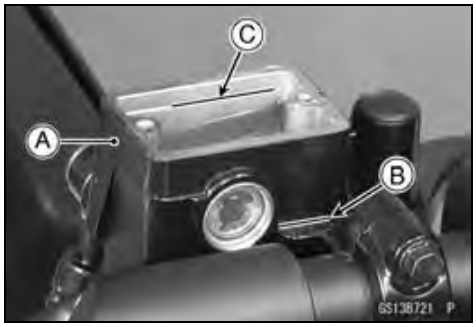
Brake Fluid Level Inspection

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

NOTE

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

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



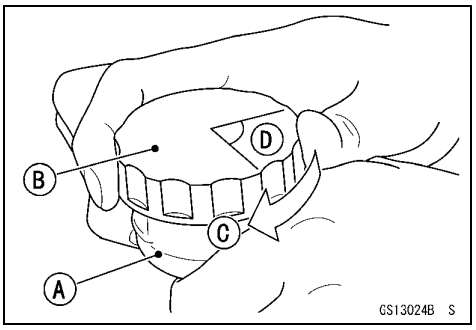
Periodic Maintenance Procedures

● Check that the brake fluid level in the rear brake reservoir [A] is above the lower level line [B].
★If the fluid level is lower than the lower level line, fill the reservoir to the upper level line [C].

⚠ WARNING

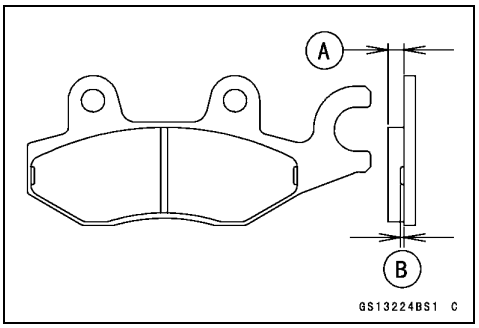
Change the brake fluid in the brake line completely if the brake fluid must be refilled but the type and brand of the brake fluid that is already in the reservoir are unidentified. After changing the fluid, use only the same type and brand of fluid thereafter.

Recommended Disc Brake Fluid
Grade: DOT4



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

Brake Pad Wear Inspection



● Remove the brake pads (see 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.

Pad Lining Thickness

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

Brake Operation Inspection

● Inspect the operation of the front and rear brake by running the vehicle on the dry road.
★If the brake operation is insufficiency, inspect the brake system.

⚠ WARNING

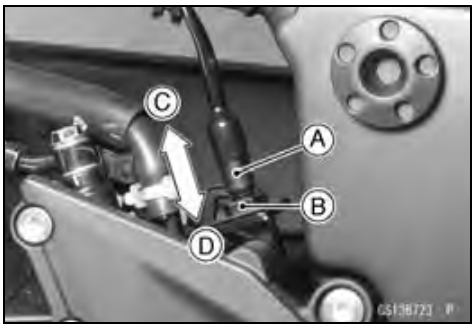
When inspecting by running the vehicle, note a surrounding traffic situation enough in the place of safety.

Periodic Maintenance Procedures

Brake Light Switch Operation Inspection

- Turn on the ignition switch.
- 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.



- 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]

CAUTION

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

★If it does not go on, inspect or replace the following items.

Battery (see Charging Condition Inspection in the Electrical System chapter)
Brake Light (see Tail/Brake Light Removal in the Electrical System chapter)
Main Fuse 30 A and Taillight Fuse 10 A (see Fuse Inspection in the Electrical System chapter)
Front Brake Light Switch [A] (see Switch Inspection in the Electrical System chapter)
Rear Brake Light Switch (see Switch Inspection in the Electrical System chapter)
Harness (see Wiring Inspection in the Electrical System chapter)

Suspension

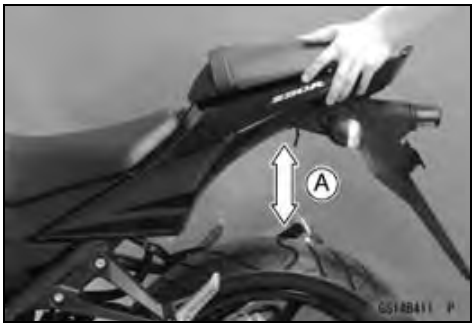
Front Forks/Rear Shock Absorber Operation Inspection

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

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

Periodic Maintenance Procedures

● 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 or repair any defective parts, if necessary.

Rear Shock Absorber Oil Leak Inspection

● Visually inspect the shock absorber [A] for oil leakage.
★If the oil leakage is found on it, replace the shock absorber with a new one.

Rocker Arm Operation Inspection

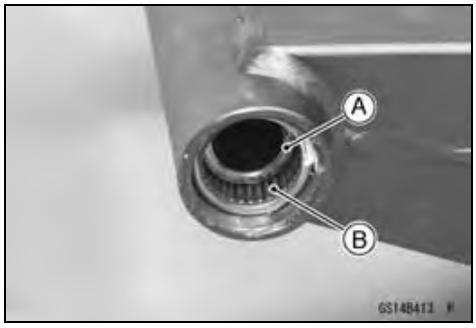
● Pump the seat down and up 4 or 5 times, and inspect the smooth stroke.
★If the rocker arm [A] does not smoothly stroke or noise is found, inspect the fasteners and bearings (see Rocker Arm/Tie-Rod Bearing, Sleeve Inspection in the Suspension chapter).

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 bearings (see Rocker Arm/Tie-Rod Bearing, Sleeve Inspection in the Suspension chapter).

Periodic Maintenance Procedures

Swingarm Pivot Lubrication



- Remove:
  Swingarm (see Swingarm Removal in the Suspension chapter)
  Sleeve [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).

Steering

Steering Play Inspection

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

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

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

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

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

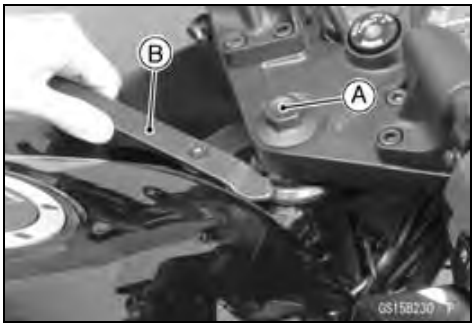
★If you feel looseness, the steering is too loose.

NOTE

○*The cables and wiring will have some effect on the motion of the fork which must be taken into account.*
○*Be sure the leads and cables are properly routed.*
○*The bearings must be in good condition and properly lubricated in order for any test to be valid.*

Periodic Maintenance Procedures

Steering Play Adjustment



- Loosen:
  Lower Front Fork Clamp Bolts (Both Sides)
  Stem Head Bolt [A]
- Adjust the steering.

Special Tool - Steering Stem Nut Wrench [B]: 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.*

- Tighten:

Torque - Steering Stem Head Bolt: 44 N·m (4.5 kgf·m, 32 ft·lb)
Lower Front Fork Clamp Bolts: 30 N·m (3.1 kgf·m, 22 ft·lb)

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

Steering Stem Bearing Lubrication

- Remove the steering stem (see Stem, Stem Bearing Removal in the Steering chapter).
- Using a high-flash point solvent, wash the upper and lower [A] 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

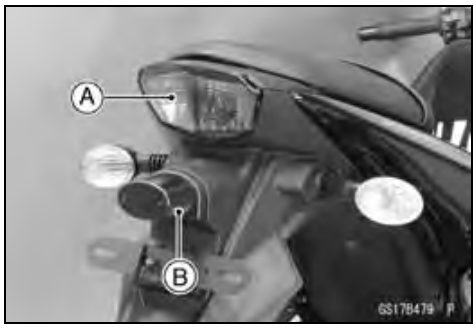
First Step

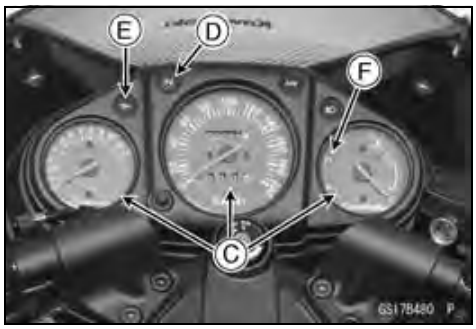
● Turn on the ignition switch.
● The following lights should go on according to below table.

Taillight [A]	goes on
License Plate Light [B]	goes on
Meter Panel Lights [C]	go on
Neutral Indicator Light [D]	goes on
Oil Pressure Warning Indicator Light [E]	goes on
FI Indicator Light [F]	goes on (about 2 seconds)
City Light [G]	goes on

★If the light does not go on, inspect or replace the following item.
Battery (see Charging Condition Inspection in the Electrical System chapter)
Main Fuse 30 A and Taillight Fuse 10 A (see Fuse Inspection in the Electrical System chapter)
Applicable Bulb (see Wiring Diagram in the Electrical System chapter)
Taillight Bulb (see Tail/Brake Light Bulb Replacement in the Electrical System chapter)
License Plate Light Bulb (see License Plate Light Bulb Replacement in the Electrical System chapter)
Meter Unit for Meter Lights (see Meter, Indicator Light Replacement in the Electrical System chapter)
Meter Unit for Neutral Indicator Light (see Meter, Indicator Light Replacement in the Electrical System chapter)
Meter Unit for Oil Pressure Warning Indicator Light (see Meter, Indicator Light Replacement in the Electrical System chapter)
FI Indicator Light (see Meter, Indicator Light Replacement in the Electrical System chapter)
City Light Bulb (see City Light Bulb Replacement in the Electrical System chapter)
Oil Pressure Switch (see Switch Inspection in the Electrical System chapter)
ECU (see ECU Power Supply Inspection in the Fuel System (DFI) chapter)
Ignition Switch (see Switch Inspection in the Electrical System chapter)
Neutral Switch (see Switch Inspection in the Electrical System chapter)
Harness (see Wiring Inspection in the Electrical System chapter)

● Turn off the ignition switch.
● The all lights should go off.
★If the light does not go off, replace the ignition switch.





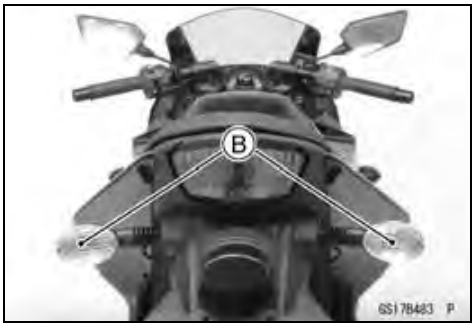
Periodic Maintenance Procedures

Second Step

- 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 flash.
- The turn signal indicator light [C] in the meter unit should flash.

★If the each light does not flash, inspect or replace the following item.

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



- Push the turn signal switch.
- The turn signal lights and indicator light should go off.

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

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

Third Step

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

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

Headlight Low Beam Bulb (see Headlight Bulb Replacement 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 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 high beam indicator light [C] should go on.

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

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

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

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

Headlight Aiming Inspection

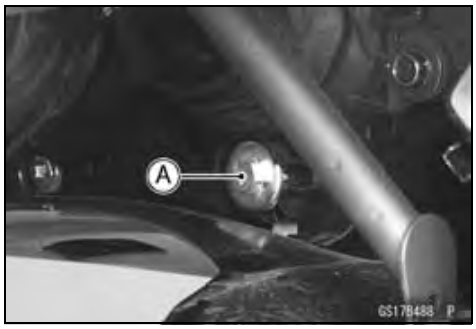
- Inspect the headlight beam for aiming.

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

Headlight Beam Horizontal Adjustment

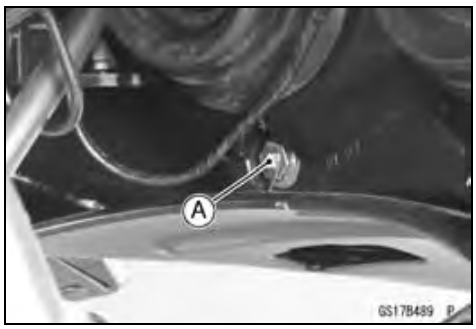
- Turn the horizontal adjuster [A] on the headlight in or out until the beam points straight ahead.

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



Headlight Beam Vertical Adjustment

- Turn the vertical adjuster [A] on the headlight 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.*

Periodic Maintenance Procedures

Sidestand Switch Operation Inspection

● Inspect the sidestand switch [A] operation accordance to the following table.

Sidestand Switch Operation

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

★If the sidestand switch operation does not work, inspect or replace the following item.
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)
Sidestand Switch (see Switch Inspection in the Electrical System chapter)
Engine Stop Switch (see Switch Inspection in the Electrical System chapter)
Starter Button (see Switch Inspection in the Electrical System chapter)
Neutral 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).

Periodic Maintenance Procedures

Engine Stop Switch Operation Inspection

First Step

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

★If the engine starts, inspect or replace the following item.
Engine Stop Switch (see Switch Inspection in the Electrical System chapter)

Second Step

- Turn on the ignition switch.
- Set the neutral position.
- Turn the engine stop switch to run position [A].
- Push the starter button and run 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 following item.
Engine Stop Switch (see Switch Inspection in the Electrical System chapter)

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

Others

Chassis Parts Lubrication

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

NOTE

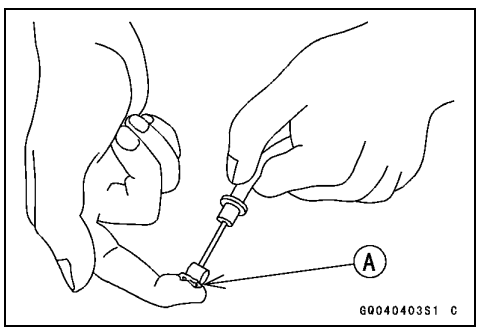
○*Whenever the vehicle has been operated under wet or rainy conditions, or especially after using a high-pressure water spray, perform the general lubrication.*

Pivots: Lubricate with Grease.

Brake Lever
Brake Pedal
Clutch Lever
Rear Brake Joint Pin
Sidestand

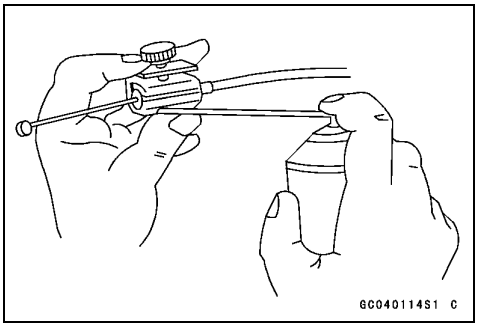
Points: Lubricate with Grease.

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

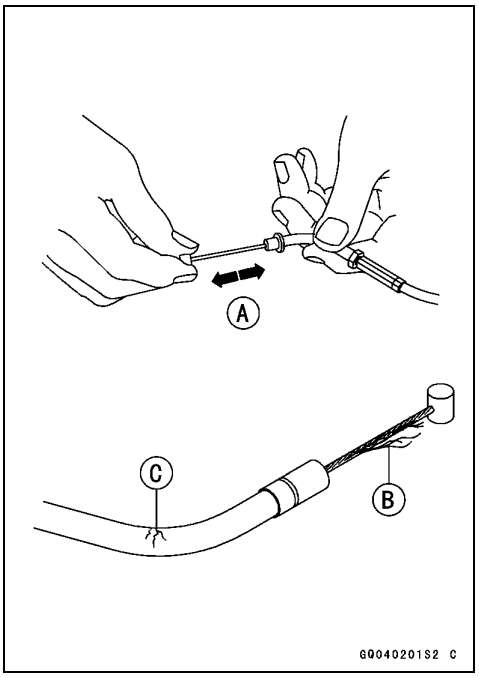


● Lubricate the cables by seeping the oil between the cable and housing.

○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

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 Locknut
- Engine Mounting Bracket Bolts and Nuts
- Engine Mounting Nuts
- Exhaust Pipe Holder Nuts
- Exhaust Pipe Mounting Bolt
- Muffler Body Clamp Bolt
- Muffler Body Mounting Bolt
- Radiator Bolts

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

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

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

Steering:
- Handlebar Mounting Bolts
- Steering Stem Head Bolt

Others:
- Footpeg Bracket Bolts
- Sidestand Nut

Periodic Maintenance Procedures

Replacement Parts

Air Cleaner Element Replacement

NOTE

○*In dusty areas, the element should be replaced more frequently than the recommended interval.*
○*After riding through rain or on muddily roads, the element should be replaced immediately.*

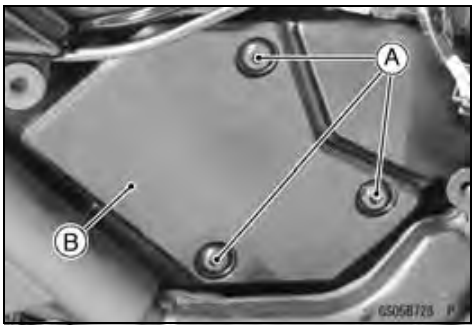
⚠ WARNING

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

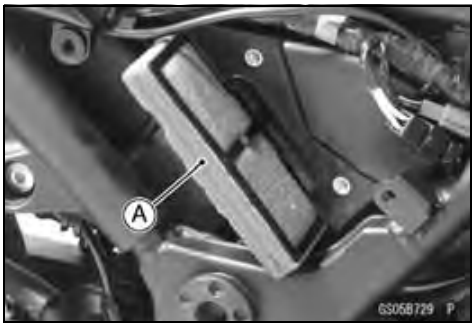
CAUTION

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

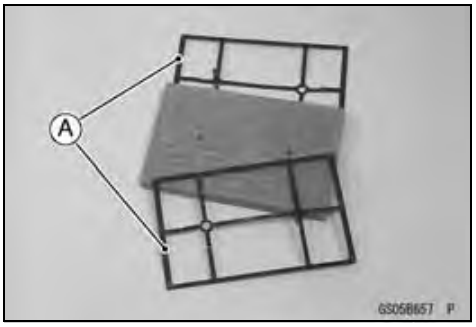
● Remove:
Right Side Cover (see Side Cover Removal in the Frame chapter)
Air Cleaner Housing Cap Bolts [A]
Air Cleaner Housing Cap [B]



● Pull out the air cleaner element [A].



● Separate the plastic holders [A].



● Install a new element and air cleaner housing cap.
● Tighten:

Torque - Air Cleaner Housing Cap Bolts: 2.5 N·m (0.25 kgf·m, 22 in·lb)

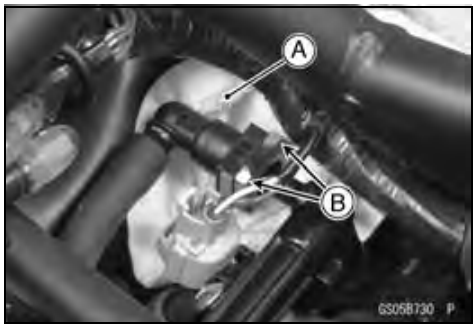
Periodic Maintenance Procedures

Fuel Hose Replacement

⚠ WARNING

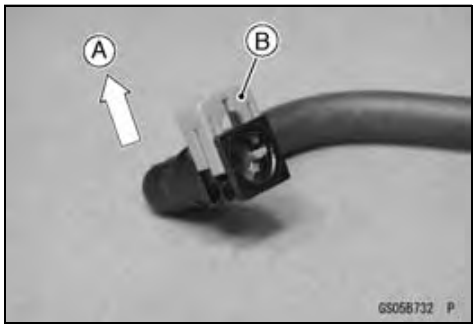
Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.
When the fuel hose is disconnected, fuel spills out from the hose and the pipe because of residual pressure. Cover the hose connection with a piece of clean cloth to prevent fuel spillage.

- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Be sure to place a piece of cloth [A] around the fuel hose joint.
- Push the joint lock claws [B].

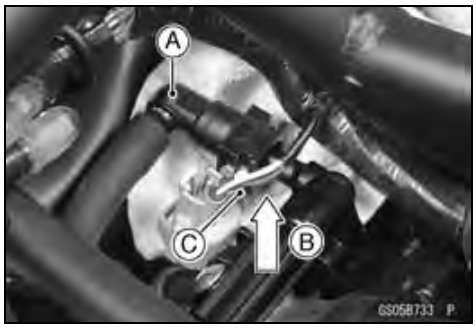


- Pull the joint lock [A] as shown in the figure.
- Pull the fuel hose joint [B] out of the fuel supply pipe.

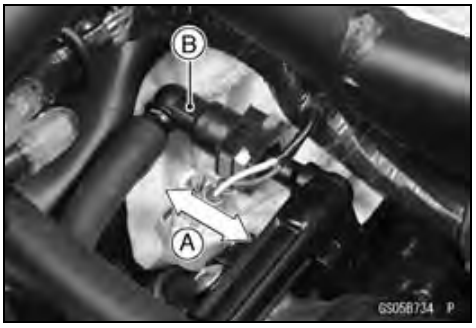
- Replace the fuel hose with a new one.
- Pull [A] the joint lock [B] fully as shown in the figure.



- Install a new fuel hose so that the white mark side faces fuel supply pipe of the fuel pump.
- Insert the fuel hose joint [A] straight onto the fuel supply pipe until the hose joint clicks.
- Push [B] the joint lock [C] until the hose joint clicks.



Periodic Maintenance Procedures



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

⚠ WARNING

Make sure the fuel hose joint is installed correctly on the fuel supply pipe or the fuel could leak.

★If it comes off, reinstall the hose joint.
- Run the fuel hose correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the fuel tank (see Fuel Tank Installation in the Fuel System (DFI) chapter).
- Start the engine and check the fuel hose for leaks.

Coolant Change

⚠ WARNING

To avoid burns, do not remove the radiator cap or try to change the coolant when the engine is still hot. Wait until it cools down. Coolant on tires will make them slippery and can cause an accident and injury. Immediately wipe up or wash away any coolant that spills on the frame, engine, or other painted parts.
Since coolant is harmful to the human body, do not use for drinking.

- Remove the lower fairings (see Lower Fairing Removal in the Frame chapter).
- Remove the radiator cap [A] in two steps. First turn the cap counterclockwise to the first stop. Then push and turn it further in the same direction and remove the cap.

Periodic Maintenance Procedures

● Place a container under the coolant drain bolts [A], then remove the drain bolts.
○The coolant will drain from the radiator and engine.

● Remove the hose [A].
● Pour the coolant into a suitable container.
● Install the hose.
● Tighten the drain bolts with the gasket.
○Replace the drain bolt gaskets with new ones.

Torque - Coolant Drain Bolt (Water Pump): 9.8 N·m (1.0 kgf·m, 87 in·lb)
Coolant Drain Bolt (Cylinder): 5.9 N·m (0.60 kgf·m, 52 in·lb)

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

CAUTION

Soft or distilled water must be used with the antifreeze in the cooling system.
If hard water is used in the system, it causes 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:	**1.5 L (1.6 US qt)**

Periodic Maintenance Procedures

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

NOTE

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

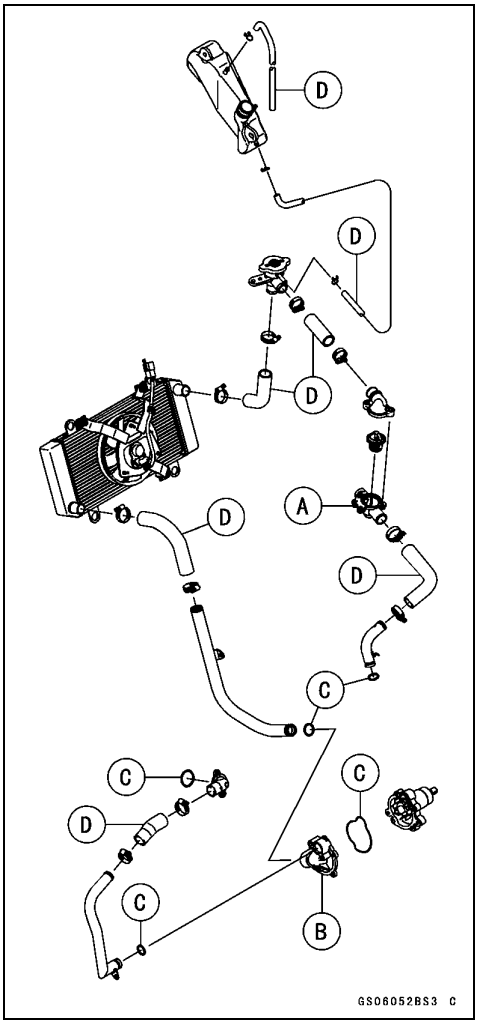
● Check the cooling system for leaks.
● Tap the radiator hoses to force any air bubbles caught inside.
● Fill the radiator up to the filler neck with coolant.

● Fill the reserve tank up to the "F" (full) level line [A] with coolant and install the cap [B].
● Install the 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.

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

Periodic Maintenance Procedures

Radiator Hose and O-ring Replacement



- Drain the coolant (see Coolant Change).
- Remove:
  Thermostat Housing [A] (see Thermostat Housing Removal in the Cooling System chapter)
  Water Pump Cover [B] (see Water Pump Cover Removal in the Cooling System chapter)
  O-rings [C]
  Hoses [D]
- Apply grease to the new O-rings and install them.
- Install the new hoses and tighten the clamps securely.

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

- Fill the coolant (see Coolant Change).
- Check the cooling system for leaks.

Engine Oil Change

- Situate the motorcycle so that it is vertical after warming up the engine.
- Remove the engine oil drain bolt [A] to drain the oil.
- ○The oil in the oil filter can be drained by removing the filter (see Oil Filter Replacement).
- Replace the drain bolt gasket [B] with a new one.
- Tighten the drain bolt.

Torque - Engine Oil Drain Bolt (Oil Screen Cover): 19.6 N·m (2.0 kgf·m, 14.5 ft·lb)

- Pour in the specified type and amount of oil.

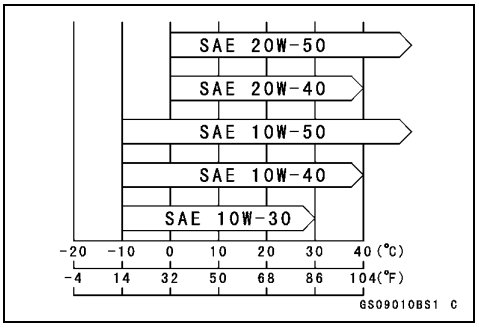
Periodic Maintenance Procedures

Recommended Engine Oil

Type: **API SE, SF or SG**
API SH, SJ or SL with JASO MA

Viscosity: **SAE 10W-40**

Capacity: **1.3 L (1.4 US qt) (when filter is not removed)**
1.6 L (1.7 US qt) (when filter is removed)
1.7 L (1.8 US qt) (when engine is completely dry)



NOTE

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

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

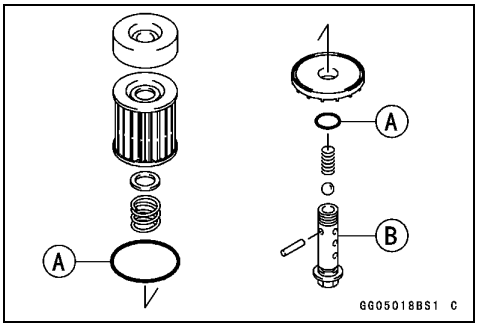
Oil Filter Replacement

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

- Replace the oil filter with a new one.
- Apply engine oil to a new O-rings [A] before installation.
- Install the oil filter, and tighten the mounting bolt [B].

Torque - Oil Filter Mounting Bolt: 19.6 N·m (2.0 kgf·m, 14.5 ft·lb)

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

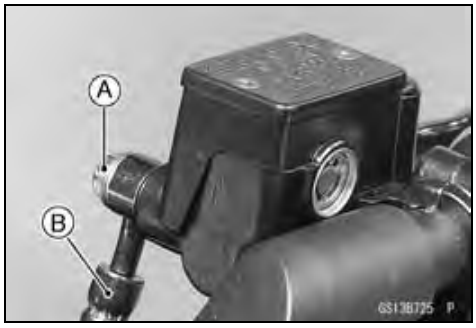


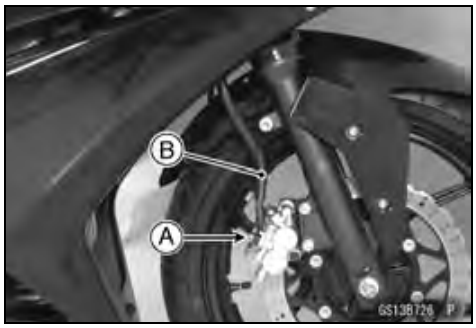
Periodic Maintenance Procedures

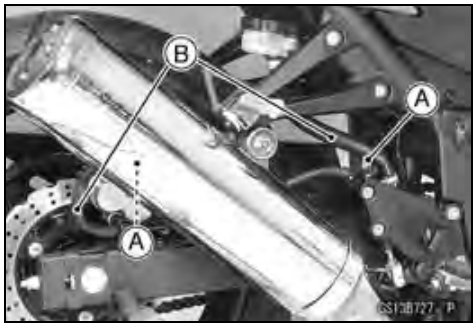
Brake Hose and Pipe Replacement

CAUTION

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







- Remove the brake hose banjo bolts [A].
- When removing the brake hose, take care not to spill the brake fluid on the painted or plastic parts.
- When removing the brake hoses [B], temporarily secure the end of the brake hose to some high place to keep fluid loss to a minimum.
- Immediately wash away any brake fluid that spills.
- There are washers on each side of the brake hose fitting. Replace them with new ones when installing.
- Tighten:

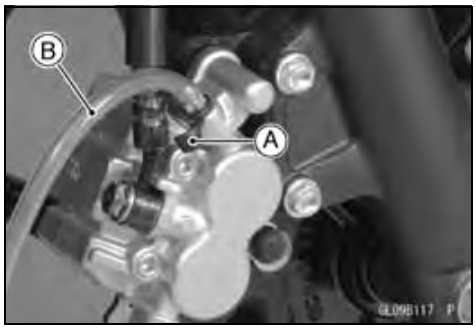
Torque - Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

- When installing the hoses, avoid sharp bending, kinking, flatting or twisting, and run the hoses according to Cable, Wire, and Hose Routing section in the Appendix chapter.
- Fill the brake line after installing the brake hose (see Brake Fluid Change).

Brake Fluid Change

NOTE

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



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

Periodic Maintenance Procedures

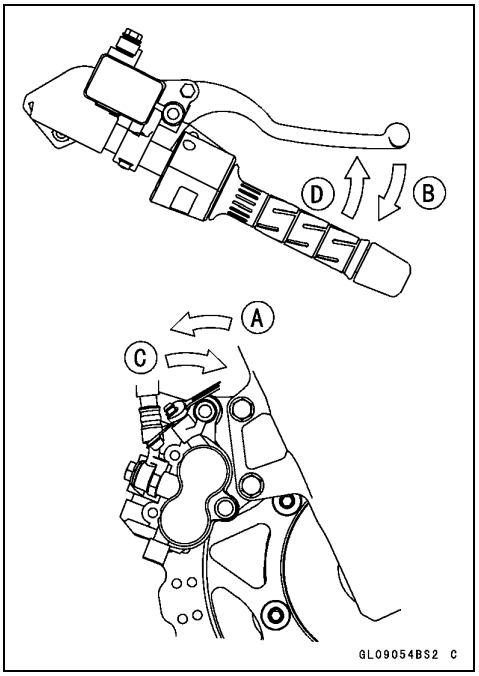
● Change the brake fluid.

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

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

NOTE

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



● Remove the clear plastic hose.

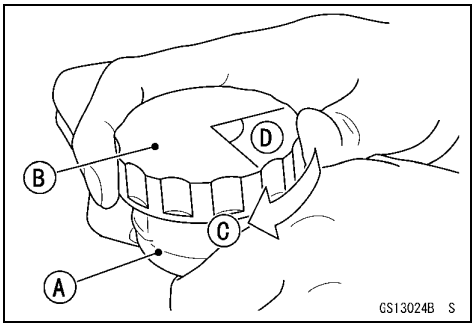
● Install the diaphragm and reservoir cap.

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



● Apply a non-permanent locking agent to the threads of the bleed valve.

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

Torque - Bleed Valve: 5.5 N·m (0.56 kgf·m, 49 in·lb)

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

★If necessary, bleed the air from the lines.

Master Cylinder Rubber Parts Replacement

Front Master Cylinder Disassembly

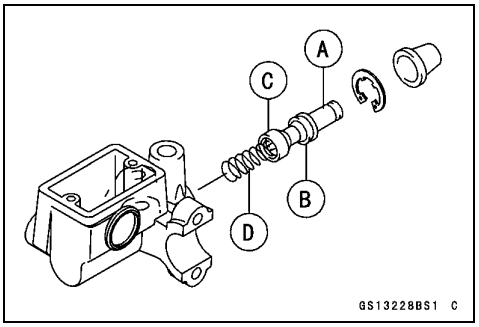
● Remove the front master cylinder (see Front Master Cylinder Removal in the Brakes chapter).

● Remove the reservoir cap and diaphragm, and pour the brake fluid into a container.

● Unscrew the locknut and pivot bolt, and remove the brake lever.

● Pull the dust cover out of place, and remove the circlip.

Special Tool - Inside Circlip Pliers: 57001-143



● Pull out the piston [A], secondary cup [B], primary cup [C] and return spring [D].

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

Periodic Maintenance Procedures

Rear Master Cylinder Disassembly

NOTE

○*Do not remove the push rod clevis for master cylinder disassembly since removal requires brake position adjustment.*

- Remove the rear master cylinder (see Rear Master Cylinder Removal in the Brakes chapter).
- Remove the circlip [A].

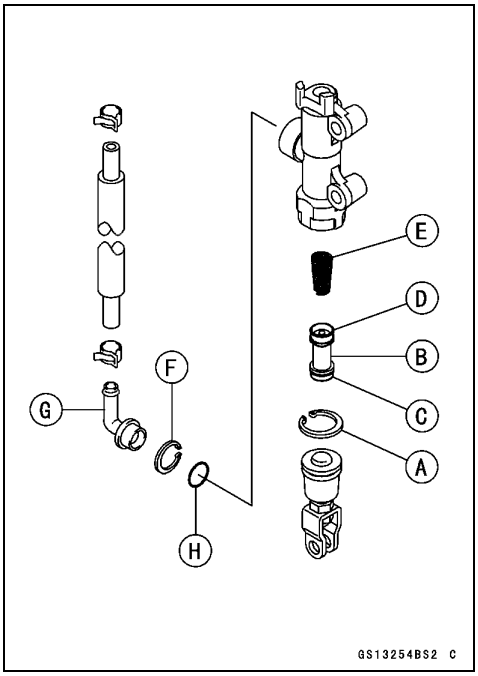
Special Tool - Inside Circlip Pliers: 57001-143

- Pull out the push rod with the piston stop.
- Take off the piston [B], secondary cup [C], primary cup [D] and return spring [E].
- Remove the circlip [F] and pull out the brake hose connector [G] and O-ring [H].

Special Tool - Inside Circlip Pliers: 57001-143

CAUTION

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



Master Cylinder Assembly

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

CAUTION

Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning 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 brake lever pivot bolt and push rod.
- Tighten:

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

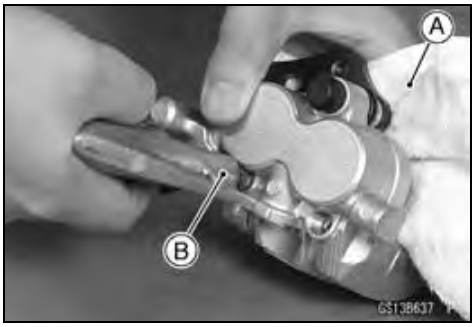
NOTE

○*The procedure to assembly/disassembly the front caliper is as follows. Assembling/disassembling the rear caliper is the same as for the front caliper.*

Caliper Disassembly

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

● Using compressed air, remove the pistons.
○Cover the piston area with a clean, thick cloth [A].
○Blow compressed air [B] into the hole for the banjo bolt to remove the piston.



⚠ WARNING

To avoid serious injury, never place your fingers or palm in front of the piston. If you apply compressed air into the caliper, the piston may crush your hand or fingers.

● Pull out the pistons by hand.
● Remove:
Caliper Holder
Dust Seals
Fluid Seals
Bleed Valve
Rubber Cap

NOTE

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

Periodic Maintenance Procedures

Caliper Assembly

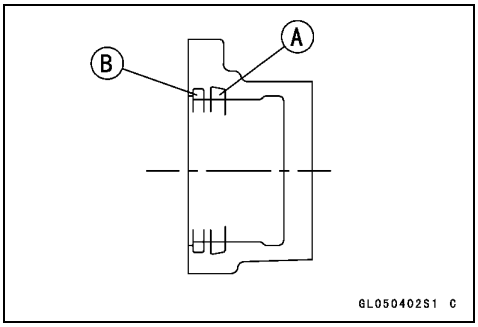
● Clean the caliper parts except for the pads.

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

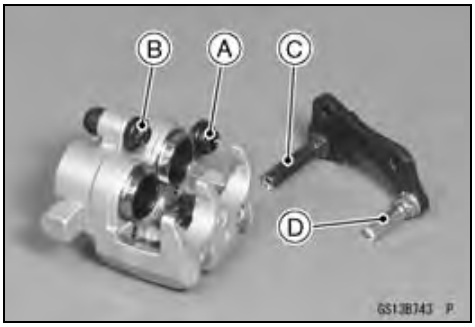
● Apply a non-permanent locking agent to the threads of the bleed valve.
● Install the bleed valve and rubber cap.

Torque - Bleed Valve: 5.5 N·m (0.56 kgf·m, 49 in·lb)

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



● Apply brake fluid to the outside of the pistons, and push them into each cylinder by hand.
● Check the dust cover [A] and the friction boot [B] replace them with new ones if they are damaged.
● Apply a thin coat of PBC (Poly Butyl Cuprysil) grease to the caliper holder shaft [C] and pin bolt [D] (PBC is a special high-temperature, water-resistance grease).
● Install the caliper holder and pad spring.



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

Spark Plug Replacement

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

Periodic Maintenance Procedures

● Replace the spark plug with a new one.

Standard Spark Plug
Type: NGK CR8E

● Insert the new spark plug in the plug hole, and finger -tighten it first.
● Using the plug wrench [A] vertically, tighten the plug.

CAUTION

The insulator of the spark plug may break if when the wrench is inclined during tightening.

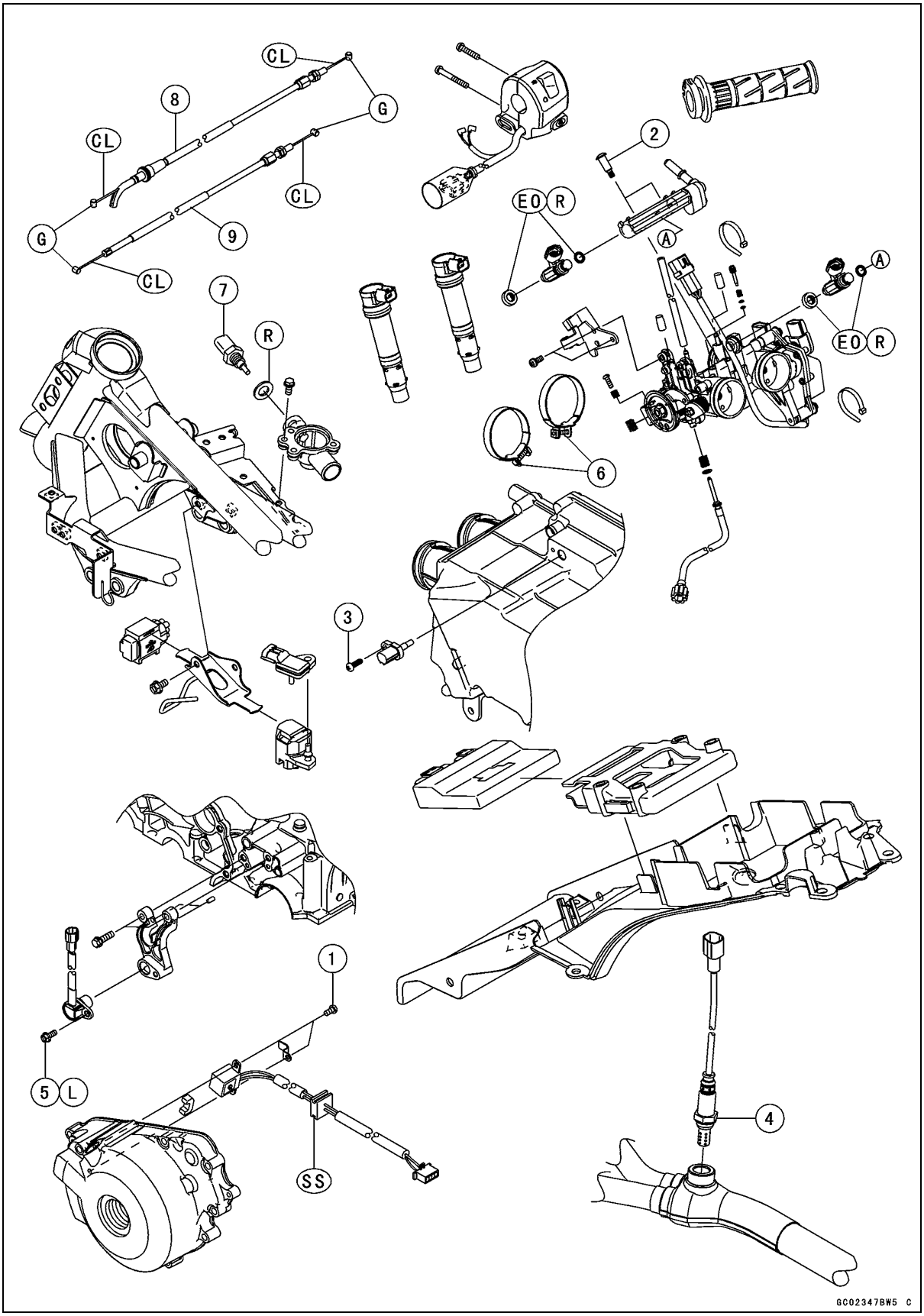
Torque - Spark Plugs: 13 N·m (1.3 kgf·m, 115 in·lb)

● Install the stick coils securely.
○Be sure the stick coils are installed by pulling up it lightly.

Fuel System (DFI)

Table of Contents

Exploded View



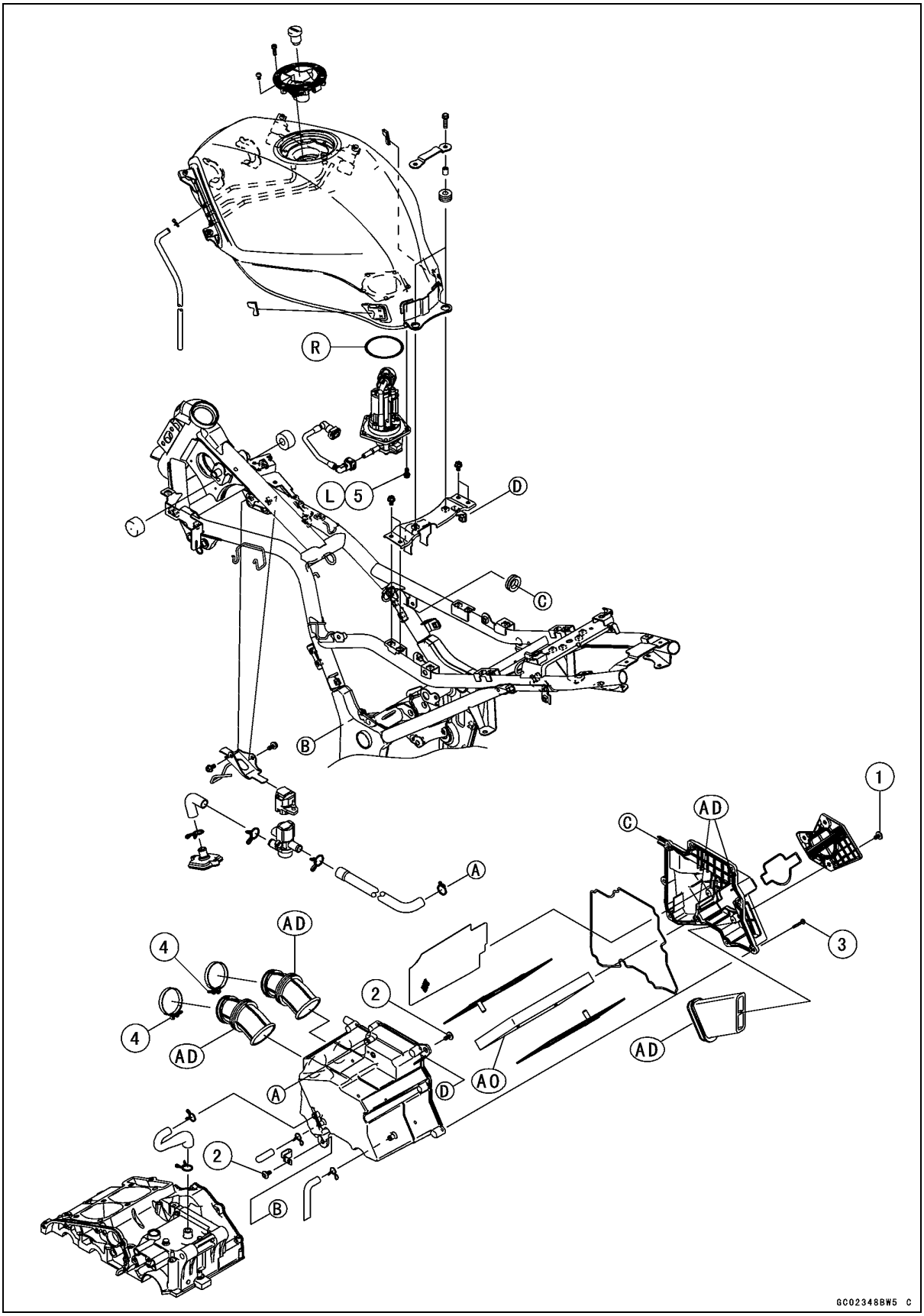
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Crankshaft Sensor Screws	3.0	0.31	27 in·lb	
2	Delivery Pipe Assy Mounting Screws	3.4	0.35	30 in·lb	
3	Inlet Air Temperature Sensor Screw	1.2	0.12	11 in·lb	
4	Oxygen Sensor	44.1	4.50	32.5	
5	Speed Sensor Bolt	7.8	0.80	69 in·lb	L
6	Throttle Body Assy Holder Clamp Screws	2.0	0.20	18 in·lb	
7	Water Temperature Sensor	25	2.5	18	

8. Throttle Cable (Accelerator)
9. Throttle Cable (Decelerator)

CL: Apply cable lubricant.
EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts
SS: Apply silicone sealant.

Exploded View



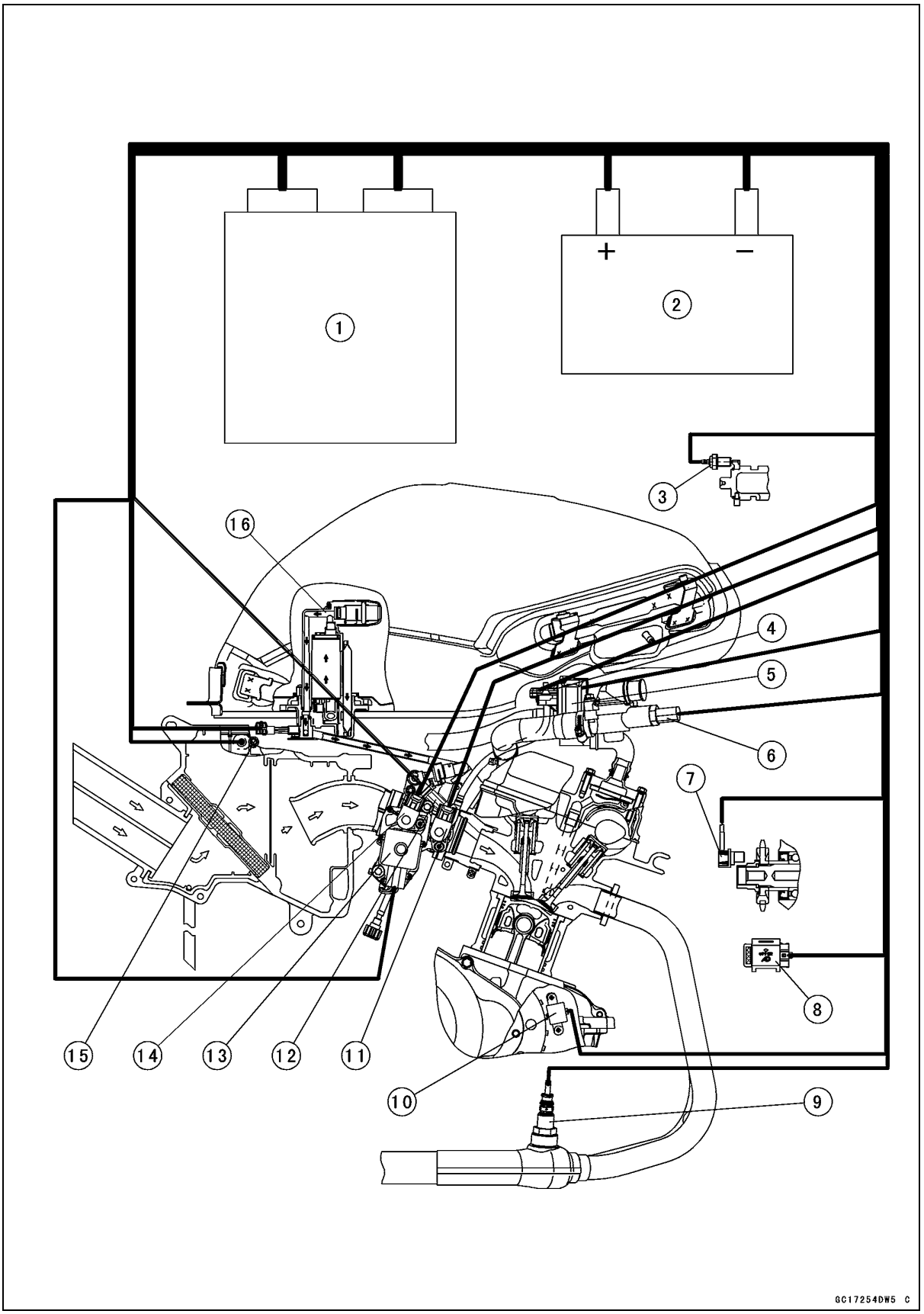
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Air Cleaner Housing Cap Bolts	2.5	0.25	22 in·lb	
2	Air Cleaner Housing Mounting Bolts	9.8	1.0	87 in·lb	
3	Air Cleaner Housing Screws	1.15	0.12	10 in·lb	
4	Air Duct Clamp Screws	2.0	0.20	18 in·lb	
5	Fuel Pump Bolts	9.8	1.0	87 in·lb	L

AD: Apply adhesive.
AO: Apply high-quality-form-air-filter oil.
L: Apply a non-permanent locking agent.
R: Replacement Parts

DFI System

DFI System

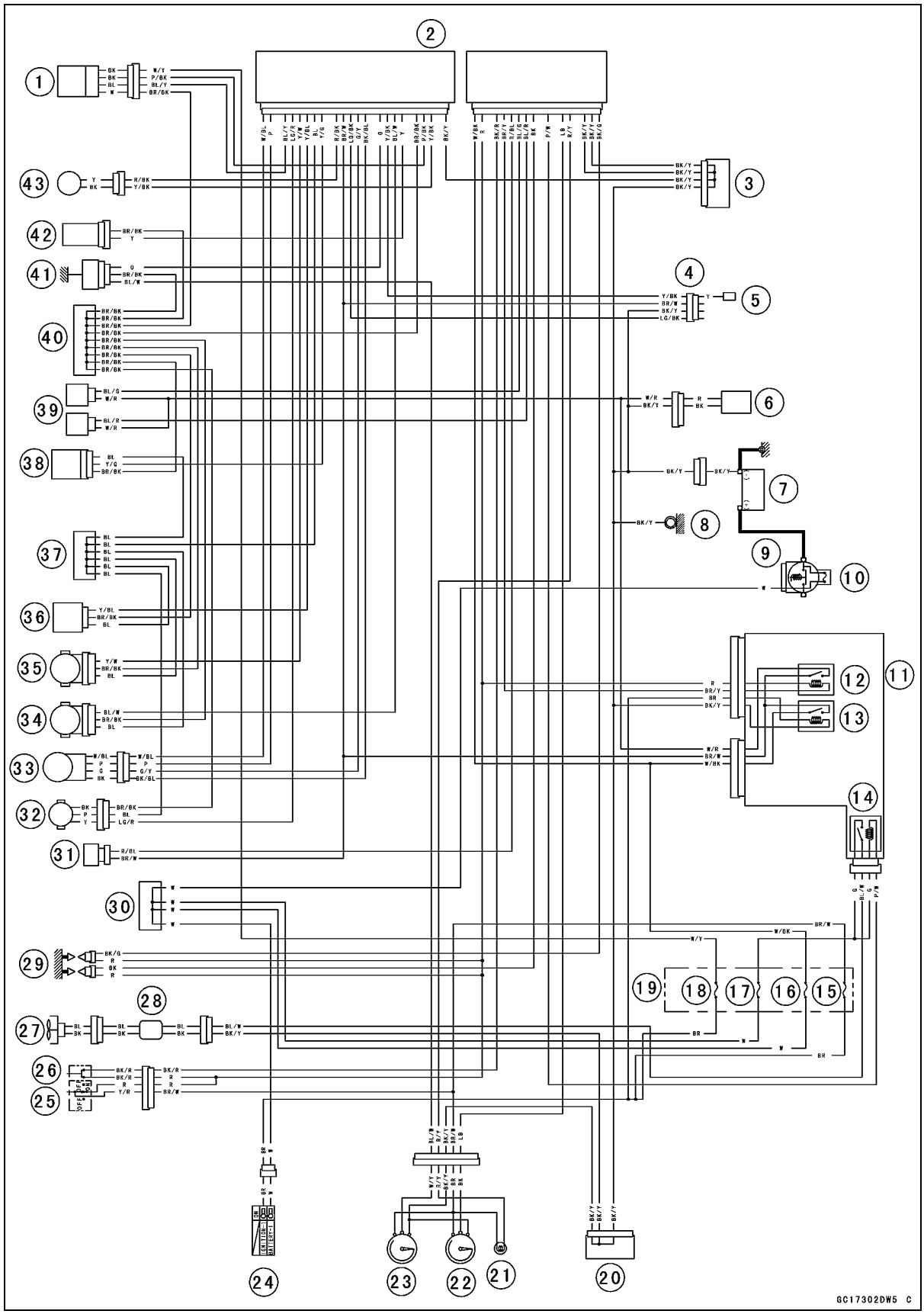


DFI System

1. ECU
2. Battery 12 V 8 Ah
3. Neutral Switch
4. Inlet Air Pressure Sensor
5. Air Switching Valve
6. Water Temperature Sensor
7. Speed Sensor
8. Vehicle-down Sensor
9. Oxygen Sensor
10. Crankshaft Sensor
11. Main Throttle Sensor
12. Fuel Injectors
13. Subthrottle Valve Actuator
14. Subthrottle Sensor
15. Inlet Air Temperature Sensor
16. Fuel Pump

DFI System

DFI System Wiring Diagram



DFI System

Part Names

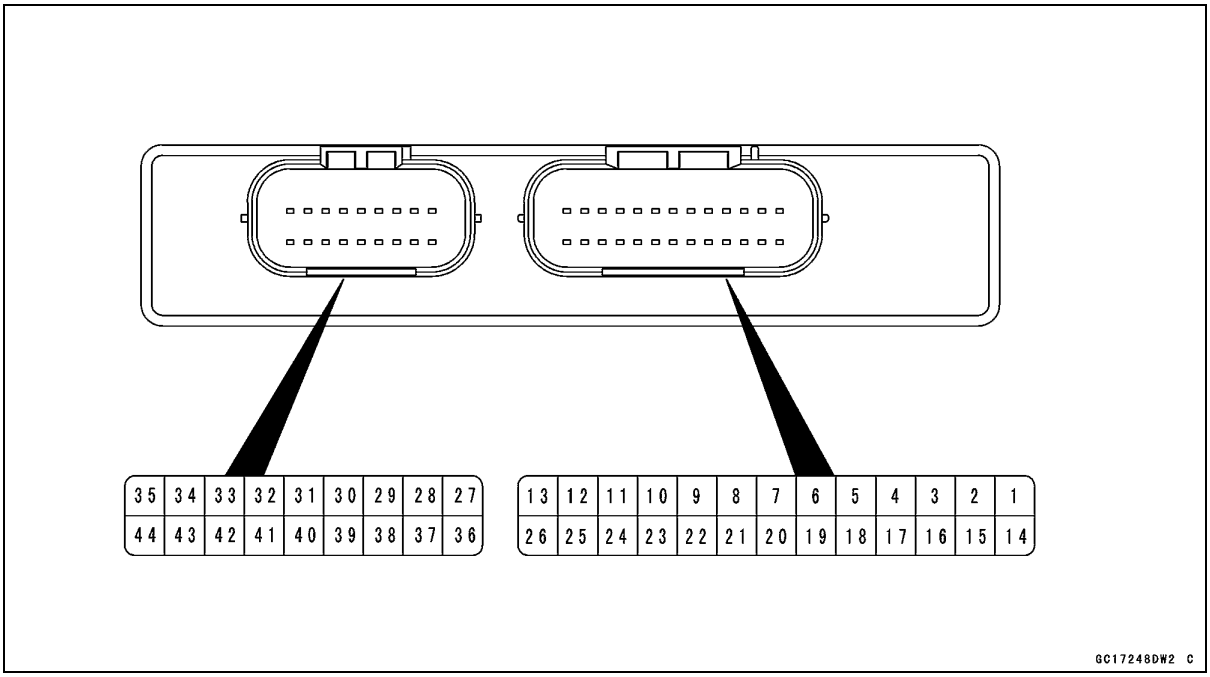
1. Oxygen Sensor
2. ECU
3. Joint Connector 2
4. Kawasaki Diagnostic System Connector
5. Self-diagnosis Terminal
6. Fuel Pump
7. Battery 12 V 8 Ah
8. Frame Ground
9. Starter Relay
10. Main Fuse 30 A
11. Relay Box
12. Fuel Pump Relay
13. ECU Main Relay
14. Fan Relay
15. Ignition Fuse 10 A
16. ECU Fuse 15 A
17. Fan Fuse 10 A
18. Oxygen Sensor Heater Fuse 10 A
19. Fuse Box
20. Joint Connector 1
21. FI Indicator Light
22. Tachometer
23. Water Temperature Gauge
24. Ignition Switch
25. Engine Stop Switch
26. Starter Button
27. Fan Motor
28. Resistor
29. Stick Coil #1, #2
30. Water-proof Joint 3
31. Air Switching Valve
32. Speed Sensor
33. Subthrottle Valve Actuator
34. Subthrottle Sensor
35. Main Throttle Sensor
36. Inlet Air Pressure Sensor
37. Water-proof Joint 2
38. Vehicle-down Sensor
39. Fuel Injector #1, #2
40. Water-proof Joint 1
41. Water Temperature Sensor
42. Inlet Air Temperature Sensor
43. Crankshaft Sensor

○Color Codes:

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

DFI System

Terminal Numbers of ECU Connectors



Terminal Names

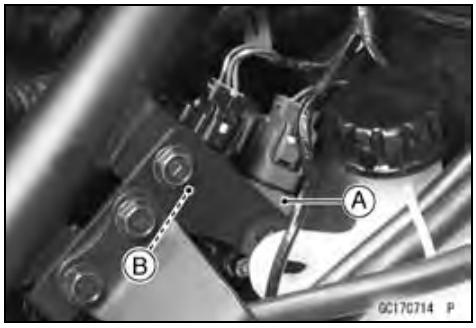
1. Subthrottle Valve Actuator: W/BL
2. Subthrottle Valve Actuator: P
3. Fuel Level Warning Indicator Light: GY
4. Oxygen Sensor: BL/Y
5. Speed Sensor: LG/R
6. Main Throttle Sensor: Y/W
7. Inlet Air Pressure Sensor: Y/BL
8. Power Supply to Sensors: BL
9. Vehicle-down Sensor: Y/G
10. Neutral Switch: LG
11. Crankshaft Sensor (+): R/BK
12. Power Supply to ECU (from ECU Main Relay): BR/W
13. External Communication Line: LG/BK
14. Subthrottle Valve Actuator: G/Y
15. Subthrottle Valve Actuator: BK/BL
16. Unused
17. Water Temperature Sensor: O
18. Self-diagnosis Terminal: Y/BK
19. Subthrottle Sensor: BL/W
20. Inlet Air Temperature Sensor: Y
21. Unused
22. Ground for Sensors: BR/BK
23. Oxygen Sensor Heater: P/BK
24. Crankshaft Sensor (–): Y/BK
25. Unused
26. Ground for ECU: BK/Y
27. Power Supply to ECU (from Battery): W/BK
28. Engine Stop Switch: R
29. Starter Lockout Switch: R/G
30. Starter Button: BK/R
31. Fuel Pump Relay: BR/Y
32. Air Switching Valve: R/BL
33. Injector #2: BL/G
34. Injector #1: BL/R

DFI System

35. Stick Coil #1: BK
36. Sidestand Switch: G/BK
37. Fan Relay: P/W
38. Unused
39. Meter Unit (Tachometer): LB
40. FI Indicator Light: R/Y
41. Unused
42. Ground for Fuel System: BK/Y
43. Ground for Ignition System: BK/Y
44. Stick Coil #2: BK/G

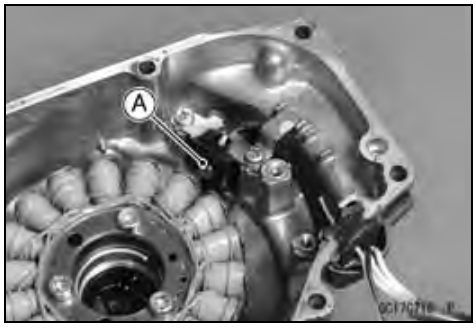
DFI Parts Location

Main Throttle Sensor [A]
Subthrottle Sensor [B]



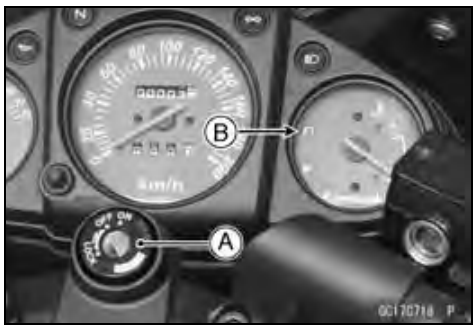
Fuel Injectors #1, #2 [A]

Crankshaft Sensor [A]



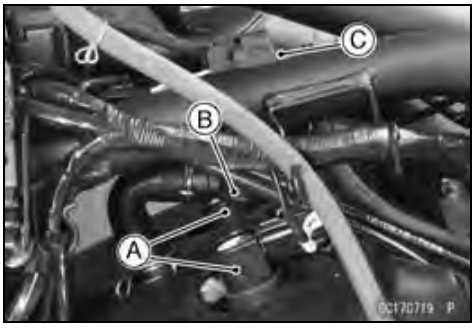
Oxygen Sensor [A]

Ignition Switch [A]
FI Indicator Light [B]



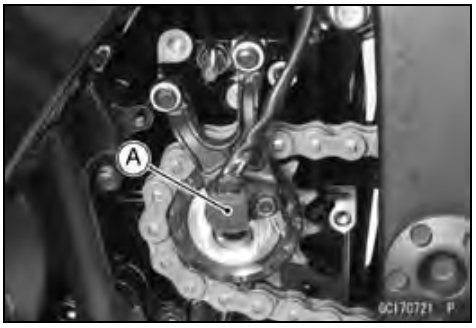
DFI Parts Location

Stick Coils #1, #2 [A]
Air Switching Valve [B]
Inlet Air Pressure Sensor [C]

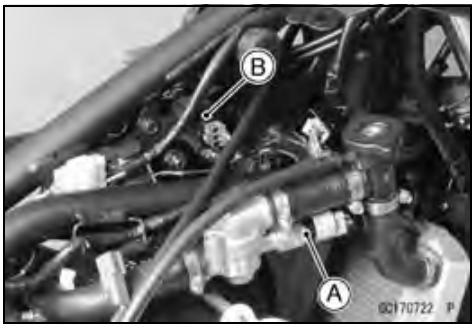


Subthrottle Valve Actuator [A]

Speed Sensor [A]



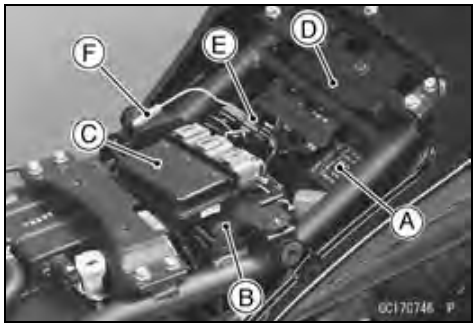
Water Temperature Sensor [A]
Vehicle-down Sensor [B]



Inlet Air Temperature Sensor [A]

DFI Parts Location

Fuse Box (Oxygen Sensor Heater Fuse 10 A, ECU Fuse 15 A, Ignition Fuse 10 A, Fan Fuse 10 A) [A]
Battery 12 V 8 Ah [B]
Relay Box (ECU Main Relay, Fan Relay, Fuel Pump Relay) [C]
ECU [D]
Kawasaki Diagnostic System Connector [E]
Self-diagnosis Terminal [F]



Fuel Pump [A]

Specifications

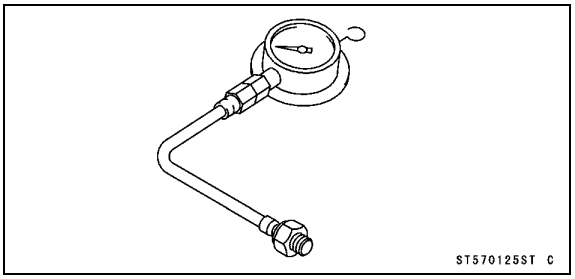
Item	Standard
Digital Fuel Injection System	
Idle Speed	1 300 ±50 r/min (rpm)
Throttle Body Assy:	
Type	Two barrel type
Bore	ϕ28 mm (1.10 in.)
Throttle Body Vacuum	24.0 ±1.33 kPa (180 ±10 mmHg)
Bypass Screws (Turn Out)	0 ~ 2 1/2 (for reference)
ECU:	
Make	DENSO
Fuel Pressure (High Pressure Line)	294 kPa (3.0 kgf/cm², 43 psi) with engine idling
Fuel Pump:	
Discharge	17 mL (0.57 US oz.) or more for 3 seconds
Fuel Injectors:	
Type	INP-288
Nozzle Type	Fine atomizing type with 8 holes
Resistance	About 11.7 ~ 12.3 Ω at 20°C (68°F)
Main Throttle Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	DC 1.020 ~ 1.050 V at idle throttle opening
	DC 4.185 ~ 4.385 V at full throttle opening (for reference)
Resistance	4 ~ 6 kΩ
Inlet Air Pressure Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	DC 3.80 ~ 4.20 V at standard atmospheric pressure (see this text for details)
Inlet Air Temperature Sensor:	
Output Voltage	About DC 2.25 ~ 2.50 V at inlet air temperature 20°C (68°F)
Resistance	5.4 ~ 6.6 kΩ at 0°C (32°F)
	0.29 ~ 0.39 kΩ at 80°C (176°F)
Water Temperature Sensor:	
Output Voltage	About DC 2.80 ~ 2.97 V at 20°C (68°F)
Speed Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	About DC 0.05 ~ 0.09 V or DC 4.5 ~ 4.9 V at ignition switch ON and 0 km/h
Vehicle-down Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	With sensor tilted 55 ~ 75° or more right or left: DC 3.7 ~ 4.4 V
	With sensor arrow mark pointed up: DC 0.4 ~ 1.4 V

Specifications

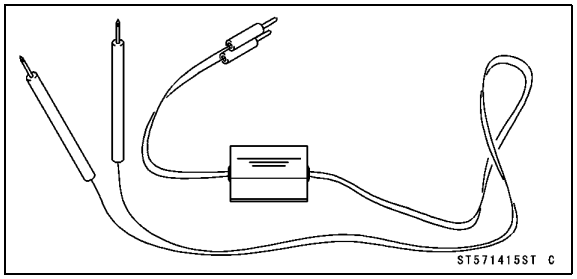
Item	Standard
Subthrottle Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	DC 0.78 ~ 0.82 V at subthrottle valve full close position
	DC 3.9 ~ 4.1 V at subthrottle valve full open position (for reference)
Resistance	4 ~ 6 kΩ
Subthrottle Valve Actuator:	
Resistance	About 5.2 ~ 7.8 Ω
Input Voltage	About DC 11.5 ~ 13.5 V
Oxygen Sensor:	
Output Voltage (Rich)	DC 0.7 V or more
Output Voltage (Lean)	DC 0.2 V or less
Heater Resistance	11.7 ~ 15.5 Ω at 20°C (68°F)
Throttle Grip and Cables	
Throttle Grip Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)
Air Cleaner	
Element	Polyurethane foam

Special Tools and Sealant

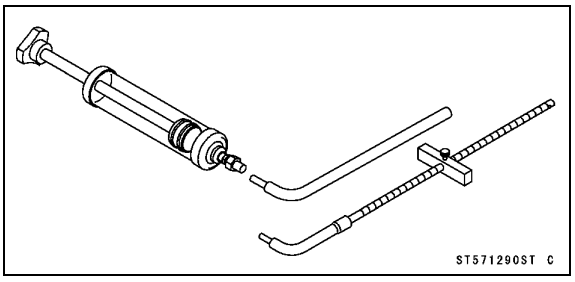
Oil Pressure Gauge, 5 kgf/cm²:
57001-125



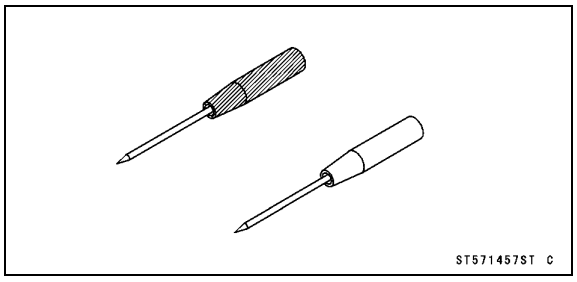
Peak Voltage Adapter:
57001-1415



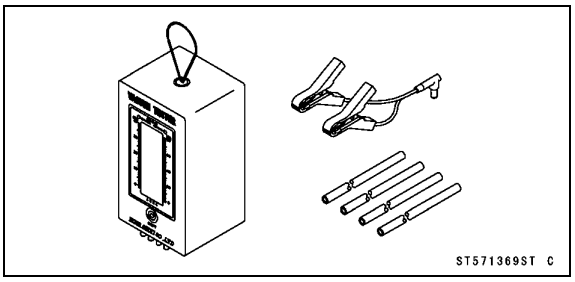
Fork Oil Level Gauge:
57001-1290



Needle Adapter Set:
57001-1457



Vacuum Gauge:
57001-1369



Throttle Sensor Setting Adapter:
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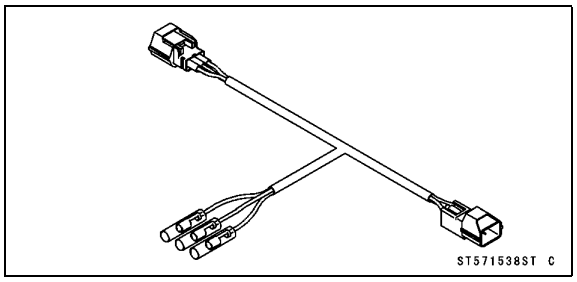
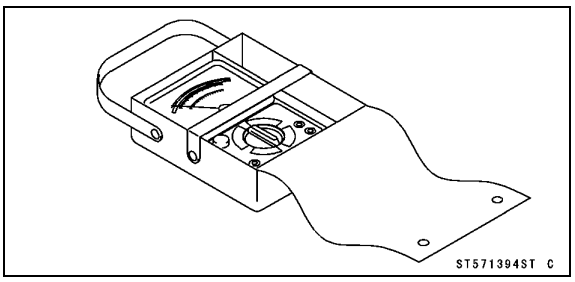
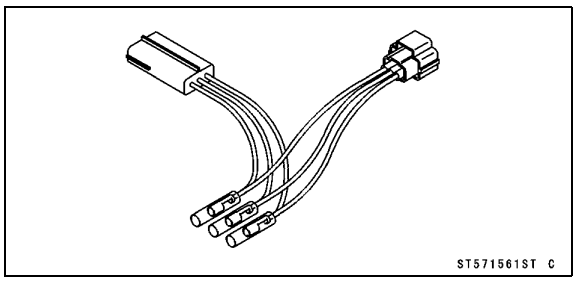


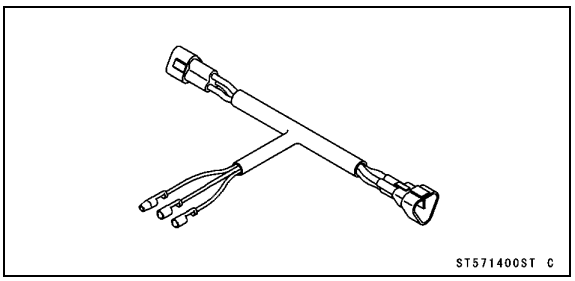
Hand Tester:
57001-1394



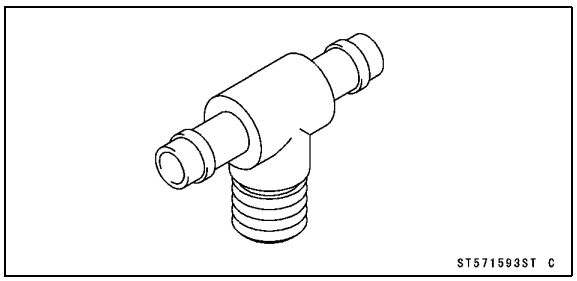
Sensor Harness Adapter:
57001-1561



Throttle Sensor Setting Adapter #1:
57001-1400

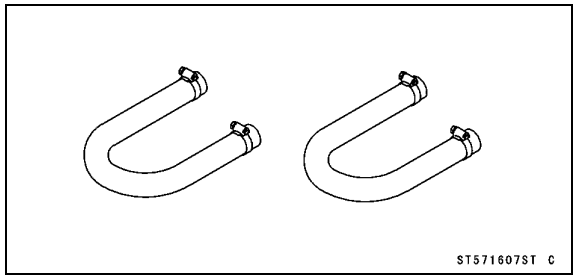


Fuel Pressure Gauge Adapter:
57001-1593

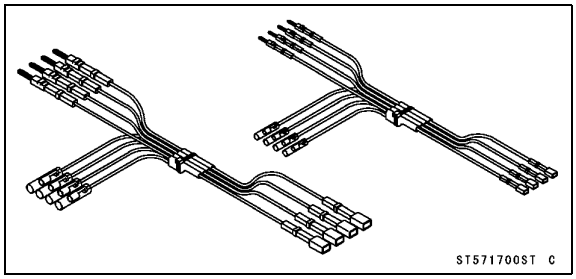


Special Tools and Sealant

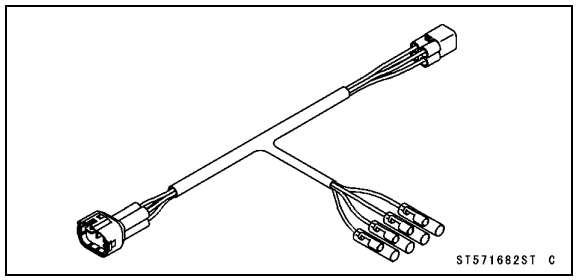
Fuel Hose:
57001-1607



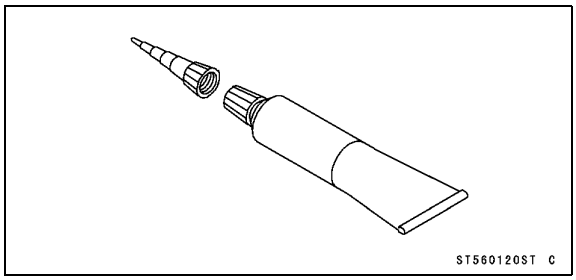
Measuring Adapter:
57001-1700



Oxygen Sensor Measuring Adapter:
57001-1682



Kawasaki Bond (Silicone Sealant):
56019-120

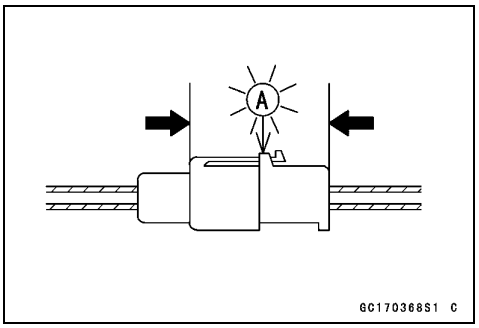


DFI Servicing Precautions

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.

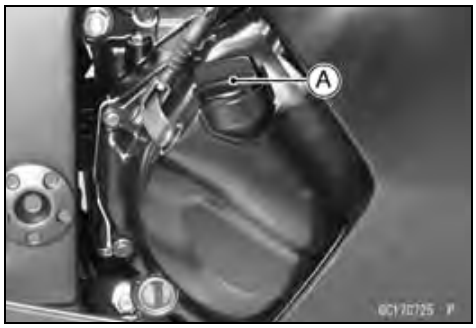
DFI Servicing Precautions

○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 fuel tank (see Fuel Tank Removal) and check the fuel hose [A].

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

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

Torque - Oil Filler Plug: Hand-Tighten



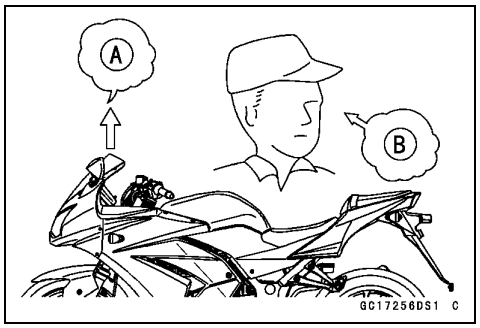
Troubleshooting the DFI System

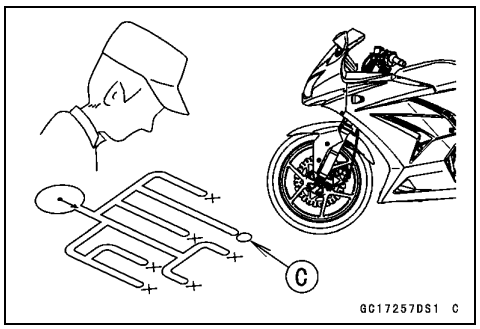
Outline

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

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

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

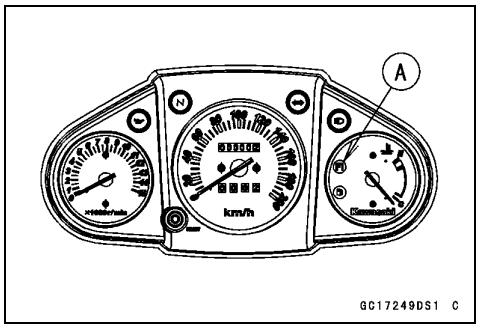




Even when the DFI system is operating normally, the FI indicator light [A] may light up under strong electrical interference. No remedy needed. Turn the ignition switch OFF to stop the indicator light.

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

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



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

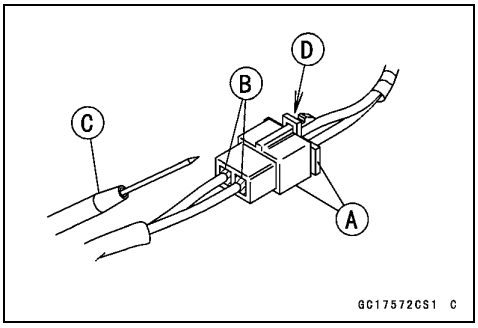
Much of the DFI system troubleshooting work consists of confirming continuity of the wiring. The DFI parts are assembled and adjusted with precision, and it is impossible to disassemble or repair them.

Troubleshooting the DFI System

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

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

Special Tool - Needle Adapter Set: 57001-1457



CAUTION

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

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

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

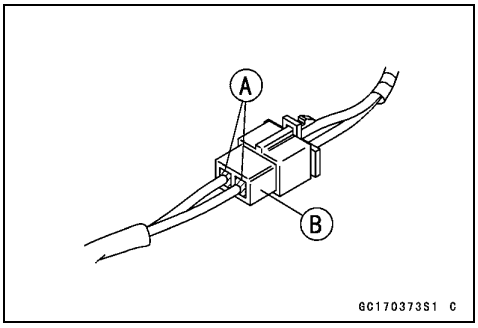
● Turn the ignition switch ON and measure the voltage with the connector joined.

CAUTION

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

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

Sealant - Kawasaki Bond (Silicone Sealant): 56019-120



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

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

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

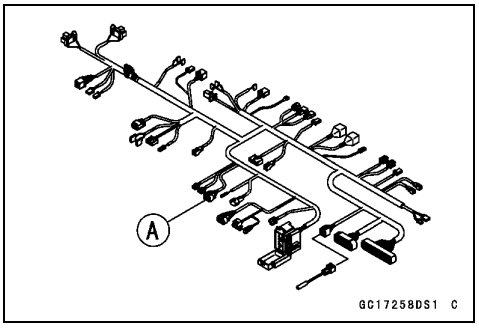
● Make sure all connectors in the circuit are clean and tight, and examine leads for signs of burning, fraying, short, etc. Deteriorated leads and bad connections can cause reappearance of problems and unstable operation of the DFI system.

★If any wiring is deteriorated, replace the wiring.

Troubleshooting the DFI System

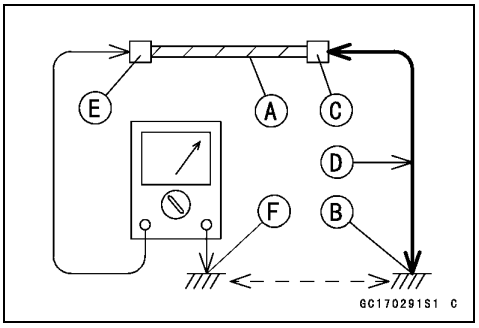
● Pull each connector [A] apart and inspect it for corrosion, dirt, and damage.
★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it. Connect the connectors securely.
● Check the wiring for continuity.
○Use the wiring diagram to find the ends of the lead which is suspected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

Special Tool - Hand Tester: 57001-1394

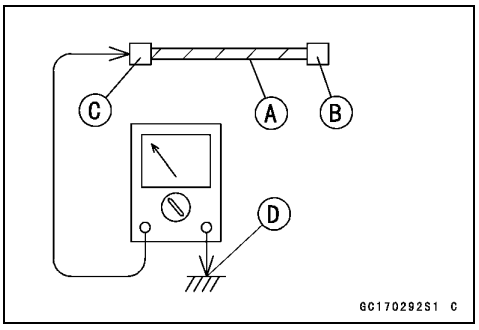


○Set the tester to the × 1 Ω range, and read the tester.
★If the tester does not read 0 Ω, the lead is defective. Replace the lead or the main harness or the subharness.

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



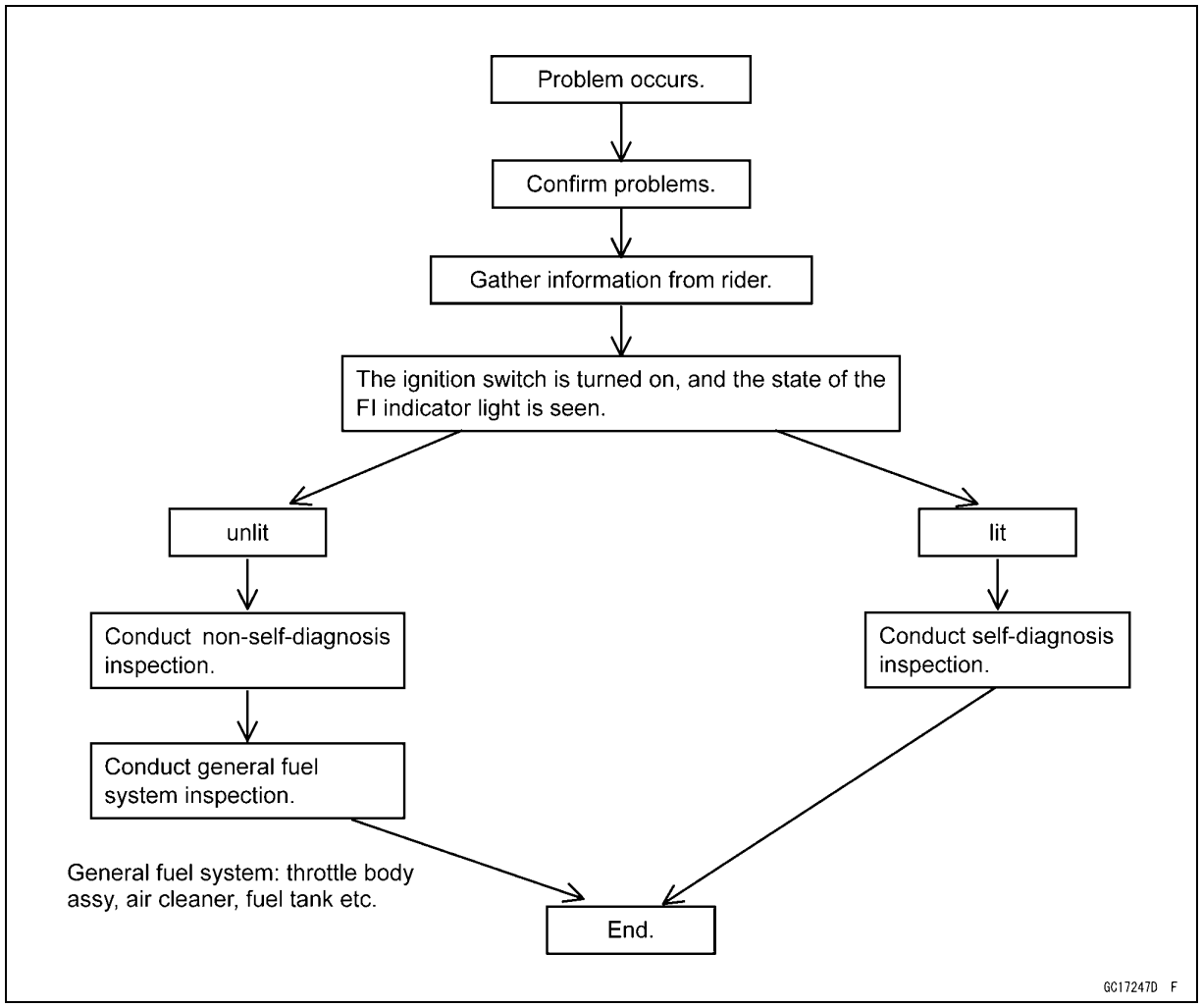
○When checking a harness [A] for short circuit, open one end [B] and check the continuity between the other end [C] and ground [D]. If there is continuity, the harness has a short circuit to ground, and it must be repaired or replaced.



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

Troubleshooting the DFI System

DFI Diagnosis Flow Chart



Inquiries to Rider

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

Troubleshooting the DFI System

Sample Diagnosis Sheet

Rider name:	**Registration No. (license plate No.):**	**Year of initial registration:**
Model:	**Engine No.:**	**Frame No.:**
Date problem occurred:		**Mileage:**
Environment when problem occurred.		
Weather	☐ fine, ☐ cloudy, ☐ rain, ☐ snow, ☐ always, ☐ other:	
Temperature	☐ hot, ☐ warm, ☐ cold, ☐ very cold, ☐ always, ☐ other:	
Problem frequency	☐ chronic, ☐ often, ☐once	
Road	☐ street, ☐ highway, ☐ mountain road (☐ uphill, ☐ downhill), ☐ bumpy, ☐ pebble	
Altitude	☐ normal, ☐ high (about 1 000 m or more)	
Motorcycle conditions when problem occurred.		
FI indicator light	☐ lights up immediately after ignition switch ON, and goes off after 1 ~ 2 seconds (normal).	
	☐ lights up immediately after ignition switch ON, and stays on (DFI problem).	
	☐ unlights (light, ECU or its wiring fault).	
	☐ sometimes lights up (probably wiring fault).	
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:	
Poor running at low speed	☐ very low idle speed, ☐ very high idle speed, ☐ rough idle speed.	
	☐ battery voltage is low (charge the battery).	
	☐ spark plug loose (tighten it).	
	☐ spark plug dirty, broken, or gap maladjusted (remedy it).	
	☐ backfiring.	
	☐ afterfiring.	
	☐ hesitation when acceleration.	
	☐ engine oil viscosity too high.	
	☐ brake dragging.	
	☐ engine overheating.	
	☐ clutch slipping.	
	☐ other:	

Troubleshooting the DFI System

Poor running or no power at high speed	☐ spark plug loose (tighten it).
	☐ spark plug dirty, broken, or gap maladjusted (remedy it).
	☐ spark plug incorrect (replace it).
	☐ knocking (fuel poor quality or incorrect).
	☐ 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
Neutral, starter lockout or sidestand switch trouble	Inspect each switch (see chapter 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 2).
Spark plug incorrect	Replace it with the correct plug (see chapter 2).
ECU ground and power supply trouble	Inspect (see chapter 3).
ECU trouble	Inspect (see chapter 3).
No or little fuel in tank	Supply fuel (see Owner's Manual).
Fuel injector trouble	Inspect and replace (see chapter 3).
Fuel pump not operating	Inspect (see chapter 3).
Fuel pump relay trouble	Inspect and replace (see chapter 3).
Fuel filter or pump screen clogged	Inspect and replace fuel pump (see chapter 3).
Fuel pressure regulator trouble	Inspect fuel pressure and replace fuel pump (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).

Poor Running at Low Speed

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

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions
Fuel pressure regulator trouble	Inspect fuel pressure and replace fuel pump (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Inlet air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Subthrottle sensor trouble	Inspect (see chapter 3).
Subthrottle valve actuator trouble	Inspect (see chapter 3).
Unstable (rough) idling:	
Fuel pressure too low or too high	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Subthrottle sensor trouble	Inspect (see chapter 3).
Subthrottle valve actuator trouble	Inspect (see chapter 3).
Engine vacuum not synchronizing	Inspect and adjust (see chapter 2).
Inlet air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Engine stalls easily:	
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Stick coil trouble	Inspect (see chapter 16).
Main throttle sensor trouble	Inspect (see chapter 3).
Subthrottle sensor trouble	Inspect (see chapter 3).
Subthrottle valve actuator trouble	Inspect (see chapter 3).
Inlet air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Fuel 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 or pump screen clogged	Inspect and replace fuel pump (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Main throttle sensor trouble	Inspect (see chapter 3).
Subthrottle sensor trouble	Inspect (see chapter 3).
Subthrottle valve actuator trouble	Inspect (see chapter 3).
Inlet air pressure sensor trouble	Inspect (see chapter 3).

DFI System Troubleshooting Guide

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

DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions
Engine overheating - Water temperature sensor, crankshaft sensor or speed sensor trouble	(see Overheating of Troubleshooting Guide in chapter 17)
Air switching valve trouble	Inspect and replace (see chapter 16).
Air suction valve trouble	Inspect and replace (see chapter 5).
Exhaust Smokes Excessively:	
(Black smoke)	
Air cleaner element clogged	Clean element (see chapter 2).
Fuel pressure too high	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Inlet 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).
Inlet air temperature sensor trouble	Inspect (see chapter 3).

Self-Diagnosis

Self-diagnosis Outline

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

User Mode

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

Dealer Mode 1

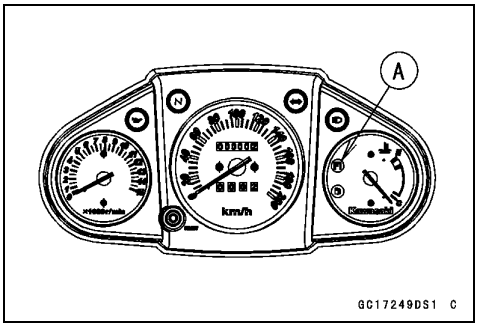
The FI indicator light emits service code(s) to show the problem(s) which the DFI system, and ignition system has at the moment of diagnosis.

Dealer Mode 2

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

Self-diagnosis Procedures

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



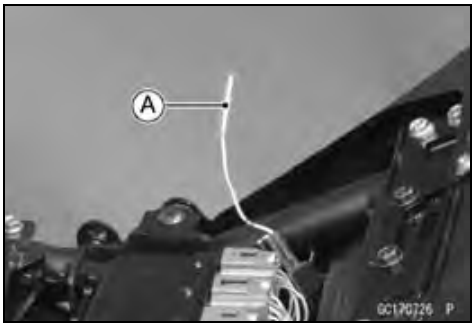
NOTE

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

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

● Remove the front seat (see Front Seat Removal in the Frame chapter).

● Ground the self-diagnosis terminal [A] (Yellow lead) to the battery (–) terminal, using a wire.

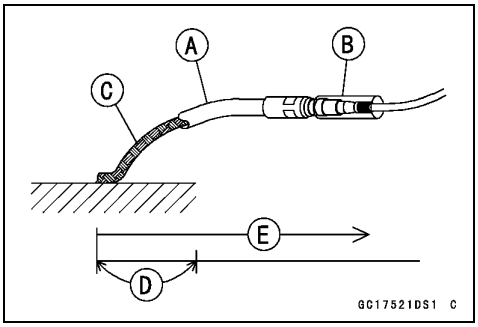


● Turn on the ignition switch.

● Connect an auxiliary lead [A] to the self-diagnosis terminal [B] for grounding.

● To enter the self-diagnosis dealer mode 1, ground [C] the self-diagnosis indicator terminal to the battery (–) terminal for more than 2 seconds [D], and then keep it grounded continuously [E].

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

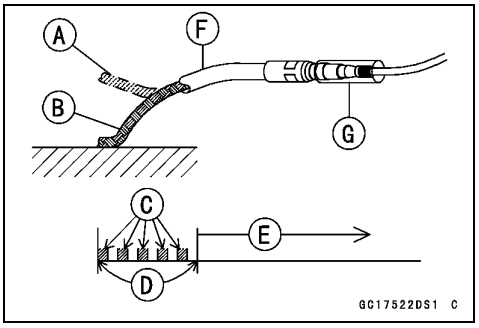


Self-Diagnosis

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

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

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



NOTE

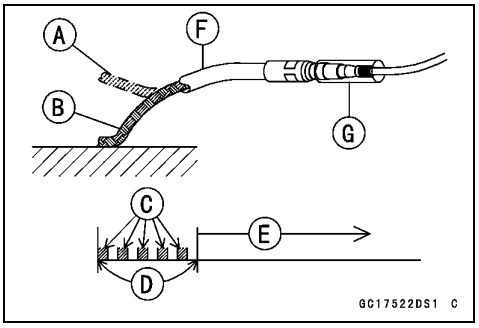
○*To enter the dealer mode 2 from the dealer mode 1, turn off the ignition switch once.*

Service Code Clearing Procedures

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

NOTE

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

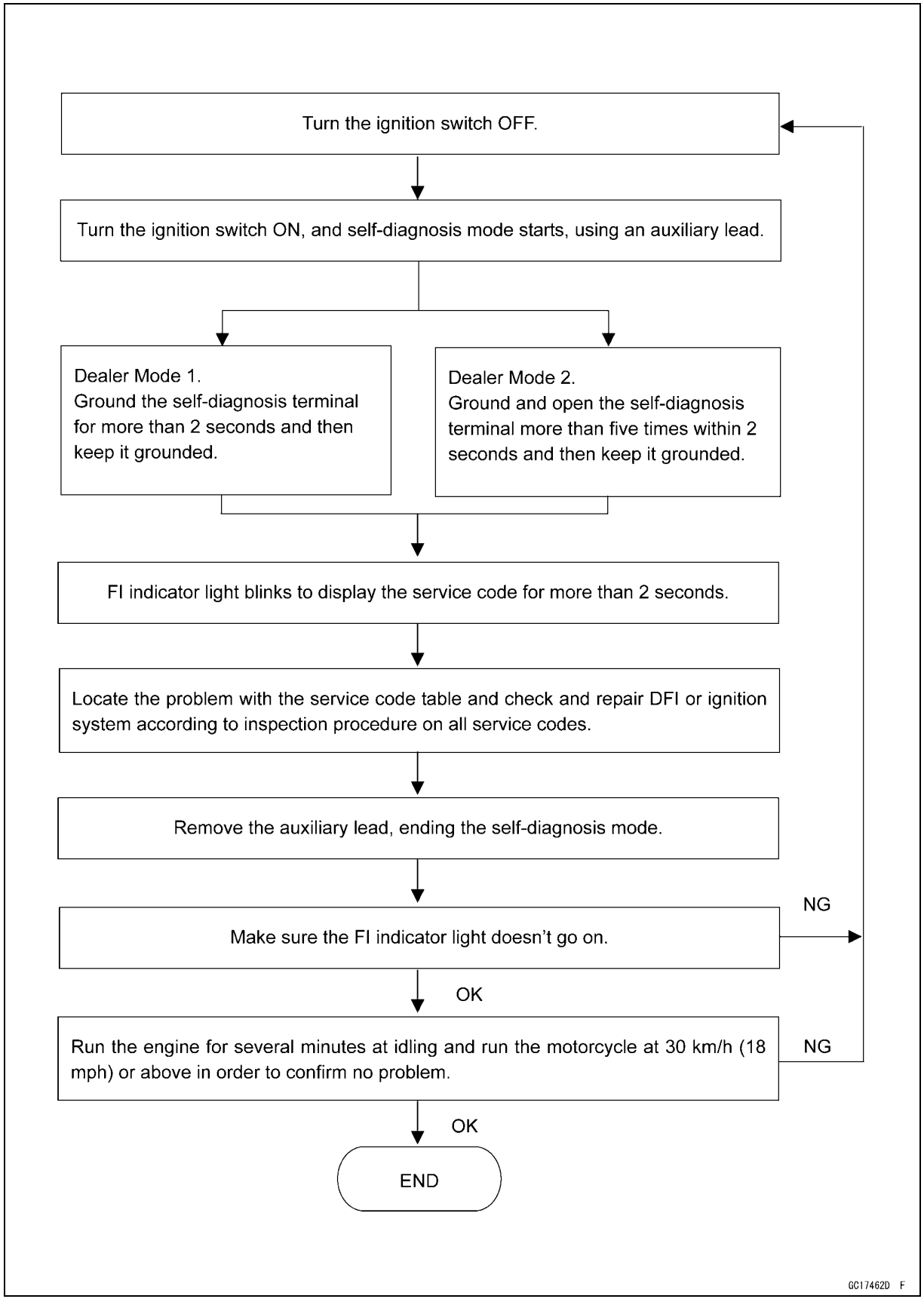


● Pull the clutch lever in more than 5 seconds, and then release it.

● Repeat opening [A] and grounding [B] the lead (self-diagnosis terminal) more than five times [C] within 2 seconds [D] after the lead is grounded, and then keep it grounded continuously [E] for more than 2 seconds.

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

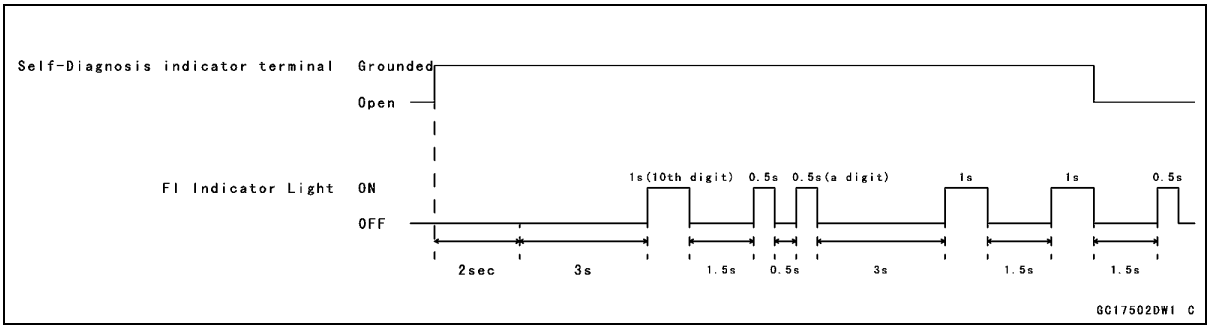
Self-Diagnosis



Self-Diagnosis

How to Read Service Codes

○Service codes are shown by a series of long and short blinks of the FI indicator light as shown below.
○Read 10th digit and unit digit as the FI indicator light blinks.
○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 self-diagnosis indicator terminal is open.
○If there is no problem, no code and unlight.
○For example, if two problems occurred in the order of 21, 12, the service codes are displayed from the lowest number in the order listed.
(12 → 21) → (12 → 21) → · · · (repeated)



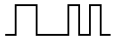
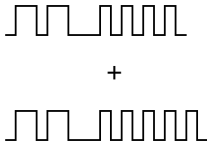
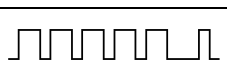
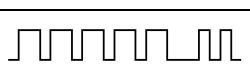
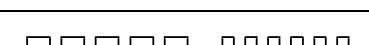
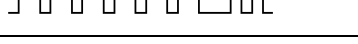
○If the problem is with the following parts, the ECU cannot memorize these problems, the FI indicator light doesn't go on, and no service codes can be displayed.
FI Indicator Light
Fuel Pump
Fuel Pump Relay
ECU Main Relay
ECU Power Source Wiring and Ground Wiring (see ECU Power Supply Inspection)
Fuel Injectors

How to Erase Service Codes

○Even if the ignition switch is turned OFF, the battery or the ECU are disconnected or the problem is solved, all service codes remain in the ECU.
○Refer to the Service Code Clearing Procedure for the service code erasure.

Self-Diagnosis

Service Code Table

Service Code	FI Indicator Light	Problems
11		Main throttle sensor malfunction, wiring open or short
12		Inlet air pressure sensor malfunction, wiring open or short
13		Inlet air temperature sensor malfunction, wiring open or short
14		Water temperature sensor malfunction, wiring open or short
21		Crankshaft sensor malfunction, wiring open or short
24 and **25**		Speed sensor malfunction, wiring open or short First 24 is displayed and then 25, repeatedly
31		Vehicle-down sensor, malfunction, wiring open or short
32		Subthrottle sensor malfunction, wiring open or short
33		Oxygen sensor inactivation, wiring open or short
51		Stick coil #1 malfunction, wiring open or short
52		Stick coil #2 malfunction, wiring open or short
56		Radiator fan relay malfunction, wiring open or short
62		Subthrottle valve actuator malfunction, wiring open or short
64		Air switching valve malfunction, wiring open or short
67		Oxygen sensor heater malfunction, wiring open or short
94		Oxygen sensor malfunction, wiring open or short

Notes:

- The ECU may be involved in these problems. If all the parts and circuits checked out good, be sure to check the ECU for ground and power supply. If the ground and power supply are checked good, replace the ECU.
- When no service code is displayed, the electrical parts of the DFI system has no fault, and the mechanical parts of the DFI system and the engine are suspect.

Self-Diagnosis

Backups

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

Service Codes	Parts	Output Signal Usable Range or Criteria	Backups by ECU
11	Main Throttle Sensor	Output Voltage 0.2 ~ 4.8 V	If the main throttle sensor system fails (the output voltage is out of the usable range, wiring short or open), the ECU locks ignition timing into the ignition timing at closed throttle position and sets the DFI in the D-J method. Also, the main throttle sensor system and inlet air pressure fails, the ECU locks ignition timing into the ignition timing at closed throttle position and sets the DFI in the α-N method.
12	Inlet Air Pressure Sensor	Inlet Air Pressure (Absolute) Pv = 150 ~ 800 mmHg	If the inlet 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.
13	Inlet Air Temperature Sensor	Inlet Air Temperature Ta = –30 ~ +120°C	If the inlet air temperature sensor fails (the signal is out of the usable range, wiring short or open), the ECU sets Ta at 40°C.
14	Water Temperature Sensor	Water Temperature Tw = –30 ~ +120°C	If the water temperature sensor system fails (the signal is out of the usable range, wiring short or open), the ECU sets Tw at 80°C.
21	Crankshaft Sensor	Crankshaft sensor must send 22 signals to the ECU at the one cranking.	If the crankshaft sensor generates other than 22 signals, the engine stops by itself.
24 and **25**	Speed Sensor	Speed sensor must send 4 signals to the ECU at the one rotation of the engine sprocket. The gear position is decided by the signal of the speed sensor.	If the speed sensor system fails (no signal, wiring short or open), the speedometer shows 0, and the ECU sets the top (6) gear position.
31	Vehicle-down Sensor	Output Voltage 0.4 ~ 4.4 V	If the vehicle-down sensor system has failures (the output voltage is more than usable range, wiring open), the ECU shuts off the fuel pump relay, the fuel injectors and the ignition system.
32	Subthrottle Sensor	Output Voltage 0.15 ~ 4.85 V	If the subthrottle sensor system fails (the output voltage is out of the usable range, wiring short or open), the ECU drive the subthrottle valve to the full closed position, and it stops the current to the subthrottle valve actuator.
33	Oxygen Sensor	The oxygen sensor is active and sensor must send signals (output voltage) continuously to the ECU.	If the oxygen sensor is not activated, the ECU stops the feedback mode of the oxygen sensor.
51	Stick Coil #1*	The stick coil primary winding must send signals continuously to the ECU.	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.

Self-Diagnosis

Service Codes	Parts	Output Signal Usable Range or Criteria	Backups by ECU
52	Stick Coil #2*	The stick coil primary winding must send signals continuously to the ECU.	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.
56	Radiator Fan Relay	When the relay OFF condition, the fan relay is open.	–
62	Subthrottle Valve Actuator	The actuator operates open and close of the subthrottle valve by the pulse signal from the ECU.	If the subthrottle valve actuator fails (the signal is out of the usable range, wiring short or open), the ECU stops the current to the actuator.
64	Air Switching Valve	The air switching valve controls the flow of the secondary air by opening and shutting the solenoid valve.	–
67	Oxygen Sensor Heater	The oxygen sensor heater raise temperature of the sensor for its earlier activation. 12 V - 6.6 W, 0.55 A	If the oxygen sensor heater fails (wiring short or open), the ECU stops the current to the heater.
94	Oxygen Sensor	The oxygen sensor must send signals continuously to the ECU	If the oxygen sensor output voltage is incorrect, the ECU stops the feedback mode of the oxygen sensor.

Note:

(1) α-N Method: the DFI control method from medium to heavy engine load. When the engine load is light like at idling or low speed, the ECU determines the injection quantity by calculating from the throttle vacuum (inlet air pressure sensor output voltage) and engine speed (crankshaft sensor output voltage). This method is called D-J 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 (main throttle sensor output voltage) and the engine speed. This method is called α-N method.

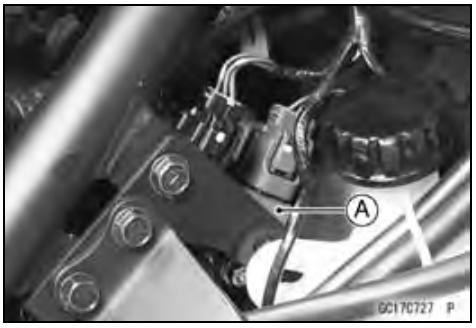
*: This depends on the number of stopped cylinders.

Main Throttle Sensor (Service Code 11)

Main Throttle Sensor Removal/Adjustment

CAUTION

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



Main Throttle Sensor Input Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

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

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538

- Connect a digital meter to the harness adapter leads.

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

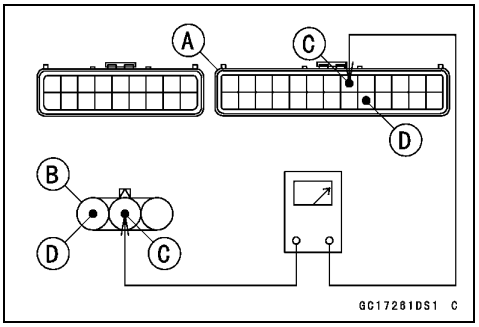
- Measure the input voltage with the engine stopped and with the connector joined.
- Turn the ignition switch ON.

Input Voltage
Standard: DC 4.75 ~ 5.25 V

- Turn the ignition switch OFF.

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

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



Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Main Throttle Sensor Connector [B]
BL lead (ECU terminal 8) [C]
BR/BK lead (ECU terminal 22) [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).

Main Throttle Sensor (Service Code 11)

Main Throttle Sensor Output Voltage Inspection

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

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

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538

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

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

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

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

- 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 1.020 ~ 1.050 V at idle throttle opening
DC 4.185 ~ 4.385 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.
1.020 × 4.75 ÷ 5.00 = 0.969 V
1.050 × 4.75 ÷ 5.00 = 0.998 V
Thus, the valid range is 0.969 ~ 0.998 V

- Turn the ignition switch OFF.

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

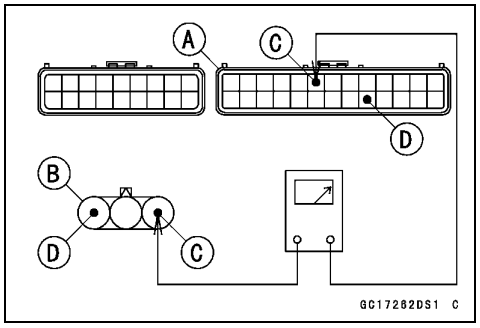
Main Throttle Sensor (Service Code 11)

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

Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Main Throttle Sensor Connector [B]
Y/W lead (ECU terminal 6) [C]
BR/BK lead (ECU terminal 22) [D]

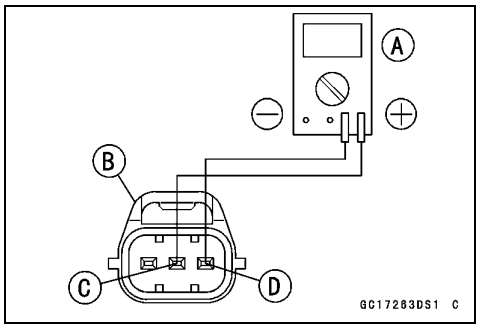


★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Main Throttle Sensor Resistance Inspection

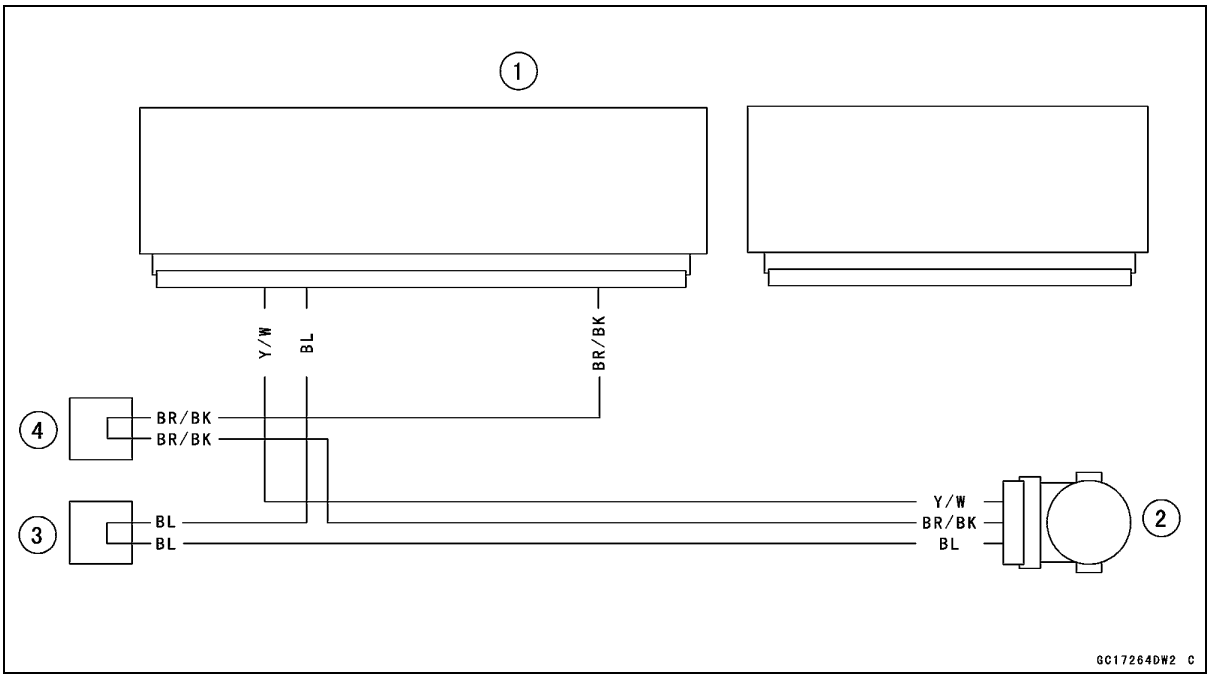
- Turn the ignition switch OFF.
- Disconnect the main throttle sensor connector.
- Connect a digital meter [A] to the main throttle sensor connector [B].
- Measure the main throttle sensor resistance.

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



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

Main Throttle Sensor Circuit



1. ECU
2. Main Throttle Sensor
3. Water-proof Joint 2
4. Water-proof Joint 1

Inlet Air Pressure Sensor (Service Code 12)

Inlet Air Pressure Sensor Removal

CAUTION

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

- Remove:
  Fuel Tank (see Fuel Tank Removal)
  Inlet Air Pressure Sensor Connector [A] (Disconnect)

- Remove the inlet air pressure sensor [A] from the rubber damper of the air switching valve and separate the vacuum hose [B].

Inlet Air Pressure Sensor Installation

- Installation is the reverse of removal.

Inlet Air Pressure Sensor Input 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 inlet air pressure sensor connector and connect the harness adapter [A] between these connectors.

Special Tool - Sensor Harness Adapter: 57001-1561

- Connect a digital meter to the harness adapter leads.

Inlet Air Pressure Sensor Input Voltage
Connections to Adapter:

Digital Meter (+) → G (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 Inlet Air Pressure Sensor Output Voltage Inspection).

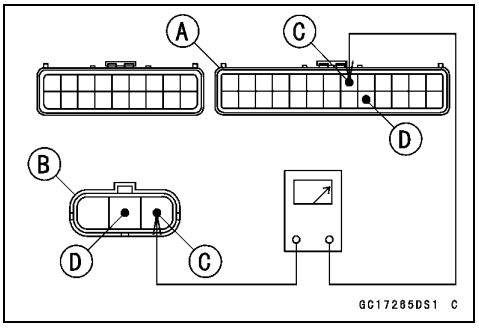
Inlet Air Pressure Sensor (Service Code 12)

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

Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Inlet Air Pressure Sensor Connector [B]
BL lead (ECU terminal 8) [C]
BR/BK lead (ECU terminal 22) [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).

Inlet Air Pressure Sensor Output Voltage Inspection

● Measure the output voltage at the inlet air pressure sensor in the same way as input voltage inspection, note the following.
○Disconnect the inlet air pressure sensor connector and connect the harness adapter [A] between these connectors.

Special Tool - Sensor Harness Adapter: 57001-1561

Inlet Air Pressure Sensor Output Voltage
Connections to Adapter:
Digital Meter (+) → G/W (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 local atmospheric pressure.*

● Turn the ignition switch OFF.
★If the reading is out of the usable range, replace the sensor.

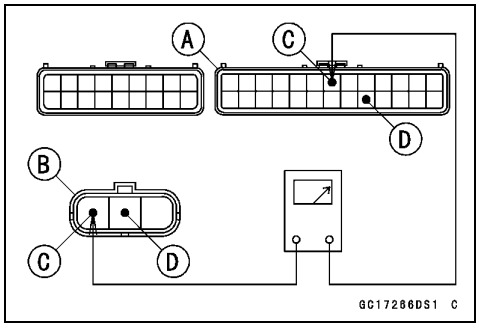
Inlet Air Pressure Sensor (Service Code 12)

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

Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.

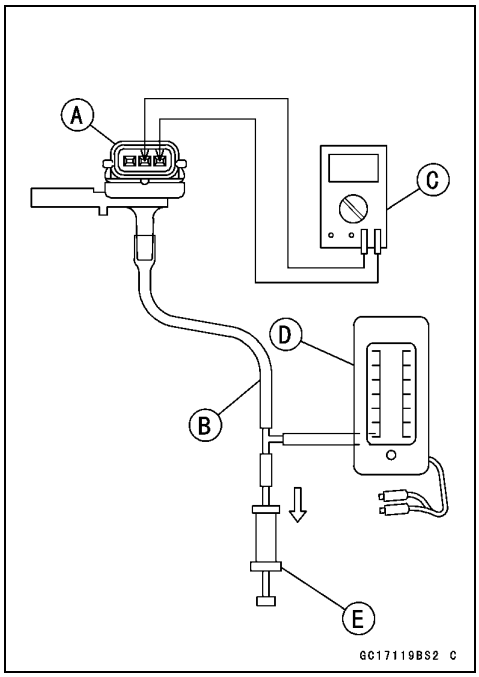
Wiring Continuity Inspection
ECU Connector [A] ←→
Inlet Air Pressure Sensor Connector [B]
Y/BL lead (ECU terminal 7) [C]
BR/BK lead (ECU terminal 22) [D]



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

Special Tools - Fork Oil Level Gauge: 57001-1290
Vacuum Gauge: 57001-1369
Sensor Harness Adapter: 57001-1561

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



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

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

Inlet Air Pressure Sensor (Service Code 12)

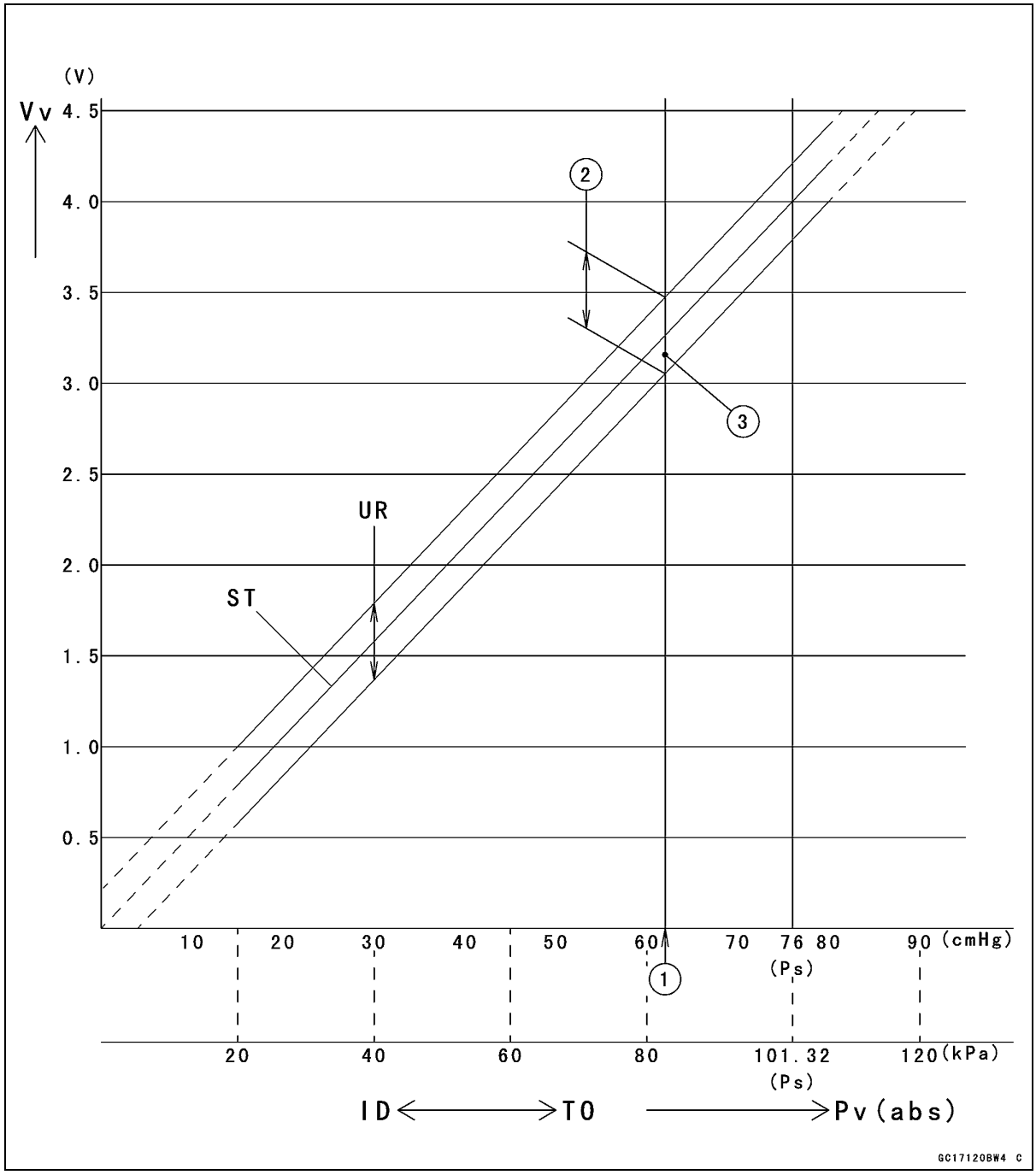
then
Pv = Pl – Pg

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

then
Pv = 70 – 8 = 62 cmHg (Absolute)

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

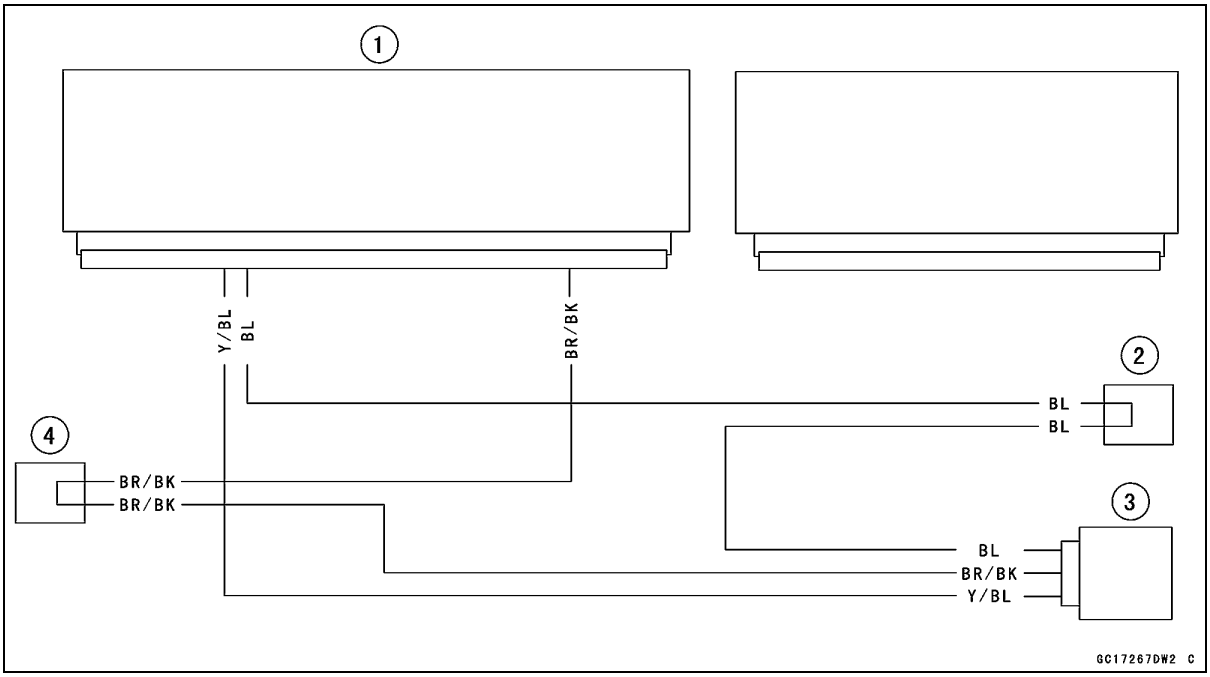
Inlet Air Pressure Sensor (Service Code 12)



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

Inlet Air Pressure Sensor (Service Code 12)

Inlet Air Pressure Sensor Circuit



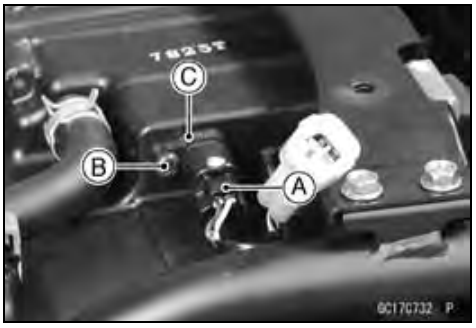
1. ECU
2. Water-proof Joint 2
3. Inlet Air Pressure Sensor
4. Water-proof Joint 1

Inlet Air Temperature Sensor (Service Code 13)

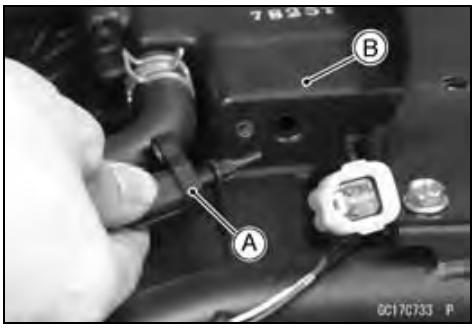
Inlet Air Temperature Sensor Removal/Installation

CAUTION

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



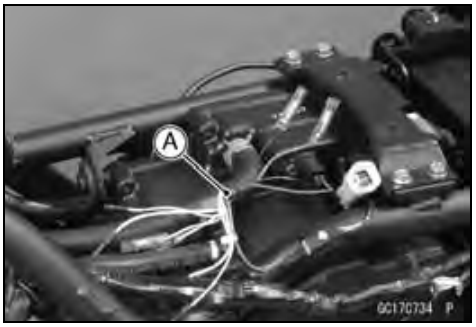
- Remove:
  Fuel Tank (see Fuel Tank Removal)
  Inlet Air Temperature Sensor Connector [A] (Disconnect)
  Inlet Air Temperature Sensor Screw [B]
  Inlet Air Temperature Sensor [C]



- Put the inlet air temperature sensor [A] into the air cleaner housing [B].
- Tighten:

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

Inlet Air Temperature Sensor Output Voltage Inspection

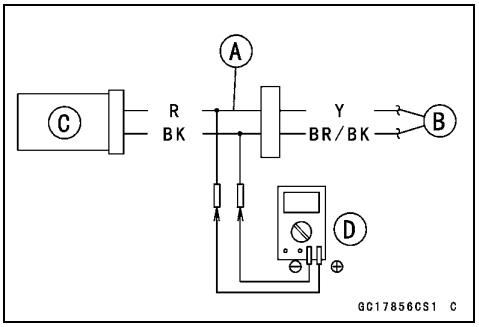


NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch OFF.
- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the inlet air temperature sensor connector and connect the harness adapter [A] between these connectors as shown in the figure.
  Main Harness [B]
  Inlet Air Temperature Sensor [C]

Special Tool - Measuring Adapter: 57001-1700



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

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

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

Output Voltage
Standard: About DC 2.25 ~ 2.50 V at inlet air temperature 20°C (68°F)

NOTE

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

Inlet Air Temperature Sensor (Service Code 13)

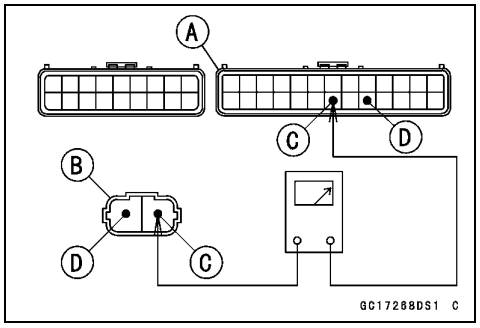
● Turn the ignition switch OFF.
★If the reading is within the standard, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

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

Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Inlet Air Temperature Sensor Connector [B]
Y lead (ECU terminal 20) [C]
BR/BK lead (ECU terminal 22) [D]



★If the wiring is good, check the inlet air temperature sensor resistance (see Inlet Air Temperature Sensor Resistance Inspection).

Inlet Air Temperature Sensor Resistance Inspection

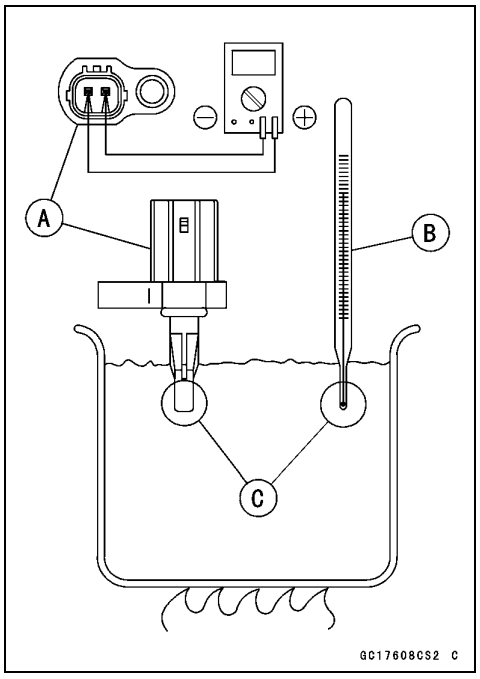
● Remove the inlet air temperature sensor (see Inlet Air Temperature Sensor Removal/Installation).
● Suspend the sensor [A] in a container of machine oil so that the heat-sensitive portion is submerged.
● Suspend a thermometer [B] with the heat-sensitive portion [C] located in almost the same depth with the sensor.

NOTE

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

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

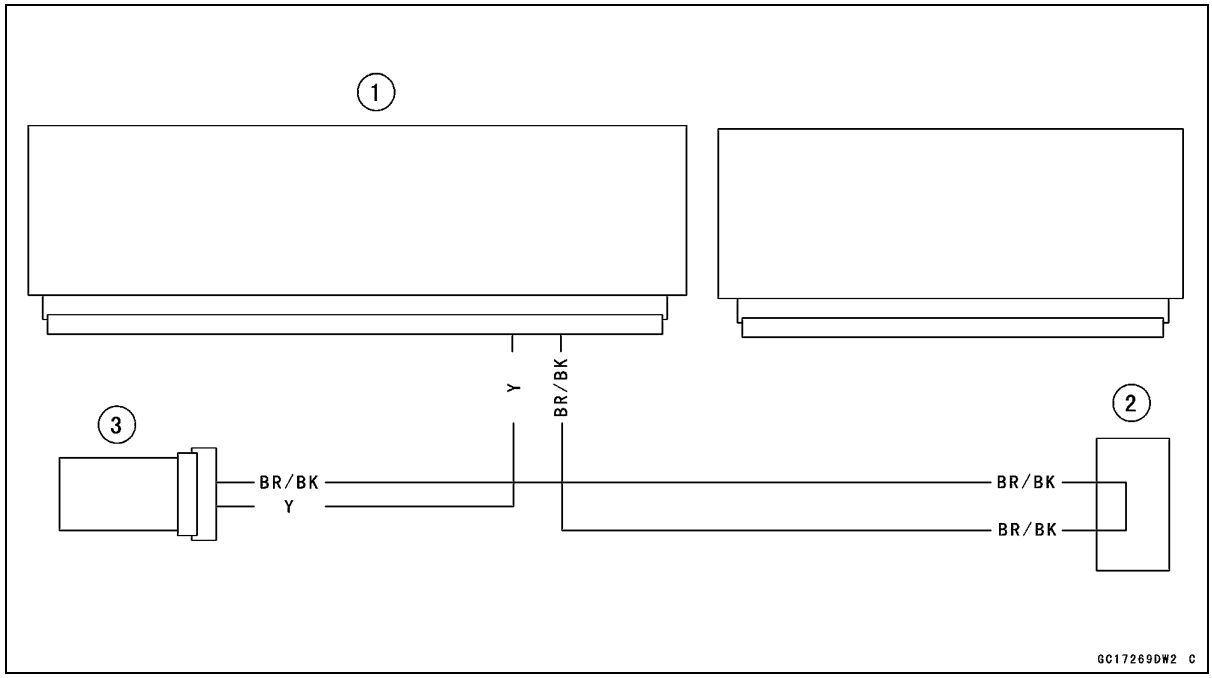
Inlet Air Temperature Sensor Resistance
Standard: 5.4 ~ 6.6 kΩ at 0°C (32°F)
0.29 ~ 0.39 kΩ at 80°C (176°F)



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

Inlet Air Temperature Sensor (Service Code 13)

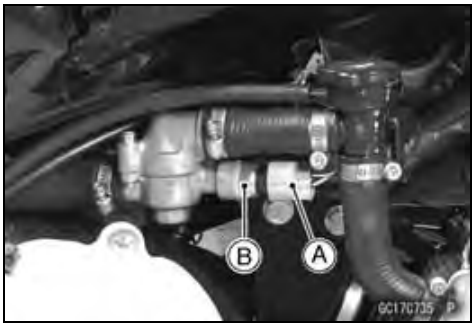
Inlet Air Temperature Sensor Circuit



1. ECU
2. Water-proof Joint 1
3. Inlet Air Temperature Sensor

Water Temperature Sensor (Service Code 14)

Water Temperature Sensor Removal/Installation



CAUTION

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

- Remove:
  Coolant (Drain, see Coolant Change in the Periodic Maintenance chapter)
  Connector [A] (Disconnect)
  Water Temperature Sensor [B]
- Replace the gasket with a new one, and tighten the water temperature sensor.

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

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

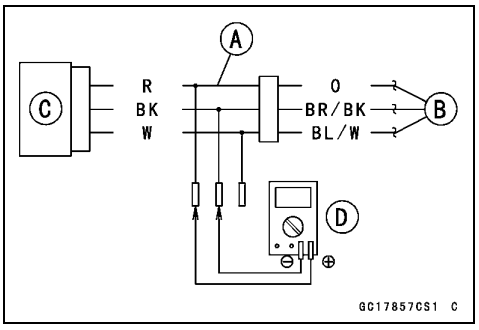
Water Temperature Sensor Output Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch OFF.
- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the water temperature sensor connector and connect the harness adapter [A] between these connectors as shown in the figure.
  Main Harness [B]
  Water Temperature Sensor [C]

Special Tool - Measuring Adapter: 57001-1700



- Connect a digital meter [D] to the harness 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 at 20°C (68°F)

NOTE

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

- Turn the ignition switch OFF.

★If the 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).

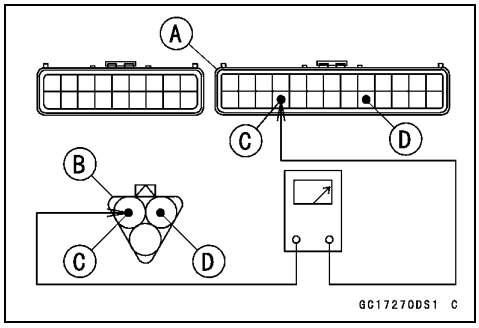
Water Temperature Sensor (Service Code 14)

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

Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Water Temperature Sensor Connector [B]
O lead (ECU terminal 17) [C]
BR/BK lead (ECU terminal 22) [D]



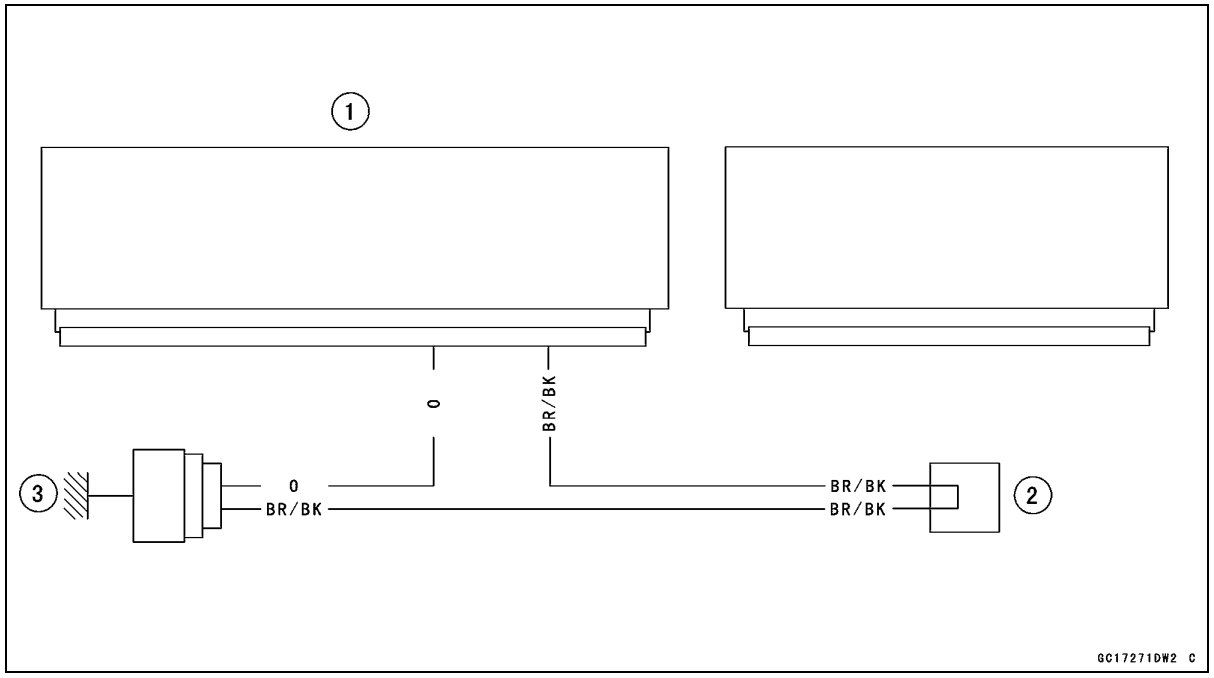
★If the wiring is good, check the water temperature sensor resistance (see Water Temperature Sensor Resistance Inspection).

Water Temperature Sensor Resistance Inspection

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

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

Water Temperature Sensor Circuit



1. ECU
2. Water-proof Joint 1
3. Water Temperature Sensor

Crankshaft Sensor (Service Code 21)

The crankshaft sensor has no power source, and when the engine stops, the crankshaft sensor generates no signals.

Crankshaft Sensor Removal/Installation

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

Crankshaft Sensor Resistance Inspection

● Refer to the Crankshaft Sensor Inspection in the Electrical System chapter.

★If the reading is within the standard, check the peak voltage (see Crankshaft Sensor Peak Voltage Inspection).

Crankshaft Sensor Peak Voltage Inspection

● Refer to the Crankshaft Sensor Peak Voltage Inspection in the Electrical System chapter.

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

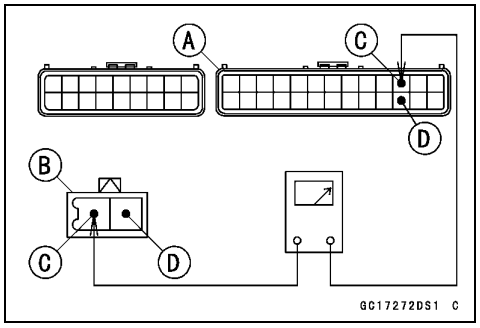
Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.

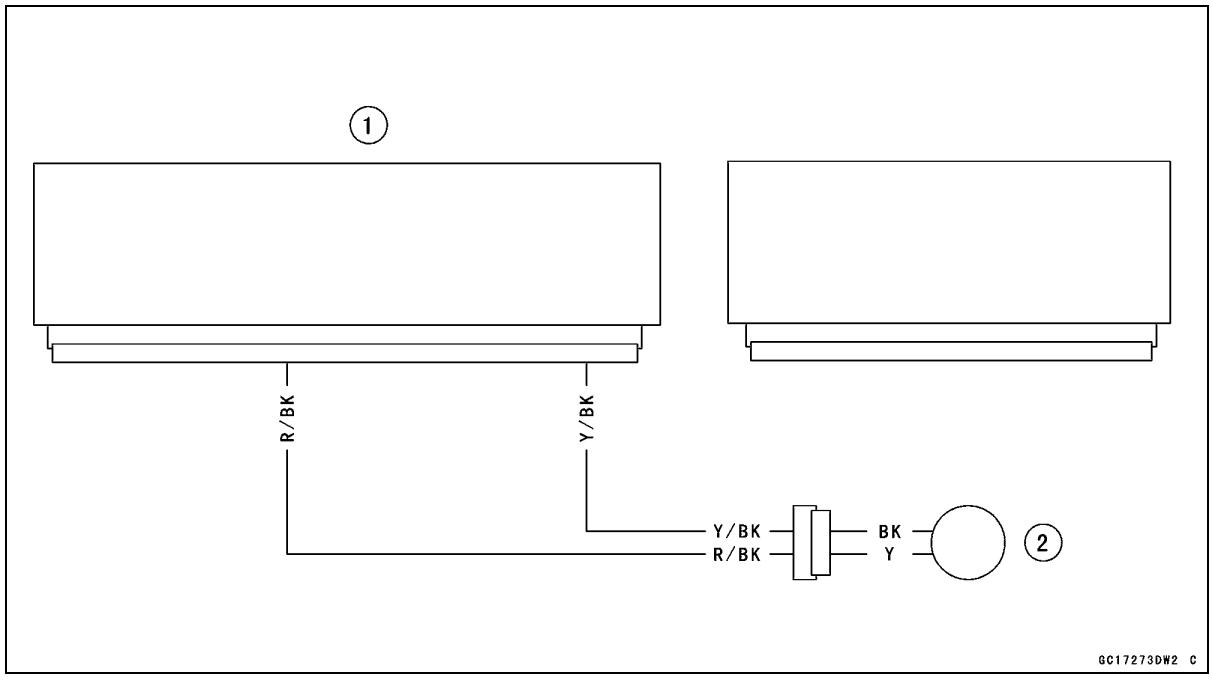
Wiring Continuity Inspection
ECU Connector [A] ←→
Crankshaft Sensor Connector [B]
R/BK lead (ECU terminal 11) [C]
Y/BK lead (ECU terminal 24) [D]

★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).



Crankshaft Sensor Circuit



1. ECU
2. Crankshaft Sensor

Speed Sensor (Service Code 24, 25)

Speed Sensor Removal/Installation

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

Speed Sensor Inspection

● Refer to the Speed Sensor Inspection in the Electrical System chapter.

Speed Sensor Input Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

● Turn the ignition switch OFF.
● Remove the left side cover (see Side Cover Removal in the Frame chapter).
● Disconnect the speed sensor connector and connect the harness adapter [A] between these connectors.

Special Tool - Throttle Sensor Setting Adapter #1: 57001 -1400

● Connect a digital meter to the harness adapter leads.

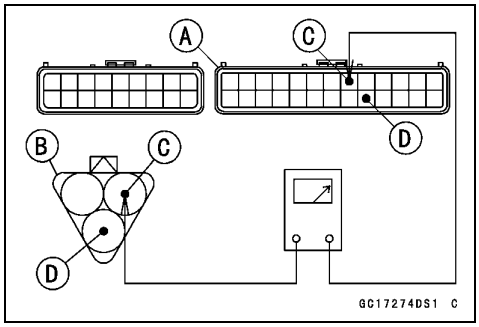
Speed Sensor Input Voltage
Connections to Adapter:
Digital Meter (+) → BL (sensor P) lead
Digital Meter (–) → BK/W (sensor BK) lead

● 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 Speed Sensor Output Voltage Inspection).

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



Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Speed Sensor Connector [B]
BL lead (ECU terminal 8) [C]
BR/BK lead (ECU terminal 22) [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).

Speed Sensor (Service Code 24, 25)

Speed Sensor Output Voltage Inspection

- Raise the rear wheel off the ground with the stand.
- Measure the output voltage at the speed sensor in the same way as input voltage inspection, note the following.

○Disconnect the speed sensor connector and connect the harness adapter [A] between these connectors.

Special Tool - Throttle Sensor Setting Adapter #1: 57001 -1400

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

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

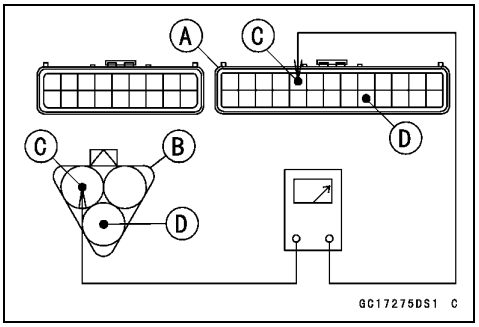
Output Voltage
Standard: About DC 0.05 ~ 0.09 V or DC 4.5 ~ 4.9 V at ignition switch ON and 0 km/h

NOTE

○*Rotate the rear wheel by hand, confirm the output voltage will be raise or lower.*

- Turn the ignition switch OFF.

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



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

Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.

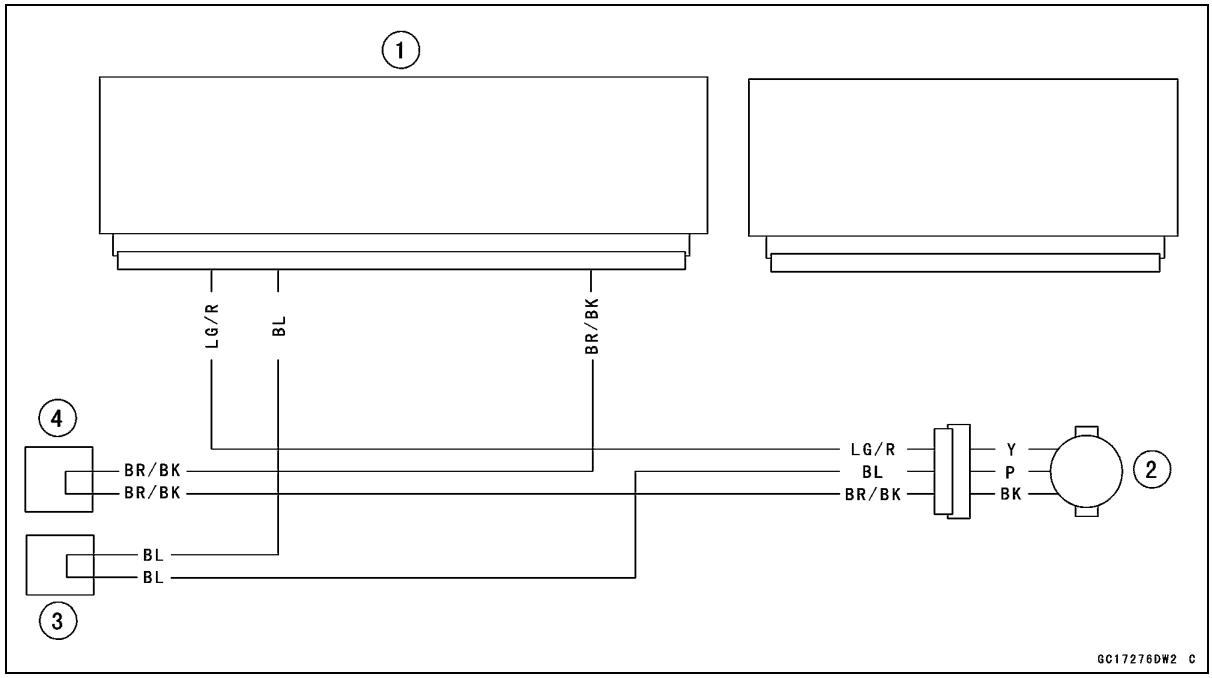
Wiring Continuity Inspection
ECU Connector [A] ←→
Speed Sensor Connector [B]
LG/R lead (ECU terminal 5) [C]
BR/BK lead (ECU terminal 22) [D]

★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).

Speed Sensor (Service Code 24, 25)

Speed Sensor Circuit



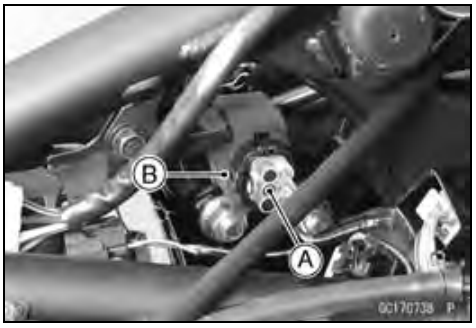
1. ECU
2. Speed Sensor
3. Water-proof Joint 2
4. Water-proof Joint 1

Vehicle-down Sensor (Service Code 31)

Vehicle-down Sensor Removal

CAUTION

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



● Remove:
Fuel Tank (see Fuel Tank Removal)
Connector [A] (Disconnect)
Vehicle-down Sensor [B]

Vehicle-down Sensor Installation

● The UPPER 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, like leaning over in a turn, with the potential for an accident resulting in injury or death. Ensure that the vehicle-down sensor is held in place by the sensor bracket.

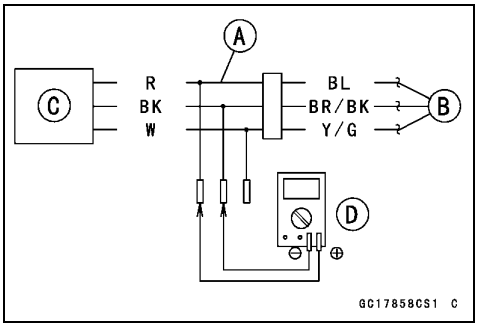
Vehicle-down Sensor Input Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

● Turn the ignition switch OFF.
● Remove the fuel tank (see Fuel Tank Removal).
● Disconnect the vehicle-down sensor connector and connect the harness adapter [A] between these connectors as shown in the figure.
Main Harness [B]
Vehicle-down Sensor [C]

Special Tool - Measuring Adapter: 57001-1700



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

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

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

Input Voltage
Standard: DC 4.75 ~ 5.25 V

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

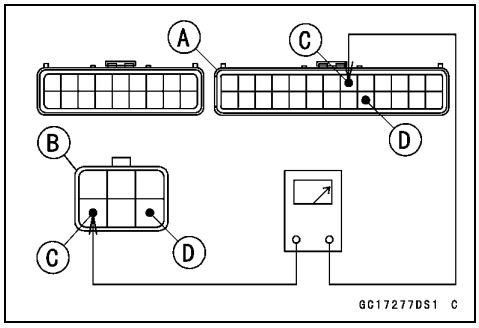
Vehicle-down Sensor (Service Code 31)

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

Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Vehicle-down Sensor Connector [B]
BL lead (ECU terminal 8) [C]
BR/BK lead (ECU terminal 22) [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).

Vehicle-down Sensor Output Voltage Inspection

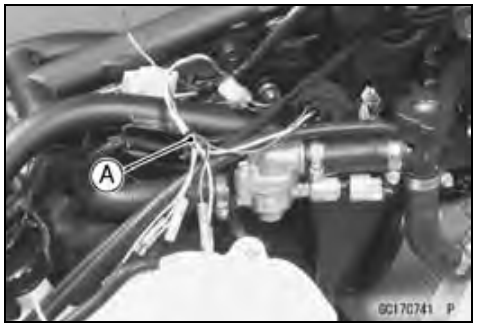
● Remove the vehicle-down sensor (see Vehicle-down Sensor Removal).
● Connect the harness adapter [A] to the vehicle-down sensor connectors as shown in the figure.

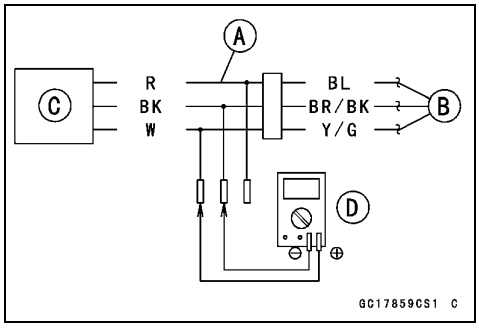
Special Tool - Measuring Adapter: 57001-1700

Main Harness [B]
Vehicle-down Sensor [C]

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

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

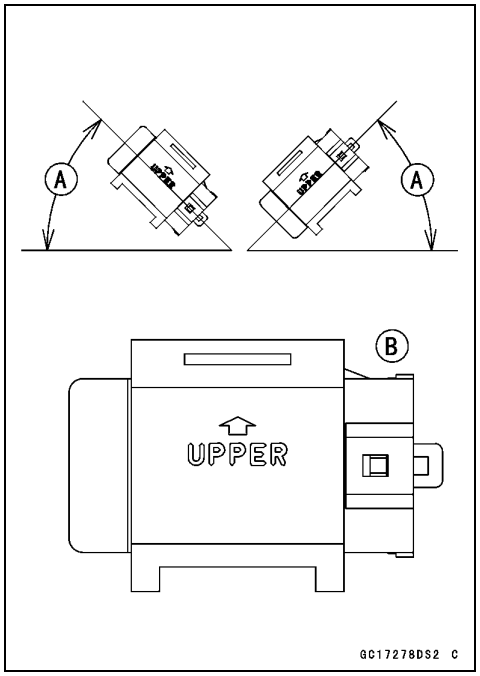




Vehicle-down Sensor (Service Code 31)

- Hold the sensor vertically.
- Measure the output voltage with the engine stopped and with the connector joined.
- Turn the ignition switch ON.
- Tilt the sensor 55 ~ 75° 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 55 ~ 75° or more right or left: DC 3.7 ~ 4.4 V
With sensor arrow mark pointed up: DC 0.4 ~ 1.4 V



NOTE

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

- Turn the ignition switch OFF.

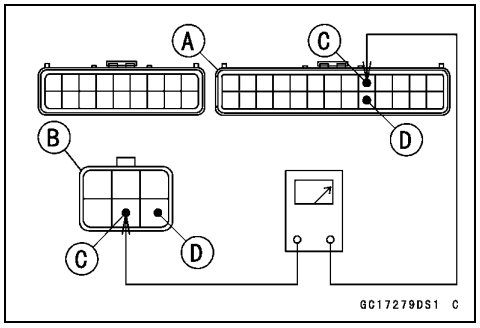
★If the reading is out of the standard, replace the sensor.

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

Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Vehicle-down Sensor Connector [B]
Y/G lead (ECU terminal 9) [C]
BR/BK lead (ECU terminal 22) [D]

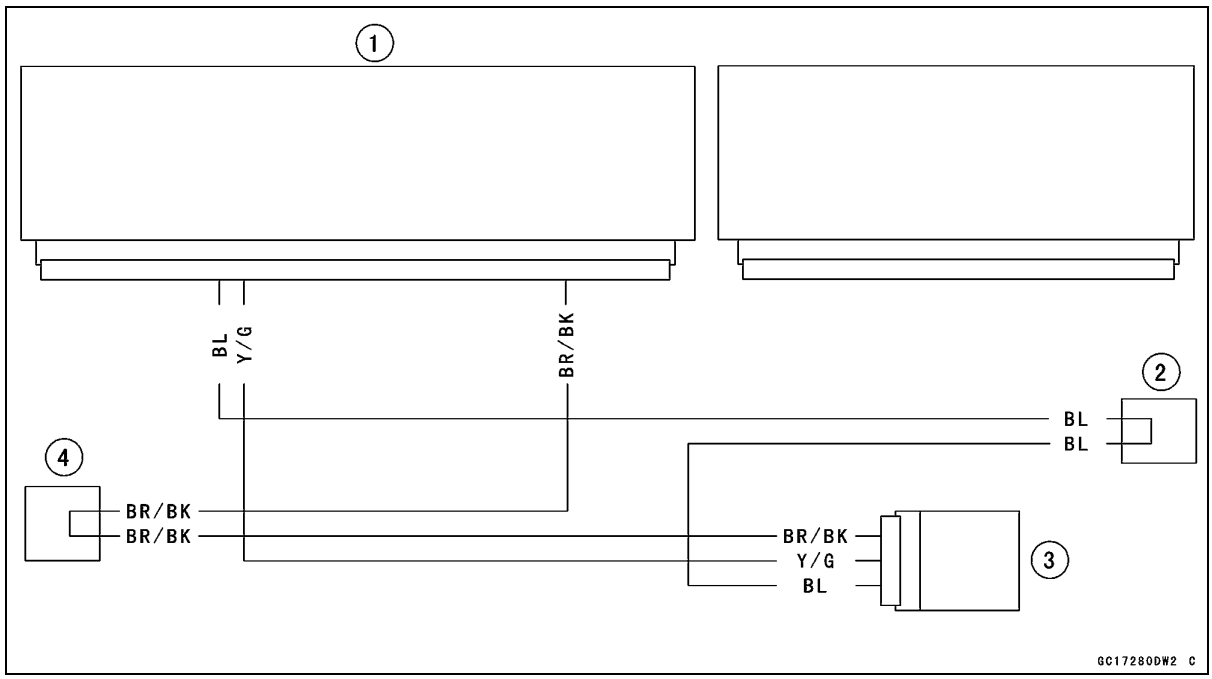


★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

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

Vehicle-down Sensor (Service Code 31)

Vehicle-down Sensor Circuit



1. ECU
2. Water-proof Joint 2
3. Vehicle-down Sensor
4. Water-proof Joint 1

Subthrottle Sensor (Service Code 32)

Subthrottle Sensor Removal/Adjustment

CAUTION

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

Subthrottle Sensor Input Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch OFF.
- Disconnect the subthrottle sensor and connect the harness adapter [A] between these connectors.

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538

- Connect a digital meter to the harness adapter leads.

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

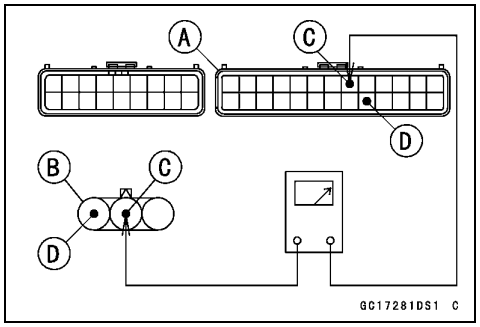
- Turn the ignition switch OFF.

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

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

Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.



Wiring Continuity Inspection
ECU Connector [A] ←→
Subthrottle Sensor Connector [B]
BL lead (ECU terminal 8) [C]
BR/BK lead (ECU terminal 22) [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).

Subthrottle Sensor (Service Code 32)

Subthrottle Sensor Output Voltage Inspection

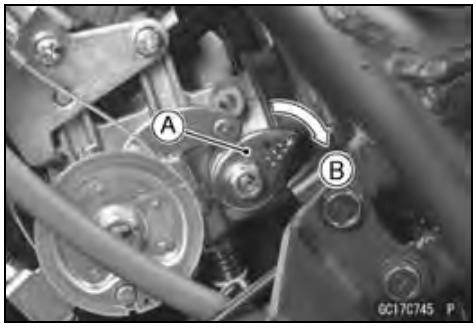
- Measure the output voltage at the subthrottle sensor in the same way as input voltage inspection, note the following.

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

Special Tool - Throttle Sensor Setting Adapter: 57001 -1538

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

- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the subthrottle valve actuator harness connector [A].



- Measure the output voltage with the engine stopped with the connector joined.
- Turn the ignition switch ON.
- Measure the output voltage when the subthrottle valve is completely closed by turning the lever [A] fully clockwise [B].

Output Voltage
Standard: DC 0.78 ~ 0.82 V at subthrottle valve full close position
DC 3.9 ~ 4.1 V at subthrottle valve full open position (for reference)

NOTE

○*Turn the lever counterclockwise, confirm the output voltage will be raise.*
○*The standard voltage refers to the value when the voltage reading at the Input Voltage Inspection shows 5 V exactly.*
○*When the input voltage reading shows other than 5 V, derive a voltage range as follows.*
Example:
In the case of a input voltage of 4.75 V.
0.78 × 4.75 ÷ 5.00 = 0.741 V
0.82 × 4.75 ÷ 5.00 = 0.779 V
Thus, the valid range is 0.741 ~ 0.779 V

- Turn the ignition switch OFF.

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

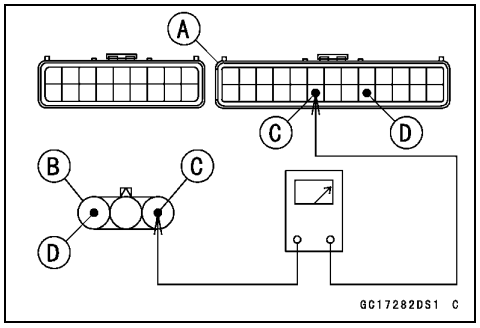
Subthrottle Sensor (Service Code 32)

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

Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Subthrottle Sensor Connector [B]
BL/W lead (ECU terminal 19) [C]
BR/BK lead (ECU terminal 22) [D]

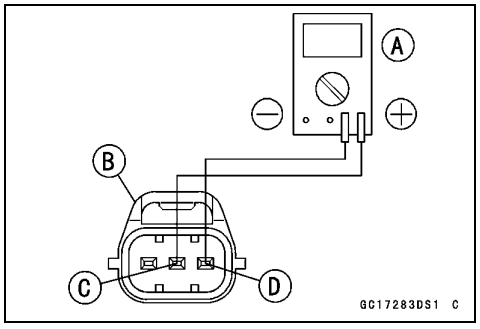


★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Subthrottle Sensor Resistance Inspection

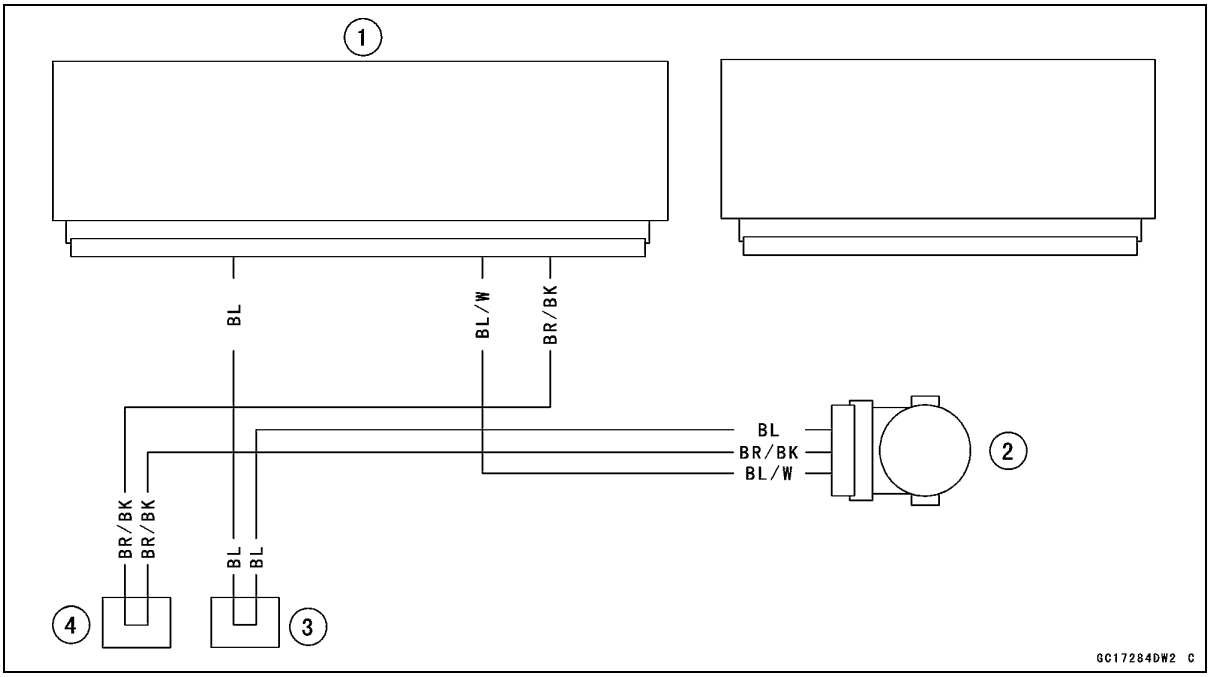
- Turn the ignition switch OFF.
- Disconnect the subthrottle sensor connector.
- Connect a digital meter [A] to the subthrottle sensor connector [B].
- Measure the subthrottle sensor resistance.

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



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

Subthrottle Sensor Circuit



1. ECU
2. Subthrottle Sensor
3. Water-proof Joint 2
4. Water-proof Joint 1

Oxygen Sensor - not activated (Service Code 33)

Oxygen Sensor Removal/Installation

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

Oxygen Sensor Inspection

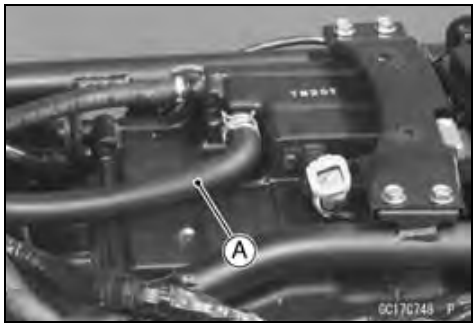
● Warm up the engine thoroughly until the radiator fan starts.
● Turn the ignition switch OFF.
● Remove the right lower fairing (see Lower Fairing Removal in the Frame chapter).
● Disconnect the oxygen sensor lead connector and connect the harness adapter [A] between these connectors.

Special Tool - Oxygen Sensor Measuring Adapter: 57001 -1682

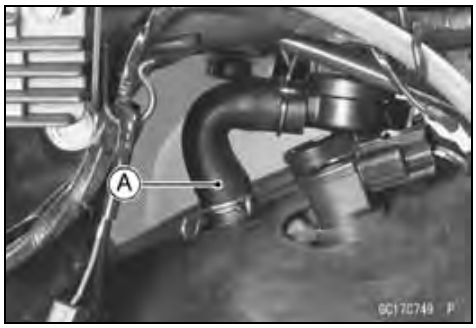
● Connect a digital meter to the harness adapter leads.

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

● Remove the fuel tank (see Fuel Tank Removal).
● Separate the hose [A] from the air cleaner housing.



● Separate the hose [A] from the air suction valve cover.



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

Oxygen Sensor - not activated (Service Code 33)

- Install the suitable plug [A] on the fitting of the air suction valve cover, and shut off the secondary air.
- Install the fuel tank (see Fuel Tank Installation).

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

Output Voltage (with Plug)
Standard: DC 0.7 V or more

- Next, remove the plug from the fitting [A] with idling.
- Measure the output voltage with the connector joined.

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

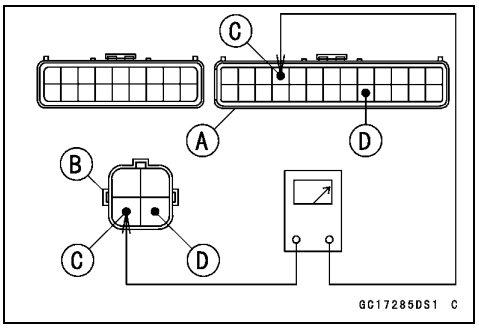
- Turn the ignition switch OFF.

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

Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and sensor connectors.

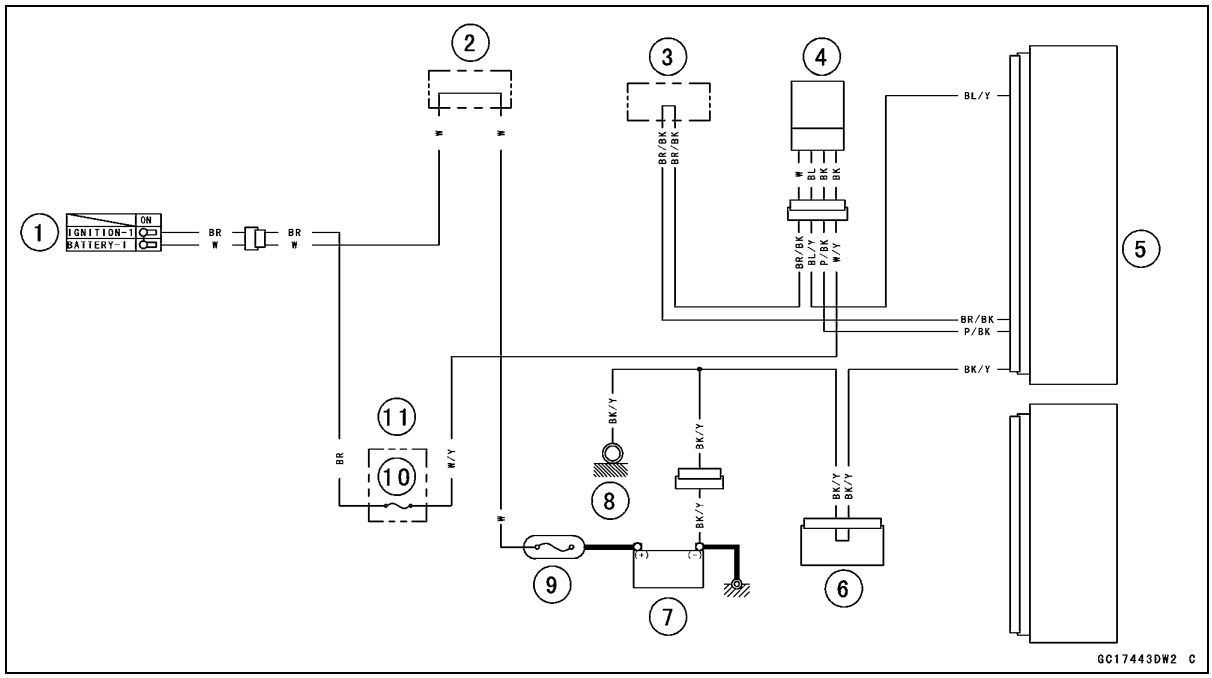
Wiring Continuity Inspection
ECU Connector [A] ←→
Oxygen Sensor Connector [B]
BL/Y lead (ECU terminal 4) [C]
BR/BK lead (ECU terminal 22) [D]



★If the wiring is good, replace the sensor.
★If the reading is within the standard (with plug: DC 0.7 V or more, without plugs: DC 0.2 V or less), check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Oxygen Sensor - not activated (Service Code 33)

Oxygen Sensor Circuit



1. Ignition Switch
2. Water-proof Joint 3
3. Water-proof Joint 1
4. Oxygen Sensor
5. ECU
6. Joint Connector 2
7. Battery 12 V 8 Ah
8. Frame Ground
9. Main Fuse 30 A
10. Oxygen Sensor Heater Fuse 10 A
11. Fuse Box

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

Stick Coil #1: Service Code 51
Stick Coil #2: Service Code 52

Stick Coil Removal/Installation

● Refer to the Stick Coil Removal/Installation in the Electrical System chapter.

Stick Coil Primary Winding Resistance Inspection

● Refer to the Stick Coil Inspection in the Electrical System chapter.
★If the reading is within the standard, check the input voltage (see Stick Coil Input Voltage Inspection).

Stick Coil Input Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

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

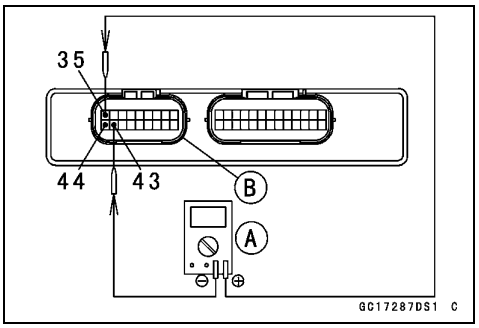
Special Tool - Needle Adapter Set: 57001-1457

Stick Coil Input Voltage
Connections to ECU Connector:
For Stick Coil #1
Digital Meter (+) → BK lead (terminal 35)
Digital Meter (–) → BK/Y lead (terminal 43)
For Stick Coil #2
Digital Meter (+) → BK/G lead (terminal 44)
Digital Meter (–) → BK/Y lead (terminal 43)

● 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.

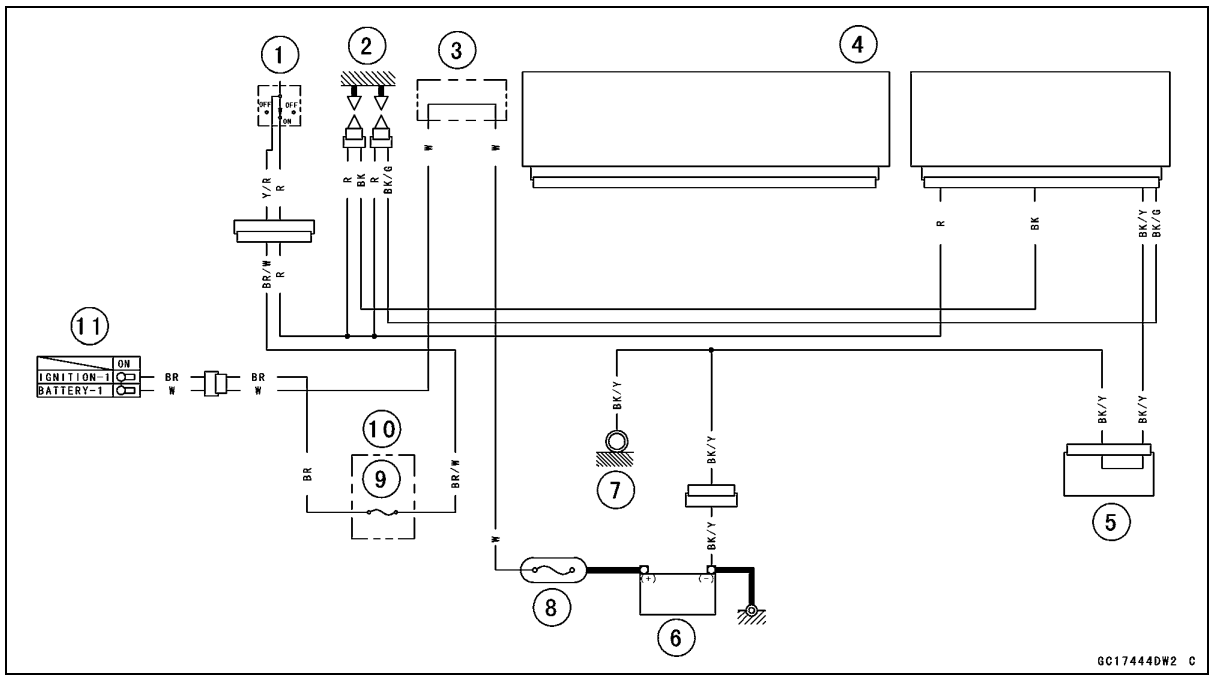
Input Voltage
Standard: Battery Voltage

● Turn the ignition switch OFF.
★If the input voltage is out of the standard, check the wiring for continuity (see wiring diagram in this section).
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
★If the 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 Coils #1, #2 (Service Code 51, 52)

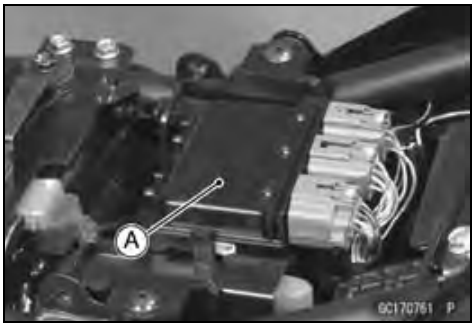
Stick Coil Circuit



1. Engine Stop Switch
2. Stick Coil #1, #2
3. Water-proof Joint 3
4. ECU
5. Joint Connector 2
6. Battery 12 V 8 Ah
7. Frame Ground
8. Main Fuse 30 A
9. Ignition Fuse 10 A
10. Fuse Box
11. Ignition Switch

Radiator Fan Relay (Service Code 56)

Radiator Fan Relay Removal/Installation



○The radiator fan relay is built in the relay box [A].

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

Radiator Fan Relay Inspection

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

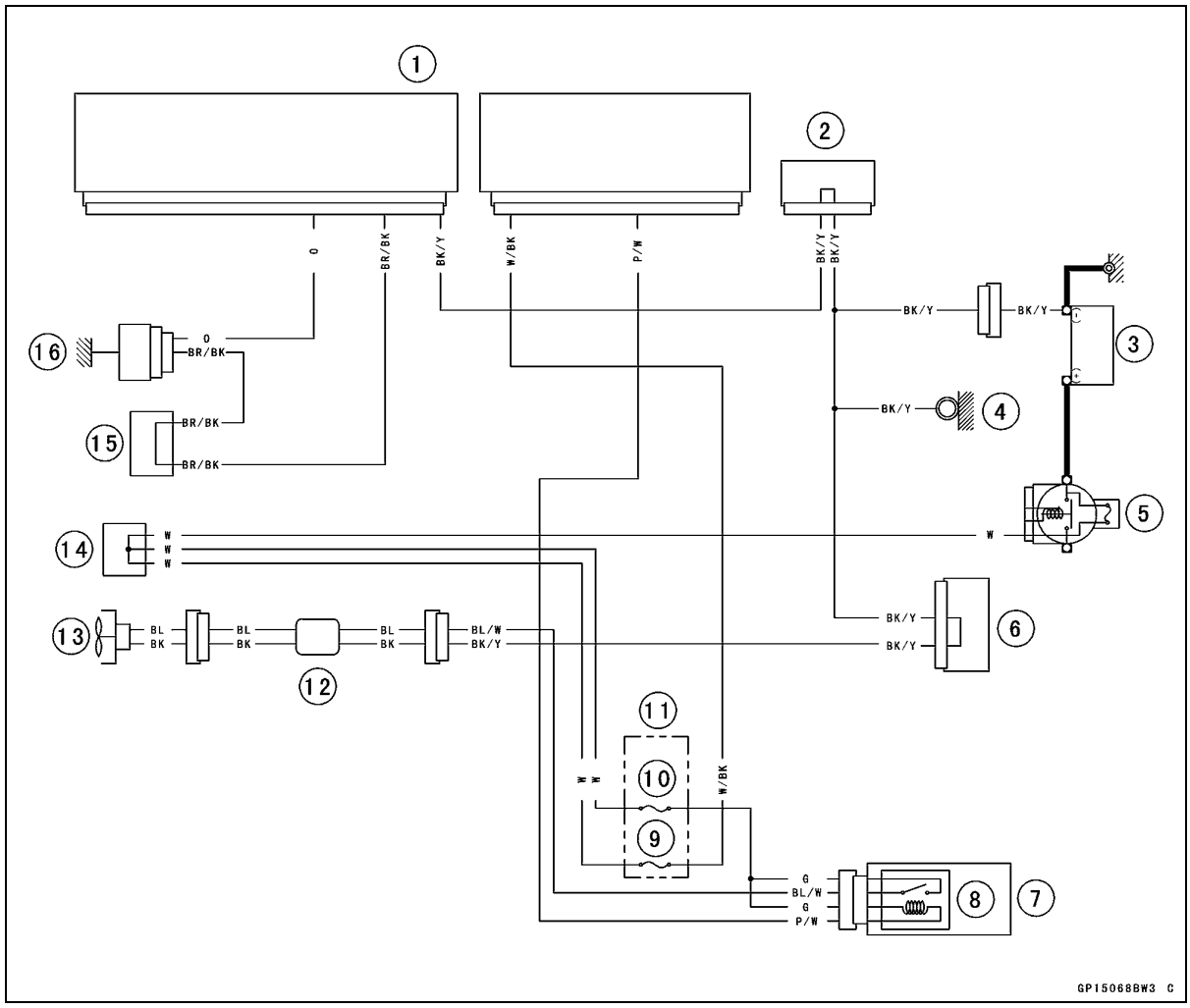
★If the radiator fan relay is normal, check the wiring for continuity (see wiring diagram in this section).

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

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

Radiator Fan Relay (Service Code 56)

Radiator Fan Relay Circuit



1. ECU
2. Joint Connector 2
3. Battery 12 V 8 Ah
4. Frame Ground
5. Main Fuse 30 A
6. Joint Connector 1
7. Relay Box
8. Fan Relay
9. ECU Fuse 15 A
10. Fan Fuse 10 A
11. Fuse Box
12. Resistor
13. Fan Motor
14. Water-proof Joint 3
15. Water-proof Joint 1
16. Water Temperature Sensor

Subthrottle Valve Actuator (Service Code 62)

Subthrottle Valve Actuator Removal

CAUTION

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

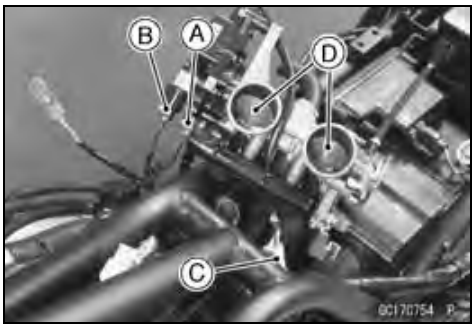
Subthrottle Valve Actuator Inspection

NOTE

○*Be sure the battery is fully charged.*

- Remove the throttle body assy (see Throttle Body Assy Removal).
- Connect the following parts temporary.
  Main Throttle Sensor Connector [A]
  Subthrottle Sensor Connector [B]
  Subthrottle Valve Actuator Connector [C]
- Turn the ignition switch ON.
- Check to see that all the subthrottle valves [D] open and close smoothly.
- Turn the ignition switch OFF.

★If the subthrottle valves do not operate, check the subthrottle valve actuator resistance (see Subthrottle Valve Actuator Resistance Inspection).



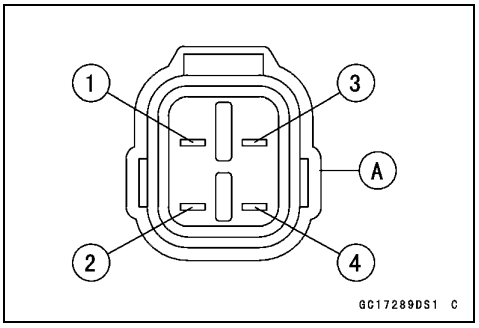
Subthrottle Valve Actuator Resistance Inspection

- Turn the ignition switch OFF.
- Remove the fuel tank (see Fuel Tank Removal).
- Disconnect the subthrottle valve actuator connector [A].

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

Subthrottle Valve Actuator Resistance

Connections:	**BK lead [1] ←→ P lead [2]**
	G lead [3] ←→ W/BL lead [4]
Standard:	**About 5.2 ~ 7.8 Ω**



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

★If the reading is within the standard, check the input voltage (see Subthrottle Valve Actuator Input Voltage Inspection).

Subthrottle Valve Actuator (Service Code 62)

Subthrottle Valve Actuator Input Voltage Inspection

NOTE

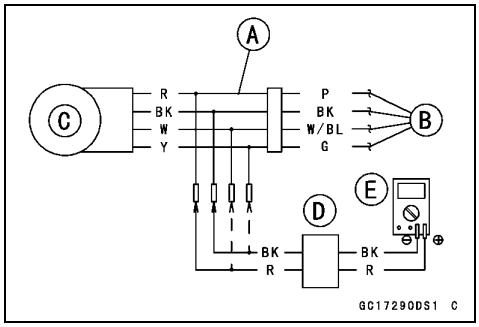
○*Be sure the battery is fully charged.*

● Turn the ignition switch OFF.
● Disconnect the subthrottle valve actuator connector and connect the harness adapter [A] between these connectors as shown in the figure.
Main Harness [B]
Subthrottle Valve Actuator [C]

Special Tool - Measuring Adapter: 57001-1700

● Connect the peak voltage adapter [D] and a digital meter [E] to the harness adapter leads.

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



Subthrottle Valve Actuator Input Voltage
Connections to Adapter:
(I) Digital Meter (+) → R (actuator P) lead
Digital Meter (–) → BK (actuator BK) lead
(II) Digital Meter (+) → W (actuator W/BL) lead
Digital Meter (–) → Y (actuator G) lead

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

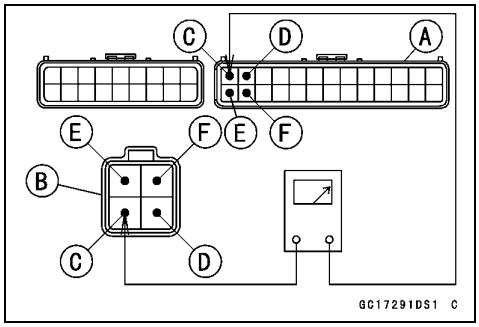
Input Voltage
Standard: About DC 11.5 ~ 13.5 V

● Turn the ignition switch OFF.
★If the reading is in specification, but the actuator does not operate, replace the throttle body assy (see Throttle Body Assy Removal/Installation).

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

Special Tool - Hand Tester: 57001-1394

○Disconnect the ECU and actuator connectors.

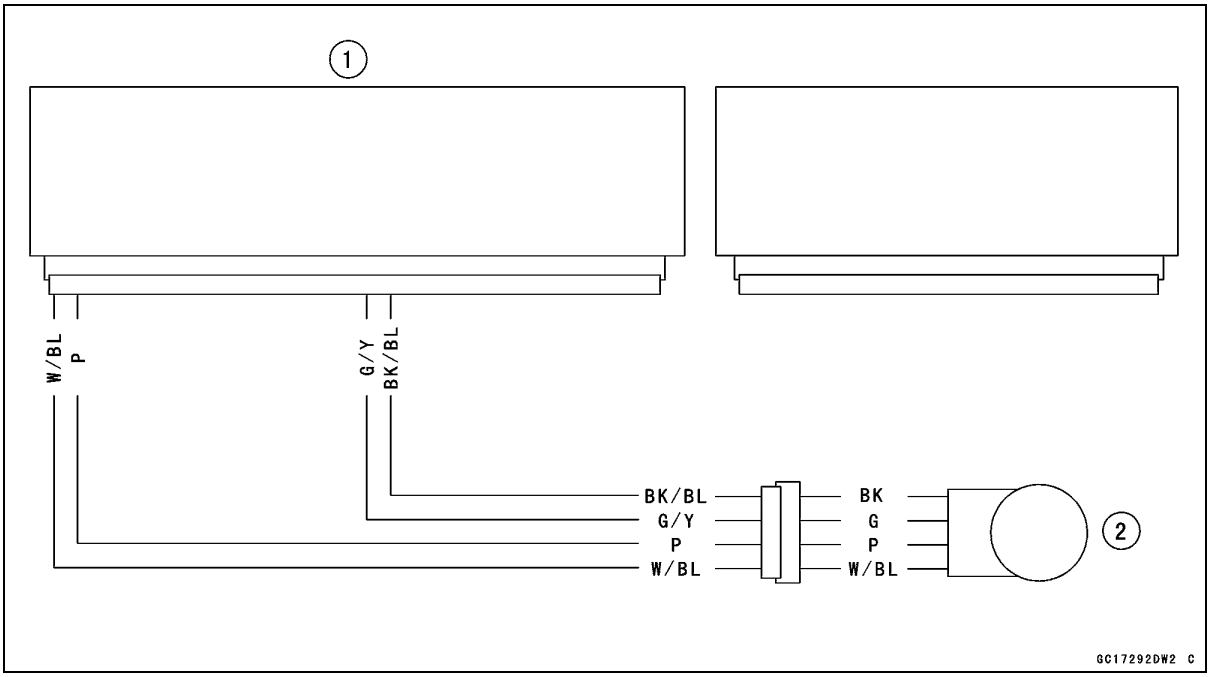


Wiring Continuity Inspection
ECU Connector [A] ←→
Subthrottle Valve Actuator Connector [B]
W/BL lead (ECU terminal 1) [C]
P lead (ECU terminal 2) [D]
G/Y lead (ECU terminal 14) [E]
BK/BL lead (ECU terminal 15) [F]

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

Subthrottle Valve Actuator (Service Code 62)

Subthrottle Valve Actuator Circuit



1. ECU
2. Subthrottle Valve Actuator

Air Switching Valve (Service Code 64)

Air Switching Valve Removal/Installation

● Refer to the Air Switching Valve Removal/Installation in the Engine Top End chapter.

Air Switching Valve Inspection

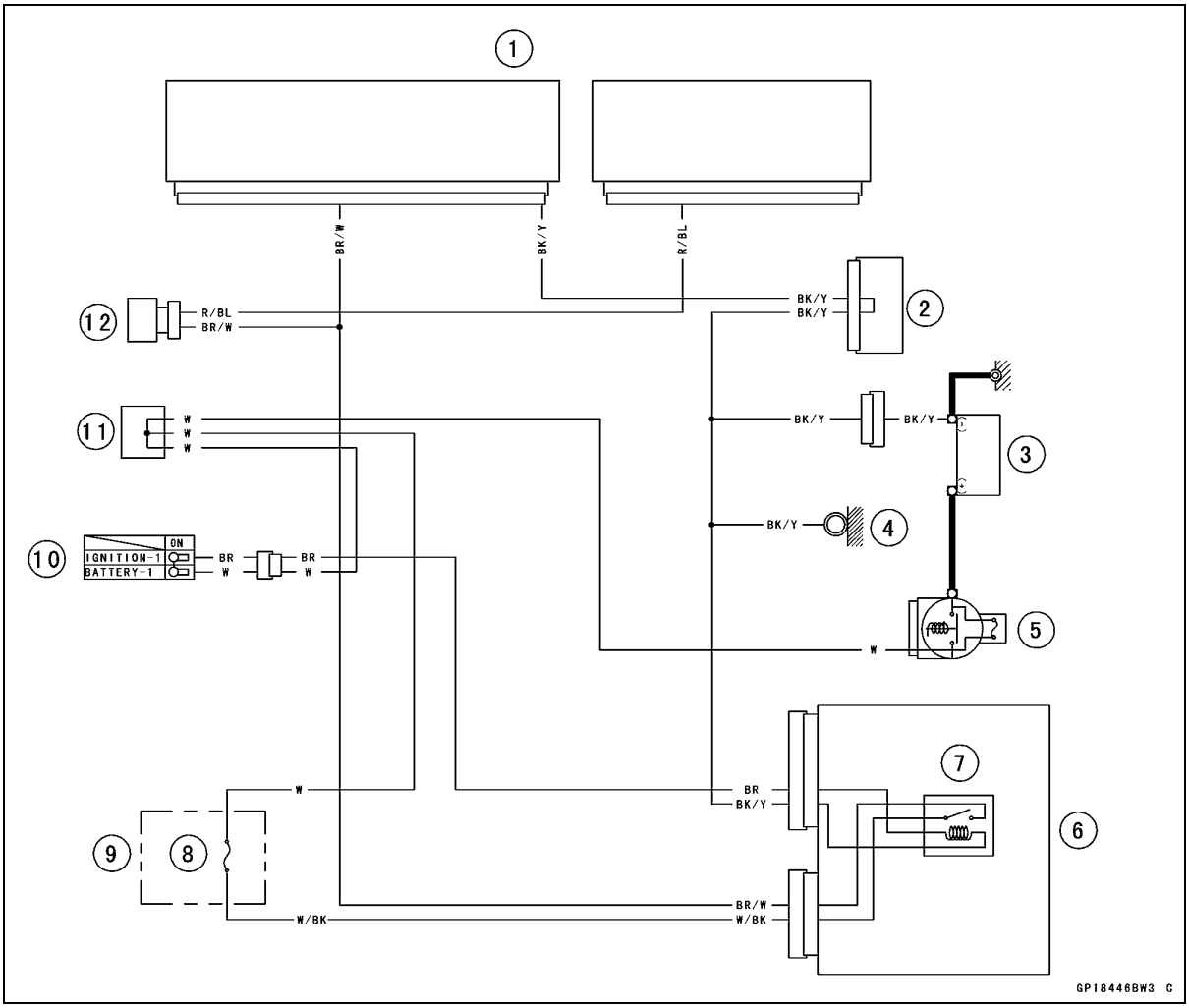
● Refer to the Air Switching Valve Unit Test in the Electrical System chapter.

★If the air switching valve is normal, check the wiring for continuity (see wiring diagram in this section).

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

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

Air Switching Valve Circuit



1. ECU
2. Joint Connector 2
3. Battery 12 V 8 Ah
4. Frame Ground
5. Main Fuse 30 A
6. Relay Box
7. ECU Main Relay
8. ECU Fuse 15 A
9. Fuse Box
10. Ignition Switch
11. Water-proof Joint 3
12. Air Switching Valve

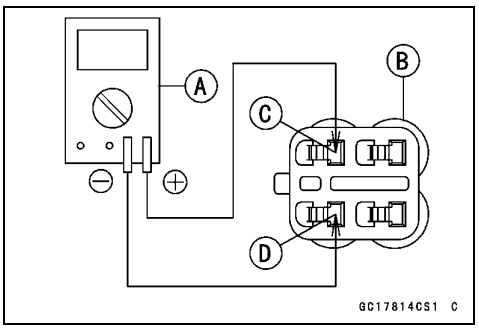
Oxygen Sensor Heater (Service Code 67)

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 lower fairing (see Lower 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 Heater Resistance
Connections: BK lead [C] ←→ BK lead [D]
Standard: 11.7 ~ 15.5 Ω at 20°C (68°F)

★If the reading is out of the standard, replace the sensor.
★If the reading is within the standard, check the power source voltage (see Oxygen Sensor Heater Power Source Voltage Inspection).

Oxygen Sensor Heater Power Source Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch OFF.
- Disconnect the oxygen sensor lead connector and connect the harness adapter [A] between these connectors.

Special Tool - Oxygen Sensor Measuring Adapter: 57001 -1682

- Connect a digital meter to the harness adapter lead.

Oxygen Sensor Power Source Voltage
Connections to Adapter:
Digital Meter (+) → P/Y (sensor BK) lead
Digital Meter (–) → Battery (–) 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.
Oxygen Sensor Heater Fuse 10 A (see Fuse Inspection in the Electrical System chapter)
Power Source Wiring (see wiring diagram in this section)

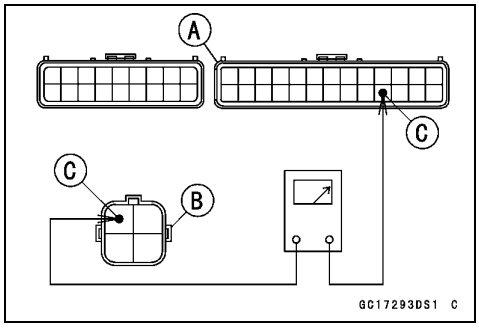
Oxygen Sensor Heater (Service Code 67)

★If the fuse and wiring are good, remove the ECU and check the wiring for continuity between main harness connectors.

Special Tool - Hand Tester: 57001-1394

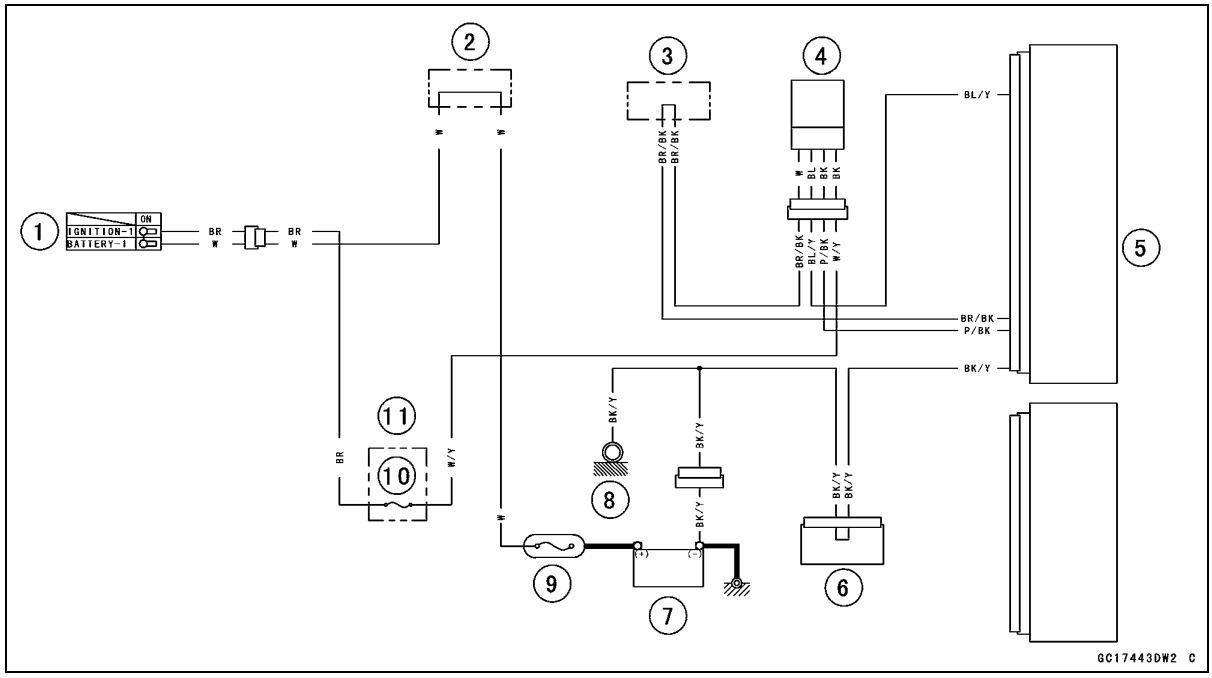
○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Oxygen Sensor Connector [B]
P/BK lead (ECU terminal 23) [C]



★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 Circuit



1. Ignition Switch
2. Water-proof Joint 3
3. Water-proof Joint 1
4. Oxygen Sensor
5. ECU
6. Joint Connector 2
7. Battery 12 V 8 Ah
8. Frame Ground
9. Main Fuse 30 A
10. Oxygen Sensor Heater Fuse 10 A
11. Fuse Box

Oxygen Sensor - Incorrect Output Voltage (Service Code 94)

Oxygen Sensor Removal/Installation

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

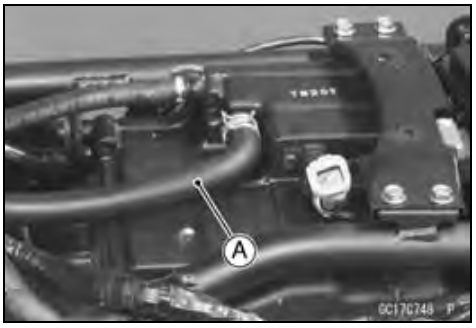
Oxygen Sensor Inspection

● Warm up the engine thoroughly until the radiator fan starts.
● Turn the ignition switch OFF.
● Remove the right lower fairing (see Lower Fairing Removal in the Frame chapter).
● Disconnect the oxygen sensor lead connector and connect the harness adapter [A] between these connectors.

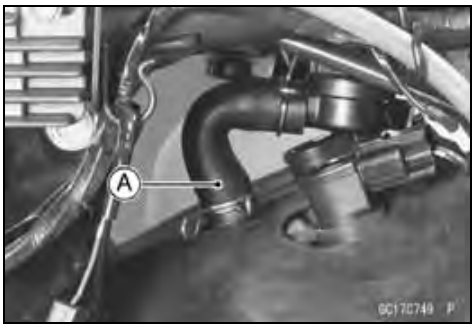
Special Tool - Oxygen Sensor Measuring Adapter: 57001 -1682

● Connect a digital meter to the harness adapter leads.

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



● Remove the fuel tank (see Fuel Tank Removal).
● Separate the hose [A] from the air cleaner housing.



● Separate the hose [A] from the air suction valve cover.

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

Oxygen Sensor - Incorrect Output Voltage (Service Code 94)

- Install the suitable plug [A] on the fitting of the air suction valve cover, and shut off the secondary air.
- Install the fuel tank (see Fuel Tank Installation).

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

Output Voltage (with Plug)
Standard: DC 0.7 V or more

- Next, remove the plug from the fitting [A] with idling.
- Measure the output voltage with the connector joined.

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

- Turn the ignition switch OFF.

★If the reading is out of the standard (with plug: DC 0.7 V or more, without plug: DC 0.2 V or less), check the following.
Fuel Pressure (see Fuel Pressure Inspection)
Fuel Injector (see Fuel Injectors section)

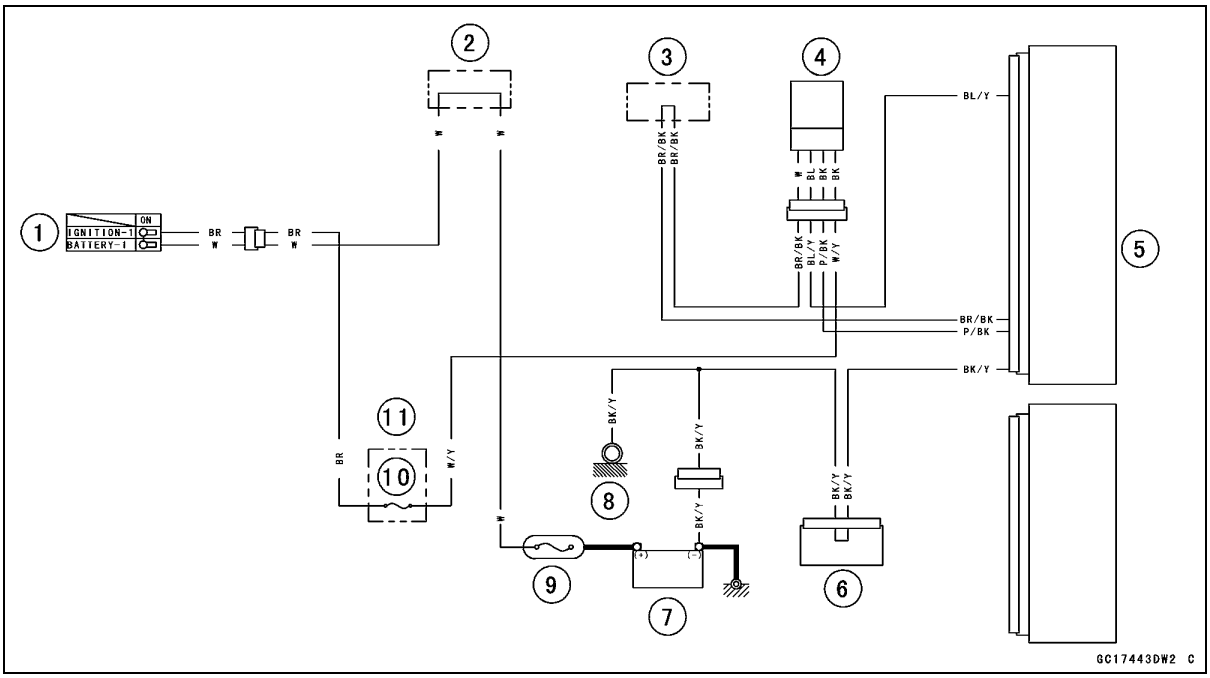
★If the fuel pressure and fuel injectors are good, replace the sensor.

★If the reading is within the standard (with plug: DC 0.7 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 - Incorrect Output Voltage (Service Code 94)

Oxygen Sensor Circuit



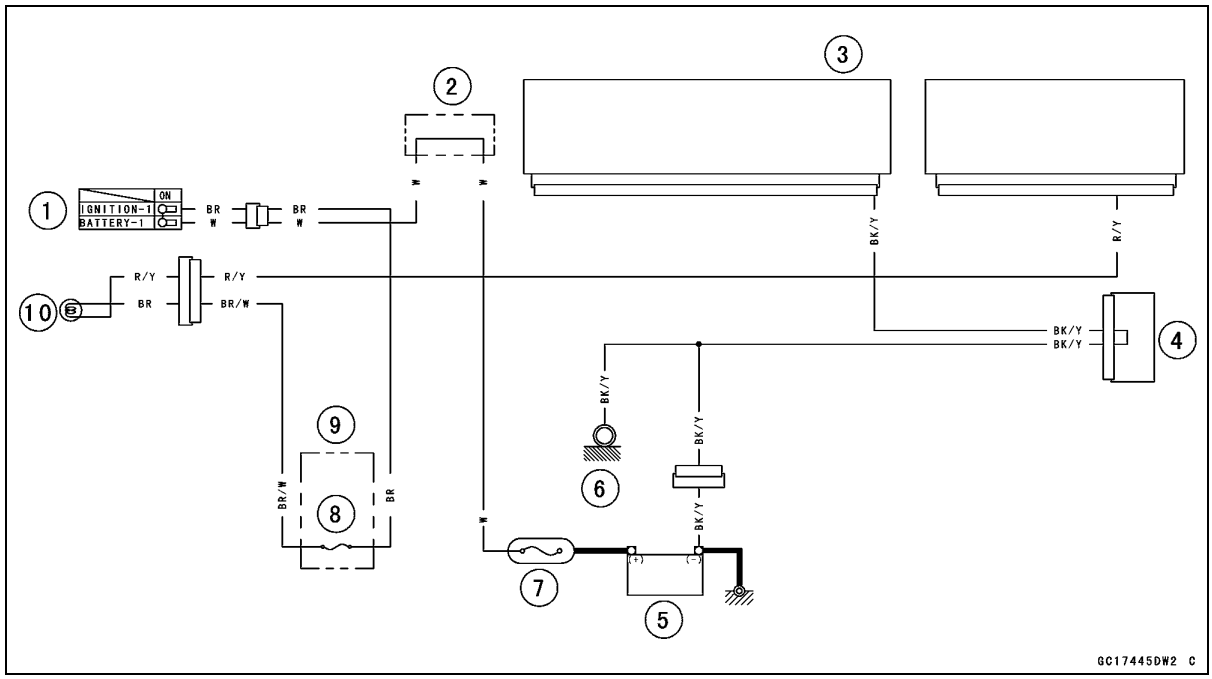
1. Ignition Switch
2. Water-proof Joint 3
3. Water-proof Joint 1
4. Oxygen Sensor
5. ECU
6. Joint Connector 2
7. Battery 12 V 8 Ah
8. Frame Ground
9. Main Fuse 30 A
10. Oxygen Sensor Heater Fuse 10 A
11. Fuse Box

FI Indicator Light

Light Inspection

● Refer to the Lights and Switches Operation Inspection in the Periodic Maintenance chapter.

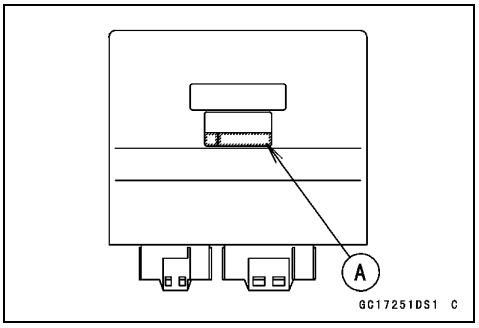
FI Indicator Light Circuit



1. Ignition Switch
2. Water-proof Joint 3
3. ECU
4. Joint Connector 2
5. Battery 12 V 8 Ah
6. Frame Ground
7. Main Fuse 30 A
8. Ignition Fuse 10 A
9. Fuse Box
10. FI Indicator Light

ECU

ECU Identification



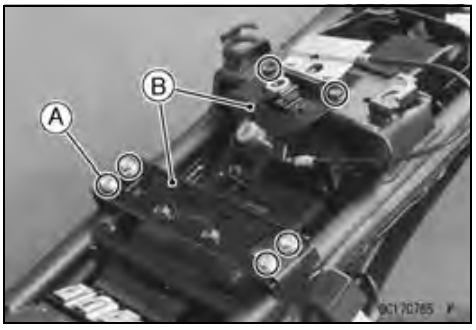
○Most countries have their own regulations, so each ECU has different characteristic. So, do not confuse ECU with each other and use only the ECU for your model. Otherwise, the motorcycle cannot clear the regulation.

ECU Identification

Part Number [A]	Specification
21175-0199	WVTA (FULL N) GB WVTA (FULL N)

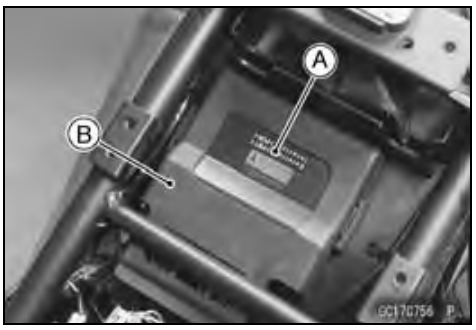
ECU Removal

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

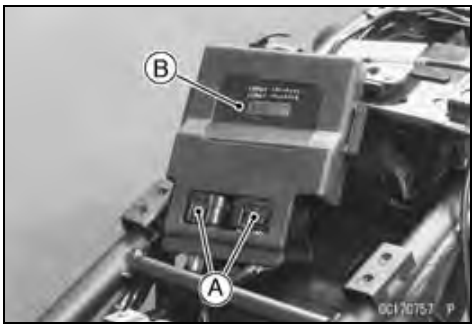


● Remove:
Seat Covers (see Seat Cover Removal in the Frame chapter)
Bolts [A]
Brackets [B]

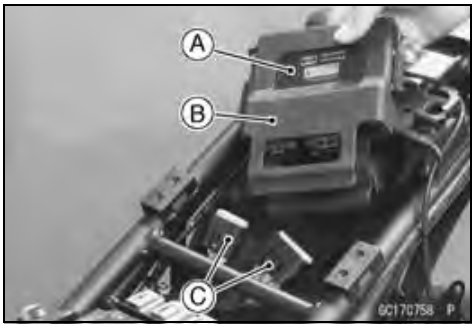
● Lift up the ECU [A] with rubber protector [B].



● Remove:
ECU Connectors [A] (Disconnect)
ECU [B]



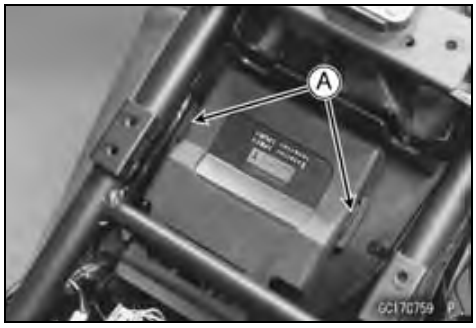
ECU Installation



● Install:
ECU [A] (In Rubber Protector [B])
ECU Connectors [C] (Connect)

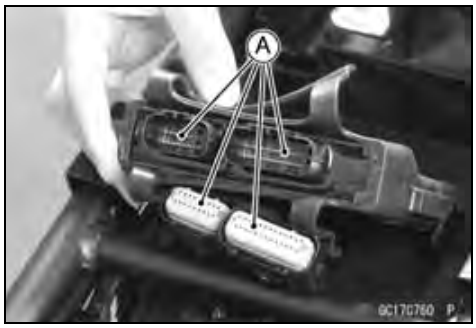
ECU

● Insert the slits of the rubber protector to the projections [A] of the rear fender.



ECU Power Supply Inspection

● Remove the front seat (see Front Seat 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 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 the hand tester [B] to the × 1 Ω range and check the following wiring for continuity.

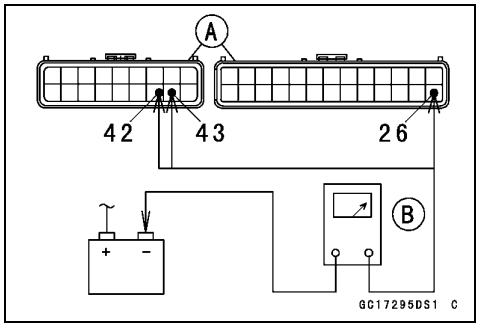
Special Tool - Hand Tester: 57001-1394

ECU Grounding Continuity Inspection
Connections:

(I) BK/Y leads (ECU terminal 26, 42 or 43) ⟷ Battery (–) Terminal
(II) Engine Ground ⟷ Battery (–) Terminal

Criteria:

Both: 0 Ω



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

ECU

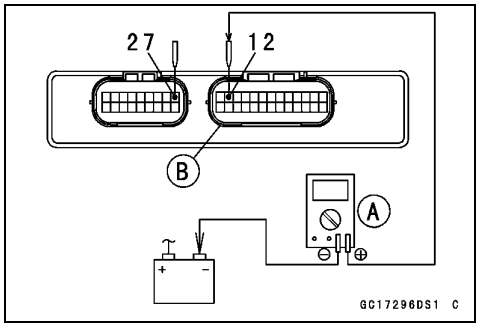
★If the wiring is good, check the power source voltage of the ECU.

NOTE

○*Be sure the battery is fully charged.*

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

Special Tool - Needle Adapter Set: 57001-1457



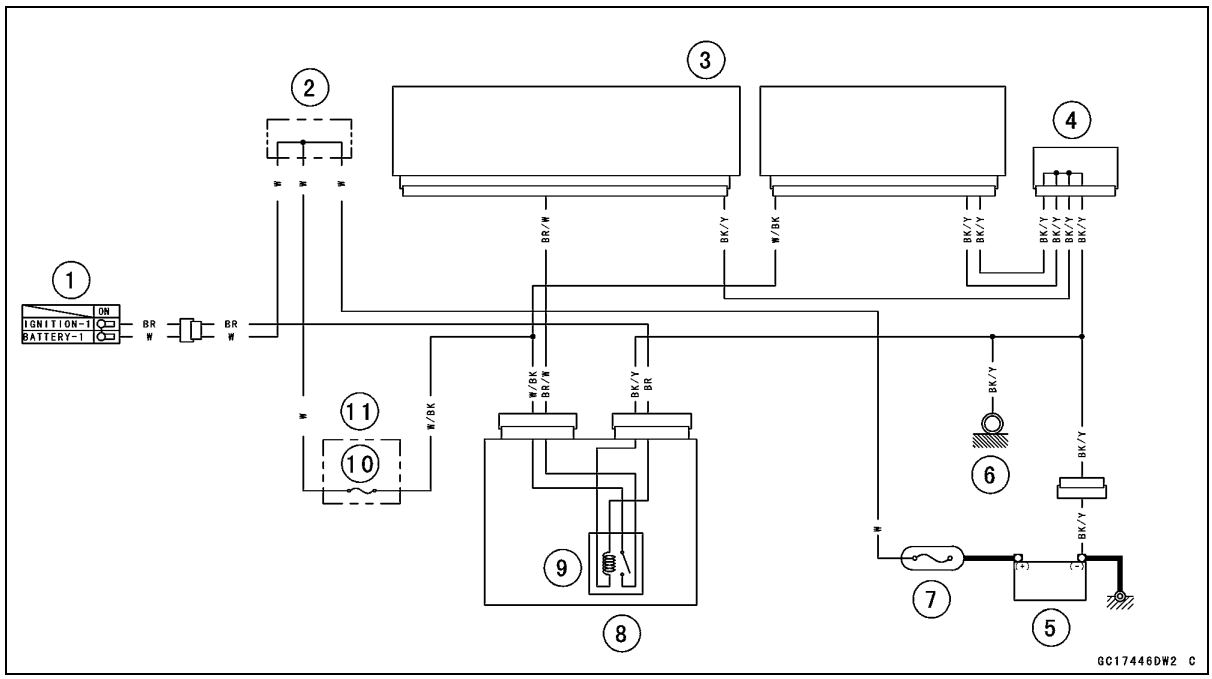
ECU Power Supply Inspection
Connections:
(I) Digital Meter (+) → Terminal 12 (BR/W)
Digital Meter (–) → Battery (–) terminal
(II) Digital Meter (+) → Terminal 27 (W/BK)
Digital Meter (–) → Battery (–) terminal
Ignition Switch OFF:
Terminal 12 (BR/W): 0 V
Terminal 27 (W/BK): Battery Voltage
Ignition Switch 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 wiring diagram in this section)

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

ECU

ECU Power Source Circuit



1. Ignition Switch
2. Water-proof Joint 3
3. ECU
4. Joint Connector 2
5. Battery 12 V 8 Ah
6. Frame Ground
7. Main Fuse 30 A
8. Relay Box
9. ECU Main Relay
10. ECU Fuse 15 A
11. Fuse Box

DFI Power Source

ECU Fuse Removal

● Refer to the 15 A ECU Fuse Removal in the Electrical System chapter.

ECU Fuse Installation

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

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

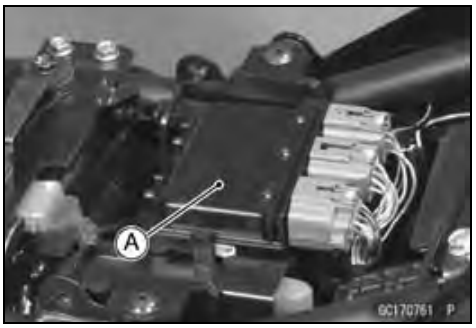
ECU Fuse Inspection

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

ECU Main Relay Removal/Installation

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

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



ECU Main Relay Inspection

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

Fuel Line

Fuel Pressure Inspection

NOTE

○*Be sure the battery is fully charged.*

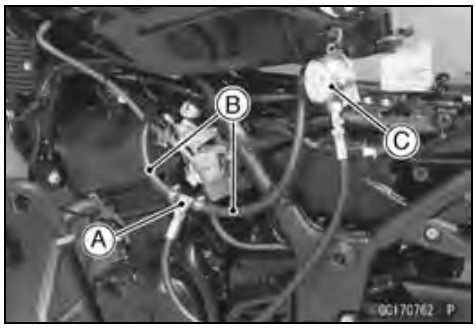
● Remove:
Fuel Tank (see Fuel Tank Removal)
Fuel Hose (see Fuel Hose Replacement in the Periodic Maintenance chapter)

○Be sure to place a piece of cloth around the fuel supply pipes of the fuel pump and the throttle body assy.

⚠ WARNING

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

● Install the fuel pressure gauge adapter [A] and fuel hoses (Special Tool: 57001-1607) [B] between the fuel supply pipes of the fuel pump and throttle body assy.
● 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

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

● Connect the fuel pump lead connector.
● Turn the engine stop switch run position.
● Turn the ignition switch ON.

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

NOTE

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

CAUTION

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.

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

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

Fuel Line

NOTE

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

- Turn the ignition switch OFF.

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

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

Fuel Line Leakage (see Fuel Injector Fuel Line Inspection)

Amount of Fuel Flow (see Fuel Flow Rate Inspection)

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

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

Fuel Tank (see Fuel Tank Installation)

- Start the engine and check for fuel leakage.

Fuel Flow Rate Inspection

⚠ WARNING

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

NOTE

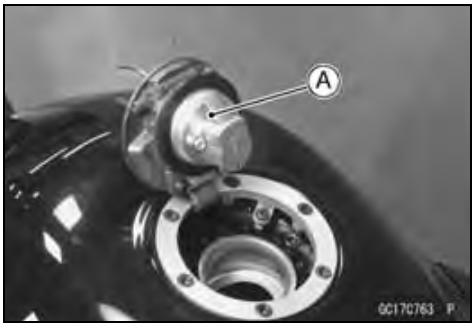
○*Be sure the battery is fully charged.*

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

Special Tool - Fuel Hose: 57001-1607

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

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

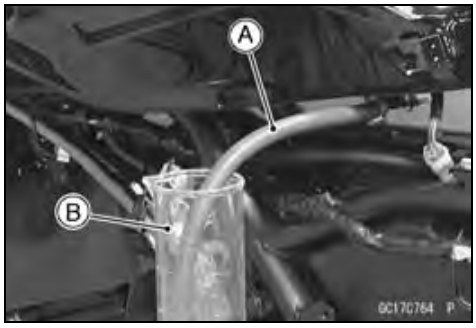


⚠ WARNING

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

Fuel Line

● Connect the prepared fuel hose [A] to the fuel supply pipe of the fuel pump.
● 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.

CAUTION

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: 17 mL (0.57 US oz.) or more for 3 seconds

● Turn the ignition switch OFF.
★If the fuel flow is much less than the specified, replace the fuel pump (see Fuel Pump Removal/Installation).
● Install the fuel tank (see Fuel Tank Installation).
● Start the engine and check for fuel leakage.

Fuel Pump

Fuel Pump Removal

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. 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 and disconnect the battery (–) terminal.
To make fuel spillage minimum, draw the fuel out from the fuel tank when the engine is cold. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

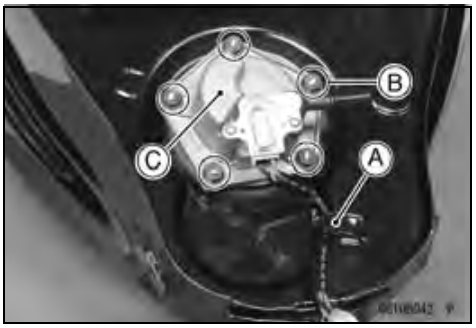
CAUTION

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 supply pipe of the fuel pump.

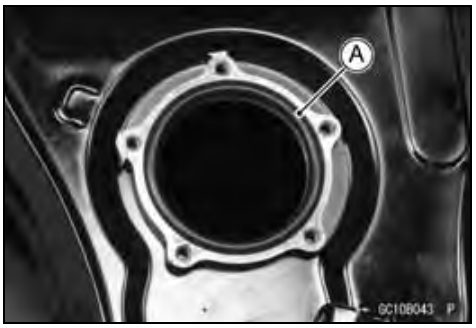
- Turn the fuel tank upside down.
- Free the lead from the clamp [A].
- Unscrew the fuel pump bolts [B], and take out the fuel pump [C].



CAUTION

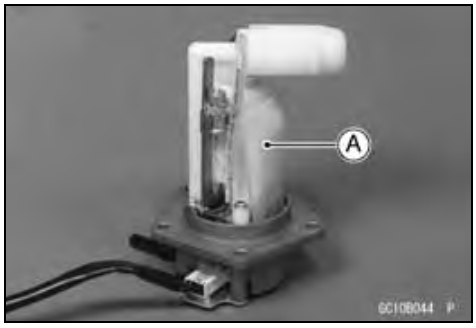
Do not pull the lead of the fuel pump. If they are pulled, the lead terminals may be damaged.

- Discard the fuel pump gasket [A].

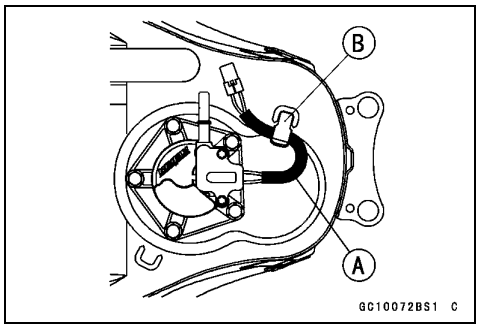


Fuel Pump

Fuel Pump Installation



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



- Apply a non-permanent locking agent to the threads of the fuel pump bolts.
- Tighten the fuel pump bolts to a snug fit, tighten them alternating diagonally.

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

- Tighten the pump bolts again alternating diagonally to check the tightness.
- Hold the lead [A] with the clamp [B].

Fuel Pump Operation Inspection

NOTE

○*Be sure the battery is fully charged.*

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

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

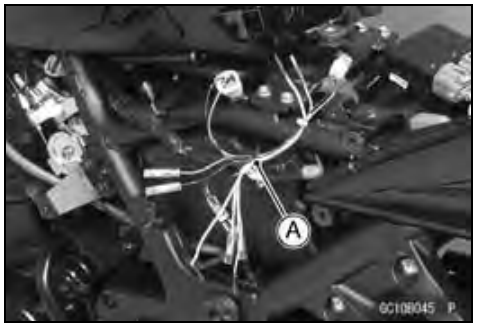
Fuel Pump

Fuel Pump Operating Voltage Inspection

NOTE

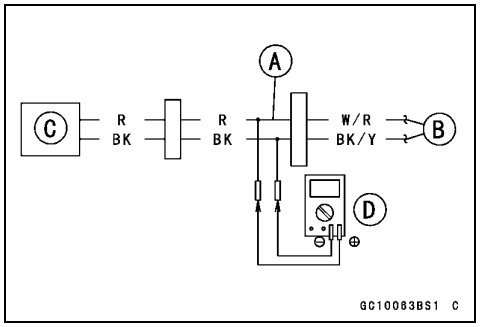
○*Be sure the battery is fully charged.*

- Turn the ignition switch OFF.
- Remove the fuel tank bolts (see Fuel Tank Removal).
- Disconnect the fuel pump lead connector and connect the harness adapter [A] between these connectors as shown in the figure.
  Main Harness [B]
  Fuel Pump [C]



Special Tool - Measuring Adapter: 57001-1700

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



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

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

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

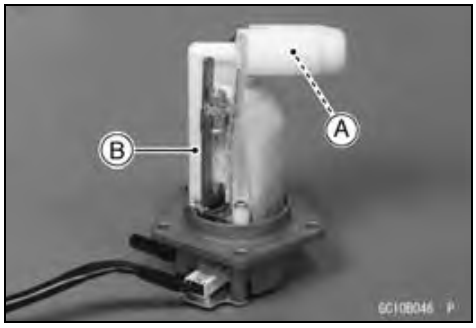
- Turn the ignition switch OFF.

★If the reading stays on battery voltage and never shows 0 V, check the fuel pump relay (see Relay Circuit Inspection in the Electrical System chapter).
★If the 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 ECU main relay and fuel pump relay (see Relay Circuit Inspection in the Electrical System chapter).
★If the main relay and pump relay are normal, check the wiring for continuity (see wiring diagram in this section).
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
★If the reading is in specification, but the pump does not operate, replace the fuel pump (see Fuel Pump Removal/Installation).

Fuel Pump

Pressure Regulator Removal

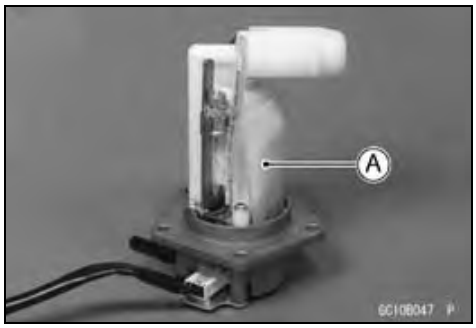
○The pressure regulator [A] is built into the fuel pump [B] and can not be removed.



Fuel Filter Cleaning

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

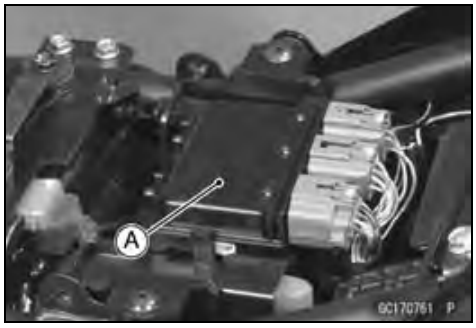
★If the fuel filter is suspected of clogging or being damaged, replace it with the fuel pump as a set.



Fuel Pump Relay Removal/Installation

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

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

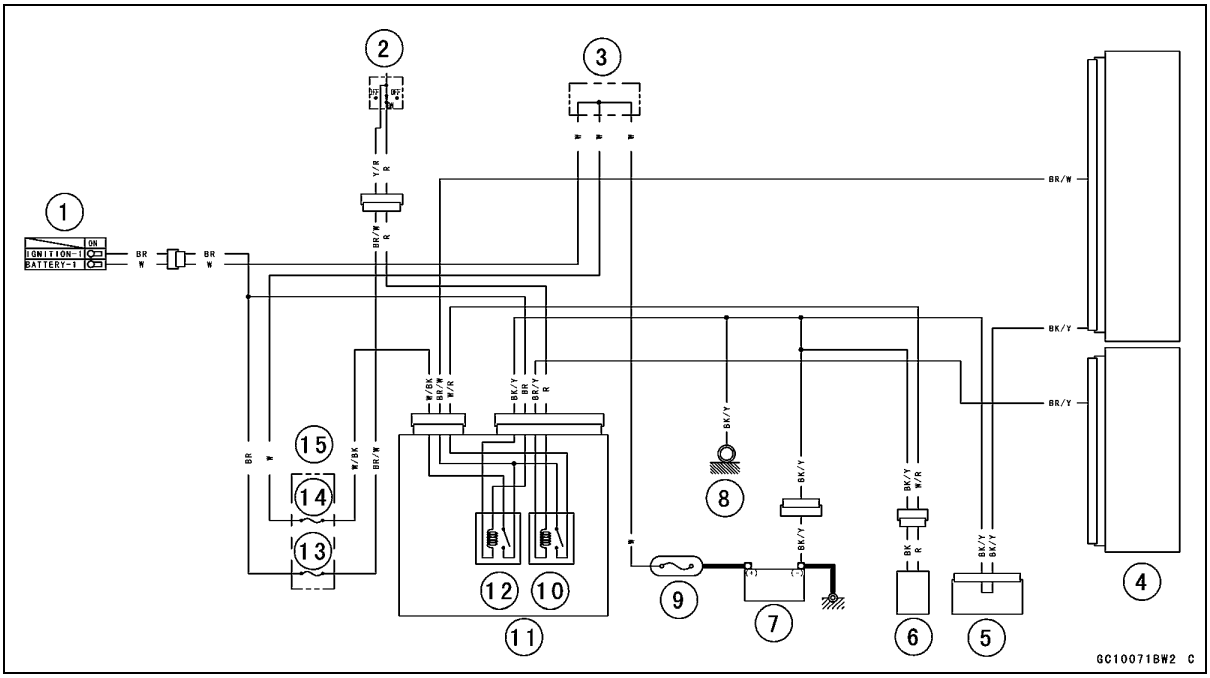


Fuel Pump Relay Inspection

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

Fuel Pump

Fuel Pump Circuit



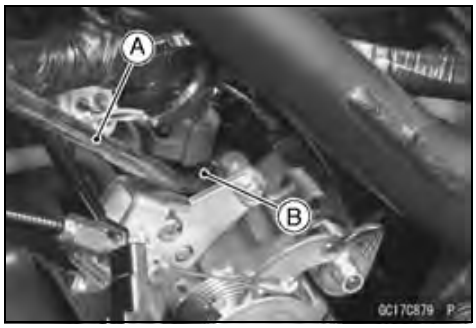
1. Ignition Switch
2. Engine Stop Switch
3. Water-proof Joint 3
4. ECU
5. Joint Connector 2
6. Fuel Pump
7. Battery 12 V 8 Ah
8. Frame Ground
9. Main Fuse 30 A
10. Fuel Pump Relay
11. Relay Box
12. ECU Main Relay
13. Ignition Fuse 10 A
14. ECU Fuse 15 A
15. Fuse Box

Fuel Injectors

Fuel Injector Removal/Installation

● Refer to the Throttle Body Assy Disassembly/Assembly.

Fuel Injector Audible Inspection

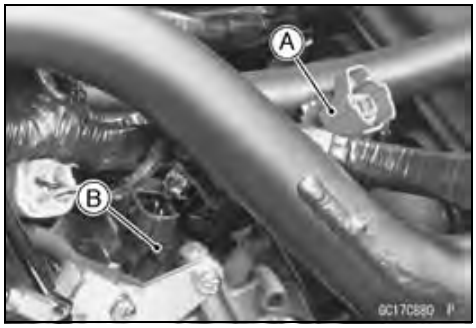


NOTE

○*Be sure the battery is fully charged.*

● Remove the lower fairings (see Lower Fairing Removal in the Frame chapter).
● Start the engine, and let it idle.
● Apply the tip of a 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 injector.
★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 fuel tank (see Fuel Tank Removal).
● Disconnect the injector connector [A].
● Connect a digital meter to the terminals of the injector [B].
● Measure the fuel injector resistance.

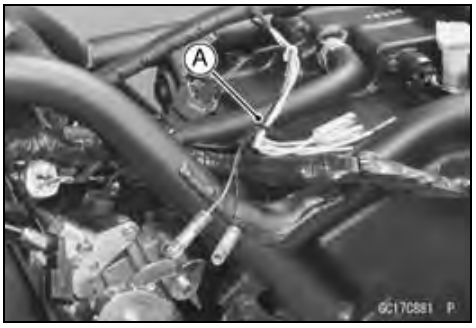
Fuel Injector Resistance
Connections:
For Fuel Injector #1
W/R ←→ BL/R terminal
For Fuel Injector #2
W/R ←→ BL/G terminal

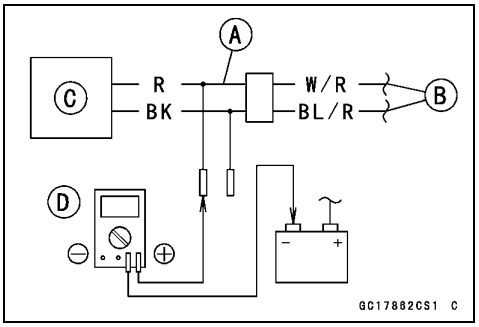
Standard: About 11.7 ~ 12.3 Ω at 20°C (68°F)

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

Fuel Injectors

Fuel Injector Power Source Voltage Inspection





NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch OFF.
- Disconnect the injector connector and connect the harness adapter [A] between these connectors as shown in the figure.
  Main Harness [B]
  Fuel Injector #1 [C]

Special Tool - Measuring Adapter: 57001-1700

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

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.
- Turn the engine stop switch to run position.
- Turn the ignition switch ON.

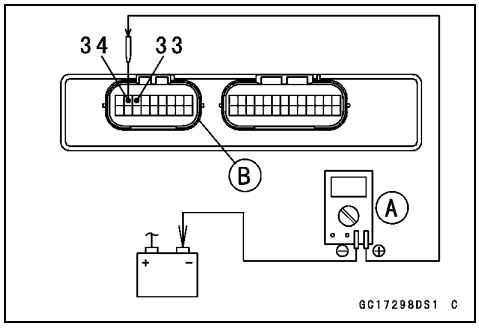
Power Source Voltage
Standard: Battery Voltage for 3 seconds, and then 0 V

- 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 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 ECU main relay and pump relay (see Relay Circuit Inspection in the Electrical System chapter).
★If the main relay and pump relay are normal, check the power source wiring (see wiring diagram in this section).
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
★If the reading is in specification, check the output voltage (see Fuel Injector Output Voltage Inspection).

Fuel Injectors

Fuel Injector Output Voltage Inspection



NOTE

○*Be sure the battery is fully charged.*

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

○Do not disconnect the ECU connector.

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

Special Tool - Needle Adapter Set: 57001-1457

Fuel Injector Output Voltage
Connections to ECU Connector:
For Fuel Injector #1
Digital Meter (+) → BL/R lead (ECU terminal 34)
Digital Meter (–) → Battery (–) terminal
For Fuel Injector #2
Digital Meter (+) → BL/G lead (ECU terminal 33)
Digital Meter (–) → Battery (–) terminal

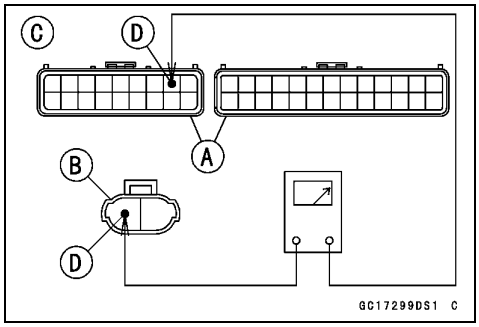
- Measure the output voltage with the engine stopped and with the connector joined.
- Turn the engine stop switch to run position.
- Turn the ignition switch ON.

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 connector.

Special Tool - Hand Tster: 57001-1394

○Disconnect the ECU and injector connector.

Wiring Continuity Inspection
ECU Connector [A] ←→ Fuel Injector Connector [B]
For Fuel Injector #1 [C]
BL/R lead (ECU terminal 34) [D]
For Fuel Injector #2
BL/G lead (ECU terminal 33)

★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

Fuel Injector Fuel Line Inspection

● Remove:
Fuel Tank (see Fuel Tank Removal)
Fuel Hose (see Fuel Hose Replacement in the Periodic Maintenance chapter)
○Be sure to place a piece of cloth around the fuel supply pipes of the fuel pump and the throttle body assy.

⚠ WARNING

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

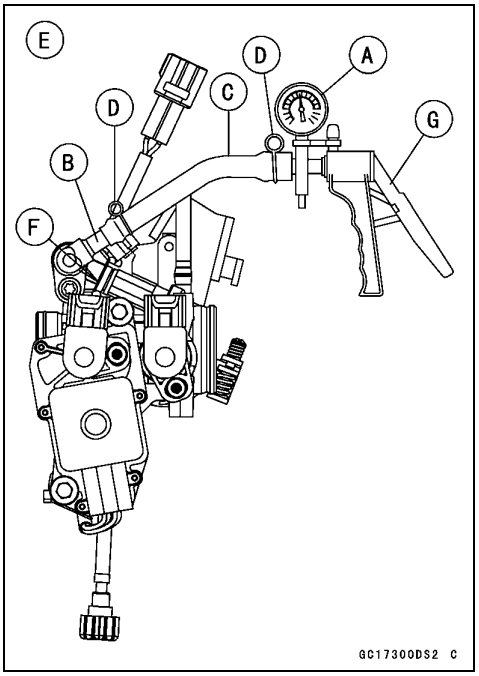
● Check the injector fuel line for leakage as follows.
○Connect a commercially available vacuum/pressure pump [A] to the nipple of the fuel supply pipe [B] with the fuel hose [C] (both ends with the clamps [D]) as shown in the figure.
Right Side View [E]
○Apply soap and water solution to the areas [F] as shown in the figure.
○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)

CAUTION

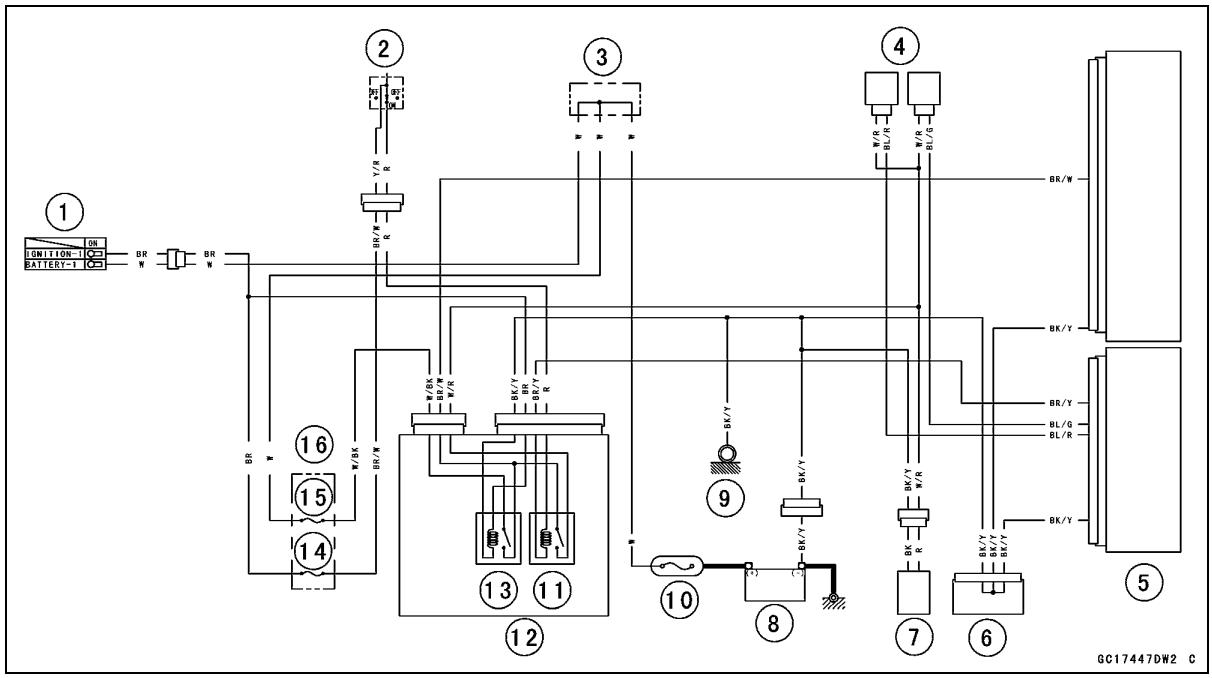
During pressure testing, do not exceed the maximum pressure for which the system is designed.

○Watch the gauge for at least 6 seconds.
★If the pressure holds steady, the 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 fuel supply pipe assy, injectors and related parts.
○Repeat the leak test, and check the fuel line for no leakage.
● Install:
Fuel Hose (see Fuel Hose Replacement in the Periodic Maintenance chapter)
Fuel Tank (see Fuel Tank Installation)
● Start the engine and check for fuel leakage.



Fuel Injectors

Fuel Injector Circuit



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

Throttle Grip and Cables

Free Play Inspection

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

Free Play Adjustment

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

Cable Installation

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

⚠ WARNING

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

Cable Lubrication

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

Throttle Body Assy

Idle Speed Inspection/Adjustment

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

Synchronization Inspection/Adjustment

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

Throttle Body Assy Removal

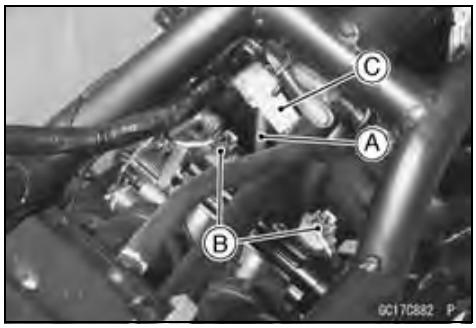
⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. 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.

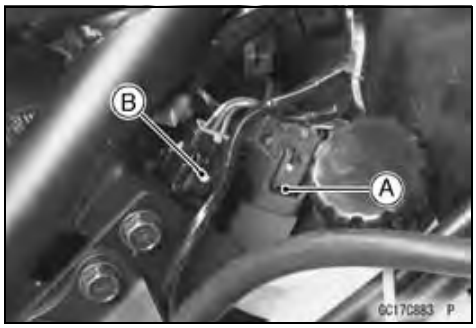
CAUTION

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

- Remove:
  Fuel Tank (see Fuel Tank Removal)
  Vacuum Hose [A]
  Fuel Injector Connectors [B]
  Subthrottle Valve Actuator Connector [C]

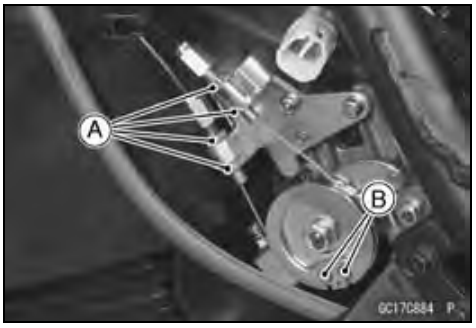


- Disconnect:
  Main Throttle Sensor Connector [A]
  Subthrottle Sensor Connector [B]

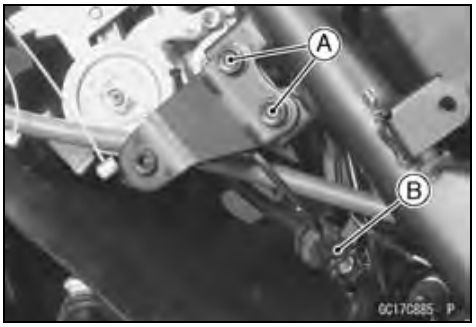


Throttle Body Assy

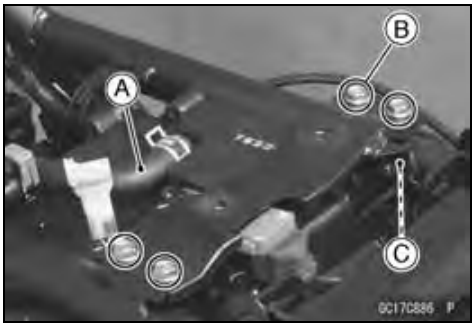
- Loosen the nuts [A], and remove the throttle cable lower ends [B].



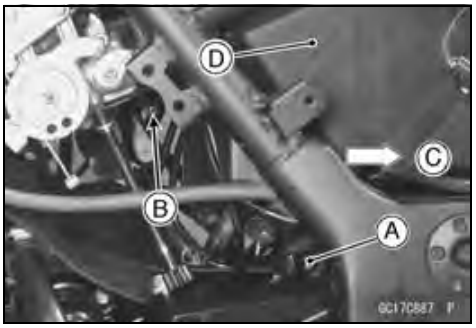
- Remove:
  Bolts [A]
  Idle Adjusting Cable [B] (from Bracket)



- Remove:
  Air Switching Valve Hose [A]
  Bracket Bolts [B]
  Right Air Cleaner Housing Mounting Bolt [C]

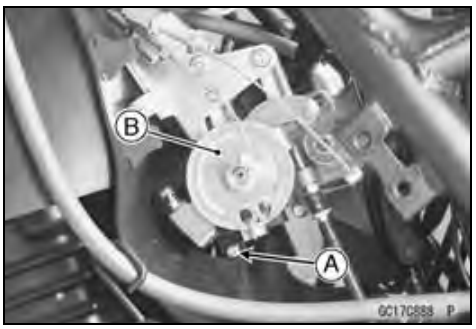


- Remove the left air cleaner housing mounting bolt [A].
- Loosen the air duct clamp screws [B].
- Move [C] the air cleaner housing [D] backward, and pull out the air ducts from the throttle body assy.



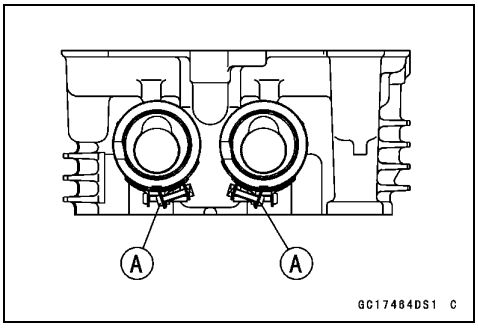
- Loosen the throttle body assy holder clamp screws [A], and pull out the throttle body assy [B] backward.
- Remove the throttle body assy to left side of motorcycle.
- After removing the throttle body assy, stuff pieces of lint-free, clean cloth into the throttle body assy holders.

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



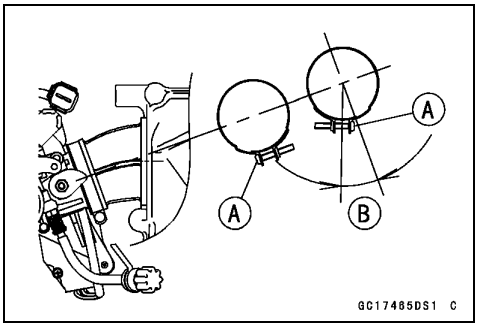
Throttle Body Assy

Throttle Body Assy Installation



- Install the throttle body assy holder clamp screws in the direction as shown in the figure.
  Screw Heads [A]
- Install the throttle body assy to the throttle body assy holders.
- Tighten:

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



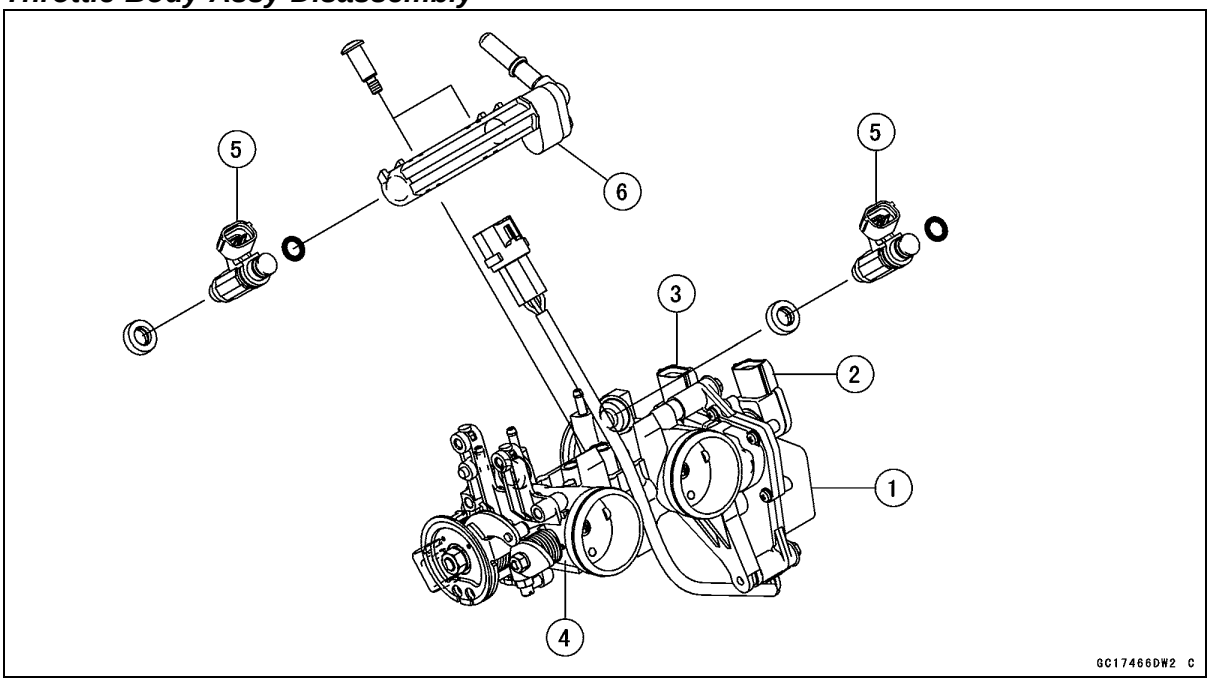
- Install the air duct clamp screws in the direction as shown in the figure.
  Screw Heads [A]
  About 21° [B]
- Install the air ducts to the throttle body assy.
- Tighten:

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

- Apply a thin coating of grease to the throttle cable lower ends.
- Fit the accelerator cable end and the decelerator cable end into the throttle pulley.
- Turn the throttle grip and make sure that the throttle valves move smoothly and return by spring force.
- Run the leads and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Adjust:
  Throttle Grip Free Play (see Throttle Control System Inspection in the Periodic Maintenance chapter)
  Idle Speed (see Idle Speed Adjustment in the Periodic Maintenance chapter)

Throttle Body Assy

Throttle Body Assy Disassembly



1. Subthrottle Valve Actuator
2. Subthrottle Sensor
3. Main Throttle Sensor
4. Throttle Body Assy
5. Fuel Injectors
6. Delivery Pipe Assy

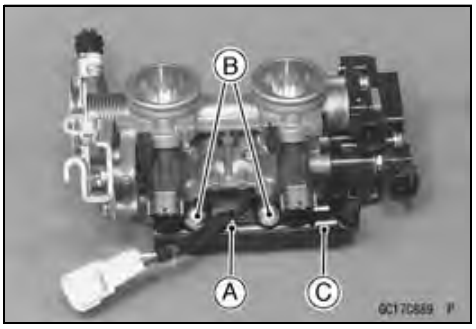
CAUTION

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

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

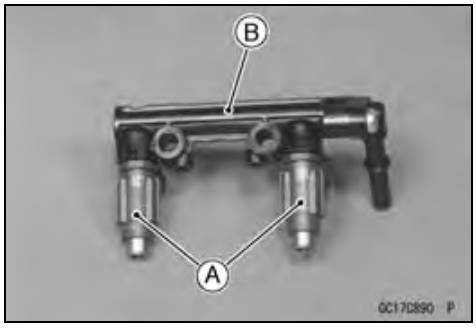
NOTE

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



Throttle Body Assy

● Pull out the injectors [A] from the delivery pipe assy [B].



NOTE

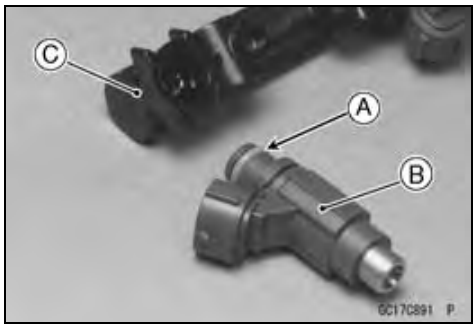
○*Do not damage the insertion portions of the injectors when they are pulled out from the delivery pipe assy.*

CAUTION

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

Throttle Body Assy Assembly

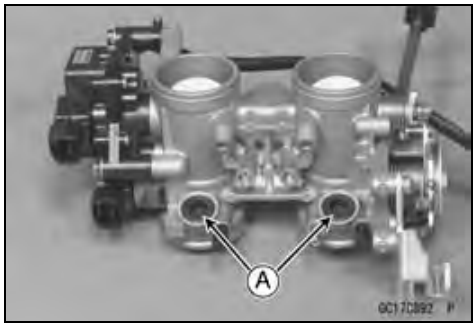
● Before assembling, blow away dirt or dust from the throttle body and delivery pipe by applying compressed air.
● Replace the O-rings [A] of each injector [B] with new ones.
● Apply engine oil to the new O-rings, insert them to the delivery pipe assy [C] and confirm whether the injectors turn smoothly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



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

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

● Bind the lead with band.
● Install the throttle body assy (see Throttle Body Assy Installation).



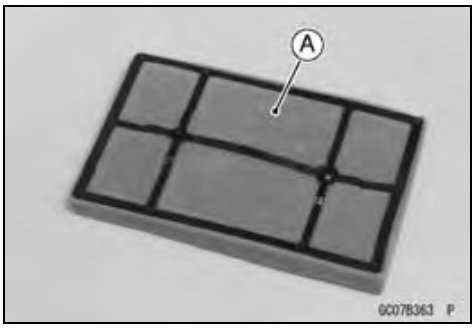
Air Cleaner

Air Cleaner Element Removal/Installation

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

Air Cleaner Element Inspection

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



Air Cleaner Oil Draining

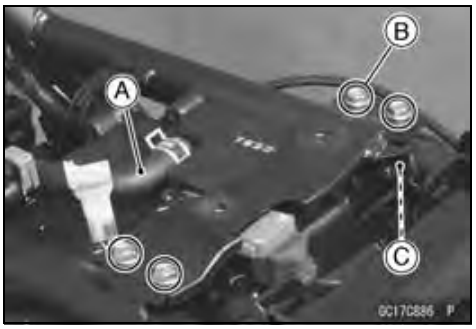
● Visually check the drain cap [A] if the water or oil accumulates.
★If any water or oil accumulates in the cap, remove the cap and drain it.

⚠ WARNING

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

Air Cleaner Housing Removal

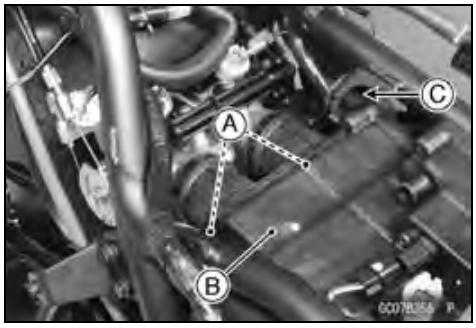
● Remove:
Rear Wheel (see Rear Wheel Removal in the Wheels/Tires chapter)
Fuel Tank (see Fuel Tank Removal)
Air Switching Valve Hose [A]
Bracket Bolts [B]
Right Air Cleaner Housing Mounting Bolt [C]
Rear Fender (see Flap and Rear Fender Removal in the Frame chapter)



● Remove:
Left Air Cleaner Housing Mounting Bolt [A]
Breather Hose [B]

Air Cleaner

● Loosen the air duct clamp screws [A].
● Remove the air cleaner housing [B], pulling out the duct portion [C] from the grommet.



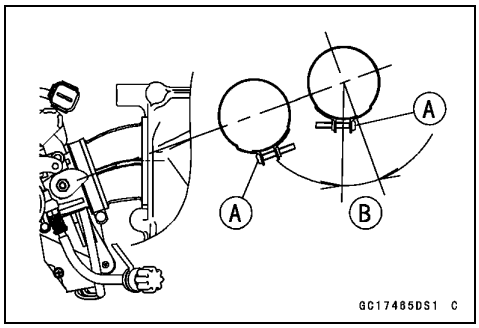
● After removing the air cleaner housing, stuff pieces of lint-free, clean cloth into the throttle body assy.

CAUTION

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

Air Cleaner Housing Installation

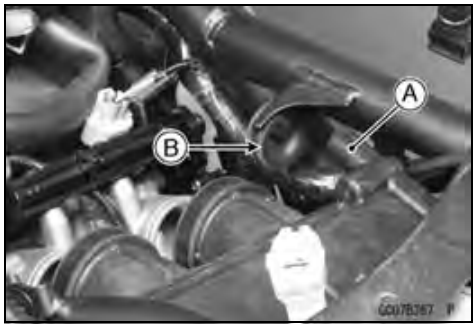
● Install is the reverse of removal.
○Install the air duct clamp screws in the direction as shown in the figure.
Screw Heads [A]
About 21° [B]



○Insert the duct portion [A] into the grommet [B].
○Tighten:

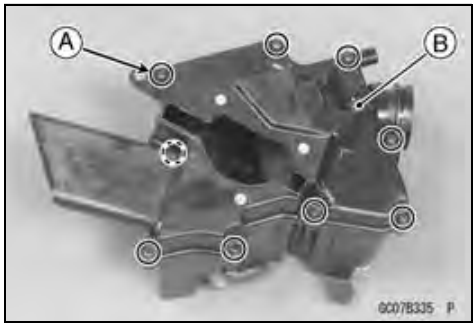
Torque - Air Duct Clamp Screws: 2.0 N·m (0.20 kgf·m, 18 in·lb)
Air Cleaner Housing Mounting Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

● Install the removed parts (see appropriate chapters).



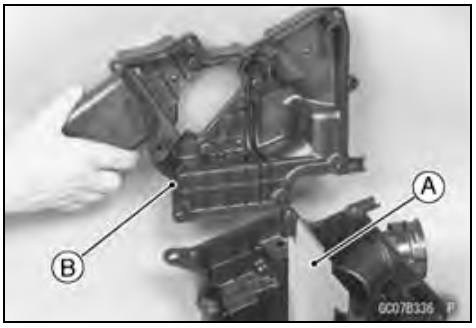
Air Cleaner Housing Disassembly

● Remove:
Air Cleaner Housing (see Air Cleaner Housing Removal)
Air Cleaner Element (see Air Cleaner Element Replacement in the Periodic Maintenance chapter)
Screws [A]
Right Cover [B]
Flame Arrester

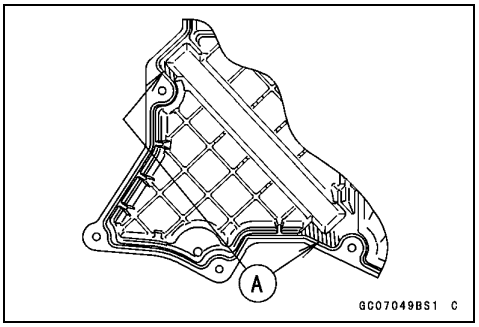


Air Cleaner

Air Cleaner Housing Assembly



- Install the flame arrester [A].
- Be sure the O-ring [B] is in position.



- Apply a adhesive cement to the slash portion [A] of the air cleaner housing.
- Install the right cover.
- Tighten:

Torque - Air Cleaner Housing Screws: 1.15 N·m (0.12 kgf·m, 10 in·lb)

Fuel Tank

Fuel Tank Removal

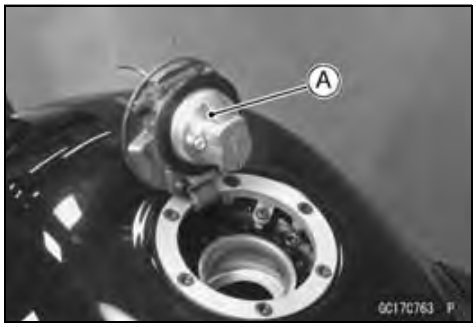
⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch OFF and disconnect the battery (–) terminal.
To avoid fire, do not remove the fuel tank when the engine is still hot. Wait until it cools down.
To make fuel spillage minimum, draw the fuel out from the fuel 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:
  Lower Fairings (see Lower Fairing Removal in the Frame chapter)
  Front Seat (see Front Seat Removal in the Frame chapter)
  Fuel Tank Bolts [A]

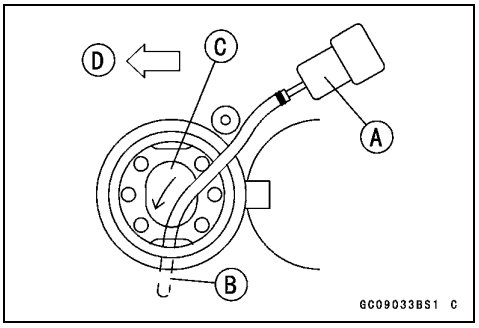
- Pull off the fuel tank drain hose [A] from the fuel tank.

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



Fuel Tank

● Draw the fuel out from the fuel tank with a commercially available pump [A].
○Use a soft plastic hose [B] as a pump inlet hose in order to insert the hose smoothly.
○Put the hose through the fill opening [C] into the tank and draw the fuel out.
Front [D]

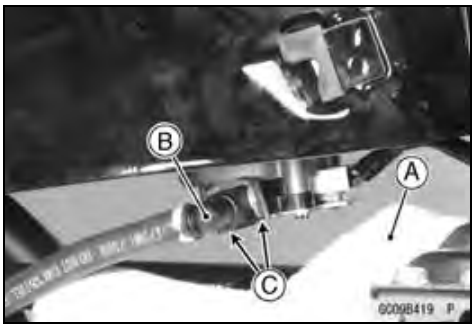


⚠ WARNING

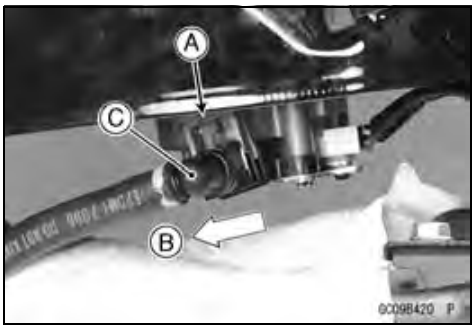
The fuel could not be removed completely from the fuel tank. Be careful for remained fuel spillage.

● Disconnect the fuel pump lead connector [A].

● Be sure to place a piece of cloth [A] around the fuel hose joint [B].
● Push the joint lock claws [C].



● Pull the joint lock [A] as shown in the figure.
● Pull [B] the fuel hose joint [C] out of the fuel supply pipe.



⚠ WARNING

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

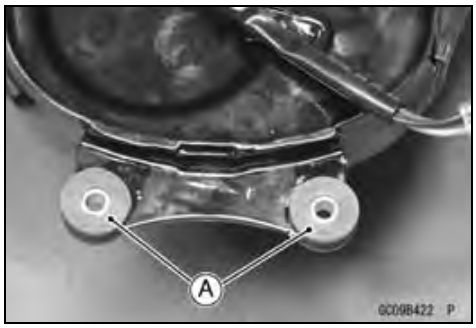
● Close the fuel tank cap.
● Remove the fuel tank, and place a it on a flat surface.

Fuel Tank

Fuel Tank Installation

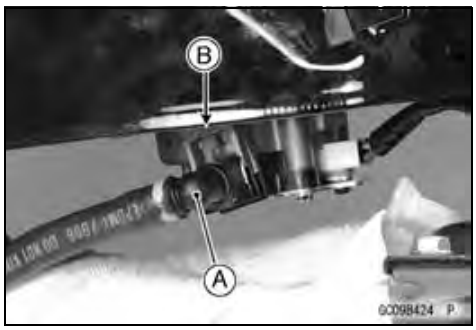
- Note the above WARNING (see Fuel Tank Removal).
- Run the hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Check that the dampers [A] are in place on the frame and the fuel tank.

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



- Pull the joint lock [A] as shown in the figure.

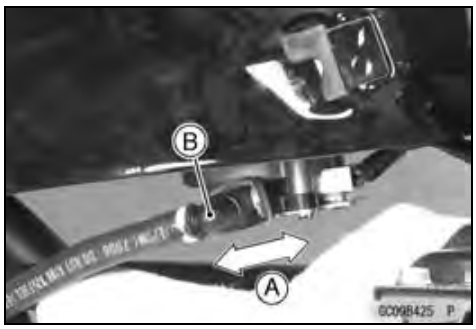
- Insert the fuel hose joint [A] straight onto the fuel supply pipe until the hose joint clicks.
- Push the joint lock [B] until the hose joint clicks.



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

⚠ WARNING

Make sure the hose joint is installed correctly on the supply pipe or the fuel could leak.

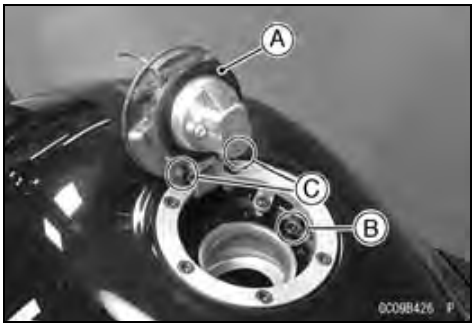


★If it comes off, reinstall the hose joint.

- Connect the fuel pump lead connector and the battery (–) terminal (see Battery Installation in the Electrical System chapter).

Fuel Tank

Fuel Tank Inspection



- Open the tank cap.
- Visually inspect the gasket [A] on the tank cap for any damage.

★Replace the gasket if it is damaged.

- Check to see if the water drain pipe [B] in the tank are not clogged. Check the tank cap breather also.

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

CAUTION

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

Fuel Tank Cleaning

⚠ WARNING

Clean the tank in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area. Because of the danger or highly flammable liquids, do not use gasoline or low-flash point solvents to clean the tank.

- Remove:
  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)

Cooling System

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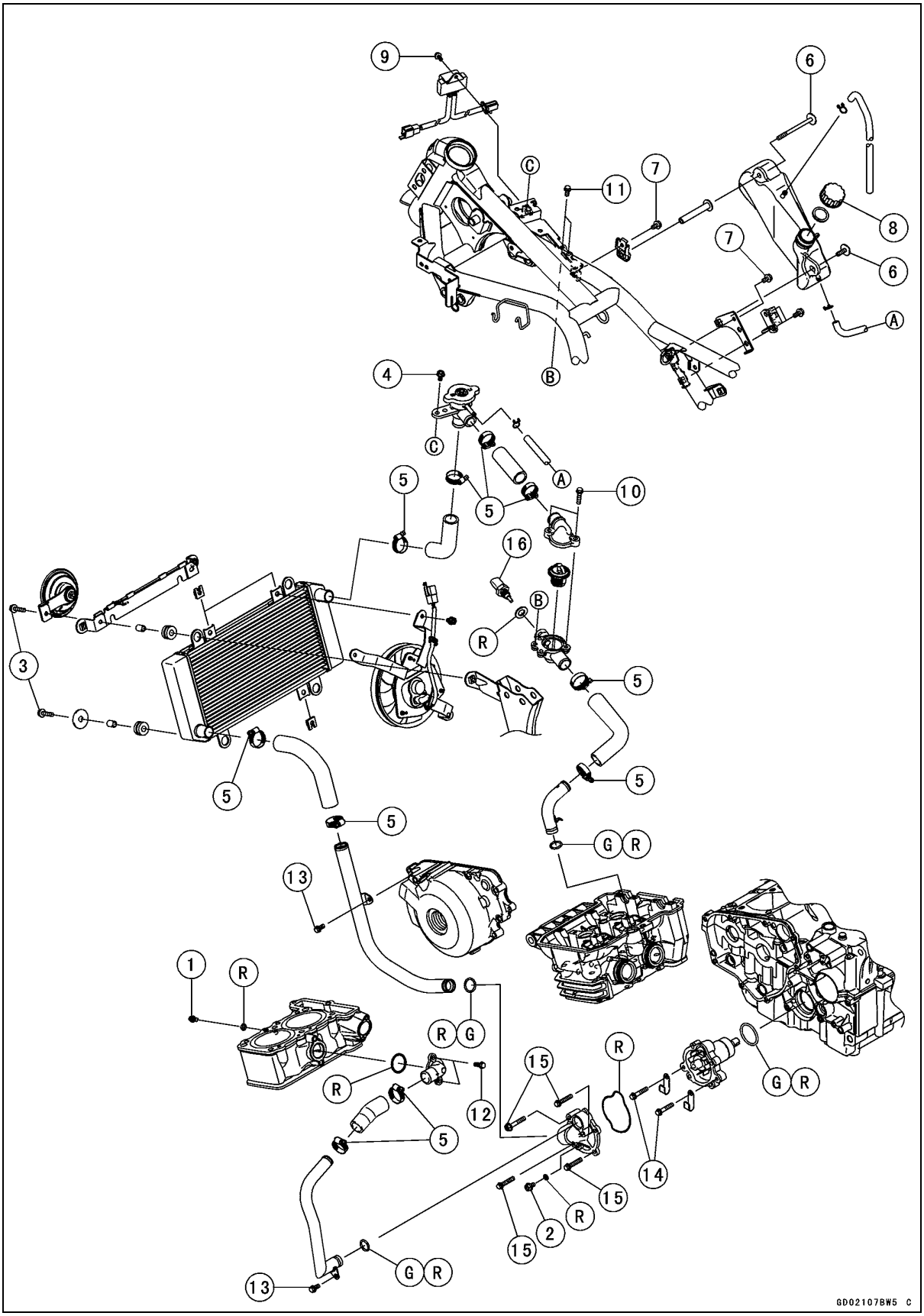
Exploded View

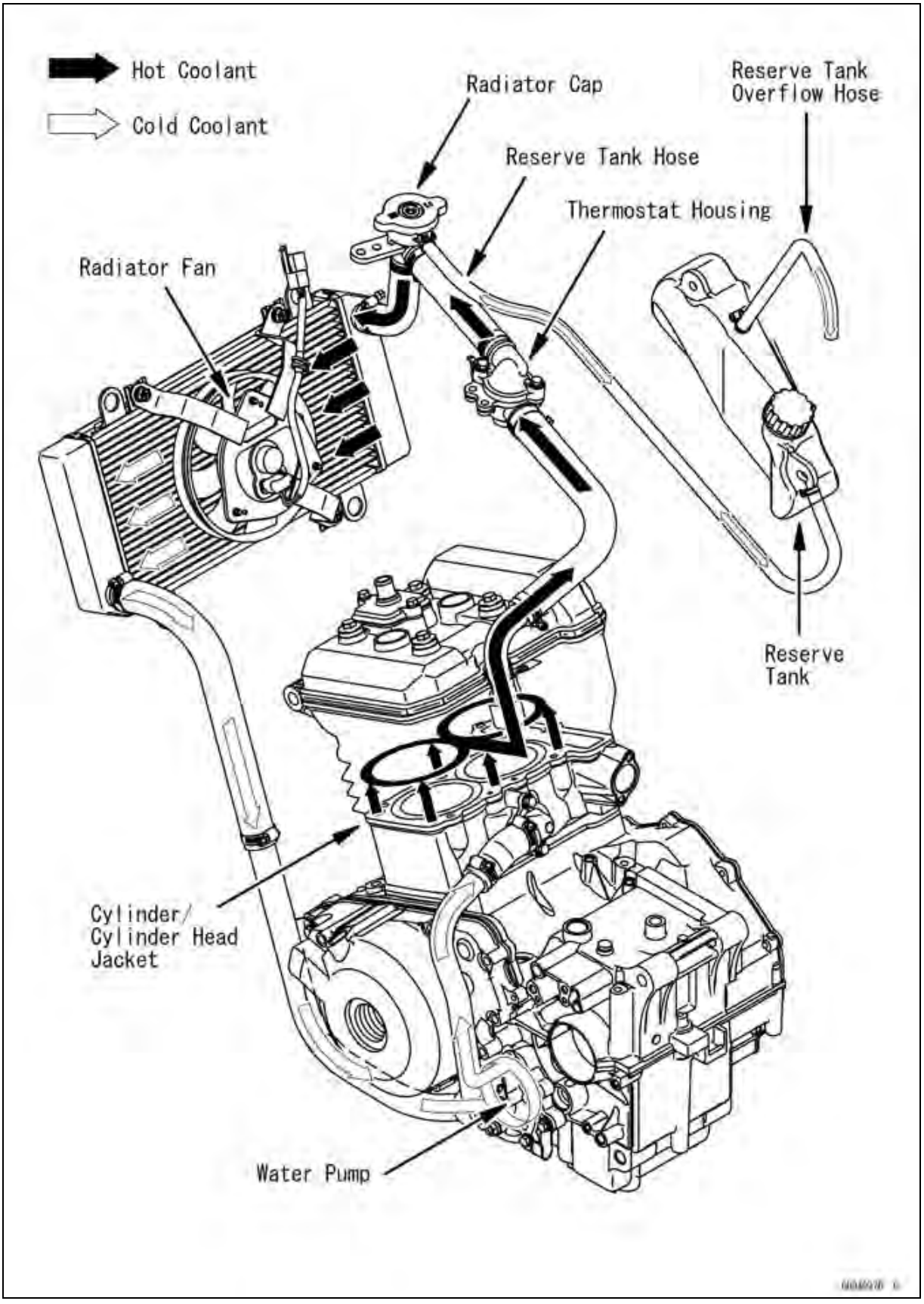


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Coolant Drain Bolt (Cylinder)	5.9	0.60	52 in·lb	
2	Coolant Drain Bolt (Water Pump)	9.8	1.0	87 in·lb	
3	Radiator Bolts	9.8	1.0	87 in·lb	
4	Radiator Cap Bracket Bolt	9.8	1.0	87 in·lb	
5	Radiator (Water) Hose Clamp Screws	1.5	0.15	13 in·lb	
6	Reserve Tank Bolts	9.8	1.0	87 in·lb	
7	Reserve Tank Bracket Bolts	9.8	1.0	87 in·lb	
8	Reserve Tank Cap	–	–	–	Hand-Tighten
9	Resistor Bolt	7.8	0.80	69 in·lb	
10	Thermostat Cover Bolts	9.8	1.0	87 in·lb	
11	Thermostat Housing Mounting Bolts	9.8	1.0	87 in·lb	
12	Water Hose Fitting Bolts	9.8	1.0	87 in·lb	
13	Water Pipe Bolts	9.8	1.0	87 in·lb	
14	Water Pump Bolts	9.8	1.0	87 in·lb	
15	Water Pump Cover Bolts	9.8	1.0	87 in·lb	
16	Water Temperature Sensor	25	2.5	18	

G: Apply grease.
R: Replacement Parts

Coolant Flow Chart



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 63.5 ~ 66.5°C (146 ~ 152°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 63.5 ~ 66.5°C (146 ~ 152°F), the thermostat opens and the coolant flows.

When the coolant temperature goes up beyond 103°C (217°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 98°C (208°F), the fan relay opens and the radiator fan stops.

In this way, this system controls the engine temperature within narrow limits where the engine operates most efficiently even if the engine load varies.

The system is pressurized by the radiator cap to suppress boiling and the resultant air bubbles which can cause engine overheating. As the engine warms up, the coolant in the radiator and the water jacket expands. The excess coolant flows through the radiator cap and hose to the reserve tank to be stored there temporarily. Conversely, as the engine cools down, the coolant in the radiator and the water jacket contracts, and the stored coolant flows back to the radiator from the reserve tank.

The radiator cap has two valves. One is a pressure valve which holds the pressure in the system when the engine is running. When the pressure exceeds 93 ~ 123 kPa (0.95 ~ 1.25 kgf/cm^2, 13 ~ 18 psi), the pressure valve opens and releases the pressure to the reserve tank. As soon as pressure escapes, the valve closes, and keeps the pressure at 93 ~ 123 kPa (0.95 ~ 1.25 kgf/cm^2, 13 ~ 18 psi). When the engine cools down, another small valve (vacuum valve) in the cap opens. As the coolant cools, the coolant contracts to form a vacuum in the system. The vacuum valve opens and allows the coolant from the reserve tank to enter the radiator.

4-6 COOLING SYSTEM

Specifications

Item	Standard
Coolant Provided when Shipping	
Type (Recommended)	Permanent type of antifreeze (soft water and ethylene glycol plus corrosion and rust inhibitor chemicals for aluminum engines and radiators)
Color	Green
Mixed Ratio	Soft water 50%, coolant 50%
Freezing Point	−35°C (−31°F)
Total Amount	1.5 L (1.6 US qt) (reserve tank full level, including radiator and engine)
Radiator Cap	
Relief Pressure	93 ~ 123 kPa (0.95 ~ 1.25 kgf/cm², 13 ~ 18 psi)
Thermostat	
Valve Opening Temperature	63.5 ~ 66.5°C (146 ~ 152°F)
Valve Full Opening Lift	6 mm (0.24 in.) or more at 80°C (176°F)

Coolant

Coolant Deterioration Inspection

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

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

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

Coolant Level Inspection

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

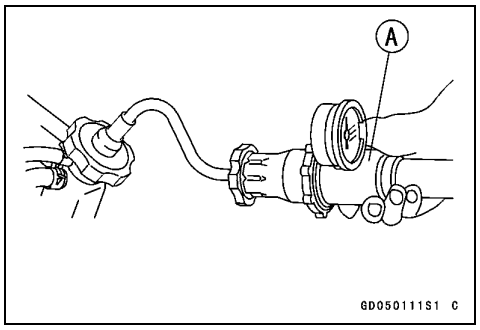
Coolant Draining

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

Coolant Filling

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

Pressure Testing



- Remove the right lower fairing (see Lower Fairing Removal in the Frame chapter).
- Remove the radiator cap, and install a cooling system pressure tester [A] on the filler neck.

NOTE

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

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

CAUTION

During pressure testing, do not exceed the pressure for which the system is designed. The maximum pressure is 123 kPa (1.25 kgf/cm², 18 psi).

- Watch the gauge for at least 6 seconds.

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

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

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

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.

CAUTION

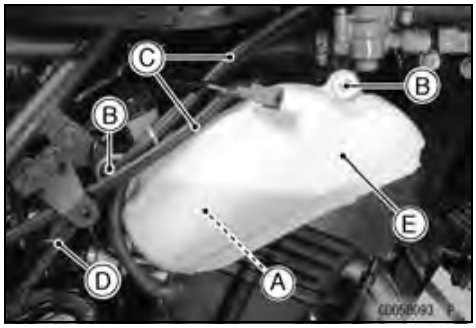
Do not use a flushing compound which is harmful to the aluminum engine and radiator. Carefully follow the instructions supplied by the manufacturer of the cleaning product.

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

Coolant Reserve Tank Removal

- Remove:

  Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Coolant [A] (from Reserve Tank) (Drain, see Coolant Change in the Periodic Maintenance chapter)
  Bolts [B]
  Hoses [C]
  Clutch Cable [D] (see Clutch Cable Removal in the Clutch chapter)
  Coolant Reserve Tank [E]



Coolant Reserve Tank Installation

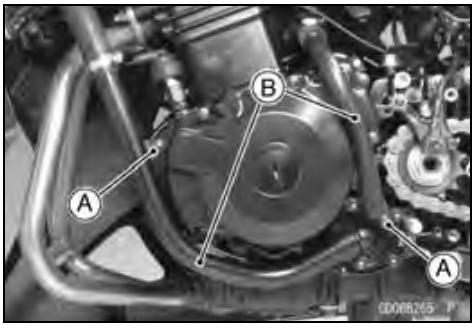
- Installation is the reverse of removal.
- Run the cable and hoses correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Install the removed parts (see appropriate chapters).

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

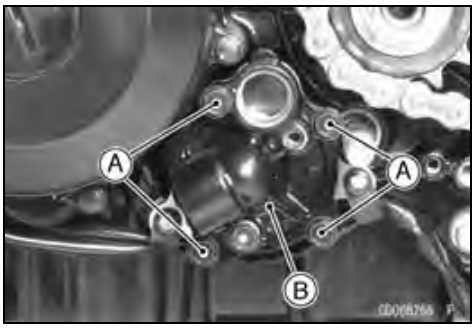
Water Pump

Water Pump Cover Removal

- Remove:
  Coolant (Drain, see Coolant Change in the Periodic Maintenance chapter)
  Left Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Engine Sprocket Cover (see Engine Sprocket Removal in the Final Drive chapter)
  Bolts [A] and Water Pipes [B]



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

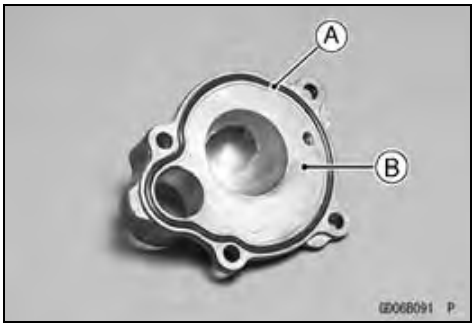


Water Pump Cover Installation

- Apply grease to a new O-ring [A].
- Fit the O-ring into the groove of the water pump cover [B].
- Install the water pump cover and water pipes, and tighten the bolts.

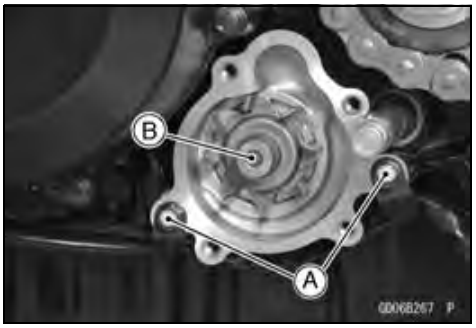
Torque - Water Pump Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)
Water Pipe Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Install the removed parts (see appropriate chapters).



Water Pump Removal

- Remove:
  Water Pump Cover (see Water Pump Cover Removal)
  Water Pump Bolts [A]
  Water Pump [B]



Water Pump Installation

- Apply grease to a new O-ring [A].
- Install the water pump aligning the slot [B] of the water pump shaft with the oil pump shaft.
- Tighten:

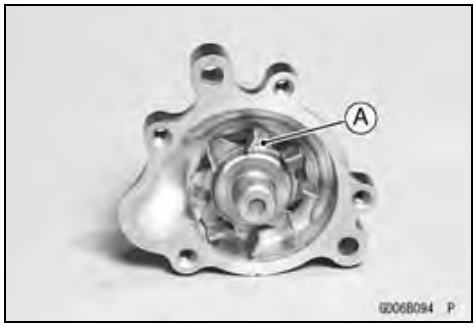
Torque - Water Pump Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

Water Pump

Water Pump Impeller Inspection

- Remove the water pump (see Water Pump Removal).
- Visually inspect the impeller [A].

★If the surface is corroded or if the blades are damaged, replace the water pump unit.



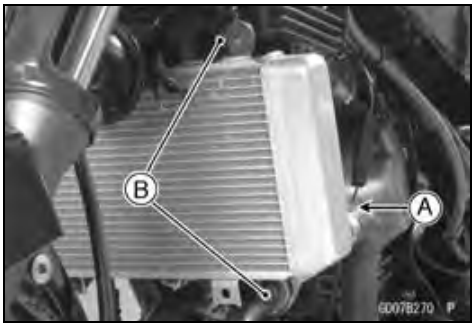
Radiator

Radiator and Radiator Fan Removal

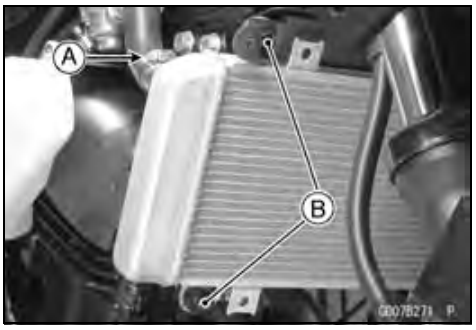
⚠ WARNING

The radiator fan is connected directly to the battery. The radiator fan may start even if the ignition switch is off. NEVER TOUCH THE RADIATOR FAN UNTIL THE RADIATOR FAN MOTOR LEAD CONNECTOR IS DISCONNECTED. TOUCHING THE FAN BEFORE THE CONNECTOR IS DISCONNECTED COULD CAUSE INJURY FROM THE FAN BLADES.

● Remove:
Inner Fairing (see Inner Fairing Removal in the Frame chapter)
Coolant (Drain, see Coolant Change in the Periodic Maintenance chapter)
Resistor (see Resistor Inspection in the Electrical System chapter)
Radiator Hose Clamp Screw [A] (Loosen)
Radiator Bolts [B]



● Remove:
Radiator Hose Clamp Screw [A] (Loosen)
Radiator Bolts [B]

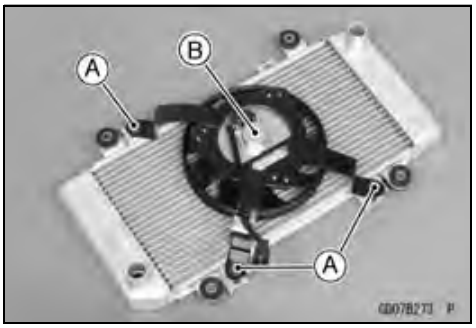


● Remove:
Radiator Fan Motor Lead Connector [A] (Disconnect)
Radiator [B]

CAUTION

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

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



Radiator

Radiator and Radiator Fan Installation

- Installation is the reverse of removal.
- Run the leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
- Cover the heat insulation rubber plate on the radiator (see Engine Installation in the Engine Removal/Installation chapter).
- Install the removed parts (see appropriate chapters).

Torque - Radiator Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)
Radiator (Water) Hose Clamp Screws: 1.5 N·m (0.15 kgf·m, 13 in·lb)
Resistor Bolt: 7.8 N·m (0.80 kgf·m, 69 in·lb)

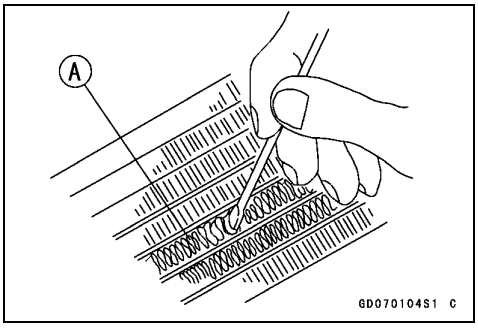
Radiator Inspection

- Check the radiator core.

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

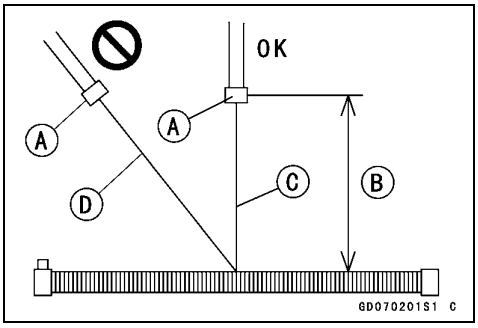
★If the corrugated fins [A] are deformed, carefully straighten them.

★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.



CAUTION

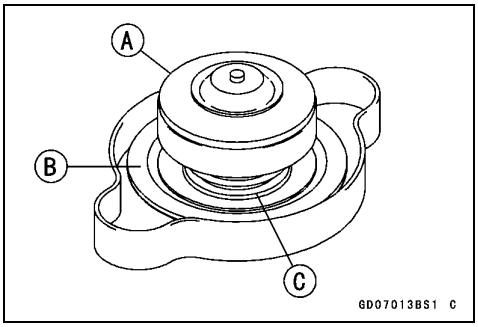
When cleaning the radiator with steam cleaner, be careful of the following to prevent radiator damage:
Keep the steam gun [A] away more than 0.5 m (1.6 ft) [B] from the radiator core.
Hold the steam gun perpendicular [C] (not oblique [D]) to the core surface.
Run the steam gun, following the core fin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



Radiator Cap Inspection

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

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

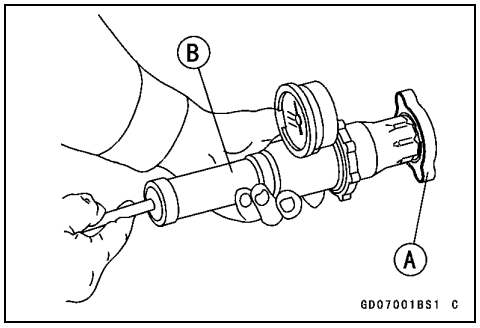


Radiator

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

NOTE

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



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

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

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

Radiator Filler Neck Inspection

● Remove:
Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
Radiator Cap

● Check the radiator filler neck for signs of damage.
● Check the condition of the top and bottom sealing seats [A] in the filler neck. They must be smooth and clean for the radiator cap to function properly.

Thermostat

Thermostat Removal

- Remove:
  Coolant (Drain, see Coolant Change in the Periodic Maintenance chapter)
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Thermostat Cover Bolts [A]

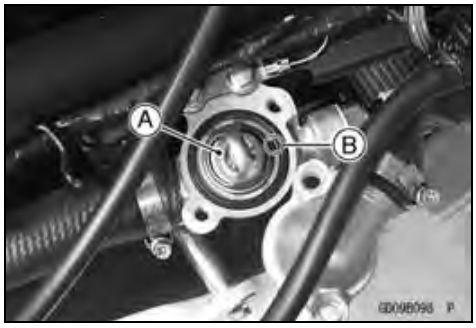
- Move the thermostat cover [A] outwards and remove the thermostat [B].

Thermostat Installation

- Install the thermostat [A] in the housing so that the air bleeder hole [B] as shown in the figure.
- Tighten:

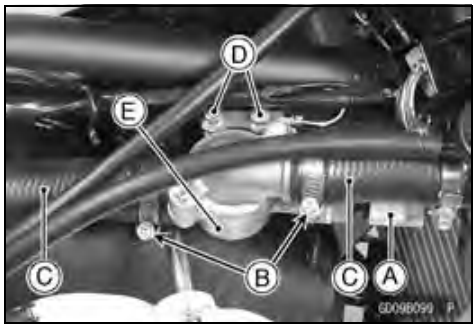
Torque - Thermostat Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Install the removed parts (see appropriate chapters).



Thermostat Housing Removal

- Remove:
  Coolant (Drain, see Coolant Change in the Periodic Maintenance chapter)
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Water Temperature Sensor Connector [A] (Disconnect)
  Hose Clamp Screws [B] (Loosen)
  Hoses [C]
  Bolts [D]
  Thermostat Housing [E]



Thermostat Housing Installation

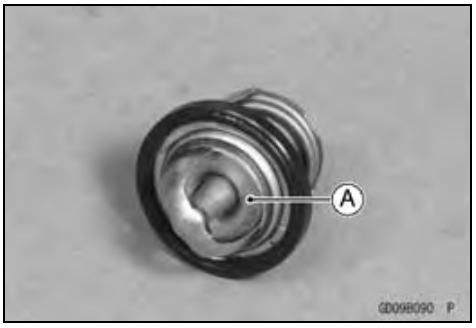
- Be sure to install the ground lead on the thermostat housing mounting bolt.
- Tighten:

Torque - Thermostat Housing Mounting Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)
Radiator (Water) Hose Clamp Screws: 1.5 N·m (0.15 kgf·m, 13 in·lb)

- Install the removed parts (see appropriate chapters).

Thermostat

Thermostat Inspection



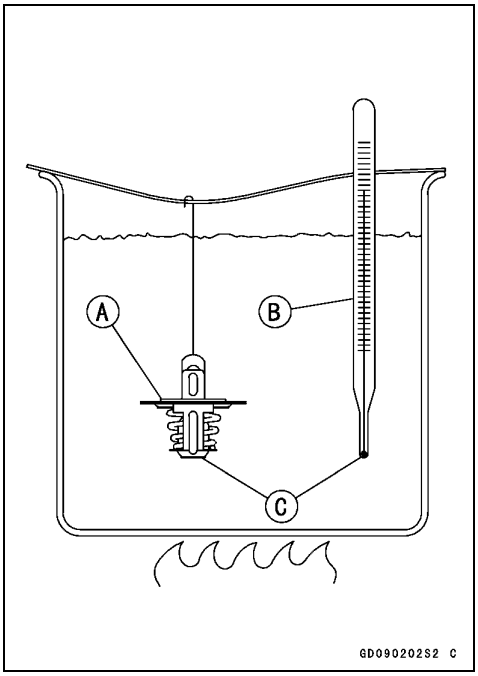
● Remove the thermostat (see Thermostat Removal), and inspect the thermostat valve [A] at room temperature.

★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
63.5 ~ 66.5°C (146 ~ 152°F)

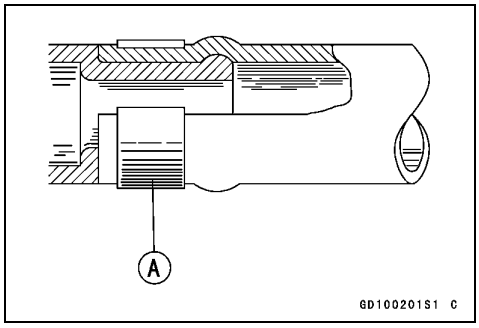
Hoses and Pipes

Hose Installation

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

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

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



Hose Inspection

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

Water Temperature Sensor

CAUTION
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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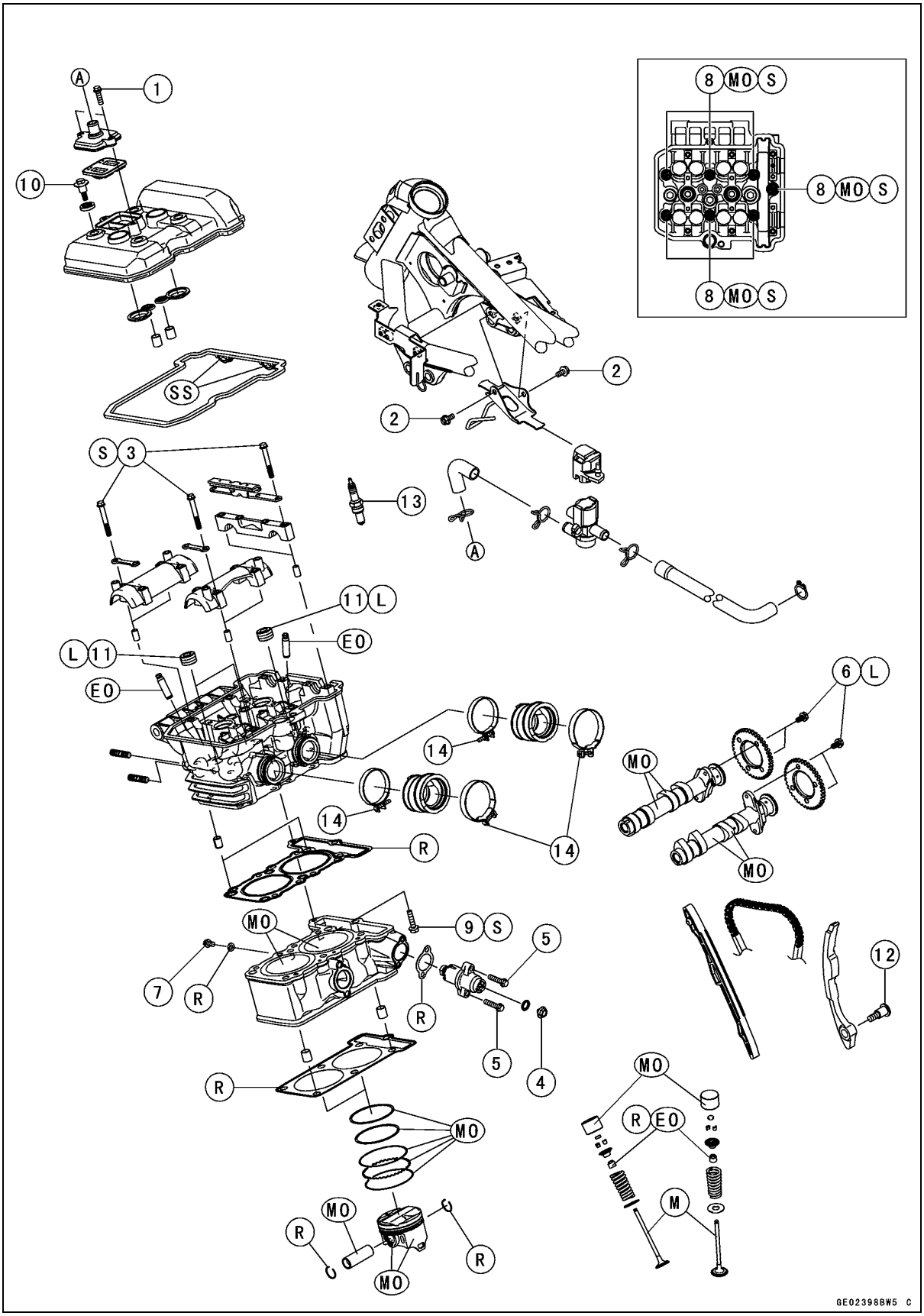
Exploded View

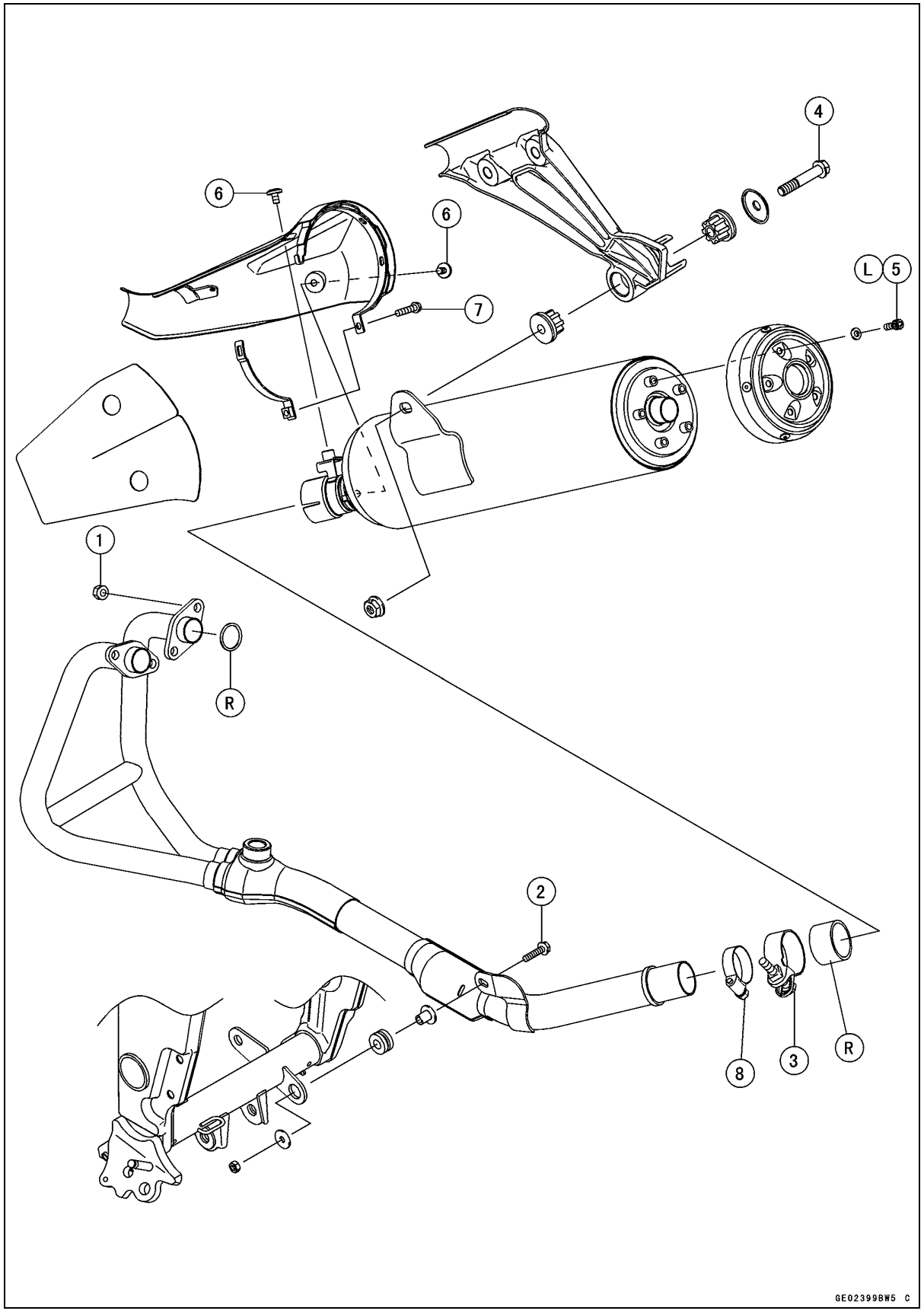


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Air Suction Valve Cover Bolts	9.8	1.0	87 in·lb	
2	Air Switching Valve Bracket Bolts	9.8	1.0	87 in·lb	
3	Camshaft Cap Bolts	12	1.2	106 in·lb	S
4	Camshaft Chain Tensioner Cap Bolt	5.0	0.51	44 in·lb	
5	Camshaft Chain Tensioner Mounting Bolts	9.8	1.0	87 in·lb	
6	Camshaft Sprocket Bolts	15	1.5	11	L
7	Coolant Drain Bolt (Cylinder)	5.9	0.60	52 in·lb	
8	Cylinder Head Bolts (M8)	31.4	3.2	23.2	MO, S
9	Cylinder Head Bolt (M6)	12	1.2	106 in·lb	S
10	Cylinder Head Cover Bolts	9.8	1.0	87 in·lb	
11	Cylinder Head Jacket Plugs	20	2.0	15	L
12	Rear Camshaft Chain Guide Bolt	17	1.7	13	
13	Spark Plugs	13	1.3	115 in·lb	
14	Throttle Body Assy Holder Clamp Screws	2.0	0.20	18 in·lb	

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

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Exhaust Pipe Holder Nuts	12	1.2	106 in·lb	
2	Exhaust Pipe Mounting Bolt	9.8	1.0	87 in·lb	
3	Muffler Body Clamp Bolt	17	1.7	13	
4	Muffler Body Mounting Bolt	30	3.1	22	
5	Muffler Body Rear Cover Bolts	9.8	1.0	87 in·lb	L
6	Muffler Cover Bolts	9.8	1.0	87 in·lb	
7	Muffler Cover Clamp Bolt	9.8	1.0	87 in·lb	
8	Muffler Cover Clamp Screw	6.9	0.70	61 in·lb	

L: Apply a non-permanent locking agent.
R: Replacement Parts

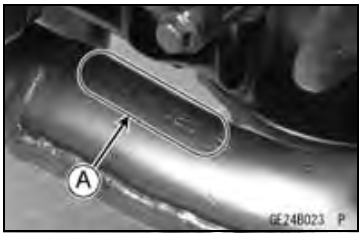
Exhaust System

Exhaust System

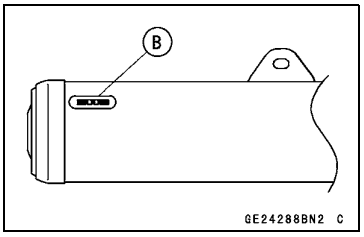
MANIFOLD	MUFFLER BODY	SPECIFICATION	MARKETING CODE
Honeycomb Type Catalyst P/No. 39178-0085 Mark : KHI M 120	Honeycomb Type Catalyst P/No. 18087-0163 Mark : KHI K 533	WVTA (FULL N) GB WVTA (FULL N)	EX250K8F EX250K8F

GE24242B F

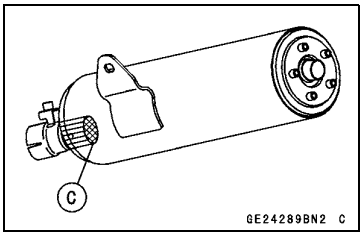
Manifold Mark Position [A]



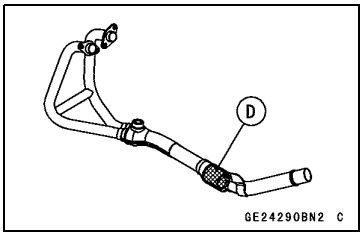
Muffler Body Mark Position [B]



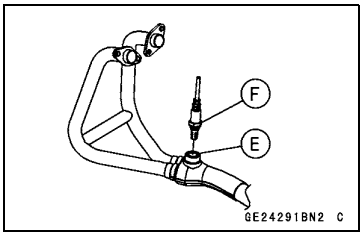
Honeycomb Type Catalyst Position [C]



Honeycomb Type Catalyst Position [D]



Manifold with Hole [E] for Oxygen Sensor [F].



Specifications

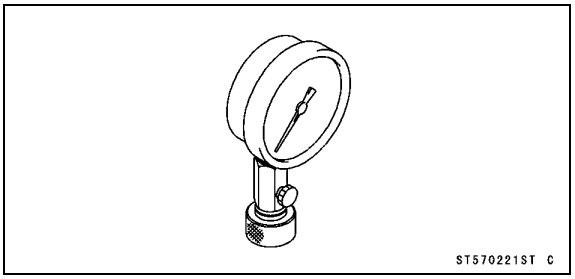
Item	Standard	Service Limit
Camshafts		
Cam Height:		
Exhaust	32.843 ~ 32.957 mm (1.2930 ~ 1.2975 in.)	32.74 mm (1.289 in.)
Inlet	33.843 ~ 33.957 mm (1.3324 ~ 1.3369 in.)	33.74 mm (1.328 in.)
Camshaft Journal, Camshaft Cap Clearance	0.028 ~ 0.071 mm (0.0011 ~ 0.0028 in.)	0.16 mm (0.0063 in.)
Camshaft Journal Diameter	23.950 ~ 23.972 mm (0.9429 ~ 0.9438 in.)	23.92 mm (0.942 in.)
Camshaft Bearing Inside Diameter	24.000 ~ 24.021 mm (0.9449 ~ 0.9457 in.)	24.08 mm (0.948 in.)
Camshaft Runout	TIR 0.02 mm (0.0008 in.) or less	TIR 0.1 mm (0.004 in.)
Cylinder Head		
Cylinder Compression	(Usable Range) 1 050 ~ 1 500 kPa (10.7 ~ 15.3 kgf/cm², 152 ~ 218 psi) at 500 r/min (rpm)	– – –
Cylinder Head Warp	– – –	0.05 mm (0.002 in.)
Valves		
Valve Clearance:		
Exhaust	0.22 ~ 0.29 mm (0.0087 ~ 0.0114 in.)	– – –
Inlet	0.15 ~ 0.24 mm (0.0059 ~ 0.0094 in.)	– – –
Valve Head Thickness:		
Exhaust	0.8 mm (0.032 in.)	0.5 mm (0.020 in.)
Inlet	0.5 mm (0.020 in.)	0.3 mm (0.012 in.)
Valve Stem Bend	TIR 0.01 mm (0.0004 in.) or less	TIR 0.05 mm (0.002 in.)
Valve Stem Diameter:		
Exhaust	4.455 ~ 4.470 mm (0.1754 ~ 0.1760 in.)	4.44 mm (0.175 in.)
Inlet	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.)
Inlet	4.500 ~ 4.512 mm (0.1772 ~ 0.1776 in.)	4.58 mm (0.180 in.)
Valve/Valve Guide Clearance (Wobble Method):		
Exhaust	0.07 ~ 0.12 mm (0.0028 ~ 0.0047 in.)	0.27 mm (0.011 in.)
Inlet	0.02 ~ 0.08 mm (0.0008 ~ 0.0032 in.)	0.23 mm (0.010 in.)
Valve Seat Cutting Angle	32°, 45°, 67.5°	– – –
Valve Seating Surface:		
Width:		
Exhaust	0.5 ~ 1.0 mm (0.0197 ~ 0.0394 in.)	– – –
Inlet	0.5 ~ 1.0 mm (0.0197 ~ 0.0394 in.)	– – –
Outside Diameter:		
Exhaust	19.3 ~ 19.5 mm (0.7598 ~ 0.7677 in.)	– – –
Inlet	21.9 ~ 22.1 mm (0.8622 ~ 0.8701 in.)	– – –
Valve Spring Free Length:		
Exhaust	39.5 mm (1.555 in.)	38.0 mm (1.50 in.)
Inlet	39.5 mm (1.555 in.)	38.0 mm (1.50 in.)

Specifications

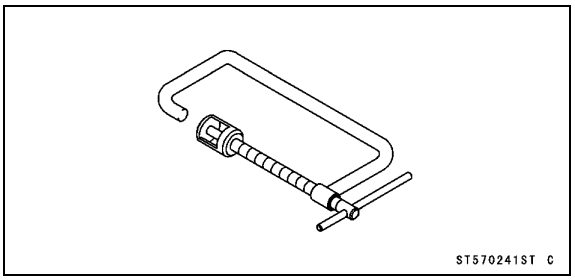
Item	Standard	Service Limit
Cylinder, Pistons		
Cylinder Inside Diameter	62.000 ~ 62.012 mm (2.4409 ~ 2.4414 in.)	62.10 mm (2.4449 in.)
Piston Diameter	61.942 ~ 61.957 mm (2.4387 ~ 2.4392 in.)	61.79 mm (2.4327 in.)
Piston/Cylinder Clearance	0.043 ~ 0.070 mm (0.0017 ~ 0.0028 in.)	– – –
Oversize Pistons and Rings	+0.5 mm (0.020 in.)	– – –
Piston Ring/Groove Clearance:		
Top	0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in.)	0.17 mm (0.0067 in.)
Second	0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in.)	0.16 mm (0.0063 in.)
Piston Ring Groove Width:		
Top	0.82 ~ 0.84 mm (0.0323 ~ 0.0331 in.)	0.92 mm (0.0362 in.)
Second	0.81 ~ 0.83 mm (0.0319 ~ 0.0327 in.)	0.91 mm (0.0358 in.)
Piston Ring Thickness:		
Top	0.77 ~ 0.79 mm (0.0303 ~ 0.0311 in.)	0.70 mm (0.028 in.)
Second	0.77 ~ 0.79 mm (0.0303 ~ 0.0311 in.)	0.70 mm (0.028 in.)
Piston Ring End Gap:		
Top	0.15 ~ 0.30 mm (0.0059 ~ 0.0118 in.)	0.6 mm (0.024 in.)
Second	0.40 ~ 0.55 mm (0.0157 ~ 0.0217 in.)	0.9 mm (0.035 in.)
Oil	0.20 ~ 0.80 mm (0.0079 ~ 0.0315 in.)	1.1 mm (0.043 in.)

Special Tools and Sealant

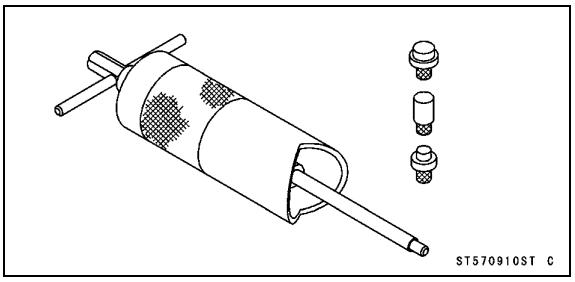
Compression Gauge, 20 kgf/cm²:
57001-221



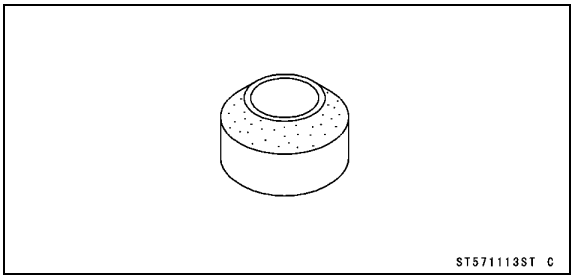
Valve Spring Compressor Assembly:
57001-241



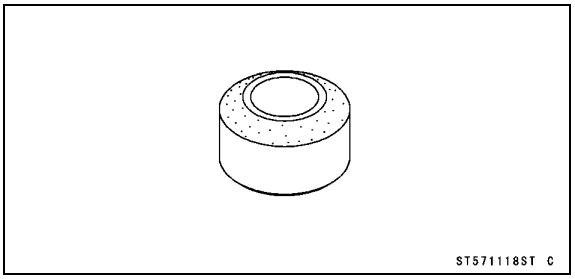
Piston Pin Puller Assembly:
57001-910



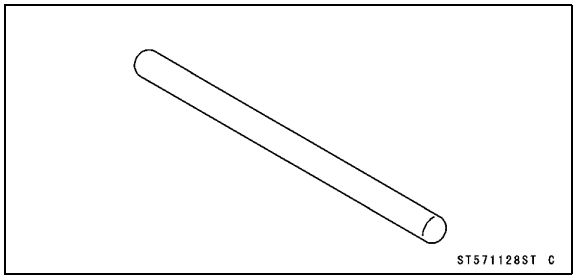
Valve Seat Cutter, 45° - ϕ24.5:
57001-1113



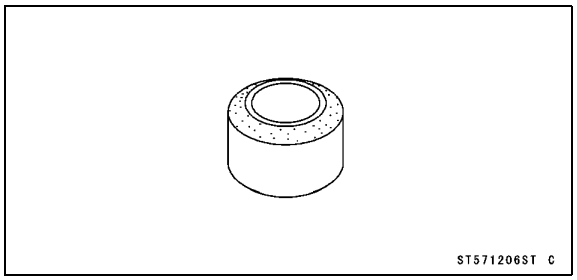
Valve Seat Cutter, 32° - ϕ25:
57001-1118



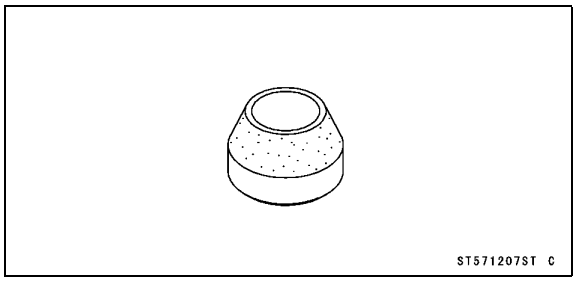
Valve Seat Cutter Holder Bar:
57001-1128



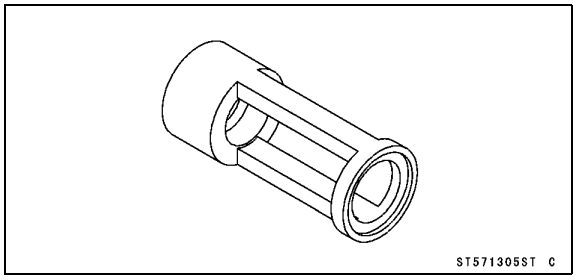
Valve Seat Cutter, 32° - ϕ22:
57001-1206



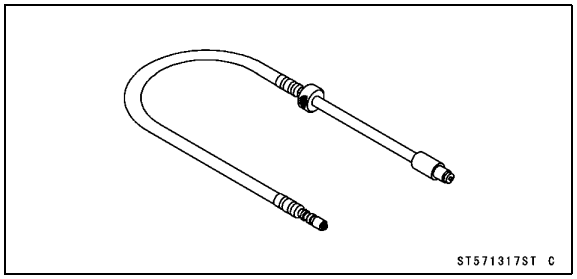
Valve Seat Cutter, 67.5° - ϕ22:
57001-1207



Valve Spring Compressor Adapter, ϕ16:
57001-1305

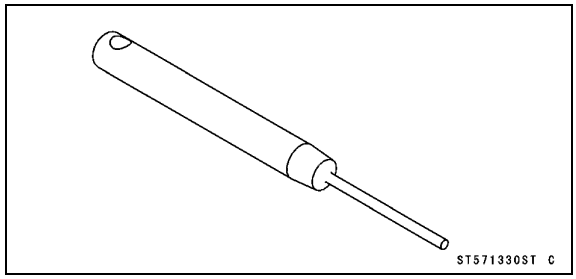


Compression Gauge Adapter, M10 × 1.0:
57001-1317

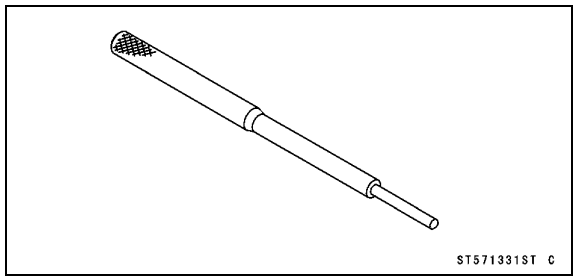


Special Tools and Sealant

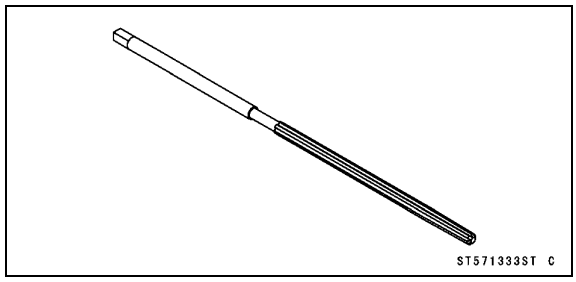
Valve Seat Cutter Holder, ϕ4.5:
57001-1330



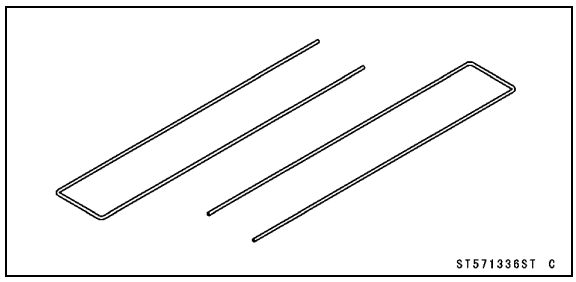
Valve Guide Arbor, ϕ4.5:
57001-1331



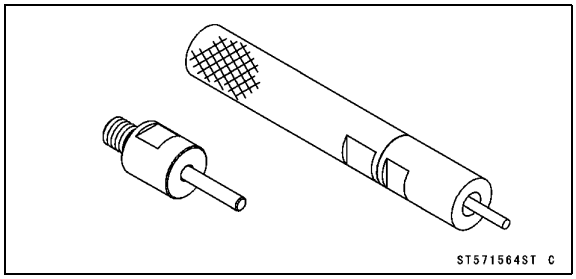
Valve Guide Reamer, ϕ4.5:
57001-1333



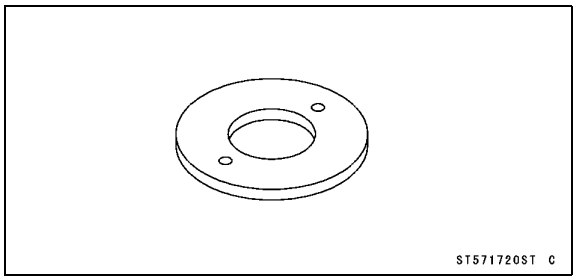
Piston Base, ϕ2.3:
57001-1336



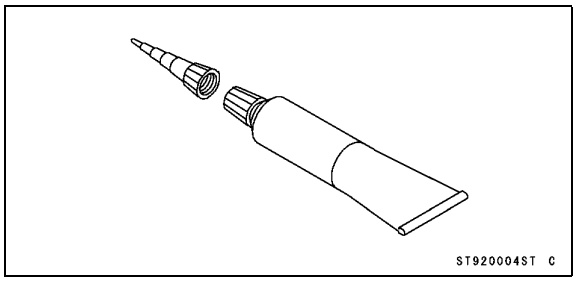
Valve Guide Driver:
57001-1564



Washer:
57001-1720

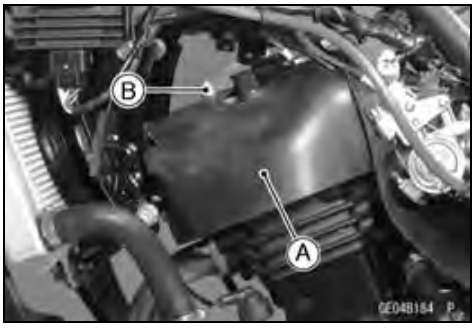


Kawasaki Bond (Silicone Sealant):
92104-0004

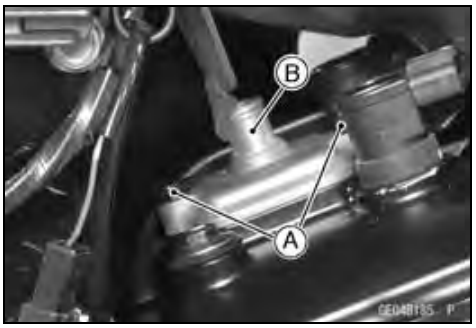


Clean Air System

Air Suction Valve Removal

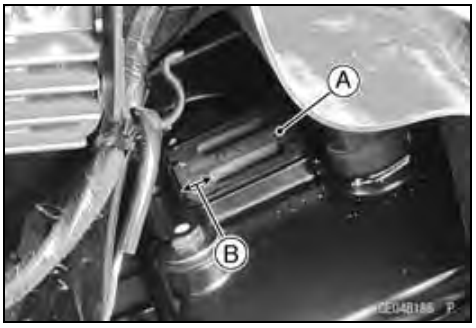


- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Air Switching Valve (see Air Switching Valve Removal)
- Free the heat insulation rubber plate [A] from the air suction valve cover [B].



- Remove:
  Air Suction Valve Cover Bolts [A]
  Air Suction Valve Cover [B]
  Air Suction Valve

Air Suction Valve Installation

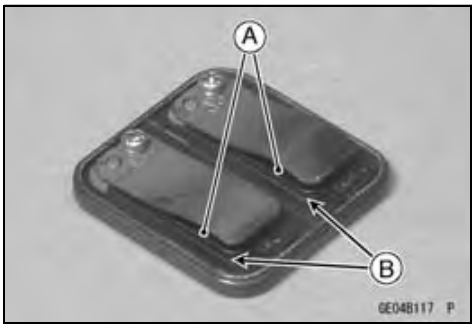


- Install the air suction valve [A] so that its wider side [B] of the reed valve case faces the front.
- Tighten:

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

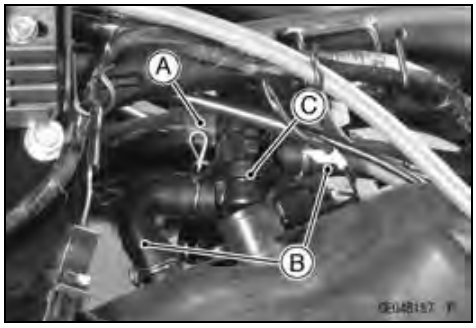


- Remove the air suction valve (see Air Suction Valve Removal).
- Visually inspect the reeds for cracks, folds, warps, heat damage or other damage.
- ★If there is any doubt as to the condition of the reeds [A], replace the air suction valve as an assembly.
- Check the reed contact areas [B] of the valve holder for grooves, scratches, any signs of separation from the holder or heat damage.
- If there is any doubt as to the condition of the reed contact areas, replace the air suction valve as an assembly.
- If any carbon or other foreign particles have accumulated between the reed and the reed contact area, wash the valve assembly clean with a high-flash point solvent.

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

Clean Air System

Air Switching Valve Removal



- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Connector [A] (Disconnect)
- Separate the hoses [B] from the air suction valve cover and air cleaner housing fitting, and remove the air switching valve [C].

CAUTION

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.

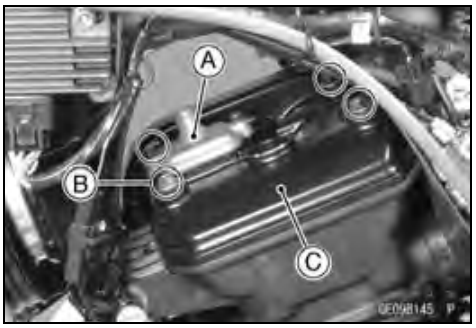
★If they are not, correct them. Replace them if they are damaged.

Cylinder Head Cover

Cylinder Head Cover Removal

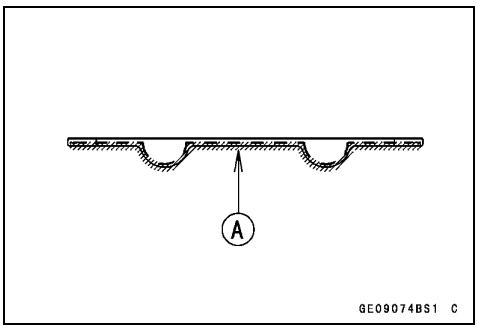
- Remove:
  Air Switching Valve (see Air Switching Valve Removal)
  Stick Coils (see Stick Coil Removal in the Electrical System chapter)
  Coolant Reserve Tank Bolts (see Coolant Reserve Tank Removal in the Cooling System chapter)
  Thermostat Housing (see Thermostat Housing Removal in the Cooling System chapter)
  Water Hose [A]
  Bolt [B] and Bracket [C]

- Free the heat insulation rubber plate [A] from the cylinder head cover.

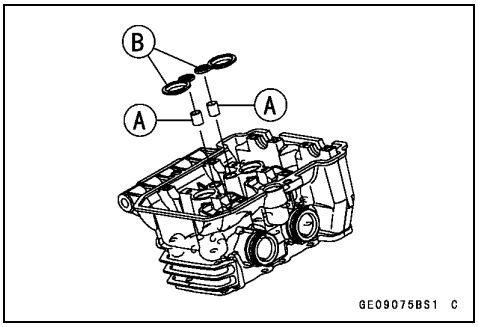


- Remove:
  Air Suction Valve Cover [A] (see Air Suction Valve Removal)
  Cylinder Head Cover Bolts [B]
  Cylinder Head Cover [C]

Cylinder Head Cover Installation



- Replace the head cover gasket with a new one.
- Apply silicone sealant [A] to the head cover gasket as shown in the figure.
  Sealant - Kawasaki Bond (Silicone Sealant): 92104-0004
- Install the new head cover gasket.

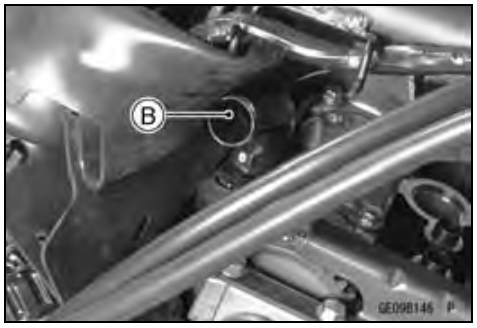


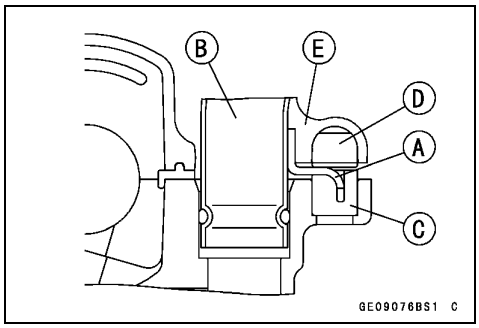
- Install:
  Dowel Pins [A]
  Plug Hole Gaskets [B]

Cylinder Head Cover

- Insert the hook [A] of the water pipe [B] in the groove of the damper [C] as shown in the figure.
  Damper [D]
- Install the head cover [E], and tighten the bolts.

  Torque - Cylinder Head Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)
- Install the removed parts (see appropriate chapters).





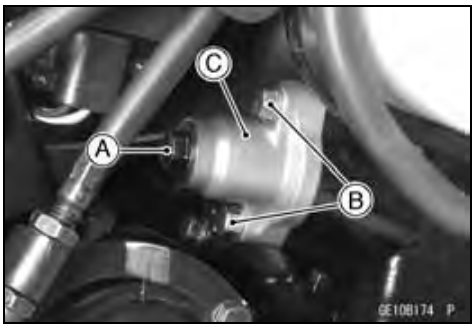
Camshaft Chain Tensioner

Camshaft Chain Tensioner Removal

CAUTION

This is a non-return type camshaft chain tensioner. The push rod does not return to its original position once it moves out to take up camshaft chain slack. Observe all the rules listed below.
When removing the tensioner, do not take out the mounting bolts only halfway. Retightening the mounting bolts from this position could damage the tensioner and the camshaft chain. Once the bolts are loosened, the tensioner must be removed and reset as described in "Camshaft Chain Tensioner Installation".
Do not turn over the crankshaft while the tensioner is removed. This could upset the camshaft chain timing and damage the valves.

- Remove:
  Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Cap Bolt [A] (Loosen)
  Mounting Bolts [B]
  Chain Tensioner [C]



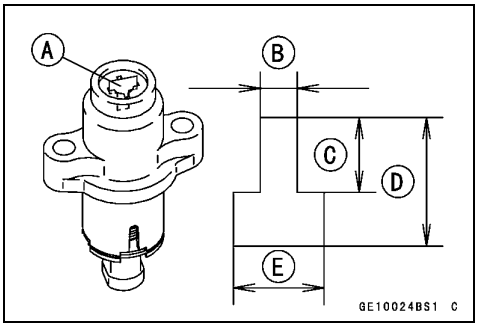
Camshaft Chain Tensioner Installation

- Remove the tensioner cap bolt and O-ring.
- While compressing the push rod [A], turn it clockwise with a suitable screwdriver until the rod stopped.

CAUTION

Do not turn the rod counterclockwise at installation. This could detach the rod and the tensioner cannot be reinstalled.

- Replace the chain tensioner gasket with a new one.
- While holding the rod in position with a suitable push rod holder plate [A] install the tensioner on the cylinder block.
  3.5 mm (0.14 in.) [B]
  7 mm (0.28 in.) [C]
  12 mm (0.47 in.) [D]
  8.5 mm (0.33 in.) [E]



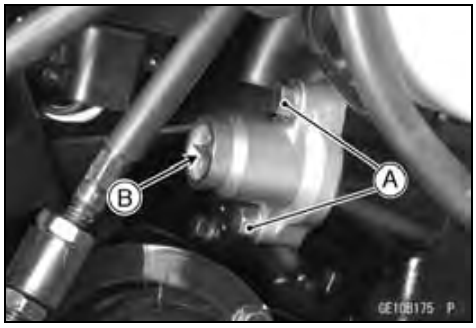
Camshaft Chain Tensioner

- Tighten:

  Torque - Camshaft Chain Tensioner Mounting Bolts [A]: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Take out the holder plate [B].
- Install the O-ring and tighten the cap bolt.

  Torque - Camshaft Chain Tensioner Cap Bolt: 5.0 N·m (0.51 kgf·m, 44 in·lb)



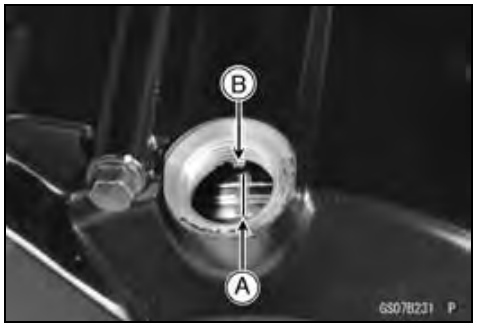
Camshaft, Camshaft Chain

Camshaft Removal

● Remove:
Cylinder Head Cover (see Cylinder Head Cover Removal)
Plugs

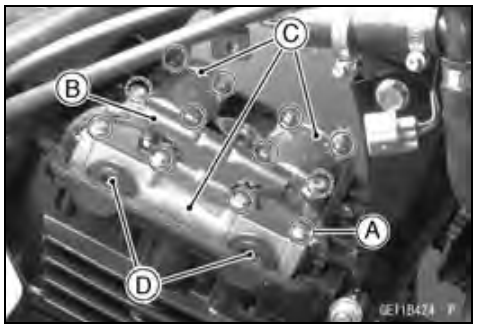
● Position the crankshaft at #2 piston TDC.

○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 projection [B] in the inspection window on the alternator cover.

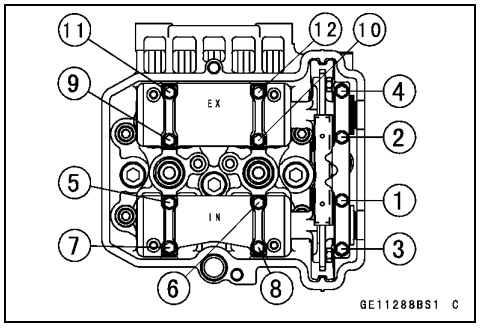


● Remove:
Camshaft Chain Tensioner (see Camshaft Chain Tensioner Removal)
Camshaft Cap Bolts [A]
Plates
Upper Chain Guide [B]
Camshaft Caps [C]
Camshafts [D]

○Loosen the camshaft cap bolts as shown sequence [1 ~ 12] in the figure.



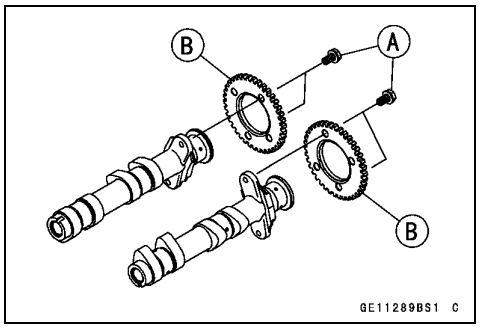
● Stuff a clean cloth into the chain tunnel to keep any parts from dropping into the crankcase.



● Remove:
Camshaft Sprocket Bolts [A]
Camshaft Sprockets [B]

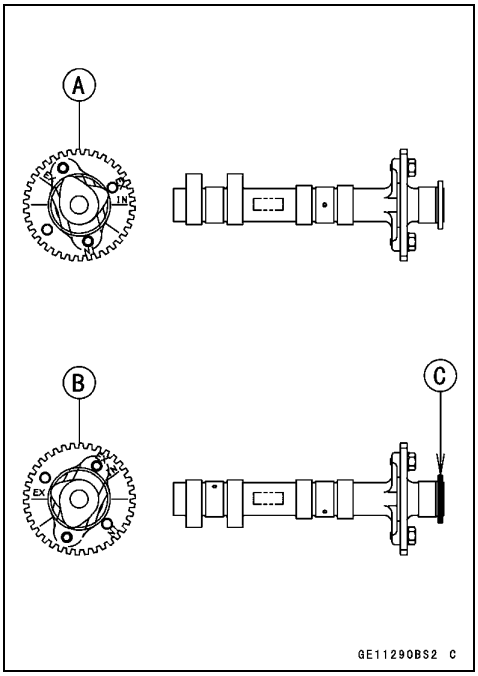
CAUTION

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 in the figure.
  Inlet Camshaft Sprocket [A]
  Exhaust Camshaft Sprocket [B]

○The exhaust camshaft has the groove [C].

- Apply a non-permanent locking agent to the threads of the camshaft sprocket bolts and tighten them.

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

- Apply molybdenum disulfide oil solution to all cam parts and journals.

★If a new camshaft is to be used, apply a thin coat of molybdenum disulfide grease to the cam surfaces.

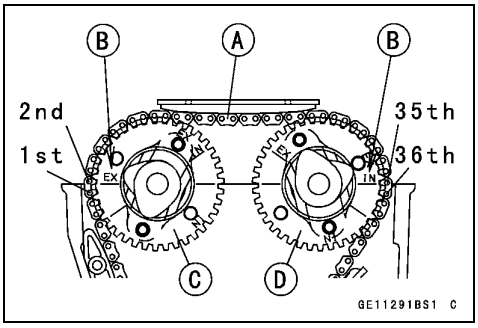
NOTE

○*Be sure to operate from the engine left side.*

- Position the crankshaft at #2 piston TDC (see Camshaft Removal).

CAUTION

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 [A] with the camshaft sprockets.
- Pull the tension side (exhaust side) of the chain taut to install the chain on the sprockets.

○Timing marks [B] align with the cylinder head upper surface.
  Exhaust Camshaft Sprocket [C]
  Inlet Camshaft Sprocket [D]

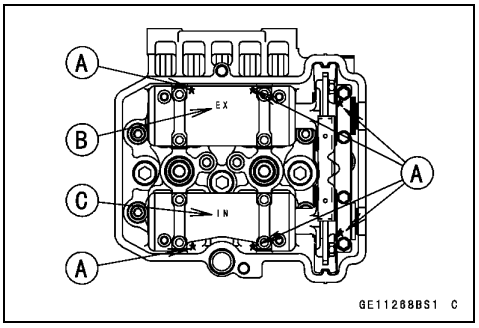
○Count the camshaft chain link pins as shown to verify that the sprocket are positioned correctly.

Camshaft, Camshaft Chain

- Install the six dowel pins on the ★ marks [A].
- Install the camshaft caps as shown in the figure, noting the "EX" [B] and "IN" [C] marks.

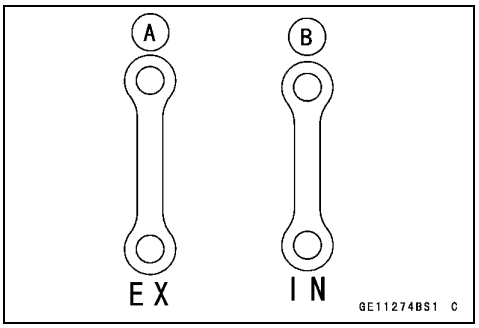
CAUTION

The camshaft caps are machined with the cylinder head. So, if a cap is installed in a wrong location, the camshaft may seize because of improper oil clearance in the bearings.



- Install the plates on the camshaft caps.

○The exhaust side plates [A] is longer the inlet side plates [B].

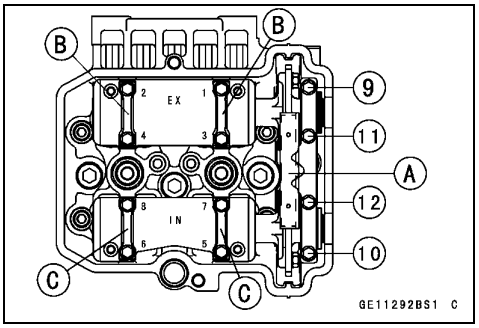


- Install the upper chain guide [A].
- First tighten the all camshaft cap bolts evenly to seat the camshaft in place, then tighten all bolts following the specified tightening sequence.

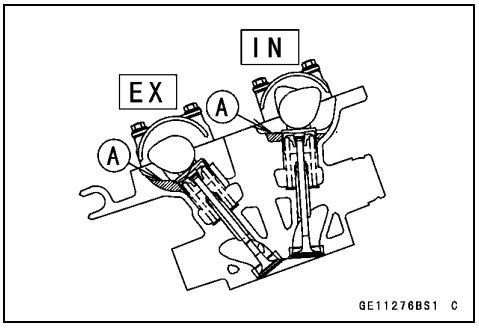
Torque - Camshaft Cap Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)

Plates (EX) [B]
Plates (IN) [C]

- Install the camshaft chain tensioner (see Camshaft Chain Tensioner Installation).



- Finally, inject [A] the engine oil into 8 places on the cylinder head as shown in the figure.
- Install the cylinder head cover (see Cylinder Head Cover Installation).



Camshaft, Camshaft Chain

Camshaft, Camshaft Cap Wear Inspection

- Remove:
  Upper Chain Guide (see Camshaft Removal)
  Camshaft Caps (see Camshaft Removal)
- Cut the strips of plastigauge to journal width. Place a strip on each journal parallel to the camshaft installed in the correct position.
- Measure each clearance between the camshaft journal and the camshaft cap using the plastigauge (press gauge) [A].
- Tighten the camshaft cap bolts (see Camshaft Installation).

NOTE

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

Camshaft Journal, Camshaft Cap Clearance

Standard: 0.028 ~ 0.071 mm (0.0011 ~ 0.0028 in.)

Service Limit: 0.16 mm (0.0063 in.)

★If any clearance exceeds the service limit, measure the diameter of each camshaft journal with a micrometer.

Camshaft Journal Diameter

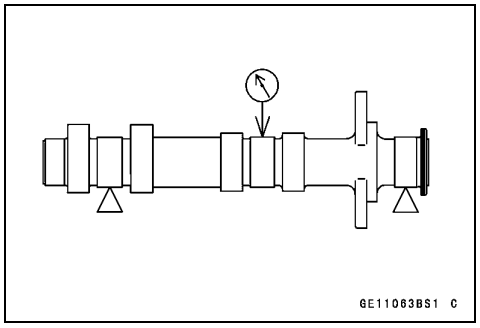
Standard: 23.950 ~ 23.972 mm (0.9429 ~ 0.9438 in.)

Service Limit: 23.92 mm (0.942 in.)

★If the camshaft journal diameter is less than the service limit, replace the camshaft with a new one and measure the clearance again.

★If the clearance still remains out of the service limit, replace the cylinder head unit.

Camshaft Runout Inspection



- Remove the camshafts (see Camshaft Removal).
- Set the camshaft in a camshaft alignment jig or on V blocks.
- Measure the runout with a dial gauge at the specified place as shown in the figure.

★If the runout exceeds the service limit, replace the camshaft.

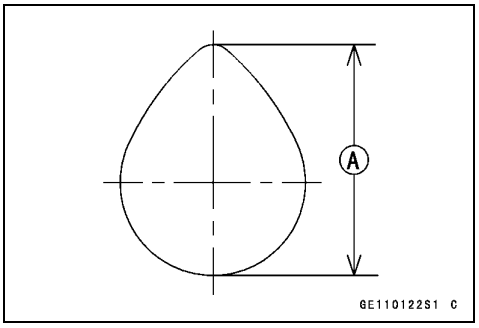
Camshaft Runout

Standard: TIR 0.02 mm (0.0008 in.) or less

Service Limit: TIR 0.1 mm (0.004 in.)

Camshaft, Camshaft Chain

Cam Wear Inspection



- Remove the camshafts (see Camshaft Removal).
- Measure the height [A] of each cam with a micrometer.

★If the cams are worn down past the service limit, replace the camshaft.

Cam Height

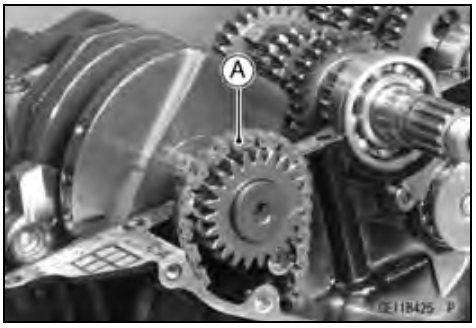
Standard:

Exhaust	**32.843 ~ 32.957 mm (1.2930 ~ 1.2975 in.)**
Inlet	**33.843 ~ 33.957 mm (1.3324 ~ 1.3369 in.)**

Service Limit:

Exhaust	**32.74 mm (1.289 in.)**
Inlet	**33.74 mm (1.328 in.)**

Camshaft Chain Removal



- Split the crankcase (see Crankcase Splitting in the Crankshaft/Transmission chapter).
- Remove the camshaft chain [A] from the crankshaft sprocket.

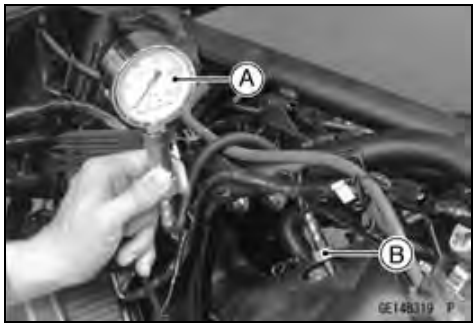
Cylinder Head

Cylinder Compression Measurement

NOTE

○*Use the battery which is fully charged.*

- Warm up the engine thoroughly.
- Stop the engine.
- Remove:
  Fuel Tank (see Fuel Tank 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 ~ 1 500 kPa (10.7 ~ 15.3 kgf/cm², 152 ~ 218 psi) at 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 damaged check gasket and cylinder head warp.
	Bad condition of valve seating	Repair if necessary.
	Incorrect valve clearance	Adjust the valve clearance.
	Incorrect piston/cylinder clearance	Replace the piston and/or cylinder.
	Piston seizure	Inspect the cylinder and replace/repair the cylinder and/or piston as necessary.
	Bad condition of piston ring and/or piston ring grooves.	Replace the piston and/or the piston rings.

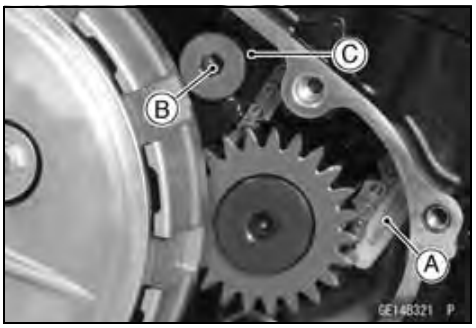
Cylinder Head

Cylinder Head Removal

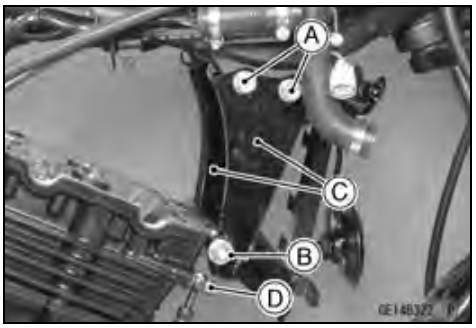
● Remove:
Coolant (Drain, see Coolant Change in the Periodic Maintenance chapter)
Cylinder Head Cover (see Cylinder Head Cover Removal)
Camshafts (see Camshaft Removal)
Radiator (see Radiator and Radiator Fan Removal in the Cooling System chapter)
Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
Exhaust Pipe (see Exhaust Pipe Removal)

● Remove the water pipe [A].

● Remove:
Front Camshaft Chain Guide [A]
Rear Camshaft Chain Guide Bolt [B]
Rear Camshaft Chain Guide [C]

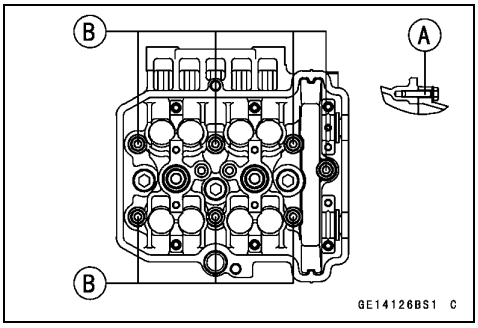


● Remove:
Engine Mounting Bracket Nuts and Bolts [A] (Both Sides)
Engine Mounting Nut [B] and Bolt
Engine Mounting Brackets [C] (Both Sides)
Oil Hose Banjo Bolt [D]



Cylinder Head

● Remove:
M6 Cylinder Head Bolt [A]
M8 Cylinder Head Bolts [B]
Cylinder Head

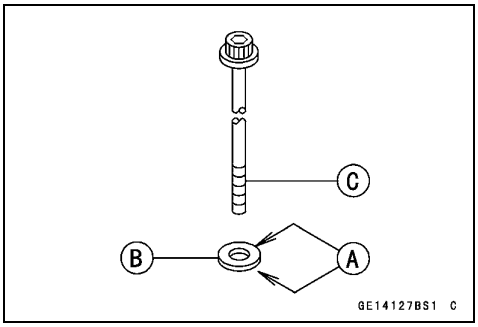


Cylinder Head Installation

NOTE

○*The camshaft cap is machined with the cylinder head, so if a new cylinder head is installed, use the cap that is supplied with the new head.*

● Install a new cylinder head gasket and dowel pins.
● 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].

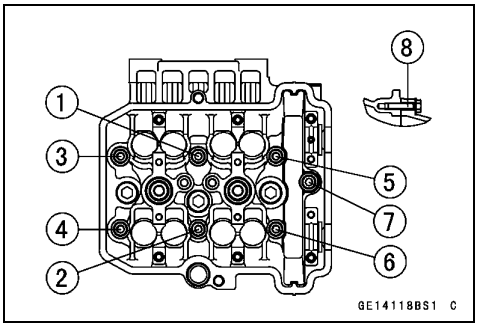


● Tighten the M8 cylinder head bolts following the tightening sequence [1 ~ 7].
146 mm (5.75 in.) [1 ~ 6]
115 mm (4.53 in.) [7]

Torque - Cylinder Head Bolts (M8): 31.4 N·m (3.2 kgf·m, 23.2 ft·lb)

● Tighten the M6 cylinder head bolt following the tightening sequence [8].

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

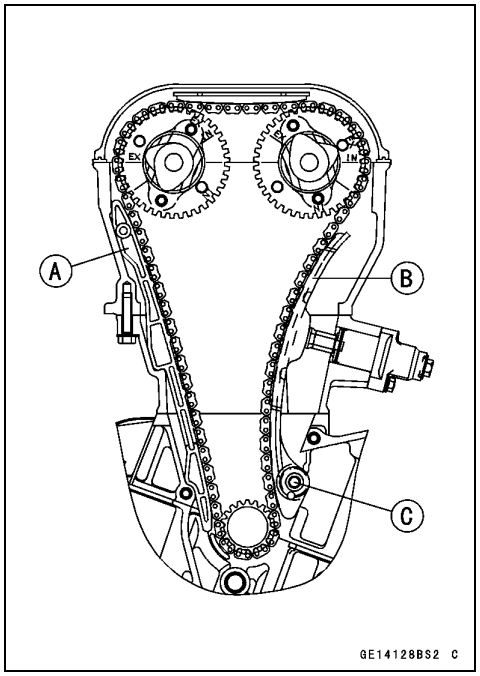


Cylinder Head

- Install:
  Front Camshaft Chain Guide [A]
  Rear Camshaft Chain Guide [B]
- Tighten:

Torque - Rear Camshaft Chain Guide Bolt [C]: 17 N·m (1.7 kgf·m, 13 ft·lb)

- Install the removed parts (see appropriate chapters).



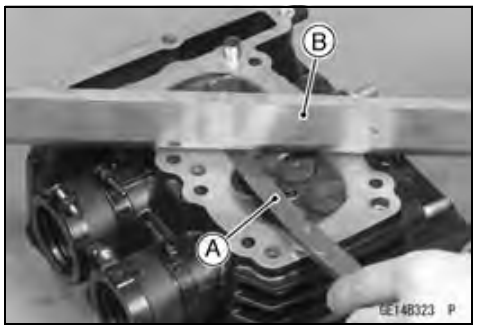
Cylinder Head Warp Inspection

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

Cylinder Head Warp
Standard: – – –
Service Limit: 0.05 mm (0.002 in.)

★If the cylinder head is warped more than the service limit, replace it.

★If the cylinder head is warped less than the service limit, repair the head by rubbing the lower surface on emery paper secured to a surface plate (first No. 200, then No. 400).



Valves

Valve Clearance Inspection

● Refer to the Valve Clearance Inspection in the Periodic Maintenance chapter.

Valve Clearance Adjustment

● Refer to the Valve Clearance Adjustment in the Periodic Maintenance chapter.

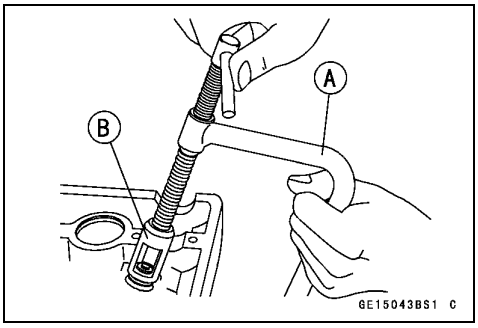
Valve Removal

● Remove:
Cylinder Head (see Cylinder Head Removal)
Valve Lifter and Shim

○Mark and record the valve lifter and shim locations so they can be installed in their original positions.

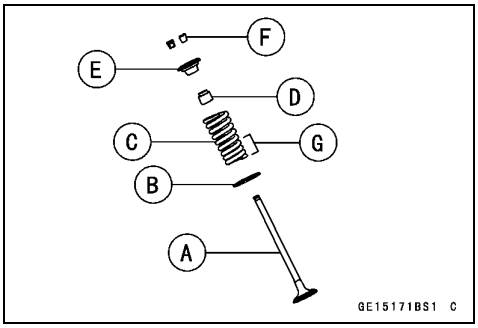
● Using the valve spring compressor assembly, remove the valve.

Special Tools - Valve Spring Compressor Assembly [A]: 57001-241
Valve Spring Compressor Adapter, ϕ16 [B]: 57001-1305



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 (White) [C]
Oil Seal [D]
Retainer [E]
Split Keepers [F]
Closed Coil End [G]



Valve Guide Removal

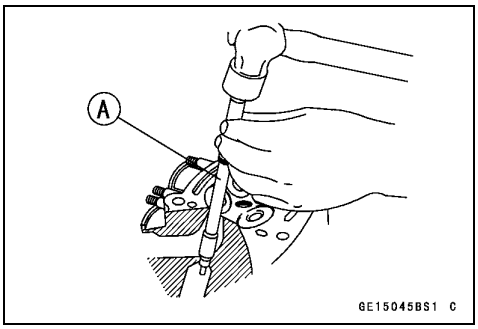
● Remove:
Valve (see Valve Removal)
Oil Seal
Spring Seat

● 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.

CAUTION

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

Special Tool - Valve Guide Arbor, ϕ4.5: 57001-1331



Valves

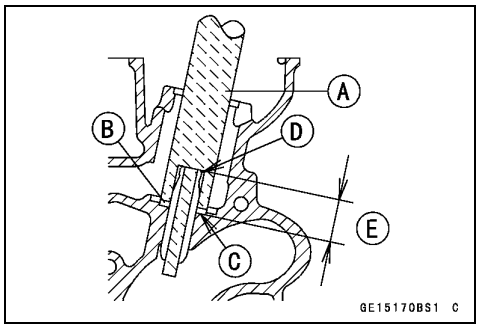
Valve Guide Installation

- 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).

CAUTION
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 [C] touches the head surface [D].
  15.3 ~ 15.5 mm (0.60 ~ 0.61 in.) [E]

Special Tools - Valve Guide Driver: 57001-1564
Washer: 57001-1720

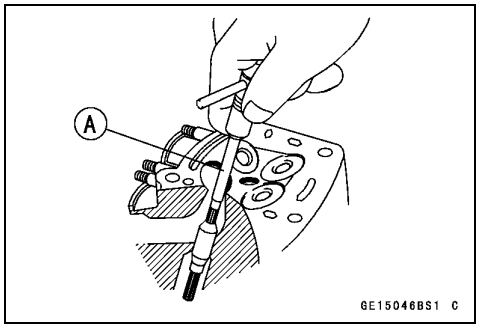


- Wait until the cylinder head cools down and then ream the valve guide with the valve guide reamer [A] even if the old guide is reused.

○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

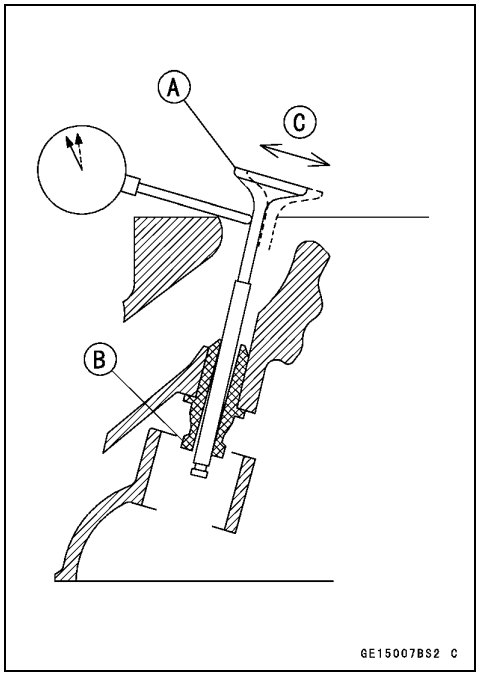


Valve-to-Guide Clearance Measurement (Wobble Method)

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 **0.07 ~ 0.12 mm (0.0028 ~ 0.0047 in.)**

Inlet **0.02 ~ 0.08 mm (0.0008 ~ 0.0032 in.)**

Service Limit:

Exhaust **0.27 mm (0.011 in.)**

Inlet **0.23 mm (0.010 in.)**

Valve Seat Inspection

● Remove the valve (see Valve Removal).

● Check the valve seating surface [A] between the valve [B] and valve seat [C].

○Measure the outside diameter [D] of the seating pattern on the valve seat.

★If the outside diameter is too large or too small, repair the seat (see Seat Repair).

Valve Seating Surface Outside Diameter

Standard:

Exhaust **19.3 ~ 19.5 mm (0.7598 ~ 0.7677 in.)**

Inlet **21.9 ~ 22.1 mm (0.8622 ~ 0.8701 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]

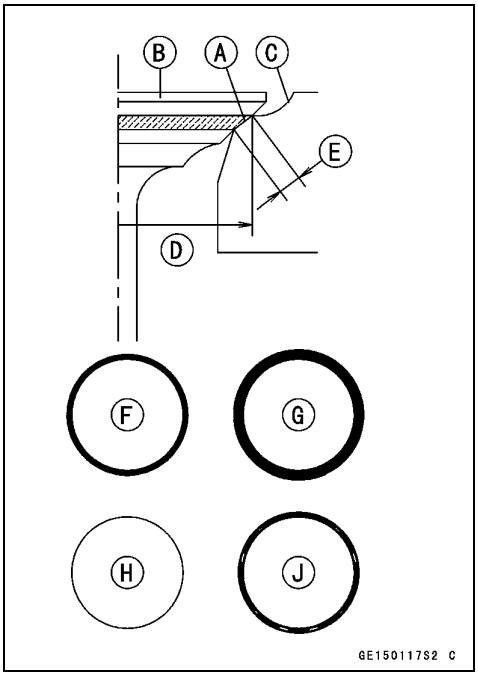
★If the width is too wide [G], too narrow [H] or uneven [J], repair the seat (see Valve Seat Repair).

Valve Seating Surface Width

Standard:

Exhaust **0.5 ~ 1.0 mm (0.0197 ~ 0.0394 in.)**

Inlet **0.5 ~ 1.0 mm (0.0197 ~ 0.0394 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

[For Exhaust Valve Seat]

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

Valve Seat Cutter, 32° - ϕ22: 57001-1206

Valve Seat Cutter, 67.5° - ϕ22: 57001-1207

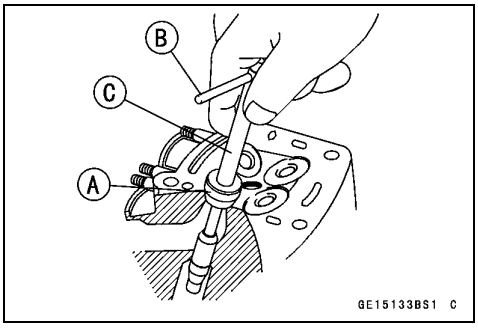
[For Inlet Valve Seat]

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

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

Valve Seat Cutter, 67.5° - ϕ22: 57001-1207

★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.*

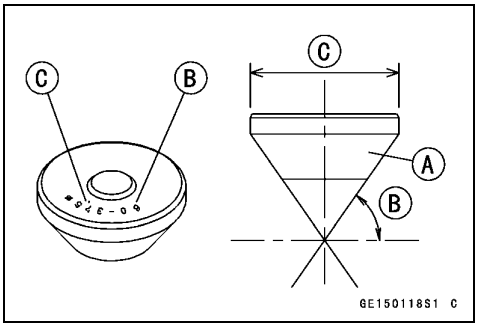
5. After use, wash it with washing oil and apply thin layer of engine oil before storing.

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

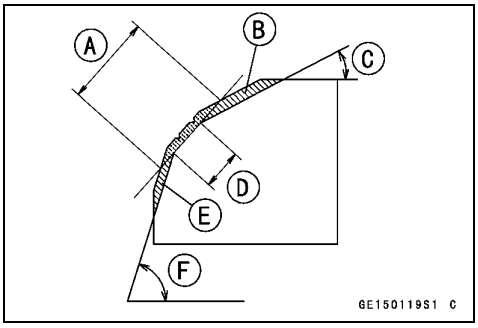
- Clean the seat area carefully.
- Coat the seat with machinist's dye.
- Fit a 45° cutter into the holder and slide it into the valve guide.
- Press down lightly on the handle and turn it right or left. Grind the seating surface only until it is smooth.

CAUTION

Do not grind the seat too much. Overgrinding will reduce valve clearance by sinking the valve into the head. If the valve sinks too far into the head, it will be impossible to adjust the clearance, and the cylinder head must be replaced.

Valves

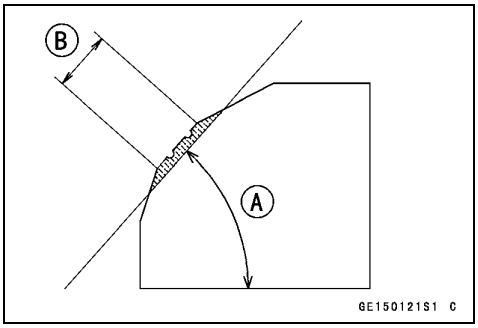
● Measure the outside diameter of the seating surface with a vernier caliper.
★If the outside diameter of the seating surface is too small, repeat the 45° grind until the diameter is within the specified range.
Widened Width [A] of engagement by machining with 45° cutter
Ground Volume [B] by 32° cutter
32° [C]
Correct Width [D]
Ground Volume [E] by 67.5° cutter
67.5° [F]



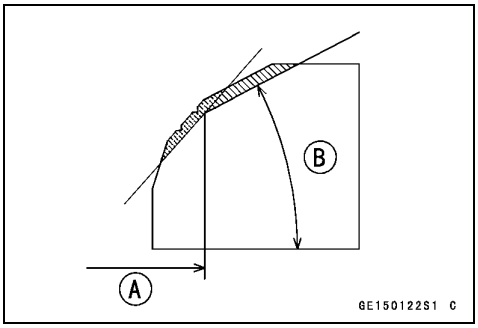
● Measure the outside diameter of the seating surface with a vernier caliper.
★If the outside diameter of the seating surface is too small, repeat the 45° grind [A] until the diameter is within the specified range.
Original Seating Surface [B]

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 67.5° 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.



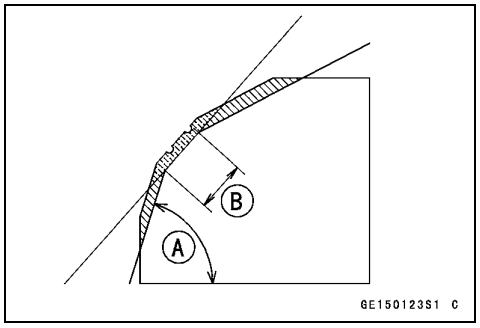
CAUTION

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

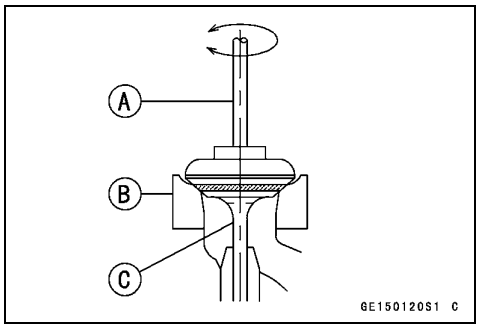
○After making the 32° grind, return to the seat outside diameter measurement step above.
● To measure the seat width, use a vernier caliper to measure the width of the 45° angle portion of the seat at several places around the seat.
★If the seat width is too narrow, repeat the 45° grind until the seat 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 67.5° [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 67.5° angle until the seat width is within the specified range.
○To make the 67.5° grind, fit 67.5° cutter into the holder, and slide it into the valve guide.
○Turn the holder, while pressing down lightly.
○After making the 67.5° grind, return to the seat width measurement step above.
Correct Width [B]

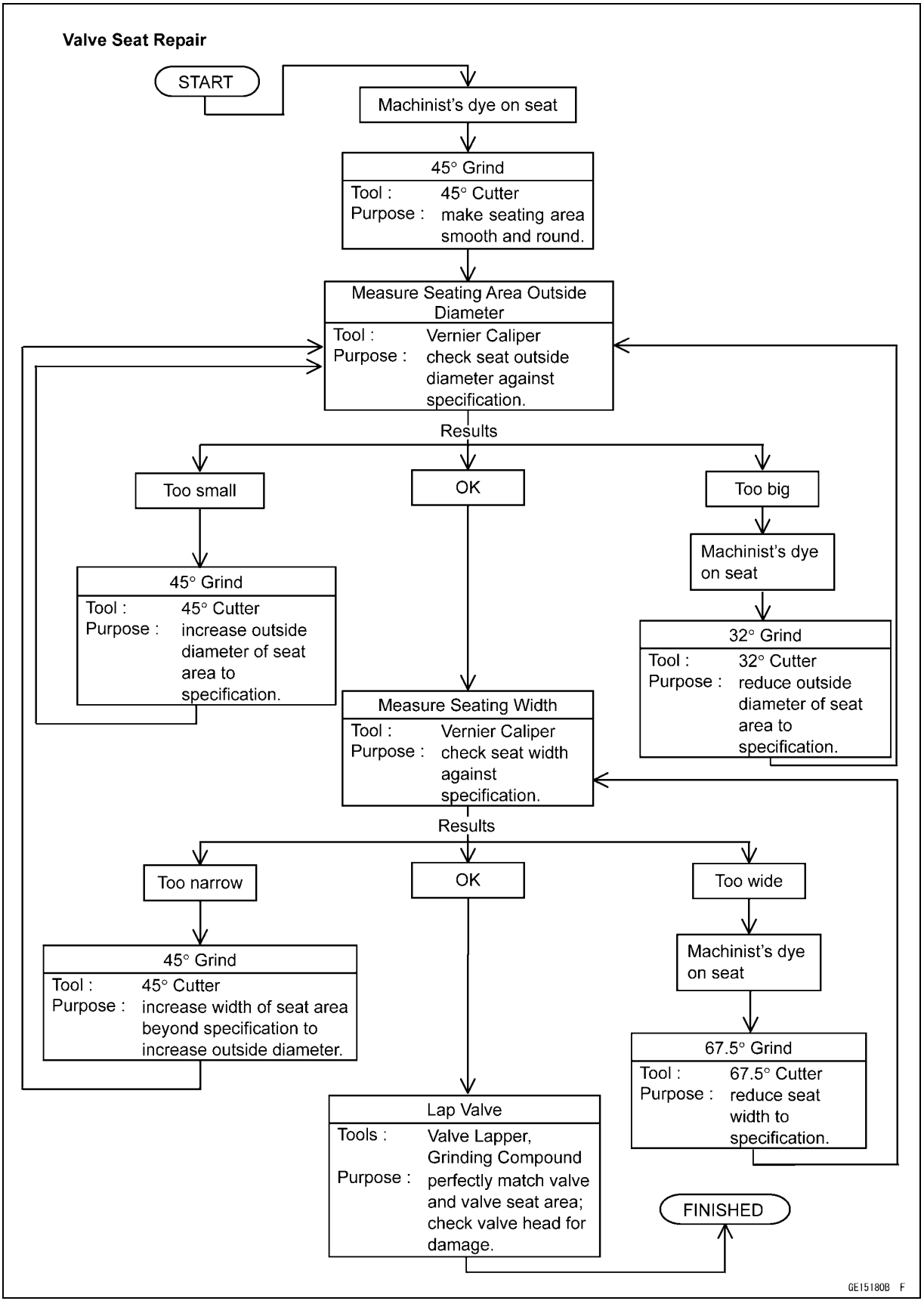


● Lap the valve to the seat, once the seat width and outside diameter are within the ranges specified above.
○Put a little coarse grinding compound on the face of the valve in a number of places around the valve head.
○Spin the valve against the seat until the grinding compound produces a smooth, matched surface on both the seat and the valve.
○Repeat the process with a fine grinding compound.
Lapper [A]
Valve Seat [B]
Valve [C]



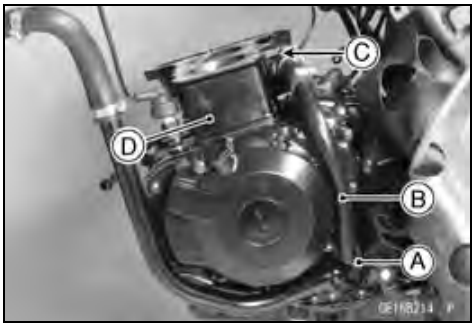
● The seating area should be marked about in the middle of the valve face.
★If the seat area is not in the right place on the valve, check to be sure the valve is the correct part. If it is, it may have been refaced too much; replace it.
● Be sure to remove all grinding compound before assembly.
● When the engine is assembled, be sure to adjust the valve clearance (see Valve Clearance Inspection in the Periodic Maintenance chapter).

Valves



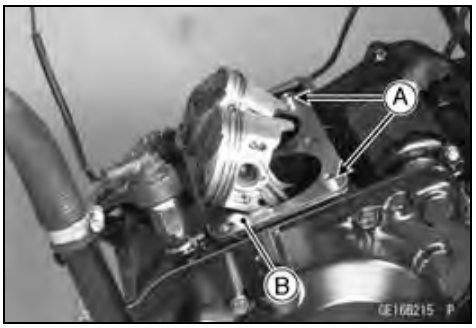
Cylinder, Pistons

Cylinder Removal



- Remove:
  Cylinder Head (see Cylinder Head Removal)
  Bolt [A]
  Water Pipe [B]
  Water Hose Fitting [C]
  Cylinder [D]

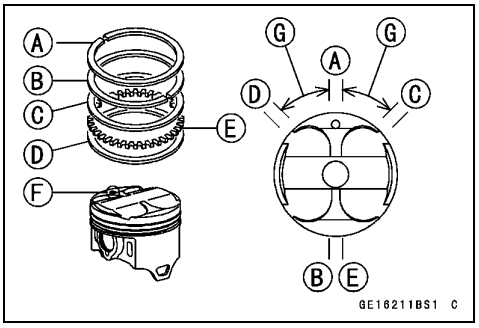
Cylinder Installation



NOTE

○*If a new cylinder is used, use a new piston ring.*

- Install the dowel pins [A] and new cylinder gasket [B].
- Apply molybdenum disulfide oil solution to the cylinder bore.



- The piston ring openings must be positioned as shown in the figure. The openings of the oil ring steel rails must be about 30 ~ 40° of angle from the opening of the top ring.
  Top Ring [A]
  Second Ring [B]
  Upper Oil Ring Steel Rail [C]
  Lower Oil Ring Steel Rail [D]
  Oil Ring Expander [E]
  Hollow [F]
  30 ~ 40° [G]

- Slip the piston base [A] to hold piston level as shown in the figure, and install the cylinder.

Special Tool - Piston Base, ϕ2.3: 57001-1336

Piston Removal

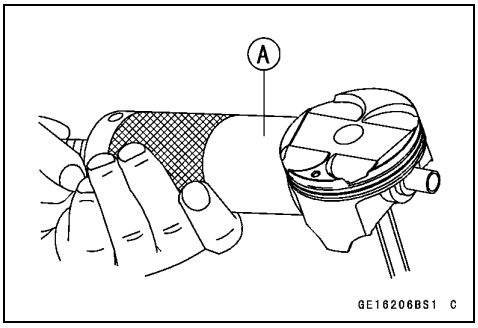
- Remove the cylinder (see Cylinder Removal).
- Place a clean cloth under the pistons and remove the piston pin snap ring [A] from the outside of each piston.

Cylinder, Pistons

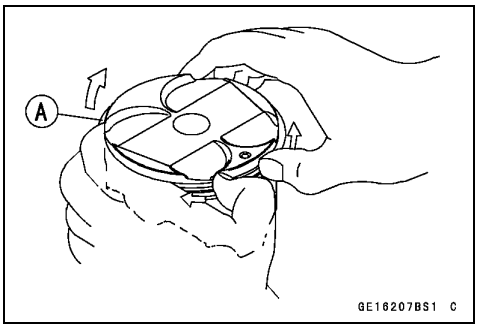
● Remove the piston pins.

Special Tool - Piston Pin Puller Assembly [A]: 57001-910

● Remove the pistons.

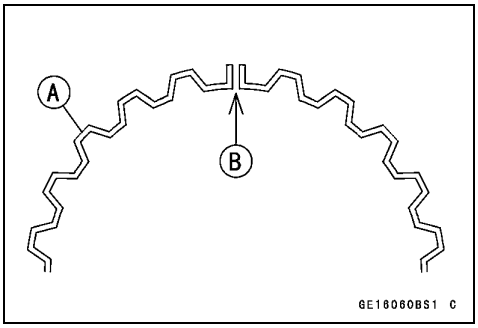


● Carefully spread the ring opening with your thumbs and then push up on the opposite side of the ring [A] to remove it.
● Remove the 3-piece oil ring with your thumbs in the same manner.



Piston Installation

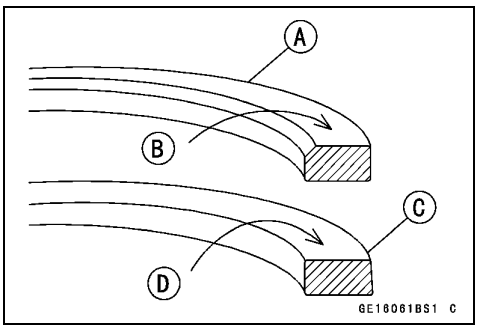
● Apply molybdenum disulfide oil solution to the oil ring expander, and install the oil ring expander [A] in the bottom piston ring groove so the ends [B] not butt together.
● Apply molybdenum disulfide oil solution to the oil ring steel rails, and install the oil ring steel rails, one above the expander 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".*

● Do not mix up the top and second ring.
● Install the top ring [A] so that the "R" mark [B] faces up.
● Install the second ring [C] so that the "RN" mark [D] faces up.
○Apply molybdenum disulfide oil solution to the piston rings.



Cylinder, Pistons

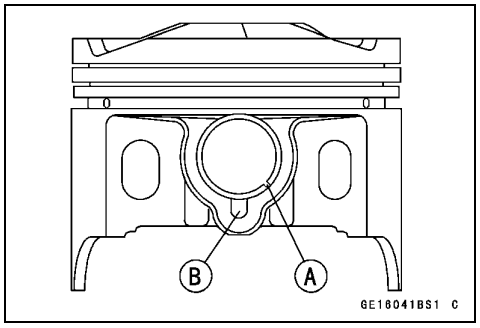
NOTE

○*If a new piston is used, use new piston ring.*

- Install the piston with its marking hollow facing forward.
- Fit a new piston pin snap ring into the side of the piston so that the ring opening [A] does not coincide with the slit [B] of the piston pin hole.

○Apply molybdenum disulfide oil solution to the piston pins and piston journals.

○When installing the piston pin snap ring, compress it only enough to install it and no more.



CAUTION

Do not reuse snap rings, as removal weakens and deforms them. They could fall out and score the cylinder wall.

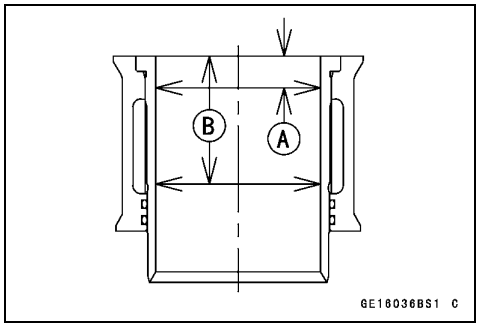
- Install the cylinder (see Cylinder Installation).

Cylinder Wear 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 in the figure.

★If any of the cylinder inside diameter measurements exceeds the service limit, replace the cylinder.

10 mm (0.39 in.) [A]
60 mm (2.36 in.) [B]



Cylinder Inside Diameter

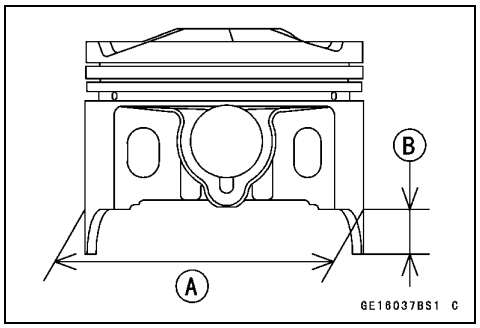
Standard: 62.000 ~ 62.012 mm (2.4409 ~ 2.4414 in.)

Service Limit: 62.10 mm (2.4449 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.



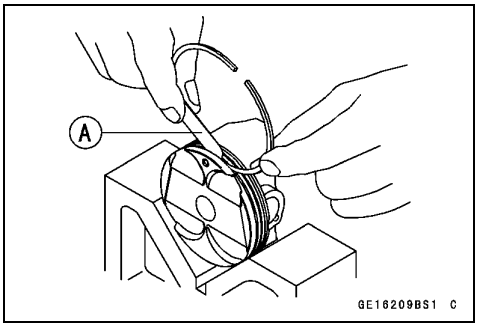
Piston Diameter

Standard: 61.942 ~ 61.957 mm (2.4387 ~ 2.4392 in.)

Service Limit: 61.79 mm (2.4327 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

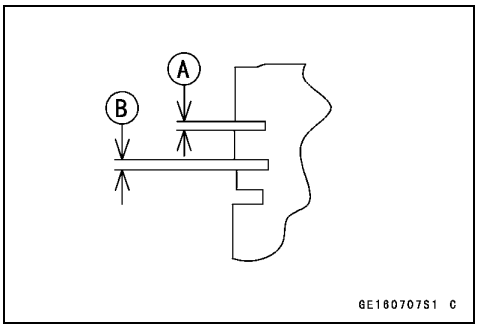
Standard:

Top	**0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in.)**
Second	**0.02 ~ 0.06 mm (0.0008 ~ 0.0024 in.)**

Service Limit:

Top	**0.17 mm (0.0067 in.)**
Second	**0.16 mm (0.0063 in.)**

Piston Ring Groove Width Inspection



● Measure the piston ring groove width.

○Use a vernier caliper at several points around the piston.

Piston Ring Groove Width

Standard:

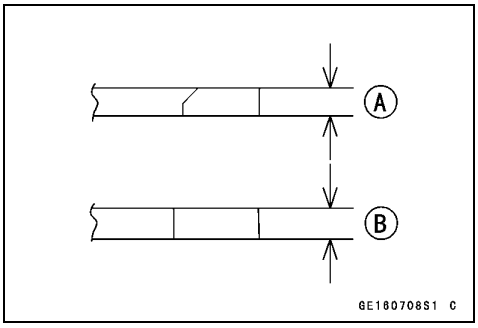
Top [A]	**0.82 ~ 0.84 mm (0.0323 ~ 0.0331 in.)**
Second [B]	**0.81 ~ 0.83 mm (0.0319 ~ 0.0327 in.)**

Service Limit:

Top	**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 (0.0303 ~ 0.0311 in.)**
Second [B]	**0.77 ~ 0.79 mm (0.0303 ~ 0.0311 in.)**

Service Limit:

Top	**0.70 mm (0.028 in.)**
Second	**0.70 mm (0.028 in.)**

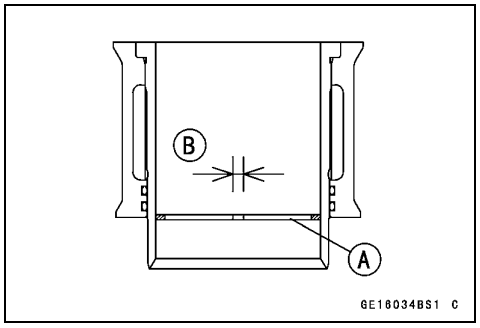
★If any of the measurements is less than the service limit on either of the rings, replace all the rings.

NOTE

○*When using new rings in a used piston, check for uneven groove wear. The rings should fit perfectly parallel to the groove sides. If not, replace the piston.*

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 (0.0059 ~ 0.0118 in.)**
Second	**0.40 ~ 0.55 mm (0.0157 ~ 0.0217 in.)**
Oil	**0.20 ~ 0.80 mm (0.0079 ~ 0.0315 in.)**

Service Limit:

Top	**0.6 mm (0.024 in.)**
Second	**0.9 mm (0.035 in.)**
Oil	**1.1 mm (0.043 in.)**

★If the end gap of either ring is greater than the service limit, replace all the rings.

Boring, Honing Performance

When boring and honing a cylinder, note the following:

○There is one size of oversize piston available. Oversize piston require oversize rings.

Oversize Pistons and Rings

+ 0.5 mm (0.020 in.)

○Before boring a cylinder, first measure the exact diameter of the oversize piston, and then, according to the standard clearance in the Specifications section, determine the rebore diameter. However, if the amount of boring necessary would make the inside diameter greater than **0.5 mm (0.020 in.)** oversize, the cylinder block must be replaced.

○Cylinder inside diameter must not vary more than **0.01 mm (0.0004 in.)** at any point.

○Be wary of measurements taken immediately after boring since the heat affects cylinder diameter.

○In the case of a rebored cylinder and oversize piston, the service limit for the cylinder is the diameter that the cylinder was bored to plus **0.1 mm (0.004 in.)** and the service limit for the piston is the oversize piston original diameter minus **0.15 mm (0.0059 in.).** If the exact figure for the rebored diameter is unknown, it can be roughly determined by measuring the diameter at the base of the cylinder.

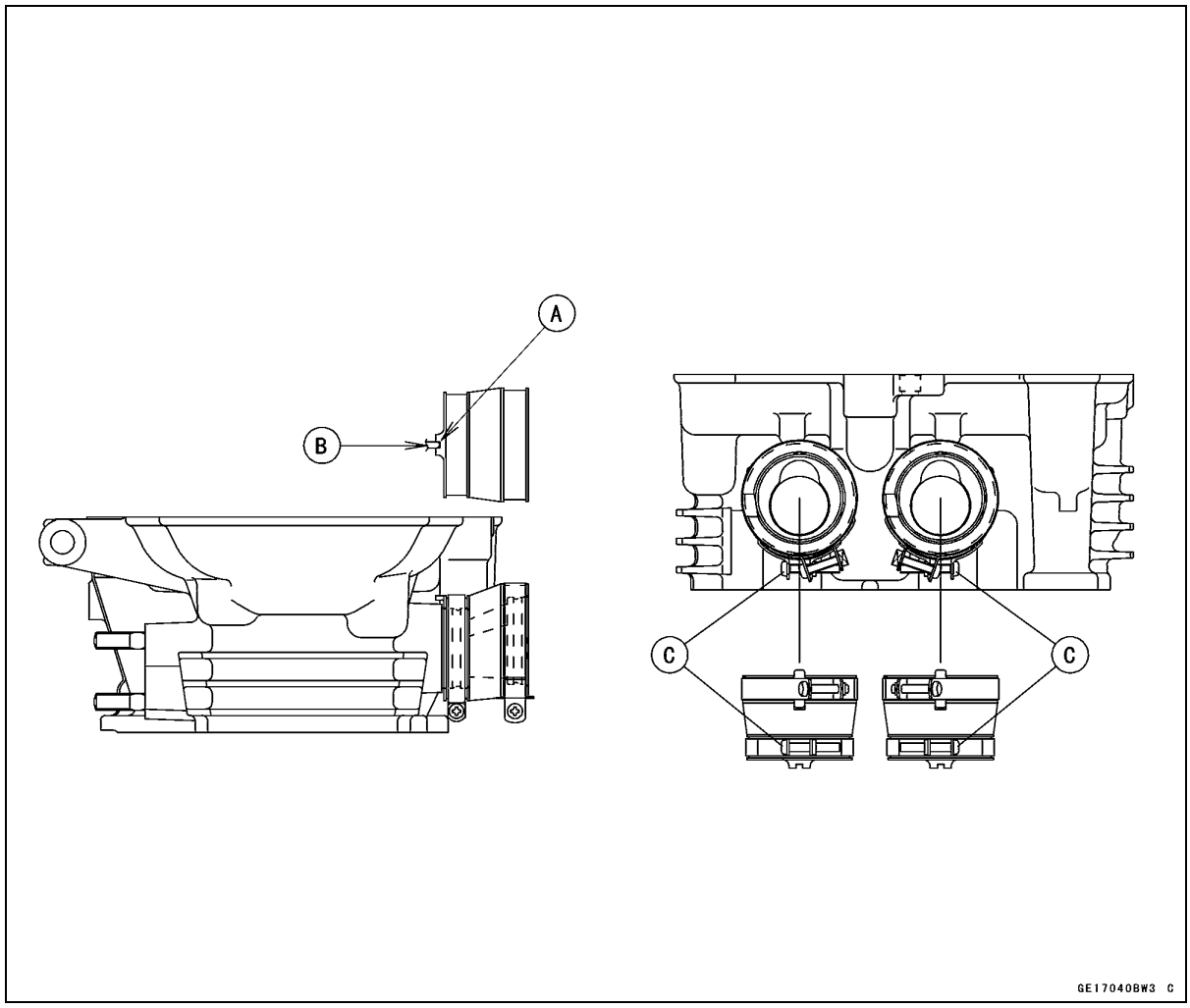
○Never separate the liner from the cylinder, because the top surface of cylinder and liner is machined at the factory as an assembly.

Throttle Body Assy Holder

Throttle Body Assy Holder Installation

- Fit the groove [A] of the throttle body holder to the projection [B] of the cylinder head.
- Install the clamps [C] as shown in the figure.
- Tighten:

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



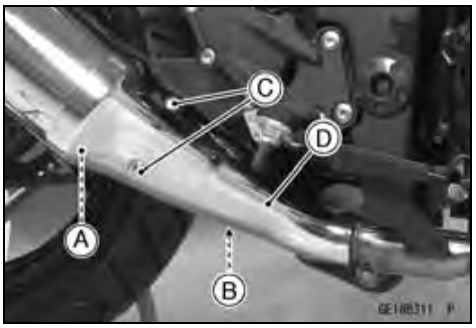
Muffler

⚠ WARNING

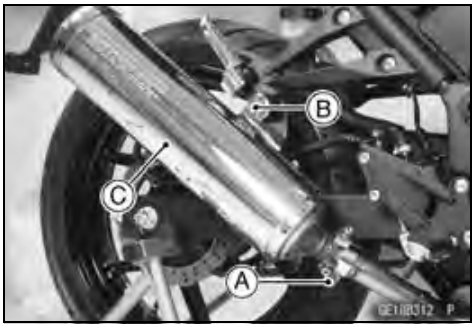
To avoid a serious burn, do not remove the muffler when the engine is still hot. Wait until the muffler cool down.

Muffler Body Removal

- Remove:
  Lower Fairings (see Lower Fairing Removal in the Frame chapter)
  Muffler Cover Clamp Bolt [A] and Clamp
  Muffler Cover Clamp Screw [B]
  Muffler Cover Bolts [C]
  Muffler Cover [D]

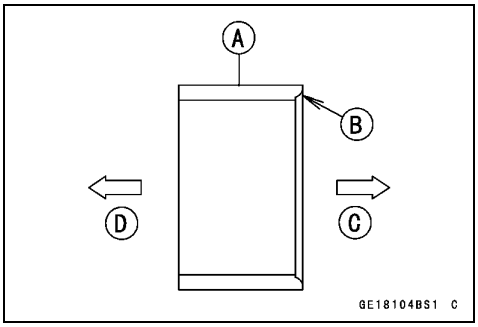


- Remove:
  Clamp Bolt [A] (Loosen)
  Mounting Nut and Bolt [B]
  Muffler Body [C]



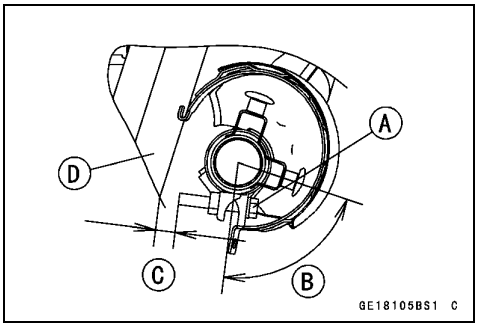
Muffler Body Installation

- Replace the muffler body gasket [A] with a new one.
- Install the muffler body gasket so that its chamfer side [B] faces front [C].
  Rear [D]



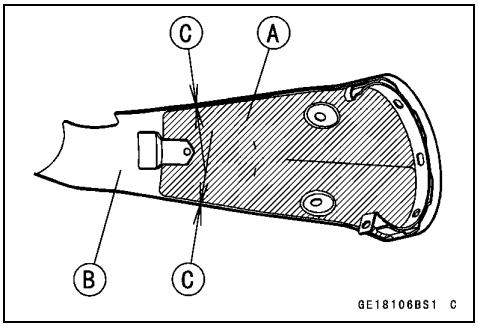
- Install the muffler body and mounting bolt.
- Install the muffler body clamp bolt [A] as shown in the figure.
  74 ~ 84° [B]
  More than 15 mm (0.59 in.) [C]
  Swingarm [D]
- Tighten:

Torque - Muffler Body Mounting Bolt: 30 N·m (3.1 kgf·m, 22 ft·lb)
Muffler Body Clamp Bolt: 17 N·m (1.7 kgf·m, 13 ft·lb)



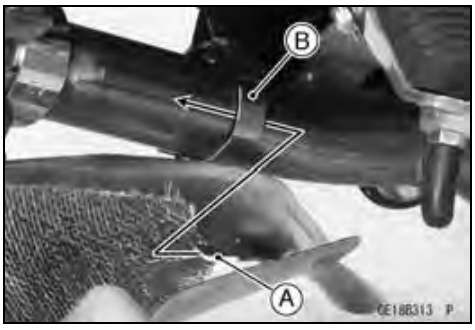
Muffler

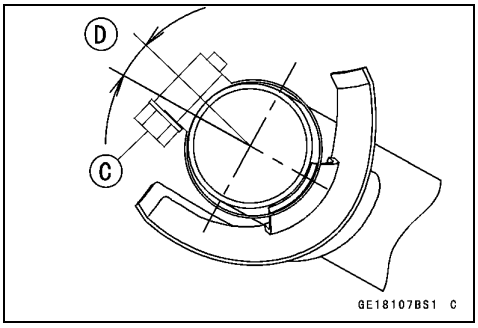
★If the pad [A] was removed, install it as shown in the figure.
Muffler Cover [B]
1 ~ 5 mm (0.04 ~ 0.20 in.) [C]



● Insert the claw [A] into the cover clamp [B] and tighten the clamp screw [C] as shown in the figure.
About 15° [D]

Torque - Muffler Cover Clamp Screw: 6.9 N·m (0.70 kgf·m, 61 in·lb)





● Tighten:

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

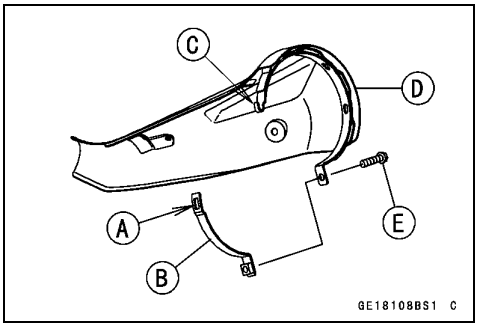
● Fit the hole [A] of the clamp [B] to the hook [C] of the muffler cover [D].

● Tighten:

Torque - Muffler Cover Clamp Bolt [E]: 9.8 N·m (1.0 kgf·m, 87 in·lb)

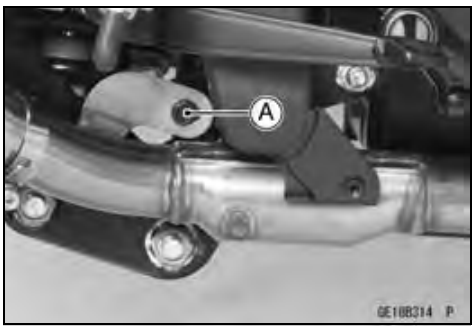
● Thoroughly warm up the engine, wait until the engine cools down, retighten all the bolts and screw.

● Install the removed parts (see appropriate chapters).



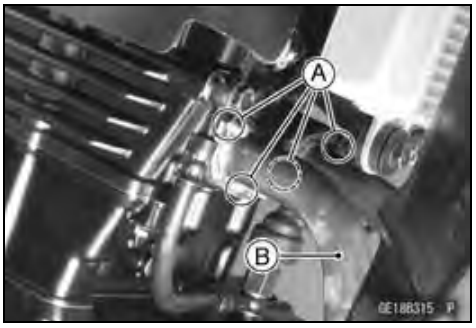
Exhaust Pipe Removal

● Remove:
Muffler Body (see Muffler Body Removal)
Oxygen Sensor (see Oxygen Sensor Removal in the Electrical System chapter)
Mounting Bolt [A]



Muffler

- Remove:
  Exhaust Pipe Holder Nuts [A]
  Exhaust Pipe [B]



Exhaust Pipe Installation

- Replace the exhaust pipe gaskets with new ones.
- Install the exhaust pipe.
- Tighten:

Torque - Exhaust Pipe Holder Nuts: 12 N·m (1.2 kgf·m, 106 in·lb)
Exhaust Pipe Mounting Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Install the removed parts (see appropriate chapters).

Clutch

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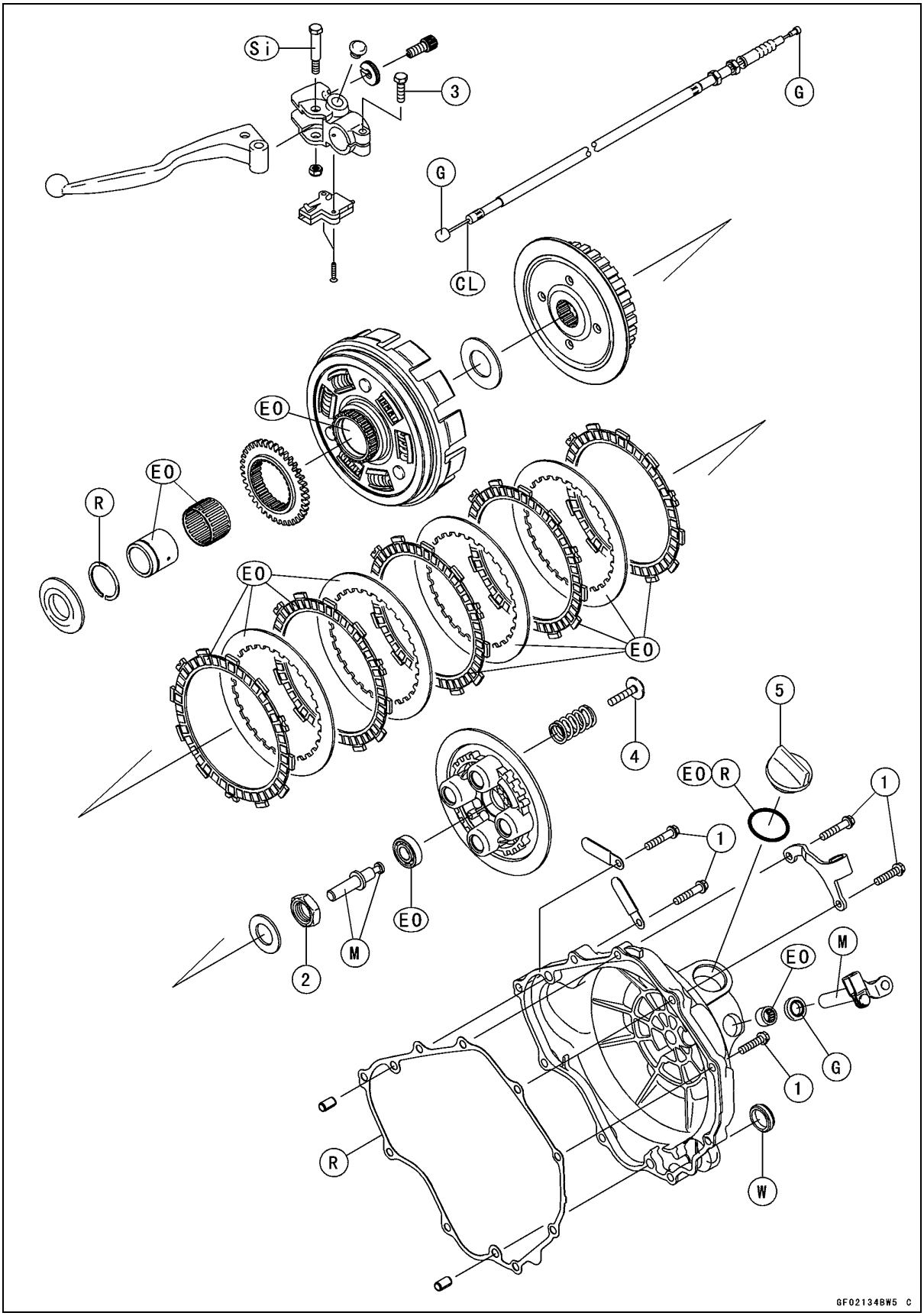
Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Clutch Cover Bolts	9.8	1.0	87 in·lb	
2	Clutch Hub Nut	132	13.5	97.4	
3	Clutch Lever Clamp Bolt	8.8	0.90	78 in·lb	
4	Clutch Spring Bolts	8.8	0.90	78 in·lb	
5	Oil Filler Plug	–	–	–	Hand-Tighten

CL: Apply cable lubricant.
EO: Apply engine oil.
G: Apply grease.
M: Apply molybdenum disulfide grease.
R: Replacement Parts
Si: Apply silicone grease.
W: Apply water.

6-4 CLUTCH

Specifications

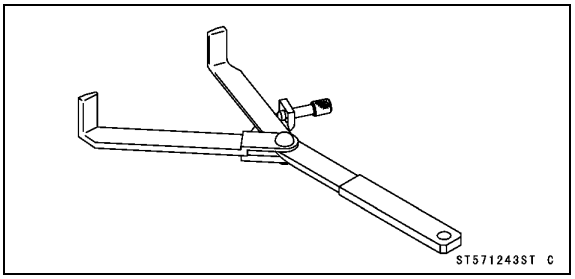
Item	Standard	Service Limit
Clutch Lever Free Play	2 ~ 3 mm (0.08 ~ 0.12 in.)	– – –
Clutch		
Friction Plate Thickness	2.92 ~ 3.08 mm (0.115 ~ 0.121 in.)	2.6 mm (0.10 in.)
Friction and Steel Plate Warp	0.15 mm (0.0059 in.) or less	0.3 mm (0.012 in.)
Clutch Spring Free Length	39.4 mm (1.55 in.)	37.6 mm (1.48 in.)

Clutch Housing Gear Selection when Replacing Clutch Housing Gear

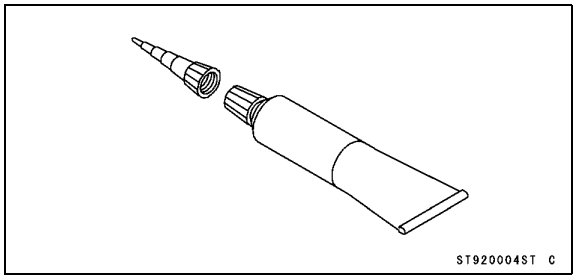
Crankshaft		Clutch Housing		
Primary Gear Marking	**Color**	**Gear Marking**	**Color**	**Part Number**
A	White	A	White	13095-0095
A	White	B	Red	13095-0096
A	White	C	None	13095-0097
A	White	D	Yellow	13095-0098
B	Red	A	White	13095-0095
B	Red	B	Red	13095-0096
B	Red	C	None	13095-0097
B	Red	D	Yellow	13095-0098
C	None	B	Red	13095-0096
C	None	C	None	13095-0097
C	None	D	Yellow	13095-0098
D	Yellow	C	None	13095-0097
D	Yellow	D	Yellow	13095-0098

Special Tool and Sealant

Clutch Holder:
57001-1243



Kawasaki Bond (Silicone Sealant):
92104-0004



Clutch Lever and Cable

Clutch Lever Free Play Inspection

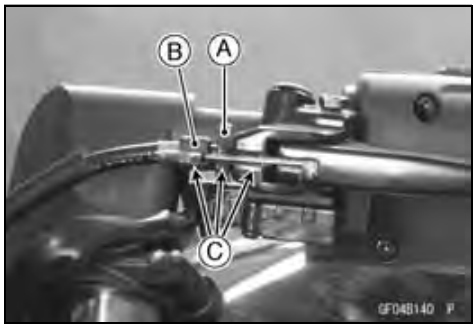
- Refer to the Clutch Operation Inspection in the Periodic Maintenance chapter.

Clutch Lever Free Play Adjustment

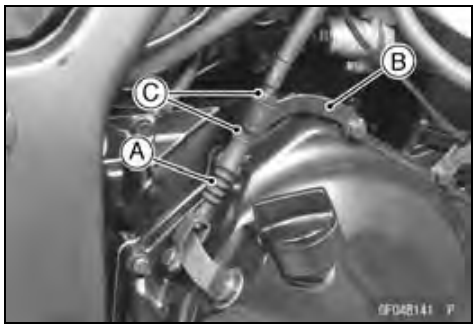
- Refer to the Clutch Operation Inspection in the Periodic Maintenance chapter.

Clutch Cable Removal

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

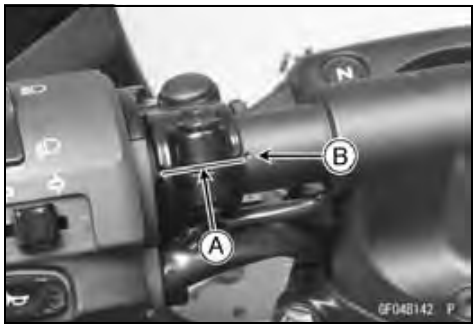
Clutch Cable Lubrication

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

Clutch Lever Installation

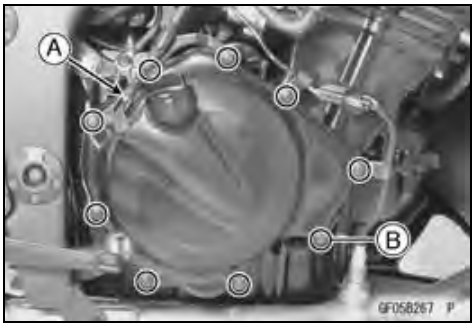
- Install the clutch lever so that the mating surface [A] of the clutch lever is aligned with the punch mark [B].
- Tighten:

Torque - Clutch Lever Clamp Bolt: 8.8 N·m (0.90 kgf·m, 78 in·lb)

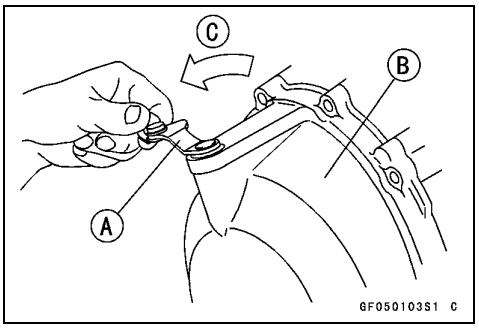


Clutch Cover

Clutch Cover Removal

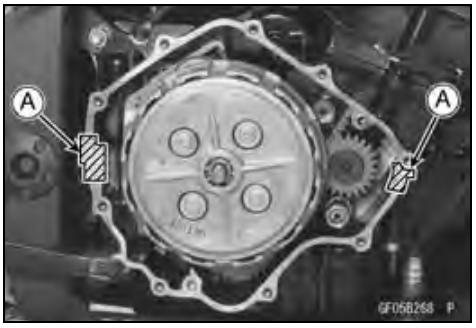


- Remove:
  Engine Oil (Drain, see Engine Oil Change in the Periodic Maintenance chapter)
  Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Clutch Cable Lower End [A]
  Clutch Cover Bolts [B]



- Turn the release lever [A] toward the rear as shown in the figure, and remove the clutch cover [B].
  About 90° [C]

Clutch Cover Installation



- Apply silicone sealant to the area [A] where the mating surface of the crankcase touches the clutch cover gasket.

  Sealant - Kawasaki Bond (Silicone Sealant): 92104-0004

- Replace the clutch cover gasket with a new one.
- Tighten the clutch cover bolts.

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

Release Shaft Removal

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

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

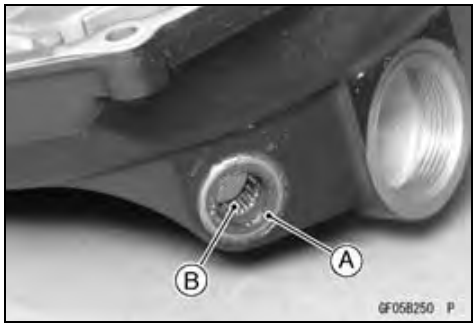
Release Shaft Installation

- Apply grease to the oil seal lips on the upper ridge of the clutch cover.
- Apply engine oil to the needle bearing in the hole of the clutch cover.
- Apply molybdenum disulfide grease to the pusher-holding portion on the release shaft.
- Insert the release shaft straight into the upper hole of the clutch cover.

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

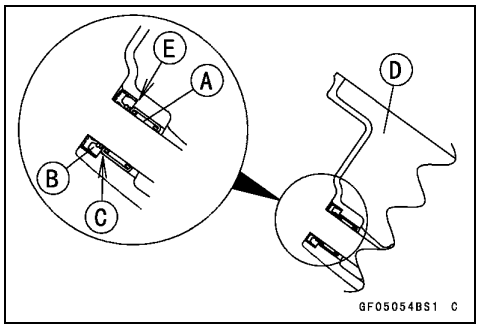
Clutch Cover

Clutch Cover Disassembly



● Remove:
Oil Seal [A]
Needle Bearing [B]
Oil Level Gauge

Clutch Cover Assembly



● Replace the needle bearing and oil seal with new ones.

NOTE

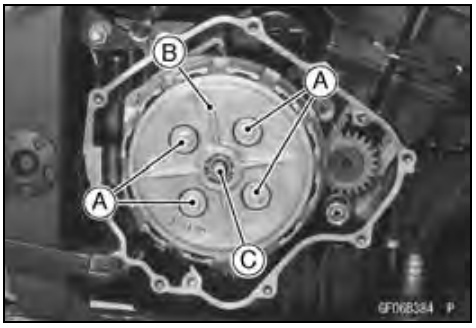
○*Install the needle bearing so that the manufacture's mark face out.*

● Install the needle bearing [A] and oil seal [B] position as shown in the figure.
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].

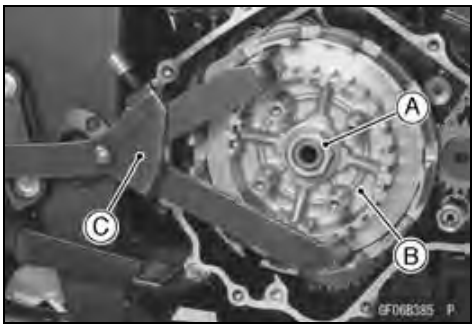
● Install the oil level gauge until the bottom.

Clutch

Clutch Removal



● Remove:
Clutch Cover (see Clutch Cover Removal)
Clutch Spring Bolts [A]
Clutch Springs
Clutch Spring Plate [B] (with Bearing and Pusher [C])



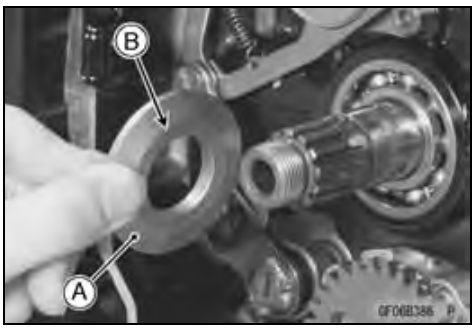
● Remove:
Friction Plates and Steel Plates
Clutch Hub Nut [A]

○Holding the clutch hub [B], remove the nut and washer.

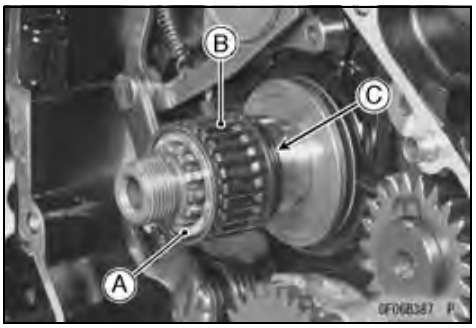
Special Tool - Clutch Holder [C]: 57001-1243

● Remove:
Clutch Hub
Spacer
Needle Bearing
Bushing
Clutch Housing
Thrust Spacer

Clutch Installation



● Install the thrust spacer [A] so that the chamfer side [B] faces inward.



● Install the bushing [A] and needle bearing [B].

○Install the snap ring [C] on the bushing so that it faces inward.

● Install the clutch housing, spacer, clutch hub, washer and clutch hub nut.

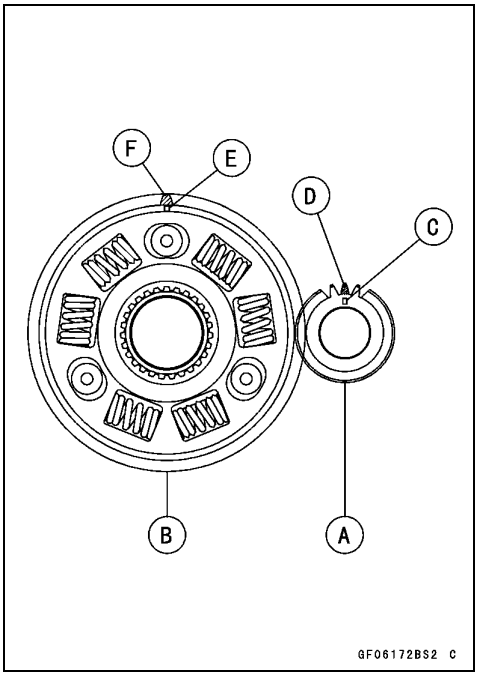
○Holding the clutch hub, tighten the clutch hub nut.

Special Tool - Clutch Holder: 57001-1243

Torque - Clutch Hub Nut: 132 N·m (13.5 kgf·m, 97.4 ft·lb)

Clutch

- If the clutch housing is replaced with a new one, select the proper clutch housing in accordance with the combination of the clutch housing gear and crankshaft primary gear markings with colors.
  Crankshaft Primary Gear [A]
  Clutch Housing Gear [B]
- Be sure to confirm the marking and color on the clutch housing gear.

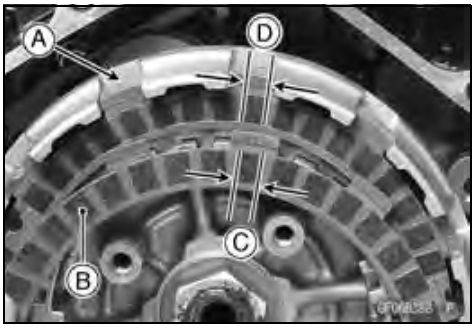


Clutch Housing Gear Selection when Replacing Clutch Housing Gear

Crankshaft		Clutch Housing		
Primary Gear Marking [C]	Color [D]	Gear Marking [E]	Color [F]	Part Number
A	White	A	White	13095-0095
A	White	B	Red	13095-0096
A	White	C	None	13095-0097
A	White	D	Yellow	13095-0098
B	Red	A	White	13095-0095
B	Red	B	Red	13095-0096
B	Red	C	None	13095-0097
B	Red	D	Yellow	13095-0098
C	None	B	Red	13095-0096
C	None	C	None	13095-0097
C	None	D	Yellow	13095-0098
D	Yellow	C	None	13095-0097
D	Yellow	D	Yellow	13095-0098

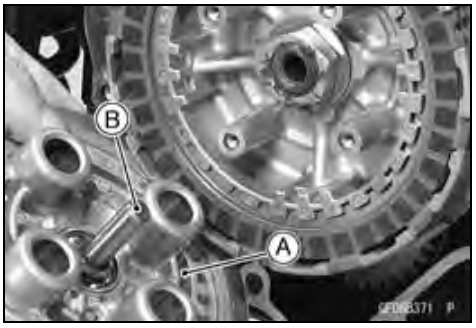
- Install the friction plate first and steel plate, and afterward install them alternately.

○The inner-end [A] and outer-end [B] friction plate blocks are wider than the others.
  Wider [C]
  Narrower [D]



Clutch

- Apply engine oil to the bearing, and install it.
- Apply molybdenum disulfide grease to the pusher ends.
- Install the clutch spring plate [A] with the pusher [B].



- Install the springs and tighten the clutch spring bolts.

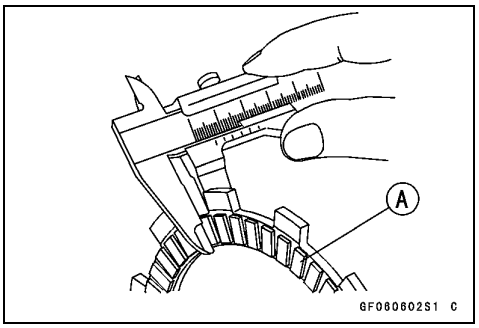
Torque - Clutch Spring Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

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

Clutch Plate 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.



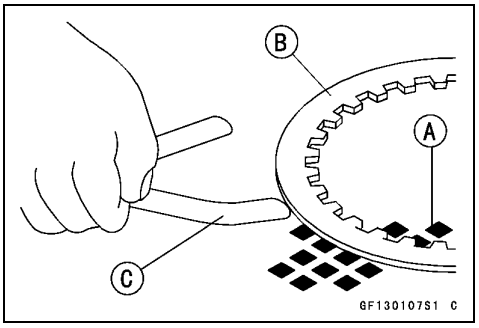
Friction Plate Thickness

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.



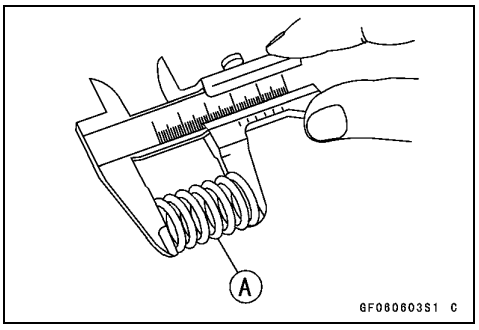
Friction and Steel Plate Warp

Standard:	**0.15 mm (0.0059 in.) or less**
Service Limit:	**0.3 mm (0.012 in.)**

Clutch Spring Free Length Inspection

- Measure the free length of the clutch springs [A].

★If any spring is shorter than the service limit, it must be replaced.



Clutch Spring Free Length

Standard:	**39.4 mm (1.55 in.)**
Service Limit:	**37.6 mm (1.48 in.)**

Engine Lubrication System

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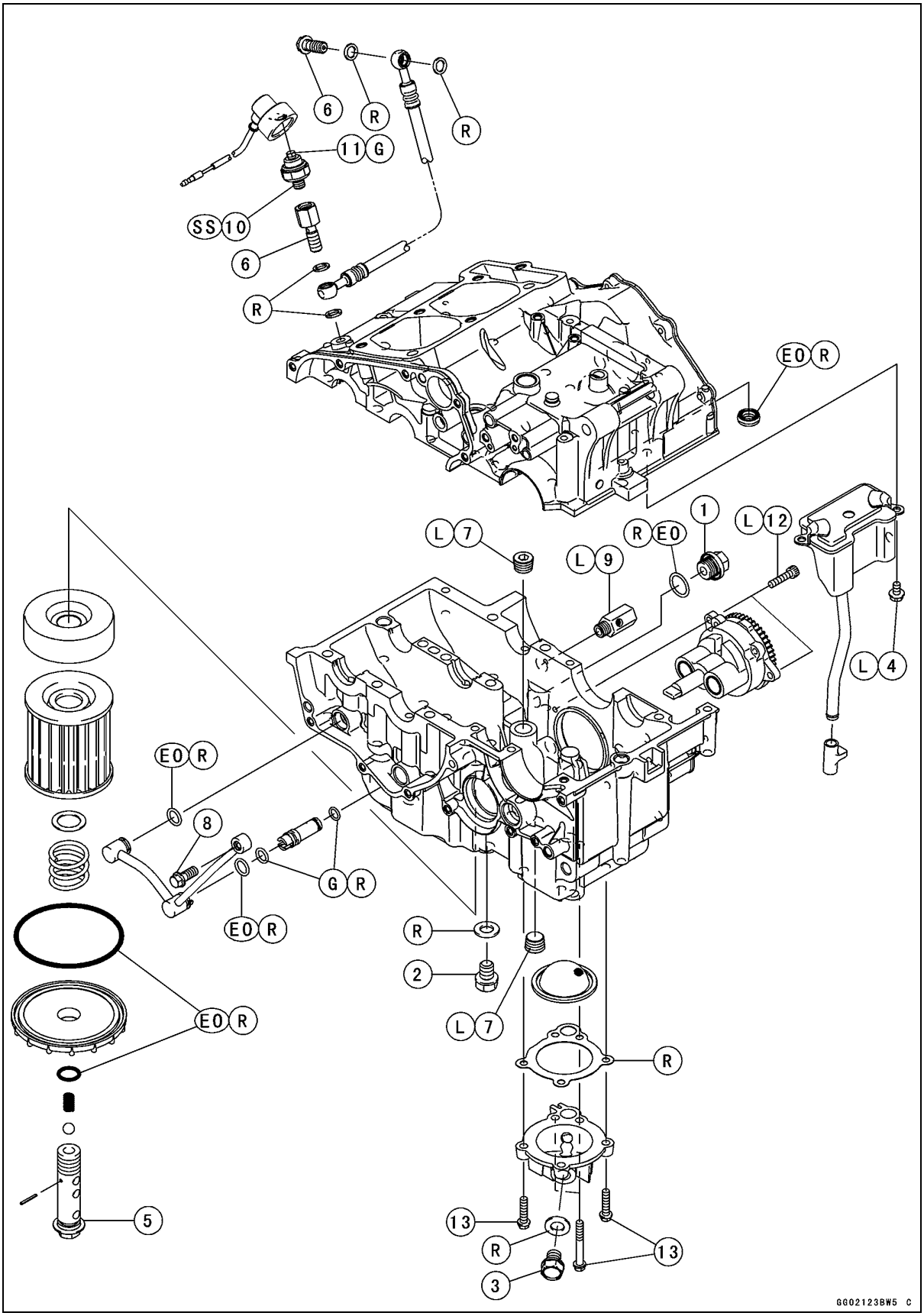
Exploded View

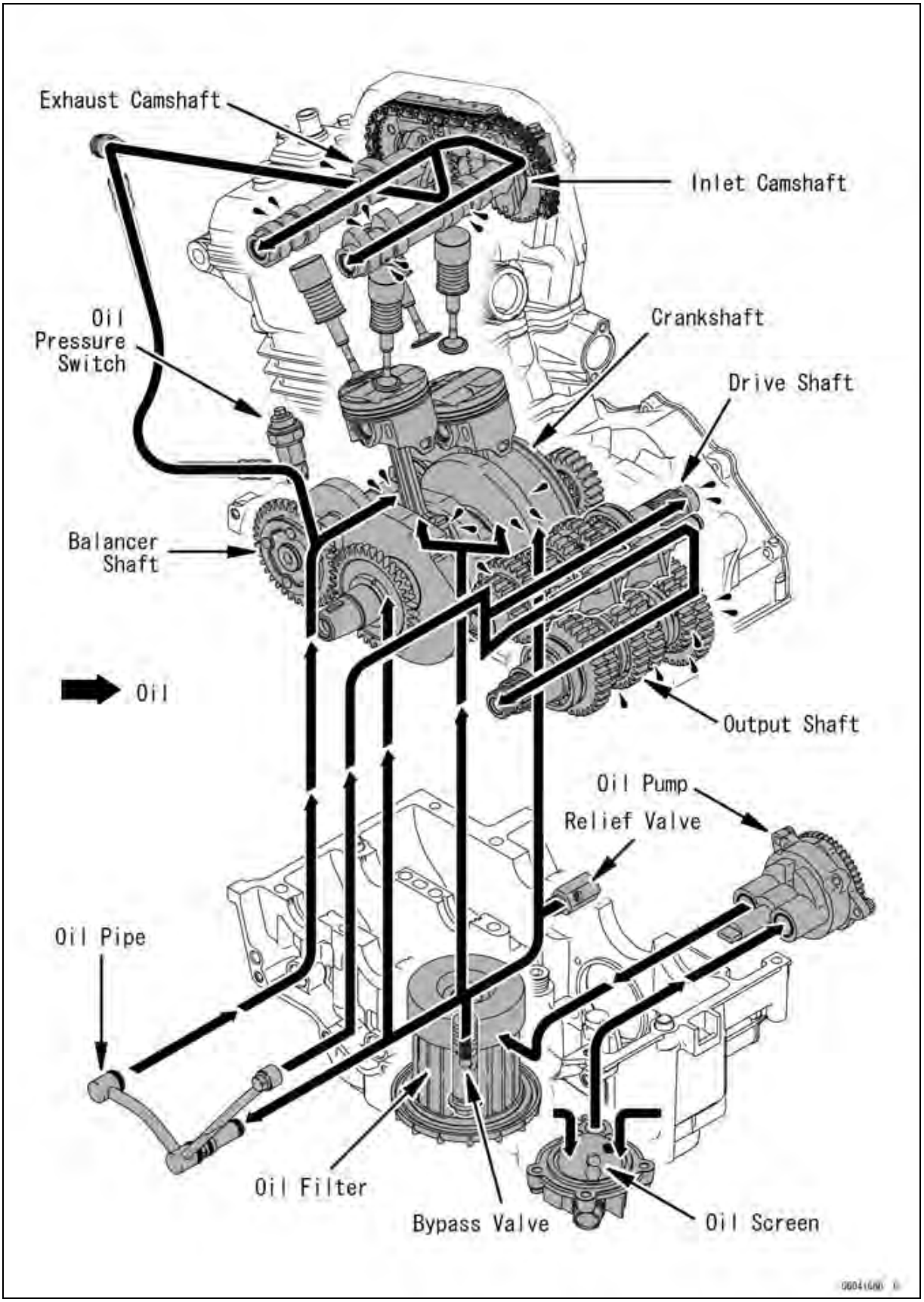


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Crankcase Oil Passage Plug	15	1.5	11	
2	Engine Oil Drain Bolt (Crankcase)	19.6	2.0	14.5	
3	Engine Oil Drain Bolt (Oil Screen Cover)	19.6	2.0	14.5	
4	Oil Breather Mounting Bolts	9.8	1.0	87 in·lb	L
5	Oil Filter Mounting Bolt	19.6	2.0	14.5	
6	Oil Hose Banjo Bolts	19.6	2.0	14.5	
7	Oil Passage Plugs	20	2.0	15	L
8	Oil Pipe Banjo Bolt	12	1.2	106 in·lb	
9	Oil Pressure Relief Valve	15	1.5	11	L
10	Oil Pressure Switch	15	1.5	11	SS
11	Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	G
12	Oil Pump Mounting Bolts	9.8	1.0	87 in·lb	L
13	Oil Screen Cover Bolts	9.8	1.0	87 in·lb	

EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts
SS: Apply silicone sealant.

Engine Oil Flow Chart

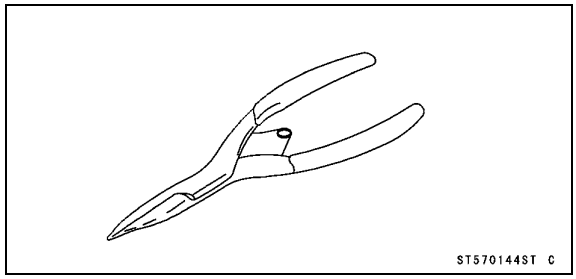


Specifications

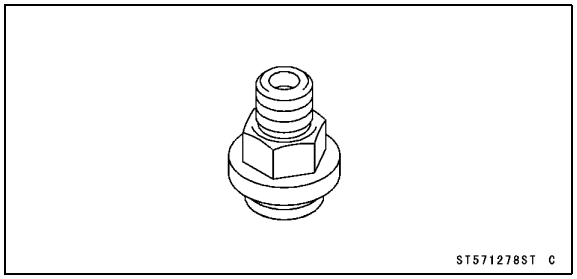
Item	Standard
Engine Oil	
Type	API SE, SF or SG API SH, SJ or SL with JASO MA
Viscosity	SAE 10W-40
Capacity	1.3 L (1.4 US qt) (when filter is not removed) 1.6 L (1.7 US qt) (when filter is removed) 1.7 L (1.8 US qt) (when engine is completely dry)
Level	Between upper and lower level lines (Wait 2 ~ 3 minutes after idling or running)
Oil Pressure Measurement	
Oil Pressure	98 ~ 147 kPa (1.0 ~ 1.5 kgf/cm², 14 ~ 21 psi) at 4 000 r/min (rpm), Oil Temperature 90°C (194°F)

Special Tools and Sealant

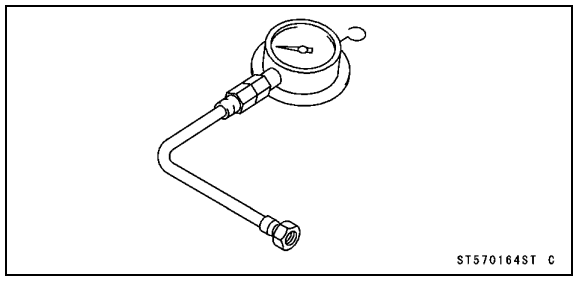
Outside Circlip Pliers:
57001-144



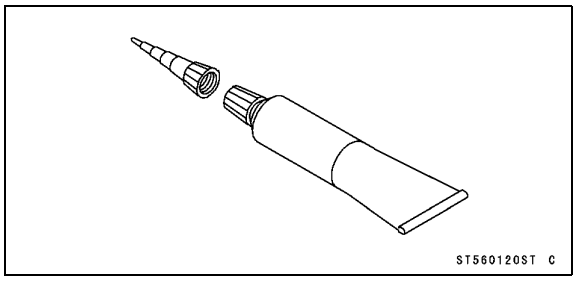
Oil Pressure Gauge Adapter, M18 × 1.5:
57001-1278



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



Kawasaki Bond (Silicone Sealant):
56019-120

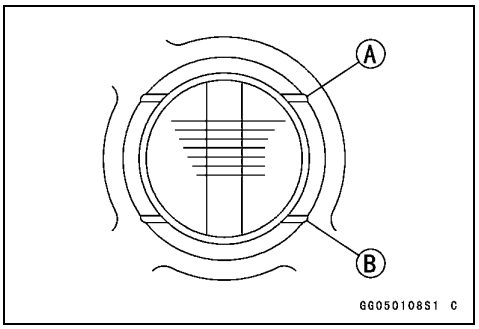


Engine Oil and Oil Filter

⚠ WARNING

Motorcycle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated wear and may result in engine or transmission seizure, accident, and injury.

Oil Level Inspection



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

NOTE

○*Situate the motorcycle so that it is perpendicular to the ground.*

○*If the motorcycle has just been used, wait several minutes for all the oil to drain down.*

○*If the oil has just been changed, start the engine and run it for several minutes at idle speed. This fills the oil filter with oil. Stop the engine, then wait several minutes until the oil settles.*

CAUTION

Racing the engine before the oil reaches every part can cause engine seizure.
If the engine oil gets extremely low or if the oil pump or oil passages clog up or otherwise do not function properly, the oil pressure warning 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

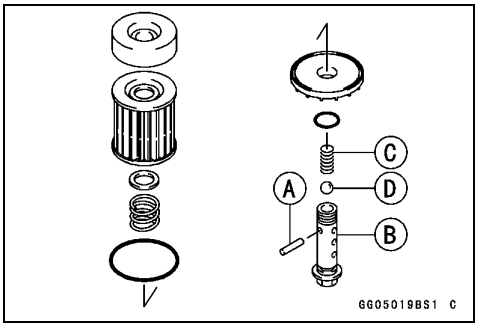
● Refer to the Engine Oil Change in the Periodic Maintenance chapter.

Oil Filter Replacement

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

Engine Oil and Oil Filter

Bypass Valve Disassembly



- Remove the oil filter (see Oil Filter Replacement in the Periodic Maintenance chapter).

NOTE

○*Oil draining is not necessary, but place the oil pan under the oil filter because oil drain a little at the oil filter removal.*

- Drive the retaining pin [A] out of the oil filter mounting bolt [B].
- Drop out the spring [C] and the bypass valve steel ball [D].

Bypass Valve Assembly

- Drop the bypass valve steel ball into the oil filter mounting bolt.
- Put the spring into the oil filter mounting bolt and compress it beyond the small hole.
- Drive the retaining pin into the small hole to hold the spring.
- Install the oil filter (see Oil Filter Replacement in the Periodic Maintenance chapter).

Bypass Valve Cleaning and Inspection

- Disassemble the bypass valve (see Bypass Valve Disassembly).
- Clean the bypass valve parts in a high-flash point solvent.

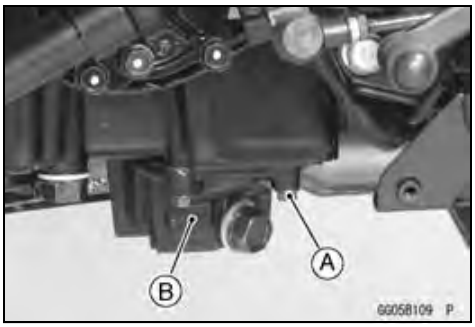
⚠ WARNING

Clean the parts in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low-flash point solvent.

- Visually inspect the bypass valve parts.

★If there is any damaged part, replace it.

Oil Screen Cleaning and Inspection



- Remove the bolts [A] and oil screen cover [B].
- Clean the oil screen [C] with high-flash point solvent and remove any particles stuck to it.

⚠ WARNING

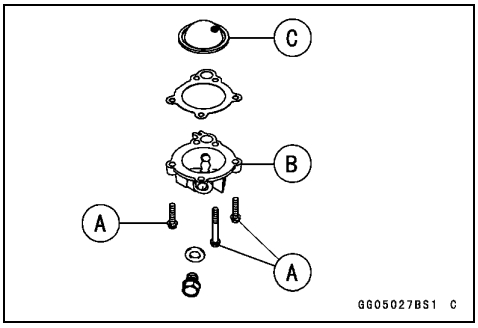
Clean the screen in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low-flash point solvent.

NOTE

○*While cleaning the screen, check for any metal particles that might indicate internal engine damage.*

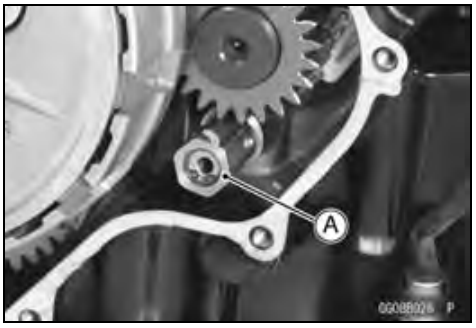
- Check the screen carefully for any damage; holes and broken wires.

★If the screen is damaged, replace the oil screen.



Oil Pressure Relief Valve

Oil Pressure Relief Valve Removal



- Remove the clutch cover (see Clutch Cover Removal in the Clutch chapter).
- Unscrew the oil pressure relief valve [A] from the crankcase.

Oil Pressure Relief Valve Installation

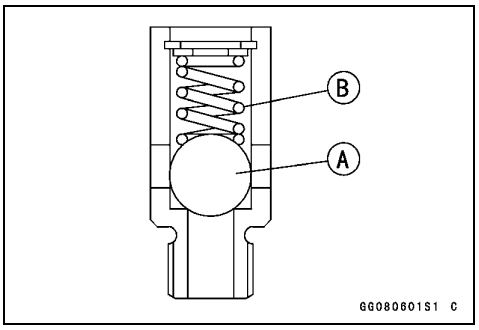
- Apply a non-permanent locking agent to the threads of the relief valve, and tighten it.

CAUTION

Do not apply too much non-permanent locking agent to the threads. This may block the oil passage.

Torque - Oil Pressure Relief Valve: 15 N·m (1.5 kgf·m, 11 ft·lb)

Oil Pressure Relief Valve Inspection



- Check to see if the valve [A] slides smoothly when pushing it in with a wooden or other soft rod, and see if it comes back to its seat by spring [B] pressure.

NOTE

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

★If any rough spots are found during above inspection, wash the valve clean with a high-flash point solvent and blow out any foreign particles that may be in the valve with compressed air.

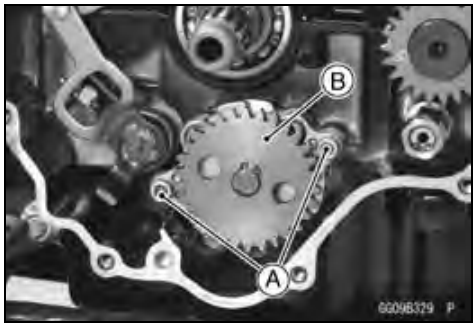
⚠ WARNING

Clean the oil pressure relief valve in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low-flash point solvent.

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

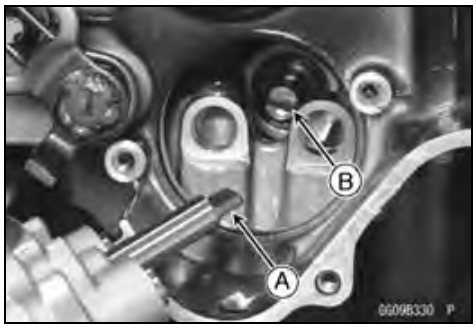
Oil Pump

Oil Pump Removal



● Remove:
Clutch (see Clutch Removal in the Clutch chapter)
Oil Pump Mounting Bolts [A]
Oil Pump [B]

Oil Pump Installation



● Fill the oil pump with engine oil for initial lubrication.
● Turn the oil pump shaft so that the projection [A] in its shaft fits into the slot [B] of the water pump shaft.
● Apply a non-permanent locking agent to the threads of the oil pump mounting bolts, and tighten them.

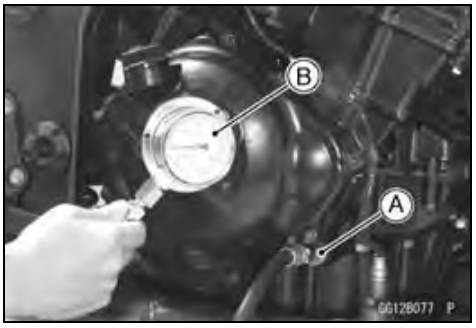
Torque - Oil Pump Mounting Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

Oil Pump Inspection

● Visually inspect the oil pump body, inner and outer rotors and cover.
★If there is any damage or uneven wear, replace the oil pump as an assembly.

Oil Pressure Measurement

Oil Pressure Measurement



- Remove the right lower fairing (see Lower Fairing Removal in the Frame chapter).
- Remove the oil passage plug, and attach the adapter [A] and gauge [B] to the plug hole.

Special Tools - Oil Pressure Gauge, 10 kgf/cm²: 57001-164
Oil Pressure Gauge Adapter, M18 × 1.5: 57001-1278

- 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: 98 ~ 147 kPa (1.0 ~ 1.5 kgf/cm², 14 ~ 21 psi) at 4 000 r/min (rpm), Oil Temperature 90°C (194°F)

- Stop the engine.
- Remove the oil pressure gauge and adapter.

⚠ WARNING

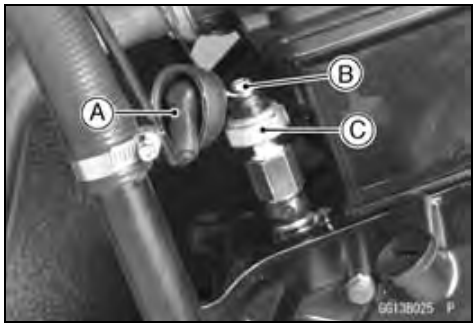
Take care against burns form hot engine oil that will drain through the oil passage when the gauge adapter is removed.

- Tighten:

Torque - Crankcase Oil Passage Plug: 15 N·m (1.5 kgf·m, 11 ft·lb)

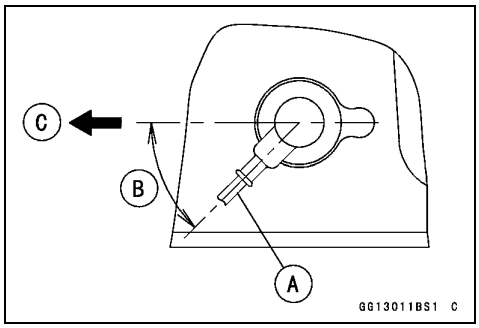
Oil Pressure Switch

Oil Pressure Switch Removal



- Remove:
  Left 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



- Apply silicone sealant to the threads of the oil pressure switch, and tighten it.

  Sealant - Kawasaki Bond (Silicone Sealant): 56019-120

  Torque - Oil Pressure Switch: 15 N·m (1.5 kgf·m, 11 ft·lb)

- Install the switch lead [A] as shown in the figure.
  45° [B]
  Front [C]
- Apply grease to the terminal.
- Tighten the terminal bolt.

  Torque - Oil Pressure Switch Terminal Bolt: 1.5 N·m (0.15 kgf·m, 13 in·lb)

- Cover the switch.
- Install the left lower fairing (see Lower Fairing Installation in the Frame chapter).

Engine Removal/Installation

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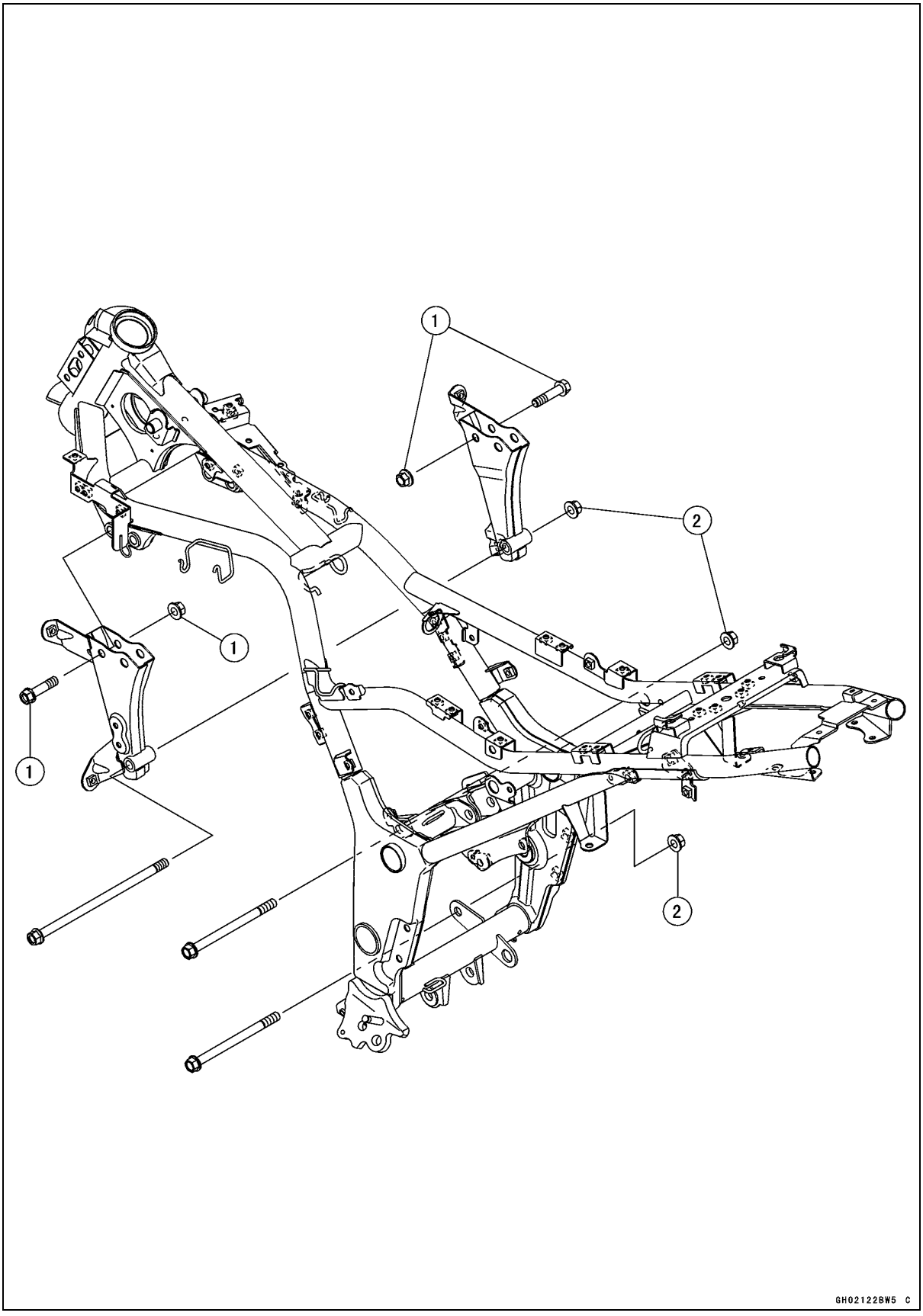
Exploded View

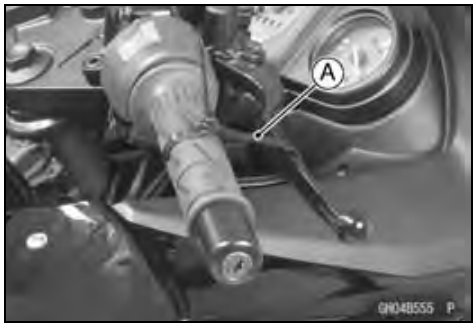


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Engine Mounting Bracket Bolts and Nuts	69	7.0	51	
2	Engine Mounting Nuts	69	7.0	51	

Engine Removal/Installation

Engine Removal



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

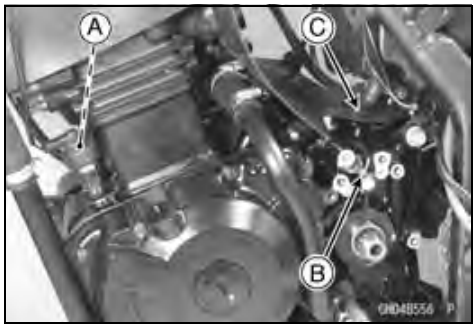
⚠ WARNING

Be sure to hold the front brake when removing the engine, or the motorcycle may fall over. It could cause an accident and injury.

CAUTION

Be sure to hold the front brake when removing the engine, or the motorcycle may fall over. The engine or the motorcycle could be damaged.

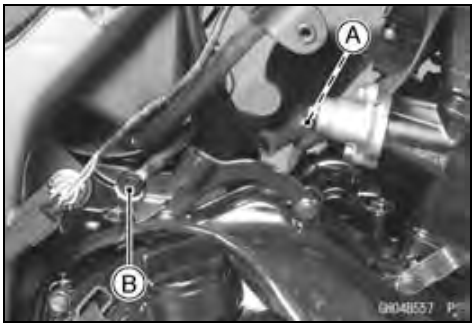
- Remove:
  Engine Oil (Drain, see Engine Oil Change in the Periodic Maintenance chapter)
  Coolant (Drain, see Coolant Change in the Periodic Maintenance chapter)
  Lower Fairings (see Lower Fairing Removal in the Frame chapter)
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Clutch Cable Lower End (see Clutch Cable Removal in the Clutch chapter)
  Coolant Reserve Tank (see Coolant Reserve Tank Removal in the Cooling System chapter)
  Radiator (see Radiator and Radiator Fan Removal in the Cooling System chapter)
  Exhaust Pipe (see Exhaust Pipe Removal in the Engine Top End chapter)
  Air Switching Valve (see Air Switching Valve Removal in the Engine Top End chapter)
  Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
  Shift Lever (see Shift Pedal Removal in the Crankshaft/Transmission chapter)
  Engine Sprocket (see Engine Sprocket Removal in the Final Drive chapter)
  Regulator/Rectifier (see Regulator/Rectifier Inspection in the Electrical System chapter)



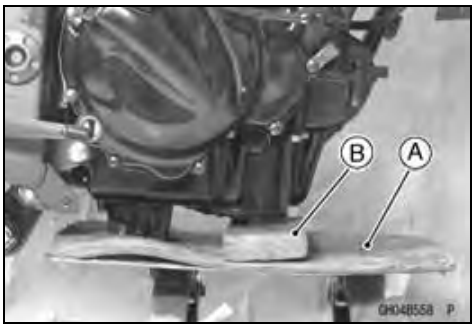
- Remove:
  Oil Pressure Switch Lead [A]
  Neutral Switch Lead Connector [B]
  Breather Hose End [C]

Engine Removal/Installation

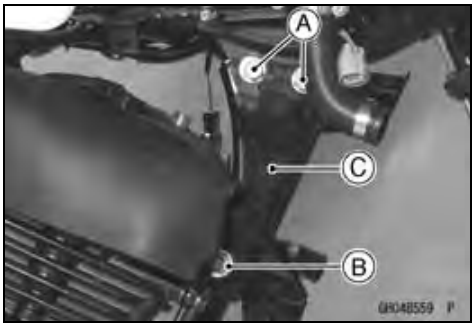
● Remove:
Starter Motor Cable [A]
Engine Ground Cable Terminal Bolt [B]
Alternator and Crankshaft Sensor Lead Connectors (see Alternator Cover Removal in the Electrical System chapter)
Stick Coil Lead Connectors (see Stick Coil Removal in the Electrical System chapter)



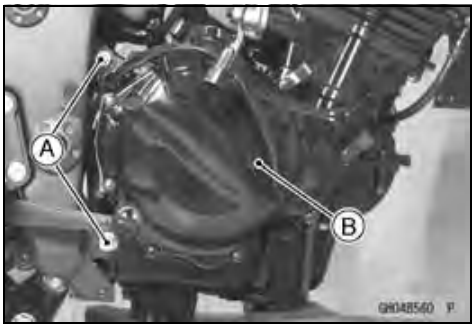
● Support the engine with a suitable stand [A].
○Put a plank [B] onto the suitable stand for engine balance.



● Remove:
Engine Mounting Bracket Nuts and Bolts [A] (Both Sides)
Engine Mounting Nut [B] and Bolt
Engine Mounting Brackets [C] (Both Sides)



● Remove:
Engine Mounting Nuts [A] and Bolts
Engine [B]

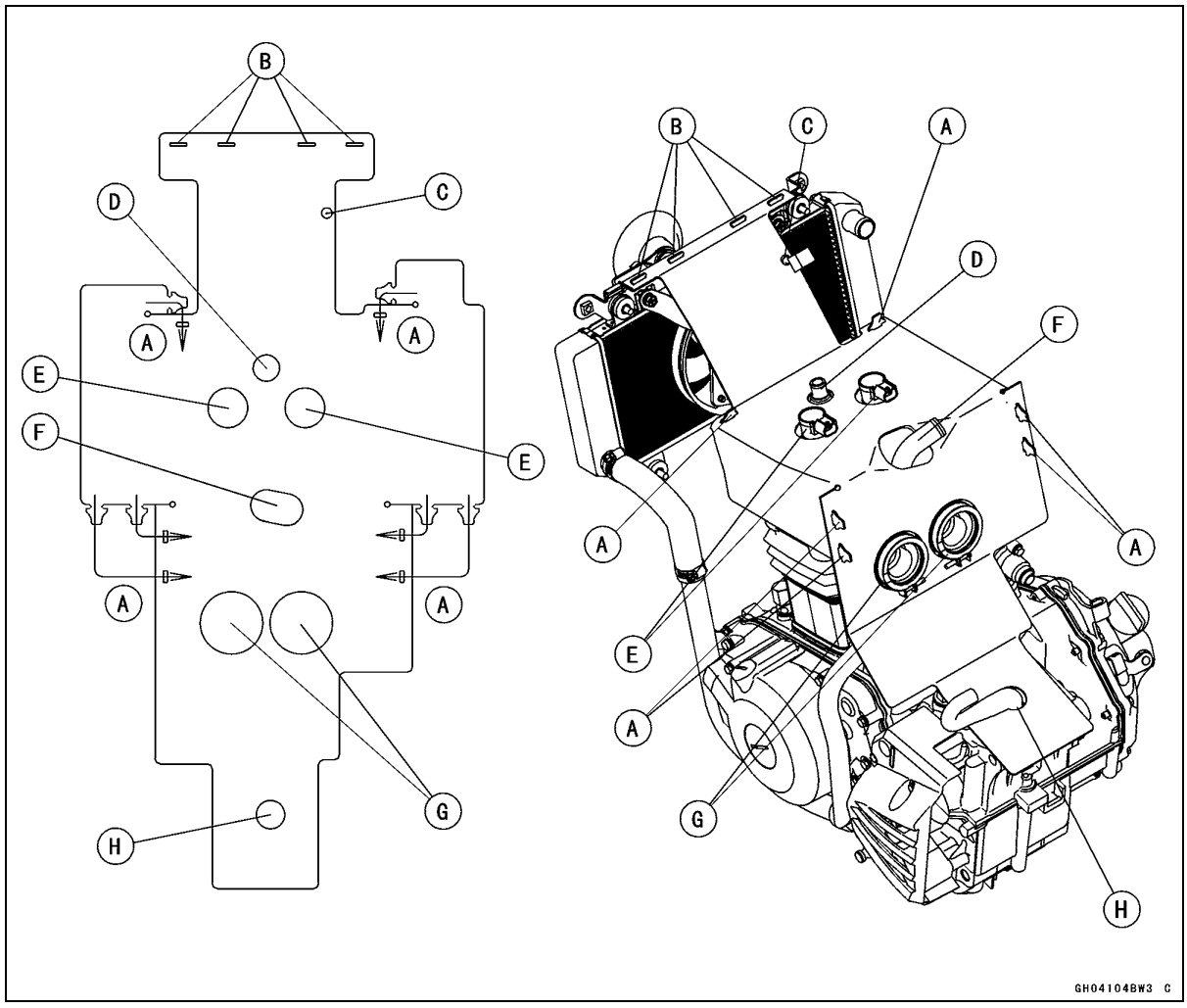


Engine Installation

● Support the engine with a suitable stand.
○Put a plank onto the suitable stand for engine balance.

Engine Removal/Installation

- Install the heat insulation rubber plate as shown in the figure.



A: After installation, set the projection in the hole.
B: To Radiator
C: To Fan Motor Lead
D: To Air Suction Valve Cover
E: To Stick Coils
F: To Water Pipe
G: To Throttle Body Assy Holders
H: To Breather Hose

- Insert the lower engine mounting bolt [A] first while supporting the engine. Then insert the upper engine mounting bolt [B], and tighten the nuts lightly.

Engine Removal/Installation

- Before tightening the mounting nuts, install the engine mounting brackets. When inserting the front engine mounting bolt, use the suitable stand under the engine to lift it.
- Tighten:

Torque - Engine Mounting Bracket Bolts and Nuts: 69 N·m (7.0 kgf·m, 51 ft·lb)
Engine Mounting Nuts: 69 N·m (7.0 kgf·m, 51 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)
  Clutch Cable (see Clutch Operation Inspection in the Periodic Maintenance chapter)
  Drive Chain (see Drive Chain Slack Inspection in the Periodic Maintenance chapter)
- Fill the engine with engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Fill the engine with coolant (see Coolant Change in the Periodic Maintenance chapter).

Crankshaft/Transmission

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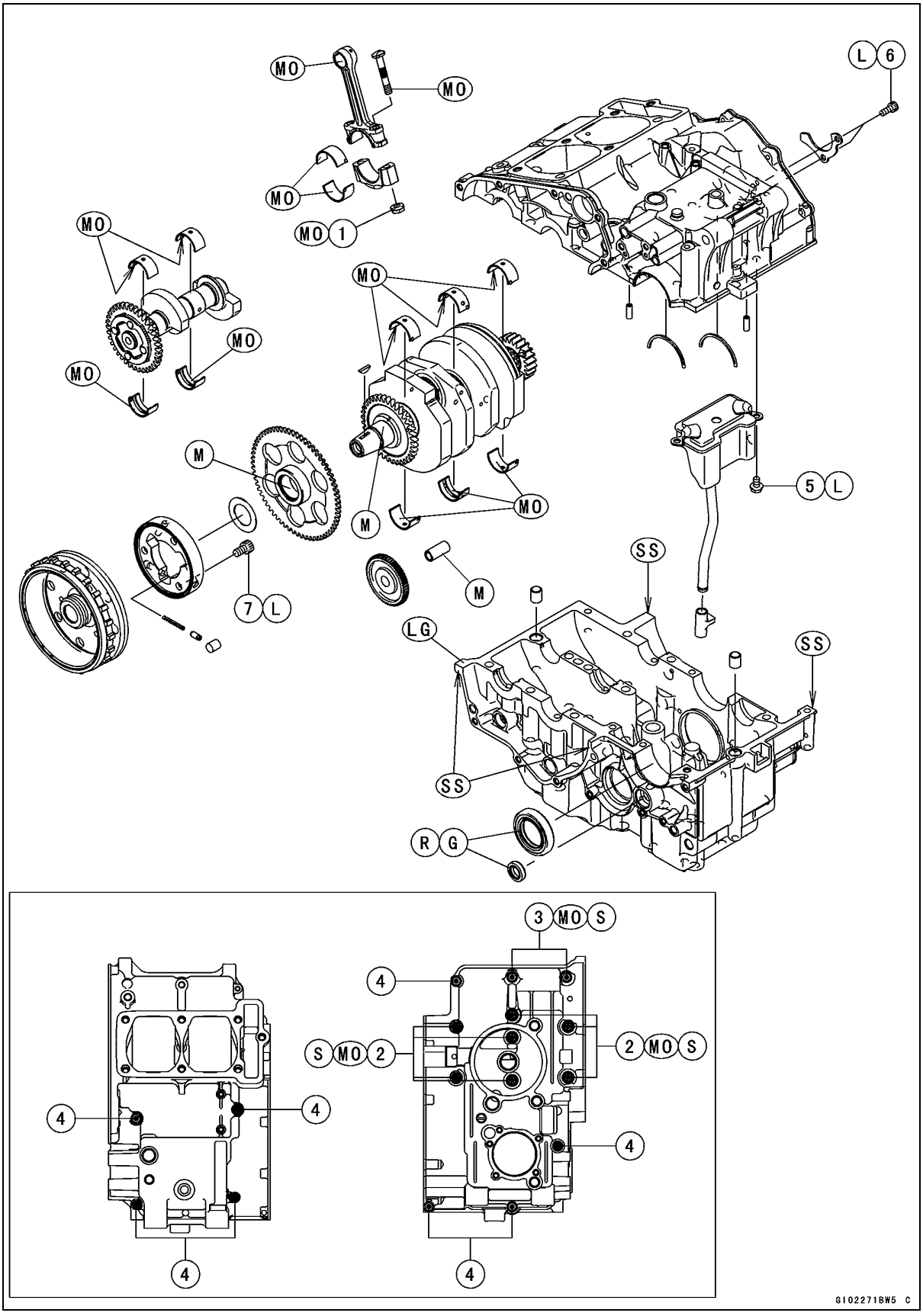
Exploded View

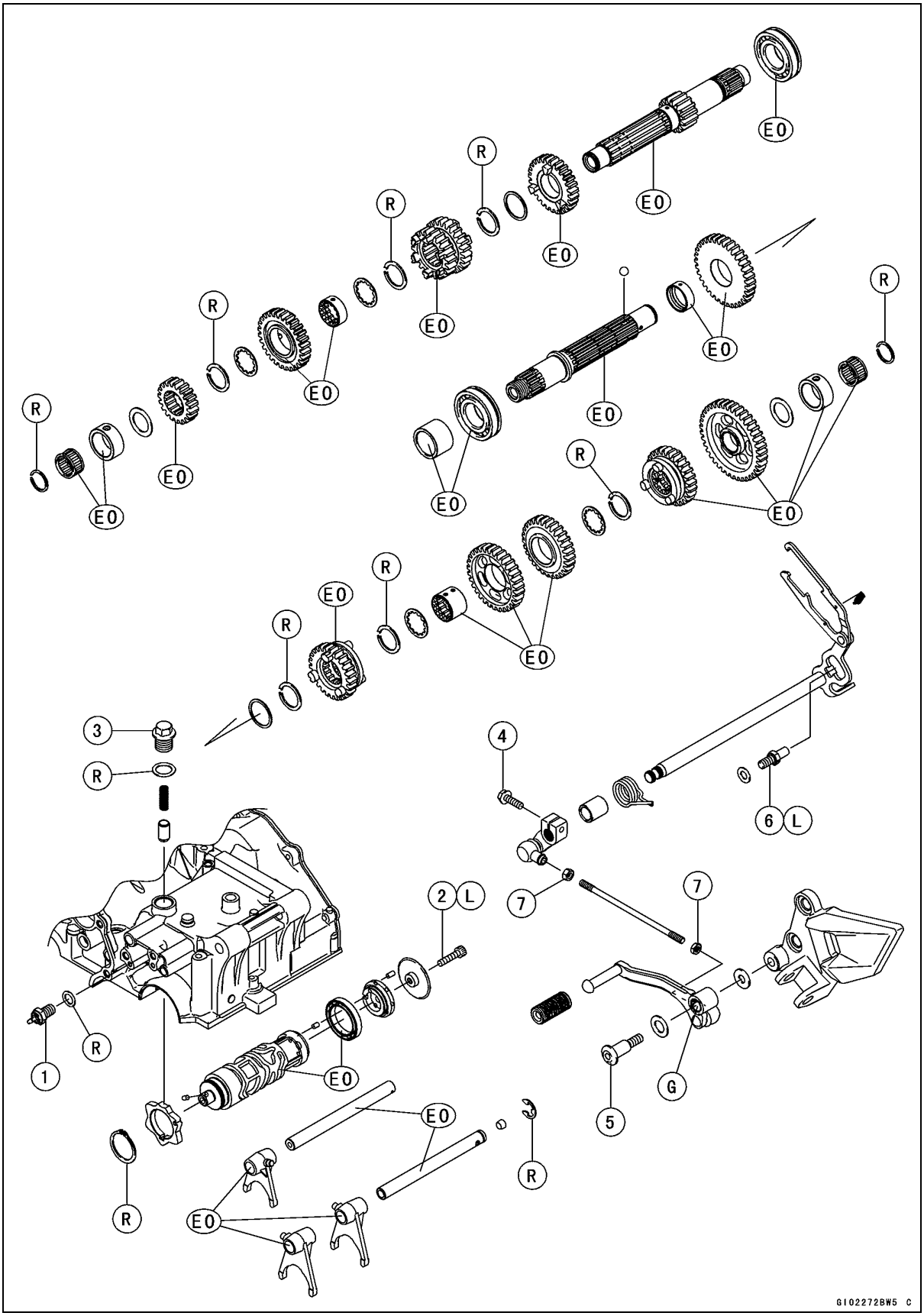


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Connecting Rod Big End Nuts	27.5	2.8	20	MO
2	Crankcase Bolts (M8, L = 90 mm)	24	2.4	18	MO, S
3	Crankcase Bolts (M8, L = 73 mm)	19	1.9	14	MO, S
4	Crankcase Bolts (M6)	12	1.2	106 in·lb	
5	Oil Breather Mounting Bolts	9.8	1.0	87 in·lb	L
6	Shift Drum Bearing Holder Bolts	12	1.2	106 in·lb	L
7	Starter Motor Clutch Bolts	34.3	3.5	25	L

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.
SS: Apply silicone sealant.

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Neutral Switch	15	1.5	11	
2	Shift Drum Pin Plate Bolt	9.0	0.92	80 in·lb	L
3	Shift Drum Positioning Bolt	24.5	2.5	18	
4	Shift Lever Bolt	12	1.2	106 in·lb	
5	Shift Pedal Mounting Bolt	25	2.5	18	
6	Shift Shaft Return Spring Pin	19.6	2.0	14.5	L
7	Tie-Rod Locknuts	7.0	0.71	62 in·lb	

EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts

Specifications

Item	Standard	Service Limit
Crankshaft, Connecting Rods		
Connecting Rod Bend	– – –	TIR 0.2/100 mm (0.008/3.94 in.)
Connecting Rod Twist	– – –	TIR 0.2/100 mm (0.008/3.94 in.)
Connecting Rod Big End Side Clearance	0.13 ~ 0.38 mm (0.0051 ~ 0.0150 in.)	0.58 mm (0.023 in.)
Connecting Rod Big End Bearing Insert/Crankpin Clearance	0.031 ~ 0.059 mm (0.0012 ~ 0.0023 in.)	0.10 mm (0.004 in.)
Crankpin Diameter:	29.984 ~ 30.000 mm (1.1805 ~ 1.1811 in.)	29.97 mm (1.1799 in.)
Marking		
None	29.984 ~ 29.994 mm (1.1805 ~ 1.1809 in.)	– – –
○	29.995 ~ 30.000 mm (1.1809 ~ 1.1811 in.)	– – –
Connecting Rod Big End Inside Diameter:	33.000 ~ 33.016 mm (1.2992 ~ 1.2998 in.)	– – –
Marking		
None	33.000 ~ 33.008 mm (1.2992 ~ 1.2995 in.)	– – –
○	33.009 ~ 33.016 mm (1.2996 ~ 1.2998 in.)	– – –
Connecting Rod Big End Bearing Insert Thickness:		
Brown	1.480 ~ 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.)	– – –
Crankshaft Side Clearance	0.05 ~ 0.20 mm (0.0020 ~ 0.0079 in.)	0.40 mm (0.0157 in.)
Crankshaft Runout	TIR 0.02 mm (0.0008 in.) or less	TIR 0.05 mm (0.0020 in.)
Crankshaft Main Bearing Insert/Journal Clearance	0.014 ~ 0.038 mm (0.0006 ~ 0.0015 in.)	0.07 mm (0.0028 in.)
Crankshaft Main Journal Diameter:	27.984 ~ 28.000 mm (1.1017 ~ 1.1024 in.)	27.96 mm (1.101 in.)
Marking		
None	27.984 ~ 27.992 mm (1.1017 ~ 1.1020 in.)	– – –
1	27.993 ~ 28.000 mm (1.1021 ~ 1.1024 in.)	– – –
Crankcase Main Bearing Inside Diameter:	31.000 ~ 31.016 mm (1.2205 ~ 1.2211 in.)	– – –

Specifications

Item	Standard	Service Limit
Marking		
○	31.000 ~ 31.008 mm (1.2205 ~ 1.2208 in.)	– – –
None	31.009 ~ 31.016 mm (1.2208 ~ 1.2211 in.)	– – –
Crankshaft Main Bearing Insert Thickness:		
Black	1.495 ~ 1.499 mm (0.05885 ~ 0.05902 in.)	– – –
Blue	1.499 ~ 1.503 mm (0.05902 ~ 0.05917 in.)	– – –
Yellow	1.503 ~ 1.507 mm (0.05917 ~ 0.05933 in.)	– – –
Balancer		
Balancer Shaft Bearing Insert/Journal Clearance	0.020 ~ 0.044 mm (0.0008 ~ 0.0017 in.)	0.07 mm (0.0028 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 ~ 25.994 mm (1.0230 ~ 1.0234 in.)	– – –
○	25.995 ~ 26.000 mm (1.0234 ~ 1.0236 in.)	– – –
Crankcase Main 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 (0.05885 ~ 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 (0.193 ~ 0.197 in.)	4.8 mm (0.189 in.)
Gear Groove Width	5.05 ~ 5.15 mm (0.199 ~ 0.203 in.)	5.3 mm (0.209 in.)
Shift Fork Guide Pin Diameter	5.9 ~ 6.0 mm (0.232 ~ 0.236 in.)	5.8 mm (0.228 in.)
Shift Drum Groove Width	6.05 ~ 6.20 mm (0.238 ~ 0.244 in.)	6.3 mm (0.248 in.)

Specifications

Connecting Rod Big End Bearing Insert Selection

Con-rod Big End Inside Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Size Color	Part Number
None	○	Brown	92028-1494
None	None	Black	92028-1493
○	○		
○	None	Blue	92028-1492

Crankshaft Main Bearing Insert Selection

Crankcase Main Bearing Inside Diameter Marking	Crankpin Main Journal Diameter Marking	Bearing Insert*		
		Size Color	Part Number	Journal Nos.
○	1	Black	92028-1487	1, 3
			92028-1490	2
○	None	Blue	92028-1486	1, 3
None	1		92028-1489	2
None	None	Yellow	92028-1582	1, 3
			92028-1586	2

*: The bearing insert for Nos. 2 journal have an oil groove.

Balancer Shaft Bearing Insert Selection

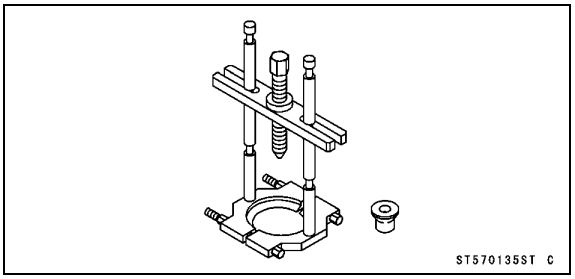
Crankcase Main Bearing Inside Diameter Marking	Balancer Shaft Journal Diameter Marking	Bearing Insert	
		Size Color	Part Number
○	○	Brown	92028-1424
○	None	Black	92028-1423
None	○		
None	None	Blue	92028-1422

Crankshaft Selection when Replacing Crankshaft

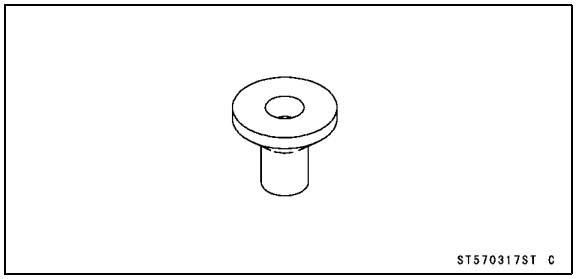
Clutch Housing		Crankshaft		
Gear Marking	Color	Primary Gear Marking	Color	Part Number
A	White	A	White	13031-0111
A	White	B	Red	13031-0112
B	Red	A	White	13031-0111
B	Red	B	Red	13031-0112
B	Red	C	None	13031-0113
C	None	A	White	13031-0111
C	None	B	Red	13031-0112
C	None	C	None	13031-0113
C	None	D	Yellow	13031-0114
D	Yellow	A	White	13031-0111
D	Yellow	B	Red	13031-0112
D	Yellow	C	None	13031-0113
D	Yellow	D	Yellow	13031-0114

Special Tools and Sealant

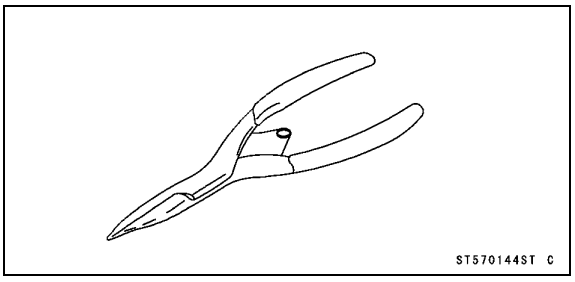
Bearing Puller:
57001-135



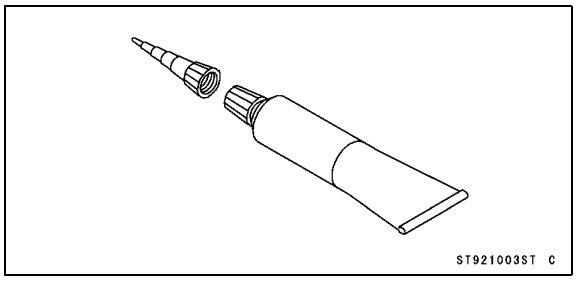
Bearing Puller Adapter:
57001-317



Outside Circlip Pliers:
57001-144



Kawasaki Bond(Liquid Gasket - Black):
92104-1064



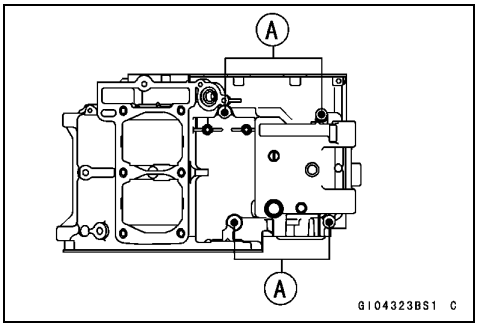
Crankcase

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:
  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 Screen (see Oil Screen Cleaning and Inspection in the Engine Lubrication System chapter)
  Cylinder Head (see Cylinder Head Removal in the Engine Top End chapter)
  Cylinder (see Cylinder Removal in the Engine Top End chapter)

★If the crankshaft is to be removed, remove the pistons (see Piston Removal in the Engine Top End chapter).

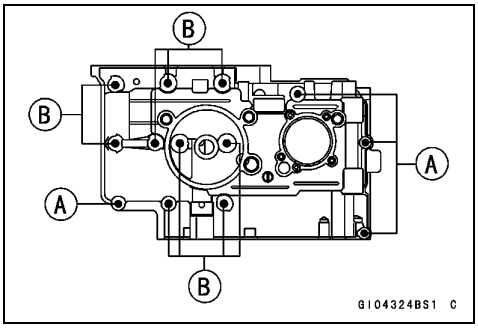
- Remove the upper crankcase bolts [A].



- Remove the lower crankcase bolts.

○First loosen the M6 bolts [A].
M8 Bolts [B]

- Tap lightly around the crankcase mating surface with a plastic mallet, and split the crankcase. Take care not to damage the crankcase.



Crankcase

Crankcase Assembly

CAUTION

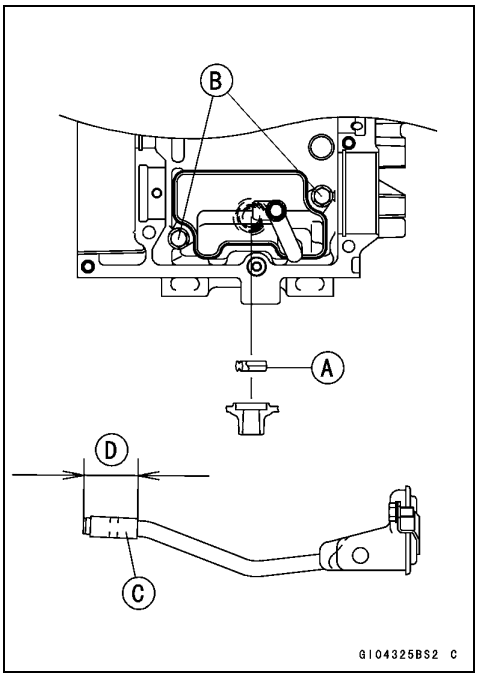
The upper and lower crankcase halves are machined at the factory in the assembled state, so the crankcase halves must be replaced as a set.

- With a high-flash point solvent, clean off the mating surfaces of the crankcase halves and wipe dry.
- Using compressed air, blow out the oil passages in the crankcase halves.

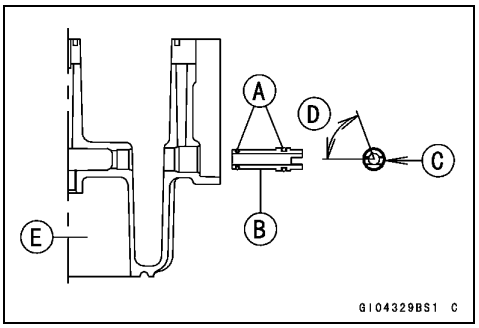
- Apply engine oil to the new O-ring [A].
- Apply a non-permanent locking agent to the threads of the oil breather mounting bolts [B] and tighten them.

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

- Install the breather hose [C] as shown in the figure.
  About 34.5 mm (1.36 in.) [D]

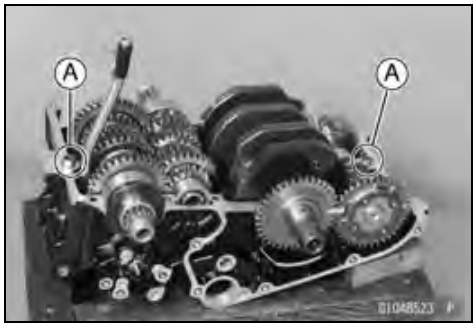


- Replace the O-rings [A] with new ones.
- Apply grease to the new O-rings.
- Install the oil passage pipe [B] as shown in the figure.
  Slit (Horizontal) [C]
  70° [D] (1 mm (0.04 in.) Hole direction)
  Lower Crankcase [E]



Crankcase

● 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)
Camshaft Chain
Transmission Shafts and Gears (see Transmission Shaft Installation)
Dowel Pins [A]



● Before fitting the lower case on the upper case, check the following.
○Be sure to hang the camshaft chain on the crankshaft.
○Check to see that the shift drum and transmission gears are in the neutral position.

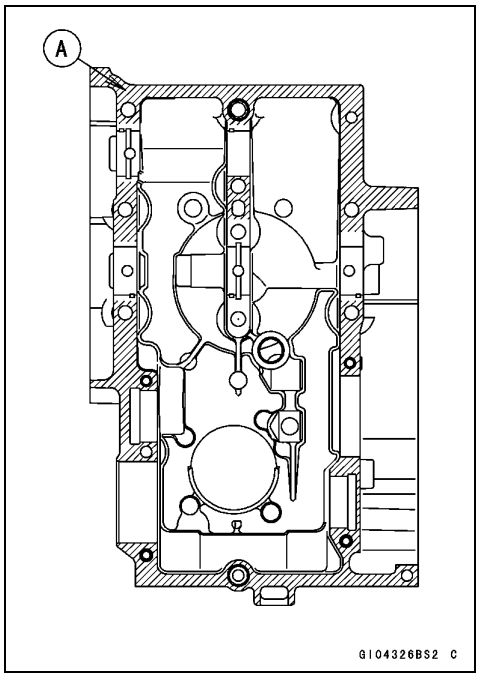
● Apply liquid gasket [A] to the mating surface of the lower crankcase half.

Sealant - Kawasaki Bond (Liquid Gasket - Black): 92104 -1064

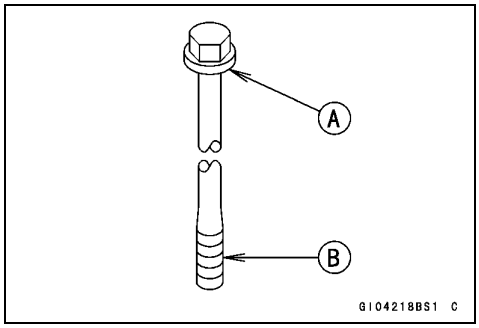
CAUTION

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

● Fit the lower crankcase to the upper crankcase.



● Apply molybdenum disulfide oil solution to the seating surface [A] and threads [B] of the M8 bolts.



Crankcase

● Tighten the lower crankcase bolts using the following steps.

○Following the sequence numbers on the lower crankcase half, tighten the M8 bolts [1 ~ 7] L= 90 mm (3.54 in.).

Torque - Crankcase Bolts (M8): 24 N·m (2.4 kgf·m, 18 ft·lb)

○Tighten the M8 bolts [8 ~ 9] L= 73 mm (2.87 in.).

Torque - Crankcase Bolts (M8): 19 N·m (1.9 kgf·m, 14 ft·lb)

○Tighten the M6 bolts.

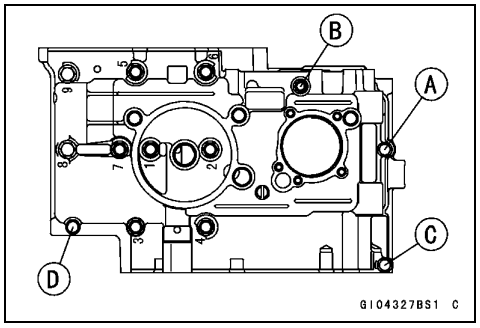
Torque - Crankcase Bolts (M6): 12 N·m (1.2 kgf·m, 106 in·lb)

L = 135 mm (5.31 in.) [A]

L = 85 mm (3.35 in.) [B] (with New Copper Washer)

L = 60 mm (2.36 in.) [C]

L = 38 mm (1.50 in.) [D]

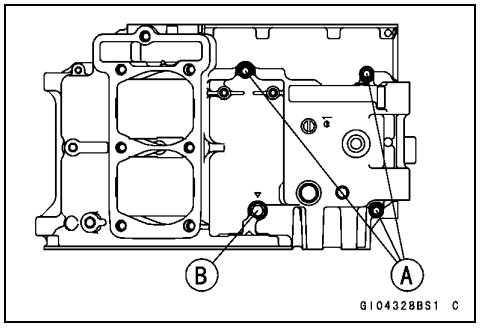


● Tighten the upper crankcase bolts in the order listed.

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

L= 85 mm (3.35 in.) [A]

L= 60 mm (2.36 in.) [B] (with New Copper Washer)



● After tightening all crankcase bolts, check the following items.

○Wipe up the liquid gasket that seeps out around the crankcase mating surface.

○Crankshaft and transmission shafts turn freely.

○While spinning the output shaft, gears shift smoothly from the 1st to 6th gear, and 6th to 1st.

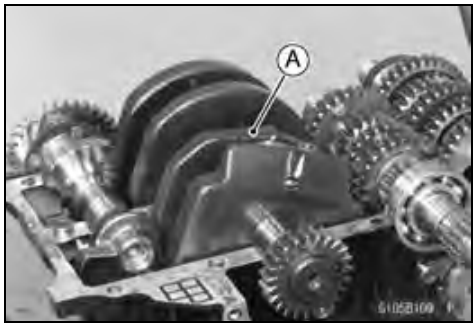
○When the output shaft stays still, the gear can not be shifted to 2nd gear or other higher gear positions.

● Install the removed parts (see appropriate chapters).

Crankshaft and Connecting Rods

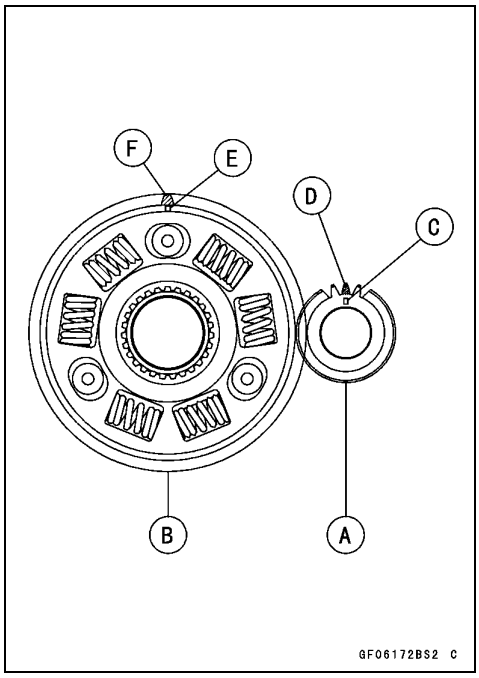
Crankshaft Removal

- Split the crankcase (see Crankcase Splitting).
- Removal the crankshaft [A].



Crankshaft Installation

- If the crankshaft is replaced with a new one, select the proper crankshaft in accordance with the combination of the crankshaft primary gear and clutch housing gear markings with colors.
  Crankshaft Primary Gear [A]
  Clutch Housing Gear [B]
- Be sure to confirm the marking and color on the crankshaft primary gear.



Crankshaft Selection when Replacing Crankshaft

Clutch Housing		Crankshaft		
Gear Marking [E]	Color [F]	Primary Gear Marking [C]	Color [D]	Part Number
A	White	A	White	13031-0111
A	White	B	Red	13031-0112
B	Red	A	White	13031-0111
B	Red	B	Red	13031-0112
B	Red	C	None	13031-0113
C	None	A	White	13031-0111
C	None	B	Red	13031-0112
C	None	C	None	13031-0113
C	None	D	Yellow	13031-0114
D	Yellow	A	White	13031-0111
D	Yellow	B	Red	13031-0112
D	Yellow	C	None	13031-0113
D	Yellow	D	Yellow	13031-0114

Crankshaft and Connecting Rods

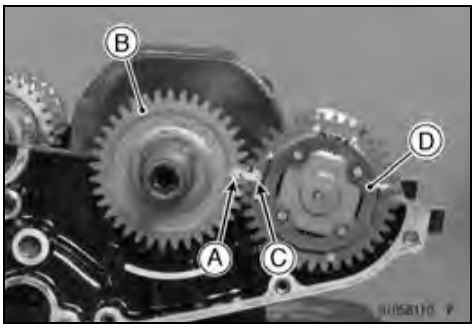
NOTE

○*If the crankshaft is replaced with a new one, refer to the Connecting Rod Big End Bearing Insert Selection in the Specifications.*

CAUTION

If the crankshaft, bearing inserts, or crankcase halves are replaced with new ones, select the bearing inserts and check clearance with a plastigage (press gauge) before assembling engine to be sure the correct bearing inserts are installed.

● Install the crankshaft.
○Align the timing mark [A] on the balancer drive gear [B] with the timing mark [C] on the balancer gear [D].
● Apply molybdenum disulfide oil solution to the crankshaft main bearing inserts.



Connecting Rod Removal

● Split the crankcase (see Crankcase Splitting).
● Remove:
Connecting Rod Big End Nuts [A]
Crankshaft

NOTE

○*Mark and record the locations of the connecting rods and their big end caps so that they can be reassembled in their original positions.*

● Remove the connecting rods from the crankshaft.

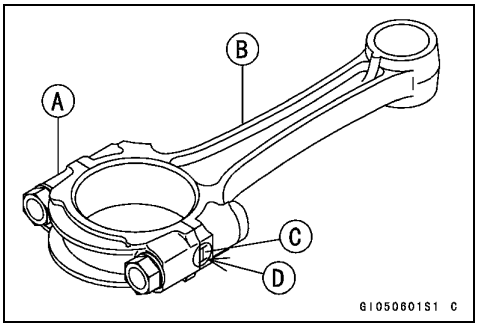
CAUTION

Discard the connecting rod bolts. To prevent damage to the crankpin surfaces, do not allow the connecting rod bolts to bump against the crankpins.

Connecting Rod Installation

CAUTION

To minimize vibration, the connecting rods should have the same weight mark.



Big End Cap [A]
Connecting Rod [B]
Weight Mark, Alphabet [C]
Diameter Mark (Around Weight Mark) [D]: "○" or no mark

Crankshaft and Connecting Rods

CAUTION

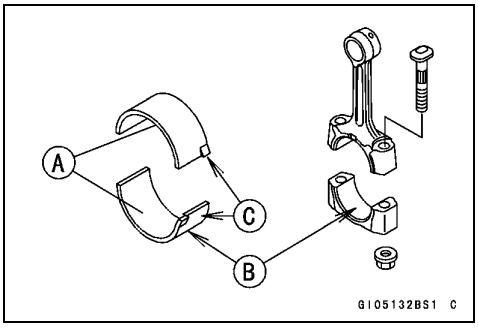
If the connecting rods, big end bearing inserts, or crankshaft are replaced with new ones, select the bearing insert and check clearance with a plastigage (press gauge) before assembling engine to be sure the correct bearing inserts are installed.

CAUTION

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.

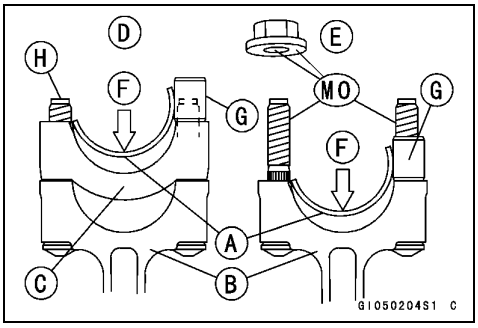
- Apply molybdenum disulfide oil solution to the inner surfaces of upper and lower bearing inserts [A].
- Do not apply any grease or oil to the cap inside and cap insert outside [B].
- Install the inserts so that their nails [C] are on the same side and fit them into the recess of the connecting rod and cap.



CAUTION

Wrong application of oil and grease could cause bearing damage.

○When installing the inserts [A], be careful not to damage the insert surface with the edge of the connecting rod [B] or the cap [C]. One way to install inserts is as follows.
  Installation [D] to Cap
  Installation [E] to Connecting Rod
  Push [F]
  Spare Dowel Pin [G]
  Connecting Rod Bolts [H]



- Install the cap on the connecting rod, aligning the weight and diameter marks.
- Remove debris and clean the surface of inserts.
- Apply molybdenum disulfide oil solution [MO] to the threads and seating surfaces of the big end nuts and bolts.

- Install the crankshaft (see Crankshaft Installation).
- Install each connecting rod on its original crankpin.
- Tighten:

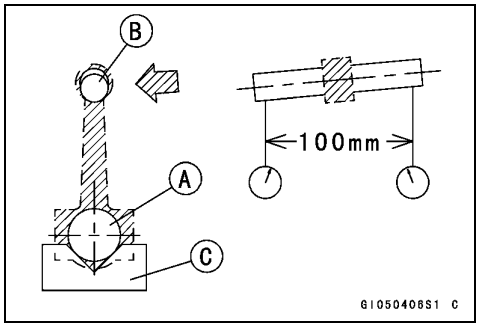
Torque - Connecting Rod Big End Nuts: 27.5 N·m (2.8 kgf·m, 20 ft·lb)

Crankshaft/Connecting Rod Cleaning

- After removing the connecting rods from the crankshaft, clean them with a high-flash point solvent.
- Blow the crankshaft oil passages with compressed air to remove any foreign particles or residue that may have accumulated in the passages.

Crankshaft and Connecting Rods

Connecting Rod Bend Inspection

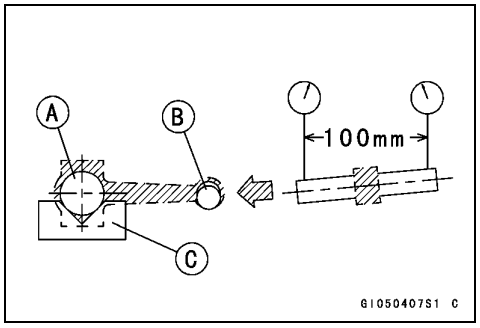


- Remove the connecting rod big end bearing inserts, and reinstall the connecting rod big end cap.
- Select an arbor [A] of the same diameter as the connecting rod big end, and insert the arbor through the connecting rod big end.
- Select an arbor of the same diameter as the piston pin and at least 100 mm (3.94 in.) long, and insert the arbor [B] through the connecting rod small end.
- On a surface plate, set the big-end arbor on V block [C].
- With the connecting rod held vertically, use a height gauge to measure the difference in the height of the arbor above the surface plate over a 100 mm (3.94 in.) length to determine the amount of connecting rod bend.

★If the connecting rod bend exceeds the service limit, the connecting rod must be replaced.

Connecting Rod Bend
Service Limit: TIR 0.2/100 mm (0.008/3.94 in.)

Connecting Rod Twist Inspection



- With the big-end arbor [A] still on V block [C], hold the connecting rod horizontally and measure the amount that the arbor [B] varies from being paralleled with the surface plate over a 100 mm (3.94 in.) length of the arbor to determine the amount of connecting rod twist.

★If the connecting rod twist exceeds the service limit, the connecting rod must be replaced.

Connecting Rod Twist
Service Limit: TIR 0.2/100 mm (0.008/3.94 in.)

Connecting Rod Big End Side Clearance Inspection

- Measure the connecting rod big end side clearance.

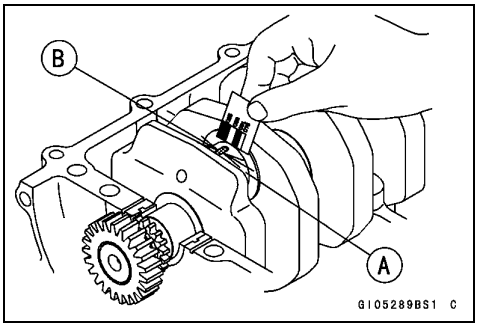
○Insert a thickness gauge [A] between the big end and either crank web to determine clearance.

Connecting Rod Big End Side Clearance
Standard: 0.13 ~ 0.38 mm (0.0051 ~ 0.0150 in.)
Service Limit: 0.58 mm (0.023 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).

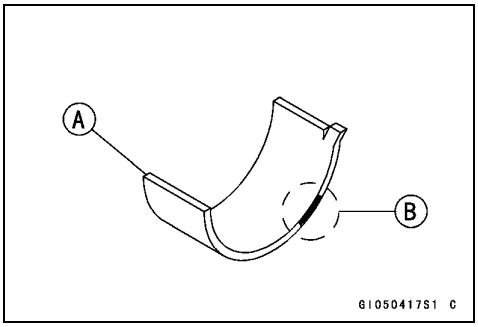
NOTE

○*Do not move the connecting rod and crankshaft during clearance measurement.*

Connecting Rod Big End Bearing Insert/Crankpin Clearance

Standard: 0.031 ~ 0.059 mm (0.0012 ~ 0.0023 in.)

Service Limit: 0.10 mm (0.004 in.)



★If the clearance is within the standard, no bearing replacement is required.

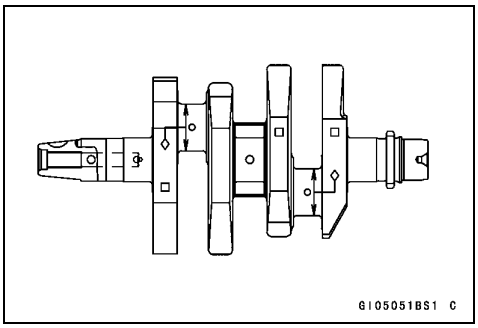
★If the clearance is between 0.059 mm (0.0023 in.) and the service limit 0.10 mm (0.004 in.), replace the bearing inserts [A] with inserts painted blue [B]. Check the insert/crankpin clearance with the plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.

★If the clearance exceeds the service limit, measure the diameter of the crankpins.

Crankpin Diameter

Standard: 29.984 ~ 30.000 mm (1.1805 ~ 1.1811 in.)

Service Limit: 29.97 mm (1.1799 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.

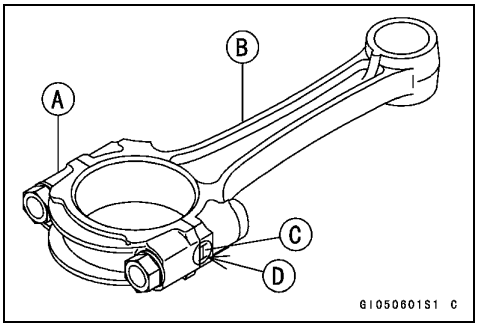
Crankpin Diameter Marks

None: 29.984 ~ 29.994 mm (1.1805 ~ 1.1809 in.)

○: 29.995 ~ 30.000 mm (1.1809 ~ 1.1811 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

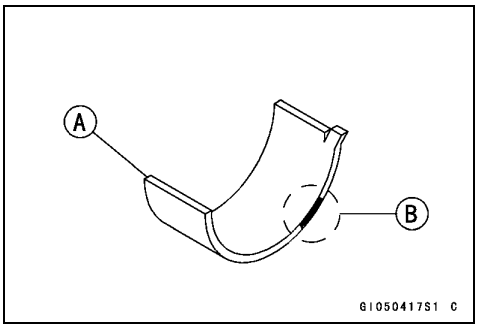
○*The mark already on the big end should almost coincide with the measurement.*

Connecting Rod Big End Inside Diameter Marks

None: 33.000 ~ 33.008 mm (1.2992 ~ 1.2995 in.)

○: 33.009 ~ 33.016 mm (1.2996 ~ 1.2998 in.)

Big End Cap [A]
Connecting Rod [B]
Weight Mark, Alphabet [C]
Diameter Mark (Around Weight Mark) [D]: "○" or no mark

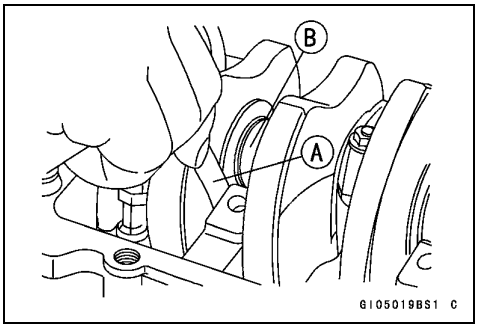


- Select the proper bearing insert [A] in accordance with the combination of the connecting rod and crankshaft coding. Size Color [B]

Con-rod Big End Inside Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Size Color	Part Number
None	○	Brown	92028-1494
None	None	Black	92028-1493
○	○		
○	None	Blue	92028-1492

- 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 [B] to determine clearance.

★If the clearance exceeds the service limit, replace the crankcase halves as a set.

NOTE

○*The upper and lower crankcase halves are machined at the factory in the assembled state, so the crankcase halves must be replaced as a set.*

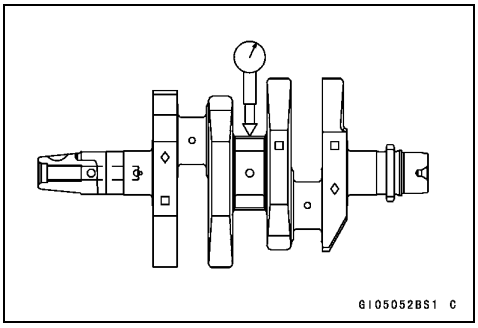
Crankshaft Side Clearance

Standard: 0.05 ~ 0.20 mm (0.0020 ~ 0.0079 in.)

Service Limit: 0.40 mm (0.0157 in.)

Crankshaft and Connecting Rods

Crankshaft Runout Inspection



● Measure the crankshaft runout.

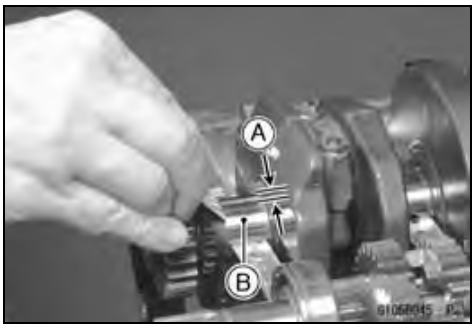
★If the measurement exceeds the service limit, replace the crankshaft.

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), measure the bearing insert/journal [B] clearance [A].

NOTE

○*Tighten the crankcase bolts to the specified torque (see Crankcase Assembly).*

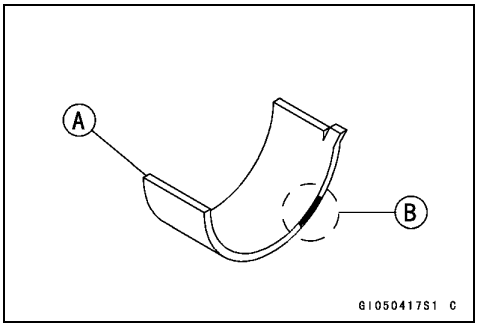
○*Do not turn the crankshaft during clearance measurement.*

○*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: 0.014 ~ 0.038 mm (0.0006 ~ 0.0015 in.)

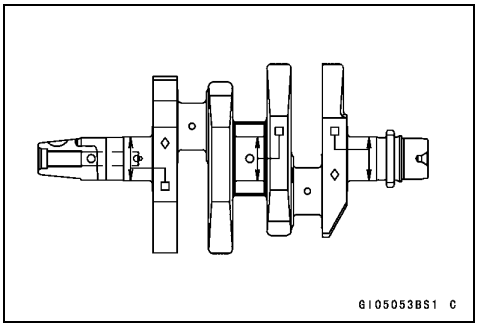
Service Limit: 0.07 mm (0.0028 in.)



★If the clearance is within the standard, no bearing replacement is required.

★If the clearance is between 0.038 mm (0.0015 in.) and the service limit 0.07 mm (0.0028 in.), replace the bearing inserts [A] with inserts painted blue [B]. Check insert/journal clearance with the plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.

★If the clearance exceeds the service limit, measure the diameter of the crankshaft main journal.



Crankshaft Main Journal Diameter

Standard: 27.984 ~ 28.000 mm (1.1017 ~ 1.1024 in.)

Service Limit: 27.96 mm (1.101 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

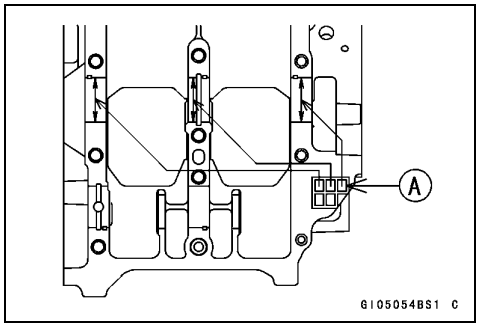
None: 27.984 ~ 27.992 mm (1.1017 ~ 1.1020 in.)

1: 27.993 ~ 28.000 mm (1.1021 ~ 1.1024 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.

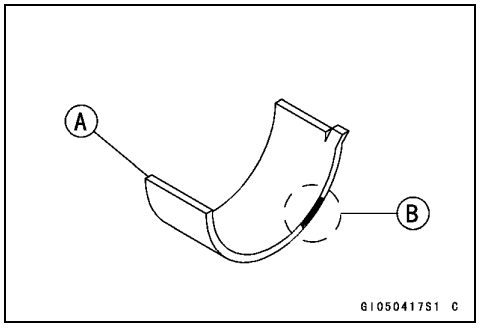


NOTE

○*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
○: 31.000 ~ 31.008 mm (1.2205 ~ 1.2208 in.)
None: 31.009 ~ 31.016 mm (1.2208 ~ 1.2211 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	Crankpin Main Journal Diameter Marking	Bearing Insert*		
		Size Color	Part Number	Journal Nos.
○	1	Black	92028-1487	1, 3
			92028-1490	2
○	None	Blue	92028-1486	1, 3
None	1		92028-1489	2
None	None	Yellow	92028-1582	1, 3
			92028-1586	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 and shaft

● Turn the starter motor clutch gear [A] by hand. The starter motor clutch gear should turn clockwise [B] freely, but should not turn counterclockwise [C].

★If the starter motor clutch does not operate as it should or if it makes noise, go to the next step.

● Disassemble the starter motor clutch, and visually inspect the clutch parts.

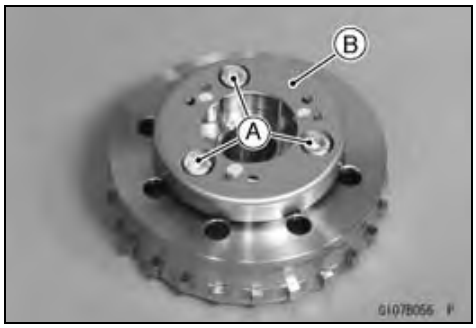
★If there is any worn or damaged part, replace it.

NOTE

○*Examine the starter motor clutch gear as well. Replace it if it worn or damaged.*

Starter Motor Clutch Disassembly

● Remove:
Alternator Rotor (see Alternator Rotor Removal in the Electrical System chapter)
Starter Motor Clutch Bolts [A]
Starter Motor Clutch [B]



Starter Motor Clutch Assembly

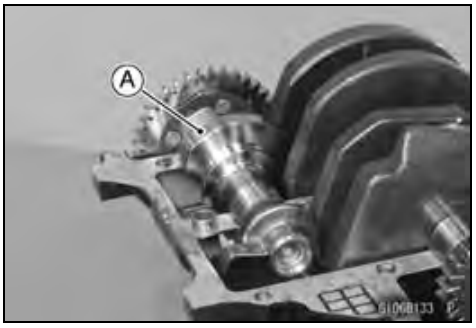
● Apply a non-permanent locking agent to the threads of the starter motor clutch bolts and tighten them.

Torque - Starter Motor Clutch Bolts: 34.3 N·m (3.5 kgf·m, 25 ft·lb)

Balancer

Balancer Removal

- Split the crankcase (see Crankcase Splitting).
- Remove the balancer shaft [A] with the balancer gear.

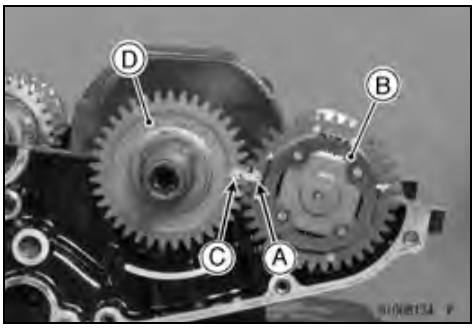


Balancer Installation

- Install the balancer shaft.

○Align the timing mark [A] on the balancer gear [B] with the timing mark [C] on the balancer drive gear [D].

- Apply molybdenum disulfide oil solution to the balancer shaft bearing inserts.



Balancer Shaft Bearing Insert/Journal Wear Inspection

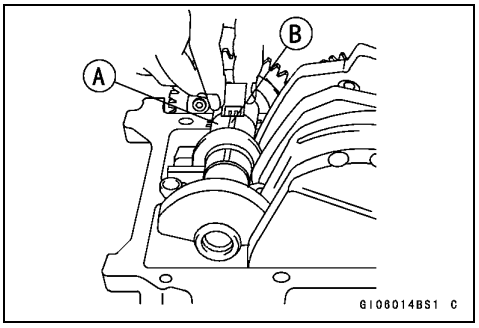
- Measure the bearing insert/journal [A] clearance with plastigage [B].

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

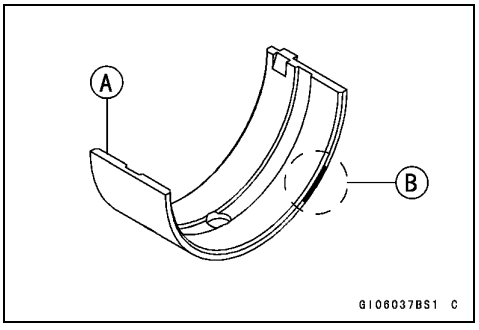
Standard: 0.020 ~ 0.044 mm (0.0008 ~ 0.0017 in.)

Service Limit: 0.07 mm (0.0028 in.)

★If the clearance is within the standard, no bearing replacement is required.

★If the clearance is between 0.044 mm (0.0017 in.) and the service limit 0.07 mm (0.0028 in.), replace the bearing inserts [A] with inserts painted blue [B]. Check insert/journal clearance with the plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.

★If the clearance exceeds the service limit, measure the diameter of the balancer shaft journal.



Balancer Shaft Journal Diameter

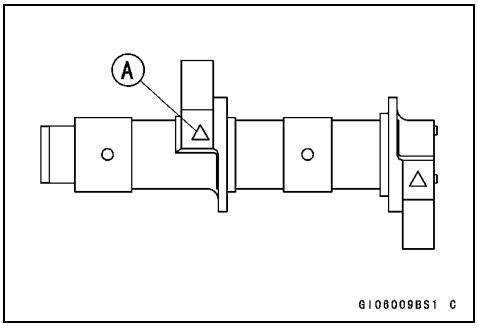
Standard: 25.984 ~ 26.000 mm (1.0230 ~ 1.0236 in.)

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 [A] on the balancer shaft, make new marks on it.



Balancer Shaft Journal Diameter Marks

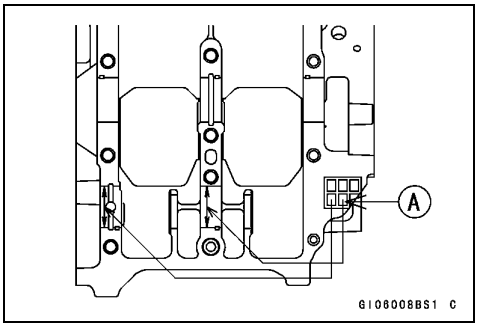
None: 25.984 ~ 25.994 mm (1.0230 ~ 1.0234 in.)

○: 25.995 ~ 26.000 mm (1.0234 ~ 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: 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.*

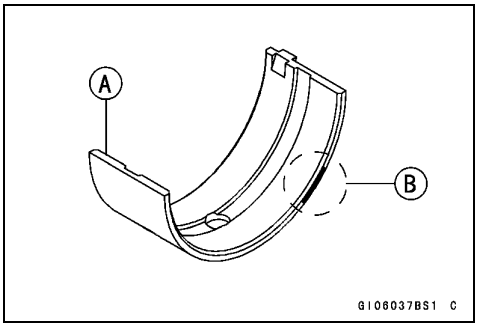
Crankcase Main Bearing Inside Diameter Marks

○: 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]

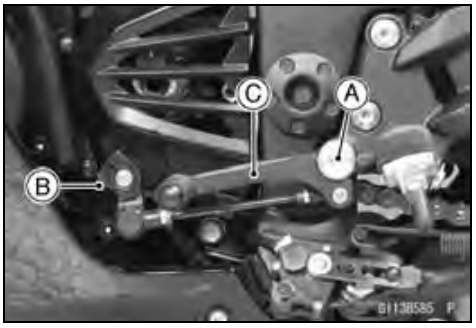


Crankcase Main Bearing Inside Diameter Marking	Balancer Shaft Journal Diameter Marking	Bearing Insert	
		Size Color	Part Number
○	○	Brown	92028-1424
○	None	Black	92028-1423
None	○		
None	None	Blue	92028-1422

● Install the new inserts in the crankcase and check insert/journal clearance with the plastigage.

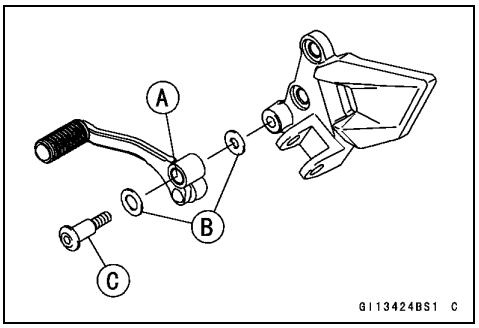
Transmission

Shift Pedal Removal



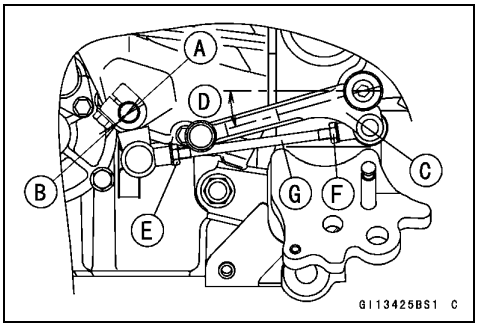
- Remove:
  Shift Pedal Mounting Bolt [A]
  Shift Lever Bolt [B]
  Shift Pedal [C] with Shift Lever

Shift Pedal Installation



- Apply grease to the shift pedal [A].
- Install the washers [B] and shift pedal.
- Tighten:

Torque - Shift Pedal Mounting Bolt [C]: 25 N·m (2.5 kgf·m, 18 ft·lb)



- Align the mark [A] on the shift shaft with the mark [B] on the shift lever.
- Tighten:

Torque - Shift Lever Bolt: 12 N·m (1.2 kgf·m, 106 in·lb)

- Install the shift pedal [C] as shown in the figure.
  About 16° [D]

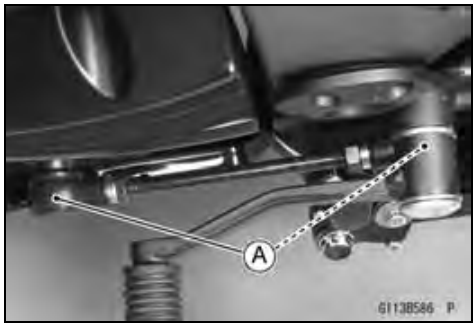
○To adjust the pedal position, loosen the front locknut [E] (left-hand threads) and rear locknut [F] and then turn the tie-rod [G].

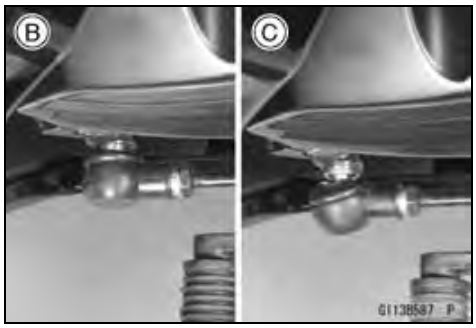
- Tighten:

Torque - Tie-Rod Locknuts: 7.0 N·m (0.71 kgf·m, 62 in·lb)

Transmission

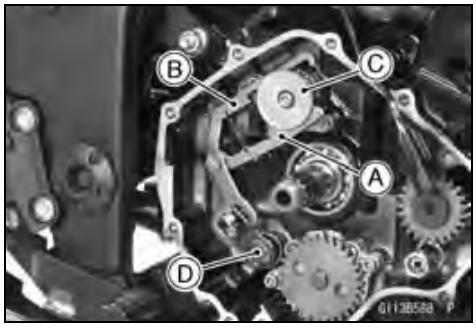
● Be sure the sealing lip of the rubber boots [A] fits into the groove of the ball joint after installing the shift lever link.
Correctly Boot Fitting Position [B]
Incorrectly Boot Fitting Position [C]





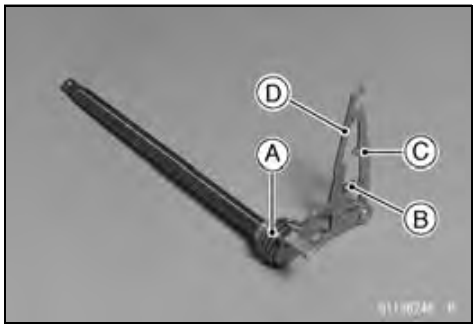
External Shift Mechanism Removal

● Remove:
Engine Oil (Drain, see Engine Oil Change in the Periodic Maintenance chapter)
Shift Lever (see Shift Pedal Removal)
Clutch (see Clutch Removal in the Clutch chapter)
● Spread the shift mechanism arm [A] and over shift limiter [B] out of the shift drum [C], and pull out the shift shaft assembly [D].



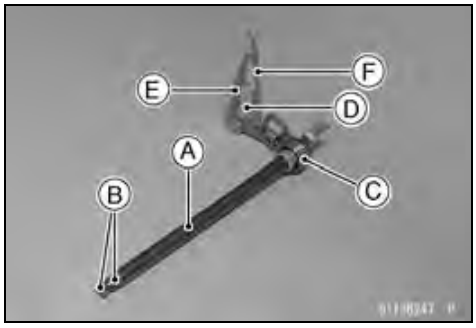
External Shift Mechanism Installation

● Check that the return spring [A] and pawl spring [B] are properly fitted on the mechanism.
● Install the shift shaft assembly.
● Place the shift mechanism arm [C] and over shift limiter [D] on the shift drum pins.
● Install the removed parts (see appropriate chapters).



External Shift Mechanism Inspection

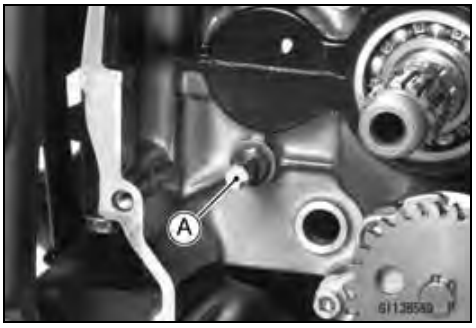
● Examine the shift shaft [A] for any damage.
★If the shaft is bent, straighten or replace it.
★If the splines [B] are damaged, replace the shaft.
★If the return spring [C] or pawl spring [D] is damaged in any way, replace them.
★If the shift mechanism arm [E] or over shift limiter [F] is damaged in any way, replace the shaft.



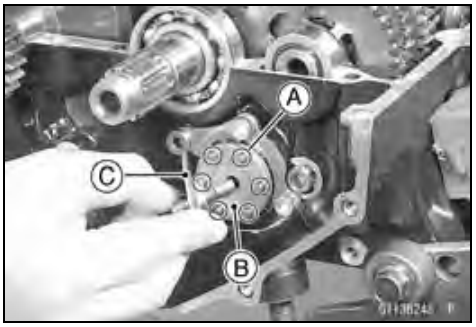
Transmission

● Check the return spring pin [A] is not loose.
★If it is loose, unscrew it, apply a non-permanent locking agent to the threads, and tighten it.

Torque - Shift Shaft Return Spring Pin: 19.6 N·m (2.0 kgf·m, 14.5 ft·lb)

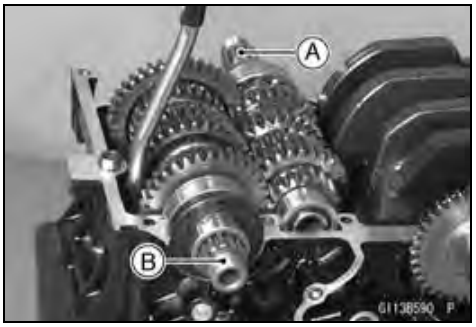


● Visually inspect the shift drum pins [A], pin holder [B] and pin plate [C].
★If they are badly worn or if they show any damage, replace them.



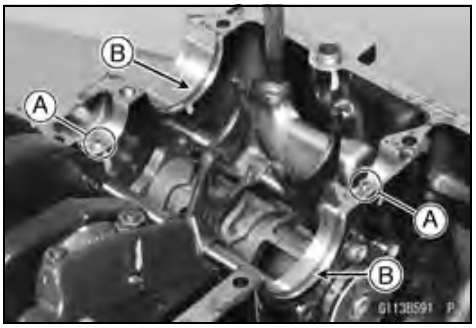
Transmission Shaft Removal

● Split the crankcase (see Crankcase Splitting).
● Remove the drive shaft [A] and output shaft [B].

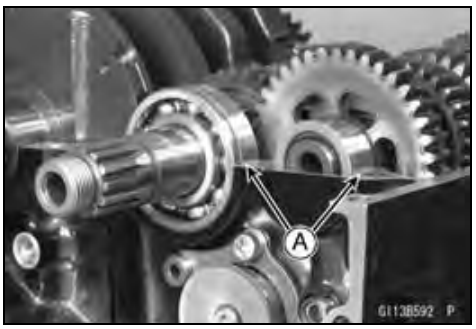


Transmission Shaft Installation

● Check to see that the set pins [A] and set rings [B] are in place.

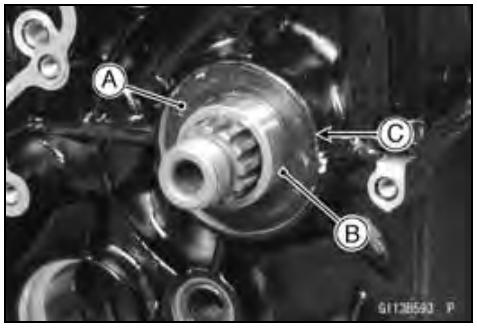


● Install the drive shaft and output shaft into the upper crankcase half.
● Apply engine oil to the bearings.
○The bearing set pins and rings must match properly with the holes or grooves in the bearing outer races. When they are properly matched, there is no clearance [A] between the crankcase and the bearing outer races.



Transmission

● Assemble the crankcase (see Crankcase Assembly).
● Press in the oil seal [A] onto collar [B] so that the surface of the oil seal is flush with the counterbore bottom surface [C] of the crankcase.
○Apply grease to the oil seal lips.

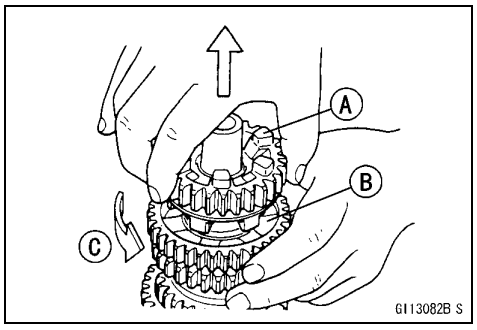


Transmission Shaft Disassembly

● Remove the transmission shafts (see Transmission Shaft Removal).
● Remove the circlips, disassemble the transmission shafts.

Special Tool - Outside Circlip Pliers: 57001-144

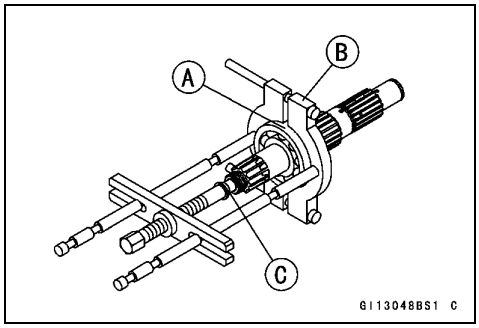
● The 5th gear [A] on the output shaft has three steel balls assembled into it for the positive neutral finder mechanism. Remove the 5th gear.
○Set the output shaft in a vertical position holding the 3rd gear [B].
○Spin the 5th gear quickly [C] and pull it off upward.



● Remove the ball bearing [A] from each shafts.

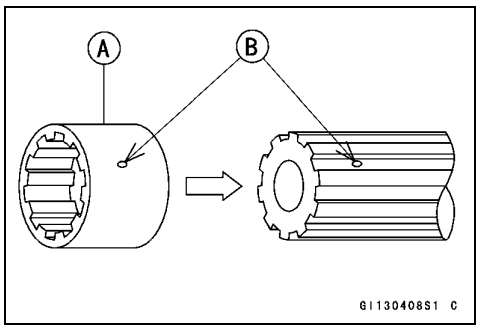
Special Tools - Bearing Puller [B]: 57001-135
Bearing Puller Adapter [C]: 57001-317

● Discard the bearing.



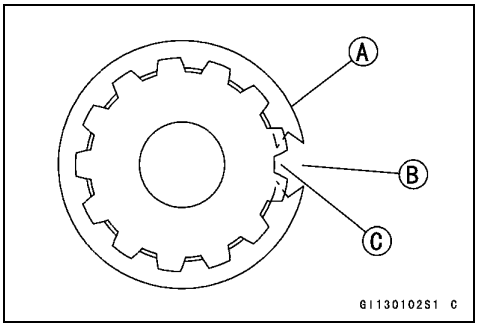
Transmission Shaft Assembly

● 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.



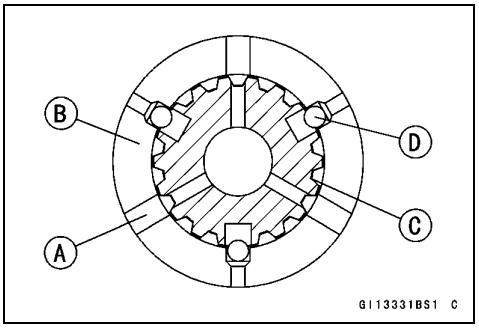
Transmission

- 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 5th and 6th gears 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.

- Fit the steel balls into the 5th gear holes in the output shaft, aligning three oil holes [A].
  5th Gear [B]
  Output Shaft [C]
  Steel Balls [D]



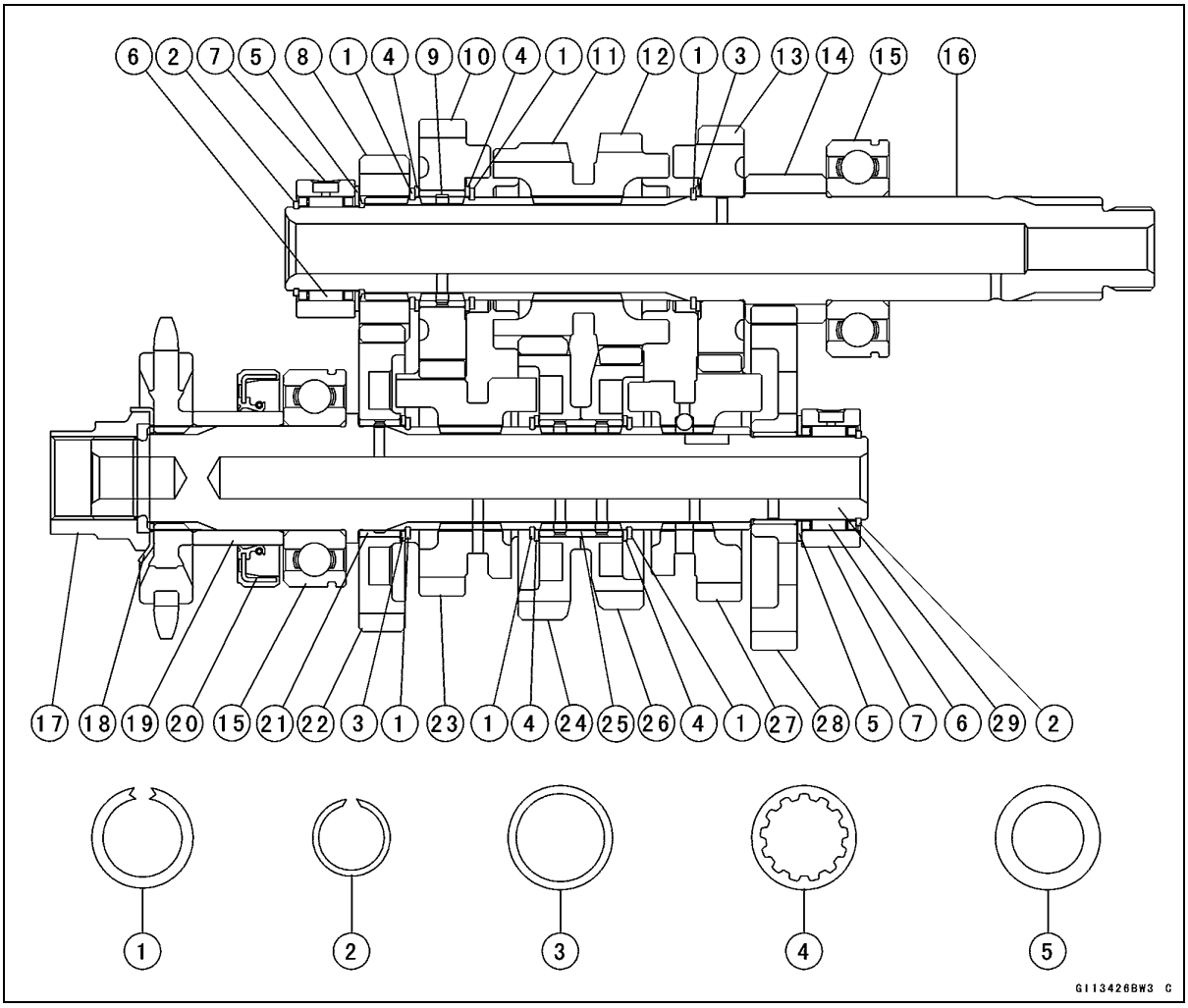
CAUTION

Do not apply grease to the balls to hold them in place. This will cause the positive neutral finder mechanism to malfunction.

○After assembling the 5th gear with steel balls in place on the output shaft, check the ball-locking effect that the 5th gear doesn't come out of the output shaft when moving it up and down by hand.

- Check that each gear spins or slides freely on the transmission shafts without binding after assembly.

Transmission

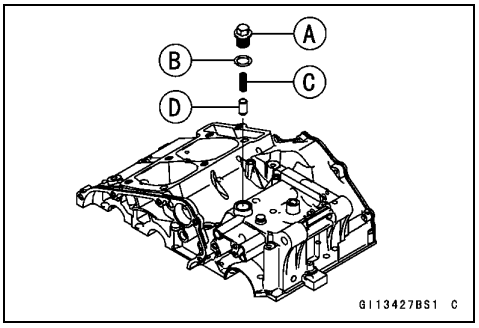


1. Circlip, ϕ29 mm (1.14 in.)
2. Circlip
3. Thrust Washer, ϕ30 mm (1.18 in.) (Inside Diameter: ϕ25.3 mm (0.996 in.))
4. Toothed Washer, ϕ30 mm (1.18 in.)
5. Thrust Washer, ϕ30 mm (1.18 in.) (Inside Diameter: ϕ20.5 mm (0.807 in.))
6. Needle Bearing
7. Bearing Outer Race
8. 2nd Gear
9. Bushing
10. 6th (Top) Gear
11. 3rd Gear
12. 4th Gear
13. 5th Gear
14. 1st Gear
15. Ball Bearing
16. Drive Shaft
17. Nut
18. Washer
19. Collar
20. Oil Seal
21. Bushing
22. 2nd Gear
23. 6th (Top) Gear
24. 3rd Gear
25. Bushing
26. 4th Gear
27. 5th Gear
28. 1st Gear
29. Output Shaft

Transmission

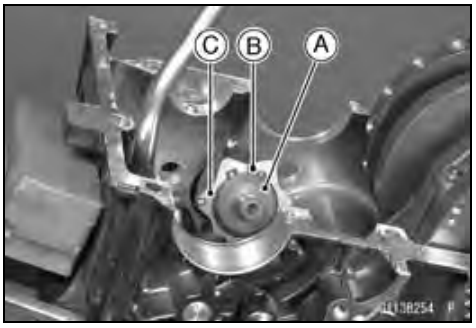
Shift Drum and Fork Removal

● Remove:
Lower Crankcase Half (see Crankcase Splitting)
Transmission Shafts (see Transmission Shaft Removal)
Shift Drum Positioning Bolt [A]
Washer [B]
Spring [C]
Pin [D]



● Remove:
Shift Drum Bearing Holder Bolts [A]
Shift Drum Bearing Holder [B]
Shift Rods [C]
Shift Forks

● Pull out the shift drum [A] about half of it, and remove the circlip [B] and the operating plate [C].
● Pull out the shift drum fully from the upper crankcase.



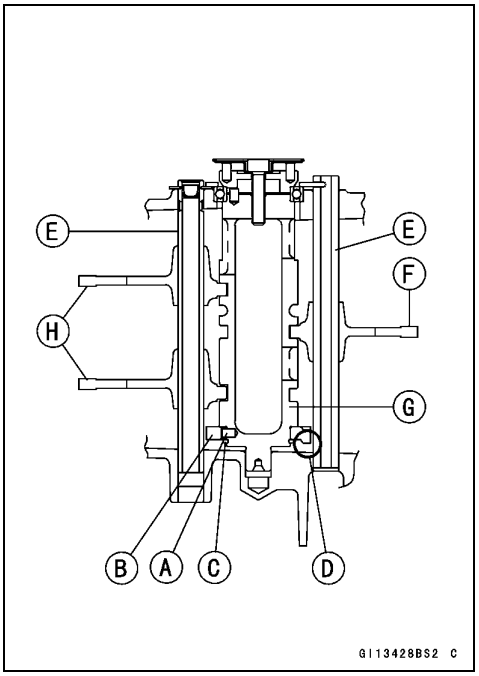
Shift Drum and Fork Installation

● Apply engine oil to the shift drum, forks and rods.
● Insert the shift drum into the upper crankcase half, and install the operating plate pin [A], operating plate [B] and new circlip [C].

NOTE

○*When installing the operating plate, the projection [D] of the operating plate faces toward the outside.*

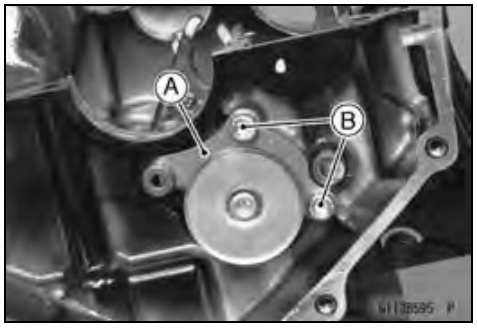
● Install the shift rods [E], noting the groove position.
○Position the one with shorter ears [F] on the drive shaft and place the pin in the center groove in the shift drum [G].
○The two forks [H] on the output shaft are identical.



Transmission

- Install the shift drum bearing holder [A].
- Apply a non-permanent locking agent to the threads of the shift drum bearing holder bolts [B], and tighten them.

Torque - Shift Drum Bearing Holder Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)



- Install the pin, spring, washer and, tighten the shift drum positioning bolt to the upper crankcase.

Torque - Shift Drum Positioning Bolt: 24.5 N·m (2.5 kgf·m, 18 ft·lb)

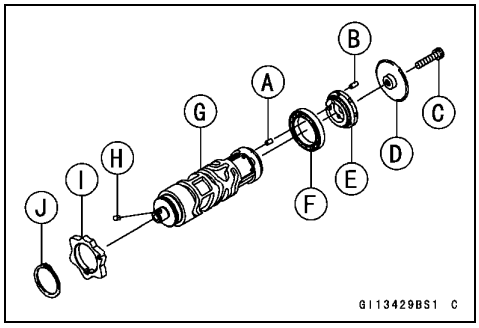
Shift Drum Disassembly

- Remove the shift drum (see Shift Drum and Fork Removal).
- While holding the shift drum with a vise, remove the shift drum pin plate bolt.

Shift Drum Assembly

- Be sure to install the dowel pin [A].
- The shift drum pins [B] are identical.
- Apply a non-permanent locking agent to the threads of the shift drum pin plate bolt [C], and tighten it.

Torque - Shift Drum Pin Plate Bolt: 9.0 N·m (0.92 kgf·m, 80 in·lb)

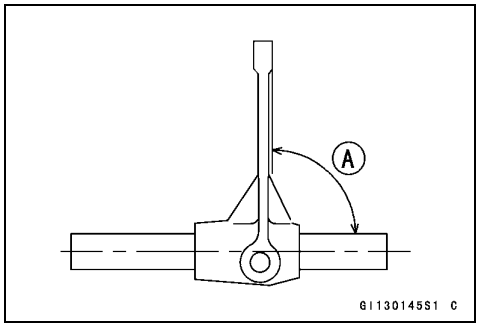


Shift Drum Pin Plate [D]
Shift Drum Pin Holder [E]
Shift Drum Bearing [F]
Shift Drum [G]
Operating Plate Pin [H]
Operating Plate [I]
Circlip [J]

Shift Fork Bending Inspection

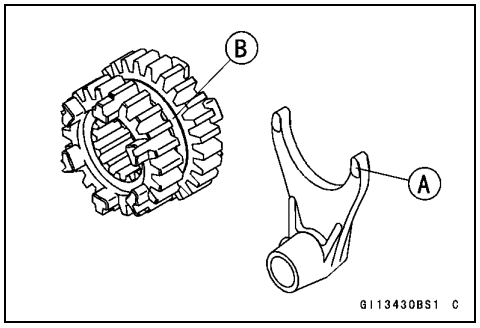
- Visually inspect the shift forks, and replace any fork that is bent. A bent fork could cause difficulty in shifting, or allow the transmission to jump out of gear when under power.

90° [A]



Transmission

Shift Fork/Gear Groove Wear Inspection



- Measure the thickness of the shift fork ears [A], and measure the width [B] of the gear grooves.

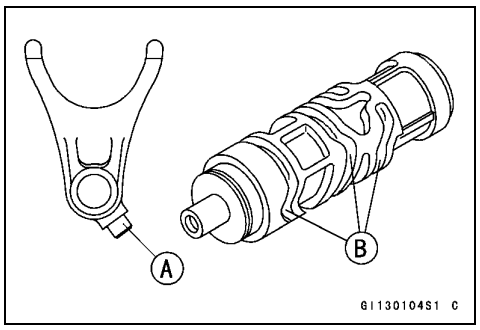
★If the thickness of a shift fork ear is less than the service limit, the shift fork must be replaced.

Shift Fork Ear Thickness
Standard: 4.9 ~ 5.0 mm (0.193 ~ 0.197 in.)
Service Limit: 4.8 mm (0.189 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 (0.209 in.)

Shift Fork Guide Pin/Drum Groove Wear Inspection



- Measure the diameter of each shift fork guide pin [A], and measure the width [B] of each shift drum groove.

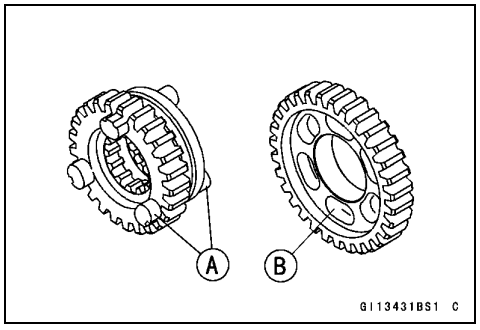
★If the guide pin on any shift fork is less than the service limit, the fork must be replaced.

Shift Fork Guide Pin Diameter
Standard: 5.9 ~ 6.0 mm (0.232 ~ 0.236 in.)
Service Limit: 5.8 mm (0.228 in.)

★If any shift drum groove is worn over the service limit, the drum must be replaced.

Shift Drum Groove Width
Standard: 6.05 ~ 6.20 mm (0.238 ~ 0.244 in.)
Service Limit: 6.3 mm (0.248 in.)

Gear Dog and Gear Dog Hole Damage Inspection



- Visually inspect the gear dogs [A] and gear dog holes [B].

★Replace any damaged gears or gears with excessively worn dogs or dog holes.

Wheels/Tires

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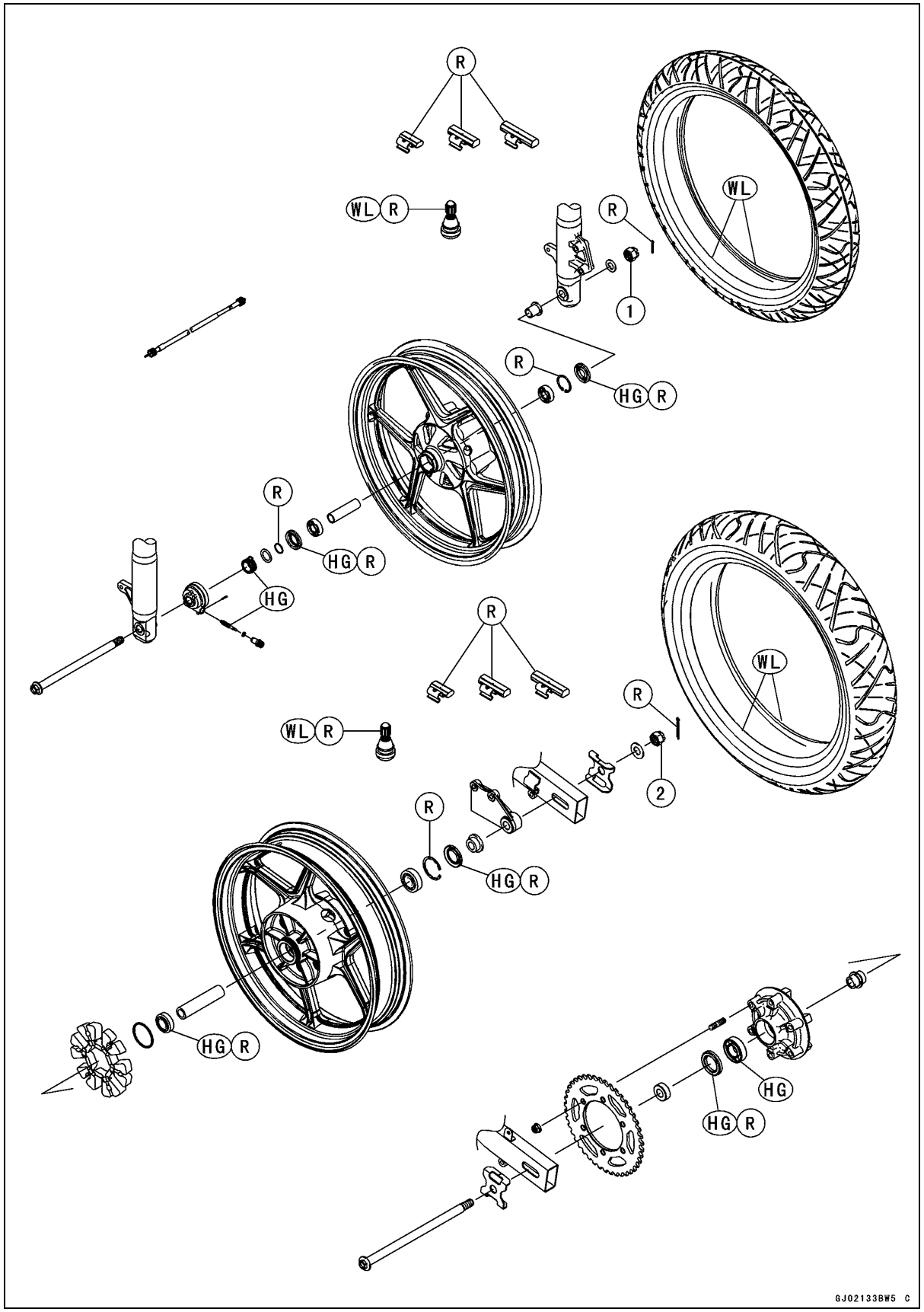
Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Axle Nut	88	9.0	65	
2	Rear Axle Nut	98	10.0	72.3	

HG: Apply high-temperature grease.
R: Replacement Parts
WL: Apply soap and water solution or rubber lubricant.

Specifications

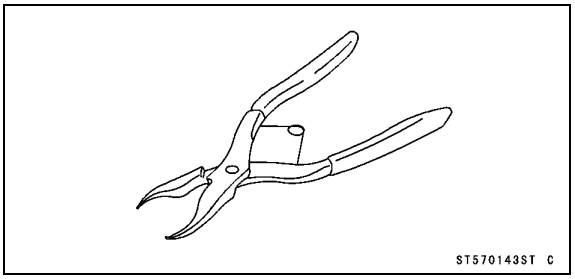
Item	Standard	Service Limit
Wheels (Rims)		
Rim Runout:		
Axial	TIR 0.5 mm (0.02 in.) or less	TIR 1.0 mm (0.04 in.)
Radial	TIR 0.8 mm (0.03 in.) or less	TIR 1.0 mm (0.04 in.)
Axle Runout/100 mm (3.94 in.)	TIR 0.1 mm (0.004 in.) or less	TIR 0.2 mm (0.008 in.)
Wheel Balance	10 g (0.35 oz.) or less	– – –
Balance Weights	10 g (0.35 oz.), 20 g (0.71 oz.), 30 g (1.06 oz.)	– – –
Rim Size:		
Front	17 × 2.75	– – –
Rear	17 × 3.50	– – –
Tires		
Air Pressure (when Cold):		
Front	Up to 170 kg (375 lb) load: 200 kPa (2.00 kgf/cm², 28 psi)	– – –
Rear	Up to 170 kg (375 lb) load: 225 kPa (2.25 kgf/cm², 32 psi)	– – –
Tread Depth:		
Front:		
IRC	4.2 mm (0.17 in.)	1 mm (0.04 in.), (AT, CH, DE) 1.6 mm (0.06 in.)
BRIDGESTONE	4.6 mm (0.18 in.)	
DUNLOP	4.5 mm (0.18 in.)	
Rear:		
IRC	6.5 mm (0.26 in.)	Up to 130 km/h (80 mph): 2 mm (0.08 in.), Over 130 km/h (80 mph): 3 mm (0.12 in.)
BRIDGESTONE	7.0 mm (0.28 in.)	
DUNLOP	7.4 mm (0.29 in.)	
Standard Tires:	Make, Type	Size
Front	IRC RX-01F BRIDGESTONE BATTLAX BT45F DUNLOP GT501F	110/70 17 M/C (54S) 110/70 17 M/C (54H)
Rear	IRC RX-01R BRIDGESTONE BATTLAX BT45R DUNLOP GT501	130/70 17 M/C (62S) 130/70 17 M/C (62H)

⚠ WARNING

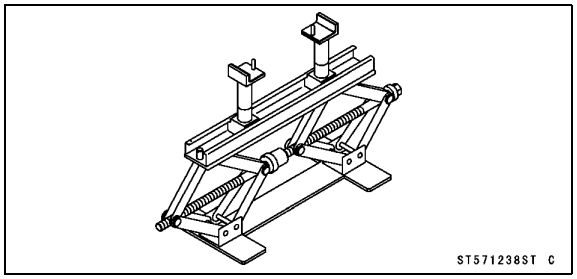
Use the same manufacturer's tires on both front and rear wheels.

Special Tools

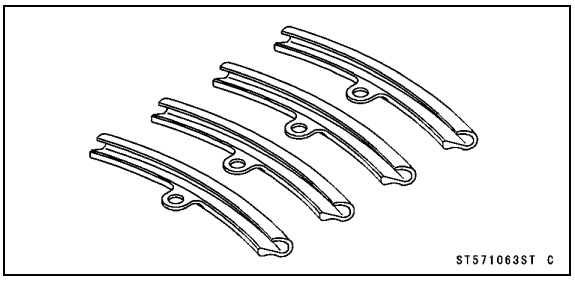
Inside Circlip Pliers:
57001-143



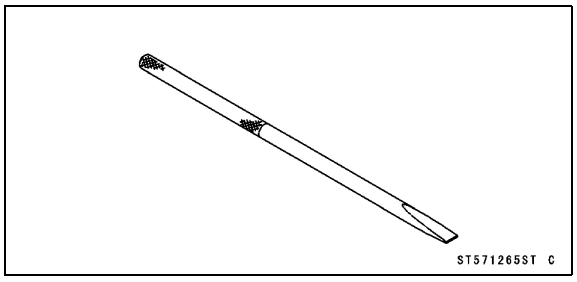
Jack:
57001-1238



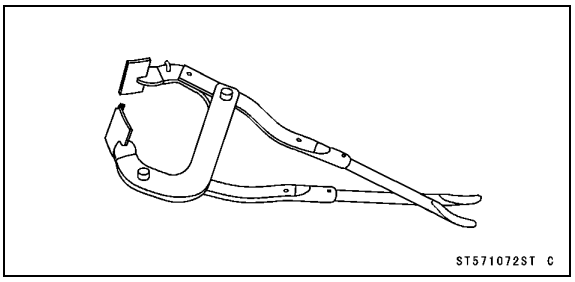
Rim Protector:
57001-1063



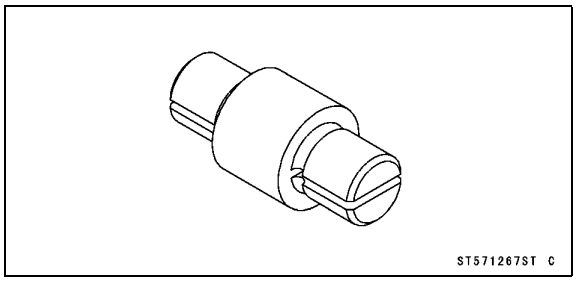
Bearing Remover Shaft, ϕ9:
57001-1265



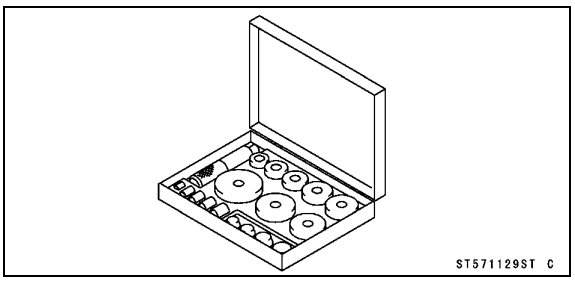
Bead Breaker Assembly:
57001-1072



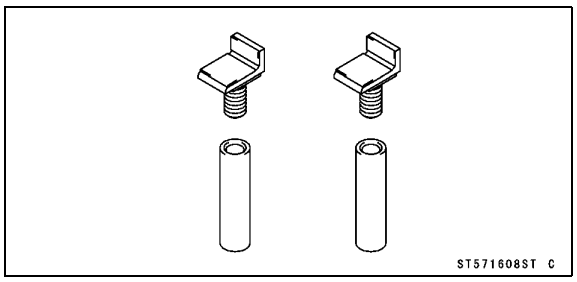
Bearing Remover Head, ϕ15 × ϕ17:
57001-1267



Bearing Driver Set:
57001-1129

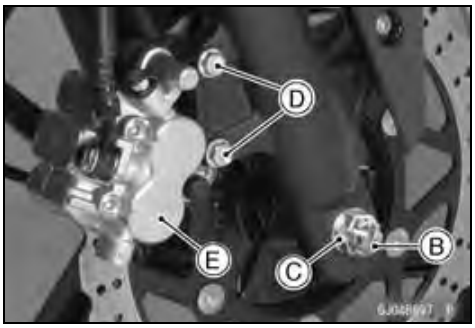


Jack Attachment:
57001-1608



Wheels (Rims)

Front Wheel Removal



- Remove:
  Speedometer Cable Lower End [A]
  Cotter Pin [B]
  Axle Nut [C] and Washer
  Front Caliper Mounting Bolts [D]
  Front Caliper [E]
- Remove the lower fairings (see Lower Fairing Removal in the Frame chapter).
- Raise the front wheel off the ground with the jack.

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

- Pull out the axle to the left and drop the front wheel out of the forks.

CAUTION

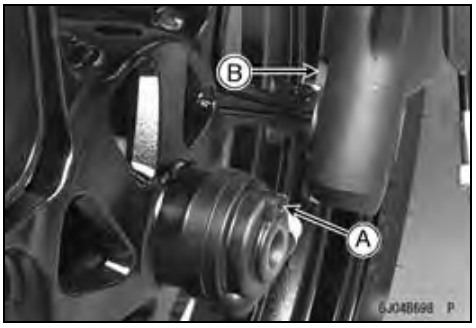
Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

Front Wheel Installation

- Apply high-temperature grease to the grease seal lips.
- Fit the collar on the right of the hub.
- Fit the speedometer gear projections [A] to the wheel hub projections [B].

Wheels (Rims)

● Install the front wheel so that the speedometer gear housing stop [A] fit into the fork leg projection [B].



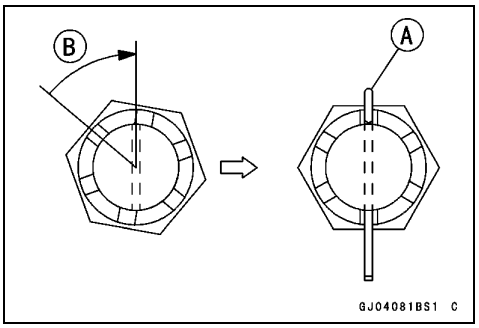
● Insert the front axle, and install the washer.
● Tighten:

Torque - Front Axle Nut: 88 N·m (9.0 kgf·m, 65 ft·lb)

● Insert a new cotter pin [A].

NOTE

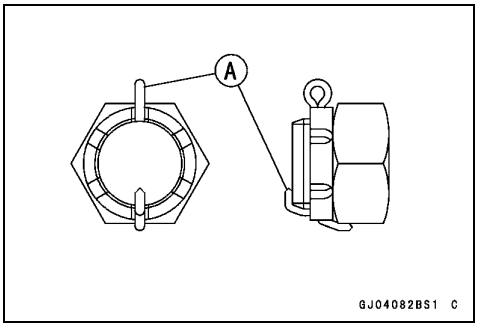
○*When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axle, tighten the nut clockwise [B] up to next alignment.*
○*It should be within 30°.*
○*Loosen once and tighten again when the slot goes past the nearest hole.*



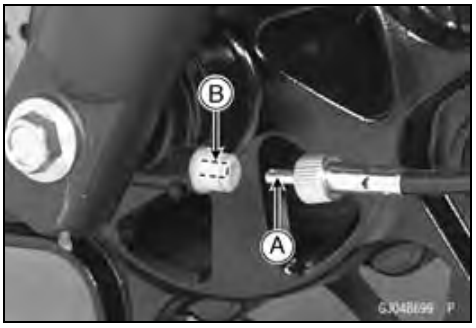
● Bend the cotter pin [A] over the nut.

⚠ WARNING

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



● Install the speedometer cable so that the drive notch [A] of it fits into the projection [B] of the speedometer pinion in the housing.



● Install the removed parts (see appropriate chapters).
● Check the front brake effectiveness (see Brake Operation Inspection in the Periodic Maintenance chapter).

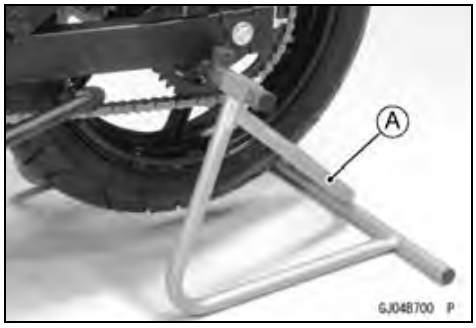
⚠ WARNING

Do not attempt to drive the motorcycle until a full brake lever is obtained by pumping the brake lever until the pads are against the disc. The brake will not function on the first application of the lever if this is not done.

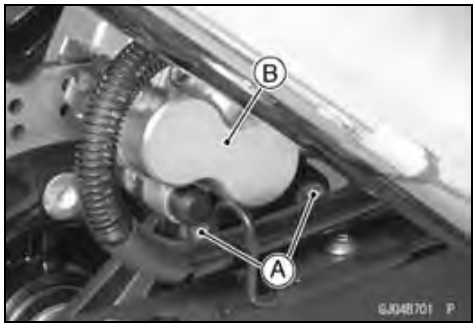
Wheels (Rims)

Rear Wheel Removal

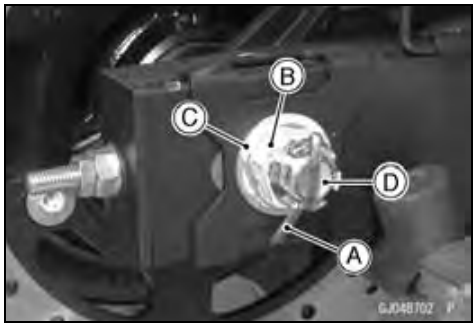
● Raise the rear wheel off the ground with the stand [A].



● Remove:
Rear Caliper Mounting Bolts [A]
Rear Caliper [B]



● Remove:
Cotter Pin [A]
Axle Nut [B]
Washer [C]
Axle [D] (from Left Side)



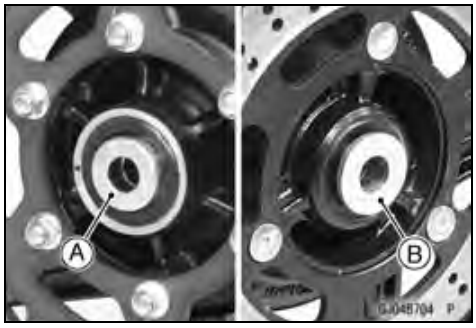
● Remove the drive chain [A] from the rear sprocket toward the left.
● Move the rear wheel back and remove it.

CAUTION

Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

Rear Wheel Installation

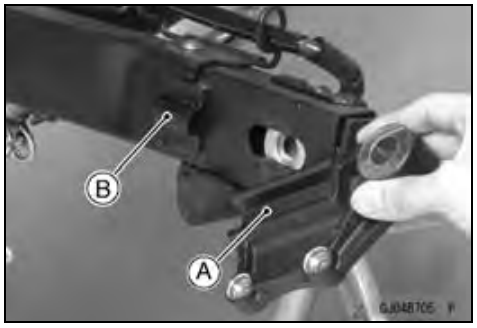
● Apply high-temperature grease to the grease seal lips.
● Fit the collars on the both sides of the hub.
Left Side Collar [A]
Right Side Collar [B] (with Flange)



Wheels (Rims)

- Engage the drive chain with the rear sprocket.
- Install the caliper bracket [A] onto the swingarm stop [B].
- Insert the axle from the left side of the wheel, and tighten the axle nut.

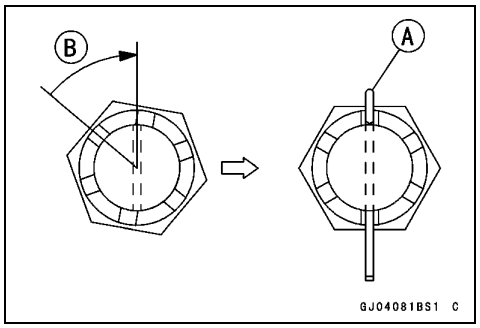
Torque - Rear Axle Nut: 98 N·m (10.0 kgf·m, 72.3 ft·lb)



- Insert a new cotter pin [A].

NOTE

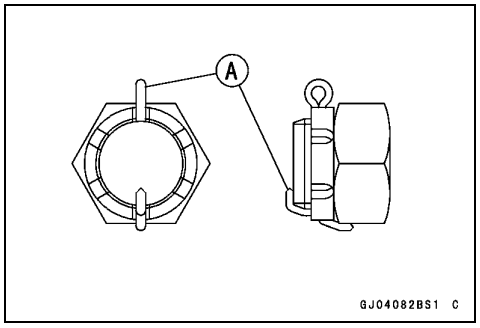
○When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axle, tighten the nut clockwise [B] up to next alignment.
○It should be within 30°.
○Loosen once and tighten again when the slot goes past the nearest hole.



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

⚠ WARNING

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



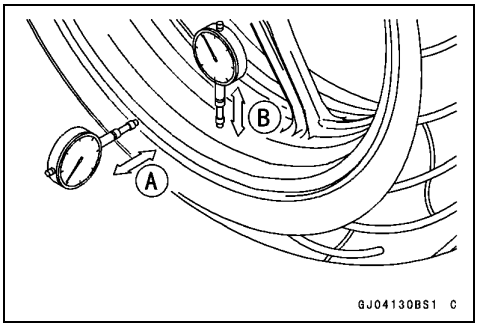
- Adjust the drive chain slack after installation (see Drive Chain Slack Inspection in the Periodic Maintenance chapter).
- Install the rear caliper (see Caliper Installation in the Brakes chapter).
- Check the rear brake effectiveness (see Brake Operation Inspection in the Periodic Maintenance chapter).

⚠ WARNING

Do not attempt to drive the motorcycle until a full brake pedal is obtained by pumping the brake pedal until the pads are against the disc. The brake will not function on the first application of the pedal if this is not done.

Wheels (Rims)

Wheel Inspection



- Raise the front/rear wheel off the ground.

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

- Spin the wheel lightly, and check for roughness or binding.
★If roughness or binding is found, replace the hub bearings (see Hub Bearing Removal/Installation).
- Inspect the wheel for small cracks, dents, bending, or warp.
★If there is any damage to the wheel, replace the wheel.
- Remove the wheel, and support it with the tire by the axle.
- Measure the rim runout, axial [A] and radial [B], with a dial gauge.
★If rim runout exceeds the service limit, check the hub bearings (see Hub Bearing Inspection).
★If the problem is not due to the bearings, replace the wheel.

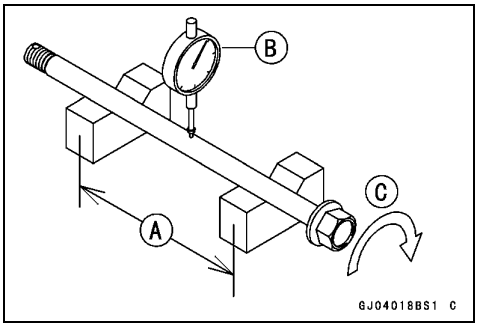
Rim Runout (with tire installed)

Standard:	
Axial	**TIR 0.5 mm (0.02 in.) or less**
Radial	**TIR 0.8 mm (0.03 in.) or less**
Service Limit:	
Axial	**TIR 1.0 mm (0.04 in.)**
Radial	**TIR 1.0 mm (0.04 in.)**

⚠ WARNING

Never attempt to repair a damaged wheel. If there is any damage besides wheel bearings, the wheel must be replaced to insure safe operational condition.

Axle Inspection



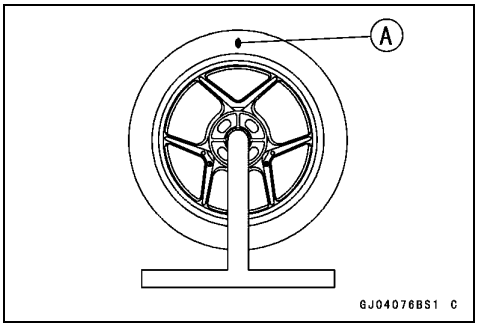
- Remove the front and rear axles (see Front/Rear Wheel Removal).
- Visually inspect the front and rear axle for damages.
★If the axle is damaged or bent, replace it.
- Place the axle in V blocks that are 100 mm (3.94 in.) [A] apart, and set a dial gauge [B] on the axle at a point halfway between the 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

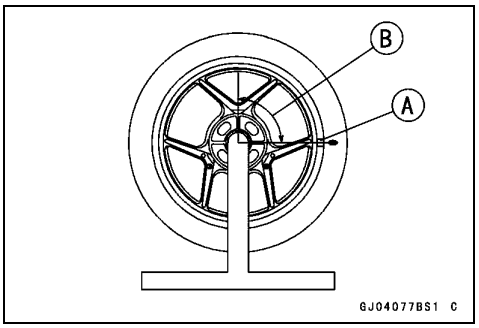


- Remove the front and rear wheels (see Front/Rear Wheel Removal).
- Support the wheel so that it can be spun freely.
- Spin the wheel lightly, and mark [A] the wheel at the top when the wheel stops.

○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

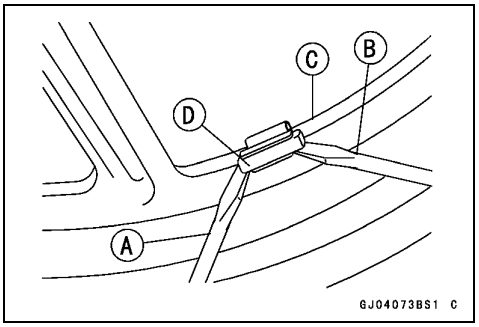


- If the wheel always stops in one position, provisionally attach a balance weight [A] on the rim at the marking using adhesive tape.
- Rotate the wheel 1/4 turn [B], and see whether or not the wheel stops in this position. If it does, the correct balance weight is being used.

★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

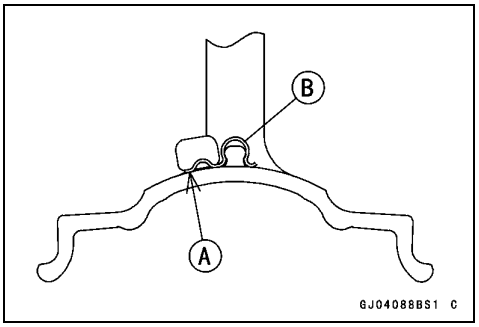


- Insert a regular tip screwdrivers [A] [B] between the rib [C] and the weight [D] as shown in the figure.
- Pry the balance weight with two screwdrivers and remove the balance weight.
- Discard the used balance weight.

CAUTION

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

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. Unbalanced wheels can create an unsafe riding condition.

Wheels (Rims)

Balance Weight

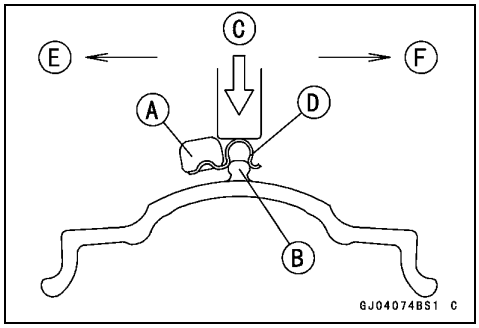
Part Number	Weight
41075-0007	10 g (0.35 oz.)
41075-0008	20 g (0.71 oz.)
41075-0009	30 g (1.06 oz.)

NOTE

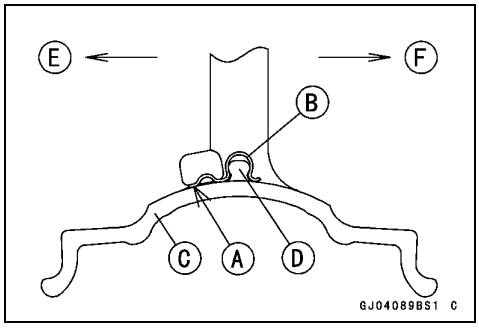
○Balance weights are available from Kawasaki dealers in 10, 20, and 30 grams (0.35, 0.71, and 1.06 oz.) sizes. An imbalance of less than 10 grams (0.35 oz.) will not usually affect running stability.

○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

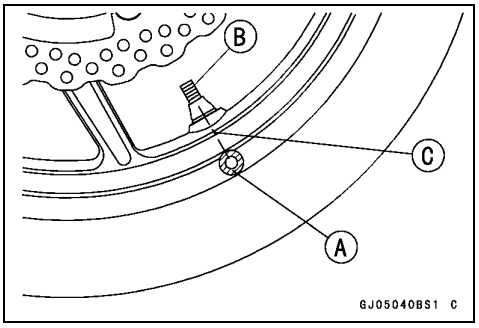
- Refer to the Air Pressure Inspection in the Periodic Maintenance chapter.

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]

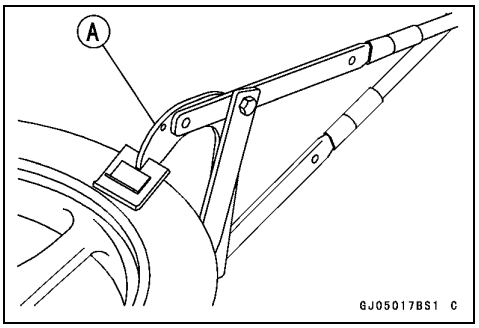


- Lubricate the tire beads and rim flanges on both sides with a soap and water solution or rubber lubricant. This helps the tire beads slip off the rim flanges.

CAUTION
Never lubricate with engine oil or petroleum distillates because they will deteriorate the tire.

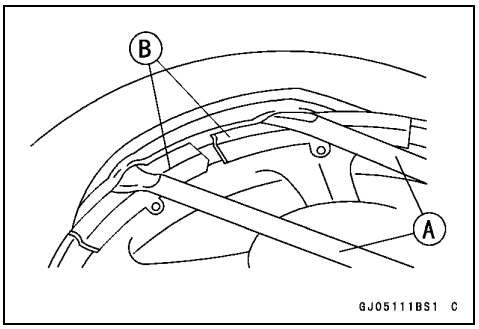
- Break the beads away from both sides of the rim with the bead breaker [A].

  Special Tool - Bead Breaker Assembly: 57001-1072



- Step on the side of the tire opposite the valve stem and start prying the tire off the rim near the air valve with tire irons [A].

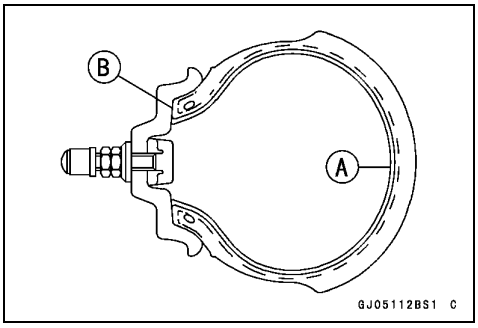
  Special Tools - Rim Protector [B]: 57001-1063
  Bead Breaker Assembly: 57001-1072



Tires

NOTE

○*For easier removal, always position the tire bead opposite the valve stem in the rim well, and pry the tire bead a little at a time.*



CAUTION

Be careful not to scratch the inner liner [A] and air sealing surfaces [B] of the rim and tire with the tire irons. A scratched inner liner or sealing surface may allow air to leak.

- After removing the bead on one side, remove the other bead from the same manner.
- Remove the tire from the rim.

Tire Installation

⚠ WARNING

Use the same manufacturer's tires on both front and rear wheels.

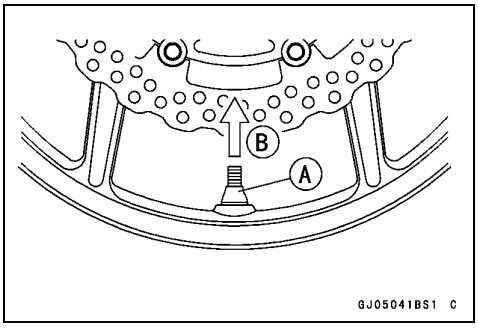
- Inspect the rim and tire, and replace them if necessary.
- Clean the sealing surfaces of the rim and tire, and smooth the sealing surfaces of the rim with a fine emery cloth if necessary.
- Remove the air valve and discard it.

CAUTION

Replace the air valve whenever the tire is replaced. Do not reuse the air valve.

- 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.

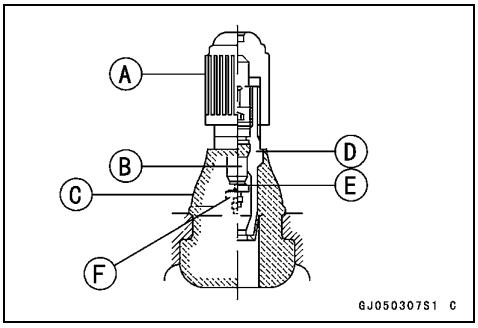


CAUTION

Do not use engine oil or petroleum distillates to lubricate the stem because they will deteriorate the rubber.

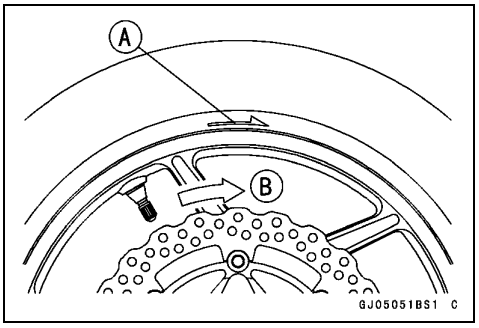
○The air valve is shown in the figure.

Valve Cap [A]
Valve Core [B]
Stem Seal [C]
Valve Stem [D]
Valve Seat [E]
Valve Opened [F]

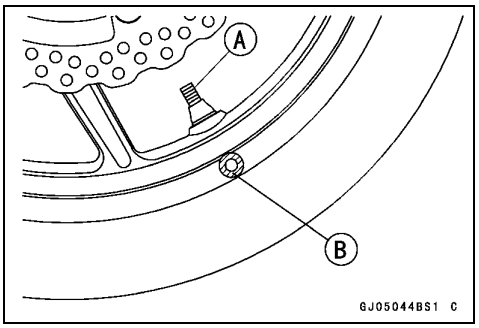


Tires

- 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 air valve [A] align with the tire balance mark [B] (the chalk mark made during removal, or the yellow paint mark on a new tire).



- By hand, slide as much as possible of the lower side of the tire bead over the rim flange, starting at the side opposite the valve stem.
- Fit the rim protectors and tire irons to install the remaining part of the tire bead which cannot be installed by hand. For easy tire installation, position the parts of the bead which is already over the rim flange in the rim well.

NOTE

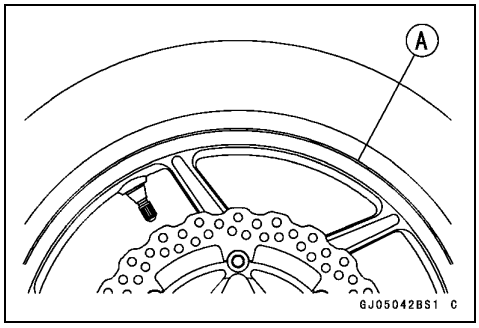
○*To prevent rim damage, be sure to place the rim protectors at any place the tire irons are applied.*

- Install the other side of the tire bead onto the rim in the same manner.
- Lubricate the tire beads and rim flanges with a soap and water solution or rubber lubricant to help seat the tire beads in the sealing surfaces of the rim while inflating the tire.
- Center the rim in the tire beads, and inflate the tire with compressed air until the tire beads seat in the sealing surfaces.

⚠ WARNING

Be sure to install the valve core whenever inflating the tire, and do not inflate the tire to more than 400 kPa (4.0 kgf/cm², 57 psi). Overinflation can explode the tire with possibility of injury and loss of life.

Tires



- Check to see that the rim lines [A] on both sides of the tire sidewalls are parallel with the rim flanges.

★If the rim flanges and tire sidewall rim lines are not parallel, remove the valve core.

- Lubricate the rim flanges and tire beads.
- Install the valve core and inflate the tire again.
- After the tire beads seat in the rim flanges, check for air leakage.

○Inflate the tire slightly above standard inflation.

○Use a soap and water solution or submerge the tire, and check for bubbles that would indicate leakage.

- Adjust the air pressure to the specified pressure (see Air Pressure Inspection in the Periodic Maintenance chapter).
- Install the air valve cap.
- Adjust the wheel balance (see Balance Adjustment).

Tire Repair

Currently two types of repair for tubeless tires have come into wide use. One type is called a temporary (external) repair which can be carried out without removing the tire from the rim, and the other type is called permanent (internal) repair which requires tire removal. It is generally understood that higher running durability is obtained by permanent (internal) repairs than by temporary (external) ones. Also, permanent (internal) repairs have the advantage of permitting a thorough examination for secondary damage not visible from external inspection of the tire. For these reasons, Kawasaki does not recommend temporary (external) repair. Only appropriate permanent (internal) repairs are recommended. Repair methods may vary slightly from make to make. Follow the repair methods indicated by the manufacturer of the repair tools and materials so that safe results can be obtained.

Hub Bearing

Hub Bearing Removal

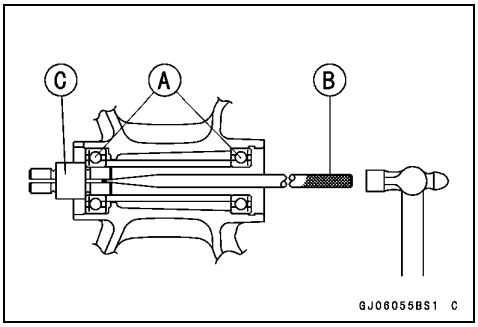
- Remove the wheels (see Front/Rear Wheel Removal), and take out the following.
  Collars
  Speedometer Gear (Out of front hub)
  Coupling (Out of rear hub)
  Grease Seals
  Circlips [A]

Special Tool - Inside Circlip Pliers: 57001-143

- Use the bearing remover to remove the hub bearings [A].

CAUTION

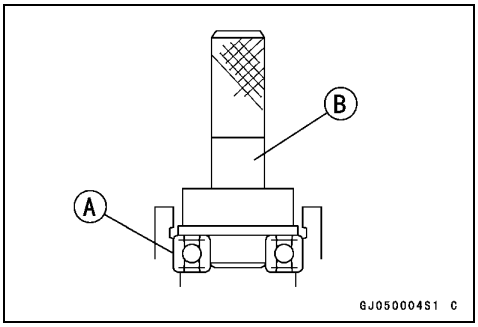
Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.



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.
- Install the bearings by using the bearing driver set which does not contact the bearing inner race.



NOTE

○*Install the bearings so that the marked side faces out.*

- Press in each bearing [A] right until they are bottomed.

Special Tool - Bearing Driver Set [B]: 57001-1129

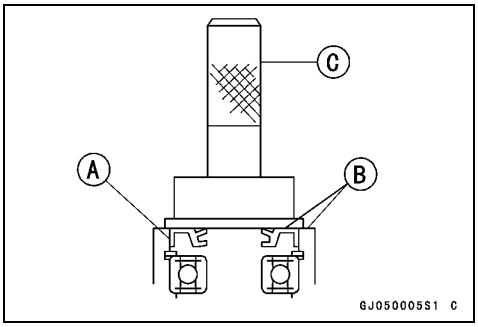
- Replace the circlips with new ones.

Special Tool - Inside Circlip Pliers: 57001-143

- 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



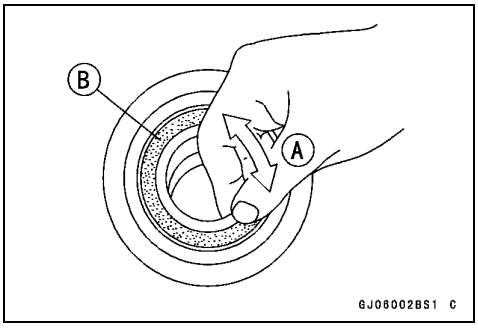
Hub Bearing

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.

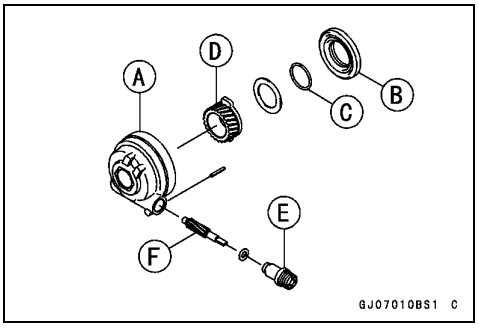
Hub Bearing Lubrication

NOTE

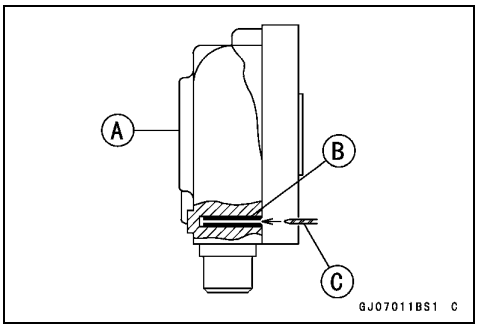
○*Since the hub bearings are packed with grease and sealed, lubrication is not required.*

Speedometer Gear Housing

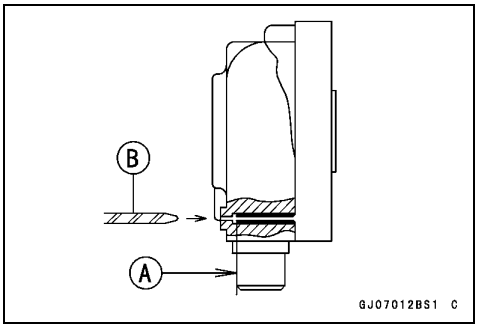
Speedometer Gear Housing Disassembly



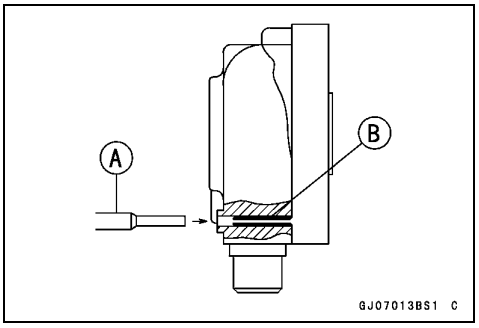
- Pull the speedometer gear housing [A] off the front wheel.
- Remove the grease seal [B] and snap ring [C].
- Pull out the speedometer gear [D].
- If the speedometer cable bushing [E] or speedometer pinion [F] needs to be removed, work in accordance with following procedures.



- First drill the housing [A] through the pin [B] using a 1.0 ~ 1.5 mm (0.04 ~ 0.06 in.) drill bit [C].



- Drill the housing from the outside to the pin end [A] using a 3.0 ~ 3.5 mm (0.12 ~ 0.14 in.) drill bit [B].



- Using a 3 mm (0.12 in.) rod [A], tap out the pin [B], and then pull out the speedometer cable bushing and speedometer pinion.

NOTE

○*It is recommended that the assembly be replaced rather than attempting to repair the components.*

Speedometer Gear Housing Assembly

- When assembling the speedometer gear housing, be careful of the following items.

○After inserting a new pin, stake the housing hole to secure the pin in place.

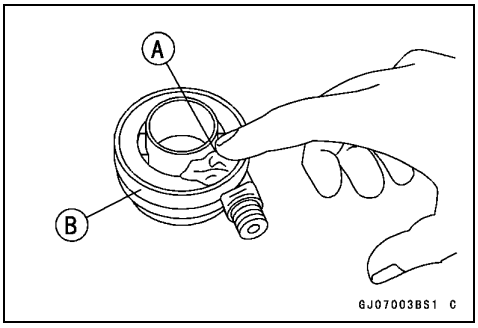
○Apply high-temperature grease to the speedometer gear.

○Replace the grease seal with a new one. Apply a little high-temperature grease to the seal. Install it using a press or a suitable driver so that the face of the seal is level with the surface of the housing.

Speedometer Gear Housing

Speedometer Gear Housing Lubrication

● Clean and grease [A] the speedometer gear housing [B].



Final Drive

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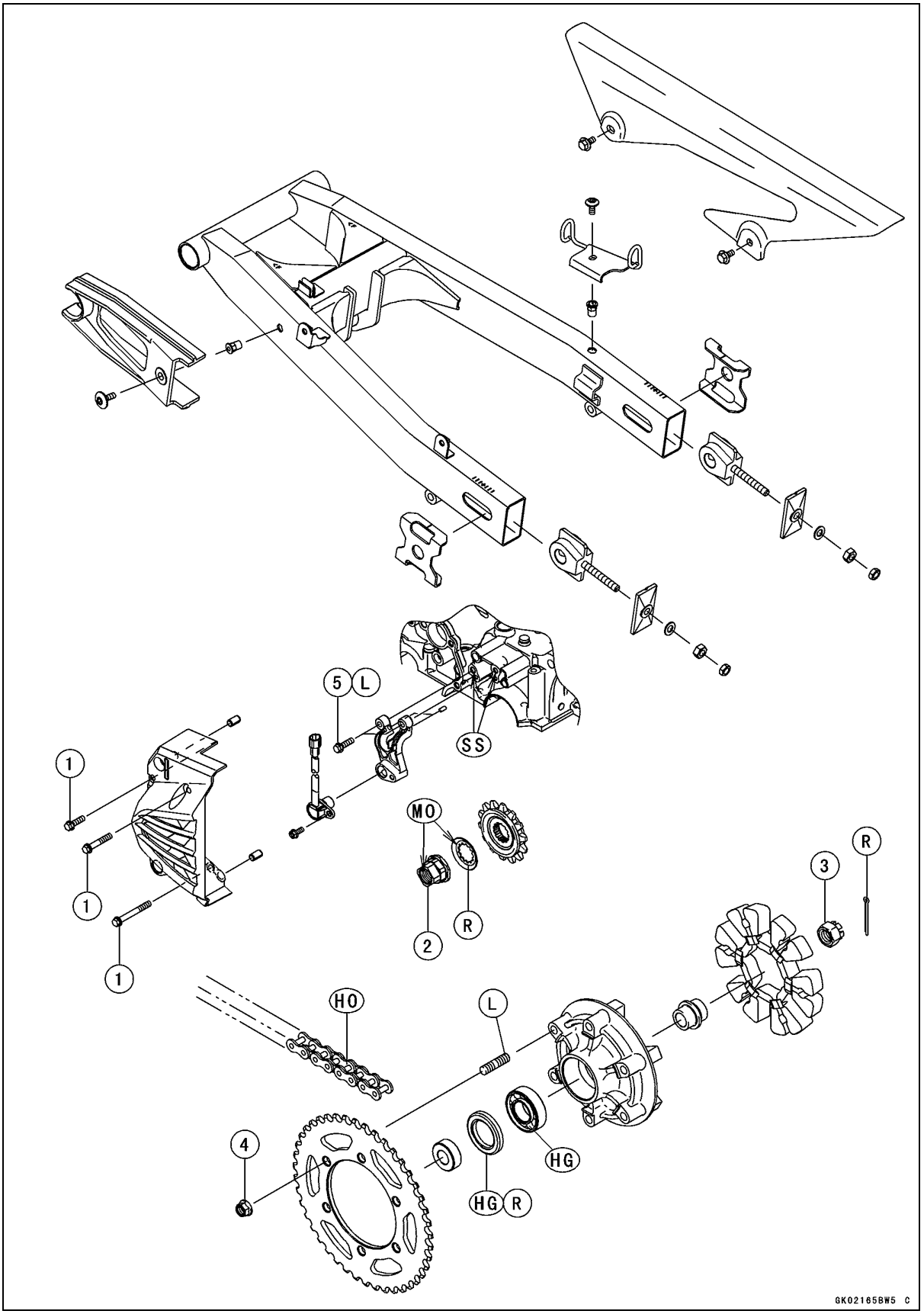
Exploded View



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 Axle Nut	98	10.0	72.3	
4	Rear Sprocket Nuts	59	6.0	44	
5	Speed Sensor Mounting Bracket Bolts	9.8	1.0	87 in·lb	L

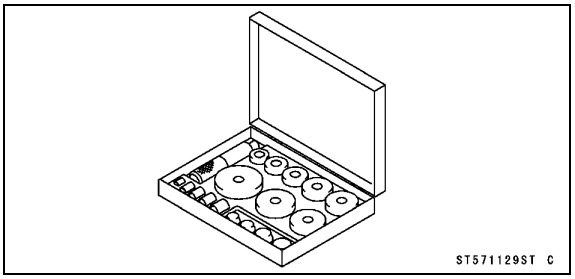
HG: Apply high-temperature grease.
HO: Apply heavy oil.
L: Apply a non-permanent locking agent.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
SS: Apply silicone sealant.

Specifications

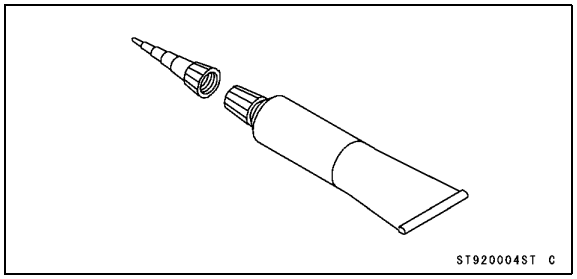
Item	Standard	Service Limit
Drive Chain		
Drive Chain Slack	20 ~ 30 mm (0.8 ~ 1.2 in.)	– – –
Drive Chain Wear (20-link Length)	317.5 ~ 318.2 mm (12.50 ~ 12.53 in.)	323 mm (12.7 in.)
Standard Chain:		
Make	ENUMA	– – –
Type	EK520SR-O_2	– – –
Link	106 links	– – –
Sprockets		
Rear Sprocket Warp	TIR 0.4 mm (0.016 in.) or less	TIR 0.5 mm (0.020 in.)

Special Tool and Sealant

Bearing Driver Set:
57001-1129



Kawasaki Bond (Silicone Sealant):
92104-0004



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

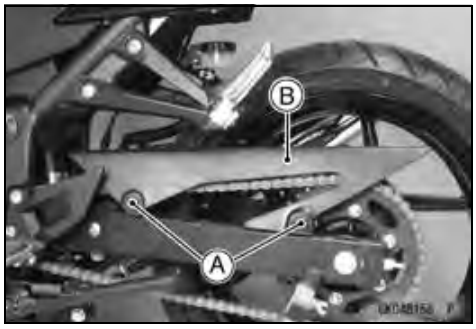
- Refer to the Drive Chain Lubrication Condition in the Periodic Maintenance chapter.

Drive Chain Guide Wear Inspection

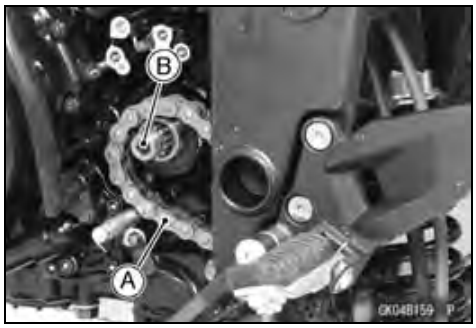
- Refer to the Chain Guide Wear Inspection in the Periodic Maintenance chapter.

Drive Chain Removal

- Remove:
  Chain Cover Bolts [A] and Chain Cover [B]
  Engine Sprocket (see Engine Sprocket Removal)
  Rear Wheel (see Rear Wheel Removal in the Wheels/Tires chapter)
  Swingarm (see Swingarm Removal in the Suspension chapter)



- Remove the drive chain [A] from the output shaft [B], and take it off the chassis.



Drive Chain Installation

- Install the drive chain to the output shaft.
- Install:
  Swingarm (see Swingarm Installation in the Suspension chapter)
  Rear Wheel (see Rear Wheel Installation in the Wheels/Tires chapter)
  Engine Sprocket (see Engine Sprocket Installation)
  Chain Cover
- Adjust the drive chain slack after installing the chain (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).

Drive Chain

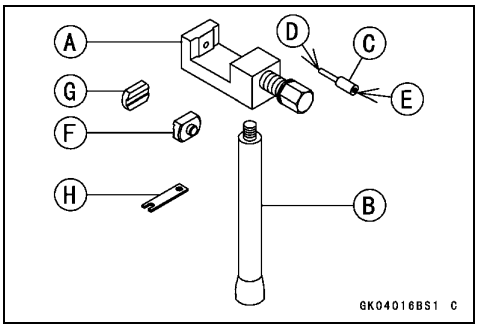
Drive Chain Replacement

● Remove:
Chain Cover (see Drive Chain Removal)
Engine Sprocket Cover (see Engine Sprocket Removal)

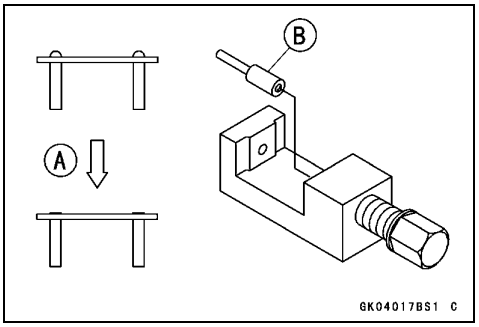
CAUTION
For safety, if the drive chain shall be replaced, replace it using a recommended tool.

Recommended Tool - Type: EK Joint Tool #50
Brand: ENUMA

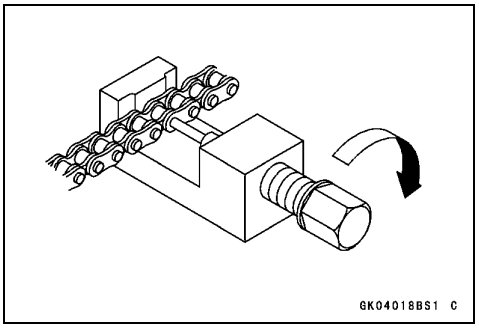
Body [A]
Handlebar [B]
Cutting and Riveting Pin [C]
For Cutting [D]
For Riveting [E]
Plate Holder (A) [F]
Plate Holder (B) [G]
Gauge [H]



● Grind [A] the pin head to make it flat.
● Set the cutting and riveting pin [B] as shown in the figure.

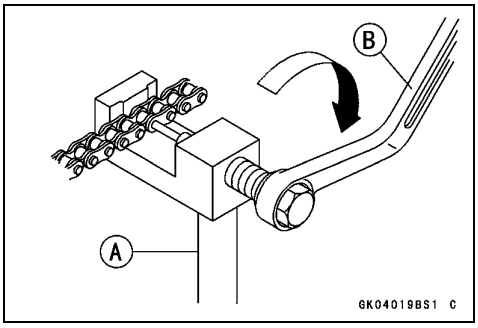


● Screw the pin holder until it touches the link pin.
● Be sure that the cutting pin hits center of the link pin.

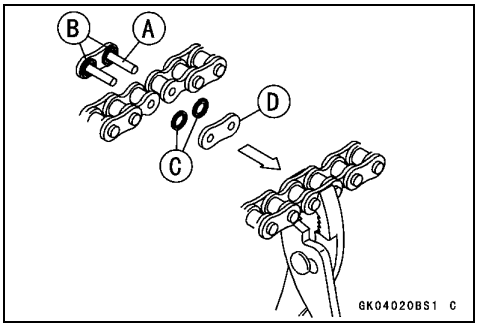


Drive Chain

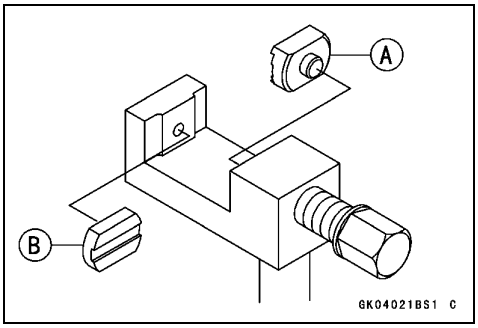
- Screw the handlebar [A] into the body.
- Turn the pin holder with the wrench [B] clockwise to extract the link pin.



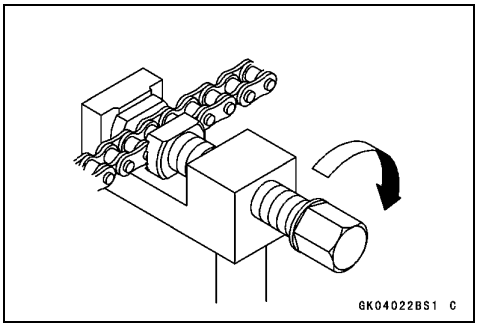
- Replace the link pin, link plate and grease seals.
- Apply grease to the link pins [A] and grease seals [B] [C].
- Engage the drive chain on the engine and rear sprockets.
- Insert the link pins in the drive chain ends.
- Install the grease seals.
- Install the link plate so that the mark [D] faces out.
- Push the link plate by hand or plier to fix it.
- Be sure to set the grease seals correctly.



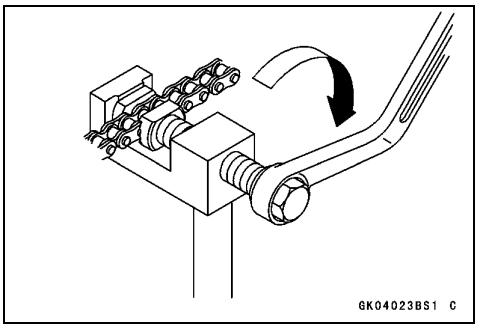
- Set the plate holder (A) [A] and plate holder (B) [B] on the body.



- 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.

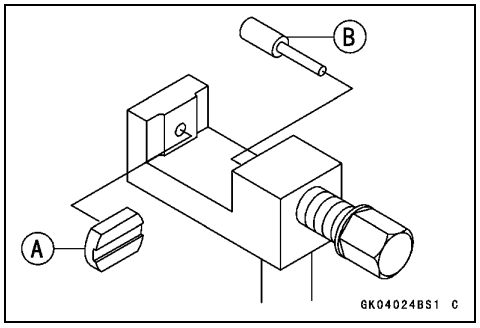


- Turn the pin holder by a wrench clockwise until two pins of link come into groove of the plate holder (A).
- Take off the plate holder.

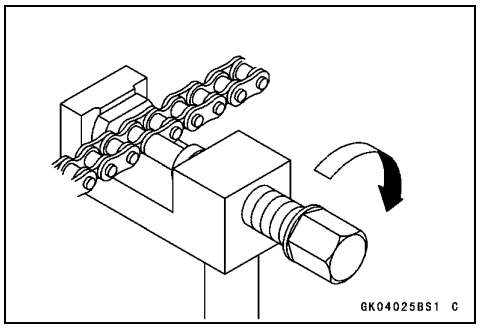


Drive Chain

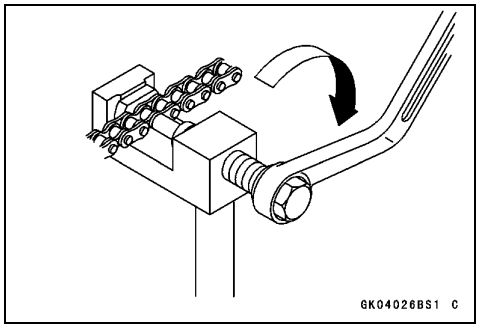
- Set the plate holder (B) [A] and cutting and riveting pin [B] as shown in the figure.



- Turn the pin holder until the riveting pin touches the link pin.



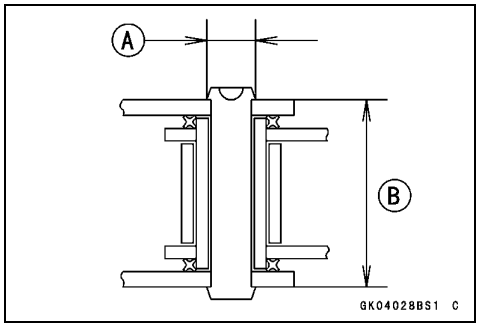
- Turn the wrench clockwise until the tip of riveting pin hits of the link pin.
- Rivet it.
- Same work for the other link pin.



- 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 (0.683 ~ 0.689 in.)



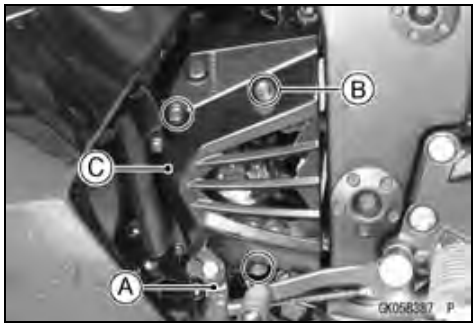
★If the reading exceeds the specified length, cut and rejoin the chain again.

- Check:
  Movement of the Rollers
- Adjust the drive chain slack after installing the chain (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).
- Install the removed parts (see appropriate chapters).

Sprocket, Coupling

Engine Sprocket Removal

- Remove:
  Shift Lever [A] (see Shift Pedal Removal in the Crankshaft/Transmission chapter)
  Engine Sprocket Cover Bolts [B]
  Engine Sprocket Cover [C]

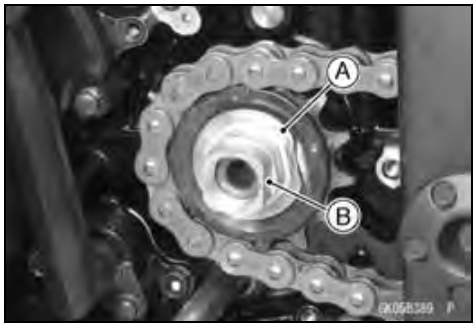


- Remove the bolts [A].

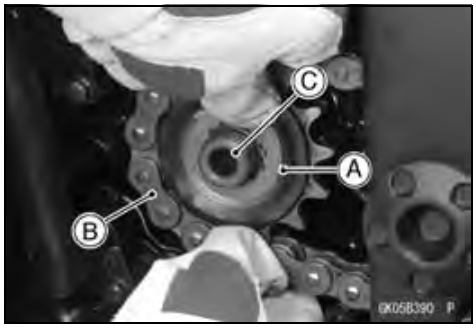
- Flatten out the bended washer [A].
- Remove the engine sprocket nut [B] and washer.

NOTE

○*When loosening the engine sprocket nut, hold the rear brake on.*



- Raise the rear wheel off the ground with the stand.
- Loosen the drive chain (see Drive Chain Slack Adjustment in the Periodic Maintenance chapter).
- Remove the drive chain from the rear sprocket toward the right.
- Pull the engine sprocket [A] with drive chain [B] off the output shaft [C].
- Disengage the drive chain from the engine sprocket.



Engine Sprocket Installation

- Replace the sprocket washer and axle cotter pin.
- Install the engine sprocket so that protruding side [A] faces inside.
- Apply molybdenum disulfide oil solution to the threads and the seating surface of the engine sprocket nut.
- Tighten:

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

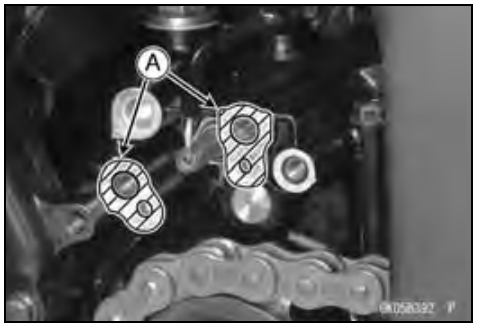
NOTE

○*Tighten the nut while applying the rear brake.*

- After torquing the engine sprocket nut, bend the one side of the washer over the nut.

Sprocket, Coupling

- Apply silicone sealant [A] to the crankcase as shown in the figure.



Sealant - Kawasaki Bond (Silicone Sealant): 92104-0004

- Install the speed sensor mounting bracket.
- Tighten:

Torque - Speed Sensor Mounting Bracket Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

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

CAUTION

Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

- Remove:
  Rear Sprocket Nuts [A]
  Rear Sprocket [B]

Rear Sprocket Installation

- Install the sprocket facing the tooth number marking [A] outward.

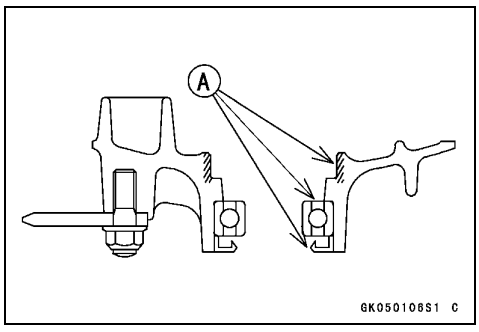
- Tighten:

Torque - Rear Sprocket Nuts: 59 N·m (6.0 kgf·m, 44 ft·lb)

- Install the rear wheel (see Rear Wheel Installation in the Wheels/Tires chapter).

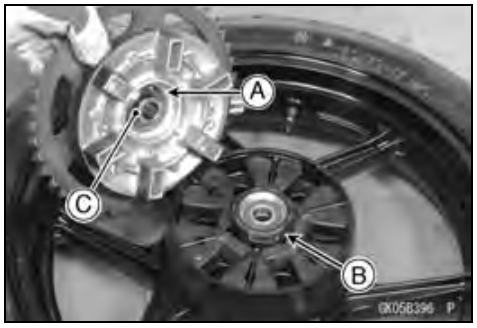
Coupling Installation

- Apply high-temperature grease to the following.
  Coupling Grease Seal Lips [A]
  Coupling Internal Surface [A]
  Ball Bearing [A]



Sprocket, Coupling

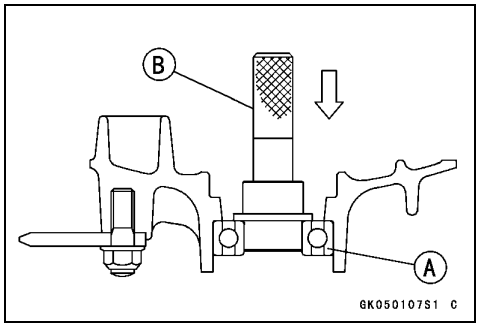
● Apply high-temperature grease to the following.
Wheel Flange Portion [A]
O-ring [B]
● Install the collar [C].



Coupling Bearing Removal

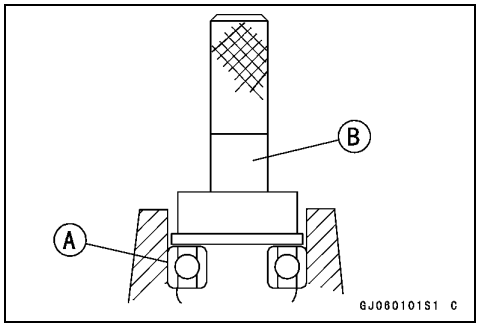
● Remove:
Coupling
Grease Seal

● 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.
● 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

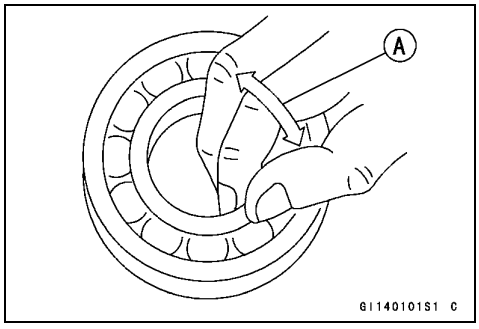
Coupling Bearing Inspection

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 high-temperature grease. Turn the bearing around by hand a few times to make sure the grease is distributed uniformly inside the bearing.

Coupling Damper Inspection

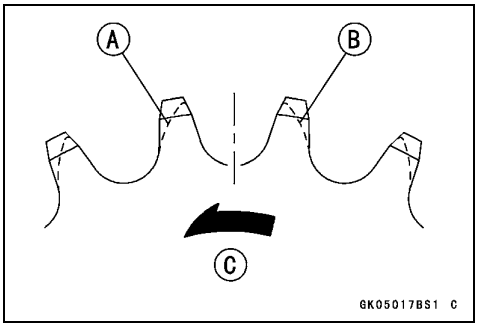
- Remove the rear wheel coupling, and inspect the rubber dampers [A].
- Replace the damper if it appears damaged or deteriorated.

Sprocket Wear Inspection

- Visually inspect the engine and rear sprocket teeth for wear and damage.

★If the teeth are worn as illustrated, replace the sprocket, and inspect the drive chain wear (see Drive Chain Wear Inspection in the Periodic Maintenance chapter).

Worn Tooth (Engine Sprocket) [A]
Worn Tooth (Rear Sprocket) [B]
Direction of Rotation [C]



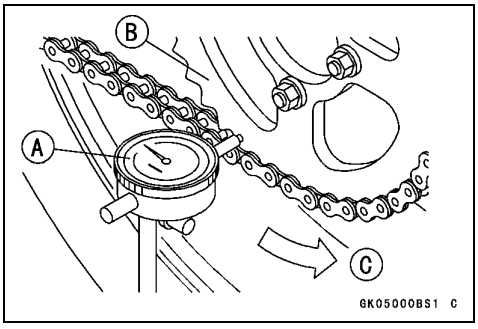
NOTE

○*If a sprocket requires replacement, the chain is probably worn also. When replacing a sprocket, inspect the chain.*

Rear Sprocket Warp Inspection

- Raise the rear wheel off the ground with the stand so that it will turn freely.
- Set a dial gauge [A] against the rear sprocket [B] near the teeth as shown in the figure, and rotate [C] the rear wheel to measure the sprocket runout (warp). The difference between the highest and lowest dial gauge readings is the amount of runout (warp).

★If the runout exceeds the service limit, replace the rear sprocket.



Rear Sprocket Warp

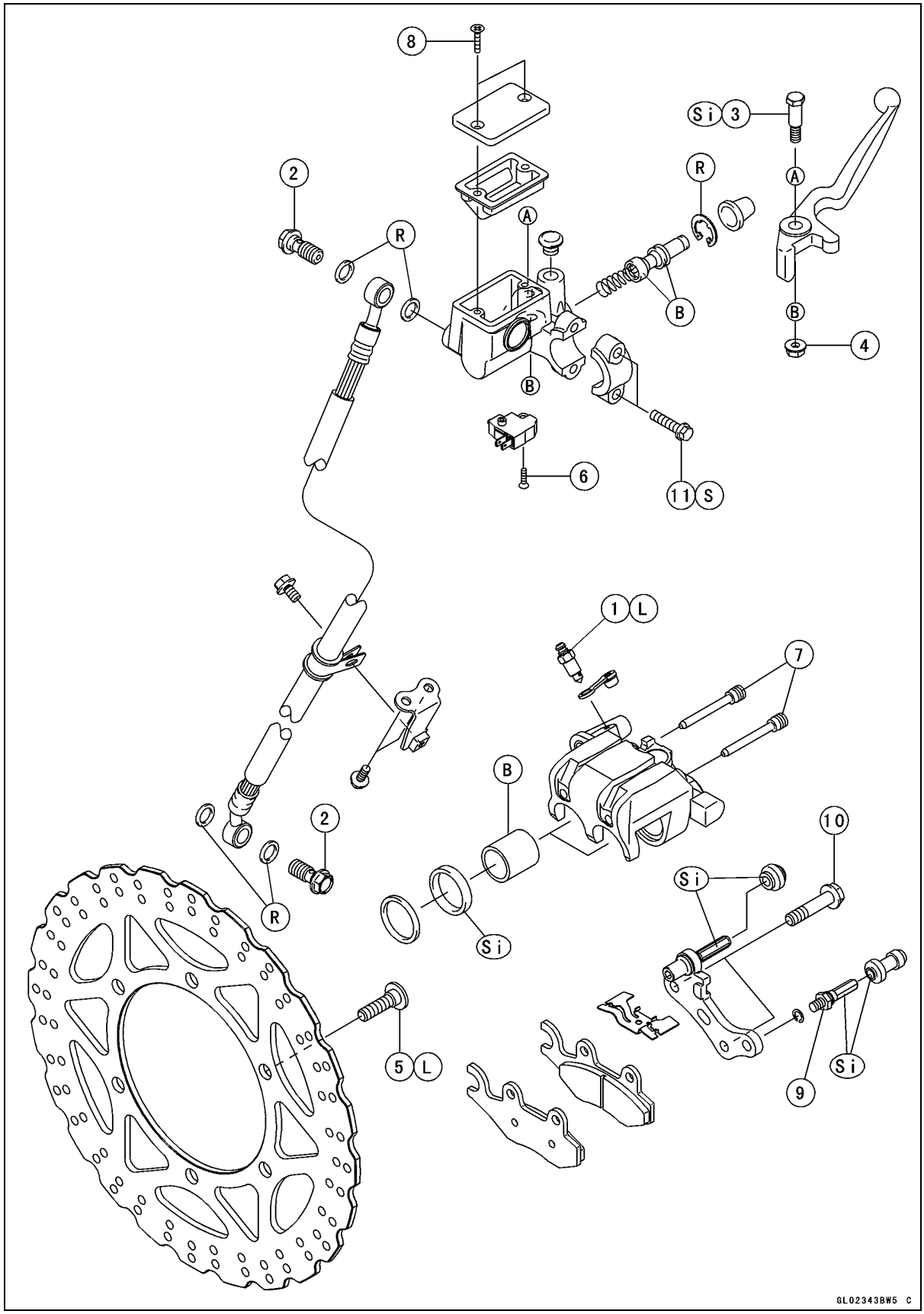
Standard: TIR 0.4 mm (0.016 in.) or less

Service Limit: TIR 0.5 mm (0.020 in.)

Brakes

Table of Contents

Exploded View

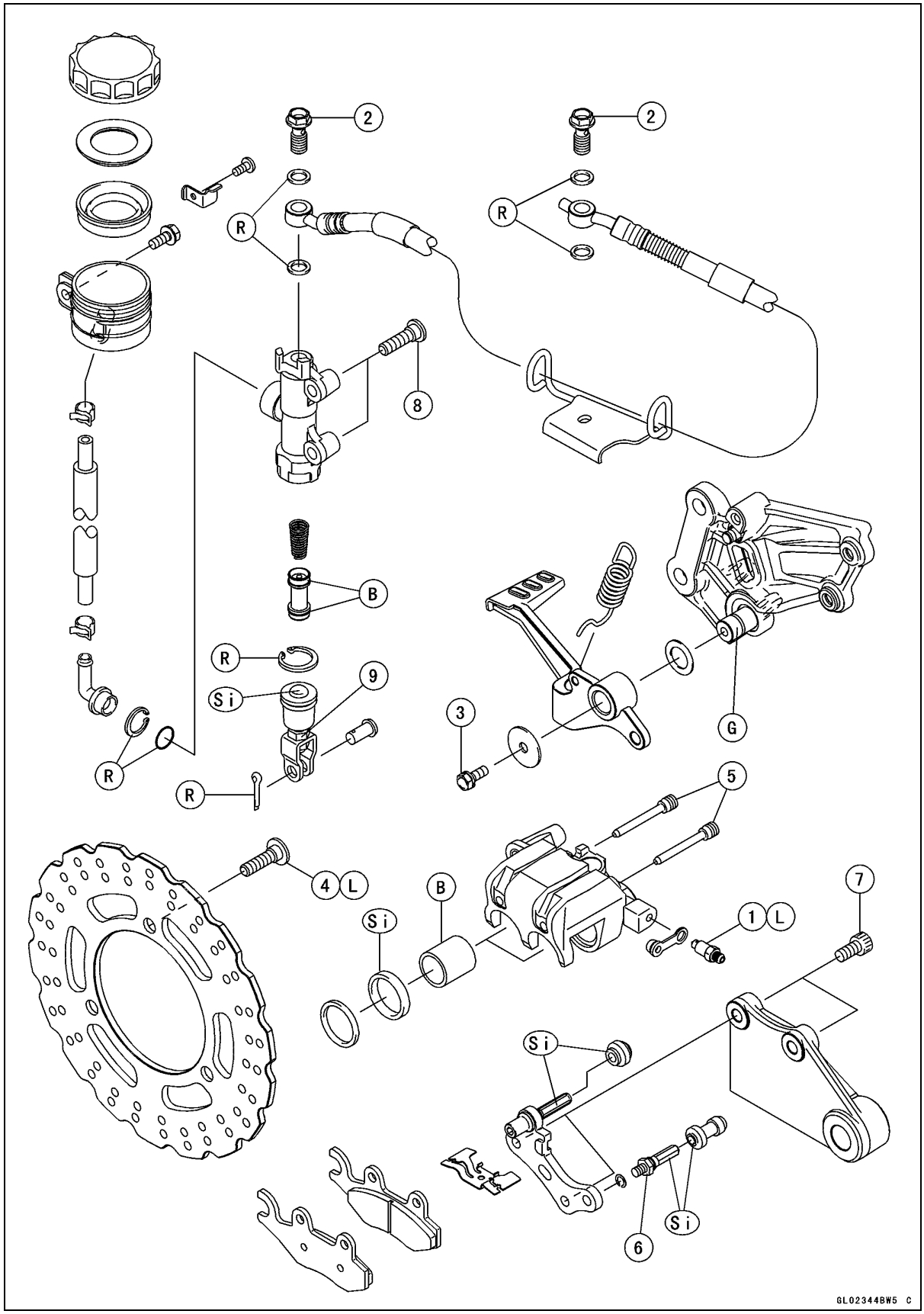


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Bleed Valve	5.5	0.56	49 in·lb	L
2	Brake Hose Banjo Bolts	25	2.5	18	
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 Brake Disc Mounting Bolts	27	2.8	20	L
6	Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
7	Front Brake Pad Pins	17.2	1.8	13	
8	Front Brake Reservoir Cap Screws	1.5	0.15	13 in·lb	
9	Front Caliper Holder Pin Bolt	17.2	1.8	13	Si
10	Front Caliper Mounting Bolts	25	2.5	18	
11	Front Master Cylinder Clamp Bolts	8.8	0.90	78 in·lb	S

B: Apply brake fluid.
L: Apply a non-permanent locking agent.
R: Replacement Parts
S: Follow the specified tightening sequence.
Si: Apply silicone grease (ex. PBC grease).

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Bleed Valve	5.5	0.56	49 in·lb	L
2	Brake Hose Banjo Bolts	25	2.5	18	
3	Brake Pedal Bolt	8.8	0.90	78 in·lb	
4	Rear Brake Disc Mounting Bolts	27	2.8	20	L
5	Rear Brake Pad Pins	17.2	1.8	13	
6	Rear Caliper Holder Pin Bolt	17.2	1.8	13	Si
7	Rear Caliper Mounting Bolts	25	2.5	18	
8	Rear Master Cylinder Mounting Bolts	25	2.5	18	
9	Rear Master Cylinder Push Rod Locknut	17.2	1.8	13	

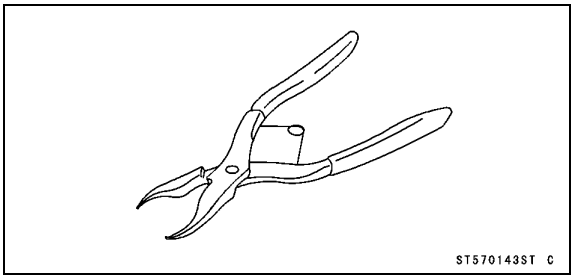
B: Apply brake fluid.
G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts
Si: Apply silicone grease (ex. PBC grease).

Specifications

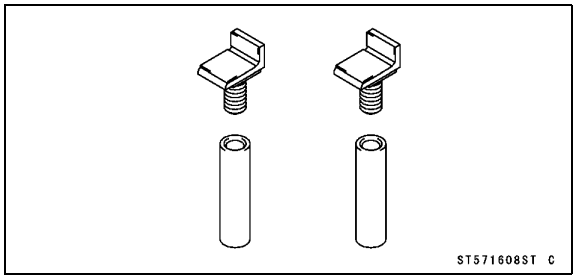
Item	Standard	Service Limit
Brake Lever, Brake Pedal		
Brake Lever Position	Non-adjustable	– – –
Brake Lever Free Play	Non-adjustable	– – –
Pedal Free Play	Non-adjustable	– – –
Pedal Position	About 40 mm (1.57 in.) below top of footpeg	– – –
Brake Pads		
Lining Thickness:		
Front	4.5 mm (0.18 in.)	1 mm (0.04 in.)
Rear	4.5 mm (0.18 in.)	1 mm (0.04 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 (0.006 in.) or less	TIR 0.3 mm (0.01 in.)
Brake Fluid		
Grade	DOT4	– – –

Special Tools

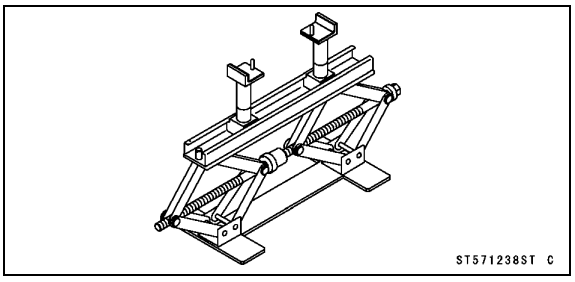
Inside Circlip Pliers:
57001-143



Jack Attachment:
57001-1608

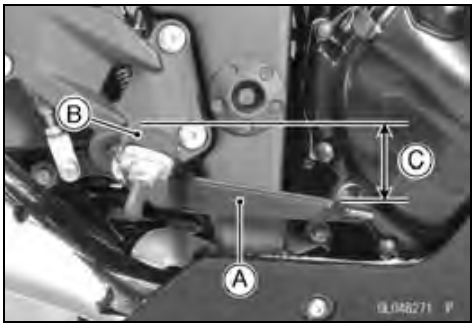


Jack:
57001-1238



Brake Lever, Brake Pedal

Brake Pedal Position Inspection

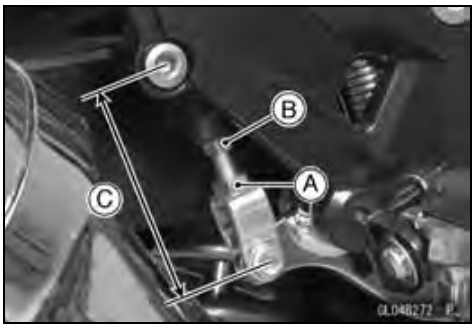


- Check that the brake pedal [A] is in the correct position.
  Footpeg [B]

Pedal Position
Standard: About 40 mm (1.57 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.

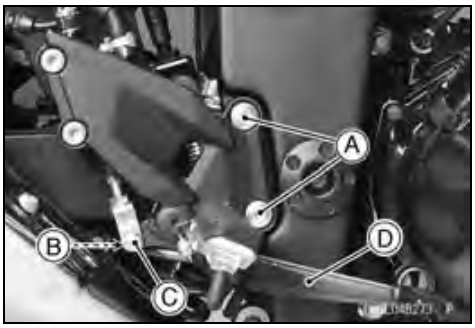
★If the length [C] shown is **80 ±1 mm (3.15 ±0.04 in.)**, the pedal position will be within the standard range.

- Tighten:

Torque - Rear Master Cylinder Push Rod Locknut: 17.2 N·m (1.8 kgf·m, 13 ft·lb)

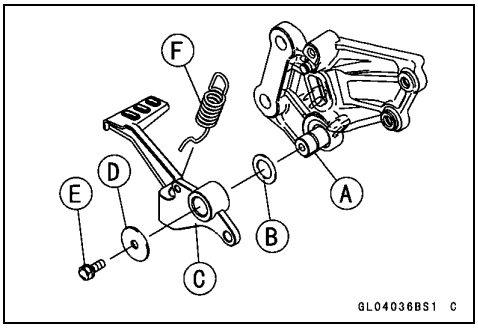
- Check the brake light switch operation (see Brake Light Switch Operation Inspection in the Periodic Maintenance chapter).

Brake Pedal Removal



- Remove:
  Right Front Footpeg Bracket Bolts [A]
  Cotter Pin [B]
  Joint Pin [C]
  Rear Brake Light Switch Spring
  Return Spring
- Remove the brake pedal bolt and take out the brake pedal [D].

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)

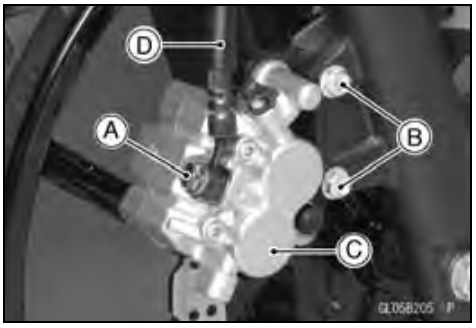
- Hook:
  Rear Brake Light Switch Spring
  Return Spring [F]
- Replace the cotter pin with a new one.
- Insert the cotter pin and bend the pin ends.
- Install the right front footpeg bracket, and tighten the bolts.

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).

Calipers

Front Caliper Removal



- Loosen the banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Unscrew the caliper mounting bolts [B], and detach the caliper [C] from the disc.
- Unscrew the banjo bolt and remove the brake hose [D] from the caliper (see Brake Hose Removal/Installation).

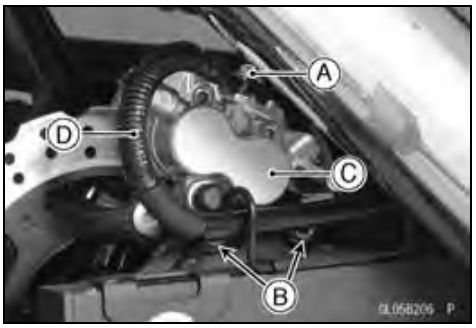
CAUTION

Immediately wash away any brake fluid that spills.

NOTE

○*If the caliper is to be disassembled after removal and if compressed air is not available, disassemble the caliper before the brake hose is removed (see Front Caliper Disassembly).*

Rear Caliper Removal



- Loosen the banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Unscrew the caliper mounting bolts [B], and detach the caliper [C] from the disc.
- Unscrew the banjo bolt and remove the brake hose [D] from the caliper (see Brake Hose Removal/Installation).

CAUTION

Immediately wash away any brake fluid that spills.

NOTE

○*If the caliper is to be disassembled after removal and if compressed air is not available, disassemble the caliper before the brake hose is removed (see Rear Caliper Disassembly).*

Caliper Installation

- Install the caliper and brake hose lower end.

○Replace the washers on each side of hose fitting with new ones.

- Tighten:

Torque - Caliper Mounting Bolts:
Front: 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

Do not attempt to drive the motorcycle until a full brake lever or pedal is obtained by pumping the brake lever or pedal and the pads are against the disc. The brakes will not function on the first application of the lever or pedal if this is not done.

Calipers

Front Caliper Disassembly

● Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Front Caliper Assembly

● Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Rear Caliper Disassembly

● Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Rear Caliper Assembly

● Refer to the Caliper Rubber Parts Replacement in the Periodic Maintenance chapter.

Caliper Fluid Seal Damage Inspection

The fluid seal (piston seal) [A] is placed around the piston to maintain clearance between the pad and the disc. If the seal is in a poor condition, it could lead the pad to wear excessively or the brake to drag, which may cause the temperature of the discs or the brake fluid to increase.

● Replace the fluid seal if it exhibits any of the conditions listed below.

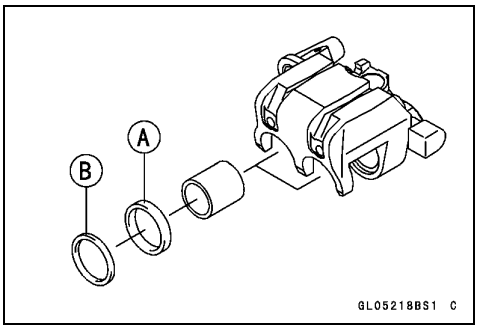
○Brake fluid leakage around the pad.

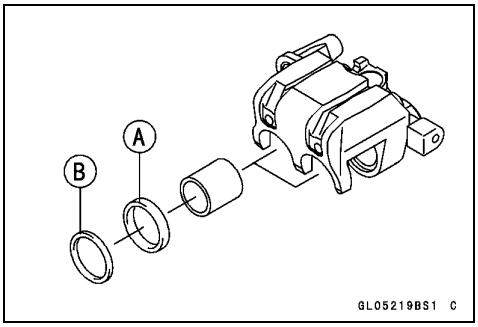
○Brakes overheat.

○Considerable difference in inner and outer pad wear.

○Seal and piston are stuck together.

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





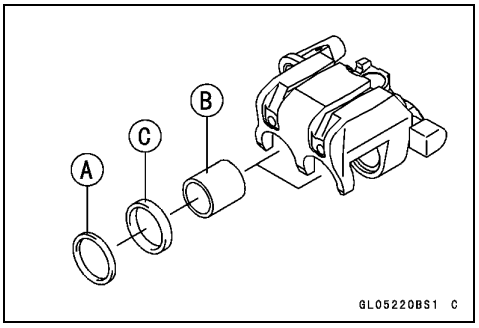
Calipers

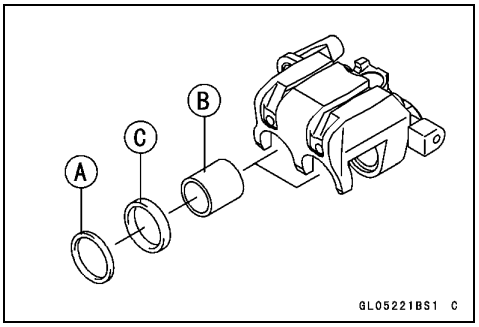
Caliper Dust Seal Damage Inspection

- 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]

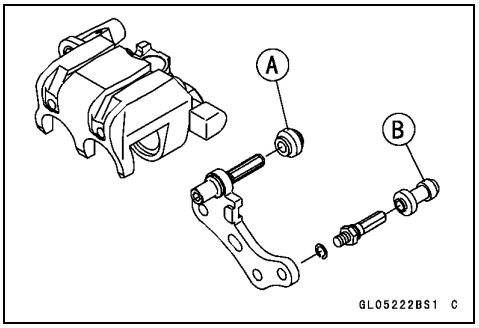


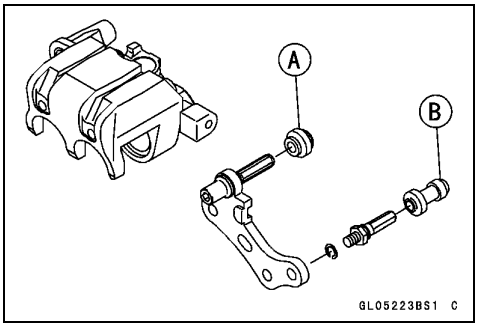


Caliper Dust Boot and Friction Boot Damage Inspection

- Check that the dust boot [A] and friction boot [B] are not cracked, worn, swollen, or otherwise damaged.

★If they show any damage, replace it.



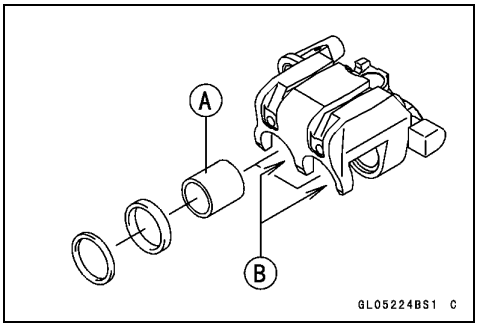


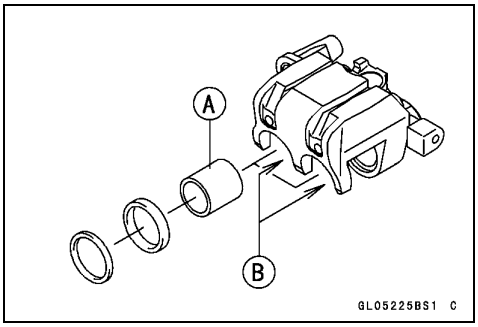
Calipers

Caliper Piston and Cylinder Damage Inspection

● Visually inspect the pistons [A] and cylinder surfaces [B].

★Replace the caliper if the cylinder and piston are badly scores or rusty.





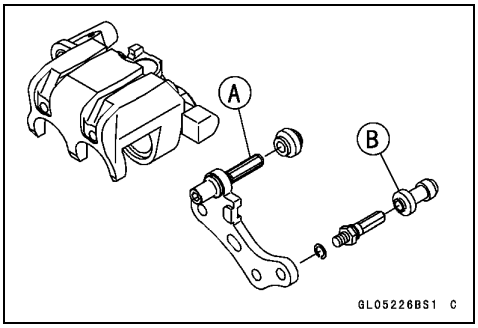
Caliper Holder Shaft Wear Inspection

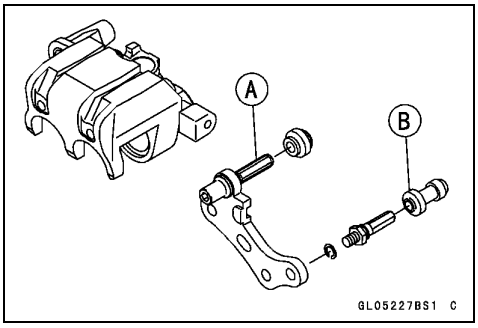
The caliper body must slide smoothly on the caliper holder shafts [A]. If the body does not slide smoothly, one pad will wear more than the other, pad wear will increase, and constant drag on the disc will raise brake and brake fluid temperature.

● Check to see that the caliper holder shafts are not badly worn or stepped, and that the friction boots [B] are not damaged.

★If the friction boot is damaged, replace the friction boot. To replace the friction boot, remove the pads and the caliper holder.

★If the caliper holder shaft is damage, replace the caliper holder.





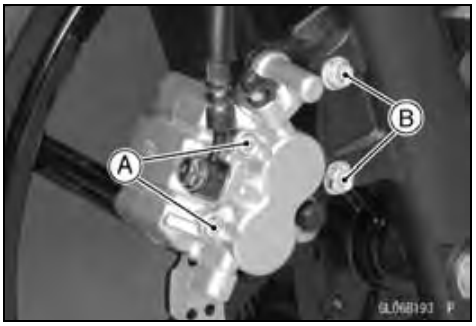
Brake Pads

Brake Pad Removal

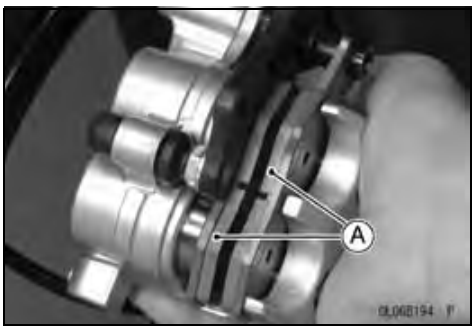
NOTE

○*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].
- Unscrew the bolts [B].
- Remove the caliper with the hose installed.

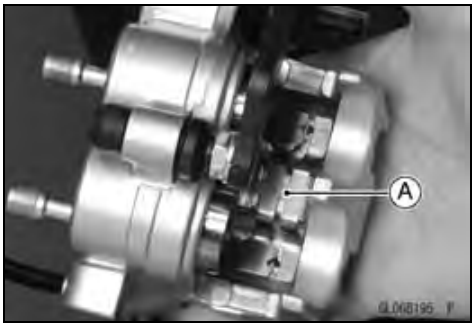


- Remove:
  Pad Pins
  Brake Pads [A]



Brake Pad Installation

- Push the caliper pistons in by hand as far as they will go.
- Install the pad spring [A] in its correct position.
- Install the outside pad first, then install the inside pad.
- Insert the pad pins.



- Install the caliper (see Caliper Installation).
- Tighten:

Torque - Brake Pad Pins: 17.2 N·m (1.8 kgf·m, 13 ft·lb)

⚠ WARNING

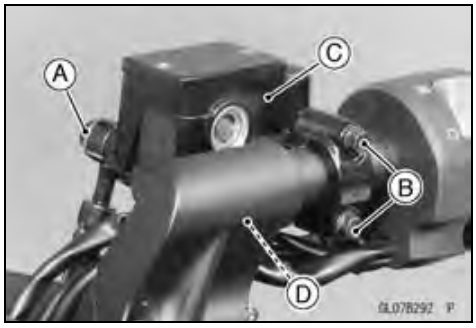
Do not attempt to drive the motorcycle until a full brake lever is obtained by pumping the brake lever and the pads are against the disc. The brake will not function on the first application of the lever if this is not done.

Brake Pad Wear Inspection

- Refer to the Brake Pad Wear Inspection in the Periodic Maintenance chapter.

Master Cylinder

Front Master Cylinder Removal

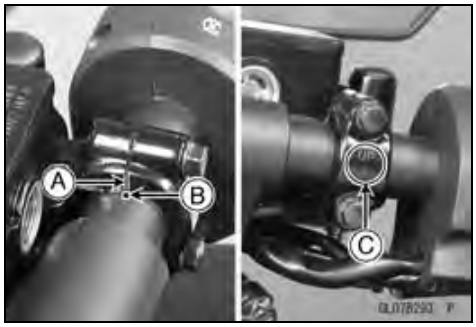


- Remove the banjo bolt [A] to disconnect the brake hose from the master cylinder (see Brake Hose Removal/Installation).
- Unscrew the clamp bolts [B], and take off the master cylinder [C] as an assembly with the reservoir, brake lever, and brake switch installed.
- Disconnect the front brake light switch connector [D].

CAUTION

Immediately wash away any brake fluid that spills.

Front Master Cylinder Installation



- 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.

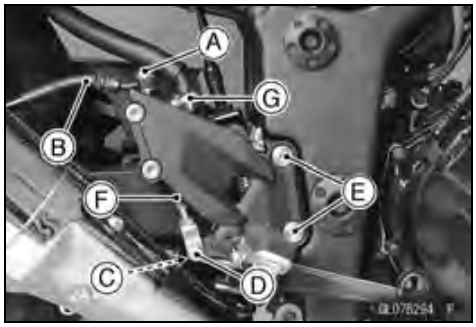
Torque - Front Master Cylinder Clamp Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

- 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



- Remove:
  Brake Hose Banjo Bolt [A]
  Brake Hose [B]
  Cotter Pin [C]
  Joint Pin [D]
  Bolts [E]
  Rear Master Cylinder [F]
- Slide out the clamp [G].
- Pull off the reservoir hose lower end, and drain the brake fluid into a container.

Rear Master Cylinder Installation

- Replace the cotter pin with a new one.
- Replace the washers that are on each side of hose fitting with new ones.
- Tighten:

Torque - Rear Master Cylinder Mounting Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)
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.

Master Cylinder

Front Master Cylinder Disassembly

● Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.

Rear Master Cylinder Disassembly

● Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.

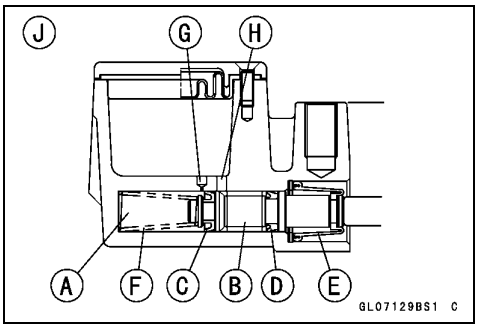
Master Cylinder Assembly

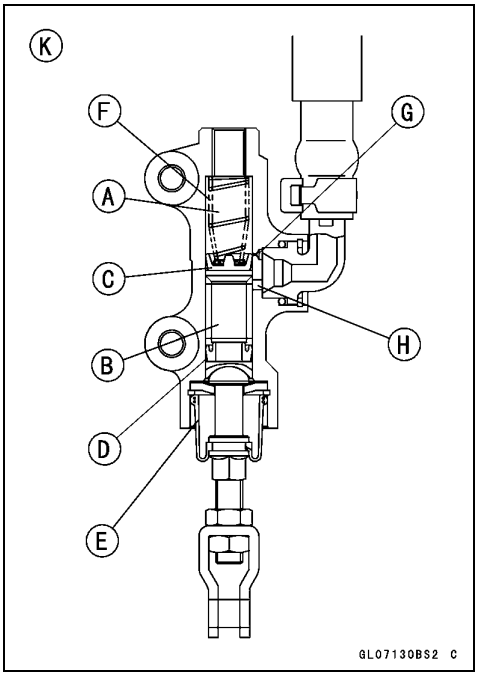
● Refer to the Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter.

Master Cylinder Inspection (Visual Inspection)

● Remove the master cylinders (see Front/Rear Master Cylinder Removal).
● Disassemble the front and rear master cylinders (see Master Cylinder Rubber Parts Replacement in the Periodic Maintenance chapter).
● Check that there are no scratches, rust or pitting on the inner wall [A] of each master cylinder and on the outside of each piston [B].
★If a master cylinder or piston shows any damage, replace them.
● Inspect the primary cup [C] and secondary cup [D].
★If a cup is worn, damaged softened (rotted), or swollen, the piston assembly should be replaced to renew the cups.
★If fluid leakage is noted at the brake lever, the piston assembly should be replaced to renew the cups.
● Check the dust covers [E] for damage.
★If they are damaged, replace them.
● Check the piston return springs [F] for any damage.
★If the springs are damaged, replace them.
● Check that relief port [G] and supply port [H] are not plugged.
★If the relief port becomes plugged, the brake pads will drag on the disc. Blow the ports clean with compressed air.

Front Master Cylinder [J]
Rear Master Cylinder [K]





Brake Disc

Brake Disc Removal

- Remove the wheels (see Front/Rear Wheel Removal in the Wheels/Tires chapter).
- Unscrew the mounting bolts, and take off the disc.

Brake Disc Installation

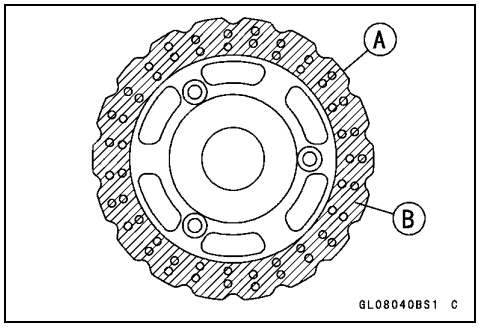
- Install the brake disc on the wheel so that the marked side [A] faces out.
- Apply a non-permanent locking agent to the threads of the front and rear brake disc mounting bolts [B], and tighten them.

Torque - Brake Disc Mounting Bolts: 27 N·m (2.8 kgf·m, 20 ft·lb)

Brake Disc Wear Inspection

- Measure the thickness of each disc [A] at the point where it has worn the most.

★If the disc has worn past the service limit, replace it.
Measuring Area [B]



Brake Discs Thickness

Standard:	
Front	**4.3 ~ 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 Warp Inspection

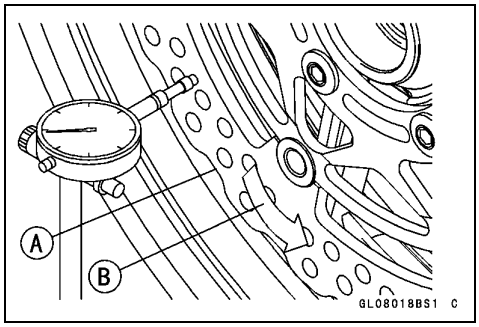
- Raise the front/rear wheel off the ground.

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

○For front disc inspection, turn the handlebar fully to one side.

- Set up a dial gauge against the disc [A] as shown in the figure and measure disc runout, while turning [B] the wheel by hand.

★If runout exceeds the service limit, replace the disc.



Disc Runout

Standard:	**TIR 0.15 mm (0.006 in.) or less**
Service Limit:	**TIR 0.3 mm (0.01 in.)**

Brake Fluid

Brake Fluid Level Inspection

● Refer to the Brake Fluid Level Inspection in the Periodic Maintenance chapter.

Brake Fluid Change

● Refer to the Brake Fluid Change in the Periodic Maintenance chapter.

Brake Line Bleeding

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

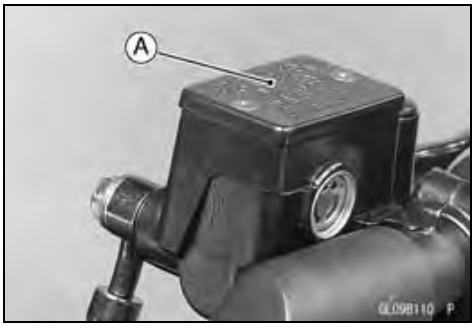
⚠ WARNING

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

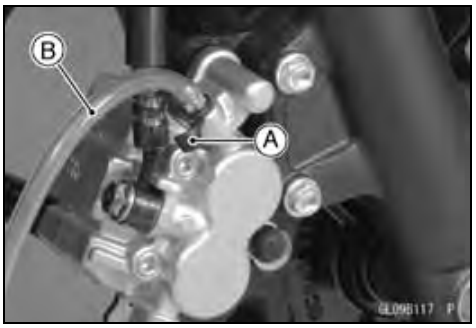
NOTE

○*The procedure to bleed the front brake line is as follows. Bleeding the rear brake line is the same as for the front brake.*

● Remove the reservoir cap [A] and diaphragm.
● Fill the reservoir with fresh brake fluid to the upper level line in the reservoir.
● Slowly pump the brake lever several times until no air bubbles can be seen rising up through the fluid from the holes at the bottom of the reservoir.
○Bleed the air completely from the master cylinder by this operation.



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

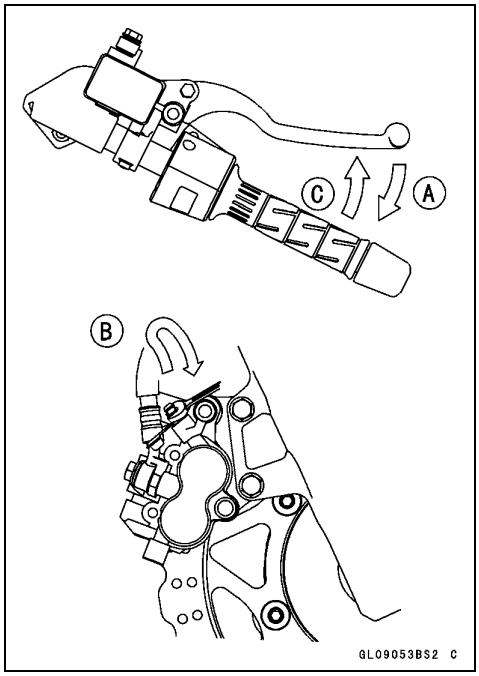


Brake Fluid

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

NOTE

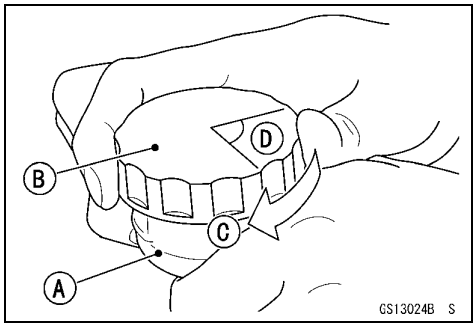
○*The fluid level must be checked often during the bleeding operation and replenished with fresh brake fluid as necessary. If the fluid in the reservoir runs completely out any time during bleeding, the bleeding operation must be done over again from the beginning since air will have entered the line.*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



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



● Apply a non-permanent locking agent to the threads of the bleed valve.
● Tighten the bleed valve, and install the rubber cap.

Torque - Bleed Valve: 5.5 N·m (0.56 kgf·m, 49 in·lb)

● Check the fluid level (see Brake Fluid Level Inspection in the Periodic Maintenance chapter).
● After bleeding is done, check the brake for good braking power, no brake drag, and no fluid leakage.

Brake Fluid

⚠ WARNING

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

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

Brake Hose

Brake Hose Removal/Installation

- Refer to the Brake Hose and Pipe Replacement in the Periodic Maintenance chapter.

Brake Hose Inspection

- Refer to the Brake Hose and Pipe Damage and Installation Condition Inspection in the Periodic Maintenance chapter.

Suspension

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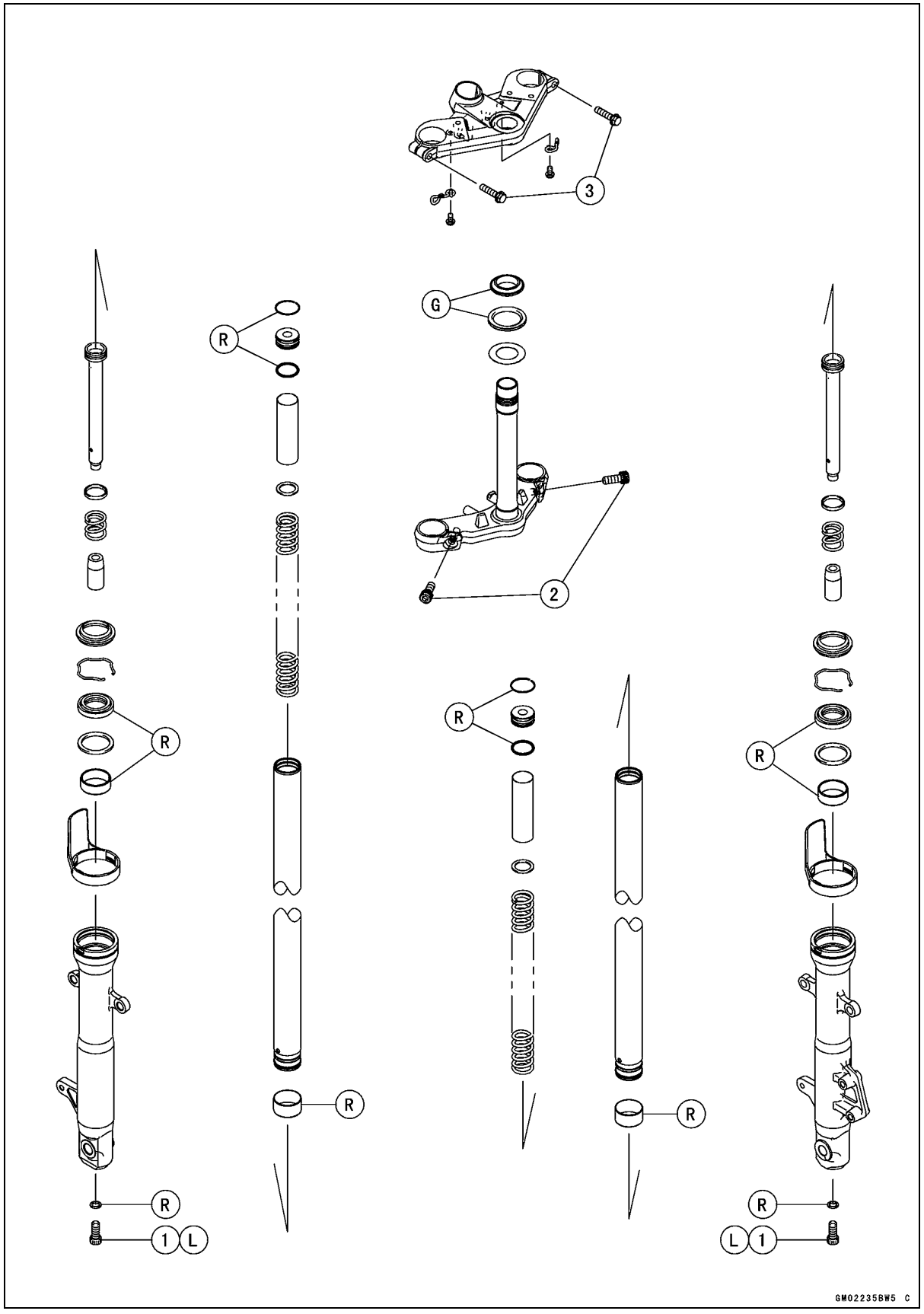
Exploded View

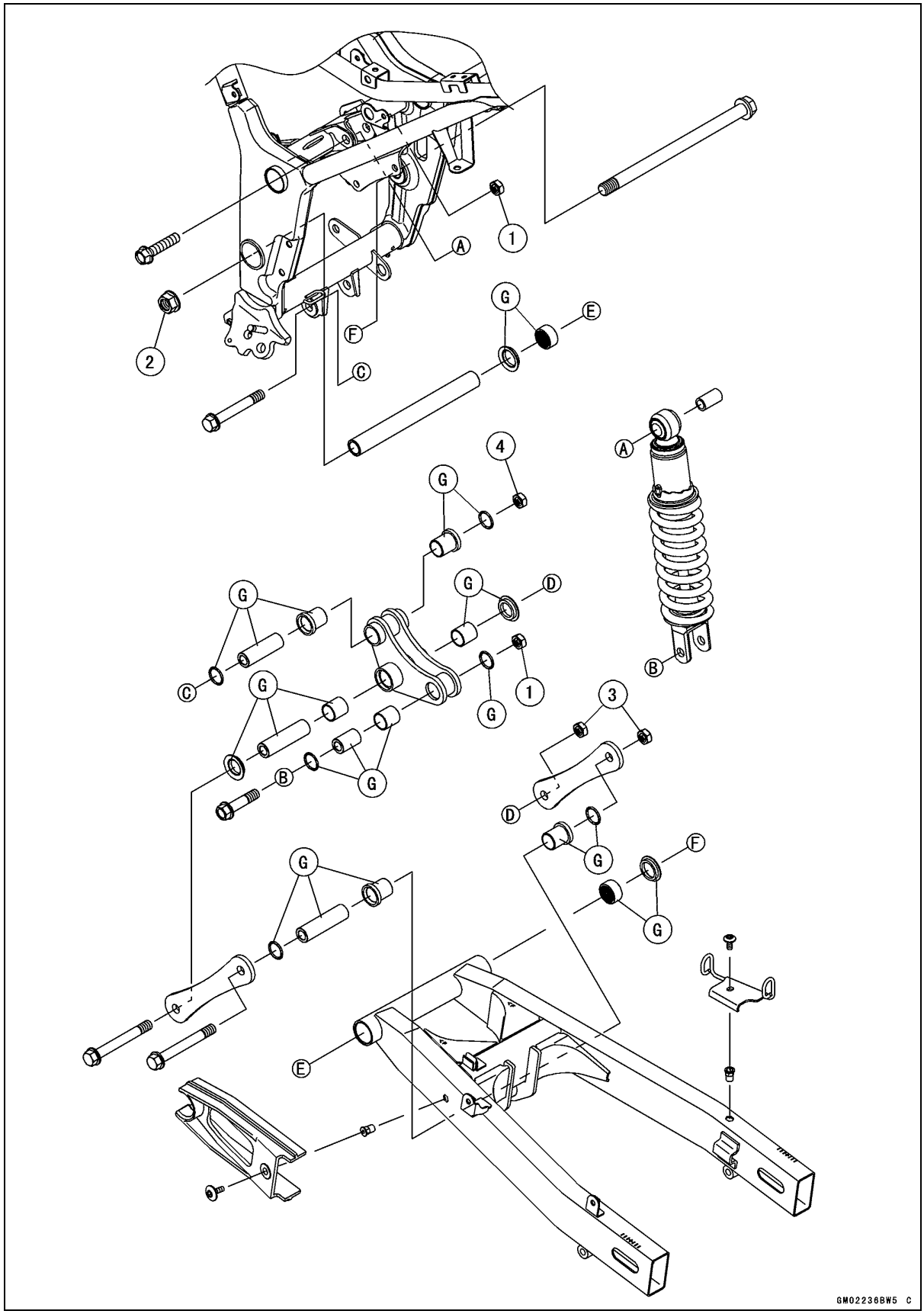


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Fork Bottom Allen Bolts	20	2.0	15	L
2	Lower Front Fork Clamp Bolts	30	3.1	22	
3	Upper Front Fork Clamp Bolts	20	2.0	15	

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 Nuts	59	6.0	44	
2	Swingarm Pivot Shaft Nut	98	10.0	72.3	
3	Tie-Rod Nuts	59	6.0	44	
4	Uni-Trak Rocker Arm Nut	59	6.0	44	

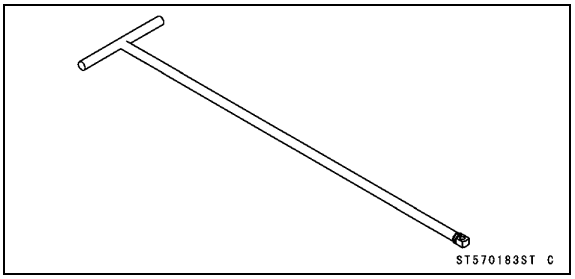
G: Apply grease.
R: Replacement Parts

Specifications

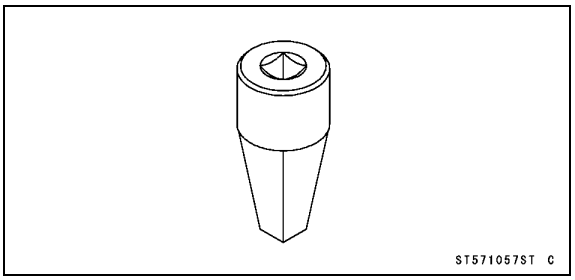
Item	Standard
Front Fork (Per One Unit)	
Fork Inner Tube Diameter	ϕ37 mm (1.5 in.)
Air Pressure	Atmospheric pressure (Non-adjustable)
Rebound Damper Setting	Non-adjustable
Fork Spring Preload Setting	Non-adjustable
Fork Oil:	
Viscosity	SHOWA SS08 or equivalent SAE 10W
Amount	Approx. 310 mL (10.5 US oz.) (when changing oil) 360 ±2.5 mL (12.2 ±0.085 US oz.) (after disassembly and completely dry)
Fork Oil Level	108 ±2 mm (4.25 ±0.08 in.) (fully compressed, without fork spring, below from the top of the inner tube)
Fork Spring Free Length	420.5 mm (16.56 in.) (Service Limit: 412 mm (16.22 in.))
Rear Shock Absorber	
Rebound Damper Setting	Non-adjustable
Spring Preload Setting	2nd position (Adjustable range: 1st ~ 5th position)
Gas Pressure	980 kPa (10 kgf/cm², 142 psi, Non-adjustable)

Special Tools

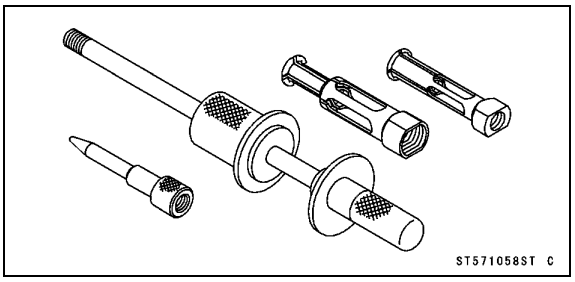
Fork Cylinder Holder Handle:
57001-183



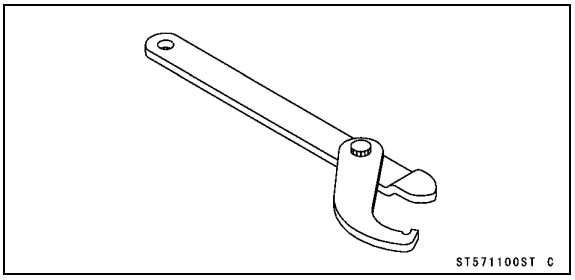
Fork Cylinder Holder Adapter:
57001-1057



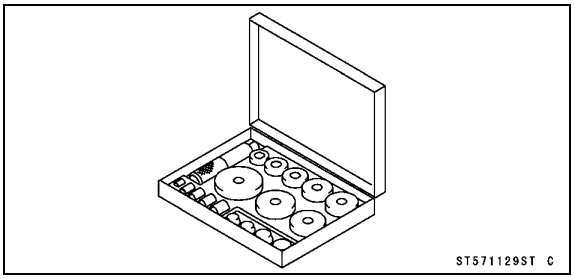
Oil Seal & Bearing Remover:
57001-1058



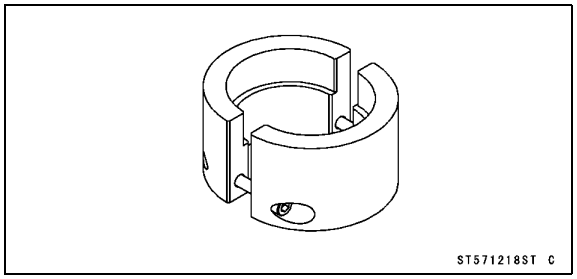
Steering Stem Nut Wrench:
57001-1100



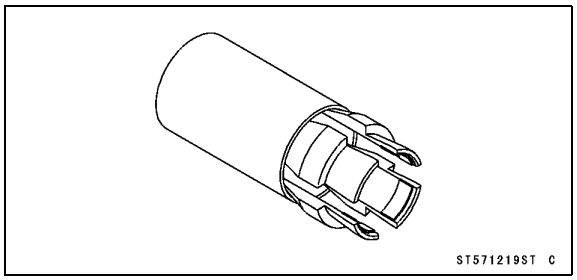
Bearing Driver Set:
57001-1129



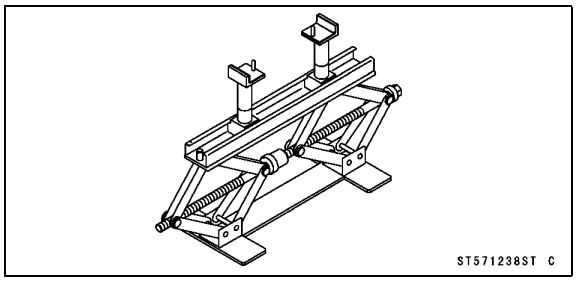
Fork Outer Tube Weight:
57001-1218



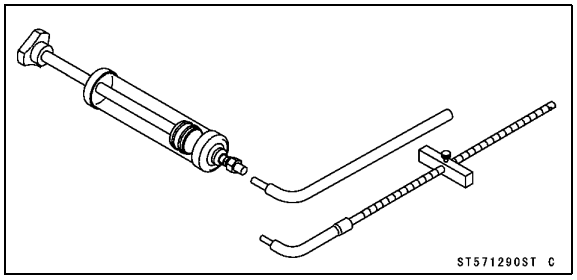
Front Fork Oil Seal Driver:
57001-1219



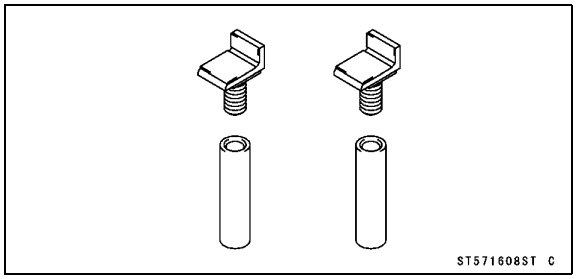
Jack:
57001-1238



Fork Oil Level Gauge:
57001-1290

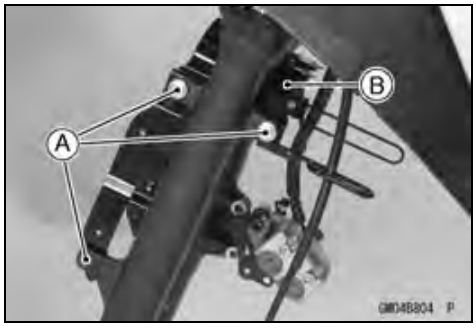


Jack Attachment:
57001-1608

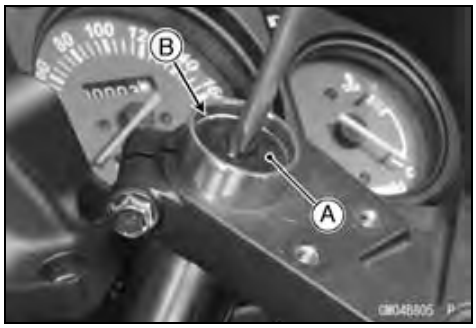


Front Fork

Front Fork Removal (Each Fork Leg)



● Remove:
Lower Fairings (see Lower Fairing Removal in the Frame chapter)
Front Wheel (see Front Wheel Removal in the Wheels/Tires chapter)
Front Fender (see Front Fender Removal in the Frame chapter)
Bolts [A] (Both Sides)
Bracket [B]



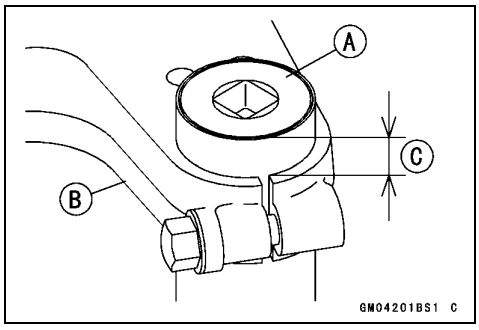
★Remove the handlebar and remove the fork top plug [A] beforehand if the fork leg is to be disassembled.

NOTE

○*To remove the top plug, remove the snap ring [B] pushing down the top plug with the screwdriver.*

● Loosen the upper [A] and lower [B] front fork clamp bolts.
● With a twisting motion, remove the fork leg down and out.

Front Fork Installation (Each Fork Leg)



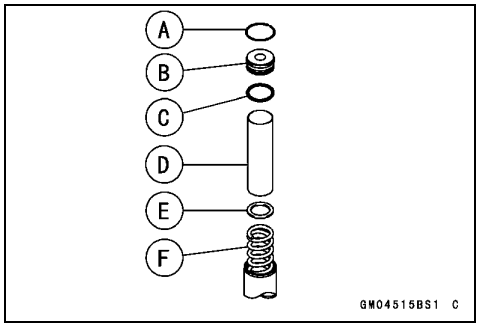
● Insert the fork leg until the inner tube top hit the handlebar lightly, that is, the distance between the inner tube top [A] and steering stem head surface [B] is approximate 12 mm (0.47 in.) [C].
● Tighten:

Torque - Lower Front Fork Clamp Bolts: 30 N·m (3.1 kgf·m, 22 ft·lb)
Upper Front Fork Clamp Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)

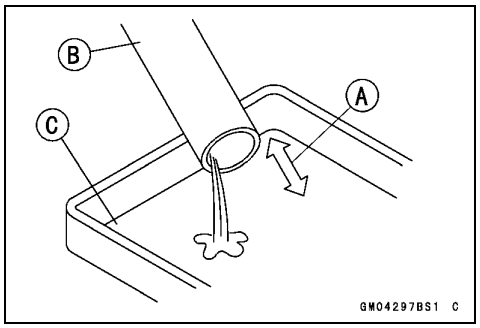
● Install the removed parts (see appropriate chapters).

Front Fork

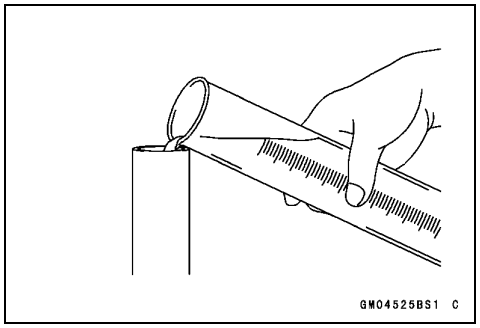
Front Fork Oil Change



● Remove:
Front Fork (see Front Fork Removal)
Snap Ring [A] (see Front Fork Removal)
Top Plug [B] with O-ring [C]
Collar [D]
Fork Spring Seat [E]
Fork Spring [F]



● Compress [A] the fork [B] upside down to draw out the oil into the suitable container [C].



● Hold the fork tube upright, pour in the type and amount of fork oil specified.

Fork Oil
Viscosity:
SHOWA SS08 or equivalent SAE 10W
Amount (Per Side):
When changing oil:
Approx. 310 mL (10.5 US oz.)
After disassembly and completely dry:
360 ±2.5 mL (12.2 ±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

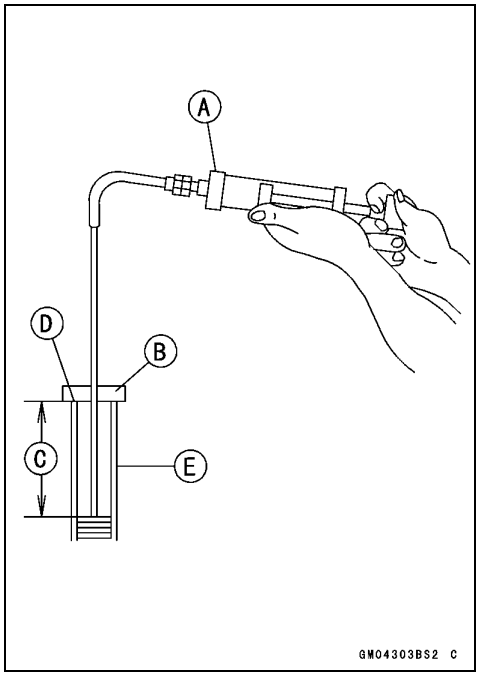
● Hold the outer tube vertically in a vise and compress the fork completely.
● Wait until the oil level stabilizes.
● Use the fork oil level gauge [A] to measure the distance between the top of the inner tube to the oil level.

Special Tool - Fork Oil Level Gauge: 57001-1290

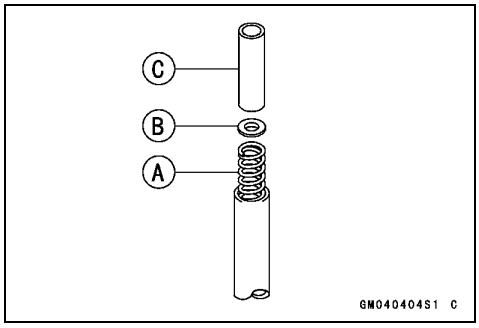
○Set the oil level gauge stopper [B] so that the distance [C] from the bottom of the stopper to the lower end of the pipe is the standard oil level distance.
○A correct measurement can not be obtained unless the level gauge pipe is placed in the center of the inner tube.

Oil Level (fully compressed, without spring)
Standard: 108 ±2 mm (4.25 ±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.



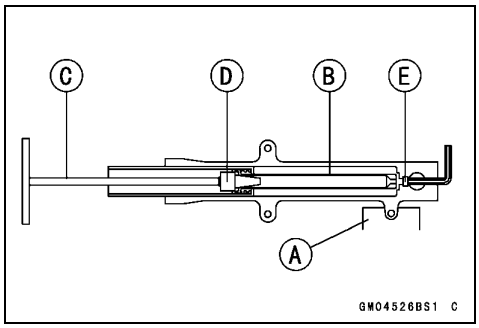
● Install:
Fork Spring [A]
Fork Spring Seat [B]
Collar [C]
● Replace the top plug O-ring and snap ring with new ones.
● Install:
Top Plug
Snap Ring
Front Fork (see Front Fork Installation)



Front Fork Disassembly

● Drain the fork oil (see Front Fork Oil Change).
● Hold the fork leg horizontally in a vise [A].
● Stop the cylinder unit [B] from turning by using the special tools.

Special Tools - Fork Cylinder Holder Handle [C]: 57001-183
Fork Cylinder Holder Adapter [D]: 57001-1057



● Unscrew the Allen bolt [E], then take the bolt and gasket out of the bottom of the outer tube.
● Take the cylinder unit out of the inner tube.

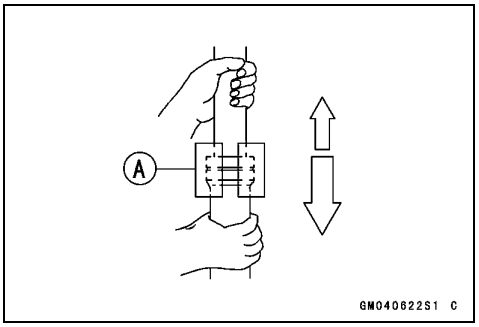
Front Fork

● Remove the following from the top of the outer tube.
Dust Seal [A]
Retaining Ring [B]

● 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

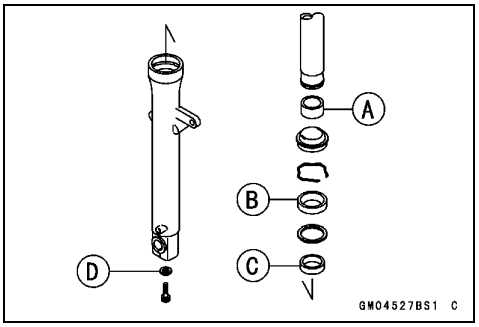
● Take out the cylinder base from the outer tube bottom.



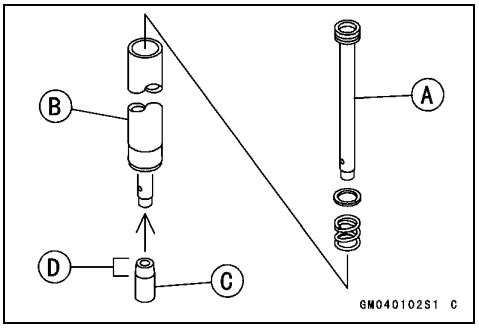
● Remove the inner guide bushing from the inner tube.

Front Fork Assembly

● Replace the following parts with a new one.
Inner Guide Bushing [A]
Oil Seal [B]
Outer Guide Bushing [C]
Bottom Allen Bolt Gasket [D]



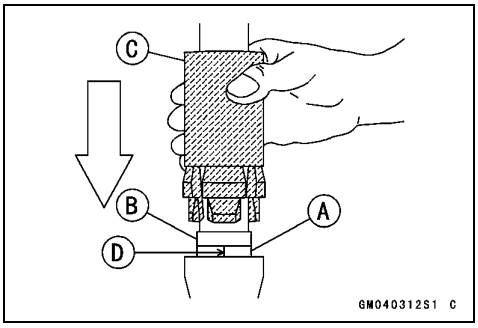
● Put the cylinder unit [A] with the spring into the inner tube [B] protruding from the inner tube, and install the cylinder base [C] onto the bottom end of the cylinder unit.
○Install the cylinder base with the tapered end [D] facing upward.
● Install the inner tube, cylinder unit, and cylinder base as a set into the outer tube.



Front Fork

● Install the new guide bushing [A] with a use one [B] on it by tapping the use one with the fork oil seal driver [C].
○The split [D] of the bushing should face toward the side of the motorcycle.

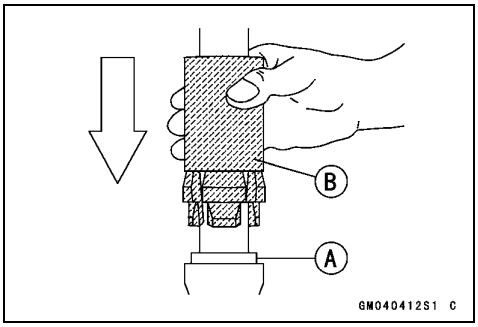
Special Tool - Front Fork Oil Seal Driver: 57001-1219



● Apply molybdenum disulfide grease to the oil seal lips, and install the washer and the oil seal [A] into the outer tube.

Special Tool - Front Fork Oil Seal Driver [B]: 57001-1219

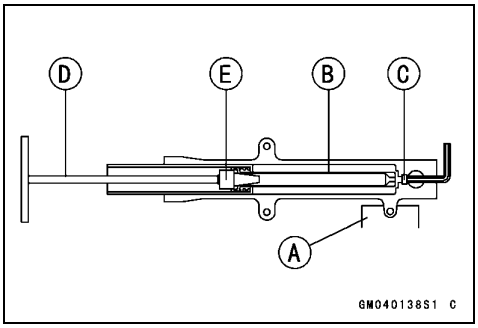
● Install the retaining ring on the outer tube.



● Install a new bottom Allen bolt gasket.
● Apply a non-permanent locking agent to the threads of the bottom Allen bolt, and tighten it.
● Hold the outer tube 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

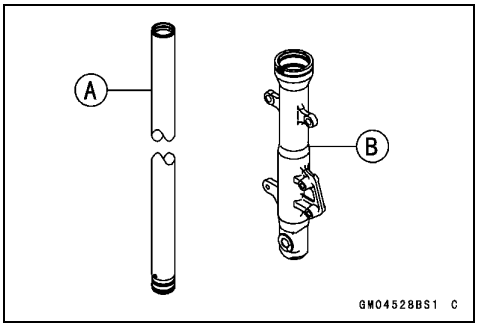
Torque - Front Fork Bottom Allen Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)



● Install the dust seal.
● Pour in the specified type of oil (see Front Fork Oil Change).

Front Fork

Inner Tube, Outer Tube Inspection



- Visually inspect the inner tube [A], and repair any damage.
- Nicks or rust damage can sometimes be repaired by using a wet-stone to remove sharp edges or raised areas which cause seal damage.

★If the damage is not repairable, replace the inner tube. Since damage to the inner tube damages the oil seal, replace the oil seal whenever the inner tube is repaired or replaced.

CAUTION

If the inner tube is badly bent or creased, replace it. Excessive bending, followed by subsequent straightening, can weaken the inner tube.

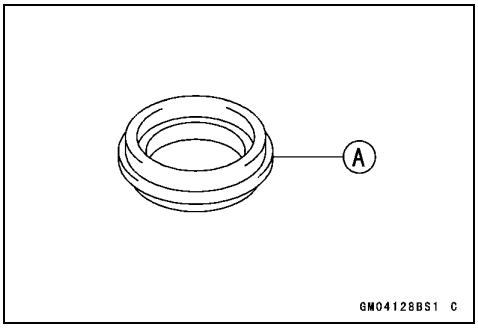
- Temporarily assemble the inner and outer [B] tubes, and pump them back and forth manually to check for smooth operation.

★If you feel binding or catching, the inner and outer tubes must be replaced.

⚠ WARNING

A straightened inner or outer fork tube may fail in use, possibly causing an accident. Replace a badly bent or damaged inner or outer tube and inspect the other tube carefully before reusing it.

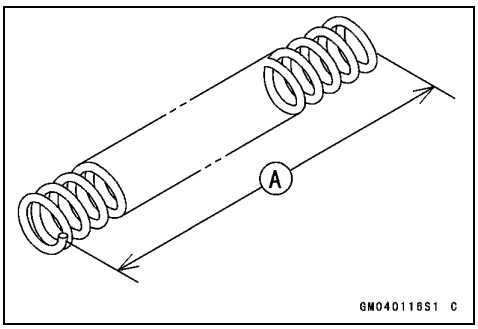
Dust Seal Inspection



- Inspect the dust seal [A] for any signs of deterioration or damage.

★Replace it if necessary.

Spring Tension Inspection



- Since a spring becomes shorter as it weakens, check its free length [A] to determine its condition.

★If the spring of either fork leg is shorter than the service limit, it must be replaced. If the length of a replacement spring and that of the remaining spring vary greatly, the remaining spring should also be replaced in order to keep the fork legs balanced for motorcycle stability.

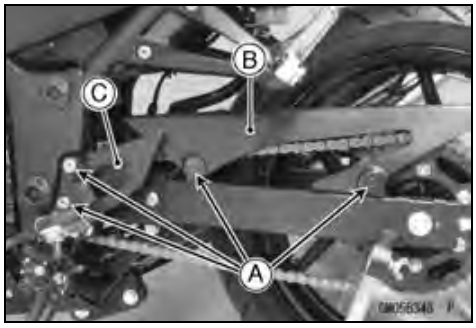
Spring Free Length

Standard: 420.5 mm (16.56 in.)

Service Limit: 412 mm (16.22 in.)

Rear Shock Absorber

Spring Preload Adjustment



● Remove the bolts [A], chain cover [B] and left front footpeg bracket [C] for turning the wrench easily.

● Using the steering stem nut wrench [A], turn the adjusting nut to adjust the spring preload.

Special Tool - Steering Stem Nut Wrench: 57001-1100

○The standard adjuster setting for average-build rider of 68 kg (150 lb) with no passenger and no accessories is 2nd position.

Spring Preload Setting

Standard Position: 2nd position

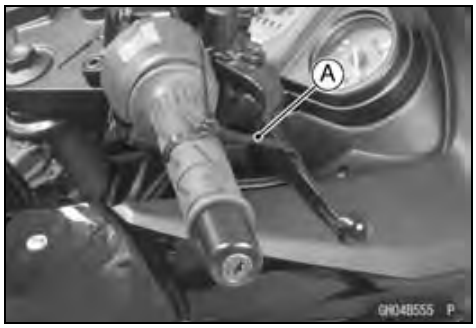
Adjustable Range: 1st ~ 5th position

● 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	Damping Force	Shock Absorber Hardness	Load	Road Conditions	Driving Speed
1st	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
5th	Strong	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.

● Remove the lower fairings (see Lower Fairing in the Frame chapter).

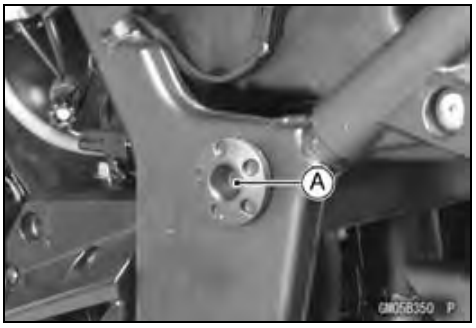
● Raise the rear wheel off the ground with jack.

Special Tools - Jack: 57001-1238

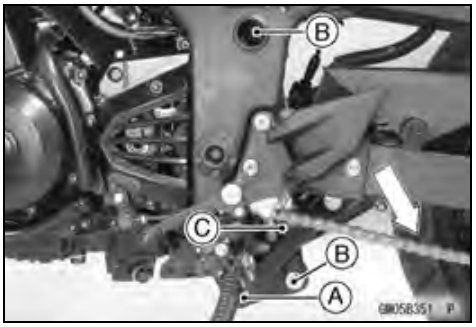
Jack Attachment: 57001-1608

Rear Shock Absorber

● Remove the caps [A] (both sides).



● Remove:
Lower Tie-Rod Nut and Bolt [A]
Rear Shock Absorber Nuts and Bolts [B]
● Remove the shock absorber [C] from downside.



Rear Shock Absorber Installation

● Install the rear shock absorber.
● Tighten:

Torque - Rear Shock Absorber Nuts: 59 N·m (6.0 kgf·m, 44 ft·lb)
Tie-Rod Nuts: 59 N·m (6.0 kgf·m, 44 ft·lb)

● Install the removed parts (see appropriate chapters).

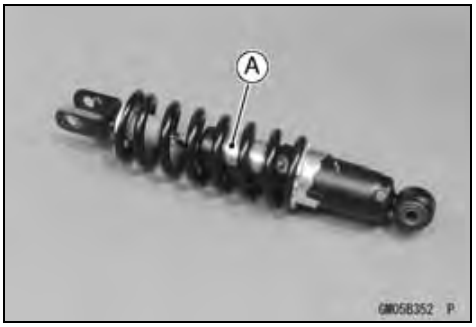
Rear Shock Absorber Inspection

● Remove the rear shock absorber (see Rear Shock Absorber Removal).
● Visually inspect the following items.
Smooth Stroke
Oil Leakage
Crack or Dent
★If there is any damage to the rear shock absorber, replace it.
● Visually inspect the rubber bushing.
★If it show any signs of damage, replace it.

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.

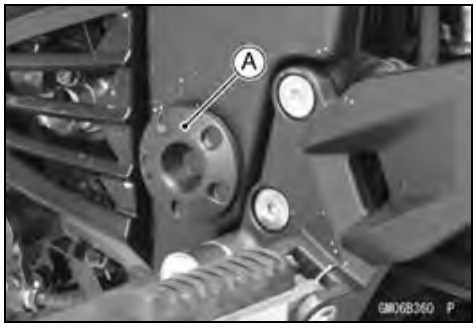


● Remove the rear shock absorber (see Rear Shock Absorber Removal).
● Drill the cylinder of the shock absorber using about 2 mm (0.08 in.) drillbit.

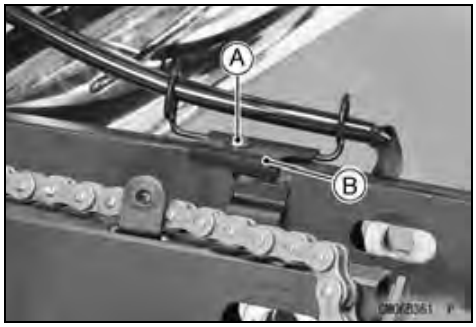
Swingarm

Swingarm Removal

● Remove:
Lower Fairings (see Lower Fairing Removal in the Frame chapter)
Chain Cover (see Drive Chain Removal in the Final Drive chapter)
Rear Wheel (see Rear Wheel Removal in the Wheels/Tires chapter)
Caps [A] (Both Sides)

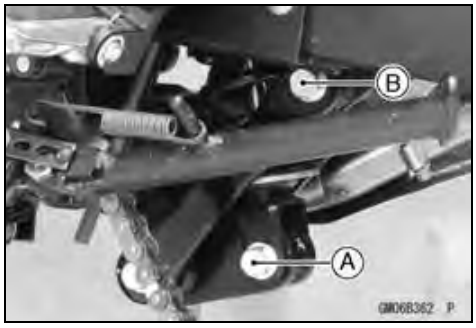


● Remove:
Bolt [A]
Clamp [B]



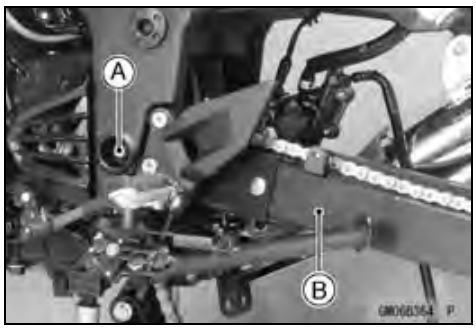
● Raise the rear wheel off the ground with jack.
Special Tools - Jack: 57001-1238
Jack Attachment: 57001-1608

● Remove:
Lower Rear Shock Absorber Nut and Bolt [A]
Upper Tie-Rod Nut and Bolt [B]



● Unscrew the swingarm pivot shaft nut [A].

● Pull out the pivot shaft [A] and remove the swingarm [B].



Swingarm

Swingarm Installation

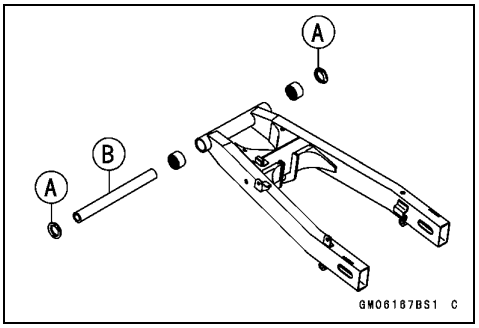
● Installation is the reverse of removal.
○Apply grease to the lips of the oil seals.
○Tighten:

Torque - Swingarm Pivot Shaft Nut: 98 N·m (10.0 kgf·m, 72.3 ft·lb)

● Install the removed parts (see appropriate chapters).

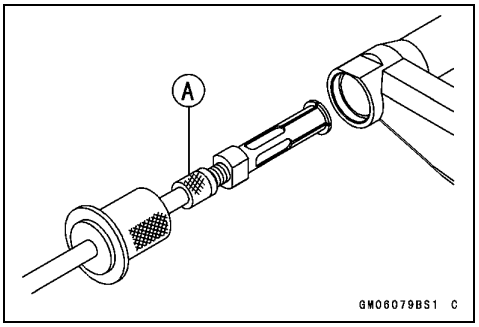
Swingarm Bearing Removal

● Remove:
Swingarm (see Swingarm Removal)
Oil Seals [A]
Sleeve [B]



● Remove the needle bearings.

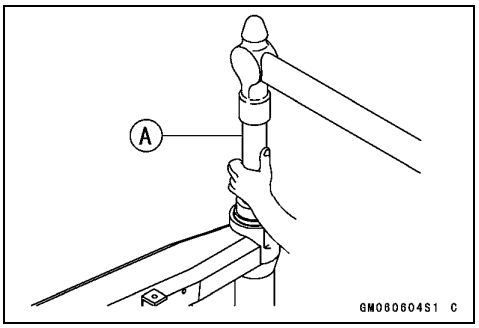
Special Tool - Oil Seal & Bearing Remover [A]: 57001-1058



Swingarm Bearing Installation

● Apply plenty of grease to the needle bearings.
● Install the needle bearings so that the manufacturer's marks face out.

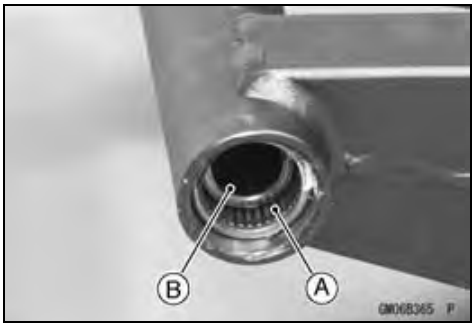
Special Tool - Bearing Driver Set [A]: 57001-1129



Swingarm Bearing, Sleeve Inspection

CAUTION
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.

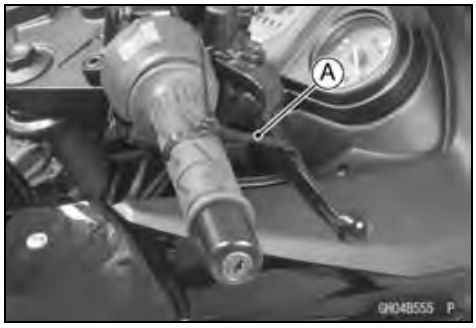


Swingarm Bearing Lubrication

● Refer to the Swingarm Pivot Lubrication in the Periodic Maintenance chapter.

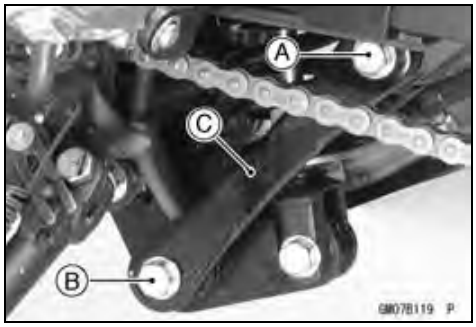
Tie-Rod, Rocker Arm

Tie-Rod Removal



- Squeeze the brake lever slowly and hold it with a band [A].
- Remove the lower fairings (see Lower Fairing Removal in the Frame chapter).
- Raise the rear wheel off the ground with the jack.

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



- Remove:
  Upper Tie-Rod Nut and Bolt [A]
  Lower Tie-Rod Nut and Bolt [B]
  Tie-Rods [C]

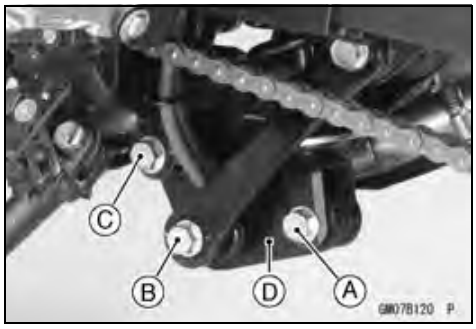
Tie-Rod Installation

- Apply grease to the inside of the oil seals and O-rings.
- Tighten:

Torque - Tie-Rod Nuts: 59 N·m (6.0 kgf·m, 44 ft·lb)

- Install the removed parts (see appropriate chapters).

Rocker Arm Removal



- Squeeze the brake lever slowly and hold it with a band.
- Remove the lower fairings (see Lower Fairing Removal in the Frame chapter).
- Raise the rear wheel off the ground with the jack.

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

- Remove:
  Lower Rear Shock Absorber Nut and Bolt [A]
  Lower Tie-Rod Nut and Bolt [B]
  Rocker Arm Nut and Bolt [C]
  Rocker Arm [D]

Rocker Arm Installation

- Apply grease to the inside of the oil seals and O-rings.
- Tighten:

Torque - Uni-Trak Rocker Arm Nut: 59 N·m (6.0 kgf·m, 44 ft·lb)
Tie-Rod Nuts: 59 N·m (6.0 kgf·m, 44 ft·lb)
Rear Shock Absorber Nuts: 59 N·m (6.0 kgf·m, 44 ft·lb)

- Install the removed parts (see appropriate chapters).

Tie-Rod, Rocker Arm Bushing Inspection

- The bushings wear so little that the wear is difficult to measure. Instead, inspect the bushings for abrasion, color change, or other damage.

★If there is any doubt as to the condition of either bushings, replace the bushing with a new one.

Tie-Rod, Rocker Arm

Tie-Rod, Rocker Arm Sleeve Inspection

● Visually inspect the sleeves.

★ If there is visible damage, replace the sleeve with a new one.

Steering

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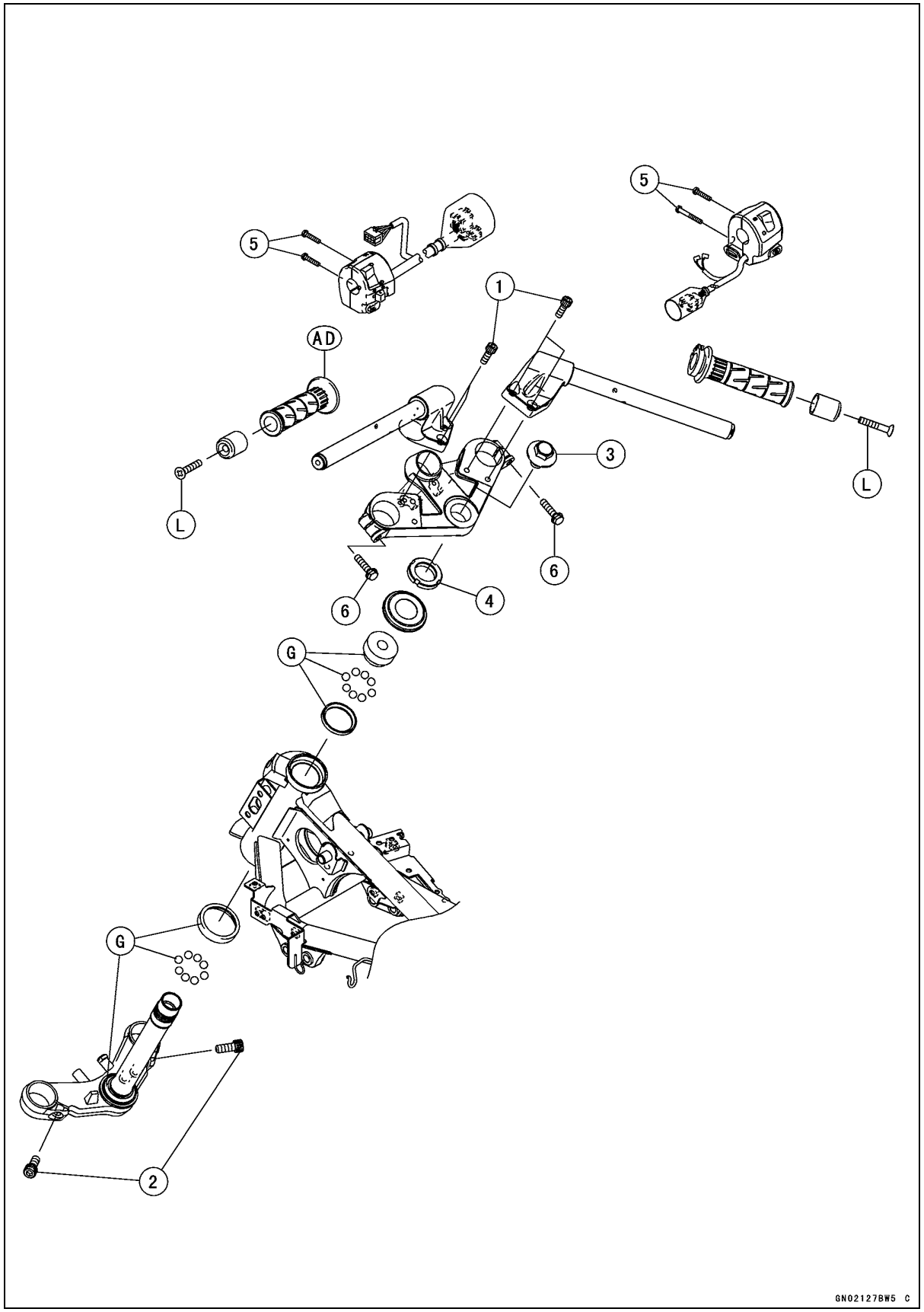
Exploded View



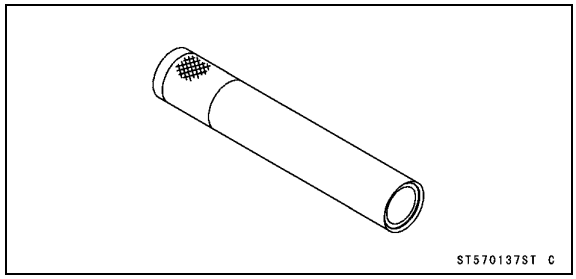
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Handlebar Mounting Bolts	25	2.5	18	
2	Lower Front Fork Clamp Bolts	30	3.1	22	
3	Steering Stem Head Bolt	44	4.5	32	
4	Steering Stem Nut	4.9	0.50	43 in·lb	
5	Switch Housing Screws	3.5	0.36	31 in·lb	
6	Upper Front Fork Clamp Bolts	20	2.0	15	

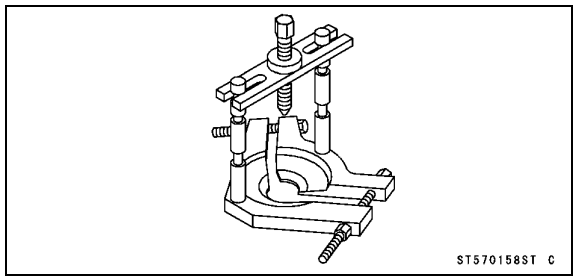
AD: Apply adhesive.
G: Apply grease.
L: Apply a non-permanent locking agent.

Special Tools

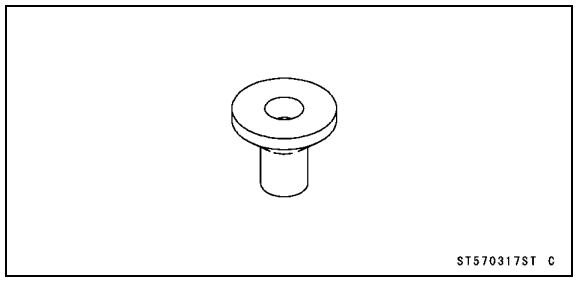
Steering Stem Bearing Driver:
57001-137



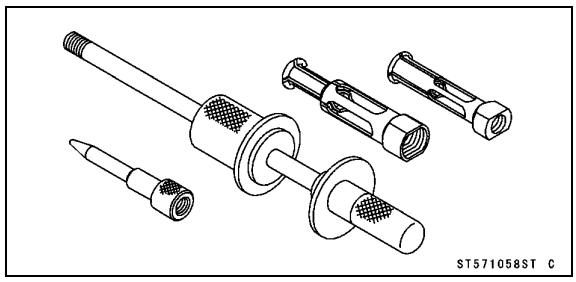
Bearing Puller:
57001-158



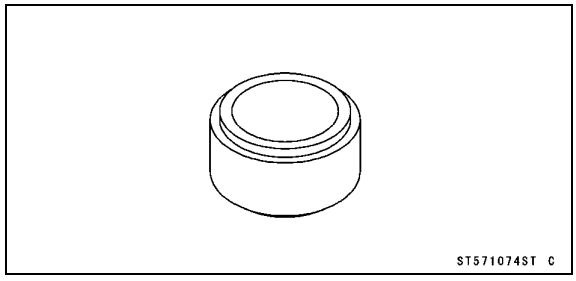
Bearing Puller Adapter:
57001-317



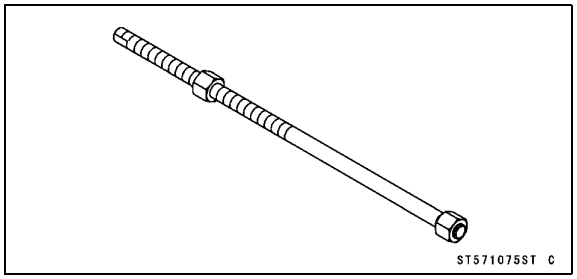
Oil Seal & Bearing Remover:
57001-1058



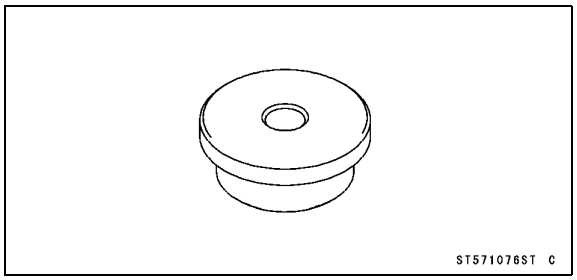
Steering Stem Bearing Driver Adapter, ϕ34.5:
57001-1074



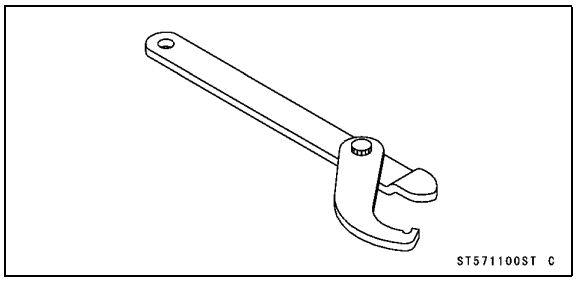
Head Pipe Outer Race Press Shaft:
57001-1075



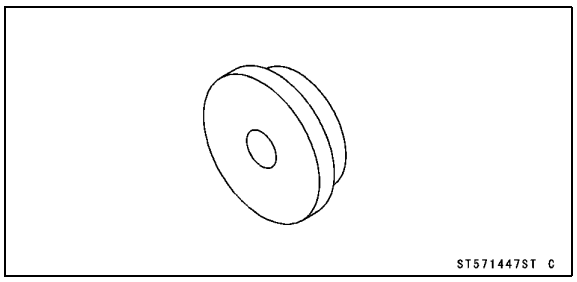
Head Pipe Outer Race Driver, ϕ51.5:
57001-1076



Steering Stem Nut Wrench:
57001-1100



Head Pipe Outer Race Driver, ϕ47:
57001-1447



Steering

Steering Inspection

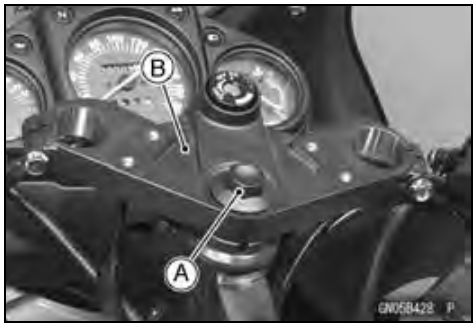
- Refer to the Steering Play Inspection in the Periodic Maintenance chapter.

Steering Adjustment

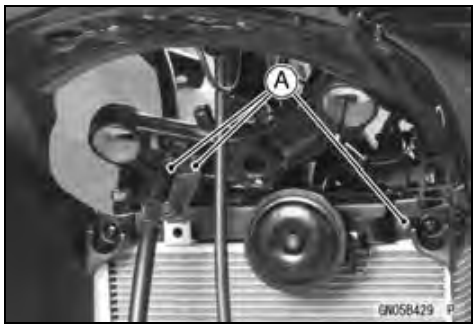
- Refer to the Steering Play Adjustment in the Periodic Maintenance chapter.

Steering Stem

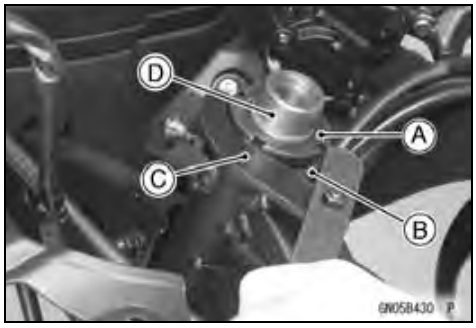
Stem, Stem Bearing Removal



- Remove:
  Lower Fairings (see Lower Fairing Removal in the Frame chapter)
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Front Wheel (see Front Wheel Removal in the Wheels/Tires chapter)
  Handlebars (see Handlebar Removal)
  Front Forks (see Front Fork Removal in the Suspension chapter)
  Steering Stem Head Bolt [A]
  Steering Stem Head [B]



- Remove the bolts [A].



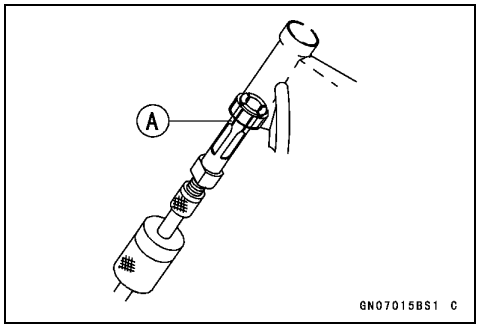
- Pushing up the stem base, and remove the steering stem nut [A] and stem cap [B].

  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.*



- Remove the upper and lower outer races using the remover [A].

  Special Tool - Oil Seal & Bearing Remover: 57001-1058

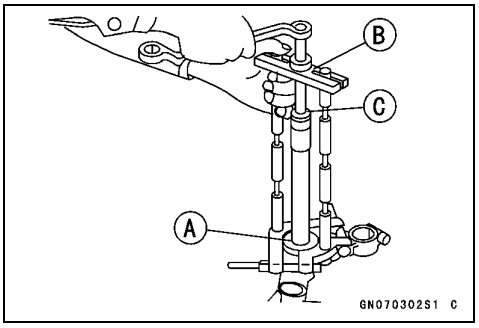
NOTE

○*If either steering stem bearing is damaged, it is recommended that both the upper and lower bearings (including outer races) should be replaced with new ones.*

Steering Stem

● Remove the lower ball bearing inner race (with its oil seal) [A] which is pressed onto the steering stem using the bearing puller [B] and adapter [C].

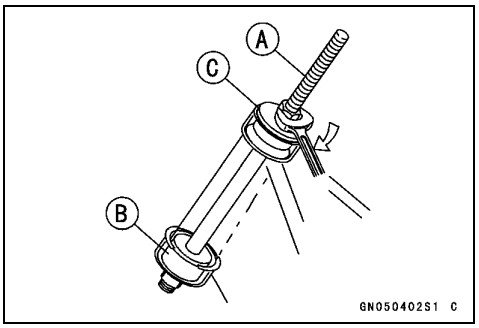
Special Tools - Bearing Puller: 57001-158
Bearing Puller Adapter: 57001-317



Stem, Stem Bearing Installation

● Replace the bearing outer races with new ones.
● Drive them into the head pipe at the same time.

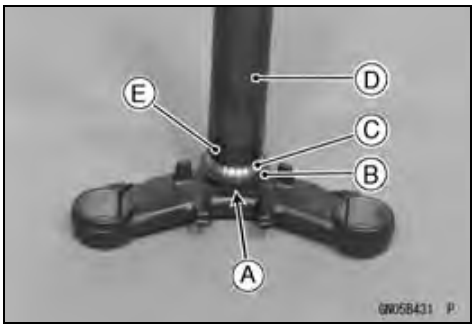
Special Tools - Head Pipe Outer Race Press Shaft [A]: 57001-1075
Head Pipe Outer Race Driver, ϕ51.5 [B]: 57001-1076
Head Pipe Outer Race Driver, ϕ47 [C]: 57001-1447



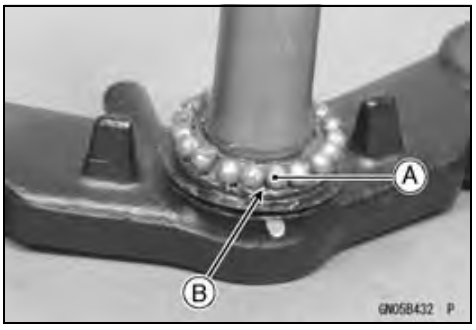
● Apply grease to the outer races.

● Replace the bearing inner races and oil seal with new ones.
● Apply grease to the oil seal.
● Install the washer [A] and oil seal [B] on the steering stem, and drive the ball bearing inner race [C] applied grease onto the stem.

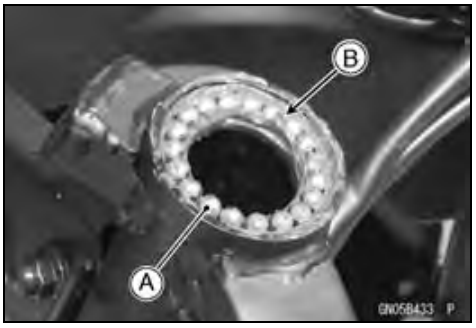
Special Tools - Steering Stem Bearing Driver [D]: 57001-137
Steering Stem Bearing Driver Adapter, ϕ34.5 [E]: 57001-1074



● Apply grease to the lower ball bearings (20) [A] and inner race [B], and install the ball bearings onto the inner race.



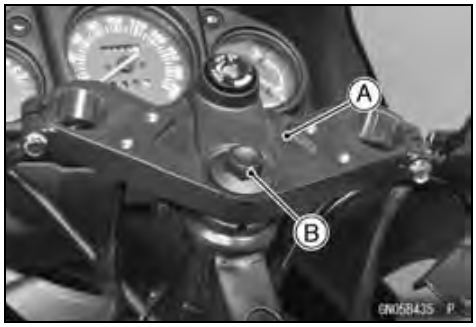
● Apply grease to the upper ball bearings (19) [A] and outer race [B], and install the ball bearings onto the outer race.



Steering Stem

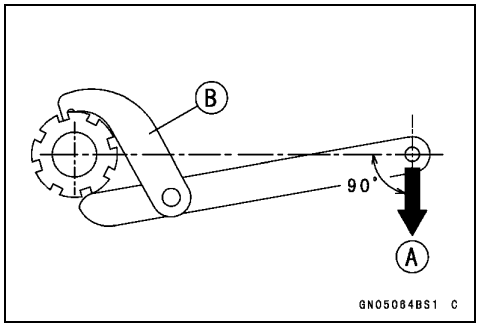
- Install the steering stem [A] carefully through the head pipe so that the steel balls on the steering stem does not fall.
- Install the stem cap [B] and steering stem nut [C], and tighten it by hand.

- Install the stem head [A].
- Tighten the stem head bolt [B] lightly.



- Settle the bearings in place as follows.

○Tighten the steering stem nut with **15 N·m (1.5 kgf·m, 11 ft·lb)** of torque first, and loosen it a fraction of a turn until it turns lightly (To tighten the stem nut to the specified torque, hook the wrench on the stem nut, and pull the wrench at the hole by **84 N (8.6 kgf, 19 lb)** [A] force in the direction shown.). Afterward tighten it again with specified torque using a steering stem nut wrench [B].



Special Tool - Steering Stem Nut Wrench: 57001-1100

Torque - Steering Stem Nut: 4.9 N·m (0.50 kgf·m, 43 in·lb)

- Adjust the steering (see Steering Play Inspection in the Periodic Maintenance chapter).
- Install the front forks (see Front Fork Installation in the Suspension chapter).

NOTE

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

Torque - Upper Front Fork Clamp Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)
Steering Stem Head Bolt: 44 N·m (4.5 kgf·m, 32 ft·lb)
Lower Front Fork Clamp Bolts: 30 N·m (3.1 kgf·m, 22 ft·lb)

⚠ WARNING

Do not impede the handlebar turning by routing the cables, harnesses and hoses improperly (see Cable, Wire and Hose Routing section in the Appendix chapter).

- Install the removed parts (see appropriate chapters).

Steering Stem

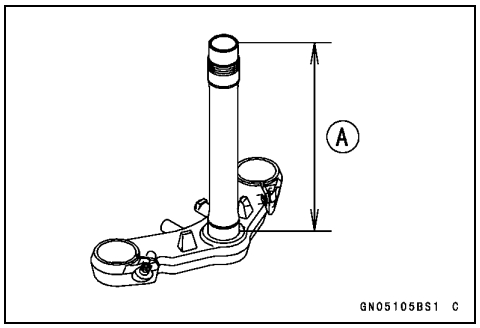
Steering Stem Bearing Lubrication

● Refer to the Steering Stem Bearing Lubrication in the Periodic Maintenance chapter.

Steering Stem Warp Inspection

● Whenever the steering stem [A] is removed, or if the steering can not be adjusted for smooth action, check the steering stem for straightness.

★If the steering stem is bent, replace the steering stem.



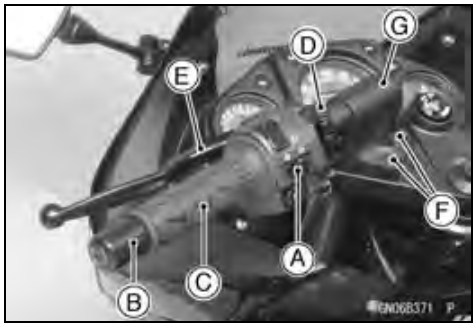
Oil Seal Deterioration, Damage Inspection

● Inspect the oil seal for any sign of deterioration or damage.

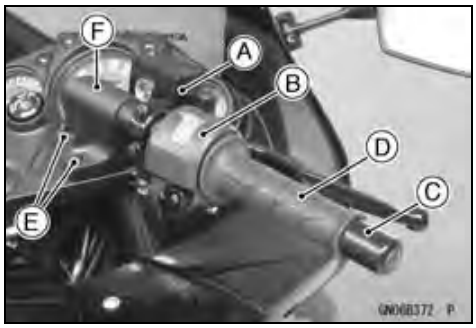
★If the oil seal is deterioration or damage, replace it with a new one.

Handlebar

Handlebar Removal



- Remove:
  Left Switch Housing [A]
  Handlebar Weight [B]
  Left Handlebar Grip [C]
  Clutch Lever Clamp Bolt [D]
  Clutch Lever Assembly [E]
  Bolts [F]
  Left Handlebar [G]

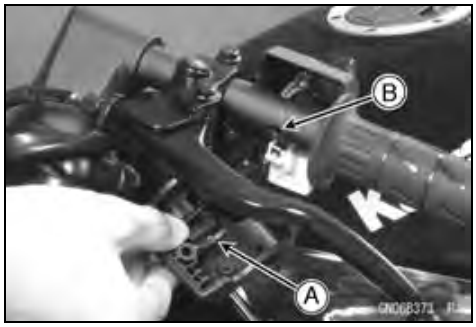


- Remove:
  Front Master Cylinder [A] (see Front Master Cylinder Removal in the Brakes chapter)
  Right Switch Housing [B]
  Handlebar Weight [C]
  Throttle Grip [D]
  Bolts [E]
  Right Handlebar [F]

Handlebar Installation

- Tighten:

Torque - Handlebar Mounting Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

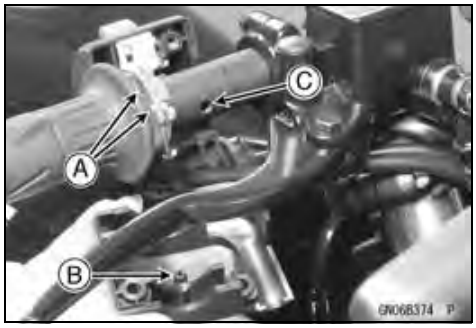


- Install the clutch lever (see Clutch Lever Installation in the Clutch chapter).
- Apply adhesive cement to the inside of the left handlebar grip, and install it.
- Apply a non-permanent locking agent to the left handlebar weight screw, and tighten it.
- Install the left switch housing.

○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)



- 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 right handlebar weight screw, and tighten it.
- Install the front brake master cylinder (see Front Master Cylinder Installation in the Brakes chapter).

Frame

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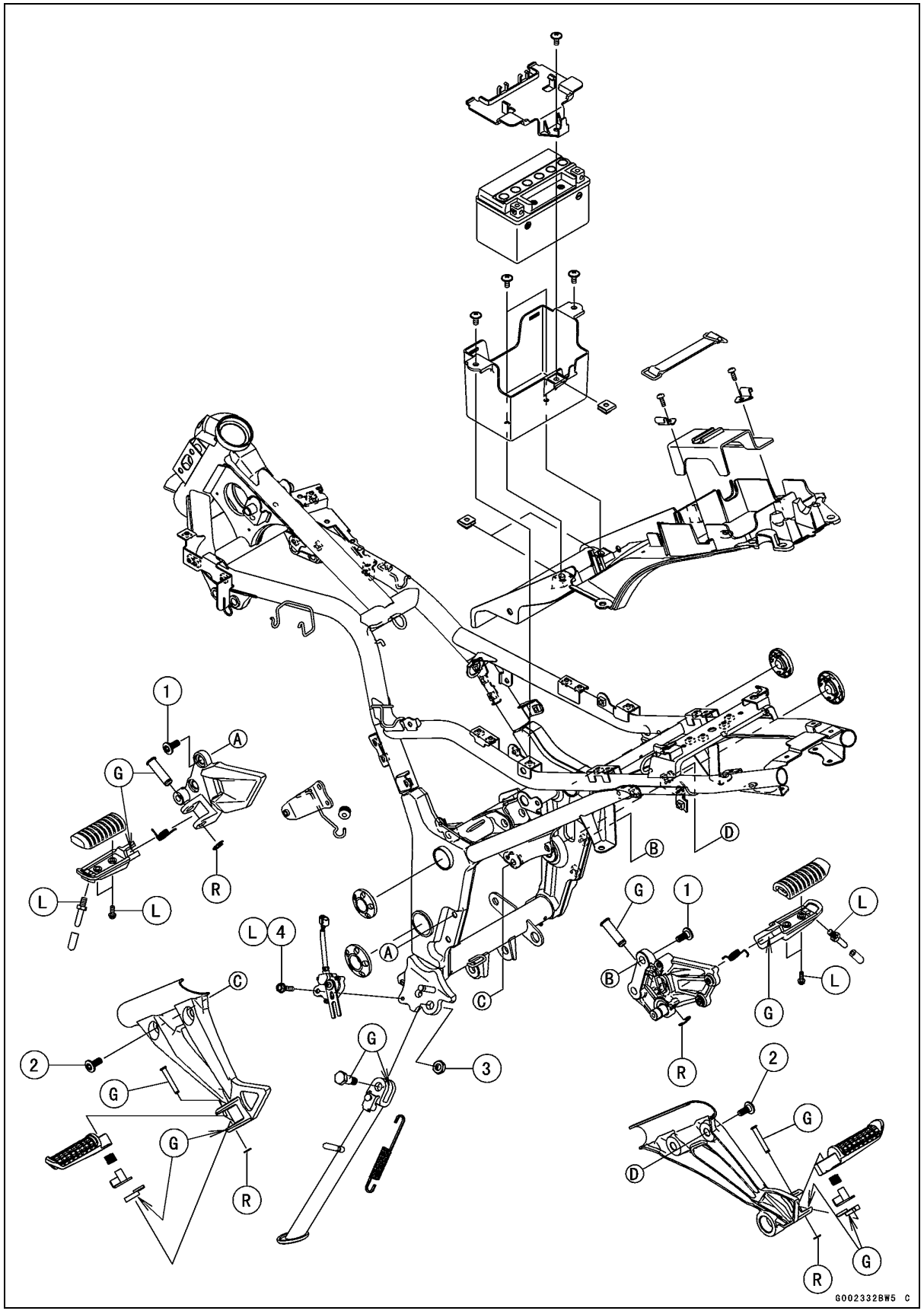
Exploded View

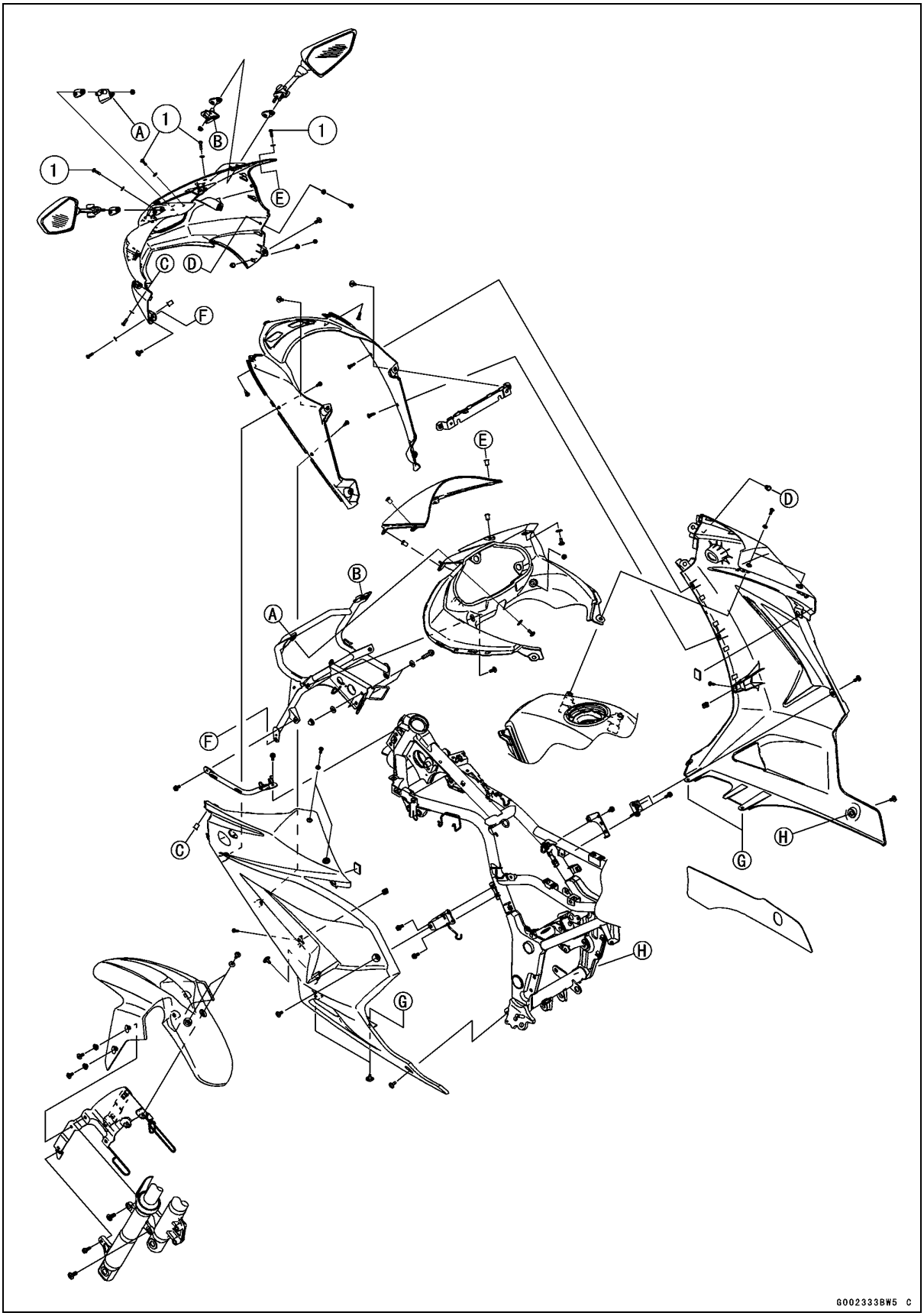


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Footpeg Bracket Bolts	25	2.5	18	
2	Rear Footpeg Bracket Bolts	25	2.5	18	
3	Sidestand Nut	39	4.0	29	
4	Sidestand Switch Bolt	8.8	0.90	78 in·lb	L

G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts

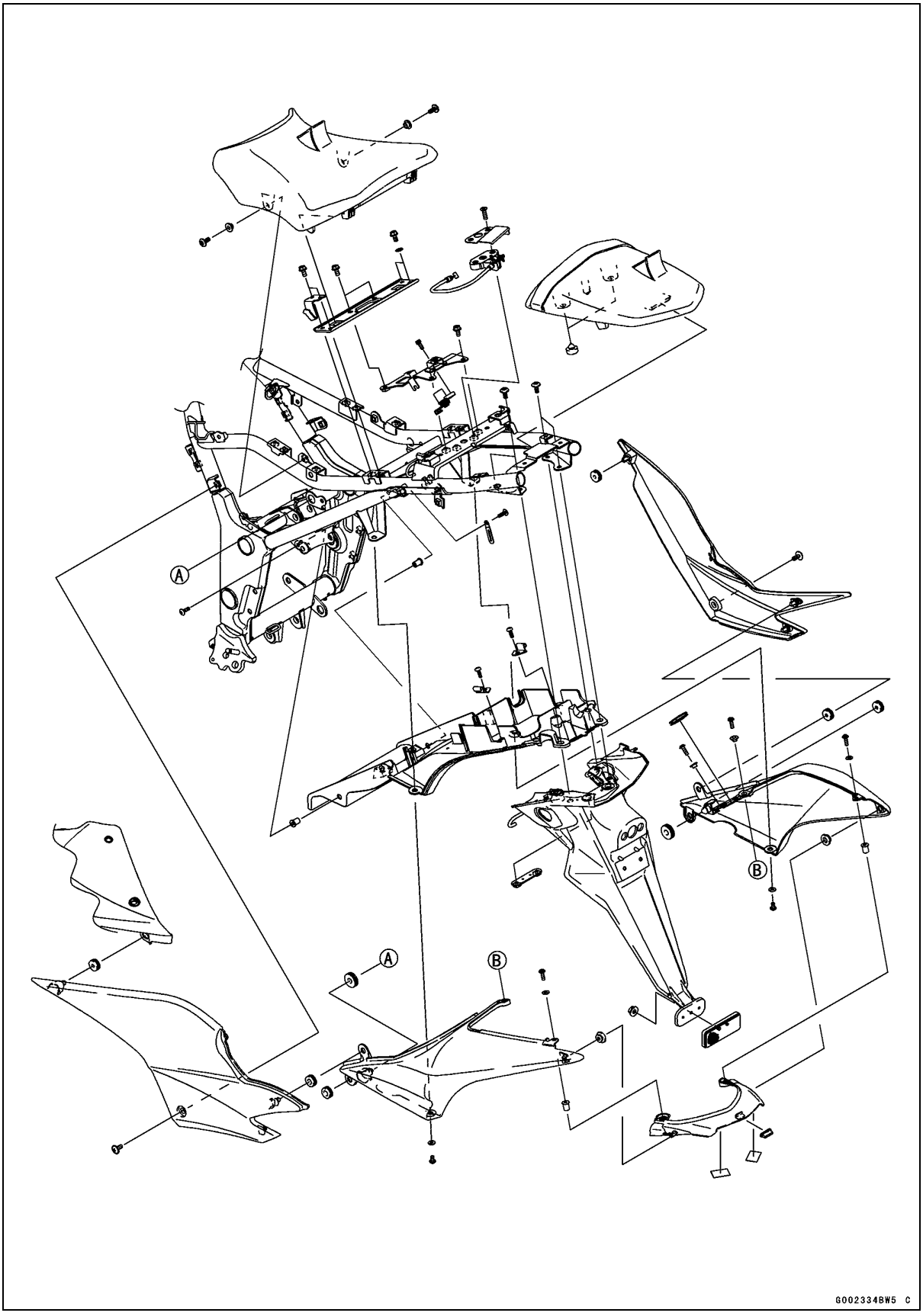
Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Windshield Mounting Bolts	0.42	0.043	3.7 in·lb	

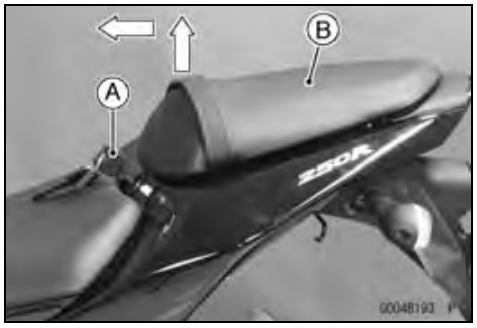
Exploded View



Seats

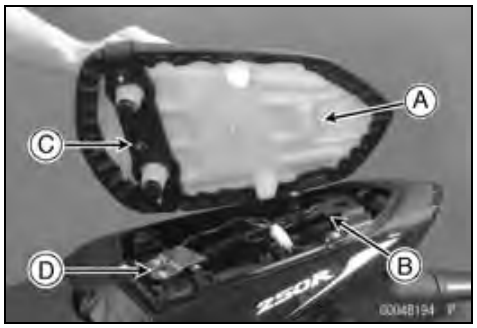
Rear Seat Removal

- Insert the ignition switch key [A] into the seat lock, turning the key clockwise, pulling the front part of the seat [B] up, and pull the seat forward.



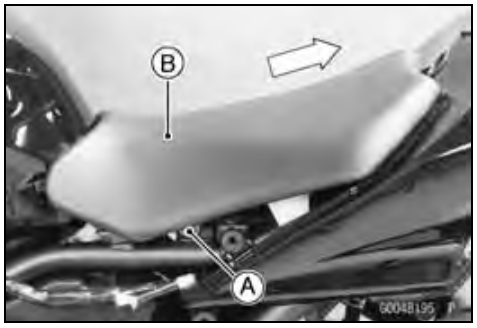
Rear Seat Installation

- Insert the rear seat slot [A] to the bracket [B] of the frame.
- Insert the seat hook [C] into the latch hole [D].
- Push down the front part of the seat until the lock clicks.



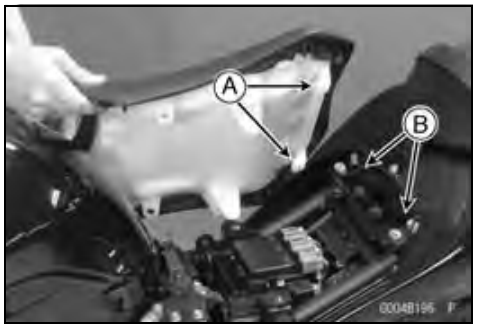
Front Seat Removal

- Remove:
  Side Covers (see Side Cover Removal)
  Bolts [A] (Both Sides)
- Pull the front seat [B] backward.



Front Seat Installation

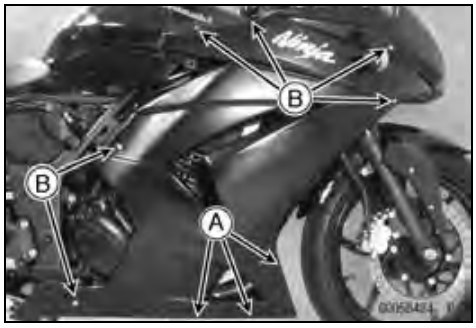
- Insert the front seat hooks [A] into the braces [B] of the bracket.
- Tighten the bolts.
- Install the side covers (see Side Cover Installation).

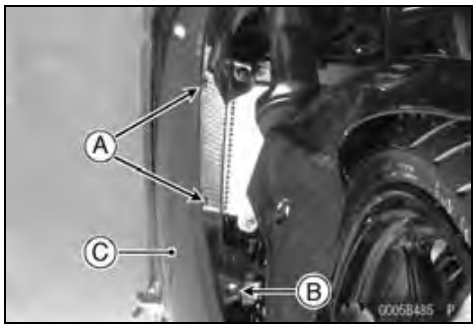


Fairings

Lower Fairing Removal

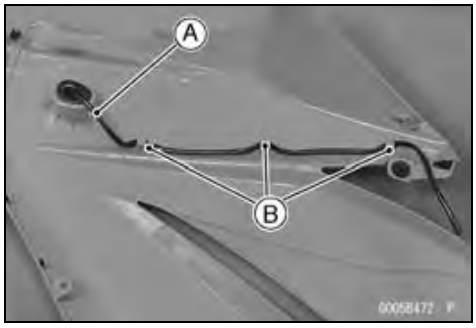
● Remove:
Side Covers (see Side Cover Removal)
Rivets [A]
Bolts [B]
Front Turn Signal Light Lead Connectors (Disconnect)
Lower Fairings [C]



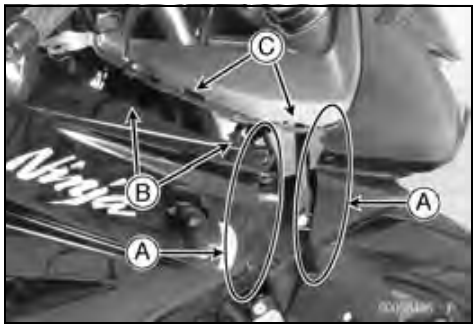


Lower Fairing Installation

● Installation is the reverse of removal.
○Run the front turn signal light lead [A] to the hooks [B].

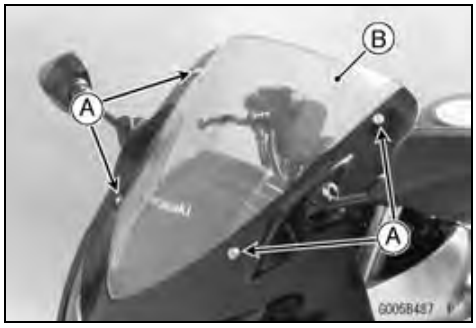


○Fit [A] the front portion of the lower fairing in the rear portion of the upper fairing.
○Install the tabs [B] of the lower fairing into the slots [C] of the inner cover.



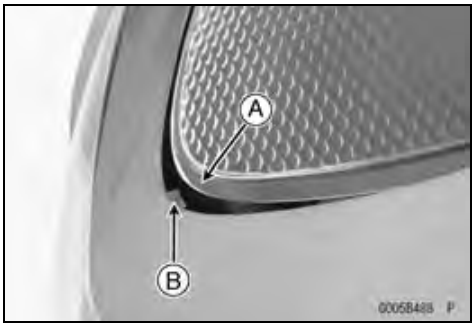
Windshield Removal

● Remove:
Bolts [A] with Washer
Windshield [B]



Fairings

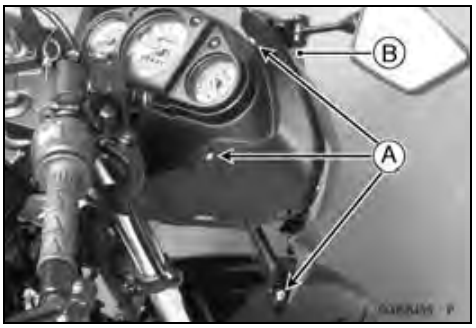
Windshield Installation



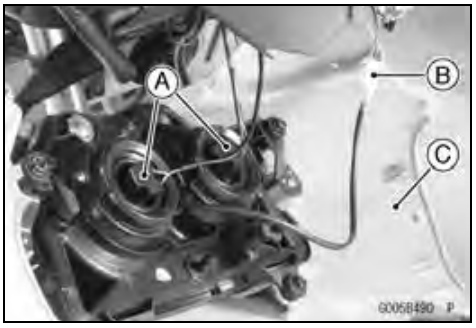
- Put the bottom end [A] to the projection [B].
- Tighten:

Torque - Windshield Mounting Bolts: 0.42 N·m (0.043 kgf·m, 3.7 in·lb)

Upper Fairing Removal

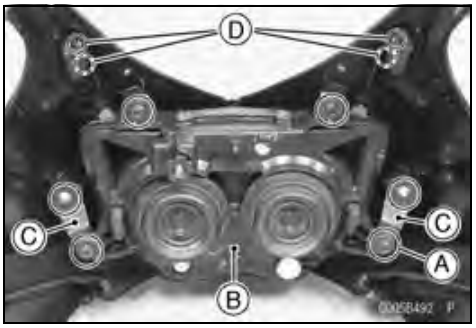


- Remove:
  Windshield (see Windshield Removal)
  Lower Fairings (see Lower Fairing Removal)
  Inner Fairing (see Inner Fairing Removal)
  Bolts [A] (Both Sides)
- Pull out the upper fairing [B] forward.



- Disconnect:
  Headlight Lead Connectors [A]
  City Light Lead Connector [B]
- Remove the upper fairing [C].

Upper Fairing Disassembly



- Remove:
  Upper Fairing (see Upper Fairing Removal)
  Bolts [A]
  Headlight [B]
  Brackets [C]
  Nuts [D] and Rear View Mirrors

Upper Fairing Assembly

- Assembly is the reverse of disassembly.

Upper Fairing Installation

- Installation is the reverse of removal.

Inner Cover Removal

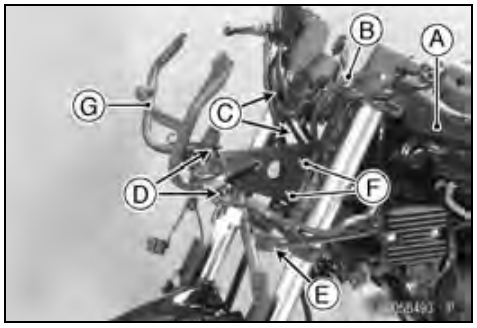
- Refer to the Meter Unit Removal/Installation in the Electrical System chapter.

Inner Cover Installation

- Refer to the Meter Unit Removal/Installation in the Electrical System chapter.

Fairings

Upper Fairing Bracket Removal

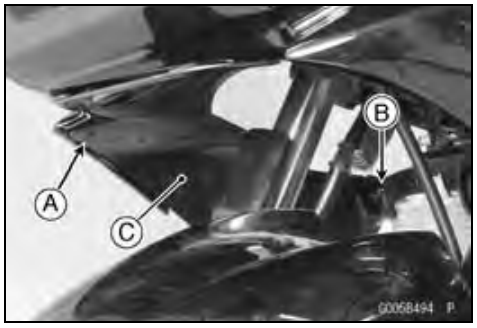


- Remove:
  Upper Fairing (see Upper Fairing Removal)
  Meter Unit (see Meter Unit Removal/Installation in the Electrical System chapter)
  Fuel Tank [A] (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Clutch Cable [B]
  Throttle Cables [C]
  Left and Right Switch Housing Lead Connectors
  Ignition Switch Lead Connector
  Bands [D]
  Bolt [E]
  Nuts [F] and Bolts
  Upper Fairing Bracket [G]

Upper Fairing Bracket Installation

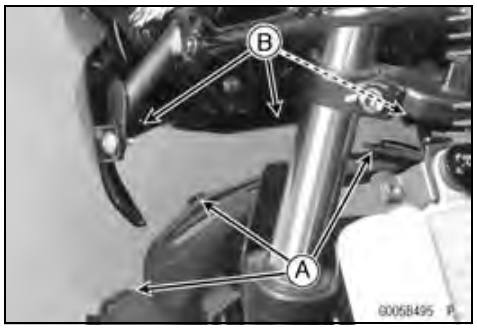
- Installation is the reverse of removal.
- Run the cables and leads correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).

Inner Fairing Removal



- Remove:
  Lower Fairings (see Lower Fairing Removal)
  Rivets [A] (Both Sides)
  Screws [B] (Both Sides)
  Inner Fairing [C]

Inner Fairing Installation

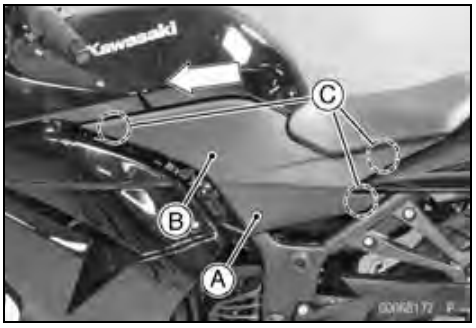


- Fit the front portions [A] of the inner fairing into the lower portions [B] of the upper fairing.

Side Cover

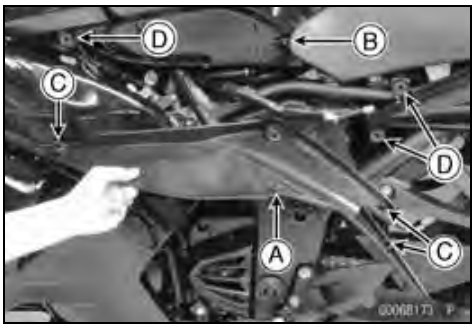
Side Cover Removal

- Remove the screw [A].
- Pull the side cover [B] evenly outward to clear the stoppers [C].



Side Cover Installation

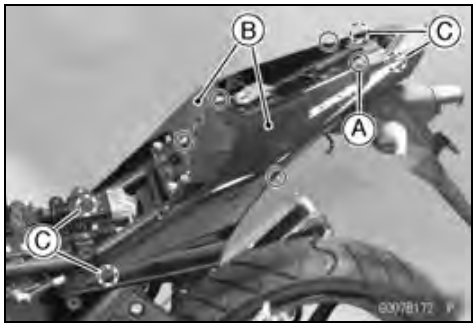
- Fit the groove [A] to the projection [B].
- Insert the projections [C] into the holes [D].
- Tighten the screw.



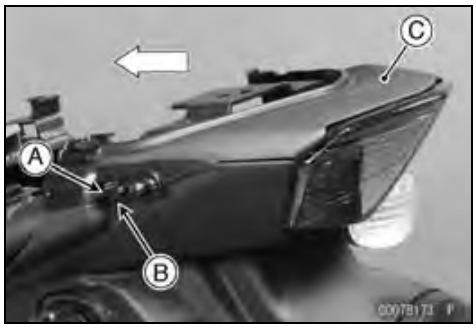
Seat Covers

Seat Cover Removal

- Remove:
  Side Covers (see Side Cover Removal)
  Seats (see Rear/Front Seat Removal)
  Bolts [A]
- Pull the left and right seat covers [B] to clear the stoppers [C].

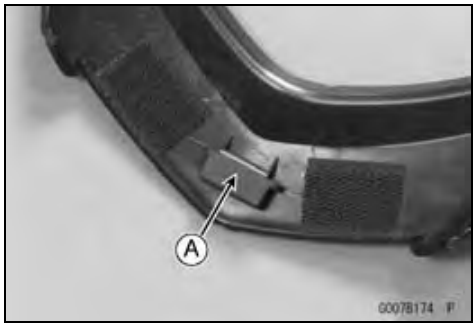


- Remove the projections [A] from the holes [B], and pull out the center seat cover [C] forward.

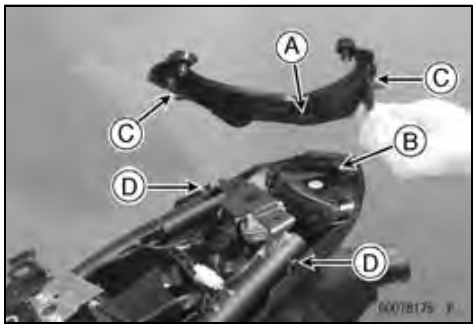


Seat Cover Installation

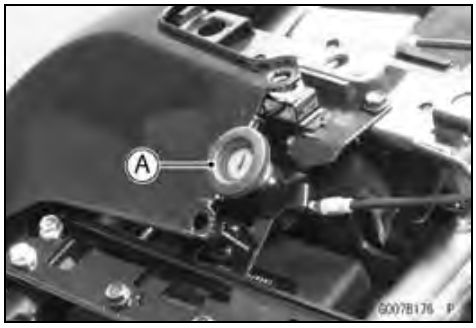
- Installation is the reverse of removal.
- ○Install the damper to the center seat cover so that its flatten side [A] faces downward.



- ○Put the projection [A] into the hole [B] of the tail/brake light.
- ○Put the holes [C] to the projections [D] of the rear fender.

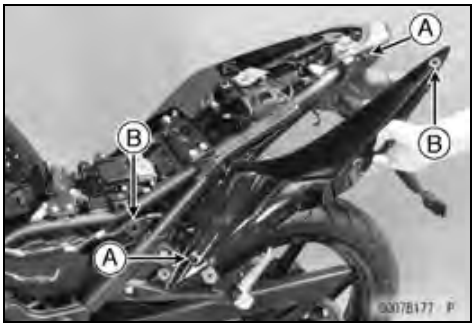


- ○Be sure that the damper [A] is in position.



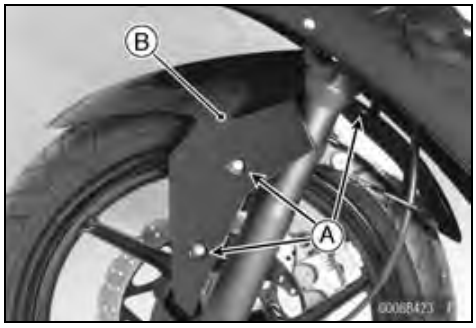
Seat Covers

○Put the projections [A] into the holes [B].
● Install the removed parts (see appropriate chapters).



Fenders

Front Fender Removal



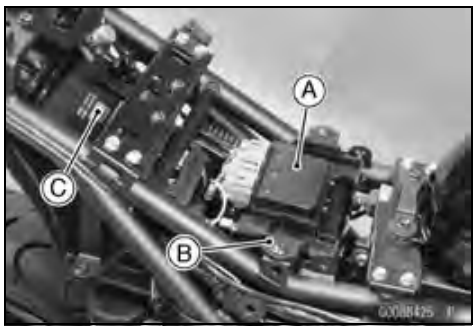
- Remove:
  Bolts [A] with Collar (Both Sides)
  Front Fender [B]

Front Fender Installation

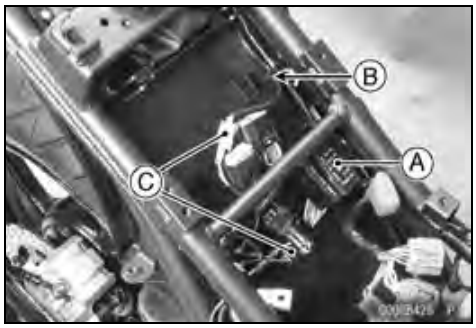
- Installation is the reverse of removal.

Flap and Rear Fender Removal

- Remove:
  Seat Covers (see Seat Cover Removal)
  Bolts [A] (Both Sides)
  Rear Footpeg Brackets [B] (Both Sides)



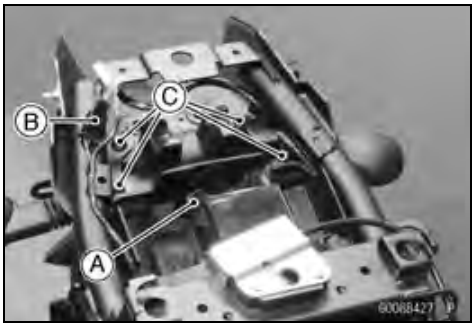
- Remove:
  Relay Box [A] (see Relay Box Removal in the Electrical System chapter)
  Battery Case [B] (see Battery Removal in the Electrical System chapter)
  ECU [C] (see ECU Removal in the Fuel System (DFI) chapter)



- Remove:
  Fuse Box [A]
  Clamp [B]
  Connectors [C]

Fenders

- Remove:
  Tail/Brake Light (see Tail/Brake Light Removal in the Electrical System chapter)
  Owner's Tool [A]
  Connector [B]
  Bolts [C]
  Flap (with Turn Signal and License Plate Lights)



- Remove the screws [A] (both sides).
- Pull out the rear fender backward.

Flap and Rear Fender Installation

- Installation is the reverse of removal.
- Install the removed parts (see appropriate chapters).

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

- Run the cable, leads and harness 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.

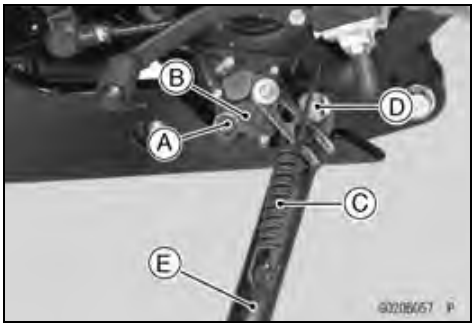
★If there is any damage to the frame, replace it.

⚠ WARNING

A repaired frame may fail in use, possibly causing an accident. If the frame is bent, dented, cracked, or warped, replace it.

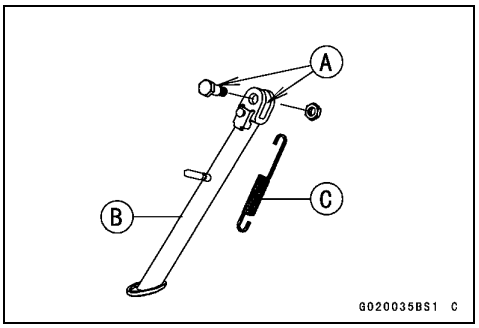
Sidestand

Sidestand Removal



- Raise the rear wheel off the ground with the stand.
- Remove:
  Sidestand Switch Bolt [A]
  Sidestand Switch [B]
  Spring [C]
  Sidestand Bolt [D]
  Sidestand [E]

Sidestand Installation



- Apply grease to the sliding area [A] of the sidestand [B].
- Tighten the bolt and lock them with the nut.

  Torque - Sidestand Nut: 39 N·m (4.0 kgf·m, 29 ft·lb)

- Hook the spring [C] so that face the long spring end upward.

○Install the spring hook direction as shown in the figure.

- Install the sidestand switch.
- Apply a non-permanent locking agent to the threads of the switch bolt, and tighten it.

  Torque - Sidestand Switch Bolt: 8.8 N·m (0.90 kgf·m, 78 in·lb)

Electrical System

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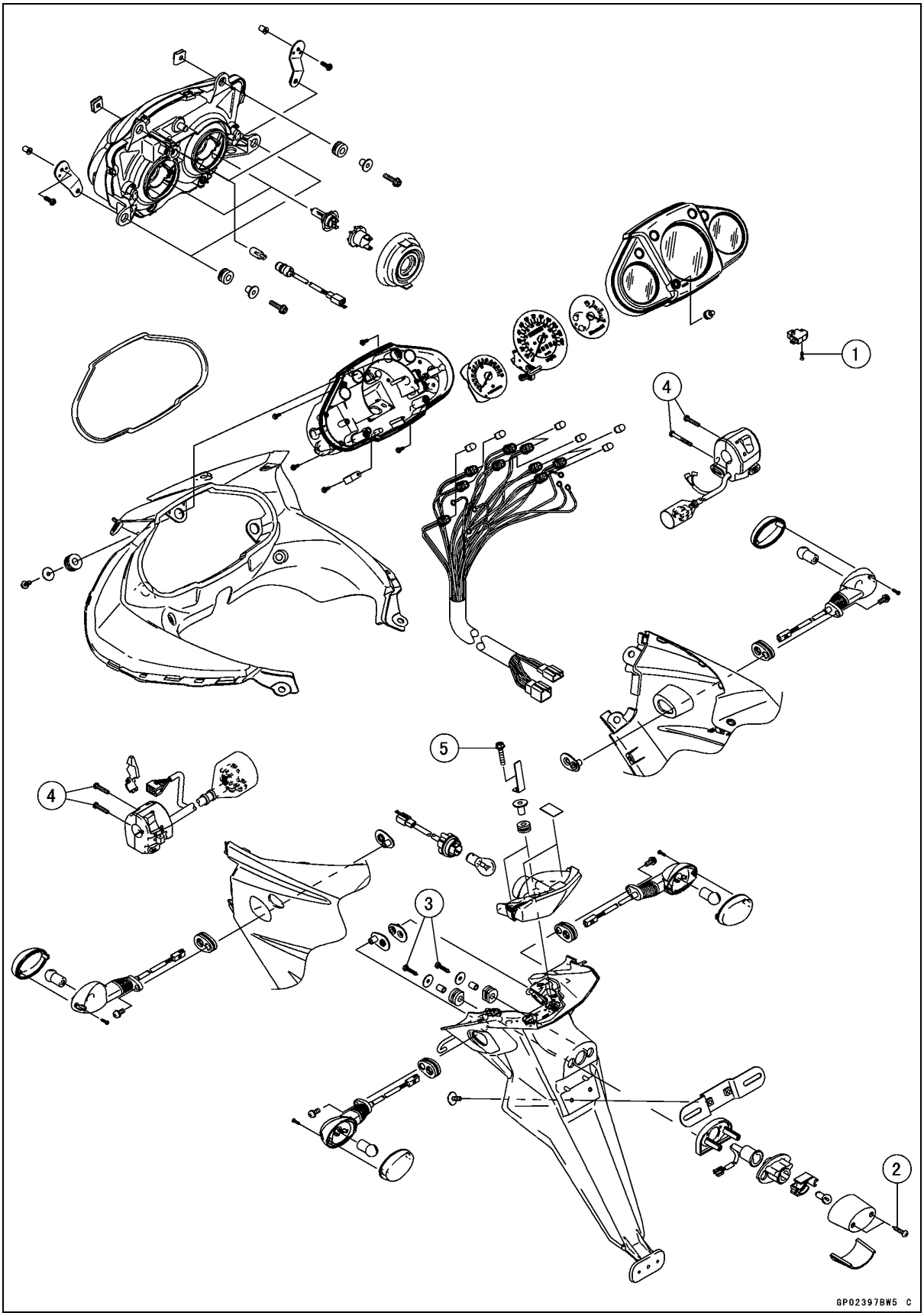
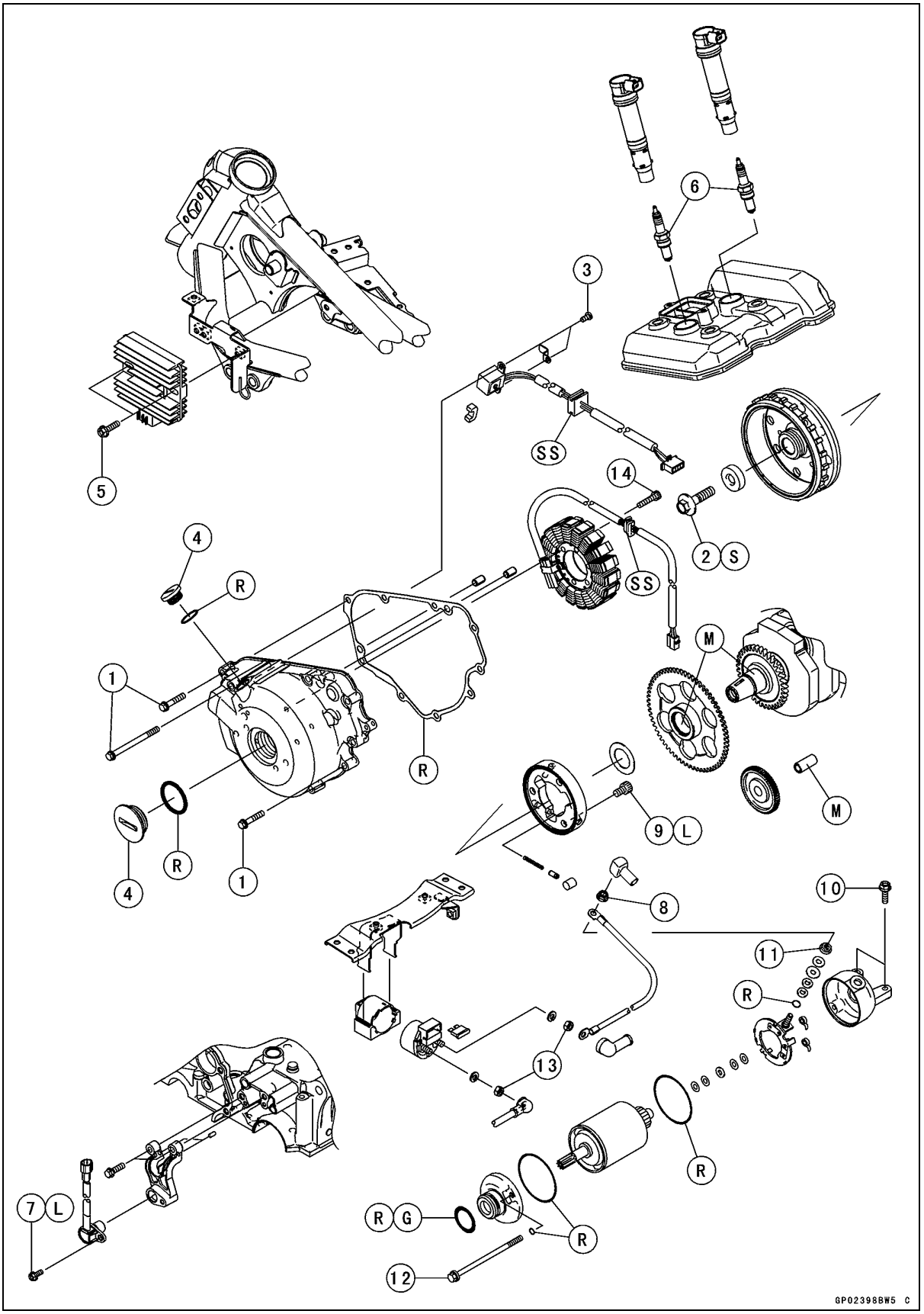
Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
2	License Plate Light Cover Screws	0.90	0.092	8.0 in·lb	
3	License Plate Light Mounting Screws	1.2	0.12	11 in·lb	
4	Switch Housing Screws	3.5	0.36	31 in·lb	
5	Tail/Brake Light Mounting Bolts	5.9	0.60	52 in·lb	

Exploded View

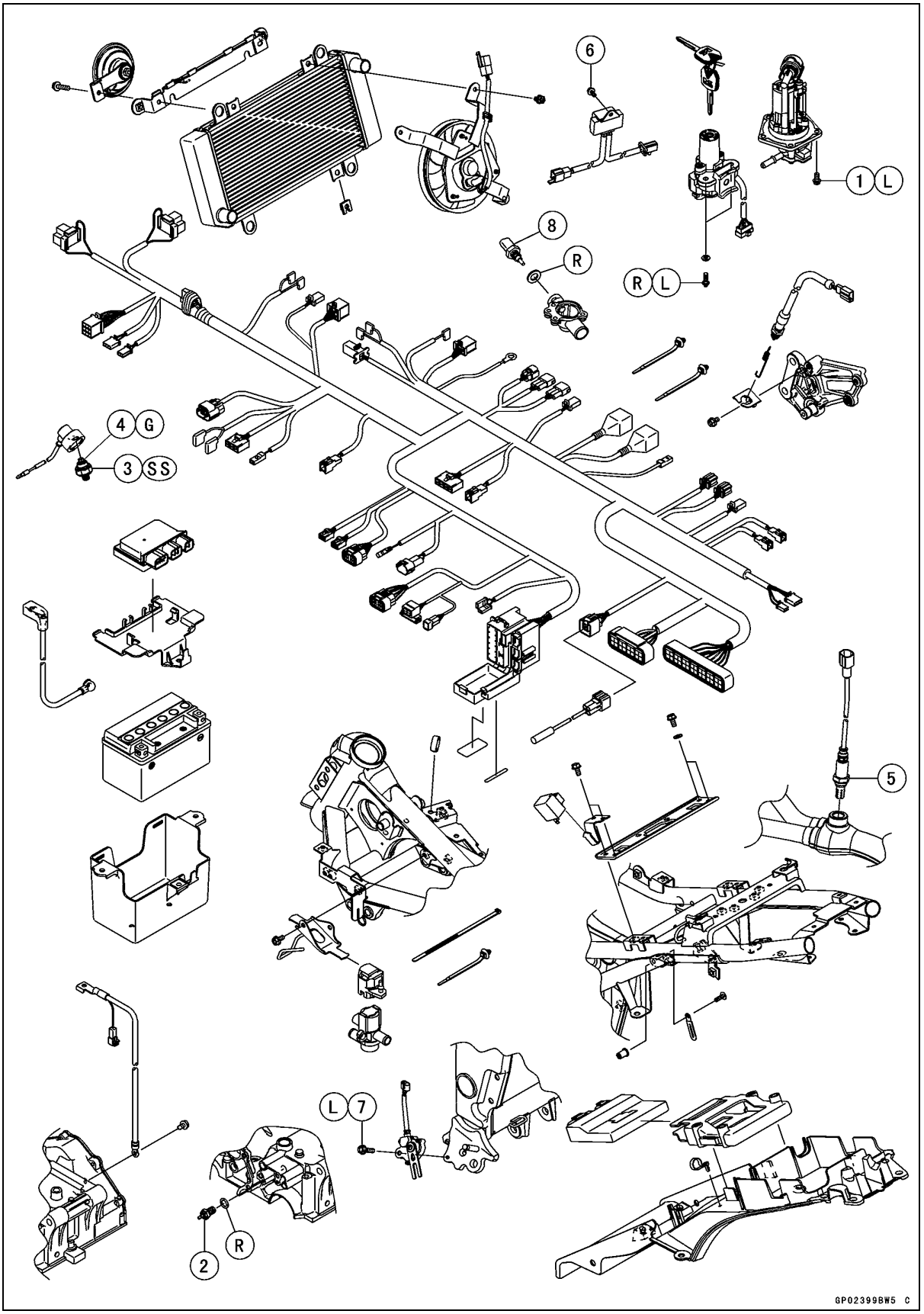


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Alternator Cover Bolts	9.8	1.0	87 in·lb	
2	Alternator Rotor Bolt	88.2	9.0	65	S
3	Crankshaft Sensor Screws	3.0	0.31	27 in·lb	
4	Plugs (Alternator Cover)	–	–	–	Hand -Tighten
5	Regulator/Rectifier Bolts	9.8	1.0	87 in·lb	
6	Spark Plugs	13	1.3	115 in·lb	
7	Speed Sensor Bolt	7.8	0.80	69 in·lb	L
8	Starter Motor Cable Terminal Nut	9.8	1.0	87 in·lb	
9	Starter Motor Clutch Bolts	34.3	3.5	25	L
10	Starter Motor Mounting Bolts	9.8	1.0	87 in·lb	
11	Starter Motor Terminal Locknut	6.9	0.70	61 in·lb	
12	Starter Motor Through Bolts	3.4	0.35	30 in·lb	
13	Starter Relay Cable Terminal Nuts	5.0	0.51	44 in·lb	
14	Stator Coil Bolts	12	1.2	106 in·lb	

G: Apply grease.
L: Apply a non-permanent locking agent.
M: Apply molybdenum disulfide grease.
R: Replacement Parts
S: Follow the specified tightening sequence.
SS: Apply silicone sealant.

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Fuel Pump Bolts	9.8	1.0	87 in·lb	L
2	Neutral Switch	15	1.5	11	
3	Oil Pressure Switch	15	1.5	11	SS
4	Oil Pressure Switch Terminal Bolt	1.5	0.15	13 in·lb	G
5	Oxygen Sensor	44.1	4.50	32.5	
6	Resistor Bolt	7.8	0.80	69 in·lb	
7	Sidestand Switch Bolt	8.8	0.90	78 in·lb	L
8	Water Temperature Sensor	25	2.5	18	

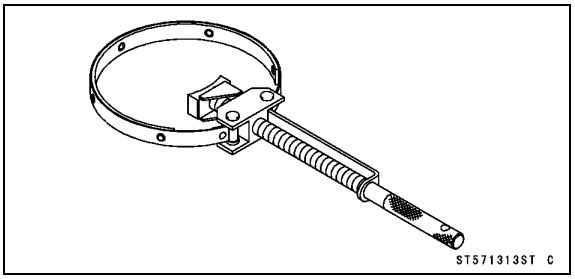
G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts
SS: Apply silicone sealant.

Specifications

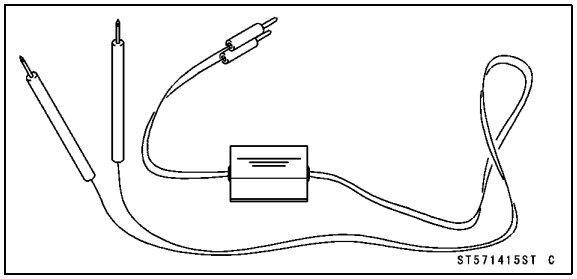
Item	Standard
Battery	
Type	Sealed Battery
Model Name	YTX9-BS
Capacity	12 V 8 Ah
Voltage	12.8 V or more
Charging System	
Type	Three-phase AC
Alternator Output Voltage	40 V or more at 4 000 r/min (rpm)
Stator Coil Resistance	0.05 ~ 0.6 Ω at 20°C (68°F)
Charging Voltage (Regulator/Rectifier Output Voltage)	13.9 ~ 14.9 V
Ignition System	
Crankshaft Sensor Resistance	100 ~ 150 Ω
Crankshaft Sensor Peak Voltage	4.5 V or more
Stick Coil:	
Primary Winding Resistance	1.0 ~ 1.6 Ω
Secondary Winding Resistance	10.8 ~ 16.2 kΩ
Primary Peak Voltage	90 V or more
Spark Plug:	
Type	NGK CR8E
Gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)
Electric Starter System	
Starter Motor:	
Brush Length	10 mm (0.39 in.) (Service Limit: 5.0 mm (0.20 in.))
Commutator Diameter	28 mm (1.10 in.) (Service Limit: 27 mm (1.06 in.))
Air Switching Valve	
Resistance	20 ~ 24 Ω at 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

Special Tools and Sealant

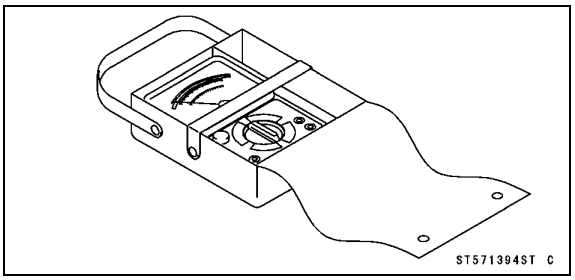
Flywheel Holder:
57001-1313



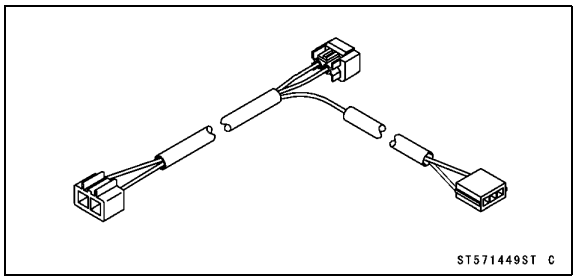
Peak Voltage Adapter:
57001-1415



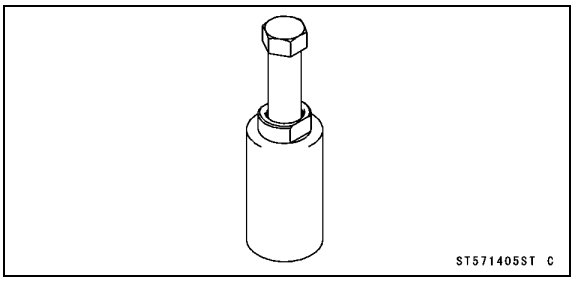
Hand Tester:
57001-1394



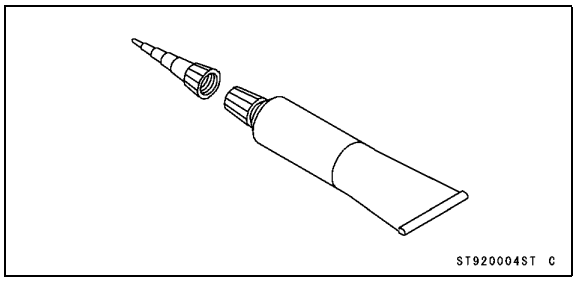
Lead Wire - Peak Voltage Adapter:
57001-1449



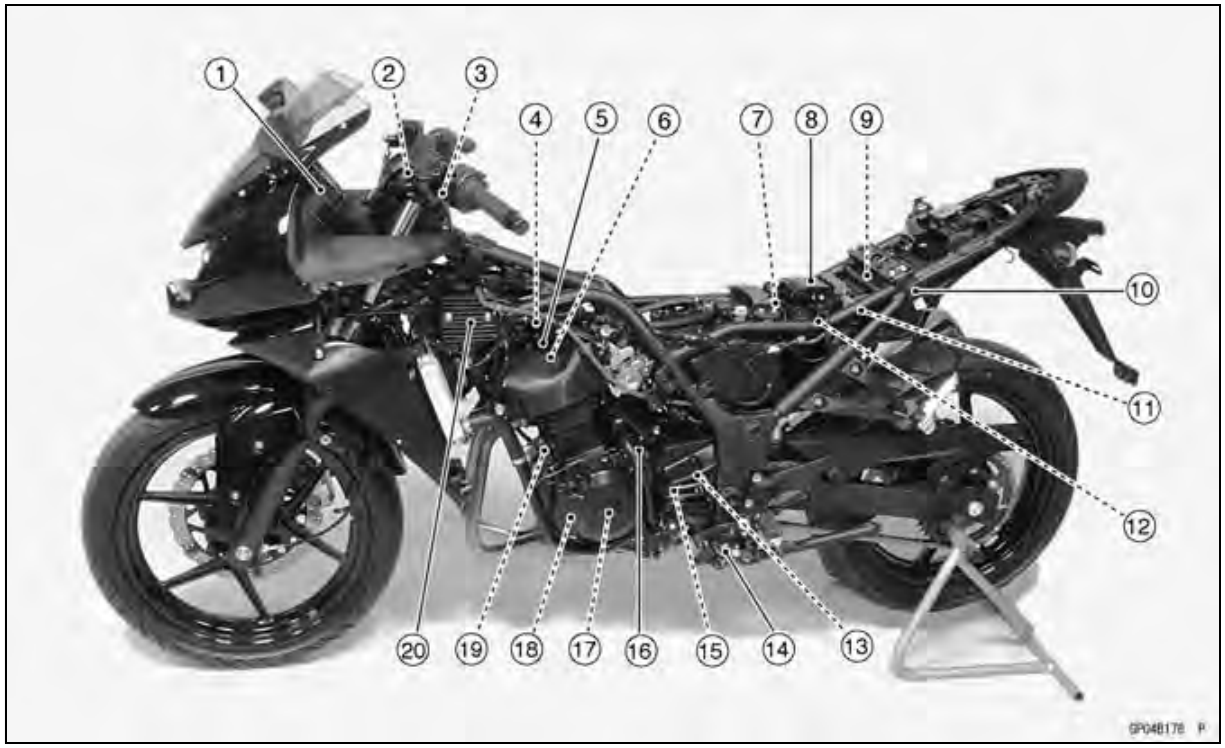
Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5:
57001-1405

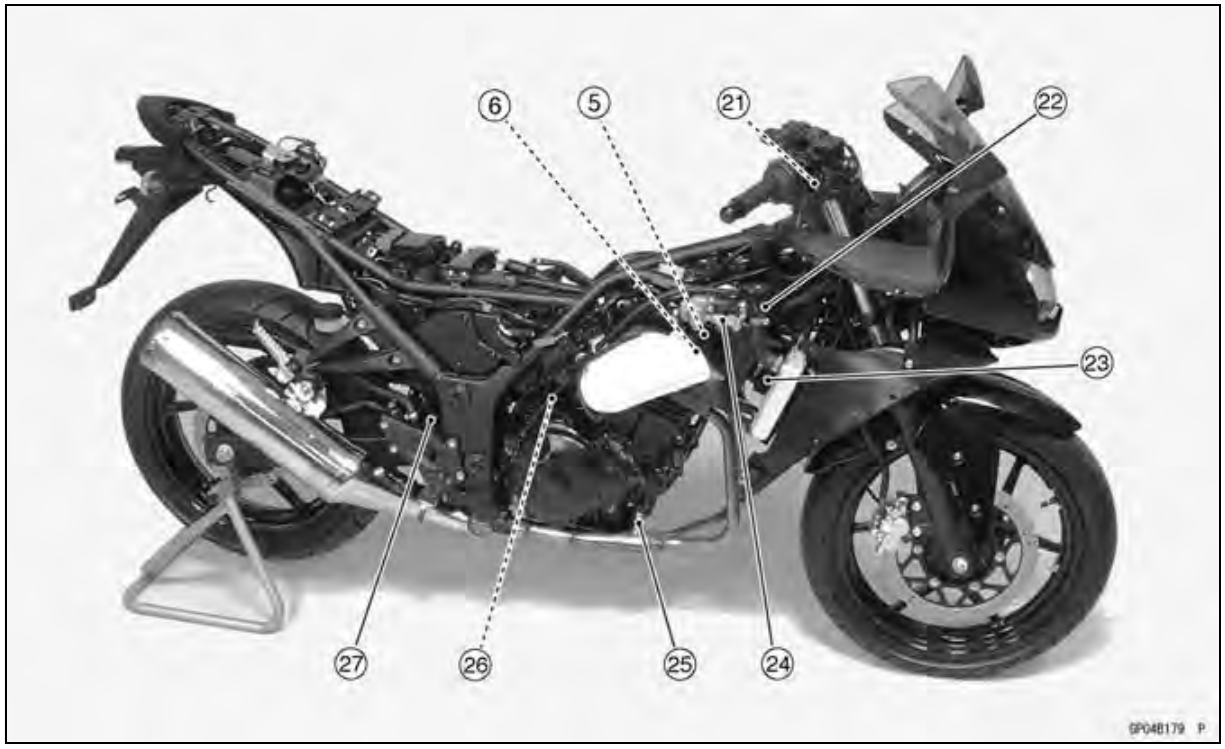


Kawasaki Bond (Silicone Sealant):
92104-0004



Parts Location

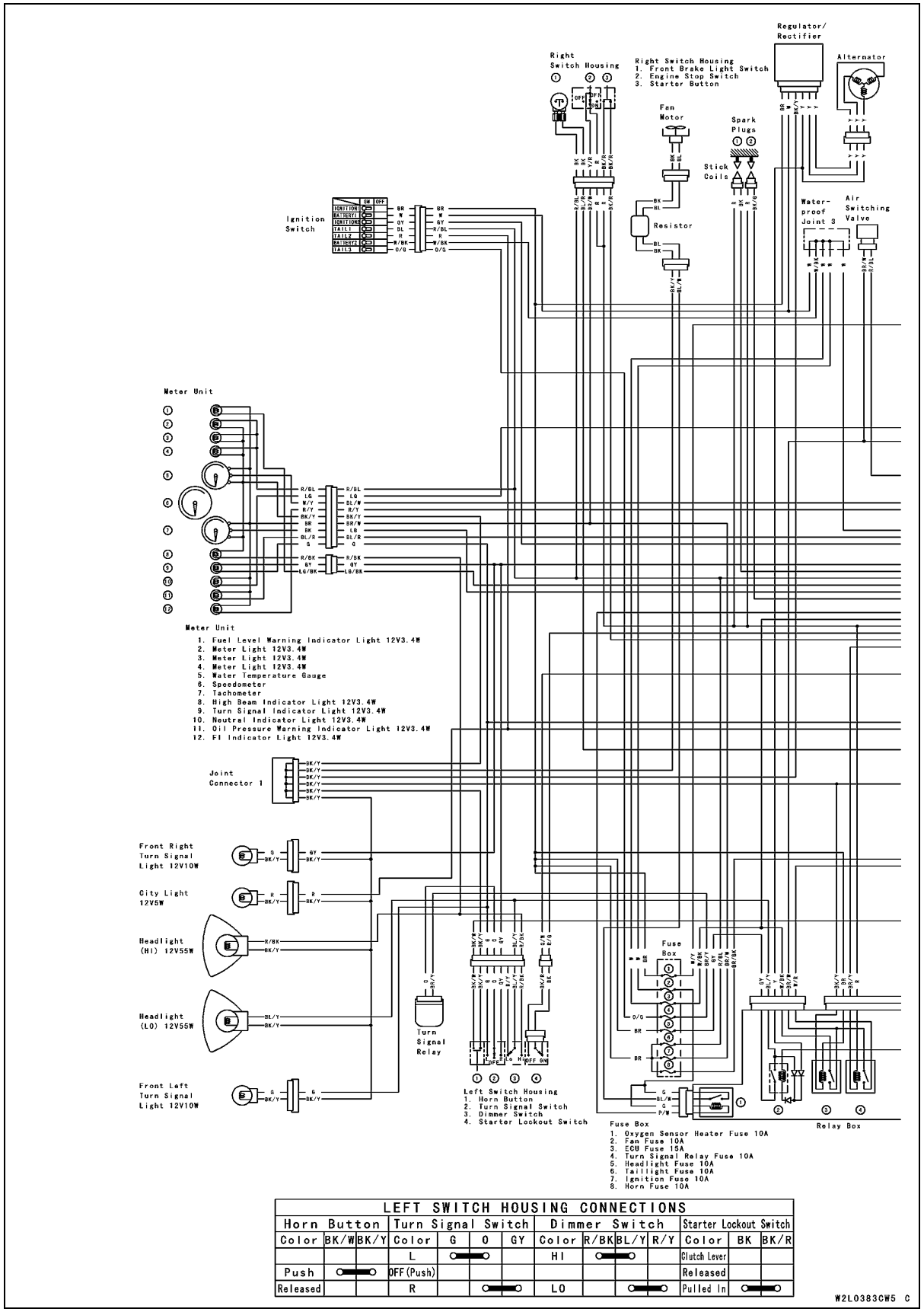




Parts Location

1. Meter Unit
2. Ignition Switch
3. Starter Lockout Switch
4. Air Switching Valve
5. Stick Coils
6. Spark Plugs
7. Starter Relay
8. Relay Box
9. ECU
10. Turn Signal Relay
11. Fuse Box
12. Battery 12 V 8 Ah
13. Speed Sensor
14. Sidestand Switch
15. Neutral Switch
16. Starter Motor
17. Alternator
18. Crankshaft Sensor
19. Oil Pressure Switch
20. Regulator/Rectifier
21. Front Brake Light Switch
22. Resistor
23. Fan Motor
24. Water Temperature Sensor
25. Oxygen Sensor
26. Engine Ground
27. Rear Brake Light Switch

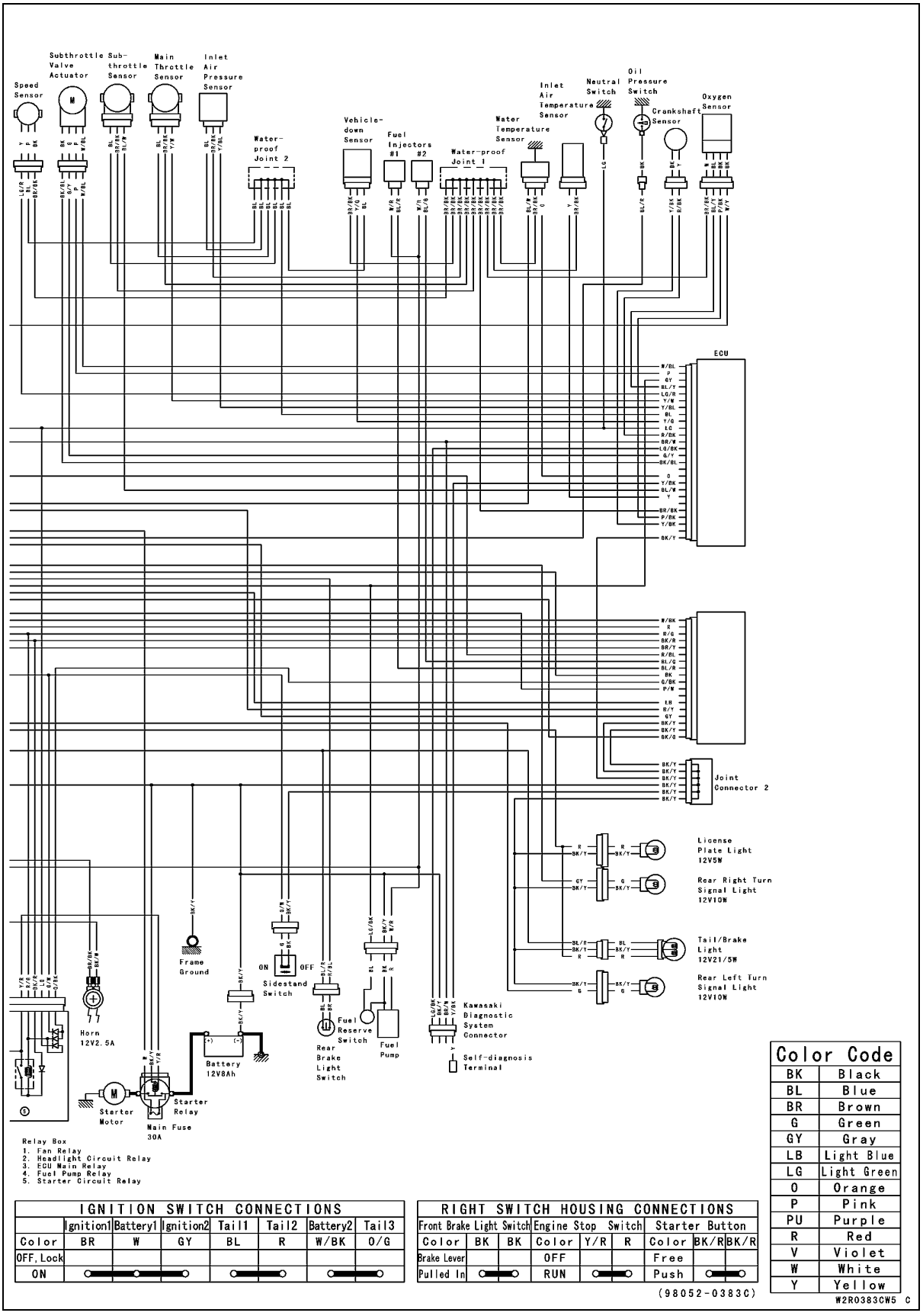
Wiring Diagram



LEFT SWITCH HOUSING CONNECTIONS													
Horn Button			Turn Signal Switch				Dimmer Switch				Starter Lockout Switch		
Color	BK/W	BK/Y	Color	G	O	GY	Color	R/BK	BL/Y	R/Y	Color	BK	BK/R
			L	○	●		HI	●			Clutch Lever		
Push	●		OFF (Push)								Released		
Released			R		●	○	LO		●	○	Pulled In	●	

W2L0383CW5 C

Wiring Diagram



IGNITION SWITCH CONNECTIONS							
	Ignition1	Battery1	Ignition2	Tail1	Tail2	Battery2	Tail3
Color	BR	W	GY	BL	R	W/BK	O/G
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	●	

Color Code	
BK	Black
BL	Blue
BR	Brown
G	Green
GY	Gray
LB	Light Blue
LG	Light Green
O	Orange
P	Pink
PU	Purple
R	Red
V	Violet
W	White
Y	Yellow

(98052-0383C)

W2R0383CW5 C

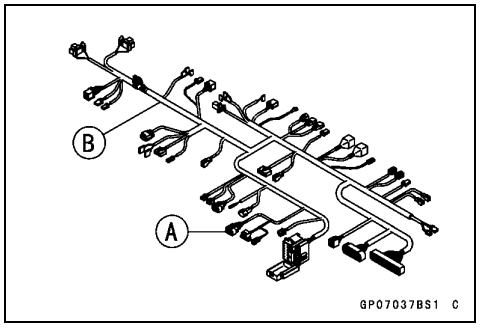
Precautions

There are a number of important precautions that are musts when servicing electrical systems. Learn and observe all the rules below.

- Do not reverse the battery cable connections. This will burn out the diodes on the electrical parts.
- Always check battery condition before condemning other parts of an electrical system. A fully charged battery is a must for conducting accurate electrical system tests.
- The electrical parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
- To prevent damage to electrical parts, do not disconnect the battery cables or any other electrical connections when the ignition switch is ON, or while the engine is running.
- Because of the large amount of current, never keep the starter button pushed when the starter motor will not turn over, or the current may burn out the starter motor windings.
- Take care not to short the cables that are directly connected to the battery positive (+) terminal to the chassis ground.
- Troubles may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the failure. If the failure was caused by some other item or items, they must be repaired or replaced, or the new replacement will soon fail again.
- Make sure all connectors in the circuit are clean and tight, and examine wires for signs of burning, fraying, etc. Poor wires and bad connections will affect electrical system operation.
- Measure coil and winding resistance when the part is cold (at room temperature).

Electrical Wiring

Wiring Inspection



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

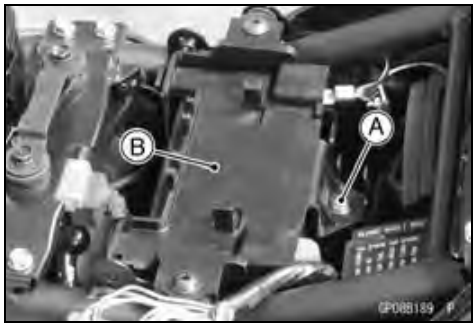
Special Tool - Hand Tester: 57001-1394

- ○Set the tester to the × 1 Ω range, and read the tester.
- ★If the tester does not read 0 Ω, the lead is defective. Replace the lead or the wiring harness [B] if necessary.

Battery

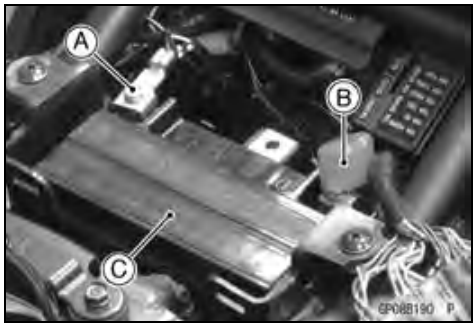
Battery Removal

- Turn off the ignition switch.
- Remove:
  Front Seat (see Front Seat Removal in the Frame chapter)
  Relay Box (see Relay Box Removal)
  Screw [A] and Battery Cover [B]



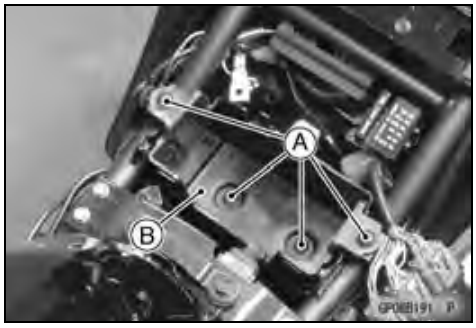
- Disconnect the negative (–) cable [A].

CAUTION
Be sure to disconnect the negative (–) cable first.



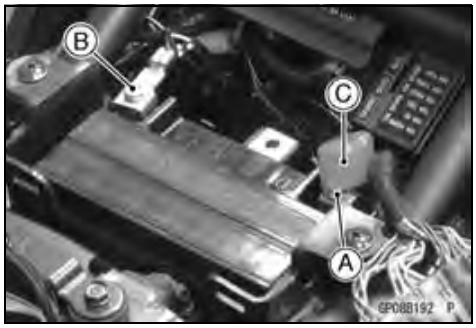
- Slide out the positive (+) terminal cap [B] and disconnect the positive (+) cable.
- Remove the battery [C].

- Remove the screws [A] and battery case [B] as necessary.

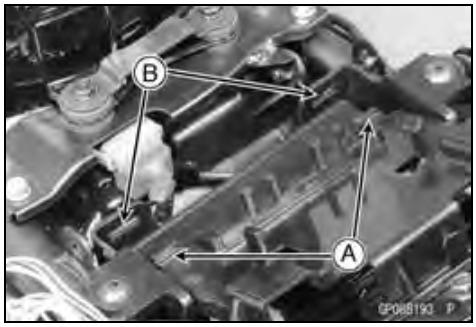


Battery Installation

- Turn off the ignition switch.
- Put the battery into the battery case.
- Connect the positive (+) cable [A] first.
- Connect the negative (–) cable [B].
- Apply a light coat of grease on the terminals to prevent corrosion.
- Cover the (+) terminal with red cap [C].



- Insert the projections [A] into the holes [B].
- Install the removed parts (see appropriate chapters).



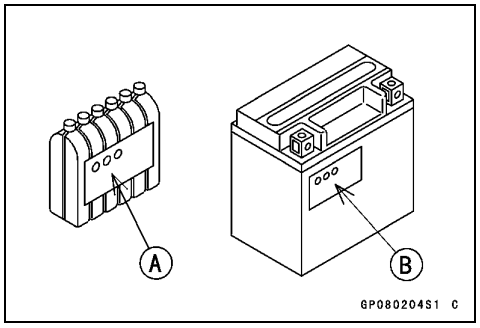
Battery

Battery Activation

Electrolyte Filling

- Make sure that the model name [A] of the electrolyte container matches the model name [B] of the battery. These names must be the same.

Battery Model Name for EX250K: YTX9-BS

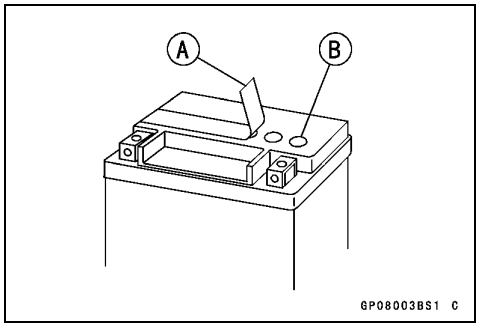


CAUTION

Be sure to use the electrolyte container with the same model name as the battery since the electrolyte volume and specific gravity vary with the battery type. This is to prevent overfilling of the electrolyte, shorting the battery life, and deterioration of the battery performance.

CAUTION

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.

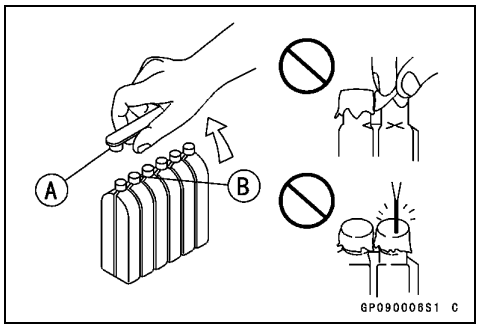


- Place the battery on a level surface.
- Check to see that the sealing sheet has no peeling, tears, or holes in it.
- Remove the sealing sheet.

NOTE

○*The battery is vacuum sealed. If the sealing sheet has leaked air into the battery, it may require a longer initial charge.*

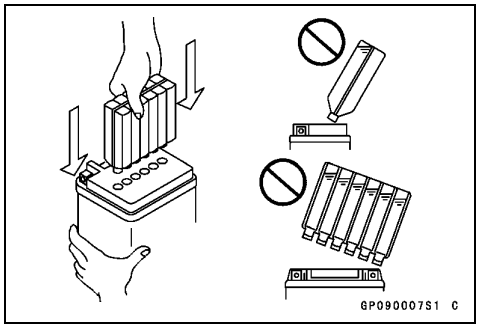
- Remove the electrolyte container from the vinyl bag.
- Detach the strip of caps [A] from the container and set aside, these will be used later to seal the battery.



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

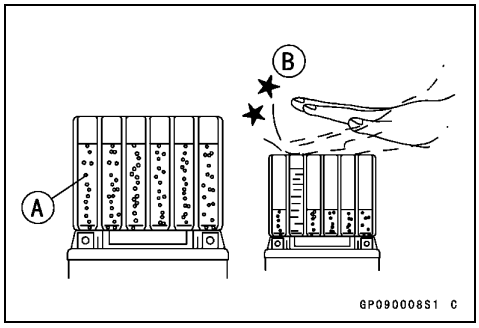
○*Do not tilt the electrolyte container.*

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.

● Keep the container in place for **20** minutes or more. Don't remove the container from the battery until it's empty, the battery requires all the electrolyte from the container for proper operation.



CAUTION

Removal of the container before it is completely empty can shorten the service life of the battery. Do not remove the electrolyte container until it is completely empty and 20 minutes have elapsed.

● Gently remove the container from the battery.

● Let the battery sit for **30** minutes prior to charging to allow the electrolyte to permeate into the plates for optimum performance.

NOTE

○*Charging the battery immediately after filling can shorten service life. Let the battery sit for at least **30** minutes after filling.*

Initial Charge

● Place the strip [A] of caps loosely over the filler ports.

● 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.

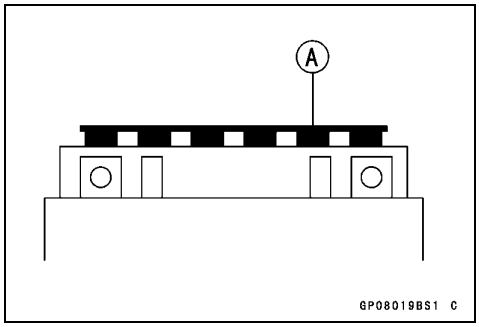
Kawasaki-recommended chargers:

Optimate III

Yuasa 1.5 Amp Automatic Charger

Battery Mate 150-9

★If the above chargers are not available, use equivalent one.



NOTE

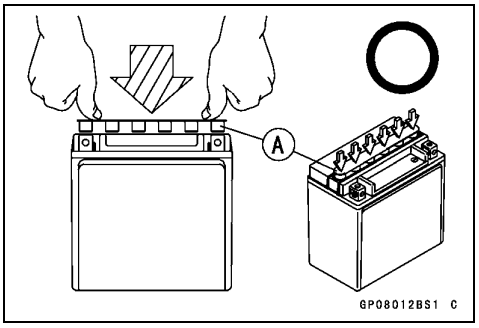
○*Charging rates will vary depending on how long the battery has been stored, temperature, and the type of charger used. Let battery sit 30 minutes after initial charge, then check voltage using a voltmeter. If it is not at least 12.8 V, repeat charging cycle.*

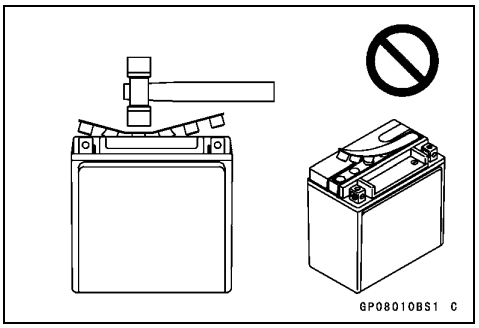
Battery

● After charging is completed, press down firmly with both hands to seat the strip of caps [A] into the battery (don't pound or hammer). When properly installed, the strip of the caps will be level with the top of the battery.

CAUTION

Once the strip of the caps is installed onto the battery, never remove the caps, nor add water or electrolyte to the battery.





NOTE

○*To ensure maximum battery life and customer satisfaction, it is recommended the battery be load tested at three times its amp-hour rating for 15 seconds.*
Re-check voltage and if less than 12.8 V repeat the charging cycle and load test. If still below 12.8 V the battery is defective.

Battery

Precautions

1) No need of topping-up
   No topping-up is necessary in this battery until it ends its life under normal use. Forcibly prying off the 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.

CAUTION

This battery is designed to sustain no unusual deterioration if refresh-charged according to the method specified above. However, the battery's performance may be reduced noticeably if charged under conditions other than given above. Never remove the seal 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).

⚠ WARNING

Keep the battery away from sparks and open flames during charging, since the battery gives off an explosive gas mixture of hydrogen and oxygen. When using a battery charger, connect the battery to the charger before turning on the charger.
This procedure prevents sparks at the battery terminals which could ignite any battery gases.
No fire should be drawn near the battery, or no terminals should have the tightening loosened.
The electrolyte contains sulfuric acid. Be careful not to have it touch your skin or eyes. If touched, wash it off with liberal amount of water. Get medial attention if severe.

Interchange

A sealed battery can fully display its performance only when combined with a proper vehicle electric system. Therefore, replace a sealed battery only on a motorcycle which was originally equipped with a sealed battery.

Be careful, if a sealed battery is installed on a motorcycle which had an ordinary battery as original equipment, the sealed battery's life will be shortened.

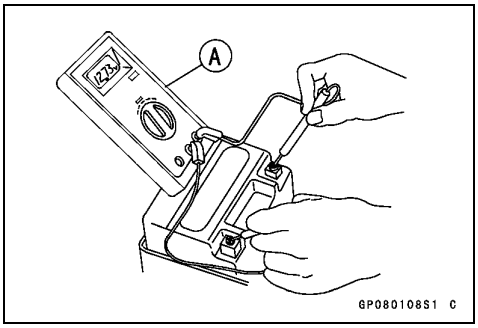
Charging Condition Inspection

○Battery charging condition can be checked by measuring battery terminal voltage with a digital voltmeter [A].

- Remove the battery (see Battery Removal).
- Measure the battery terminal voltage.

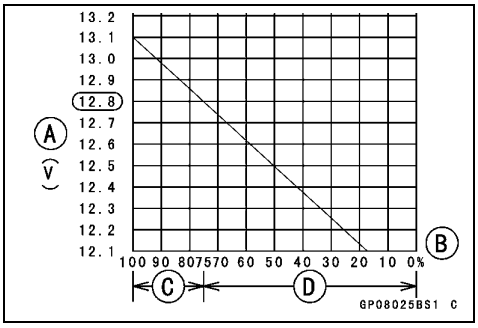
NOTE

○*Measure with a digital voltmeter which can be read one decimal place voltage.*



Battery

★If the reading is 12.8 V or more, no refresh charge is required, however, if the read is below the specified, refresh charge is required.

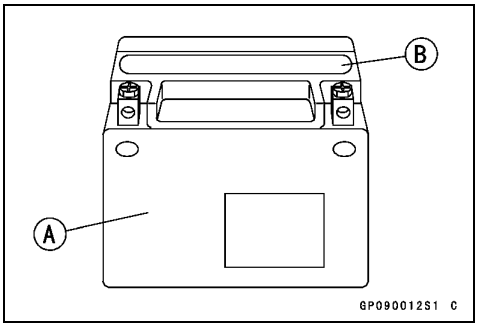


Battery Terminal Voltage
Standard: 12.8 V or more

Terminal Voltage (V) [A]
Battery Charge Rate (%) [B]
Good [C]
Refresh charge is required [D]

Refreshing Charge

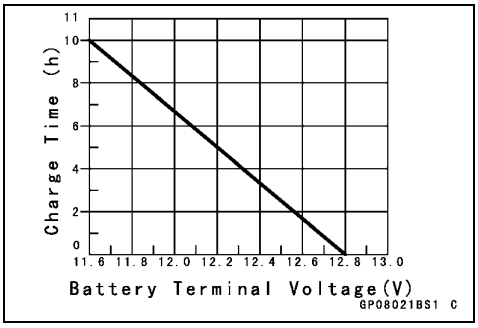
- Remove the battery [A] (see Battery Removal).
- Do refresh charge by following method according to the battery terminal voltage.



⚠ WARNING

This battery is sealed type. Never remove sealing cap [B] even at charging. Never add water. Charge with current and time as stated below.

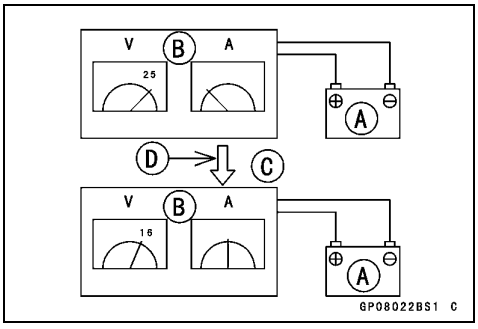
Terminal Voltage: 11.5 ~ less than 12.8 V
Standard Charge 0.9 A × 5 ~ 10 h (see following chart)
Quick Charge 4 A × 1 h



CAUTION

If possible, do not quick charge. If quick charge is done unavoidably, do standard charge later on.

Terminal Voltage: less than 11.5 V
Charging Method: 0.9 A × 20 h



NOTE

○*Increase the charging voltage to a maximum voltage of 25 V if the battery will not accept current initially. Charge for no more than 5 minutes at the increased voltage then check if the battery is drawing current. If the battery will accept current decrease the voltage and charge by the standard charging method described on the battery case. If the battery will not accept current after 5 minutes, replace the battery.*

Battery [A]
Battery Charger [B]
Standard Value [C]
Current starts to flow [D]

- Determine the battery condition after refresh charge.

○Determine the condition of the battery left for 30 minutes after completion of the charge by measuring the terminal voltage according to the table below.

Criteria	Judgement
12.8 V or higher	Good
12.0 ~ lower than 12.8 V	Charge insufficient → Recharge
lower than 12.0 V	Unserviceable → Replace

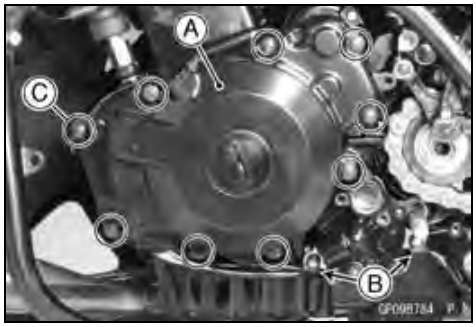
Charging System

Alternator Cover Removal

- Remove:
  Left Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Engine Oil (Drain, see Engine Oil Change in the Periodic Maintenance chapter)
  Coolant (Drain, see Coolant Change in the Periodic Maintenance chapter)
  Water Pipes (see Water Pump Cover Removal in the Cooling System chapter)

- Disconnect the alternator and crankshaft sensor lead connectors [A].

- Place a suitable container under the alternator cover [A].
- Take out the leads from the clamps [B].
- Remove:
  Alternator Cover Bolts [C]
  Alternator Cover



Alternator Cover Installation

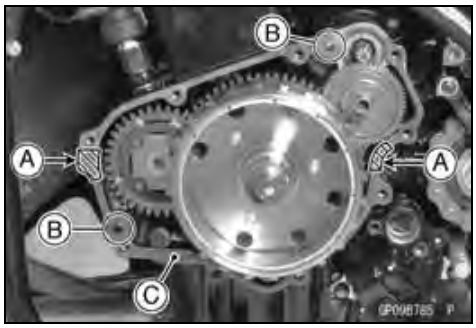
- Apply silicone sealant to the crankshaft sensor lead grommet and crankcase halves mating surface [A] on the front and rear sides of the cover mount.

  Sealant - Kawasaki Bond (Silicone Sealant): 92104-0004

- Check that dowel pins [B] are in place on the crankcase.
- Install a new gasket [C] and the alternator cover.
- Tighten:

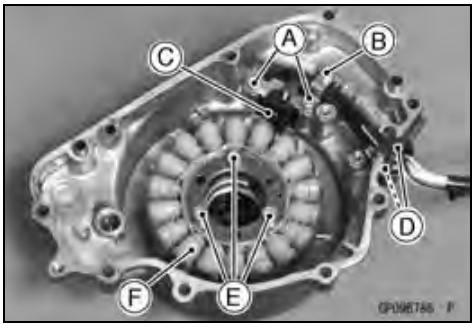
  Torque - Alternator Cover Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

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



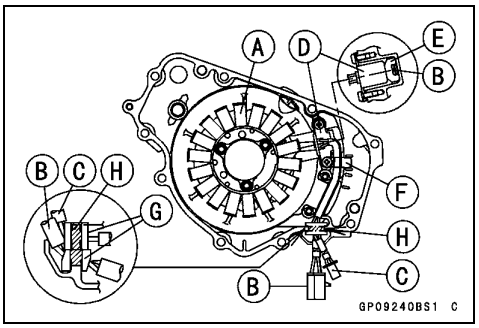
Charging System

Stator Coil Removal



- Remove:
  Alternator Cover (see Alternator Cover Removal)
  Screws [A] and Clamp [B]
  Crankshaft Sensor [C]
  Lead Grommets [D]
  Stator Coil Bolts [E]
  Stator Coil [F]

Stator Coil Installation



- Install the stator coil [A] and tighten the bolts.

  Torque - Stator Coil Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)

- Install the alternator [B] and crankshaft sensor [C] leads into the alternator cover as shown in the figure.
  Crankshaft Sensor [D]
  Damper [E]
  Clamp [F]
  Grommets [G]
  Silicone Sealant Applied Areas [H]

○Apply silicone sealant to the grommets, and fit them into the notch of the cover securely.

  Sealant - Kawasaki Bond (Silicone Sealant): 92104-0004

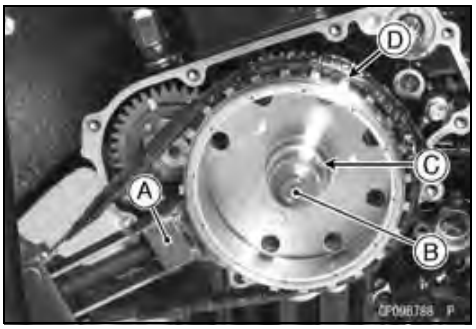
- Install the crankshaft sensor and clamp.
- Tighten:

  Torque - Crankshaft Sensor Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)

- Install the alternator cover (see Alternator Cover Installation).

Alternator Rotor Removal

- Remove:
  Alternator Cover (see Alternator Cover Removal)
  Shaft [A]
  Starter Idle Gear [B]



- Hold the alternator rotor steady with the flywheel holder [A].
- Remove the rotor bolt [B] and washer [C].

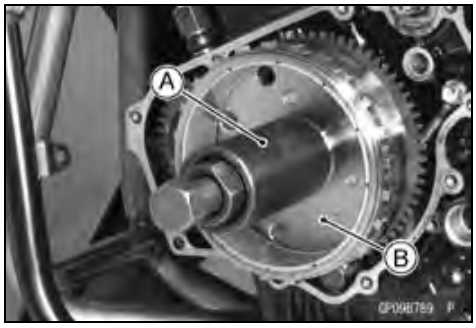
  Special Tool - Flywheel Holder: 57001-1313

CAUTION
Do not hold the projections [D].

Charging System

- 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

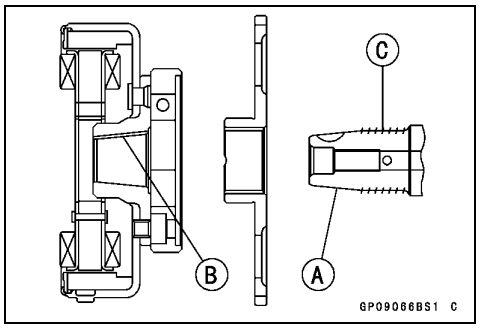


CAUTION

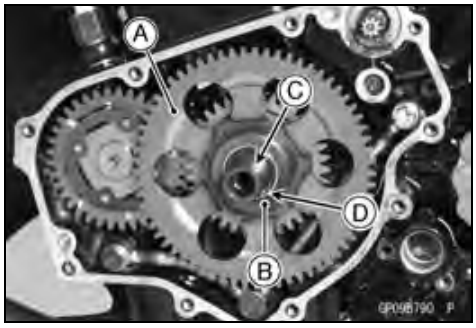
Do not attempt to strike the alternator rotor itself. Striking the rotor can cause the magnets to lose their magnetism.

Alternator Rotor Installation

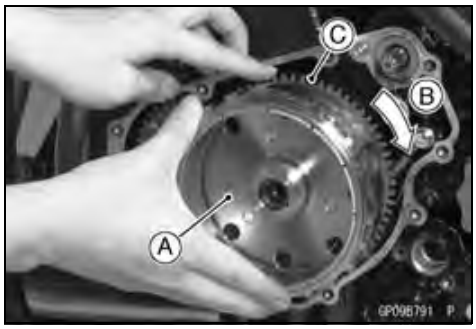
- Using a cleaning fluid, clean off any oil or dirt on the following portions and dry them with a clean cloth.
  Crankshaft Tapered Portion [A]
  Alternator Rotor Tapered Portion [B]
- Apply a thin coat of molybdenum disulfide grease to the crankshaft [C].



- Install the starter clutch gear [A] and washer [B].
- Again, clean the crankshaft tapered portion [C] and dry there.
- Fit the woodruff key [D] securely in the slot in the crankshaft before installing the alternator rotor.

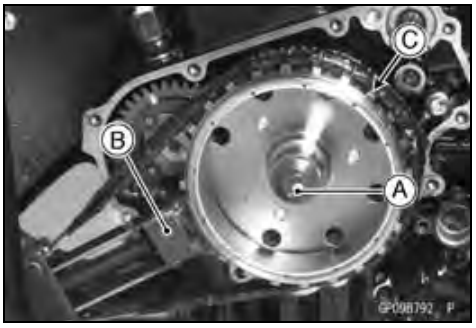


- Install the alternator rotor [A] while turning [B] the starter clutch gear [C].



Charging System

● Install the washer and alternator rotor bolt [A].



NOTE

○*Confirm the alternator rotor fit or not to the crankshaft before tightening it with specified torque.*

● Install the rotor bolt and tighten it with 55 N·m (5.6 kgf·m, 41 ft·lb) of torque.

Special Tool - Flywheel Holder [B]: 57001-1313

CAUTION

Do not hold the projections [C].

● Remove the rotor bolt and washer.
● Check the tightening torque with flywheel puller.

Special Tool - Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5: 57001-1405

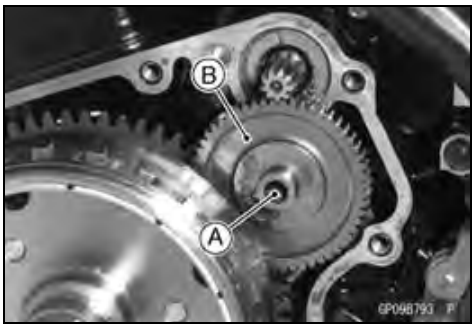
★If the rotor is not pulled out with 20 N·m (2.0 kgf·m, 15 ft·lb) of drawing torque, it is installed correctly.
★If the rotor is pulled out with under 20 N·m (2.0 kgf·m, 15 ft·lb) of drawing torque, clean off any oil dirt or flaw of the crankshaft and rotor tapered portion, and dry them with a clean cloth. Then, confirm that it is not pulled out with above torque.
● Tighten the alternator rotor bolt while holding the alternator rotor steady with the flywheel holder.

Special Tool - Flywheel Holder: 57001-1313

CAUTION

Do not hold the projections.

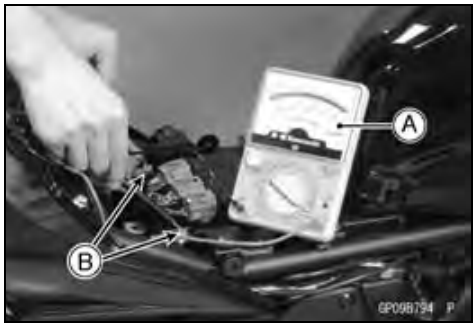
Torque - Alternator Rotor Bolt: 88.2 N·m (9.0 kgf·m, 65 ft·lb)



● 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 battery cover (see Battery Removal).
- Check that the ignition switch is turned off, and connect the hand tester [A] to the battery terminals [B].

Special Tool - Hand Tester: 57001-1394

- Start the engine, and note the voltage readings at various engine speeds with the headlight turned on and then turned off (To turn off the headlight, disconnect the headlight connector on the headlight unit.). The readings should show nearly battery voltage when the engine speed is low, and, as the engine speed rises, the readings should also rise. But they must be kept under the specified voltage.

Charging Voltage

Tester Range	Connections		Reading
	Tester (+) to	Tester (–) to	
25 V DC	Battery (+)	Battery (–)	13.9 ~ 14.9 V

- Turn off the ignition switch to stop the engine, and disconnect the hand tester.

★If the charging voltage is kept between the values given in the table, the charging system is considered to be working normally.

★If the charging voltage is much higher than the values specified in the table, the regulator/rectifier is defective or the regulator/rectifier leads are loose or open.

★If the charging voltage does not rise as the engine speed increases, then the regulator/rectifier is defective or the alternator output is insufficient for the loads. Check the alternator and regulator/rectifier to determine which part is defective.

Alternator Inspection

There are three types of alternator failures: short, open (wire burned out), or loss in rotor magnetism. A short or open in one of the coil wires will result in either a low output, or no output at all. A loss in rotor magnetism, which may be caused by dropping or hitting the alternator, by leaving it near an electromagnetic field, or just by aging, will result in low output.

Charging System

● To check the alternator output voltage, do the following procedures.
○Turn off the ignition switch.
○Remove the right side cover (see Side Cover Removal in the Frame chapter).
○Disconnect the alternator lead connector [A].
○Connect the hand tester as shown in the table 1.

Special Tool - Hand Tester: 57001-1394

○Start the engine.
○Run it at the rpm given in the table 1.
○Note the voltage readings (total 3 measurements).

Table 1 Alternator Output Voltage at 4 000 r/min (rpm)

Tester Range	Connections		Reading
	Tester (+) to	Tester (–) to	
250 V AC	One Yellow Lead	Another Yellow Lead	40 V or more

★If the output voltage shows the value in the table, the alternator operates properly. The regulator/rectifier is damaged.
★If the output voltage shows a much lower reading than that given in the table, stop the engine and inspect the stator coil resistance.
● Check the stator coil resistance as follows.
○Stop the engine.
○Connect the hand tester as shown in the table 2.

Special Tool - Hand Tester: 57001-1394

○Note the readings (total 3 measurements).

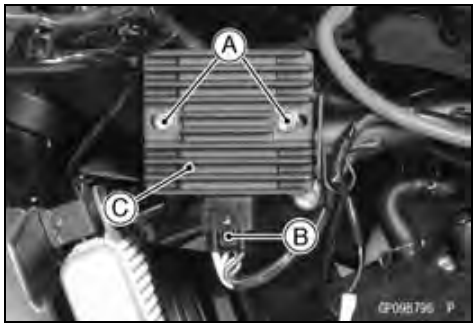
Table 2 Stator Coil Resistance at 20°C (68°F)

Tester Range	Connections		Reading
	Tester (+) to	Tester (–) to	
× 1 Ω	One Yellow Lead	Another Yellow Lead	0.05 ~ 0.6 Ω

★If there is more resistance than shown in the table, or no hand tester reading (infinity) for any two leads, the stator has an open lead and must be replaced. Much less than this resistance means the stator is shorted, and must be replaced.
● Using the highest resistance range of the hand tester, measure the resistance between each of the yellow leads and chassis ground.
★Any hand tester reading less than infinity (∞) indicates a short, necessitating stator replacement.
★If the stator coils have normal resistance, but the voltage check showed the alternator to be defective; then the rotor magnets have probably weakened, and the rotor must be replaced.

Charging System

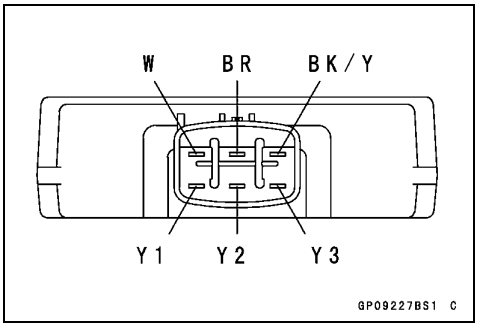
Regulator/Rectifier Inspection



● Remove:
Left Lower Fairing (see Lower Fairing Removal in the Frame chapter)
Bolts [A]
Connector [B] (Disconnect)
Regulator/Rectifier [C]

Rectifier Circuit Check

● Check conductivity of the following pair of terminals.



Rectifier Circuit Inspection

Tester connection	W-Y1,	W-Y2,	W-Y3
	BK/Y-Y1,	BK/Y-Y2,	BK/Y-Y3

★The resistance should be low in one direction and more than ten times as much in the other direction. If any two terminals are low or high in both directions, the rectifier is defective and the regulator/rectifier must be replaced.

NOTE

○*The actual meter reading varies with the meter used and the individual rectifier, but, generally speaking the lower reading should be from zero to one half the scale.*

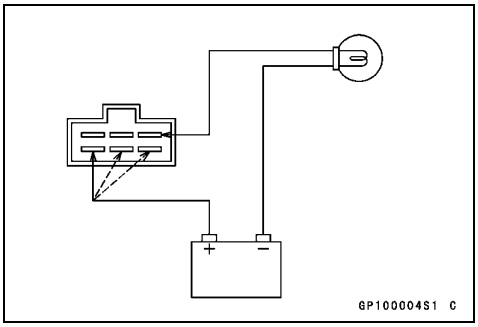
Regulator Circuit Check

To test the regulator out of circuit, use three 12 V batteries and a test light (12 V 3 ~ 6 W bulb in a socket with leads).

CAUTION

The test light works as an indicator and also a current limiter to protect the regulator/rectifier from excessive current. Do not use an ammeter instead of a test light.

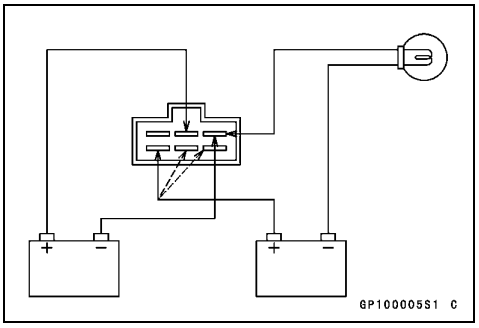
● Check to be sure the rectifier circuit is normal before continuing.



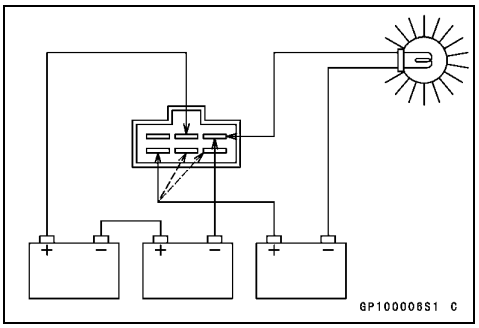
● Do the 1st step regulator circuit test.
○Connect the test light and the 12 V battery to the regulator/rectifier as shown in the figure.
○Check the Y1, Y2 and Y3 terminal respectively.
★If the test light turns on, the regulator/rectifier is defective. Replace it.
★If the test light does not turn on, continue the test.

Charging System

● Do the 2nd step regulator circuit test.
○Connect the test light and the 12 V battery in the same manner as specified in the "Regulator Circuit Test-1st Step".
○Apply 12 V to the BR terminal.
○Check the Y1, Y2 and Y3 terminal respectively.
★If the test light turns on, the regulator/rectifier is defective. Replace it.
★If the test light does not turn on, continue the test.



● Do the 3rd step regulator circuit test.
○Connect the test light and the 12 V battery in the same manner as specified in the "Regulator Circuit Test-1st Step".
○Momentarily apply 24 V to the BR terminal by adding a 12 V battery.
○Check the Y1, Y2 and Y3 terminals respectively.



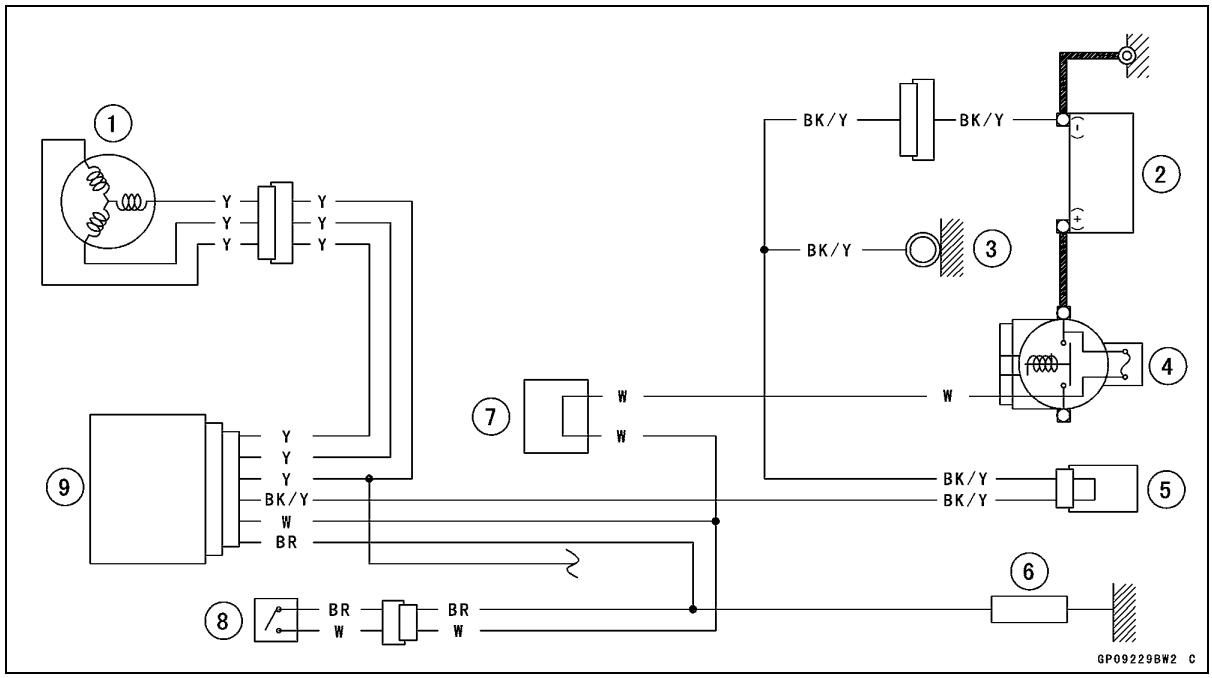
CAUTION

Do not apply more than 24 V. If more than 24 V is applied, the regulator/rectifier may be damaged. Do not apply 24 V more than a few seconds. If 24 V is applied for more than a few seconds, the regulator/rectifier may be damaged.

★If the test light did not light when the 24 V was applied momentarily to the voltage monitoring terminal, the regulator/rectifier is defective. Replace it.
★If the regulator/rectifier passes all of the tests described, it may still be defective. If the charging system still does not work properly after checking all of the components and the battery, test the regulator/rectifier by replacing it with a known good unit.

Charging System

Charging System Circuit



1. Alternator
2. Battery 12 V 8 Ah
3. Frame Ground
4. Main Fuse 30 A
5. Joint Connector 1
6. Load
7. Water-proof Joint 3
8. Ignition Switch
9. Regulator/Rectifier

Ignition System

⚠ WARNING

The ignition system produces extremely high voltage. Do not touch the spark plugs or stick coils while the engine is running, or you could receive a severe electrical shock.

CAUTION

Do not disconnect the battery cables or any other electrical connections when the ignition switch is ON, or while the engine is running. This is to prevent ECU 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:
Right Side Cover (see Side Cover Removal in the Frame chapter)
Crankshaft Sensor Lead Connector [A] (Disconnect)

● Set the hand tester [B] to the × 1 Ω range and connect (+) lead to the yellow lead and (–) lead to the black lead in the connector.

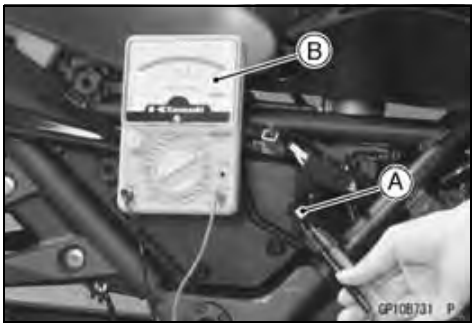
Special Tool - Hand Tester: 57001-1394

Crankshaft Sensor Resistance: 100 ~ 150 Ω

★If there is more resistance than the specified value, the coil has an open lead and must be replaced. Much less than this resistance means the coil is shorted, and must be replaced.

● Using the highest resistance range of the tester, measure the resistance between the crankshaft sensor leads and chassis ground.

★Any tester reading less than infinity (∞) indicates a short, necessitating replacement of the crankshaft sensor assembly.



Ignition System

Crankshaft Sensor Peak Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

- Remove:
  Right Side Cover (see Side Cover Removal in the Frame chapter)
  Crankshaft Sensor Lead Connector [A] (Disconnect)
- Set the hand tester [B] to the DC 25 V range.
- Connect the peak voltage adapter [C] to the hand tester and crankshaft sensor leads in the connector.

Special Tools - Hand Tester: 57001-1394
Peak Voltage Adapter: 57001-1415
Type: KEK-54-9-B

Connections:

Crankshaft Sensor Lead		Peak Voltage Adapter		Hand Tester
Yellow	←	Red	→	(+)
Black	←	Black	→	(–)

- Turn the ignition switch and engine stop switch ON.
- Pushing the starter button, turn the engine 4 ~ 5 seconds with the transmission gear in neutral to measure the crankshaft sensor peak voltage.
- Repeat the measurement 5 or more times.

Crankshaft Sensor Peak Voltage
Standard: 4.5 V or more

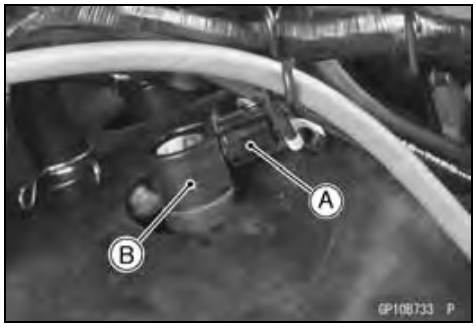
★If the tester reading is not specified one, inspect the crankshaft sensor (see Crankshaft Sensor Inspection).

Stick Coil Removal

CAUTION

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

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



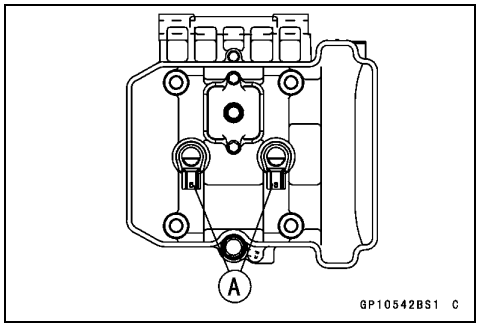
- Disconnect the stick coil connectors [A].
- Pull the stick coils [B] off the spark plugs.

CAUTION

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

Ignition System

Stick Coil Installation

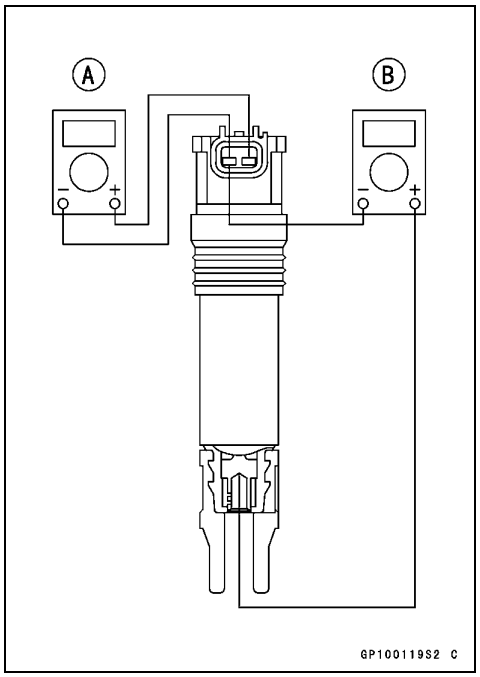


- Insert the coil as shown being careful of the coil heads [A] direction.
- Be sure the stick coils are installed by pulling up it lightly.
- Connect the connectors.

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

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

Stick Coil Inspection



- Remove the stick coils (see Stick Coil Removal).
- Measure the primary winding resistance [A] as follows.

○Connect the hand tester between the coil terminals.
○Set the tester to the × 1 Ω range, and read the tester.

- Measure the secondary winding resistance [B] as follows.

○Connect the tester between the plug terminal and (–) coil terminal.
○Set the tester to the × 1 kΩ range and read the tester.

Stick Coil Winding Resistance

Primary Windings:	**1.0 ~ 1.6 Ω**
Secondary Windings:	**10.8 ~ 16.2 kΩ**

★If the tester does not read as specified, replace the coil.

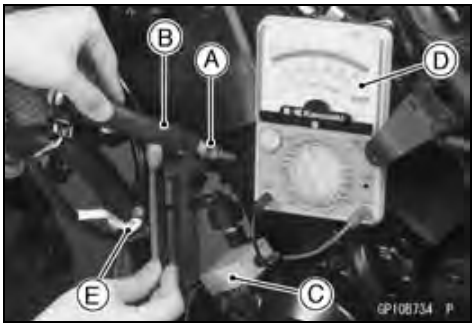
Ignition System

Stick Coil Primary Peak Voltage

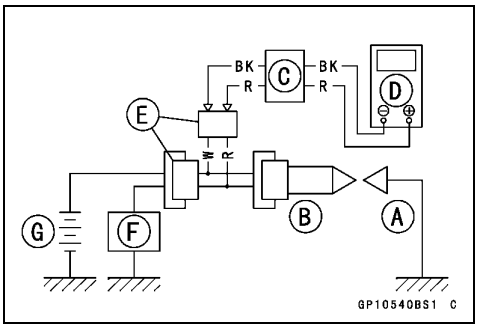
NOTE

○*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 the hand tester [D] which is set to the DC 250 V range.
○Connect the adapter to the lead wire-peak voltage adapter [E] which is connected between the stick coil connector and stick coil.
ECU [F]
Battery [G]



Special Tools - Hand Tester: 57001-1394
Peak Voltage Adapter: 57001-1415
Type: KEK-54-9-B
Lead Wire - Peak Voltage Adapter: 57001-1449



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 the engine stop switch ON.
● Pushing the starter button, turn the engine 4 ~ 5 seconds with the transmission in neutral to measure the primary peak voltage.
● Repeat the measurements 5 times for one stick coil.

Stick Coil Primary Peak Voltage
Standard: 90 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

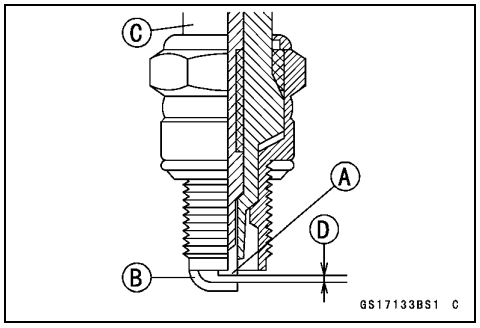
● Refer to the Spark Plug Replacement in the Periodic Maintenance chapter.

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 CR8E

Interlock Operation Inspection

- Raise the rear wheel off the ground with stand.
- Turn the engine stop switch ON (run position).

1st Check

- Start the engine to the following conditions.

Condition:
Transmission Gear → 1st Position
Clutch Lever → Release
Sidestand → Down or Up

○Turn the ignition switch ON and push the starter button.
○Then the starter motor should not turn when the starter system circuit is normality.
★If the engine is start, inspect the starter lockout switch, neutral switch 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
Sidestand → Up

○Turn the ignition switch ON and push the starter button.
○Then the starter motor should turn when the starter system circuit is normality.
★If the starter motor is not turn, inspect the starter lockout switch, neutral switch, sidestand 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

Sidestand → Up

- Set the sidestand on the ground, then the engine will stop.

★If the engine does not stop, inspect the neutral switch, sidestand switch and relay box.

★If their parts are normality, replace the ECU.

IC Igniter Inspection

○The IC igniter is built in the ECU [A].

- Refer to the following items.

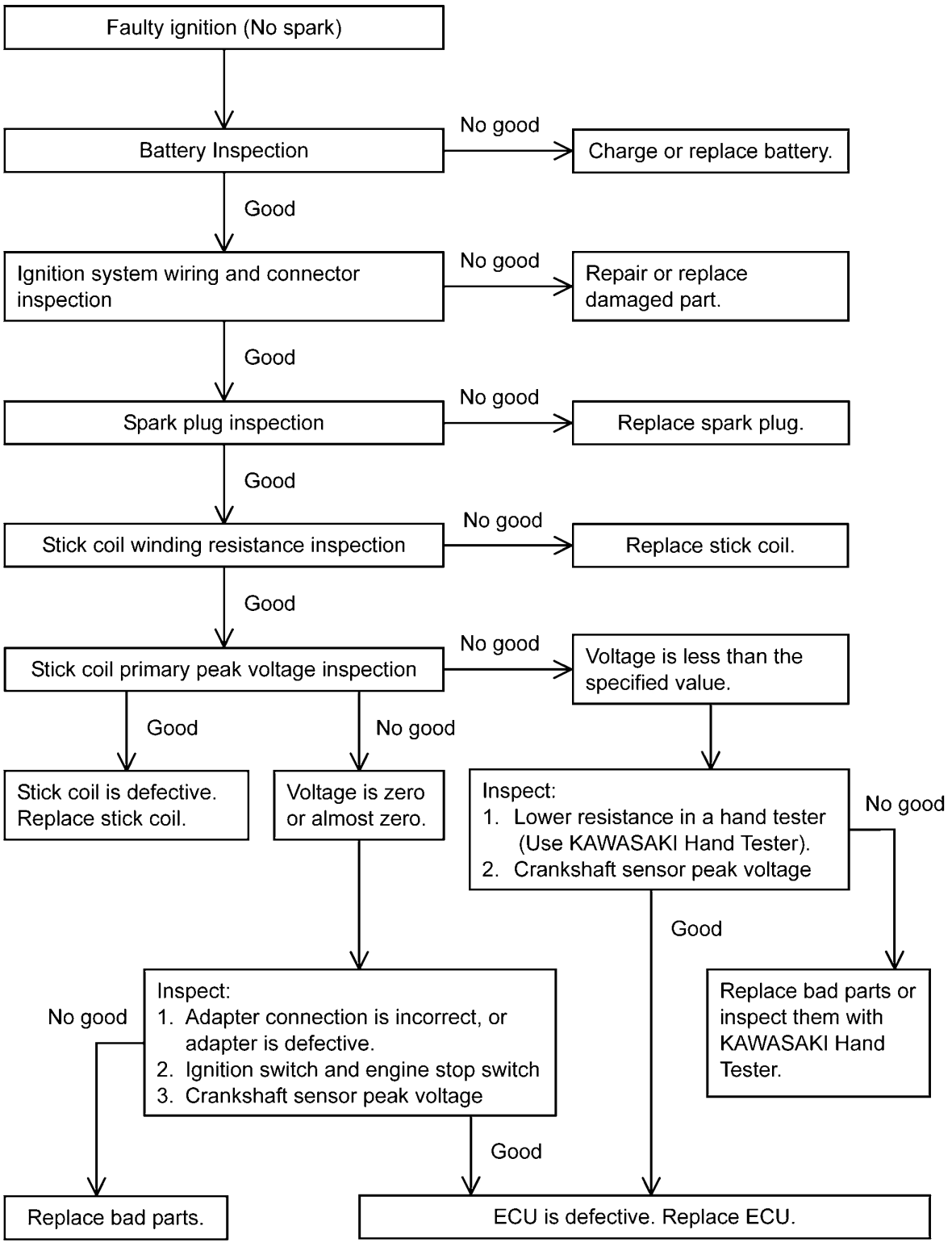
Interlock Operation Inspection (see Interlock Operation Inspection)

Ignition System Troubleshooting (see Ignition System section)

ECU Power Supply Inspection (see ECU Power Supply Inspection in the Fuel System (DFI) chapter)

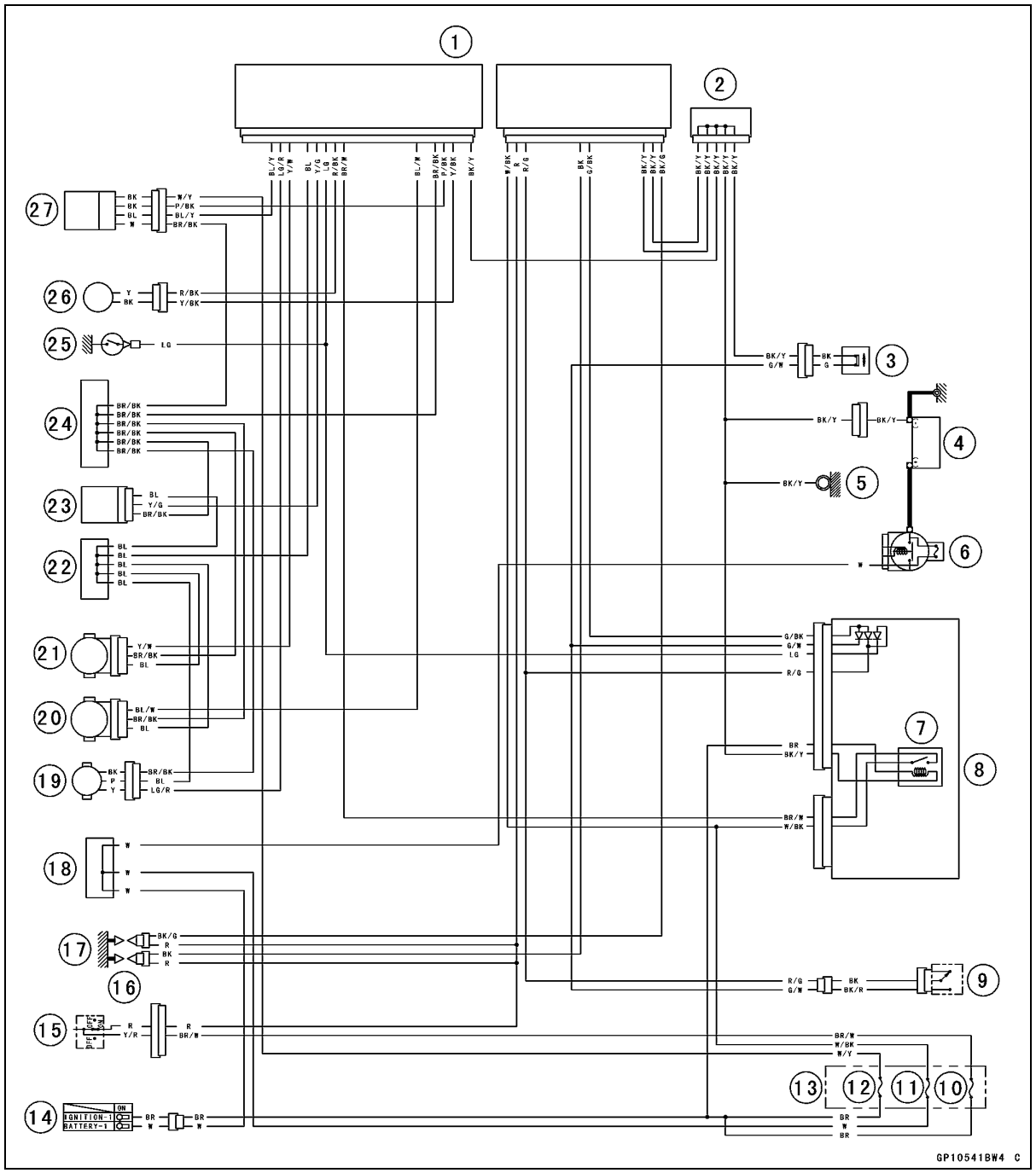
Ignition System

Ignition System Troubleshooting



Ignition System

Ignition System Circuit



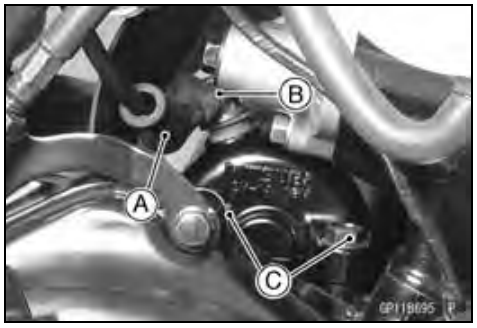
1. ECU
2. Joint Connector 2
3. Sidestand Switch
4. Battery 12 V 8 Ah
5. Frame Ground
6. Main Fuse 30 A
7. ECU Main Relay
8. Relay Box
9. Starter Lockout Switch
10. Ignition Fuse 10 A
11. ECU Fuse 15 A
12. Oxygen Sensor Heater Fuse 10 A
13. Fuse Box
14. Ignition Switch
15. Engine Stop Switch
16. Spark Plugs
17. Stick Coils
18. Water-proof Joint 3
19. Speed Sensor
20. Subthrottle Sensor
21. Main Throttle Sensor
22. Water-proof Joint 2
23. Vehicle-down Sensor
24. Water-proof Joint 1
25. Neutral Switch
26. Crankshaft Sensor
27. Oxygen Sensor

Electric Starter System

Starter Motor Removal

CAUTION

Do not tap the starter motor shaft or body. Tapping the shaft or body could damage the motor.



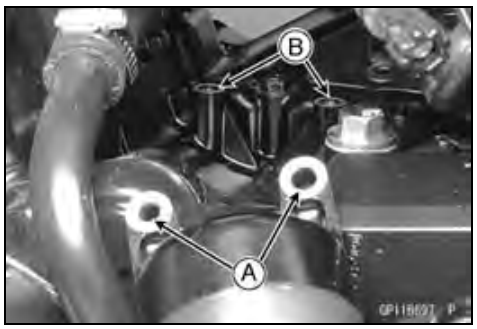
- Remove the lower fairings (see Lower Fairings Removal in the Frame chapter).
- Slide back the rubber cap [A].
- Remove:
  Starter Motor Cable Terminal Nut [B]
  Mounting Bolts [C]

- Pull out the starter motor [A] toward the left side.

Starter Motor Installation

CAUTION

Do not tap the starter motor shaft or body. Tapping the shaft or body could damage the motor.



- When installing the starter motor, clean the starter motor legs [A] and crankcase [B] where the starter motor is grounded.

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

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

- Install the starter motor cable, and tighten the nut.

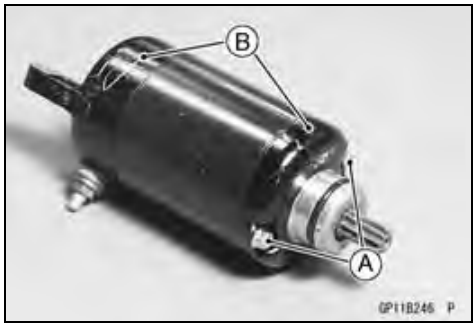
  Torque - Starter Motor Cable Terminal Nut: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Slide the rubber cap to the original position.
- Install the removed parts (see appropriate chapters).

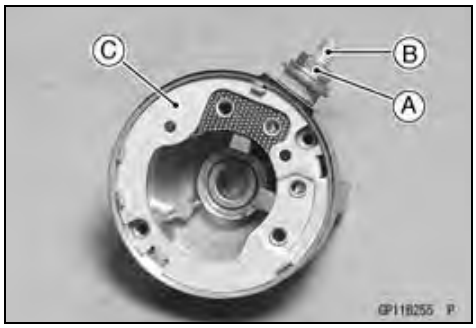
Electric Starter System

Starter Motor Disassembly

- Remove the starter motor (see Starter Motor Removal).
- Take off the starter motor through bolts [A] and remove the both end covers [B] and pull the armature out of the yoke.

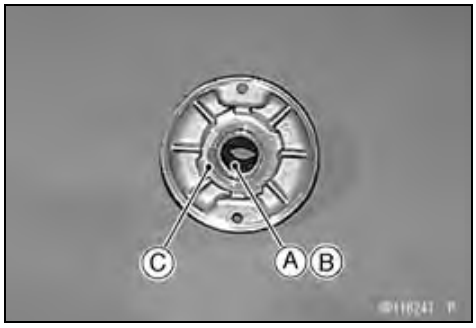


- Remove the terminal locknut [A], washer and insulators, and then remove the brushes and terminal bolt [B] with the brush plate [C] from the end cover.



Starter Motor Assembly

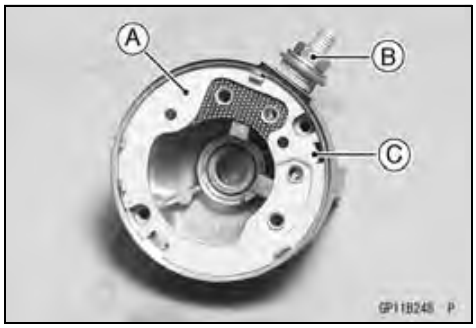
- Replace the O-rings with new ones.
- Apply a thin coat of high-temperature grease to the oil seal [A] and needle bearing [B].
- Fit the toothed washer [C] into the end cover.



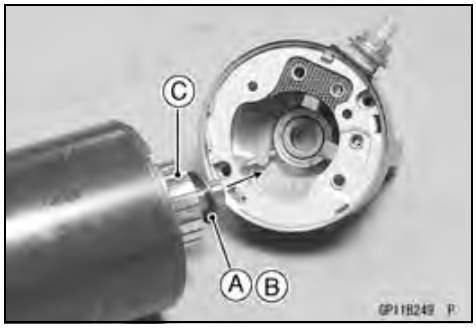
- Install:
  Brush Plate [A]
  New O-ring
  Insulators
  Washer
- Tighten:

Torque - Starter Motor Terminal Locknut [B]: 6.9 N·m (0.70 kgf·m, 61 in·lb)

○Fit the tongue [C] of the brush plate into the groove of the end cover.

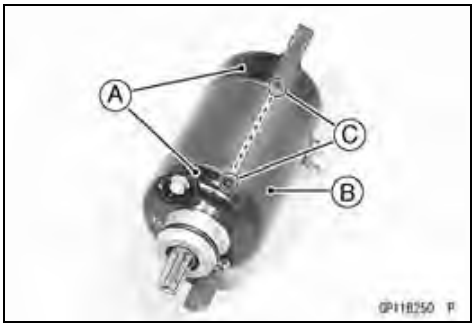


- Install the steel washer [A] and resin washer [B] on the armature shaft.
- Install the armature [C] among the brushes.



Electric Starter System

● Align the end covers [A] with the marks [C] of the yoke [B].



● Replace the O-rings on the through bolts with new ones and tighten them.

Torque - Starter Motor Through Bolts: 3.4 N·m (0.35 kgf·m, 30 in·lb)

Brush Inspection

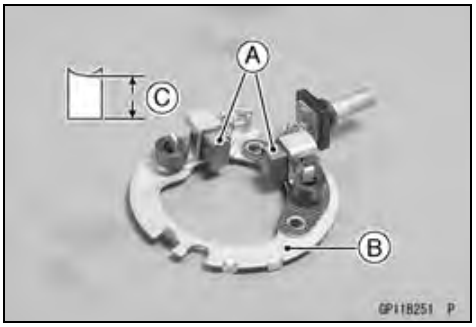
● Measure the length of each brush [A].

★If any is worn down to the service limit, replace the brush plate assembly [B].

Starter Motor Brush Length [C]

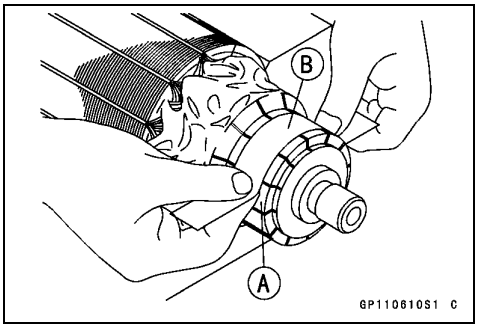
Standard: 10 mm (0.39 in.)

Service Limit: 5.0 mm (0.20 in.)



Commutator Cleaning and Inspection

● Smooth the commutator surface [A] if necessary with fine emery cloth [B], and clean out the grooves.



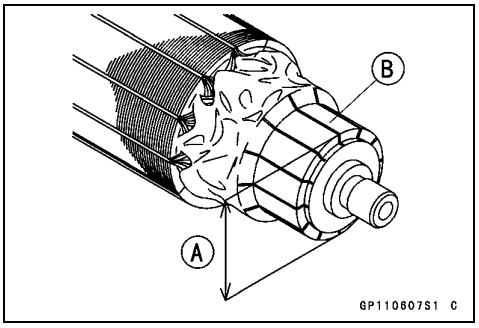
● Measure the diameter [A] of the commutator [B].

★If the commutator diameter is less than the service limit, replace the starter motor with a new one.

Commutator Diameter

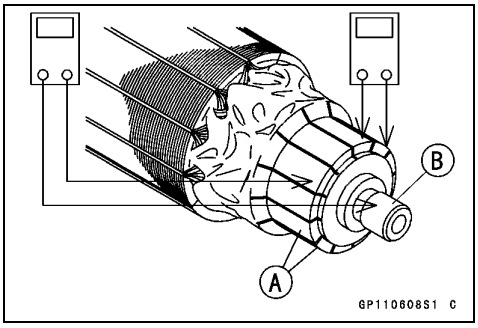
Standard: 28 mm (1.10 in.)

Service Limit: 27 mm (1.06 in.)



Electric Starter System

Armature Inspection



- Using the × 1 Ω hand tester range, measure the resistance between any two commutator segments [A].

Special Tool - Hand Tester: 57001-1394

★If there is a high resistance or no reading (∞) between any two segments, a winding is open and the starter motor must be replaced.

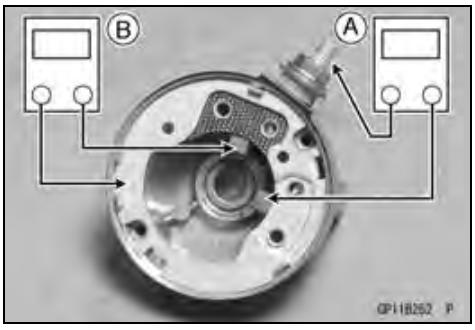
- Using the highest hand tester range, measure the resistance between the segments and the shaft [B].

★If there is any reading at all, the armature has a short and the starter motor must be replaced.

NOTE

○*Even if the foregoing checks show the armature to be good, it may be defective in some manner not readily detectable with the hand tester. If all other starter motor and starter motor circuit components check good, but the starter motor still does not turn over or only turns over weakly, replace the starter motor with a new one.*

Brush Lead Inspection

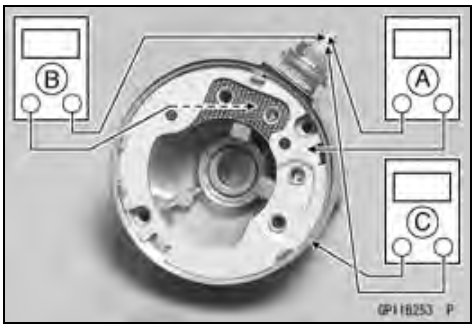


- Using the × 1 Ω hand tester range, measure the resistance as shown in the figure.
  Terminal Bolt and Positive Brush [A]
  Brush Plate and Negative Brush [B]

Special Tool - Hand Tester: 57001-1394

★If there is not close to zero ohms, the brush lead has an open. Replace the brush plate assembly.

Brush Plate and Terminal Bolt Inspection

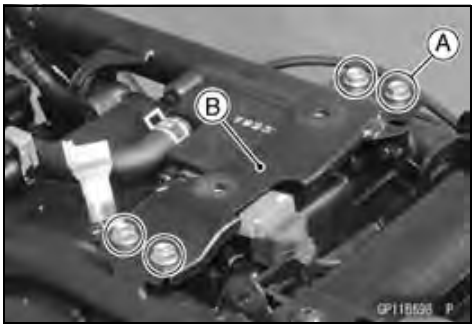


- Using the highest hand tester range, measure the resistance as shown in the figure.
  Terminal Bolt and Brush Plate [A]
  Terminal Bolt and Negative Brush Holder [B]
  Terminal Bolt and End Cover [C]

Special Tool - Hand Tester: 57001-1394

★If there is any reading, the brush holder and/or terminal bolt have a short. Replace the brush plate assembly.

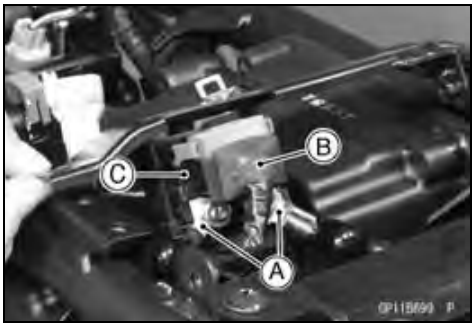
Starter Relay Inspection



- Remove:
  Battery Negative (–) Cable (see Battery Removal)
  Fuel Tank (see Fuel Tank Removal in the Fuel System (DFI) chapter)
  Bracket Bolts [A]
  Bracket [B]

Electric Starter System

● Remove:
Cable Terminals [A] and Connector [B] (Disconnect)
Starter Relay [C]



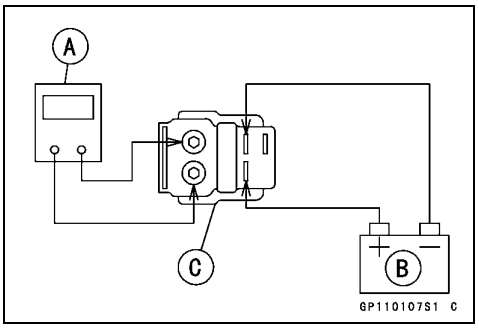
● Connect the hand tester [A] and 12 V battery [B] to the starter relay [C] as shown in the figure.

Special Tool - Hand Tester: 57001-1394

★If the relay does not work as specified, the relay is defective. Replace the relay.

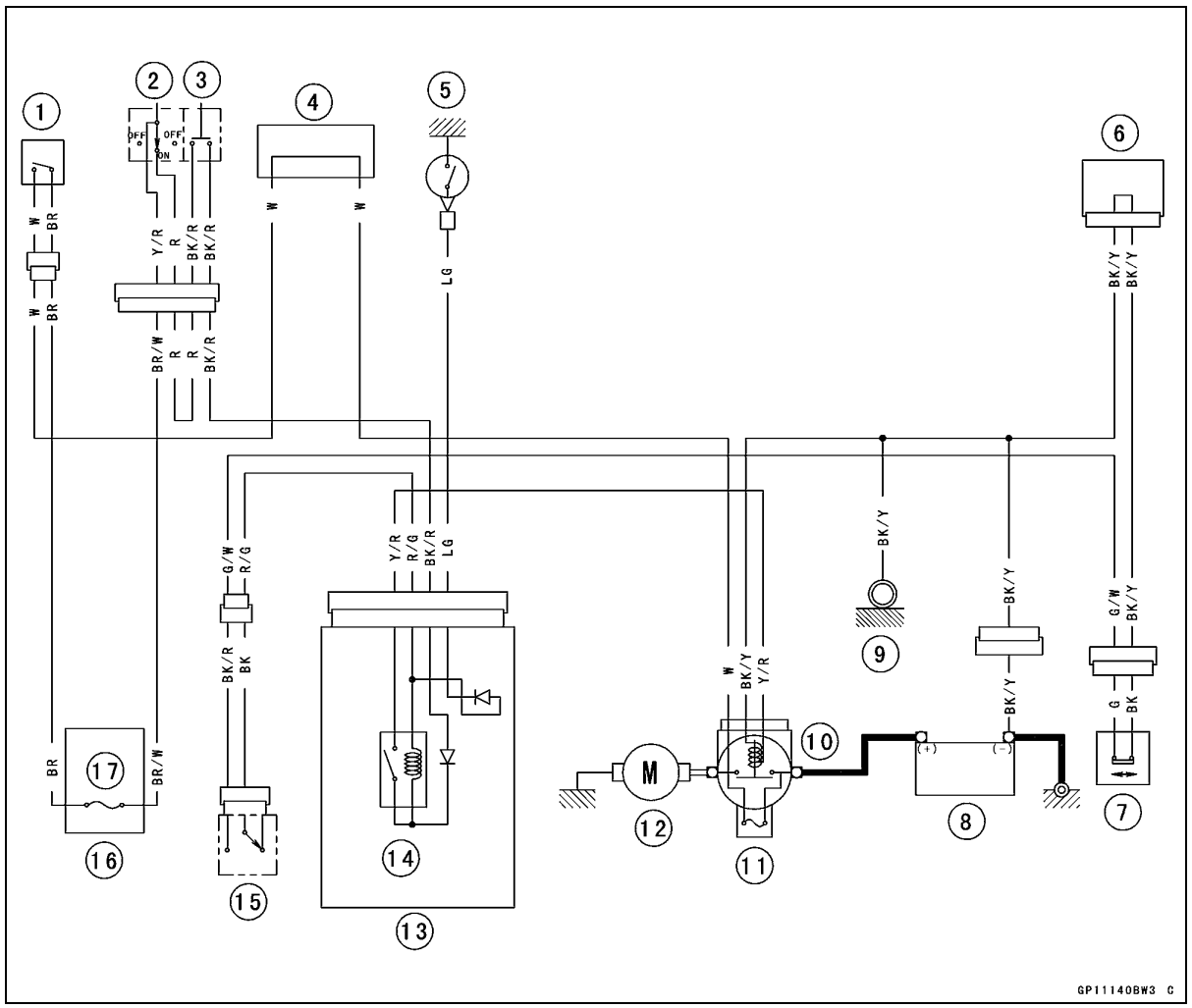
Testing Relay

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



Electric Starter System

Electric Starter Circuit



1. Ignition Switch
2. Engine Stop Switch
3. Starter Button
4. Water-proof Joint 3
5. Neutral Switch
6. Joint Connector 2
7. Sidestand Switch
8. Battery 12 V 8 Ah
9. Frame Ground
10. Starter Relay
11. Main Fuse 30 A
12. Starter Motor
13. Relay Box
14. Starter Circuit Relay
15. Starter Lockout Switch
16. Fuse Box
17. Ignition Fuse 10 A

Lighting System

This motorcycle adopt the daylight system and have a headlight relay in the relay box. The headlight does not go on when the ignition switch and the engine stop switch are first turned on. The headlight comes on after the starter button is released and stays on until the ignition switch is turned off. The headlight will go out momentarily whenever the starter button is pressed and come back on when the button is released.

Headlight Beam Horizontal Adjustment

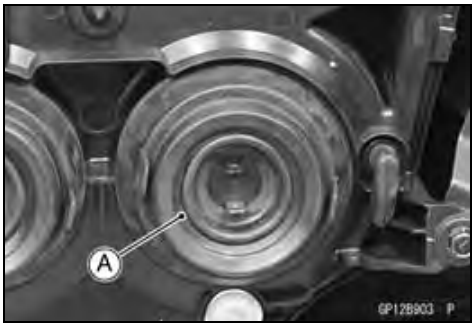
- Refer to the Headlight Aiming Inspection in the Periodic Maintenance chapter.

Headlight Beam Vertical Adjustment

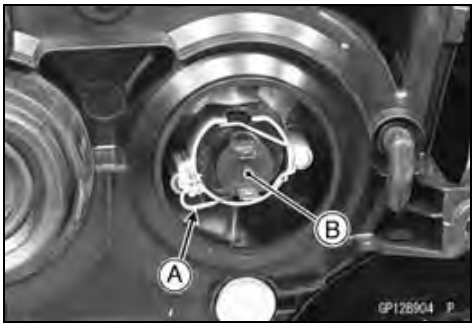
- Refer to the Headlight Aiming Inspection in the Periodic Maintenance chapter.

Headlight Bulb Replacement

- Remove:
  Upper Fairing (see Upper Fairing Removal in the Frame chapter)
  Headlight Bulb Dust Cover [A]



- Remove:
  Hook [A]
  Headlight Bulb [B]



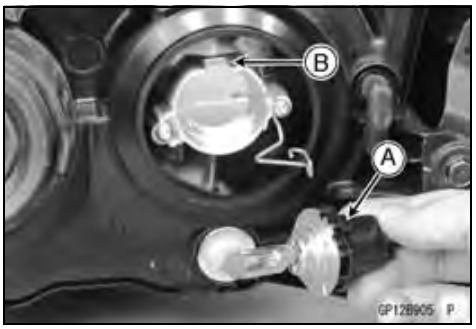
CAUTION

When handling the quartz-halogen bulb, never touch the glass portion with bare hands. Always use a clean cloth. Oil contamination from hands or dirty rags can reduce bulb life or cause the bulb to explode.

NOTE

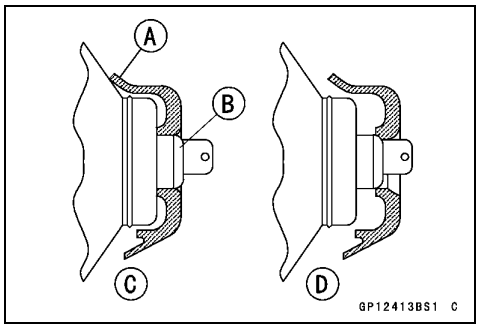
○*Clean off any contamination that inadvertently gets on the bulb with alcohol or soap and water solution.*

- Replace the headlight bulb.
- Fit the projection [A] of the bulb in the hollow [B] of the headlight.



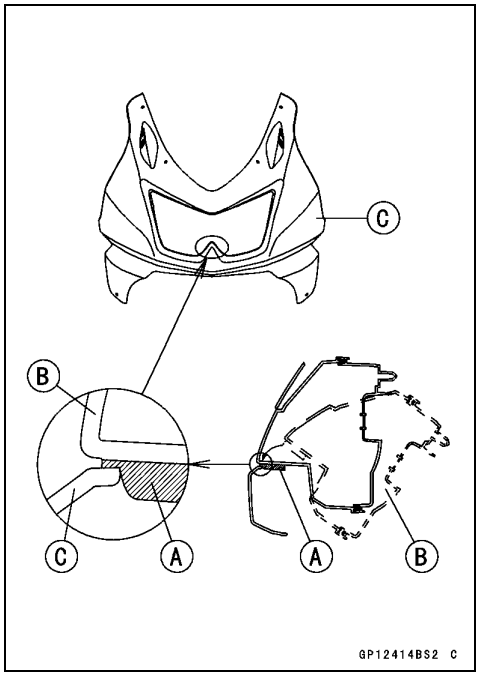
● Install the hook [A].

● Fit the dust cover [A] onto the bulb [B] firmly as shown in the figure.
Good [C]
Bad [D]
● After installation, adjust the headlight aim (see Headlight Aiming Inspection in the Periodic Maintenance chapter).



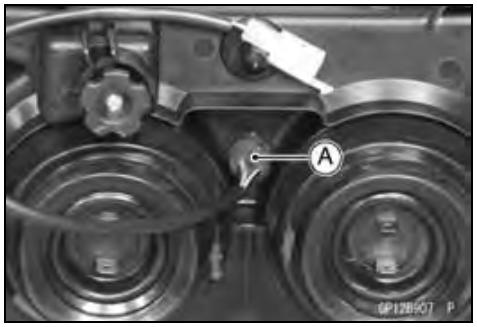
Headlight Removal/Installation

● Refer to the Upper Fairing Disassembly/Assembly in the Frame chapter.
● After installing, confirm the damper [A] between the headlight [B] and upper fairing [C] as shown in the figure.



City Light Bulb Replacement

● Remove the upper fairing (see Upper Fairing Removal in the Frame chapter).
● Pull out the socket [A] together with the bulb.

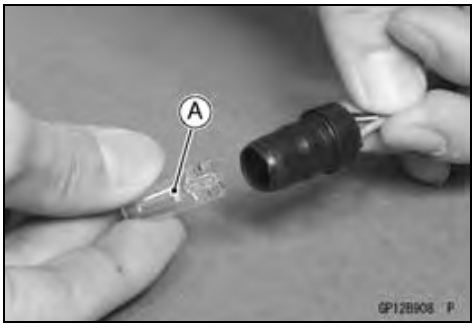


Lighting System

● Pull out the bulb [A] straight from the socket.

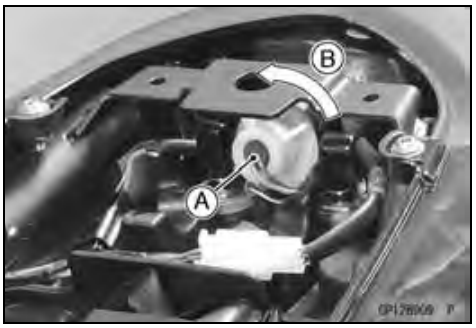
CAUTION
Do not turn the bulb. Pull the bulb out to prevent damage to the bulb. Do not use bulb rated for greater wattage then the specified value.

● Replace the bulb with a new one.

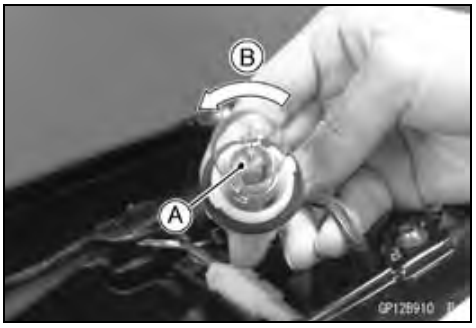


Tail/Brake Light Bulb Replacement

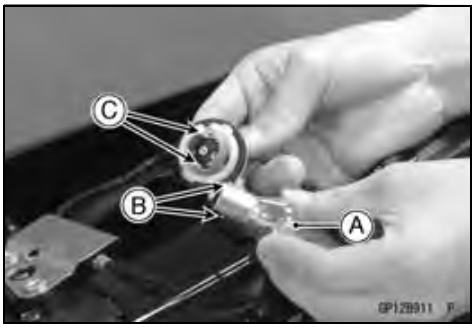
● Remove the rear seat (see Rear Seat Removal in the Frame chapter).
● Turn the socket [A] counterclockwise [B].



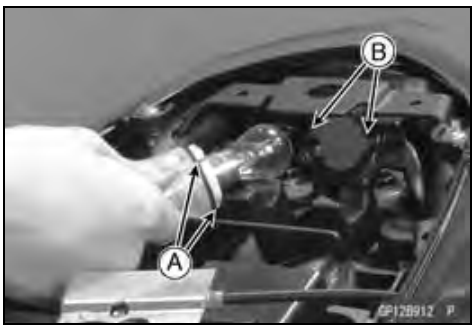
● Push the bulb [A] in the socket, turn it counterclockwise [B], and pull it out.



● Insert the new bulb [A] by aligning its upper and lower pins [B] with the upper and lower grooves [C] in the socket, and turn the bulb clockwise.
○Turn the bulb about 15°.

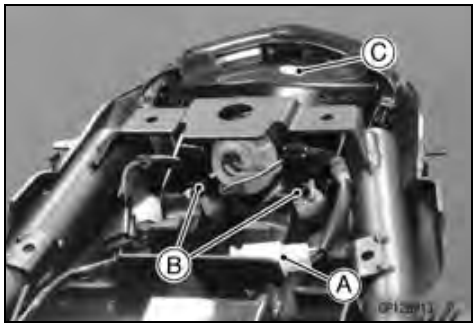


● Fit the projections [A] of the socket into the grooves [B] of the tail/brake light.
● Turn the socket clockwise.



Lighting System

Tail/Brake Light Removal



- Remove:
  Seat Covers (see Seat Cover Removal in the Frame chapter)
  Connector [A] (Disconnect)
  Tail/Brake Light Mounting Bolts [B]
  Tail/Brake Light [C]

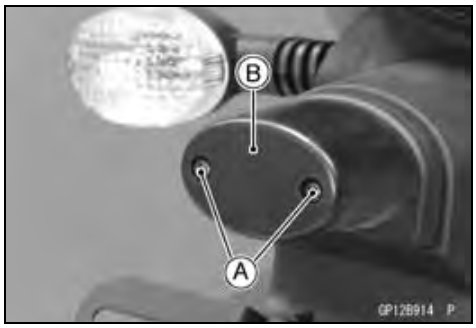
Tail/Brake Light Installation

- Tighten:

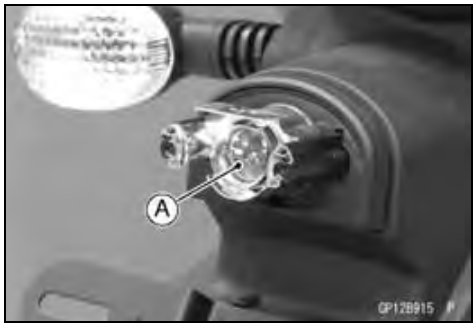
Torque - Tail/Brake Light Mounting Bolts: 5.9 N·m (0.60 kgf·m, 52 in·lb)

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

License Plate Light Bulb Replacement



- Remove:
  Screws [A]
  License Plate Light Cover [B]



- Push and turn the bulb [A] counterclockwise and remove it.
- Replace the bulb with a new one.

- Insert the new bulb [A] by aligning its upper and lower pins [B] with the upper and lower grooves [C] in the socket, and turn the bulb clockwise.

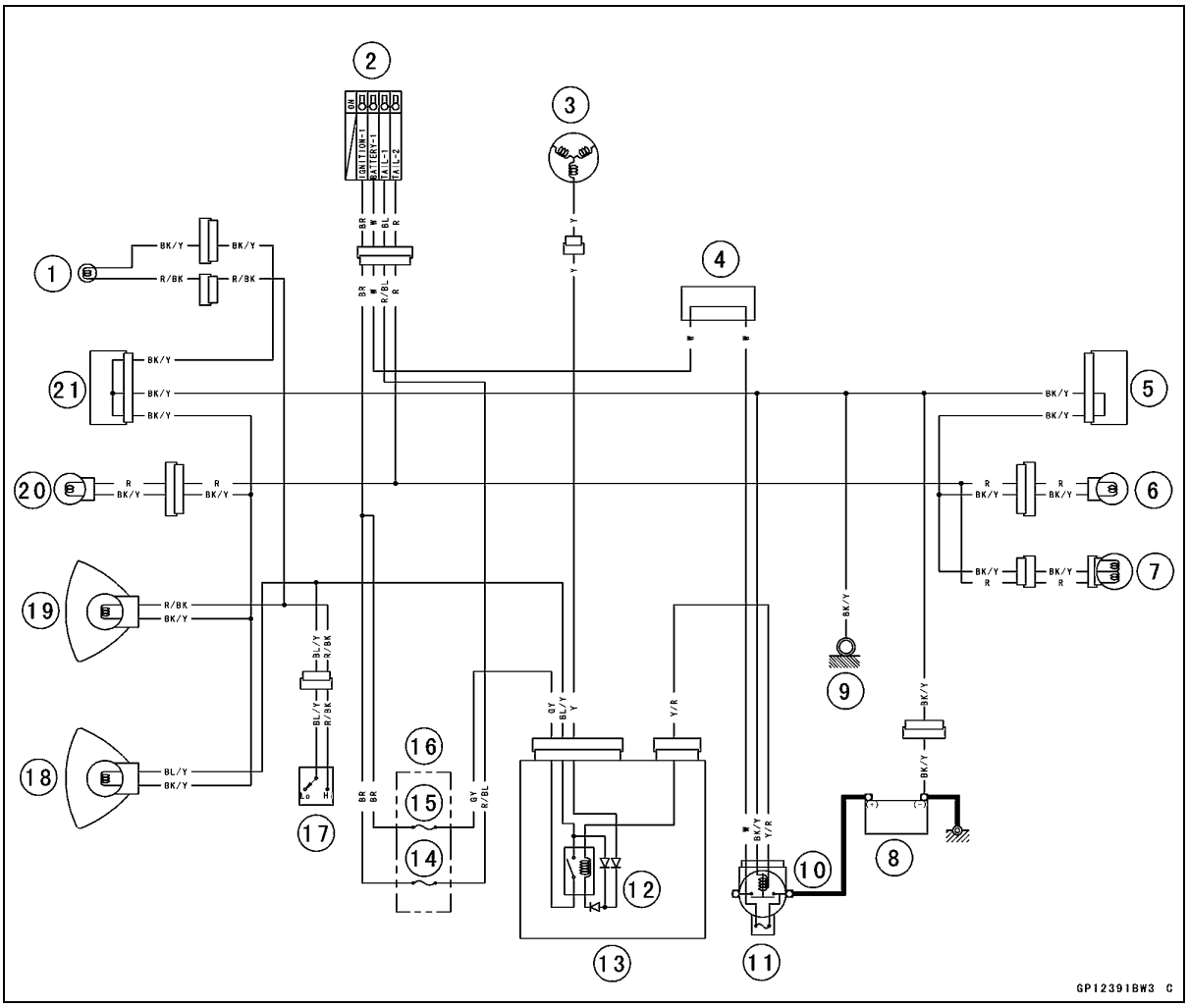
○Turn the bulb about 15°.

- Tighten:

Torque - License Plate Light Cover Screws: 0.90 N·m (0.092 kgf·m, 8.0 in·lb)

Lighting System

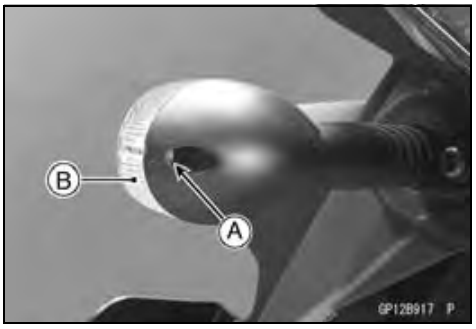
Headlight/Tail Light Circuit



1. High Beam Indicator Light 12 V 3.4 W
2. Ignition Switch
3. Alternator
4. Water-proof Joint 3
5. Joint Connector 2
6. License Plate Light 12 V 5 W
7. Tail/Brake Light 12 V 21/5 W
8. Battery 12 V 8 Ah
9. Frame Ground
10. Starter Relay
11. Main Fuse 30 A
12. Headlight Circuit Relay
13. Relay Box
14. Taillight Fuse 10 A
15. Headlight Fuse 10 A
16. Fuse Box
17. Dimmer Switch
18. Headlight (Low) 12 V 55 W
19. Headlight (High) 12 V 55 W
20. City Light 12 V 5 W
21. Joint Connector 1

Turn Signal Light Bulb Replacement

● Unscrew the screw [A] and remove the lens [B].

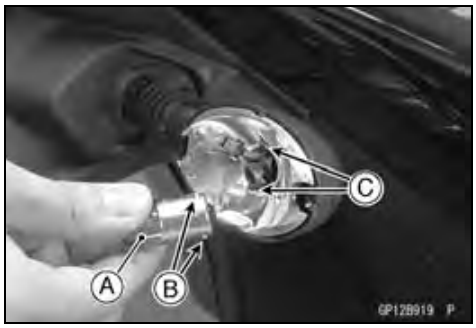


Lighting System

● Push and turn the bulb [A] counterclockwise and remove it.

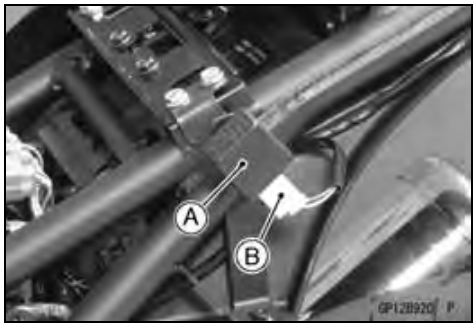
● Insert the new bulb [A] by aligning its upper and lower pins [B] with the upper and lower grooves [C] in the socket, and turn the bulb clockwise.

○Turn the bulb about 15°.



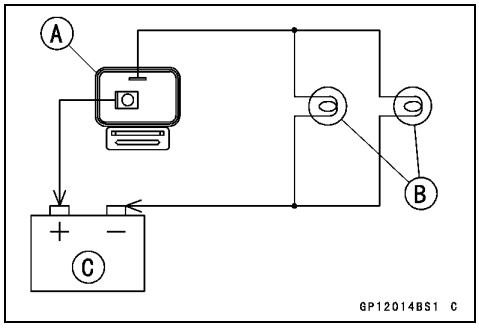
Turn Signal Relay Inspection

● Remove:
Left Seat Cover (see Seat Cover Removal in the Frame chapter)
Turn Signal Relay [A]
Connector [B] (Disconnect)



● Connect one 12 V battery and turn signal lights as indicated in the figure, and count how may times the lights flash for one minute.
Turn Signal Relay [A]
Turn Signal Lights [B]
12 V Battery [C]

★If the lights do not flash as specified, replace the turn signal relay.



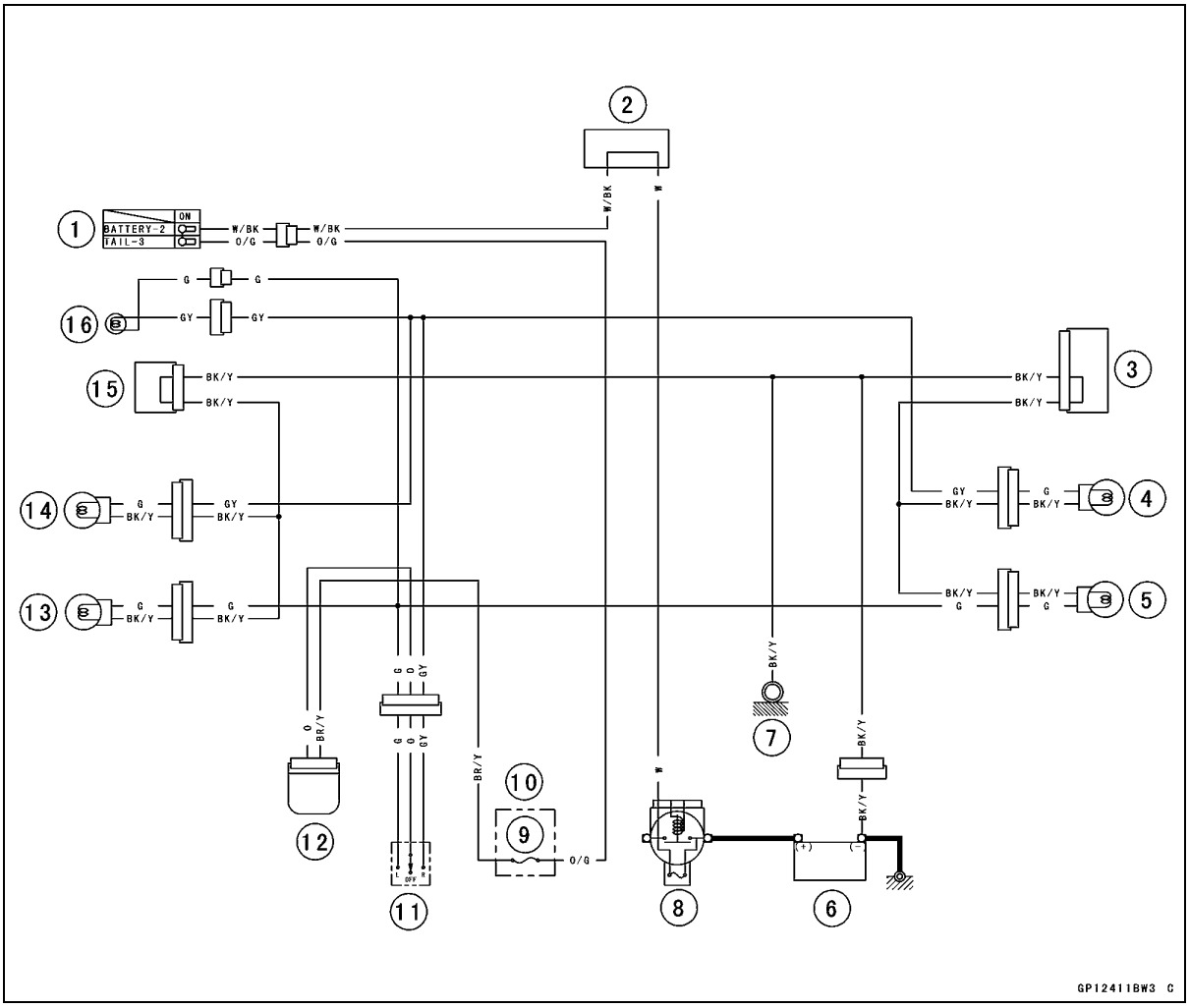
Testing Turn Signal Relay

Load		Flashing Times (c/m*)
The Number of Turn Signal Lights	Wattage (W)	
1**	10	Lights stays on
2	20	75 ~ 95

(*): Cycle(s) per minute
(**): Corrected to "one light burned out".

Lighting System

Turn Signal Light Circuit



1. Ignition Switch
2. Water-proof Joint 3
3. Joint Connector 2
4. Rear Right Turn Signal Light 12 V 10 W
5. Rear Left Turn Signal Light 12 V 10 W
6. Battery 12 V 8 Ah
7. Frame Ground
8. Main Fuse 30 A
9. Turn Signal Relay Fuse 10 A
10. Fuse Box
11. Turn Signal Switch
12. Turn Signal Relay
13. Front Left Turn Signal Light 12 V 10 W
14. Front Right Turn Signal Light 12 V 10 W
15. Joint Connector 1
16. Turn Signal Indicator Light 12 V 3.4 W

Air Switching Valve

Air Switching Valve Operation Test

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

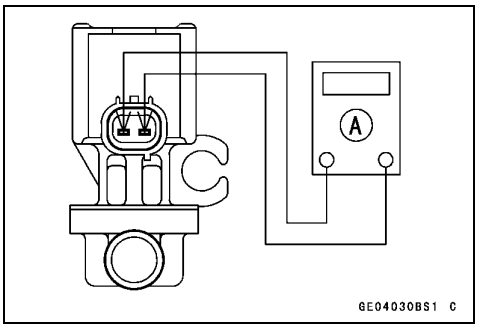
Air Switching Valve Unit Test

● Remove the air switching valve (see Air Switching Valve Removal in the Engine Top End chapter).
● Set the hand tester [A] to the × 1 Ω range and connect it to the air switching valve terminals as shown in the figure.

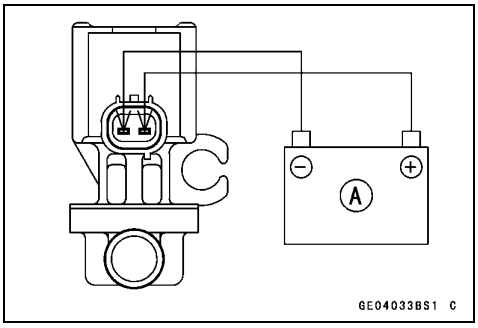
Special Tool - Hand Tester: 57001-1394

Air Switching Valve Resistance
Standard: 20 ~ 24 Ω at 20°C (68°F)

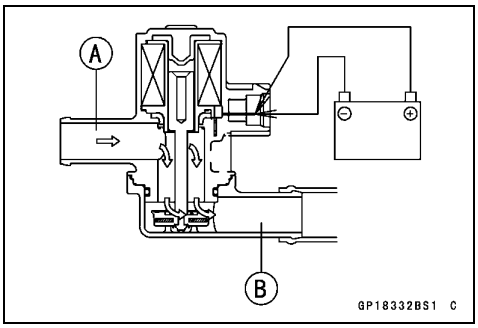
★If the tester does not read as specified value, replace it with a new one.



● Connect the 12 V battery [A] to the air switching valve terminals as shown in the figure.



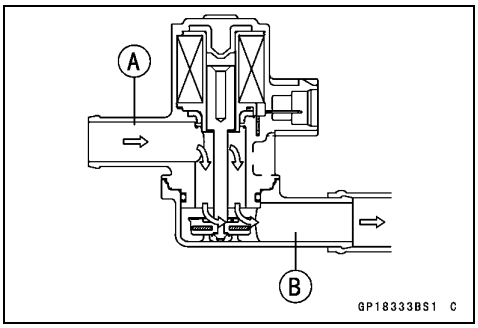
● Blow the air to the inlet air duct [A], and make sure does not flow the blown air from the outlet air duct [B].



● Disconnect the 12 V battery.
● Blow the air to the inlet air duct [A] again, and make sure flow the blown air from the outlet air duct [B].
★If the air switching valve does not operate as described, replace it with a new one.

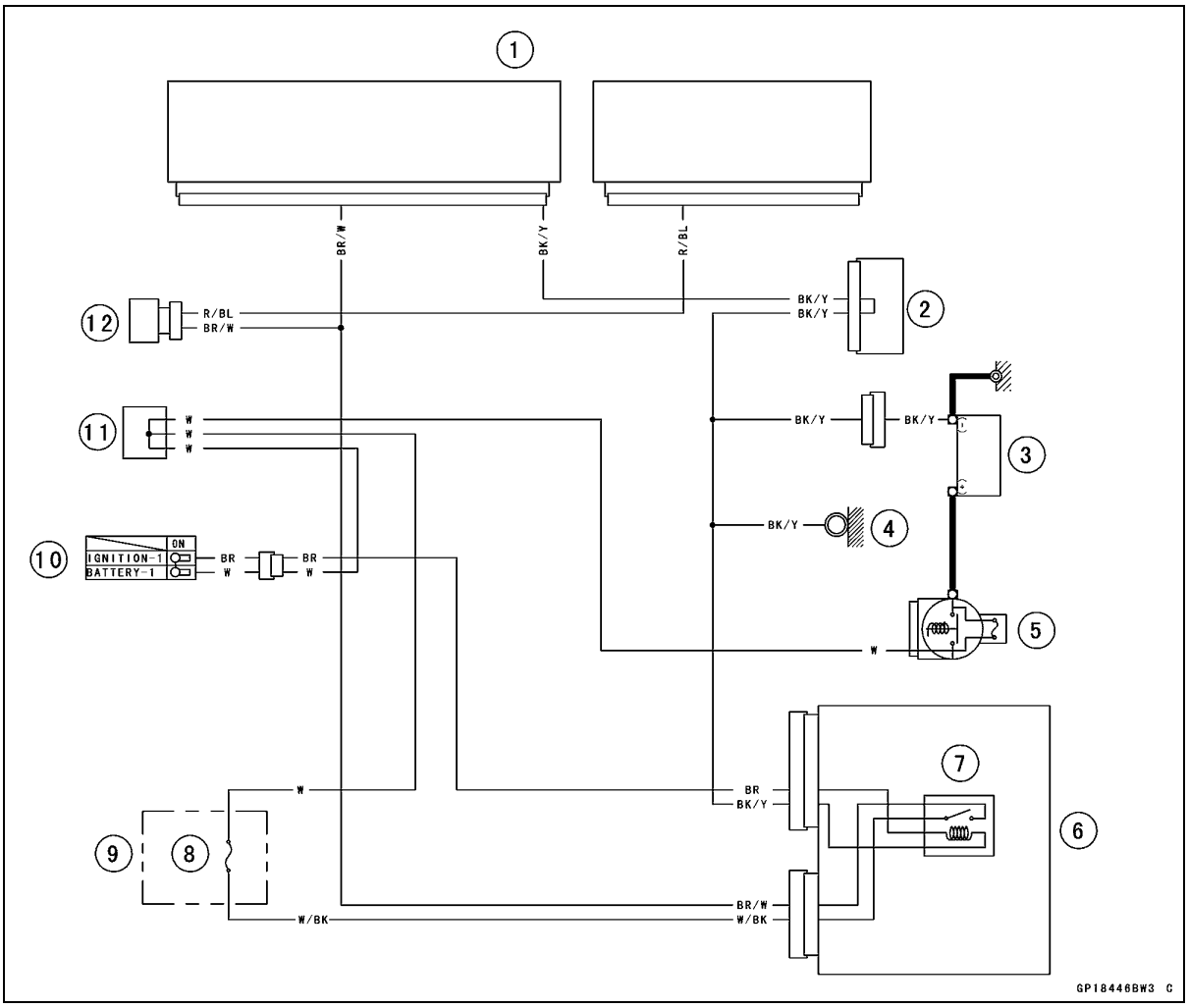
NOTE

○*To check air flow through the air switching valve, just blow through the air switching valve hose (inlet side).*



Air Switching Valve

Air Switching Valve Circuit



1. ECU
2. Joint Connector 2
3. Battery 12 V 8 Ah
4. Frame Ground
5. Main Fuse 30 A
6. Relay Box
7. ECU Main Relay
8. ECU Fuse 15 A
9. Fuse Box
10. Ignition Switch
11. Water-proof Joint 3
12. Air Switching Valve

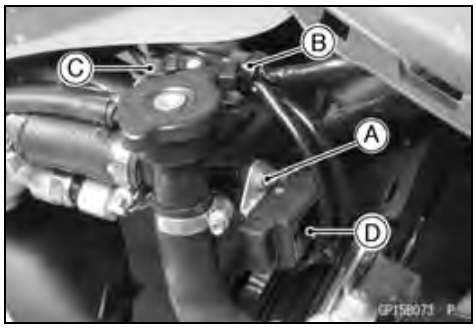
Radiator Fan System

Fan Motor Inspection

- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Disconnect the connector [A].
- Using an auxiliary leads, supply battery power to the fan motor.

★If the fan does not rotate, the fan motor is defective and must be replaced.

Resistor Inspection

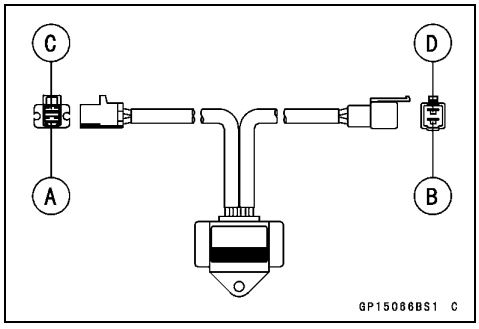


- Remove:
  Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
  Bolt [A]
  Clamp [B]
  Connectors [C]
  Resistor [D]

- Set the hand tester to the × 1 Ω range, and check the continuity as shown in the figure.

Special Tools - Hand Tester: 57001-1394

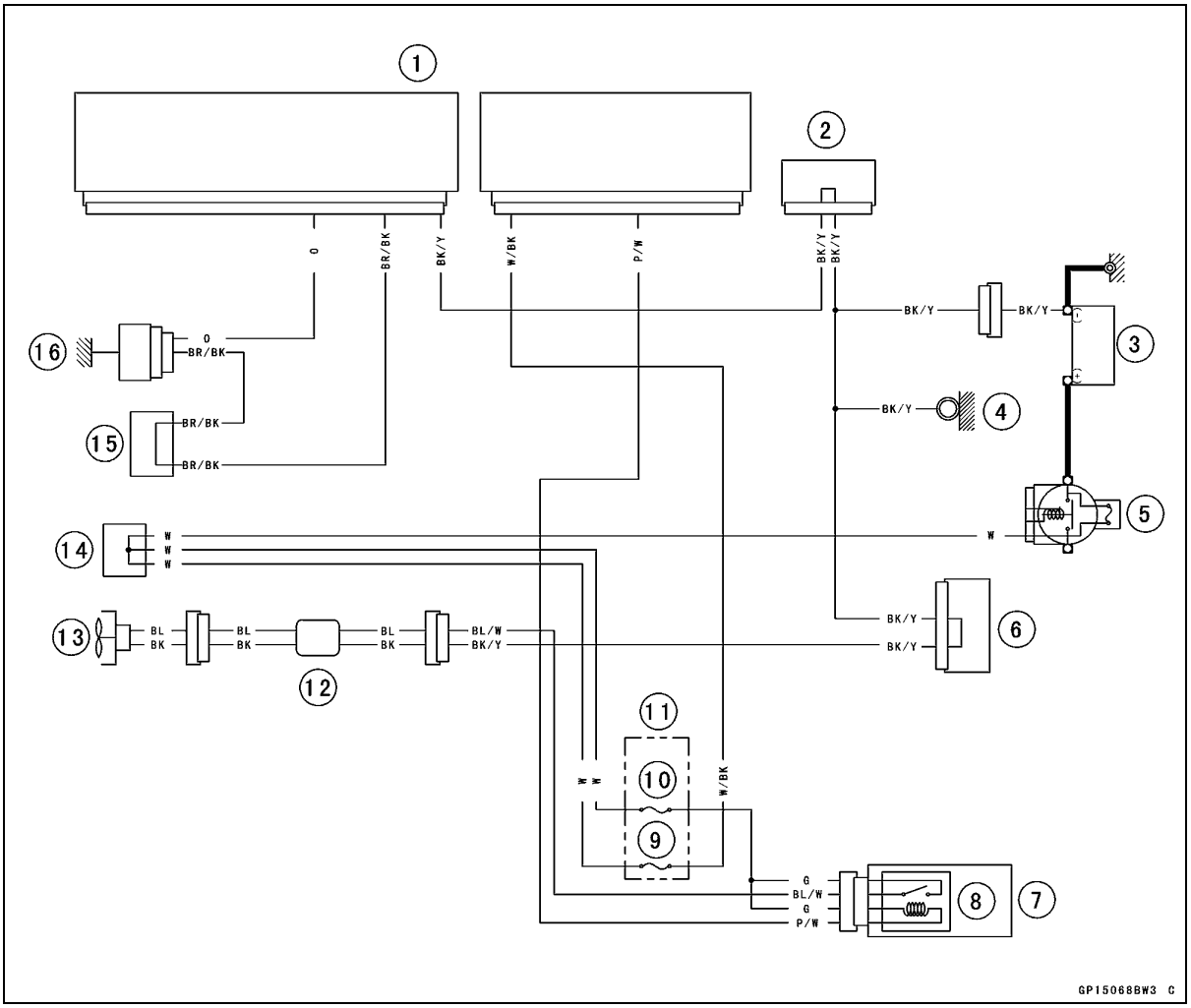
Connections:	**BL lead [A] ⟷ BL lead [B]**
	BK lead [C] ⟷ BK lead [D]
Standard	**About 0 Ω**



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

Radiator Fan System

Radiator Fan Circuit

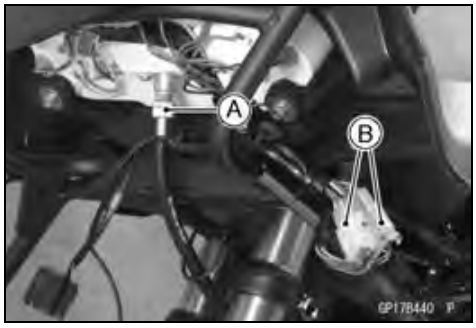


1. ECU
2. Joint Connector 2
3. Battery 12 V 8 Ah
4. Frame Ground
5. Main Fuse 30 A
6. Joint Connector 1
7. Relay Box
8. Fan Relay
9. ECU Fuse 15 A
10. Fan Fuse 10 A
11. Fuse Box
12. Resistor
13. Fan Motor
14. Water-proof Joint 3
15. Water-proof Joint 1
16. Water Temperature Sensor

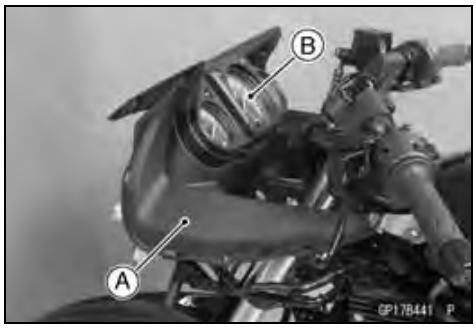
Meter, Gauge, Indicator Unit

Meter Unit Removal/Installation

● Remove:
Upper Fairing (see Upper Fairing Removal in the Frame chapter)
Speedometer Cable Upper End [A]
Connectors [B]

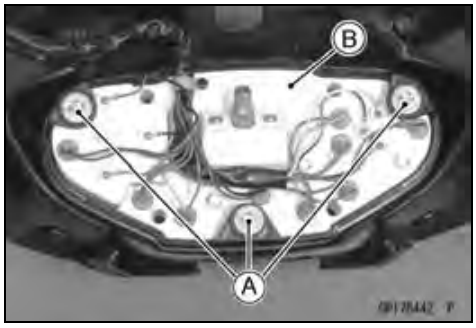


● Remove the inner cover [A] with meter unit [B].

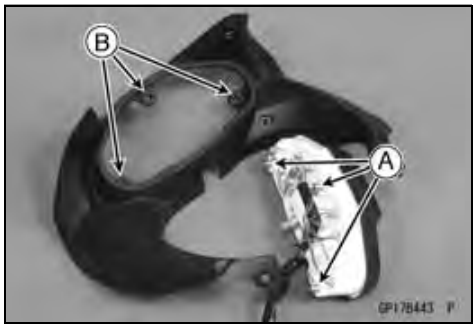


● Remove:
Bolts [A]
Meter Unit [B]

CAUTION
Place the meter unit so that the face is up. If a meter unit is left upside down or sideways for any length of time, it will malfunction.

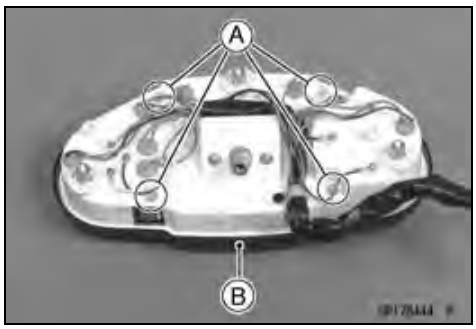


● Installation is the reverse of removal.
○Fit the projections [A] into the grommets [B].
● Run the leads and cable correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
● Install the removed parts (see appropriate chapters).



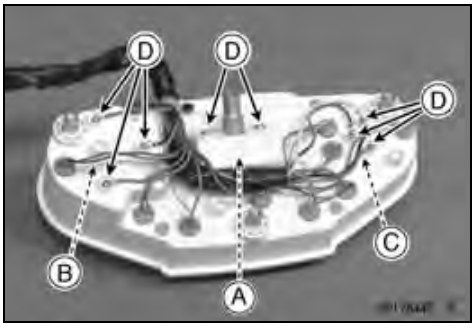
Meter Unit Disassembly

● Remove:
Meter Unit (Meter Unit Removal/Installation)
Screws [A]
Meter Cover [B]



Meter, Gauge, Indicator Unit

● Remove the speedometer [A], tachometer [B] and water temperature gauge [C] by removing screws [D].

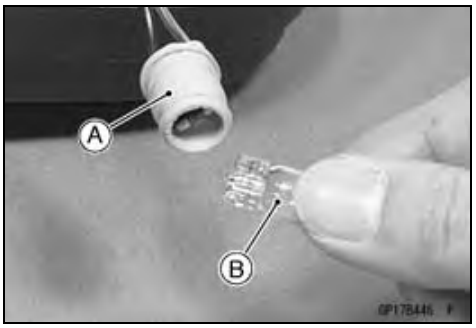


CAUTION

Do not remove a meter pointer unless the meter is to be replace. The pointers cannot be reinstalled. The pointer mounting is different from replacement meters.

Meter, Indicator Light Bulb Replacement

● Remove the meter unit (Meter Unit Removal/Installation).
● Pull out the socket [A] together with the bulb.
● Pull the bulb [B] out of the socket.



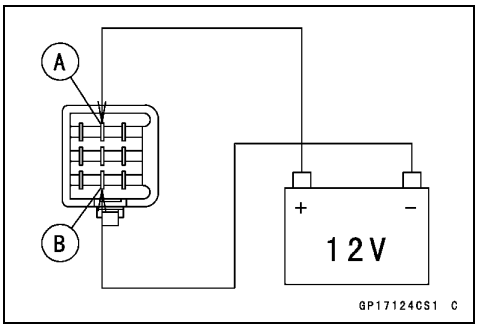
CAUTION

Do not turn the bulb. Pull the bulb out to prevent damage to the bulb. Do not use bulb rated for greater wattage then the specified value.

● Replace the bulb with a new one.
○Repeat the same procedure for other bulbs.

Tachometer Inspection

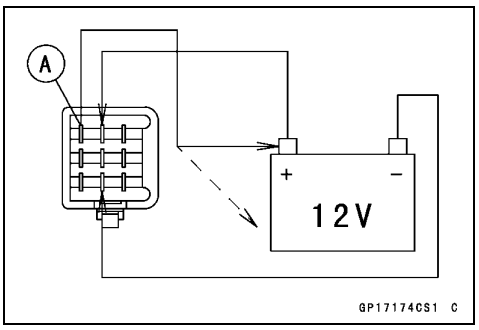
● Remove the meter unit (see Meter Unit Removal/Installation).
● Using the insulated auxiliary leads, connect the 12 V battery to the meter unit connector (9 pins connector) as follows.
○Connect the battery positive terminal to the BR lead terminal [A].
○Connect the battery negative terminal to the BK/Y lead terminal [B].



CAUTION

Do not short each terminals.

● Using the insulated auxiliary leads, open and connect the BK lead terminal [A] to the battery positive terminal repeatedly.

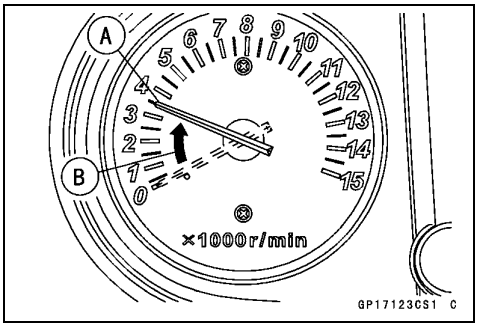


Meter, Gauge, Indicator Unit

● Then the tachometer needle [A] should flick [B].
★If the needle does not flick, check the meter unit harness for continuity (see wiring diagram in this section).

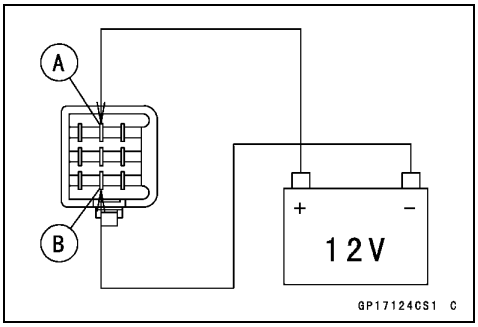
Special Tool - Hand Tester: 57001-1394

★If the harness is normal, replace the tachometer.



Water Temperature Gauge Inspection

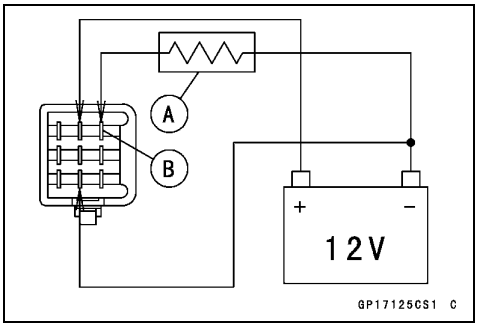
● Remove the meter unit (see Meter Unit Removal/Installation).
● Using the insulated auxiliary leads, connect the 12 V battery to the meter unit connector (9 pins connector) as follows.
○Connect the battery positive terminal to the BR lead terminal [A].
○Connect the battery negative terminal to the BK/Y lead terminal [B].



CAUTION

Do not short each terminals.

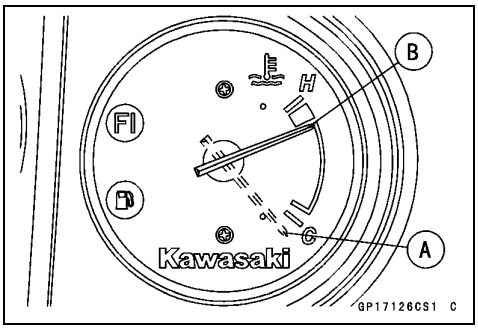
● Connect the variable rheostat [A] to the W/Y lead terminal [B] as shown in the figure.
● Adjust the resistance value to the approximately 20 Ω.



● The water temperature gauge [A] indicate the position [B] of the about 125°C.
★If the water temperature gauge does not work, check the meter unit harness for continuity (see wiring diagram in this section).

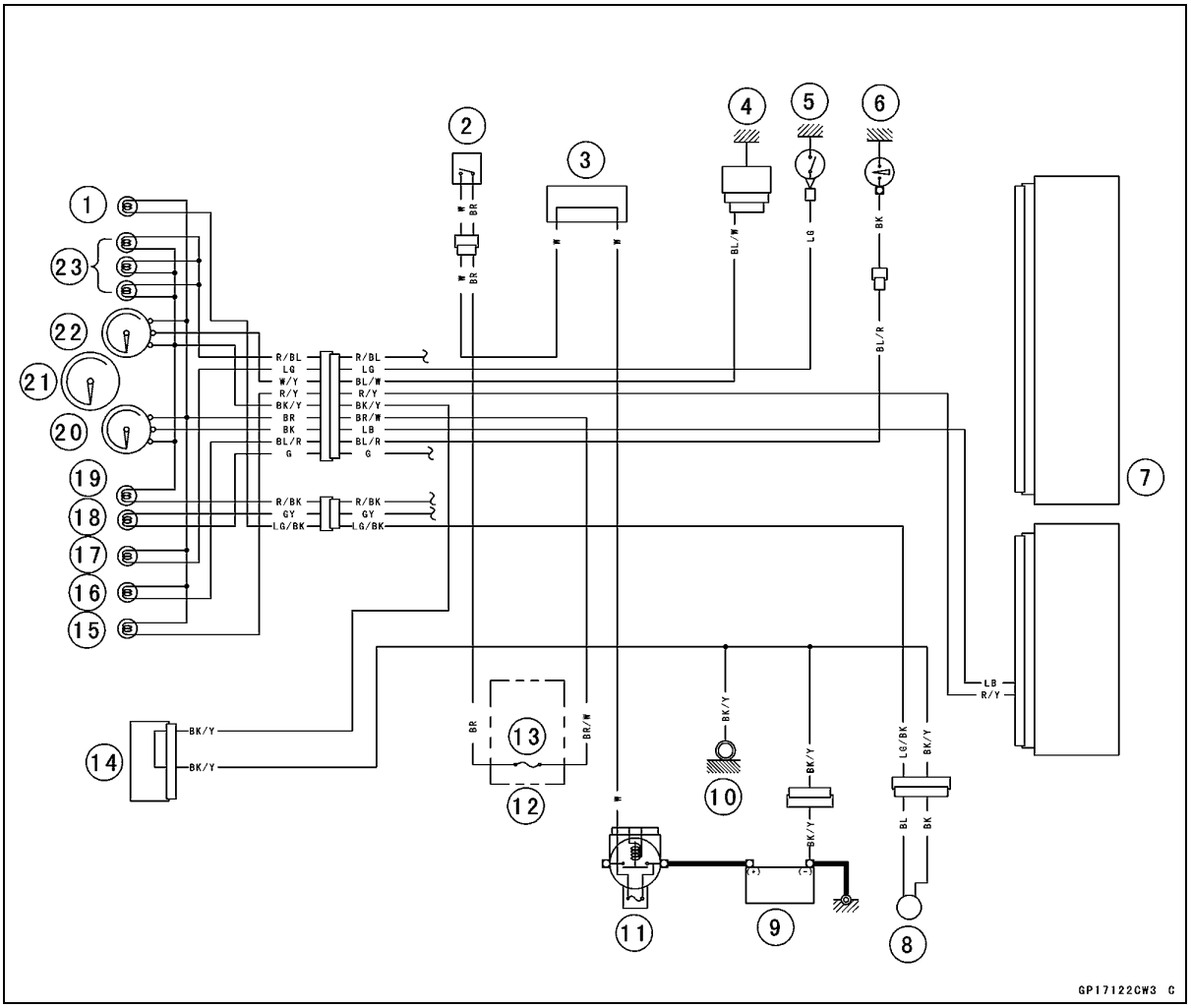
Special Tool - Hand Tester: 57001-1394

★If the harness is normal, replace the water temperature gauge.



Meter, Gauge, Indicator Unit

Meter Unit Circuit



1. Fuel Level Warning Indicator Light 12 V 3.4 W
2. Ignition Switch
3. Water-proof Joint 3
4. Water Temperature Sensor
5. Neutral Switch
6. Oil Pressure Switch
7. ECU
8. Fuel Reserve Switch
9. Battery 12 V 8 Ah
10. Frame Ground
11. Main Fuse 30 A
12. Fuse Box
13. Ignition Fuse 10 A
14. Joint Connector 1
15. FI Indicator Light 12 V 3.4 W
16. Oil Pressure Warning Indicator Light 12 V 3.4 W
17. Neutral Indicator Light 12 V 3.4 W
18. Turn Signal Indicator Light 12 V 3.4 W
19. High Beam Indicator Light 12 V 3.4 W
20. Tachometer
21. Speedometer
22. Water Temperature Gauge
23. Meter Lights 12 V 3.4 W

Switches and Sensors

Brake Light Timing Inspection

● Refer to the Brake Light Switch Operation Inspection in the Periodic Maintenance chapter.

Brake Light Timing Adjustment

● Refer to the Brake Light Switch Operation Inspection in the Periodic Maintenance chapter.

Switch Inspection

● Using a hand tester, check to see that only the connections shown in the table have continuity.

○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.

Special Tool - Hand Tester: 57001-1394

Rear Brake Light Switch Connections

Rear Brake Light Switch Connections		
Color	BR	BL
When brake pedal is pushed down	○———	———○
When brake pedal is released		

Sidestand Switch Connections

Sidestand Switch Connections		
Color	BK	G
When sidestand is down		
When sidestand is up	○———	———○

Neutral Switch Connections

Neutral Switch Connections		
Color	SW. Terminal	Ground
When transmission is in neutral	○———	———○
When transmission is not in neutral		

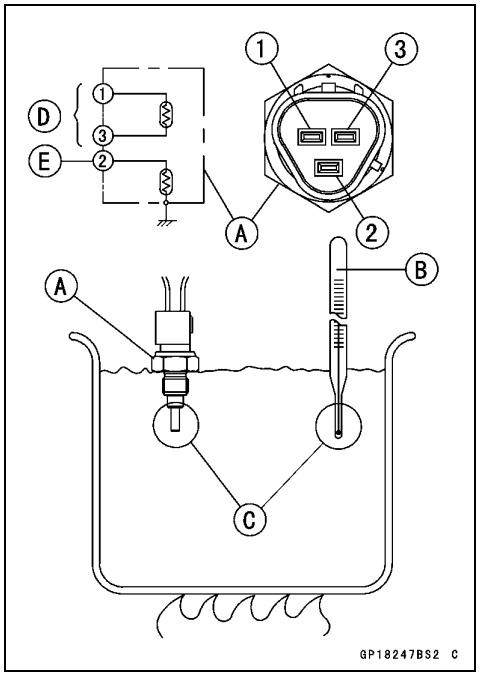
Oil Pressure Switch Connections*

Oil Pressure Switch Connections *		
Color	SW. Terminal	Ground
When engine is stopped	○———	———○
When engine is running		

*: Engine lubrication system is in good condition.

Switches and Sensors

Water Temperature Sensor Inspection



- Remove the water temperature sensor (see Water Temperature Sensor Removal/Installation in the Fuel System (DFI) chapter).
- Suspend the sensor [A] in a container of coolant so that the threaded portion is submerged.
- Suspend an accurate thermometer [B] with temperature sensing portions [C] located in almost the same depth.

NOTE

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

- Place the container over a source of heat and gradually raise the temperature of the coolant while stirring the coolant gently.
- Using the hand tester, measure the internal resistance of the sensor.

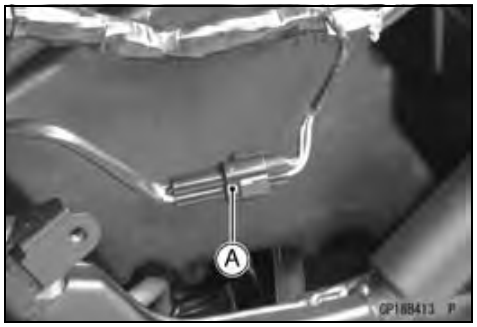
○The sensor sends electric signals to the ECU and water temperature gauge in the meter unit.
○Measure the resistance across the terminals and the body (for the gauge) at the temperatures shown in the table.
★If the hand tester does not show the specified values, replace the sensor.

Water Temperature Sensor

Resistance for ECU [D]	
Temperature	Resistance (kΩ) (Terminal [1]-[3])
20°C (68°F)	2.46 $^{+0.155}_{-0.143}$
80°C (176°F)	0.32 ±0.011
110°C (230°F)	0.1426 ±0.0041

Resistance for Water Temperature Gauge [E]	
Temperature	Resistance (Ω) (Terminal [2]-Body)
50°C (122°F)	210 ±40
120°C (248°F)	21.2 ±1.5

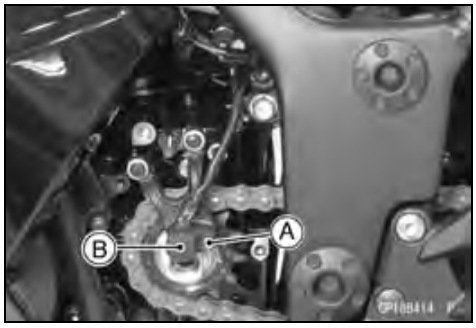
Speed Sensor Removal



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

- Remove:
  Left Side Cover (see Side Cover Removal in the Frame chapter)
  Engine Sprocket Cover (see Engine Sprocket Removal in the Final Drive chapter)
  Connector [A] (Disconnect)

● Remove:
Speed Sensor Bolt [A]
Speed Sensor [B]



Speed Sensor Installation

● Installation is the reverse of removal.
● Run the lead correctly (see Cable, Wire, and Hose Routing section in the Appendix chapter).
● Apply a non-permanent locking agent to the threads of the speed sensor bolt, and tighten it.

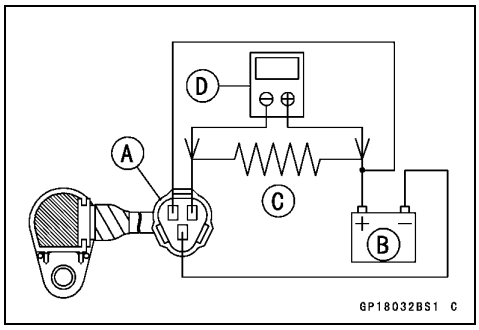
Torque - Speed Sensor Bolt: 7.8 N·m (0.80 kgf·m, 69 in·lb)

● Install the removed parts (see appropriate chapters).

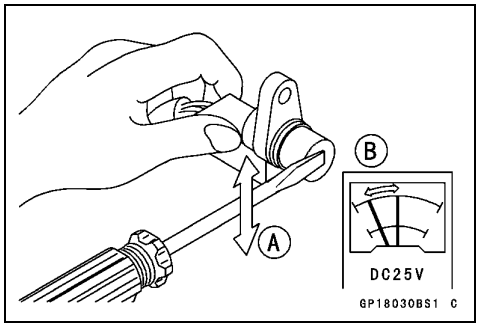
Speed Sensor Inspection

● Remove the speed sensor (see Speed Sensor Removal).
● Connect the speed sensor connector [A] with the battery [B], 10 kΩ resistor [C] and hand tester [D] as shown in the figure.
● Set the tester to the DC 25 V range.

Special Tool - Hand Tester: 57001-1394



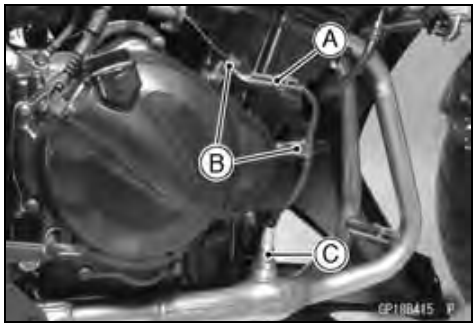
● Trace [A] each side of the speed sensor surface with the screwdriver.
○Then the tester indicator should flick [B].
★If the tester indicator does not flick, replace the speed sensor.



Oxygen Sensor Removal

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

● Remove:
Right Lower Fairing (see Lower Fairing Removal in the Frame chapter)
Oxygen Sensor Lead Connector [A] (Disconnect)
● Free the lead from the clamps [B].
● Remove the oxygen sensor [C].

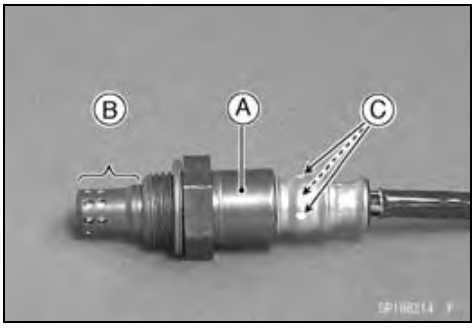


Switches and Sensors

Oxygen Sensor Installation

CAUTION

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:

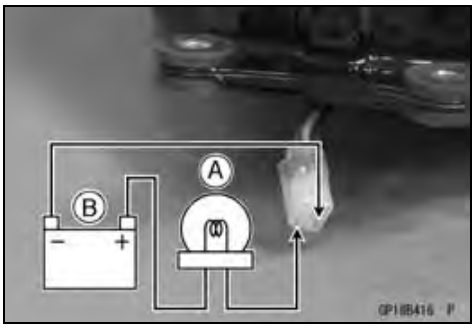
  Torque - Oxygen Sensor: 44.1 N·m (4.50 kgf·m, 32.5 ft·lb)

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

Oxygen Sensor Inspection

- Refer to the Oxygen Sensor Inspection in the Fuel System (DFI) chapter.

Fuel Reserve Switch Inspection



- Remove the fuel tank (see Fuel Tank Removal in the Fuel System (DFI) chapter).
- Fill the fuel tank with fuel.
- Close the fuel tank cap surely.
- Connect the test light [A] (12 V 3.4 W bulb in a socket with leads) and the 12 V battery [B] to the fuel pump connector.

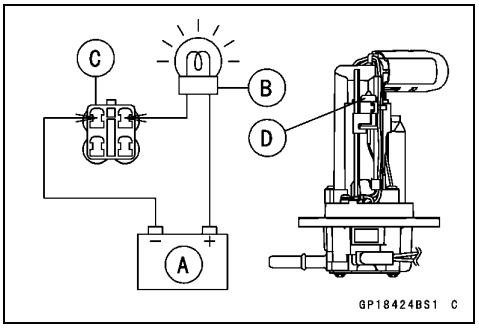
  Connections:

  Battery (+) → 12 V 3.4 W Bulb (One Side)

  12 V 3.4 W Bulb (Other Side) → BL Lead Terminal

  Battery (–) → BK Lead Terminal

★If the test light turn on, the reserve switch is defective. Replace the fuel pump.



- Remove the fuel pump (see Fuel Pump Removal in the Fuel System (DFI) chapter).
- Connect the test light (12 V 3.4 W bulb in a socket with leads) and the 12 V battery to the fuel pump connector as shown in the figure.

  12 V Battery [A]
  Test Light [B]
  Fuel Pump Connector [C]
  Fuel Reserve Switch [D]

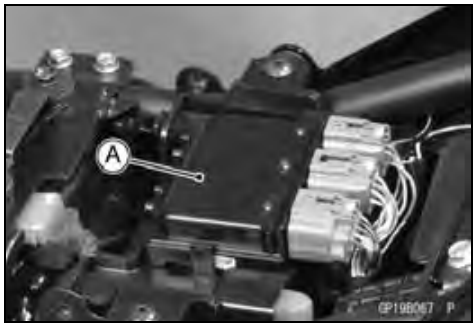
★If the test light doesn't light, replace the fuel pump.

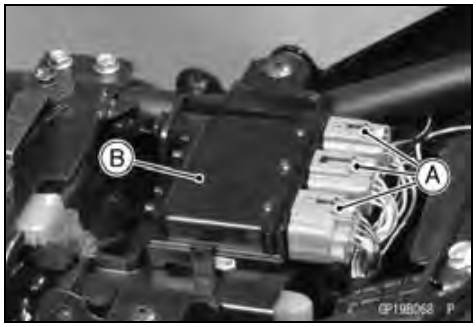
NOTE

○*It may take a long time to turn on the test light in case that the fuel reserve switch is inspected just after the fuel pump is removed. Leave the fuel reserve switch with leads for inspection connected for few minutes.*

Relay Box

The relay box [A] has relays and diodes. The relays and diodes can not be removed.





Relay Box Removal

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

- Remove:
  Front Seat (see Front Seat Removal in the Frame chapter)
  Connectors [A] (Disconnect)
  Relay Box [B]

Relay Circuit Inspection

- Remove the relay box (see Relay Box Removal).
- Check conductivity of the following numbered terminals by connecting the hand tester and one 12 V battery to the relay box as shown in the figure (see Relay Box Internal Circuit in this section).

★If the tester does not read as specified, replace the relay box.

Relay Circuit Inspection (with the battery disconnected)

	Tester Connection	Tester Reading (Ω)
Headlight Circuit Relay	1-3	∞
ECU Main Relay	7-6	∞
	4-5	Not ∞*
Fuel Pump Relay	7-8	∞
	9-10	Not ∞*
Starter Circuit Relay	11-16	∞
	11-12	∞
Fan Relay	17-20	∞
	18-19	Not ∞*

*: The actual reading varies with the hand tester used.

Relay Box

Relay Circuit Inspection (with the battery connected)

	Battery Connection (+) (–)	Tester Connection	Tester Reading (Ω)
ECU Main Relay	2-11	1-3	0
	4-5	7-6	0
Fuel Pump Relay	9-10	7-8	0
Fan Relay	18-19	17-20	0

	Battery Connection (+) (–)	Tester Connection DC 25 V Range (+) (–)	Tester Reading (V)
Starter Circuit Relay	16-12	11-12	Battery Voltage

(+): Apply positive lead.
(–): Apply negative lead.

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

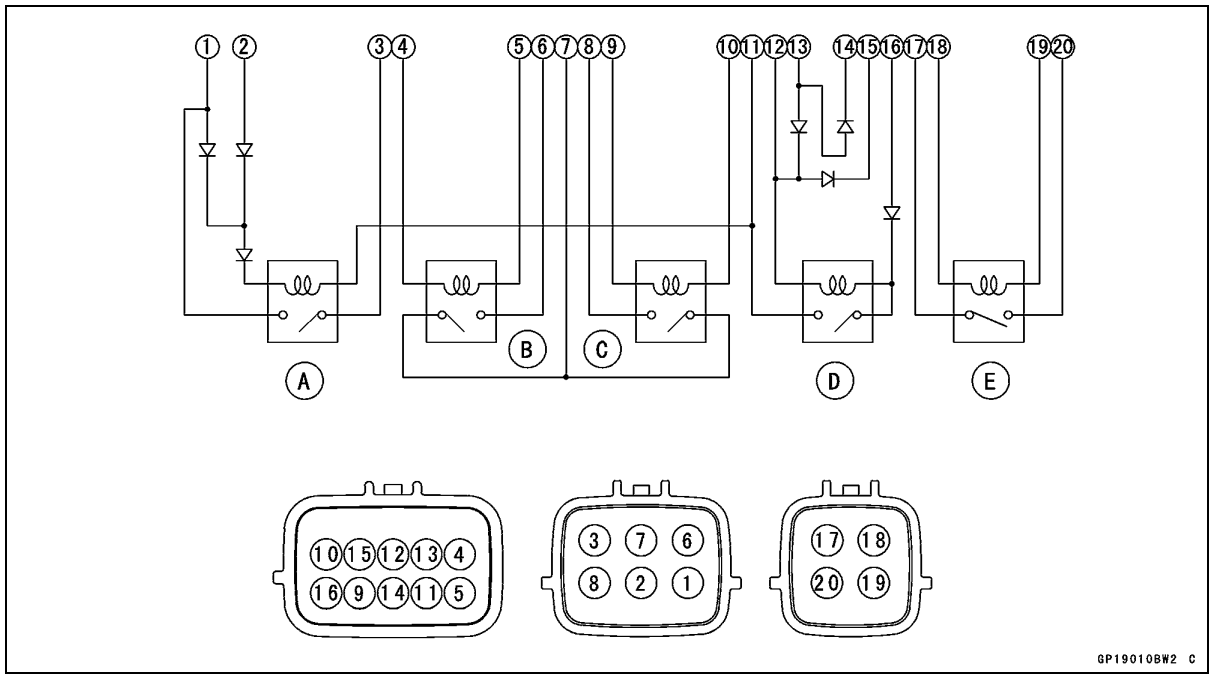
★The resistance should be low in one direction and more than ten times as much in the other direction. If any diode shows low or high in both directions, the diode is defective and the relay box must be replaced.

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

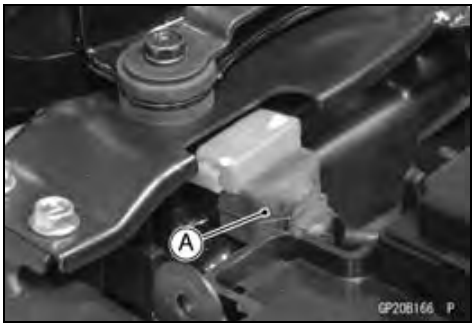


A: Headlight Circuit Relay
B: ECU Main Relay
C: Fuel Pump Relay
D: Starter Circuit Relay
E: Fan Relay

Fuse

30 A Main Fuse Removal

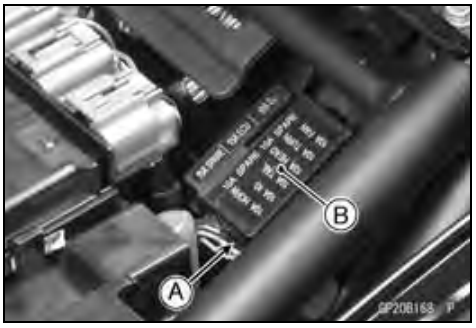
- Remove:
  Front Seat (see Front Seat Removal in the Frame chapter)
  30 A Main Fuse Connector [A] (Disconnect)



- Pull out the main fuse [A] from the starter relay with a needle nose pliers.

Fuse Box Fuse Removal

- Remove the front seat (see Front Seat Removal in the Frame chapter).
- Unlock the hook [A] to lift up the lid [B].



- Pull the fuses [A] straight out of the fuse box with needle nose pliers.

15 A ECU Fuse Removal

- Remove the front seat (see Front Seat Removal in the Frame chapter).
- Unlock the hook [A] to lift up the lid [B].

Fuse

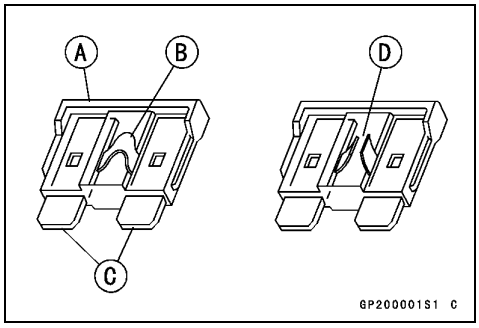
● Pull out the ECU fuse [A] from the fuse box.

Fuse Installation

● If a fuse fails during operation, inspect the electrical system to determine the cause, and then replace it with a new fuse of proper amperage.
● Install the fuse box fuses on the original position as specified on the lid.

Fuse Inspection

● Remove the fuse (see 30 A Main/Fuse Box/15 A ECU Fuse Removal).
● Inspect the fuse element.
★If it is blown out, replace the fuse. Before replacing a blown fuse, always check the amperage in the affected circuit. If the amperage is equal to or greater than the fuse rating, check the wiring and related components for a short circuit.
Housing [A]
Fuse Element [B]
Terminals [C]
Blown Element [D]



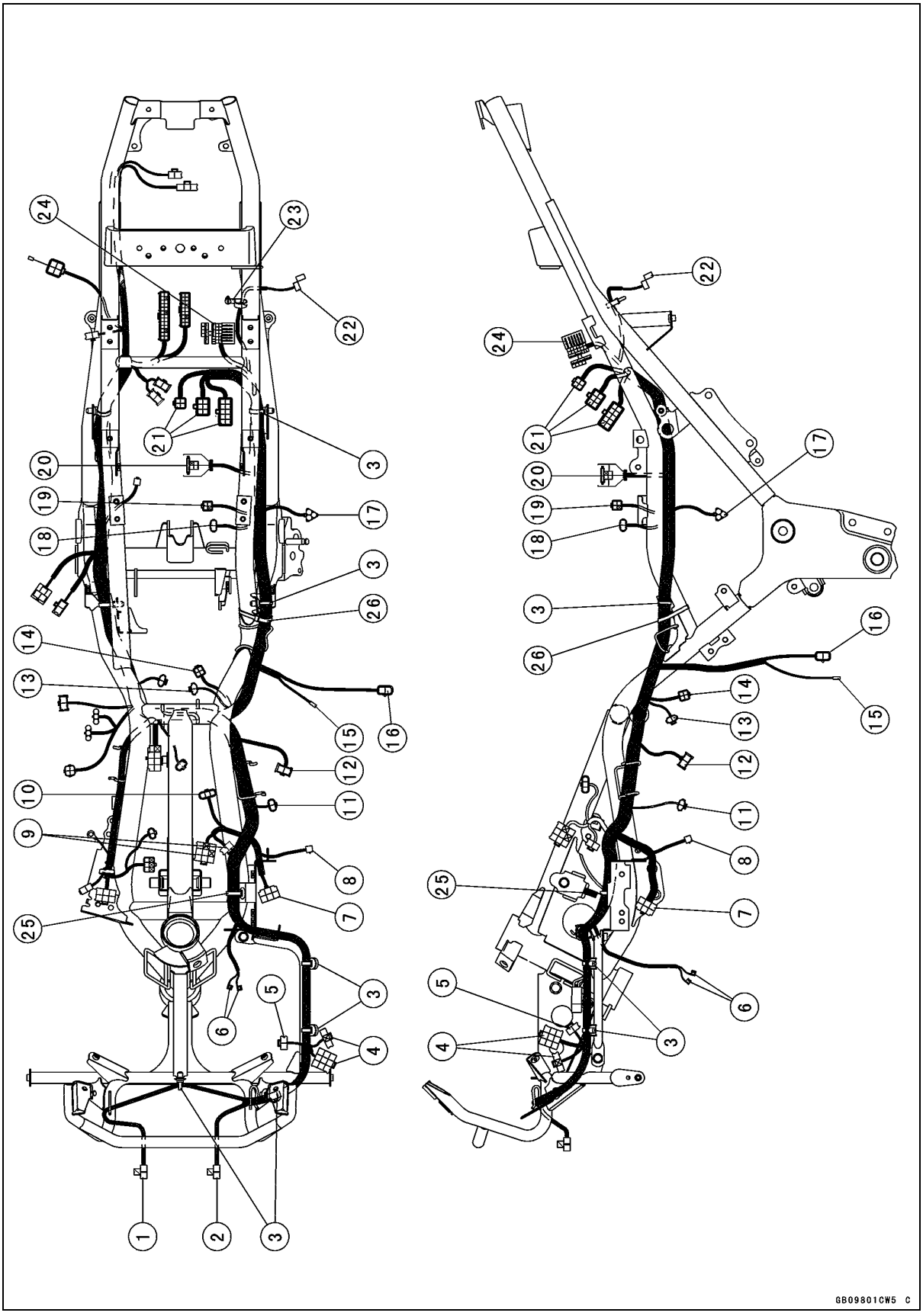
CAUTION

When replacing a fuse, be sure the new fuse matches the specified fuse rating for that circuit. Installation of a fuse with a higher rating may cause damage to wiring and components.

Appendix

Table of Contents

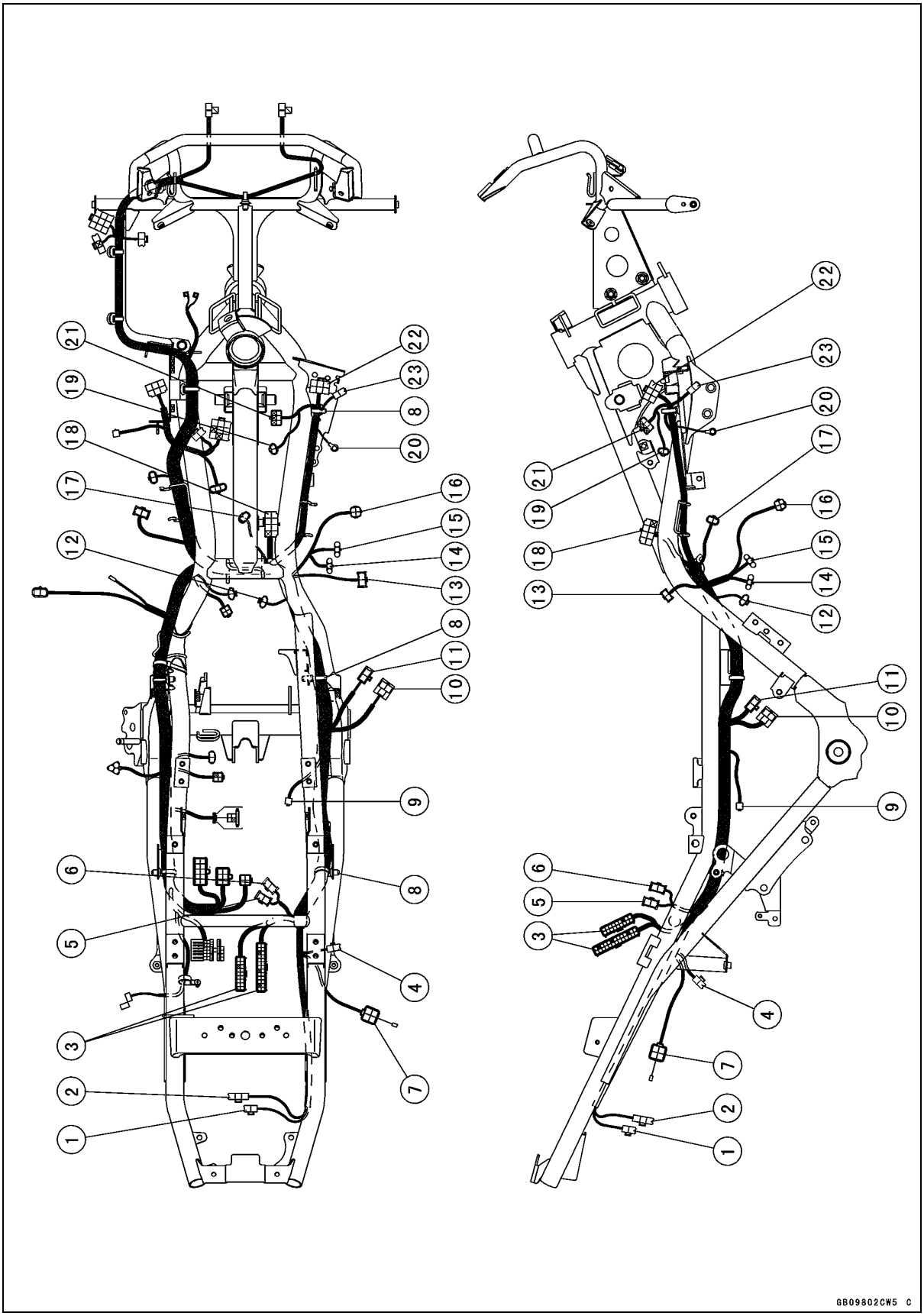
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Headlight (High) Connector
2. Headlight (Low) Connector
3. Bands
4. Meter Lead Connectors
5. City Light Lead Connector
6. Horn Lead Connectors
7. Regulator/Rectifier Lead Connector
8. Oil Pressure Switch Lead Connector
9. Left Switch Housing Lead Connectors
10. Inlet Air Pressure Sensor Lead Connector
11. Stick Coil #1 Lead Connector
12. Front Left Turn Signal Light Lead Connector
13. Fuel Injector #1 Lead Connector
14. Subthrottle Valve Actuator Lead Connector
15. Neutral Switch Lead Connector
16. Sidestand Switch Lead Connector
17. Speed Sensor Lead Connector
18. Inlet Air Temperature Sensor Lead Connector
19. Fuel Pump Lead Connector
20. Starter Relay Lead Connector
21. Relay Box Lead Connectors
22. Turn Signal Relay Lead Connector
23. Clamp
24. Fuse Box
25. Clamp
26. Band

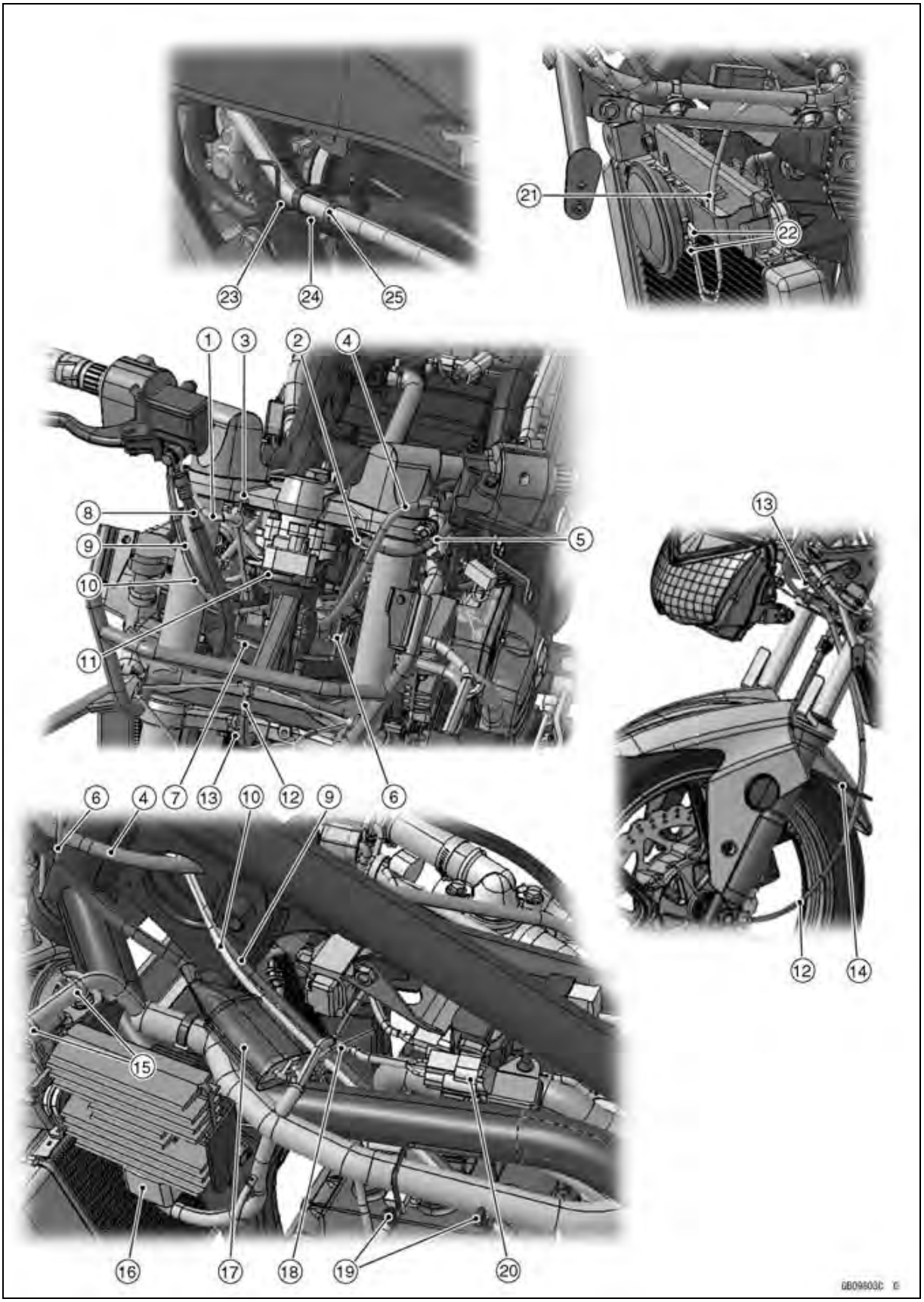
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. License Plate Light Lead Connector
2. Tail/Brake Light Lead Connector
3. ECU Lead Connectors
4. Rear Brake Light Switch Lead Connector
5. Rear Right Turn Signal Light Lead Connector
6. Rear Left Turn Signal Light Lead Connector
7. Kawasaki Diagnostic System Connector
8. Bands
9. Battery Negative Cable
10. Alternator Lead Connector
11. Crankshaft Sensor Lead Connector
12. Fuel Injector #2 Lead Connector
13. Front Right Turn Signal Light Lead Connector
14. Subthrottle Sensor Lead Connector
15. Main Throttle Sensor Lead Connector
16. Oxygen Sensor Lead Connector
17. Stick Coil #1 Lead Connector
18. Ignition Switch Lead Connector
19. Air Switching Valve Lead Connector
20. Frame Ground Terminal
21. Vehicle-down Sensor Lead Connector
22. Right Switch Housing Lead Connector
23. Resistor Lead Connector

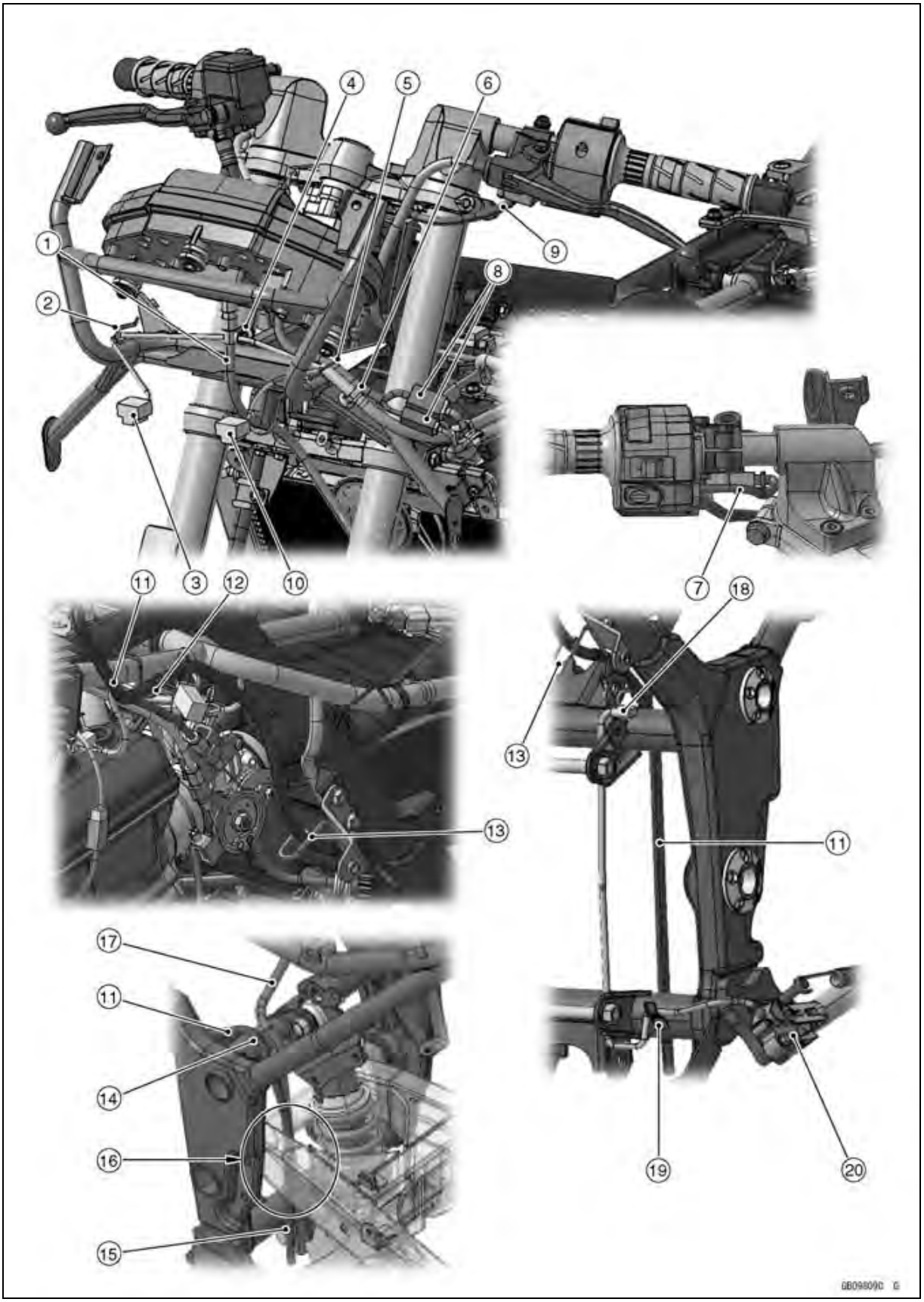
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Right Switch Housing Lead
2. Guide (Run the left switch housing lead through into the guide.)
3. Guide (Run the right switch housing lead through into the guide.)
4. Clutch Cable
5. Left Switch Housing Lead
6. Guide (Run the clutch cable and left switch housing lead through into the guide.)
7. Guide (Run the throttle cables, right switch housing and ignition switch leads through into the guide.)
8. Brake Hose
9. Throttle Cable (Accelerator)
10. Throttle Cable (Decelerator)
11. Ignition Switch Lead
12. Speedometer Cable
13. Guide (Run the speedometer cable through into the guide.)
14. Guide (Run the speedometer cable through into the guide.)
15. Guides (Run the main harness through into the guides.)
16. Regulator/Rectifier Lead Connector
17. Left Switch Housing Lead Connector
18. Guide (Run the throttle cables and inlet air pressure sensor lead through into the guide.)
19. Guides (Run the main harness through inside the guides.)
20. Inlet Air Pressure Sensor Lead Connector
21. Guide (Run the horn lead through into the guide.)
22. Horn Lead Connectors
23. Guide (Run the main harness through inside the guide.)
24. Band (Hold the main harness together with the frame pipe.)
25. Clamp (Hold the main harness and insert the clamp into the frame.)

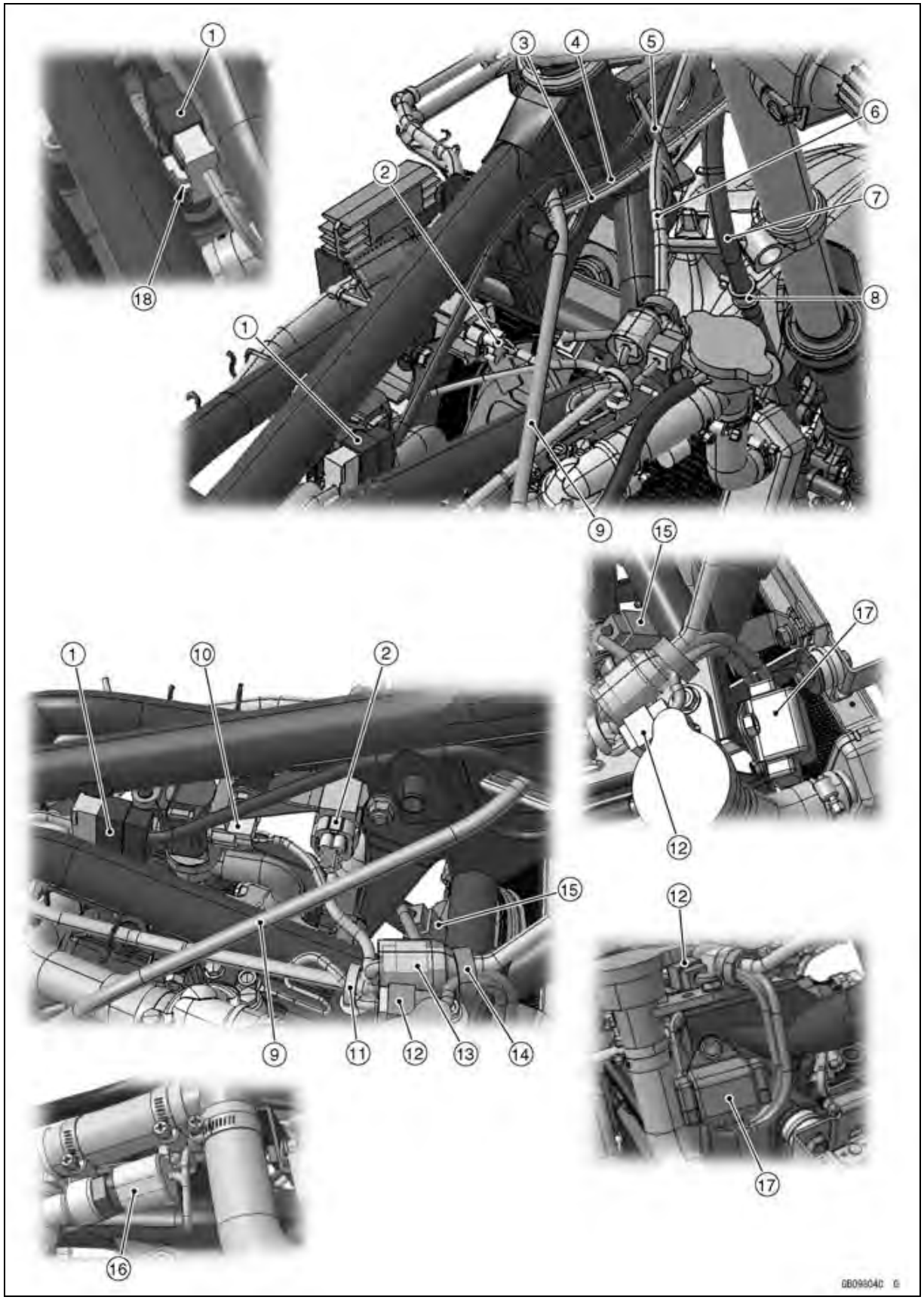
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Speedometer Cable
2. Guide (Run the headlight (high) lead through into the guide.)
3. Headlight (High) Connector
4. Band (Hold the headlight (high) lead and insert the band into the upper fairing bracket.)
5. Guide (Run the meter unit harness and main harness through into the guide.)
6. Band (Hold the meter unit harness and main harness, and insert the band into the upper fairing bracket.)
7. Starter Lockout Switch Lead
8. Meter Connectors
9. Left Switch Housing Lead
10. Headlight (Low) Connector
11. Fuel Tank Breather Hose
12. Guide (Run the fuel tank breather hose through into the guide.)
13. Guide (Run the fuel tank breather hose through into the guide.)
14. Guide (Run the fuel tank breather and reserve tank overflow hoses through into the guide.)
15. Guide (Run the fuel tank breather and reserve tank overflow hoses through into the guide.)
16. Run the fuel tank breather and reserve tank overflow hoses through the inside of the swingarm.
17. Reserve Tank Overflow Hose
18. Sidestand Switch Lead Connector
19. Clamp (Run the sidestand switch lead through the inside of the clamp.)
20. Sidestand Switch

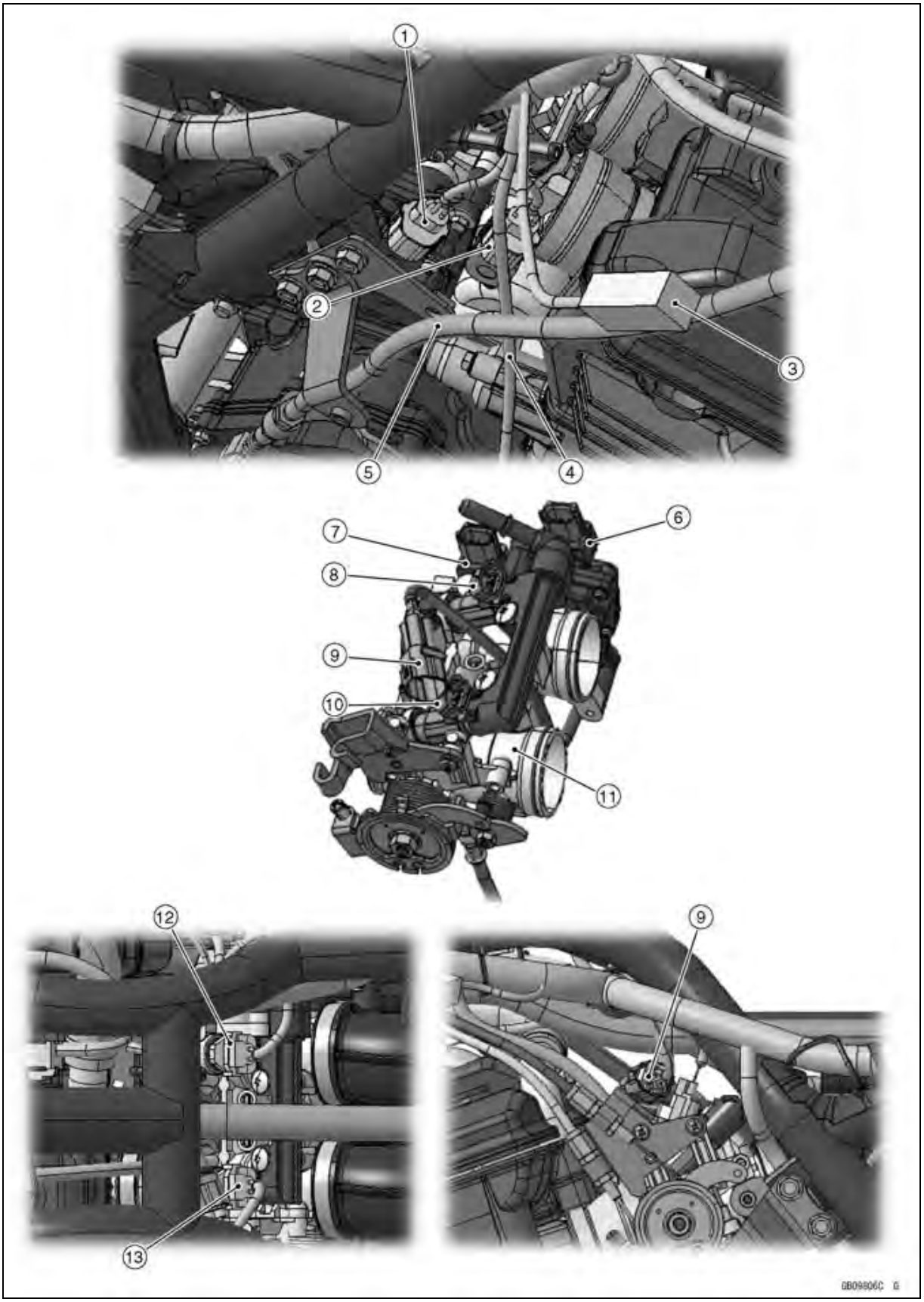
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Ignition Switch Lead Connector
2. Vehicle-down Sensor Lead Connector
3. Throttle Cable (Accelerator)
4. Throttle Cable (Decelerator)
5. Guide (Run the throttle cables, right switch housing and ignition switch leads through into the guide.)
6. Right Switch Housing Lead
7. Brake Hose
8. Clamp
9. Clutch Cable
10. Air Switching Valve Lead Connector
11. Band (Hold the main harness and insert the band into the frame.)
12. Resistor Lead Connector (Main Harness Side)
13. Right Switch Housing Lead Connector
14. Clamp (Hold the right switch housing and resistor leads, and insert the clamp into the frame.)
15. Resistor Lead Connector (Radiator Fan Side)
16. Water Temperature Sensor Lead Connector
17. Resistor
18. Bracket

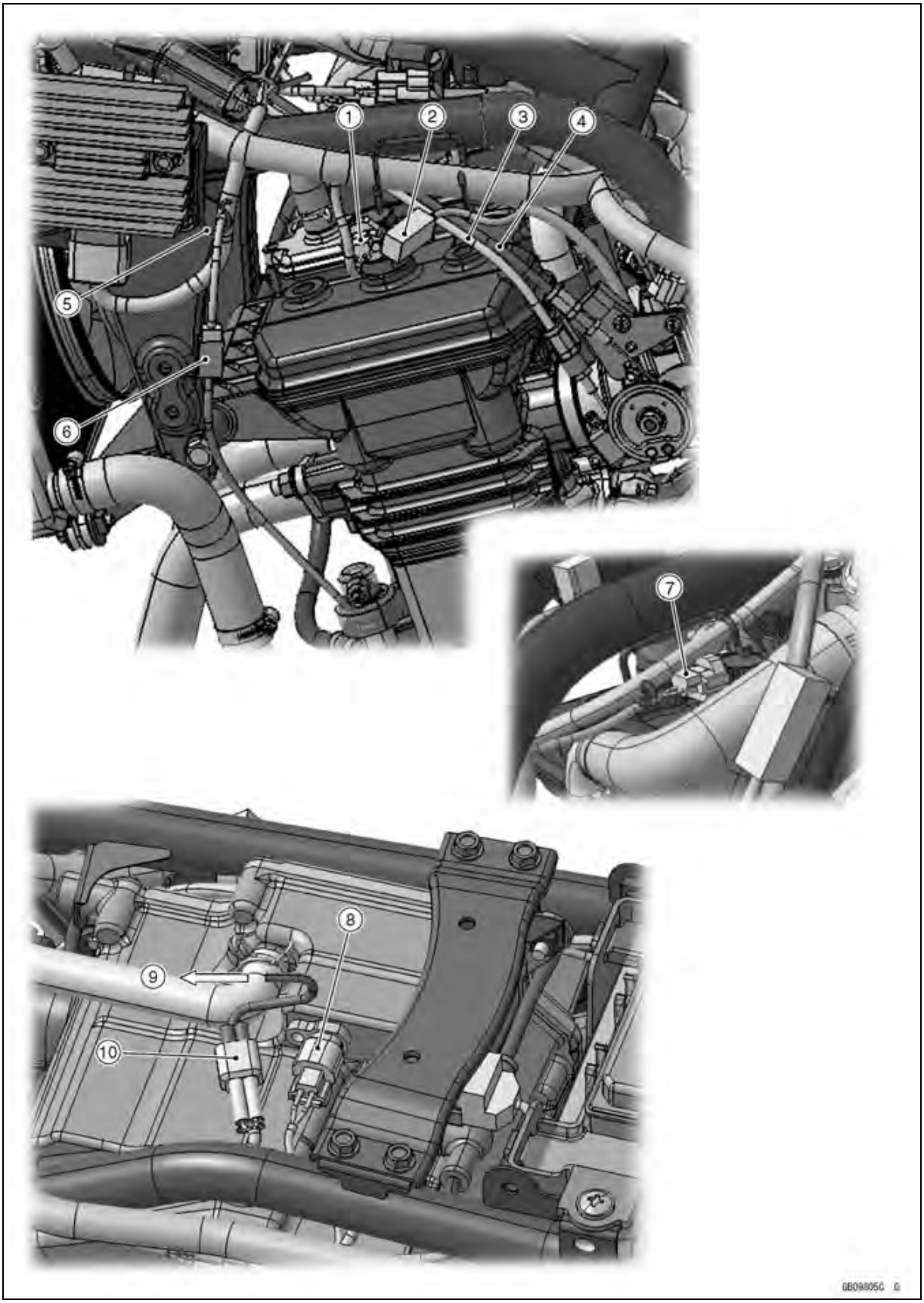
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Subthrottle Sensor Lead Connector
2. Main Throttle Sensor Lead Connector
3. Front Right Turn Signal Light Lead Connector
4. Oxygen Sensor
5. Clutch Cable
6. Subthrottle Sensor
7. Main Throttle Sensor
8. Fuel Injector #2
9. Subthrottle Valve Actuator Lead Connector
10. Fuel Injector #1
11. Throttle Body Assy
12. Fuel Injector #2 Lead Connector
13. Fuel Injector #1 Lead Connector

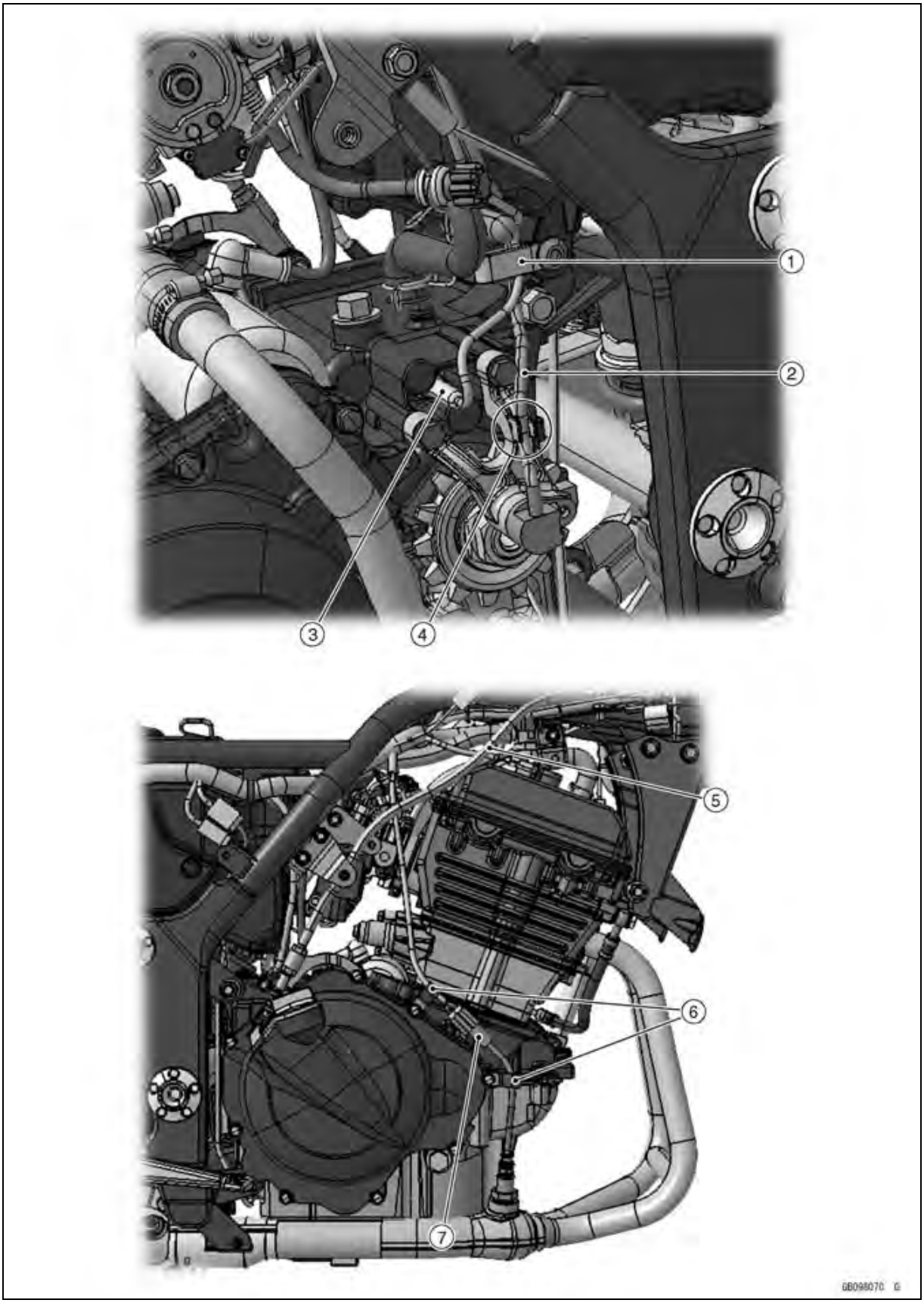
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Stick Coil #1 Lead Connector
2. Front Left Turn Signal Light Lead Connector
3. Throttle Cable (Decelerator)
4. Throttle Cable (Accelerator)
5. Guide (Run the oil pressure switch lead through into the guide.)
6. Oil Pressure Switch Lead Connector
7. Stick Coil #2 Lead Connector
8. Inlet Air Temperature Sensor Lead Connector
9. To Fuel Tank
10. Fuel Pump Lead Connector

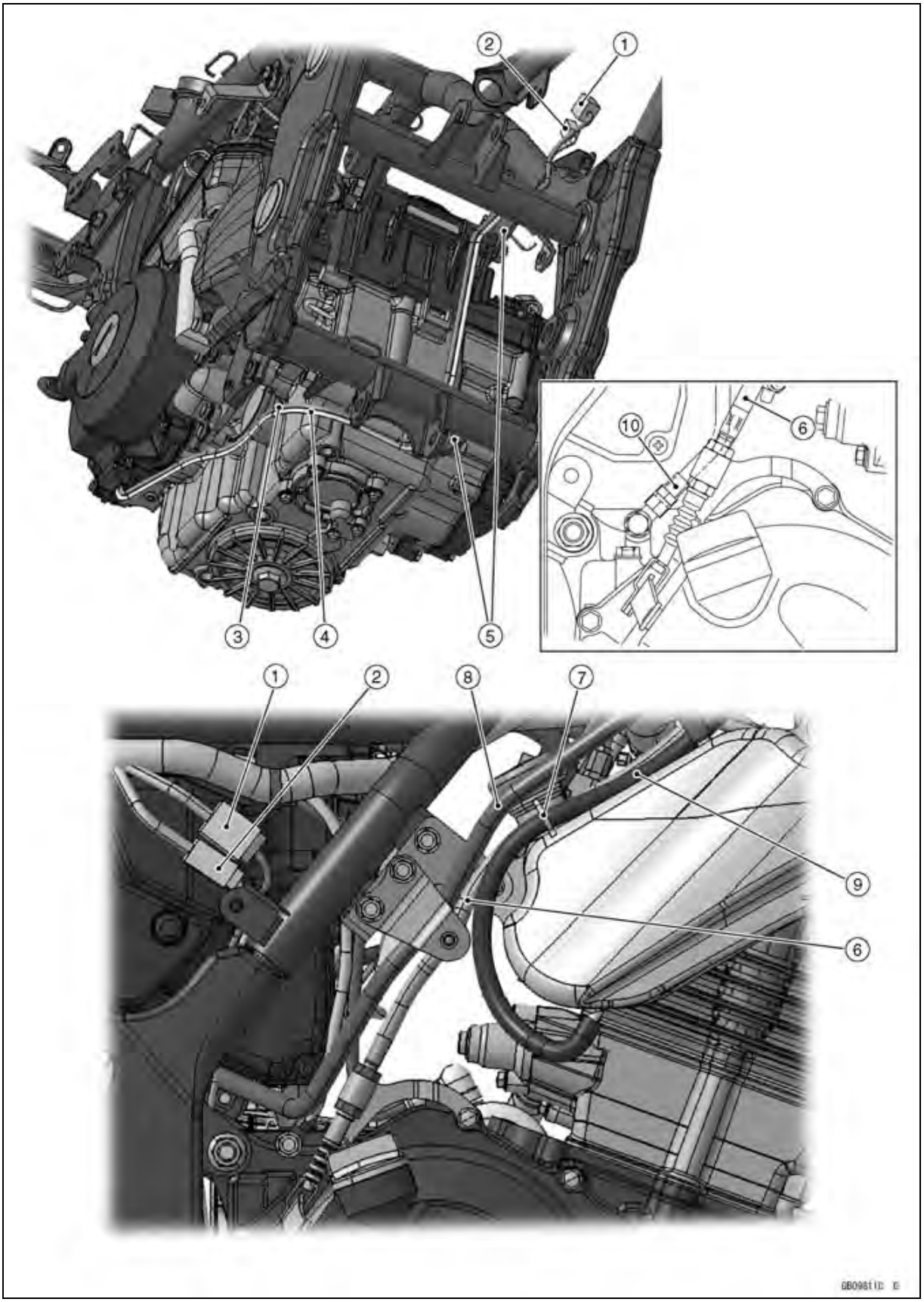
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Clamp (Hold the neutral switch and speed sensor leads.)
2. Speed Sensor Lead
3. Neutral Switch Lead Connector
4. Insert the speed sensor lead into the groove of the speed sensor mounting bracket.
5. Clutch Cable
6. Clamps (Hold the oxygen sensor lead.)
7. Oxygen Sensor Lead Connector

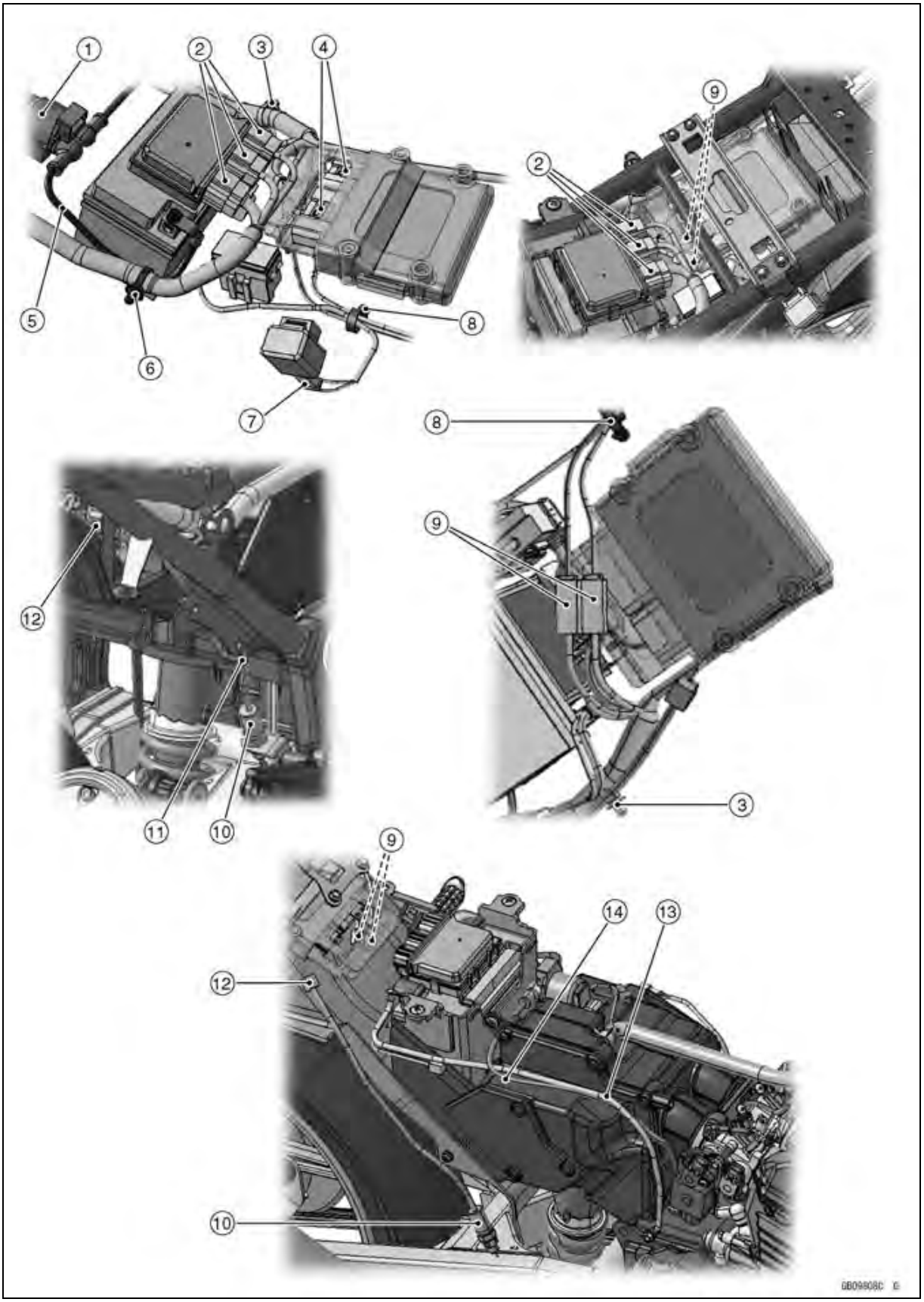
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Alternator Lead Connector
2. Crankshaft Sensor Lead Connector
3. Alternator Lead
4. Crankshaft Sensor Lead
5. Brackets
6. Clutch Cable
7. Run the clutch cable and reserve tank hose into the hole of the reserve tank.
8. Reserve Tank Overflow Hose
9. Reserve Tank Hose
10. Battery Negative Cable (Set the direction of the cable as shown in the figure.)

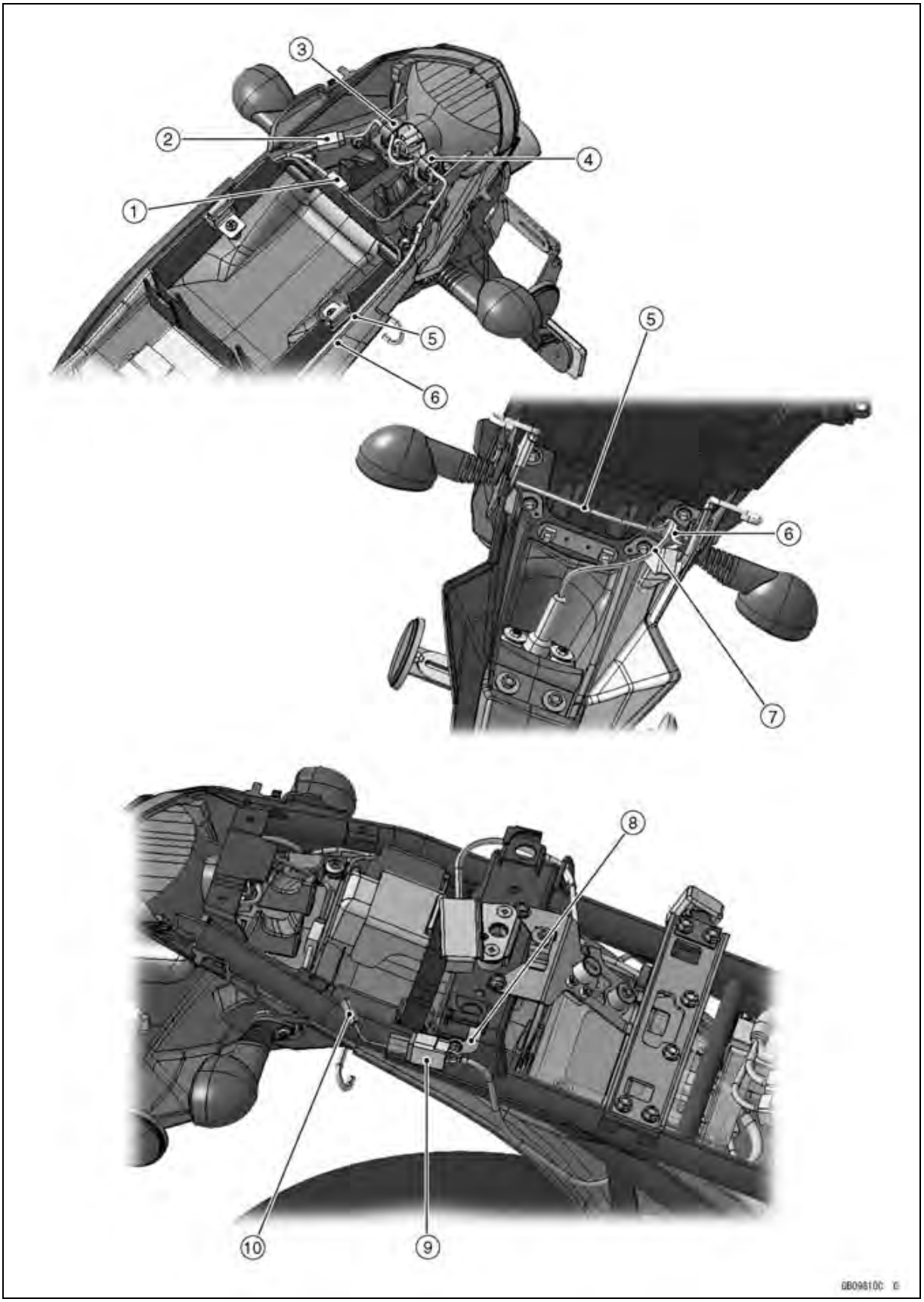
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Starter Relay
2. Relay Box Lead Connectors
3. Clamp (Hold the main harness and insert the clamp into the frame.)
4. ECU Lead Connectors
5. Battery Positive Cable
6. Clamp (Hold the main harness and insert the clamp into the frame.)
7. Turn Signal Relay Lead Connector
8. Clamp (Hold the rear turn signal light and turn signal relay leads, and insert the clamp into the rear fender.)
9. Rear Turn Signal Light Lead Connectors
10. Rear Brake Light Switch
11. Clamp (Hold the rear brake light switch lead.)
12. Rear Brake Light Switch Lead Connector
13. Battery Negative Cable
14. Starter Motor Cable

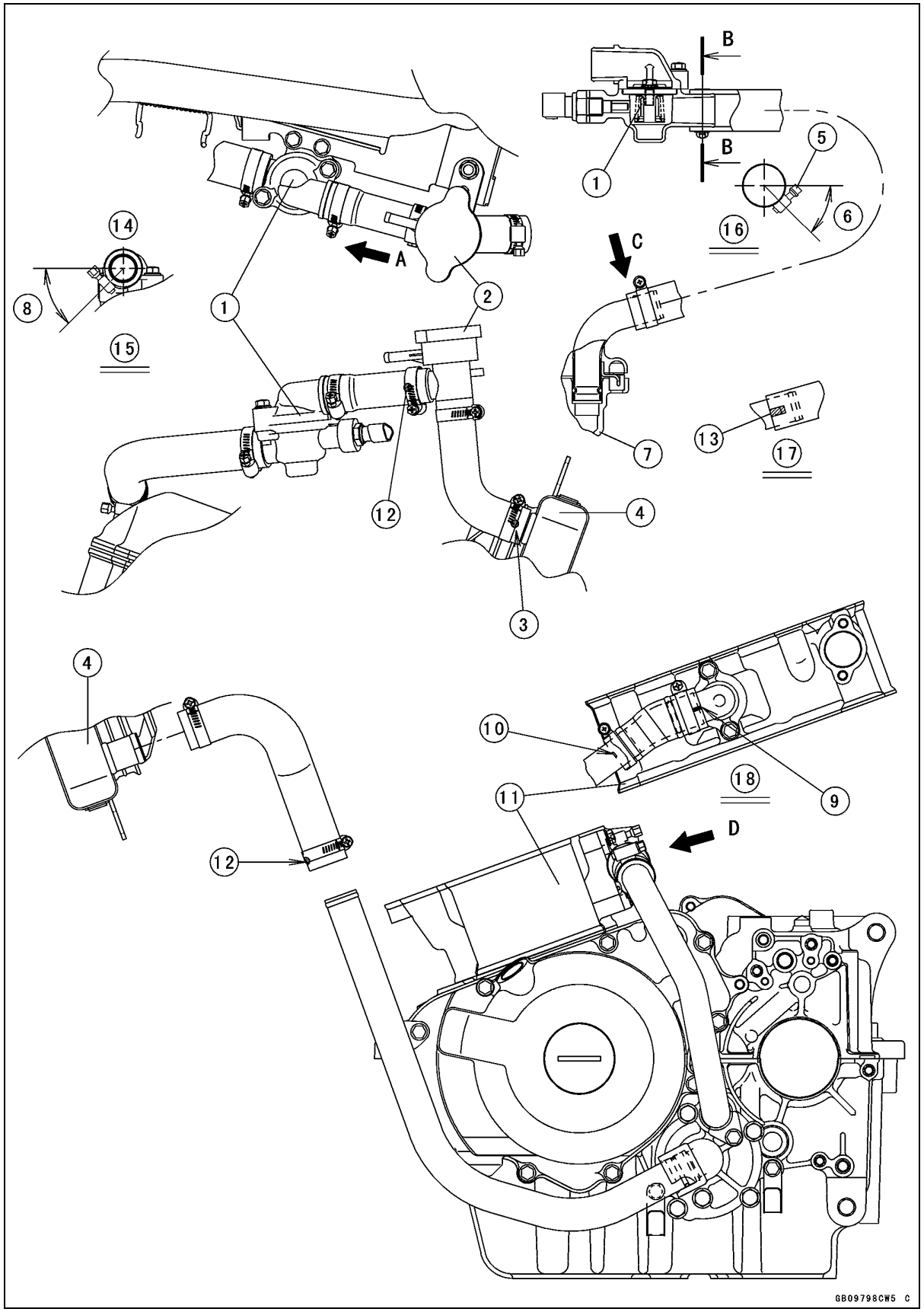
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Tail/Brake Light Lead Connector
2. License Plate Light Lead Connector
3. Clamp (Hold the license plate light lead.)
4. Clamp (Hold the license plate light and tail/brake light leads.)
5. Rear Right Turn Signal Light Lead
6. Rear Left Turn Signal Light Lead
7. License Plate Light Lead
8. Clamp
9. Kawasaki Diagnostic System Connector
10. Self-diagnosis Terminal

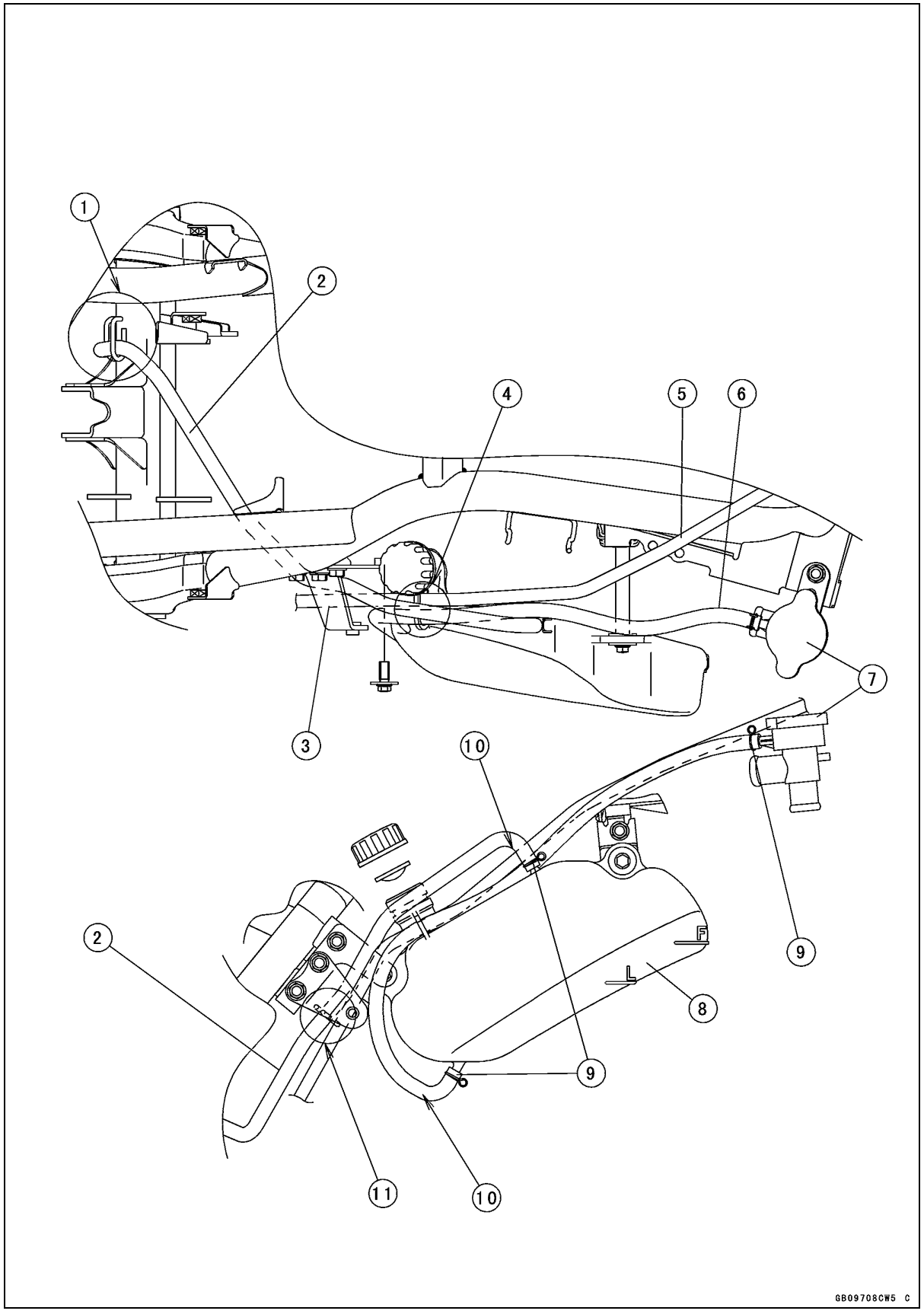
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Thermostat
2. Radiator Cap
3. Install the hose so that its white paint mark side faces the radiator.
4. Radiator
5. Clamp Screw
6. 45°
7. Cylinder Head
8. 45 ~ 55°
9. Align the white paint mark on the hose with the projection mark on the fitting.
10. Install the hose so that its end covers the white paint mark on the pipe.
11. Cylinder
12. Install the hose so that its white paint mark side faces the pipe.
13. Align the white paint mark on the hose with the projection mark on the fitting.
14. Upper
15. Viewed A
16. Section B-B
17. Viewed C
18. Viewed D

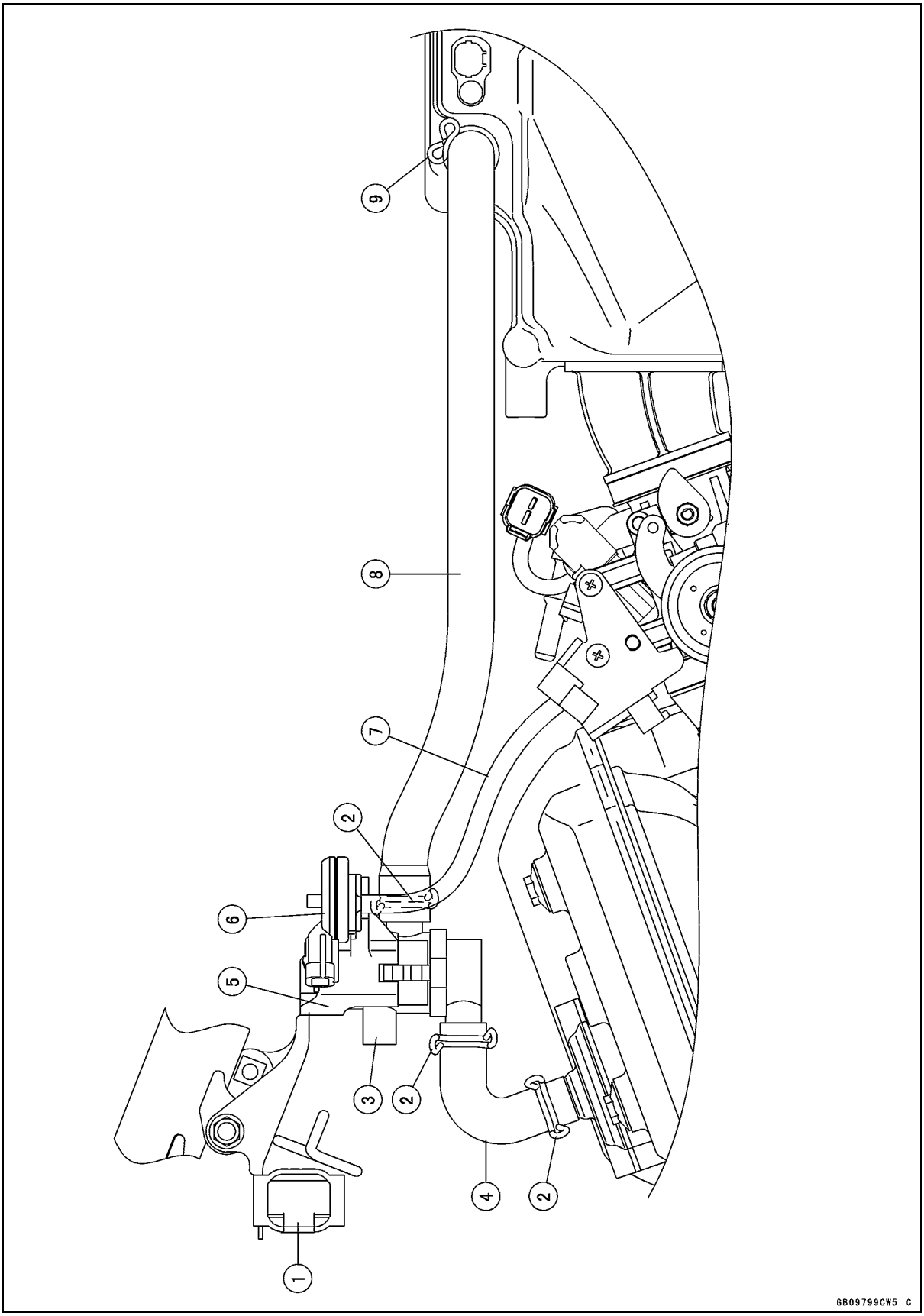
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Run the reserve tank overflow hose into the guides.
2. Reserve Tank Overflow Hose
3. Bracket
4. Run the clutch cable and reserve tank hose into the hole of the reserve tank.
5. Clutch Cable
6. Reserve Tank Hose
7. Radiator Cap
8. Reserve Tank
9. Clamps
10. Hose Curve Side
11. Run the only reserve tank overflow hose into the bracket guide.

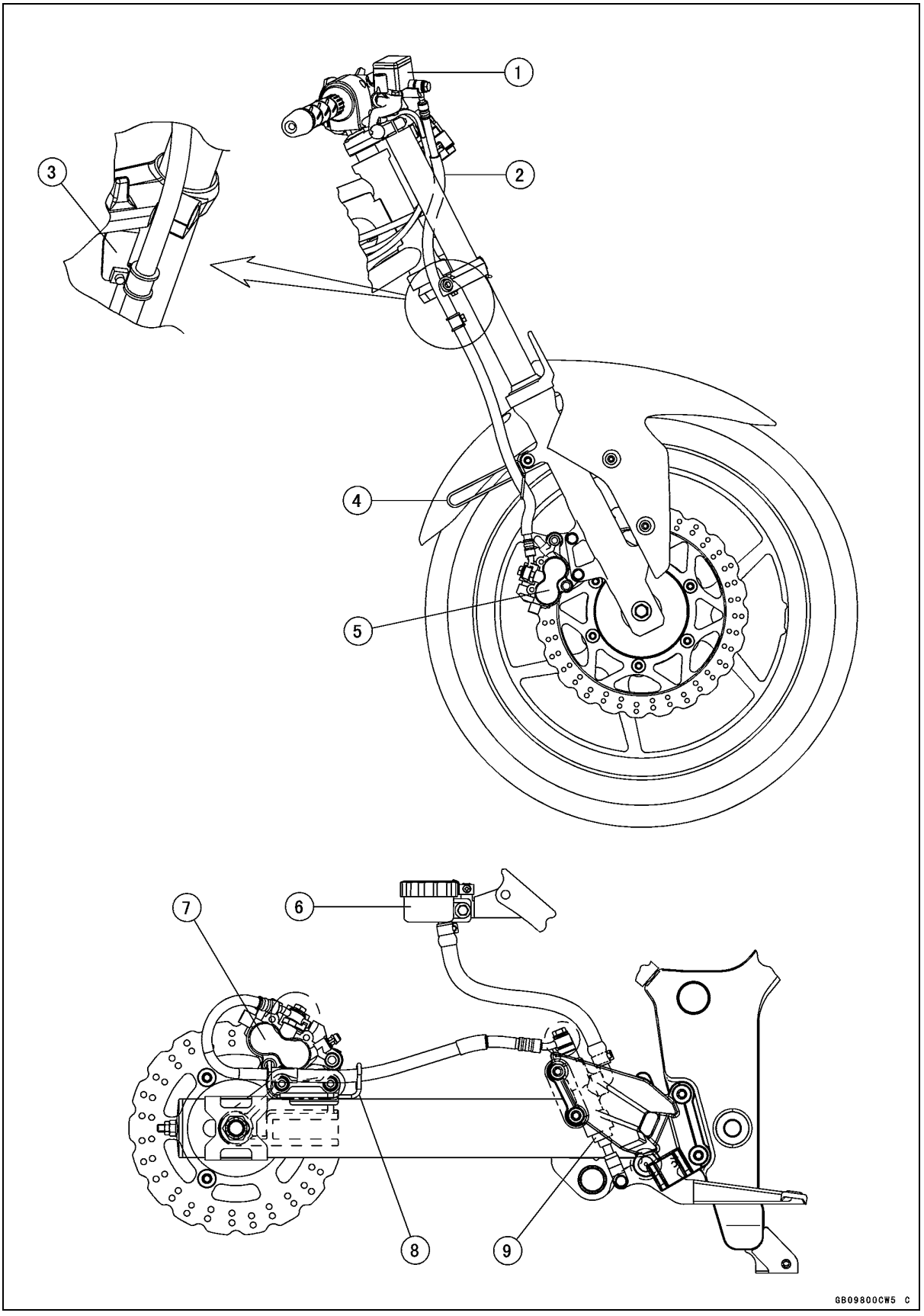
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Vehicle-down Sensor
2. Clamps
3. Air Switching Valve
4. Install the hose so that its white mark side faces the air switching valve.
5. Damper
6. Inlet Air Pressure Sensor
7. Vacuum Hose
8. Air Switching Valve Hose
9. Clamp

Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Front Master Cylinder
2. Front Brake Hose
3. Bracket
4. Guide
5. Front Brake Caliper
6. Rear Brake Reservoir Tank
7. Rear Brake Caliper
8. Clamp
9. Rear Master Cylinder

Troubleshooting Guide

NOTE

○*Refer to the Fuel System chapter for most of DFI trouble shooting guide.*

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

Engine Doesn't Start, Starting Difficulty:

Starter motor not rotating:
- Ignition and engine stop switch not ON
- Starter lockout switch or neutral switch trouble
- Starter motor trouble
- Battery voltage low
- Starter relay not contacting or operating
- Starter button not contacting
- Starter system wiring shorted or open
- Ignition switch trouble
- Engine stop switch trouble
- Main 30 A or ignition fuse blown

Starter motor rotating but engine doesn't turn over:
- Vehicle-down sensor (DFI) coming off
- Starter clutch trouble
- Starter idle gear trouble

Engine won't turn over:
- Valve seizure
- Valve lifter seizure
- Cylinder, piston seizure
- Crankshaft seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Transmission gear or bearing seizure
- Camshaft seizure
- Starter idle gear seizure

No fuel flow:
- No fuel in tank
- Fuel pump trouble
- Fuel tank air vent obstructed
- Fuel filter clogged
- Fuel line clogged

No spark; spark weak:
- Vehicle-down sensor (DFI) coming off
- Ignition switch not ON
- Engine stop switch turned OFF
- 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
- Neutral, starter lockout, or sidestand switch trouble
- Crankshaft sensor trouble
- Ignition switch or engine stop switch shorted
- Starter system wiring shorted or open
- Main 30 A or ignition fuse blown

Fuel/air mixture incorrect:
- Bypass screw and/or idle adjusting 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
- Air bleed pipe bleed holes clogged
- Pilot passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Fuel tank air vent obstructed
- Fuel pump trouble
- Throttle body assy holder loose
- Air cleaner duct loose

Compression low:
- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn

Piston ring bad (worn, weak, broken, or sticking)
Piston ring/groove clearance excessive
Cylinder head gasket damaged
Cylinder head warped
Valve spring broken or weak
Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)
Camshaft cam worn

Run-on (dieseling):
Ignition switch trouble
Engine stop switch trouble
Fuel injector trouble
Loosen terminal of battery (–) cable or ECU ground lead
Carbon accumulating on valve seating surface
Engine overheating

Other:
ECU trouble
Throttle body assy not synchronizing
Engine oil viscosity too high
Drive train trouble
Brake dragging
Clutch slipping
Engine overheating
Air suction valve trouble
Air switching valve trouble

Poor Running or No Power at High Speed:

Firing incorrect:
Spark plug dirty, broken, or maladjusted
Spark plug incorrect
Stick coil shorted or not in good contact trouble
Stick coil trouble
ECU trouble

Fuel/air mixture incorrect:
Air cleaner clogged, poorly sealed, or missing
Air cleaner duct loose
Water or foreign matter in fuel
Throttle body assy holder loose
Fuel to injector insufficient
Fuel tank air vent obstructed
Fuel line clogged
Fuel pump trouble

Compression low:
Spark plug loose
Cylinder head not sufficiently tightened down
No valve clearance
Cylinder, piston worn
Piston ring bad (worn, weak, broken, or sticking)
Piston ring/groove clearance excessive
Cylinder head gasket damaged
Cylinder head warped
Valve spring broken or weak
Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

Knocking:
Carbon built up in combustion chamber
Fuel poor quality or incorrect
Spark plug incorrect
ECU trouble

Miscellaneous:
Throttle valve won't fully open
Brake dragging
Clutch slipping
Engine overheating
Engine oil level too high
Engine oil viscosity too high
Drive train trouble
Camshaft cam 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 duct loose
Air cleaner clogged, poorly sealed, or missing

Compression high:
Carbon built up in combustion chamber

Engine load faulty:
Clutch slipping
Engine oil level too high

Troubleshooting Guide

Engine oil viscosity too high
Drive train trouble
Brake dragging

Lubrication inadequate:
Engine oil level too low
Engine oil poor quality or incorrect

Gauge incorrect:
Water temperature gauge broken
Water temperature sensor broken

Coolant incorrect:
Coolant level too low
Coolant deteriorated
Wrong coolant mixed ratio

Cooling system component incorrect:
Radiator fin damaged
Radiator clogged
Thermostat trouble
Radiator cap trouble
Radiator fan relay trouble
Fan motor broken
Fan blade damaged
Water pump not turning
Water pump impeller damaged

Over Cooling:

Gauge incorrect:
Water temperature gauge broken
Water temperature sensor broken

Cooling system component incorrect:
Thermostat trouble

Clutch Operation Faulty:

Clutch slipping:
Friction plate worn or warped
Steel plate worn or warped
Clutch spring broken or weak
Clutch hub or housing unevenly worn
No clutch lever play
Clutch inner cable trouble
Clutch release mechanism trouble

Clutch not disengaging properly:
Clutch plate warped or too rough
Clutch spring compression uneven
Engine oil deteriorated
Engine oil viscosity too high
Engine oil level too high
Clutch housing frozen on drive shaft
Clutch hub nut loose
Clutch hub spline damaged
Clutch friction plate installed wrong
Clutch lever play excessive
Clutch release mechanism trouble

Gear Shifting Faulty:

Doesn't go into gear; shift pedal doesn't return:
Clutch not disengaging
Shift fork bent or seized
Gear stuck on the shaft
Shift return spring weak or broken
Shift return spring pin loose
Shift mechanism arm broken
Shift pawl broken
Pawl spring broken

Jumps out of gear:
Shift fork ear worn, bent
Gear groove worn
Gear dogs and/or dog holes worn
Shift drum groove worn
Shift fork guide pin worn
Drive shaft, output shaft, and/or gear splines worn

Overshifts:
Neutral positioning pin spring weak or broken
Pawl 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

Troubleshooting Guide

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)

Abnormal Drive Train Noise:

Clutch noise:
Clutch damper weak or damaged
Clutch housing/friction plate clearance excessive
Clutch housing gear worn

Transmission noise:
Bearings worn
Transmission gear worn or chipped
Metal chips jammed in gear teeth
Engine oil insufficient

Drive line noise:
Drive chain adjusted improperly
Drive chain worn
Rear and/or engine sprocket worn
Chain lubrication insufficient
Rear wheel misaligned

Abnormal Frame Noise:

Front fork noise:
Oil insufficient or too thin
Spring weak or broken

Rear shock absorber noise:
Shock absorber damaged

Disc brake noise:
Pad installed incorrectly
Pad surface glazed
Disc warped
Caliper trouble

Other noise:
Bracket, nut, bolt, etc. not properly mounted or tightened

Oil Pressure Warning Indicator Light Goes On:

Engine oil pump damaged
Engine oil screen clogged
Engine oil filter clogged
Engine oil level too low
Engine oil viscosity too low
Camshaft bearing worn
Crankshaft bearing worn
Oil pressure switch damaged
Wiring faulty
Relief valve stuck open
O-ring at the oil passage in the crankcase damaged

Exhaust Smokes Excessively:

White smoke:
Piston oil ring worn
Cylinder worn
Valve oil seal damaged
Valve guide worn
Engine oil level too high

Black smoke:
Air cleaner clogged

Brown smoke:
Air cleaner duct loose
Air cleaner poorly sealed or missing

Handling and/or Stability Unsatisfactory:

Handlebar hard to turn:
Cable routing incorrect
Hose routing incorrect
Wiring routing incorrect
Steering stem nut too tight
Steering stem bearing damaged
Steering stem bearing lubrication inadequate
Steering stem bent
Tire air pressure too low

Handlebar shakes or excessively vibrates:
Tire worn
Swingarm pivot bearing worn
Rim warped, or not balanced
Wheel bearing worn
Handlebar mounting bolt loose
Steering stem nut loose
Front, rear axle runout excessive
Engine mounting nut loose

Handlebar pulls to one side:
Frame bent
Wheel misalignment
Swingarm bent or twisted
Swingarm pivot shaft runout excessive
Steering maladjusted
Front fork bent
Right and left front fork oil level uneven

Shock absorption unsatisfactory:
(Too hard)
Front fork oil excessive
Front fork oil viscosity too high
Rear shock absorber adjustment too hard
Tire air pressure too high
Front fork bent
(Too soft)
Tire air pressure too low
Front fork oil insufficient and/or leaking
Front fork oil viscosity too low
Rear shock adjustment too soft
Front fork, rear shock absorber spring weak
Rear shock absorber oil leaking

Troubleshooting Guide

Brake Doesn't Hold:

Air in the brake line
Pad or disc worn
Brake fluid leakage
Disc warped
Contaminated pad
Brake fluid deteriorated
Primary or secondary cup damaged in master cylinder
Master cylinder scratched inside

Battery Trouble:

Battery discharged:
Charge insufficient
Battery faulty (too low terminal voltage)
Battery cable making poor contact
Load excessive (e.g., bulb of excessive wattage)
Ignition switch trouble
Alternator trouble
Wiring faulty
Regulator/rectifier trouble

Battery overcharged:
Alternator trouble
Regulator/rectifier trouble
Battery faulty

MODEL APPLICATION

Year	Model	Beginning Frame No.
2008	EX250K8F	JKAEX250KKDA00052

□:This digit in the frame number changes from one machine to another.

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